SUBARU

LEGACY

2004 Model Year

PDF Service Manual

GENERAL INFORMATION SECTION (Pub.No.G2320GE1)

ENGINE SECTION 1 (Pub.No.G2320GE2)

ENGINE SECTION 2 (Pub.No.G2320GE3)

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GENERAL INFORMATION SECTION

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This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE1

FOREWORD

FW

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1. Foreword

A: FOREWORD

These manuals are used when performing maintenance, repair, or diagnosis of Subaru LEGACY.

Applied model:
BL*****, BP***** from 2004MY

The manuals contain the latest information at the time of publication. Changes in specifications, methods, etc. may be made without notice.

HOW TO USE THIS MANUALS

HU

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1. How to Use This Manuals

A: HOW TO USE THIS MANUALS

1. STRUCTURE

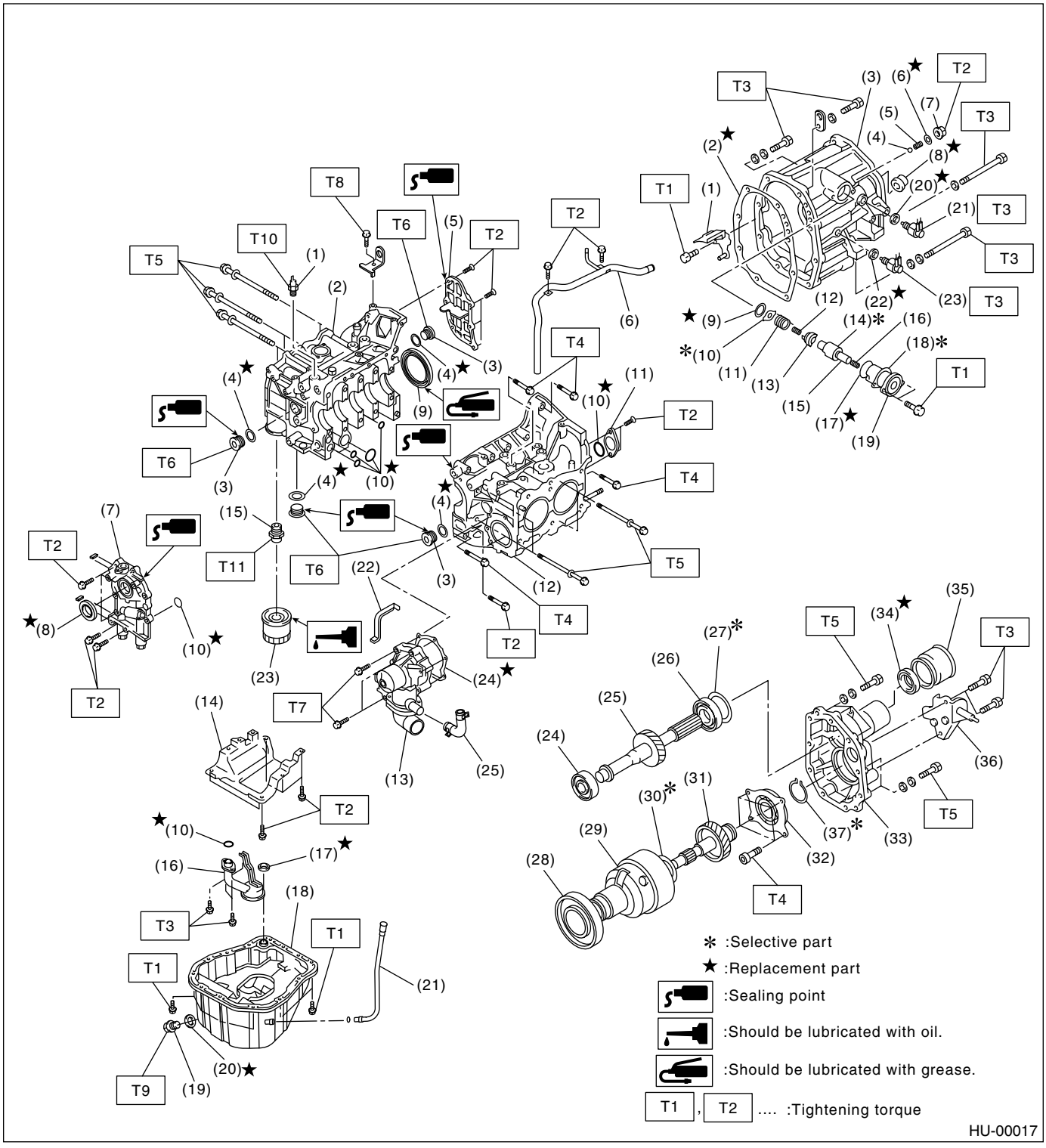
Each section consists of SCT that are broken down into SC that are divided into sections for each component. The specification, maintenance and other information for the components are included, and the diagnostic information has also been added where necessary.

2. CONTENTS

The first page has an index with tabs.

3. COMPONENT

Illustrations are provided for each component. The information necessary for repair work (tightening torque, grease up points, etc.) is described on these illustrations. Information is described using symbol.
To order parts, refer to parts catalogue.
Example:



4. SPECIFICATION

If necessary, specifications are also included.

5. INSPECTION

Inspections to be carried out before and after maintenance are included.

6. MAINTENANCE

• Maintenance instructions for serviceable parts describe work area and detailed step with illustration. It also describes the use of special tool, tightening torque, caution for each procedure.
• If many serviceable parts are included in one service procedure, appropriate reference is provided for each parts.

Example:

15.Main Shaft Assembly for Single-Range ← (A)

A: REMOVAL ← (B)

1) Remove the manual transmission assembly from vehicie. <Ref. to MT-33, REMOVAL, Manual Transmission Assembly.> ← (C)

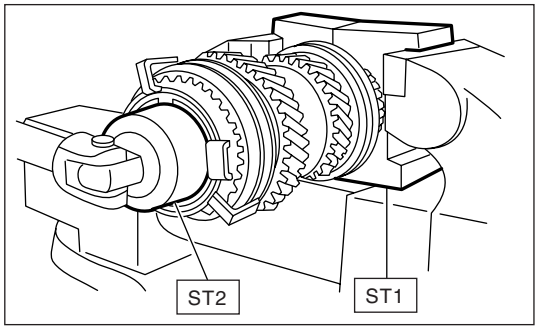
---

11) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE: ← (D)
Secure the lock nuts in two Places affer tightening.

ST2 499987003 SOCKET WRENCH
ST1 498937000 (E) TRANSMISSION HOLDER (F)

Tightening torque:
118 N·m (12.0 kgf-m, 86.8 ft-lb) ← (G)



← (H)

HU-00020

(A) Component
(B) Process
(C) Reference
(D) Cautions
(E) Tool number of special tool
(F) Name of special tool
(G) Tightening torque
(H) Illustration

7. DIAGNOSIS

Tables showing a step-by-step process make it easy to conduct diagnosis.

8. SI UNITS

Measurements in these manuals are according to the SI units. Metric and yard/pound measurements are also included.

Example:

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)

Item	SI units	Conventional unit	Remarks
Force	N (Newton)	kgf	1 kgf = 9.80655 N
Mass (Weight)	kg, g	kg, g	
Capacity	ℓ, mℓ or cm^3	ℓ or cc	1 cc = 1 cm^3 = 1 mℓ
Torque	N·m	kgf-m, kgf-cm	1 kgf-m = 9.80655 N·m
Rotating speed	rpm	rpm	
Pressure	kPa (kilopascal)	kgf/cm^2	1 kgf/cm^2 = 98.0655 kPa
		mmHg	1 mmHg = 0.133322 kPa
Power	W	PS	1 PS = 0.735499 kW
Calorie	W·h	cal	1 kcal = 1.16279 W·h
Fuel consumption rate	g/kw·h	g/PS·h	1 g/PS·h=1.3596 g/kW·h

The figure used in these manuals are described in the SI units and conventional units are described in ( ).

9. EXPLANATION OF TERMINOLOGY

- **List**

AAI	:	Air Assist Injection
A/B	:	Airbag
ABS	:	Antilock Brake System
A/C	:	Air Conditioner
A/F	:	Air Fuel Ratio
ALT	:	Generator
ASSY	:	Assembly
AT	:	Automatic Transmission
ATF	:	Automatic Transmission Fluid
BATT	:	Battery
CD-R/RW	:	CD Recordable/Rewritable
CPU	:	Central Processing Unit
DOHC	:	Double Overhead Camshaft
DVD	:	Digital Versatile Disc
ECM	:	Engine Control Module (ECM)
EGR	:	Exhaust Gas Recirculation
ELR	:	Emergency Locking Retractor
EX	:	Exhaust
F/B	:	Fuse & Joint Box
FL	:	Fusible Link
Ft	:	Full-time AWD
FWD	:	Front Wheel Drive
GPS	:	Global Positioning System
H/U	:	Hydraulic Unit
IG	:	Ignition
INT	:	Intermittent
ISC	:	Idle Speed Control
LH	:	LH (Left Hand)
LSD	:	Limited Slip Differential
M/B	:	Main Fuse & Relay Box
MD	:	Mini Disc
MPI	:	Multi Point Injection
MP-T	:	Multi-Plate Transfer
MT	:	Manual Transmission
Non-turbo	:	Natural Aspiration
NC	:	Normal Close (Relay)
NO	:	Normal Open (Relay)
OP	:	Option Parts
P/S	:	Power Steering
P/W	:	Power Window
PCD	:	Pitch Circle Diameter
PCV	:	Positive Crankcase Ventilation
RH	:	RH (Right Hand)
Rr	:	Rear
SOHC	:	Single Overhead Camshaft
SRS	:	Supplemental Restraint System
SSM	:	Subaru Select Monitor
ST	:	Special Tool
SW	:	Switch
TCS	:	Traction Control System
TGV	:	Tumble Generated Valve
T/M	:	Transmission
ViS-C	:	Viscous Coupling
VSV	:	Vacuum Switching Valve
VTD	:	Variable Torque Distribution
W/H	:	Wiring Harness
Pr	:	Primary
2ndr	:	Secondary

SPECIFICATIONS

SPC

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1. LEGACY.....2

1. LEGACY

A: DIMENSION

1. SEDAN MODEL

Model			2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC
Overall length		mm (in)	4,665 (183.7)			
Overall width		mm (in)	1,730 (68.1)			
Overall height (at C.W.)		mm (in)	1,425 (56.1)			
Compartment	Length	mm (in)	1,900 (74.8)			
	Width	mm (in)	1,445 (56.9)			
	Height	mm (in)	1,165 (45.9), 1,100 (43.3)★1			
Wheelbase		mm (in)	2,670 (105.1)			
Tread	Front	mm (in)	1,495 (58.9)			
	Rear	mm (in)	1,490 (58.7)			
Minimum road clearance		mm (in)	150 (5.9)			

★1: With sunroof

2. WAGON MODEL

Model			2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC
Overall length		mm (in)	4,720 (185.8)			
Overall width		mm (in)	1,730 (68.1)			
Overall height (at C.W.)		mm (in)	1,470 (57.9)			
Compartment	Length	mm (in)	1,840 (72.4)			
	Width	mm (in)	1,445 (56.9)			
	Height	mm (in)	1,190 (46.9), 1,145 (45.1)★1			
Wheelbase		mm (in)	2,670 (105.1)			
Tread	Front	mm (in)	1,495 (58.9)			
	Rear	mm (in)	1,485 (58.5)			
Minimum road clearance		mm (in)	150 (5.9)	155 (6.1)	150 (5.9)	

★1: With sunroof

3. OUTBACK MODEL

Model			2.0 L SOHC	3.0 L DOHC
Overall length		mm (in)	4,730 (186.2)	
Overall width		mm (in)	1,770 (69.7)	
Overall height (at C.W.)		mm (in)	1,545 (60.8)	
Compartment	Length	mm (in)	1,840 (72.4)	
	Width	mm (in)	1,445 (56.9)	
	Height	mm (in)	1,190 (46.9), 1,145 (45.1)★1	
Wheelbase		mm (in)	2,670 (105.1)	
Tread	Front	mm (in)	1,495 (58.9)	
	Rear	mm (in)	1,485 (58.5)	
Minimum road clearance		mm (in)	200 (7.9)	

★1: With sunroof

B: ENGINE

Model		2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC
Engine type		Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine
Valve arrangement		Overhead camshaft			
Bore × Stroke	mm (in)	92 × 75 (3.62 × 2.95)		99.5 × 79.0 (3.917 × 3.110)	89.2 × 80.0 (3.512 × 3.150)
Displacement	cm^3 (cu in)	1,994 (121.67)		2,457 (149.9)	3,000 (183.06)
Compression ratio		10.0	9.5	10.0	10.7
Ignition order		1 — 3 — 2 — 4			1 — 6 — 3 — 2 — 5 — 4
Idle speed at Park or Neutral position	rpm	650	650	650	650
Maximum output	kW (PS)/rpm	101 (137)/5,600	180 (245)/6,400	121 (165)/5,600	180 (245)/6,600
Maximum torque	N·m (kgf-m, ft-lb)/rpm	187 (19.1, 137.9)/4,400	310 (31.6, 228.6)/2,400	226 (23.0, 166.7)/4,400	297 (30.3, 219.1)/4,200

C: ELECTRICAL

Model				2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC
Ignition timing (at idling)			BTDC	13°	14°	13°	15°
Spark plug	Type and manufacturer			CHAMPION: RC10YC4	NGK:ILFR6B	CHAMPION: RC10YC4 NGK: PFR5B-11★1	NGK:ILFR6B
Generator				12V — 110A			
Battery	Type and capacity (5HR)	EC, EK, K4	MT	12V — 48AH (55D23L)	—	12V — 48AH (55D23L)	—
			AT	12V — 52AH (65D23L)	—	12V — 52AH (75D23L)	12V — 52AH (75D23L)
		KA		—	12V — 48AH (55D23L)	12V — 27AH (34B19L)	12V — 48AH (55D23L)
		KS		12V — 27AH (34B19L)	—		

★1: EC, EK model

D: TRANSMISSION

Model			SEDAN, WAGON					
			2.0 L SOHC		2.0 L DOHC turbo	2.5 L SOHC		3.0 L DOHC
Transmission type			4AT	5MT	5AT	4AT	5MT	5AT
Clutch type			TCC	DSPD	TCC	TCC	DSPD	TCC
Gear ratio		1st	2.785	3.454	3.540	2.785	3.454	3.540
		2nd	1.545	1.947	2.264	1.545	2.062	2.264
		3rd	1.000	1.366	1.471	1.000	1.448	1.471
		4th	0.694	0.972	1.000	0.694	1.088	1.000
		5th	—	0.738	0.834	—	0.825, 0.780★1	0.834
		Rev.	2.272	3.333	2.370	2.272	3.333	2.370
Auxiliary transmission gear ratio★2		High	—	1,000	—	—	1,000	—
		Low	—	1,447	—	—	1,196	—
Reduction gear (Front)	1st reduction	Type of gear	Helical	—	Helical	Helical	—	Helical
		Gear ratio	1.000	—	1.000	1.000	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.111	3.272	4.111	3.700, 4.111★1	3.083
Reduction gear (Rear)	Transfer reduction	Type of gear	—	Helical	—	—	Helical	—
		Gear ratio	—	1.000	—	—	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid	Hypoid
		Gear ratio	4.111	4.111	3.272	4.111	3.700, 4.111★1	3.083

Model			OUTBACK		
			2.5 L SOHC		3.0 L DOHC
Transmission type			4AT	5MT	5AT
Clutch type			TCC	DSPD	TCC
Gear ratio		1st	2.785	3.454	3.540
		2nd	1.545	2.062	2.264
		3rd	1.000	1.448	1.471
		4th	0.694	1.088	1.000
		5th	—	0.825	0.834
		Rev.	2.272	3.333	2.370
Auxiliary transmission gear ratio★2		High	—	1,000	—
		Low	—	1,196	—
Reduction gear (Front)	1st reduction	Type of gear	Helical	—	Helical
		Gear ratio	1.000	—	1.000
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid
		Gear ratio	4.444	3.900, 4.111★1	3.272
Reduction gear (Rear)	Transfer reduction	Type of gear	—	Helical	—
		Gear ratio	—	1.000	—
	Final reduction	Type of gear	Hypoid	Hypoid	Hypoid
		Gear ratio	4.444	3.900, 4.111★1	3.272

5MT: 5-forward speeds with synchromesh and 1-reverse
4AT: Electronically controlled fully-automatic, 4-forward speeds and 1-reverse

5AT: Electronically controlled fully-automatic, 5-forward speeds and 1-reverse
DSPD: Dry Single Plate Diaphragm
TCC: Torque Converter Clutch
★1: KA, K4 model
★2: Dual range model only

E: STEERING

Model			SEDAN, WAGON			
			2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC
Type			Rack and Pinion			
Turns, lock to lock			3.2	2.8	3.2	2.8
Minimum turning diameter	m (ft)	Center of tire width to center of tire width	10.8 (35.4)			
		Wall to wall	11.6 (38.1)			

Model			OUTBACK	
			2.5 L SOHC	3.0 L DOHC
Type			Rack and Pinion	
Turns, lock to lock			3.2	
Minimum turning diameter	m (ft)	Center of tire width to center of tire width	10.8 (35.4)	
		Wall to wall	11.6 (38.1)	

F: SUSPENSION

Front	Macpherson strut type suspension
Rear	Multi-link type suspension

G: BRAKE

Model	Except for 2.0 L DOHC turbo	2.0 L DOHC turbo
Service brake system	Dual circuit hydraulic with vacuum suspended power unit	
Front	Ventilated disc brake	
Rear	Disc brake	Ventilated disc brake
Parking Brake	Mechanical on rear brakes	

H: TIRE

Model	SEDAN, WAGON				OUTBACK	
	2.0 L SOHC	2.0 L DOHC turbo	2.5 L SOHC	3.0 L DOHC	2.5 L SOHC	3.0 L DOHC
Wheel size	16 × 6 $^1/_2$JJ	17 × 7JJ	16 × 6 $^1/_2$JJ 17 × 7JJ	17 × 7JJ	16 × 6 $^1/_2$JJ	17 × 7JJ
Tire size	205/55 R16 89V	215/45 R17 87W	205/55 R16 89V 215/45 R17 87W	215/45 R17 87W	215/60 R16 95V 215/60 R16 95H★1	215/55 R17 94V 215/55 R17 93H★1
Type	Steel belted radial, Tubeless					

★1: KA model

I: CAPACITY

Model			2.0 L SOHC				2.0 L DOHC turbo
			4AT		5MT		5AT
			LHD	RHD	LHD	RHD	
Fuel tank		ℓ (US gal, Imp gal)	64 (16.9, 14.1)				
Engine oil	Capacity (at overhaul)	ℓ (US qt, Imp qt)	4.5 (4.8, 4.0)				5.0 (5.3, 4.4)
	Filling amount of engine oil (at replace)	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)				
Transmission gear oil		ℓ (US qt, Imp qt)	—		3.5 (3.7, 3.1) 4.0 (4.2, 3.5)★2		—
ATF		ℓ (US qt, Imp qt)	8.4 (8.9, 7.4)		—		9.8 (10.4, 8.6)
Front differential gear oil		ℓ (US qt, Imp qt)	1.2 (1.3, 1.1)		—		1.4 (1.5 1.2)
Rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)				
Power steering fluid		ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)				
Engine coolant		ℓ (US qt, Imp qt)	6.3 (6.7, 5.5) 6.7 (7.1, 5.9)★1	6.4 (6.8, 5.6) 6.8 (7.2, 6.0)★1	6.4 (6.8, 5.6)	6.5 (6.9, 5.7)	7.3 (7.7, 6.4)

Model			2.5 L SOHC				3.0 L DOHC	
			4AT		5MT		5AT	
			LHD	RHD	LHD	RHD	LHD	RHD
Fuel tank		ℓ (US gal, Imp gal)	64 (16.9, 14.1)					
Engine oil	Capacity (at overhaul)	ℓ (US qt, Imp qt)	4.5 (4.8, 4.0)				7.2 (7.6, 6.3)	
	Filling amount of engine oil (at replace)	ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)				Approx. 5.5 (5.8, 4.8)	
Transmission gear oil		ℓ (US qt, Imp qt)	—		3.5 (3.7, 3.1) 4.0 (4.2, 3.5)★2		—	
ATF		ℓ (US qt, Imp qt)	9.3 (9.8, 8.2)		—		9.8 (10.4, 8.6)	
Front differential gear oil		ℓ (US qt, Imp qt)	1.2 (1.3, 1.1)		—		1.4 (1.5, 1.2)	
Rear differential gear oil		ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)					
Power steering fluid		ℓ (US qt, Imp qt)	0.8 (0.8, 0.7)					
Engine coolant		ℓ (US qt, Imp qt)	6.3 (6.7, 5.5) 6.7 (7.1, 5.9)★1	6.4 (6.8, 5.6) 6.8 (7.2, 6.0)★1	6.4 (6.8, 5.6)	6.5 (6.9, 5.7)	7.2 (7.6, 6.3) 7.7 (8.1, 6.7)★1	7.8 (8.2, 6.9)★1

★1: With ATF cooler (with warmer function)
★2: Dual range model only

J: WEIGHT

1. SEDAN MODEL

• LHD model

Option code★1			EC					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Single range)					
Curb weight (C.W.)	Front	kgf (lb)	740 (1,631)	755 (1,664)	760 (1,676)	760 (1,676)	765 (1,686)	775 (1,709)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	590 (1,301)	590 (1,301)	605 (1,334)	615 (1,356)
	Total	kgf (lb)	1,330 (2,932)	1,345 (2,965)	1,350 (2,976)	1,350 (2,976)	1,370 (3,020)	1,390 (3,064)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	❍
	A/C		—	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	❍	❍
	Sunroof		—	—	—	—	❍	❍
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			4AT					
Curb weight (C.W.)	Front	kgf (lb)	760 (1,676)	775 (1,709)	780 (1,720)	780 (1,720)	785 (1,731)	795 (1,753)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	590 (1,301)	590 (1,301)	605 (1,334)	615 (1,356)
	Total	kgf (lb)	1,350 (2,976)	1,365 (3,009)	1,370 (3,020)	1,370 (3,020)	1,390 (3,064)	1,410 (3,109)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	❍
	A/C		—	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	❍	❍
	Sunroof		—	—	—	—	❍	❍
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Single range)					
Curb weight (C.W.)	Front	kgf (lb)	760 (1,676)	770 (1,698)	765 (1,686)	770 (1,698)	765 (1,686)	775 (1,709)
	Rear	kgf (lb)	600 (1,323)	605 (1,334)	600 (1,323)	605 (1,334)	605 (1,334)	610 (1,345)
	Total	kgf (lb)	1,360 (2,998)	1,375 (3,031)	1,365 (3,009)	1,375 (3,031)	1,370 (3,020)	1,385 (3,053)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	❍	❍
	Winter pack		—	—	—	—	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	—	❍	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—
	Navigation system		—	—	❍	❍	❍	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Single range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	775 (1,709)	780 (1,720)	785 (1,731)	780 (1,720)	790 (1,742)	785 (1,731)
	Rear	kgf (lb)	615 (1,356)	625 (1,378)	625 (1,378)	600 (1,323)	605 (1,334)	600 (1,323)
	Total	kgf (lb)	1,390 (3,064)	1,405 (3,097)	1,410 (3,109)	1,380 (3,042)	1,395 (3,075)	1,385 (3,053)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		❍	❍	❍	—	—	—
	Winter pack		❍	❍	❍	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	❍	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		❍	❍	❍	—	—	—
	Sunroof		❍	❍	❍	—	—	—
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			4AT					
Curb weight (C.W.)	Front	kgf (lb)	790 (1,742)	785 (1,731)	795 (1,753)	800 (1,764)	805 (1,774)	805 (1,774)
	Rear	kgf (lb)	605 (1,334)	605 (1,334)	610 (1,345)	615 (1,356)	625 (1,378)	625 (1,378)
	Total	kgf (lb)	1,395 (3,075)	1,390 (3,064)	1,405 (3,097)	1,415 (3,120)	1,430 (3,153)	1,430 (3,153)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	❍	❍	❍
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	❍	❍	❍	❍	❍
	Winter pack		—	❍	❍	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		❍	—	❍	—	❍	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	❍	❍	❍
	Sunroof		—	—	—	❍	❍	❍
	Navigation system		❍	❍	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC			
Model			3.0 L DOHC			
			AWD			
			3.0 R, 3.0 R-A			
			5AT			
Curb weight (C.W.)	Front	kgf (lb)	875 (1,929)	880 (1,940)	890 (1,962)	890 (1,962)
	Rear	kgf (lb)	625 (1,378)	630 (1,389)	635 (1,400)	635 (1,400)
	Total	kgf (lb)	1,495 (3,296)	1,510 (3,329)	1,525 (3,362)	1,525 (3,362)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	2,030 (4,475)	2,030 (4,475)	2,030 (4,475)	2,030 (4,475)
Option	Vehicle Dynamics Control		—	❍	❍	❍
	Cruise control		❍	❍	❍	❍
	McIntosh audio		—	—	—	—
	Leather interior		❍	❍	❍	❍
	Winter pack		❍	❍	❍	❍
	15 inch tire		—	—	—	—
	17 inch tire		—	—	—	—
	A/C		❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍
	Curtain airbag		—	—	❍	❍
	Sunroof		—	—	❍	❍
	Navigation system		—	—	—	❍
	Self levelizer		—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			K4			KS		K4
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Single range)					4AT
Curb weight (C.W.)	Front	kgf (lb)	750 (1,653)	740 (1,631)	755 (1,664)	750 (1,653)	760 (1,676)	770 (1,698)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	590 (1,301)	590 (1,301)	600 (1,323)	590 (1,301)
	Total	kgf (lb)	1,340 (2,954)	1,330 (2,932)	1,345 (2,965)	1,340 (2,954)	1,360 (2,998)	1,360 (2,998)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	❍	—	—	—
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	—	❍	❍	❍	❍
	Side airbag		—	—	❍	—	—	—
	Curtain airbag		—	—	—	—	—	—
	Sunroof		—	—	—	—	❍	—
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			K4	KS		K4		KS
Model			2.0 L SOHC			2.5 L SOHC		
			AWD					
			2.0 i			2.5 i		
			4AT			5MT (Single range)		
Curb weight (C.W.)	Front	kgf (lb)	775 (1,709)	770 (1,698)	780 (1,720)	770 (1,698)	775 (1,709)	760 (1,676)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	595 (1,312)	610 (1,345)	620 (1,367)	595 (1,312)
	Total	kgf (lb)	1,365 (3,009)	1,360 (2,998)	1,375 (3,031)	1,380 (3,042)	1,395 (3,075)	1,355 (2,987)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	—	—	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	—	—	❍	❍	—
	Curtain airbag		—	—	—	❍	❍	—
	Sunroof		—	—	❍	❍	❍	—
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KS		K4			
Model			2.5 L SOHC		2.5 L SOHC			
			AWD					
			2.5 i					
			5MT (Single range)		4AT			
Curb weight (C.W.)	Front	kgf (lb)	770 (1,698)	770 (1,698)	790 (1,742)	795 (1,753)	795 (1,753)	800 (1,764)
	Rear	kgf (lb)	605 (1,334)	610 (1,345)	610 (1,345)	620 (1,367)	615 (1,356)	625 (1,378)
	Total	kgf (lb)	1,375 (3,031)	1,380 (3,042)	1,400 (3,086)	1,415 (3,120)	1,410 (3,109)	1,425 (3,142)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	❍	❍	—	—
	Cruise control		❍	❍	—	—	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	❍	—	—	❍	❍
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	❍	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	❍	❍	❍	❍
	Curtain airbag		—	—	❍	❍	❍	❍
	Sunroof		❍	❍	❍	❍	❍	❍
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KS			K4	
Model			2.5 L SOHC			3.0 L DOHC	
			AWD				
			2.5 i			3.0 R, 3.0 R-A	
			4AT			5AT	
Curb weight (C.W.)	Front	kgf (lb)	780 (1,720)	790 (1,742)	790 (1,742)	890 (1,962)	880 (1,940)
	Rear	kgf (lb)	595 (1,312)	605 (1,334)	610 (1,345)	635 (1,400)	635 (1,400)
	Total	kgf (lb)	1,375 (3,031)	1,395 (3,075)	1,400 (3,086)	1,525 (3,362)	1,515 (3,340)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	2,030 (4,475)	2,030 (4,475)
Option	Vehicle Dynamics Control		—	—	—	❍	—
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—
	Leather interior		—	—	❍	❍	❍
	Winter pack		—	—	—	—	—
	15 inch tire		—	—	—	—	—
	17 inch tire		—	—	—	—	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		—	—	—	❍	❍
	Curtain airbag		—	—	—	❍	❍
	Sunroof		—	❍	❍	❍	❍
	Navigation system		—	—	—	—	—
	Self levelizer		—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

• RHD model

Option code★1			EK					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Single range)				4AT	
Curb weight (C.W.)	Front	kgf (lb)	755 (1,664)	760 (1,676)	770 (1,698)	775 (1,709)	775 (1,709)	780 (1,720)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	605 (1,334)	610 (1,345)	590 (1,301)	590 (1,301)
	Total	kgf (lb)	1,345 (2,965)	1,350 (2,976)	1,375 (3,031)	1,385 (3,053)	1,365 (3,009)	1,370 (3,020)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	—	—	—
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	❍	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	❍	❍	❍	—	❍
	Curtain airbag		—	—	❍	❍	—	—
	Sunroof		—	—	❍	❍	—	—
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EK					
Model			2.0 L SOHC		2.5 L SOHC			
			AWD					
			2.0 i		2.5 i			
			4AT		5MT (Single range)			
Curb weight (C.W.)	Front	kgf (lb)	790 (1,742)	795 (1,753)	760 (1,676)	765 (1,686)	770 (1,698)	775 (1,709)
	Rear	kgf (lb)	605 (1,334)	610 (1,345)	600 (1,323)	600 (1,323)	605 (1,334)	620 (1,367)
	Total	kgf (lb)	1,395 (3,075)	1,405 (3,097)	1,360 (2,998)	1,365 (3,009)	1,375 (3,031)	1,395 (3,075)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	—	—	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	❍
	Winter pack		—	—	—	—	—	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	—	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	—	❍	❍	❍
	Curtain airbag		❍	❍	—	—	—	❍
	Sunroof		❍	❍	—	—	—	❍
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EK					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Single range)		4AT			
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	785 (1,731)	780 (1,720)	785 (1,731)	790 (1,742)	805 (1,774)
	Rear	kgf (lb)	625 (1,378)	625 (1,378)	600 (1,323)	600 (1,323)	610 (1,345)	615 (1,356)
	Total	kgf (lb)	1,410 (3,109)	1,410 (3,109)	1,380 (3,042)	1,385 (3,053)	1,400 (3,086)	1,420 (3,131)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	❍
	Cruise control		❍	❍	—	—	—	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		❍	❍	—	—	—	❍
	Winter pack		❍	❍	—	—	—	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		❍	❍	—	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	—	❍	❍	❍
	Curtain airbag		❍	❍	—	—	—	❍
	Sunroof		❍	❍	—	—	—	❍
	Navigation system		—	❍	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EK				
Model			2.5 L SOHC			3.0 L DOHC	
			AWD				
			2.5 i			3.0 R, 3.0 R-A	
			4AT			5AT	
Curb weight (C.W.)	Front	kgf (lb)	810 (1,785)	805 (1,774)	810 (1,785)	890 (1,962)	890 (1,962)
	Rear	kgf (lb)	620 (1,367)	620 (1,367)	620 (1,367)	635 (1,400)	635 (1,400)
	Total	kgf (lb)	1,430 (3,153)	1,425 (3,142)	1,430 (3,153)	1,525 (3,362)	1,525 (3,362)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	2,030 (4,475)	2,030 (4,475)
Option	Vehicle Dynamics Control		❍	❍	❍	❍	❍
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—
	Leather interior		❍	❍	❍	❍	❍
	Winter pack		❍	❍	❍	❍	❍
	15 inch tire		—	—	—	—	—
	17 inch tire		❍	—	❍	—	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍
	Curtain airbag		❍	❍	❍	❍	❍
	Sunroof		❍	❍	❍	❍	❍
	Navigation system		—	❍	❍	—	❍
	Self levelizer		—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Single range)				4AT	
Curb weight (C.W.)	Front	kgf (lb)	755 (1,664)	760 (1,676)	765 (1,687)	780 (1,720)	775 (1,709)	780 (1,720)
	Rear	kgf (lb)	590 (1,301)	590 (1,301)	595 (1,312)	610 (1,345)	590 (1,301)	590 (1,301)
	Total	kgf (lb)	1,340 (2,954)	1,350 (2,976)	1,360 (2,998)	1,390 (3,064)	1,365 (3,009)	1,370 (3,020)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)	1,900 (4,189)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	❍	❍	❍	—	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	❍	—	—	—
	17 inch tire		—	—	—	❍	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	❍	—	—
	Curtain airbag		—	—	—	❍	—	—
	Sunroof		—	—	—	❍	—	—
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.0 L SOHC		2.0 L DOHC turbo		2.5 L SOHC	
			AWD					
			2.0 i		2.0 GT		2.5 i	
			4AT		5AT		5MT (Single range)	
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	800 (1,764)	845 (1,863)	860 (1,896)	765 (1,687)	770 (1,698)
	Rear	kgf (lb)	595 (1,312)	610 (1,345)	615 (1,356)	635 (1,400)	600 (1,323)	605 (1,334)
	Total	kgf (lb)	1,380 (3,042)	1,410 (3,109)	1,460 (3,219)	1,495 (3,296)	1,365 (3,009)	1,375 (3,031)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,900 (4,189)	1,900 (4,189)	2,000 (4,409)	2,000 (4,409)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	❍	—	—
	Leather interior		—	—	—	❍	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		❍	—	—	—	—	—
	17 inch tire		—	❍	—	—	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	❍	❍	❍	—	—
	Curtain airbag		—	❍	—	❍	—	—
	Sunroof		—	❍	—	❍	—	—
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Single range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	775 (1,709)	780 (1,720)	785 (1,731)	785 (1,731)	790 (1,742)	795 (1,753)
	Rear	kgf (lb)	615 (1,356)	620 (1,367)	625 (1,378)	595 (1,312)	605 (1,334)	615 (1,356)
	Total	kgf (lb)	1,390 (3,064)	1,400 (3,086)	1,410 (3,109)	1,380 (3,042)	1,395 (3,053)	1,410 (3,109)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	❍	—	—	—
	Winter pack		—	—	❍	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	❍	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	—	—	❍
	Curtain airbag		❍	❍	❍	—	—	❍
	Sunroof		❍	❍	❍	—	—	❍
	Navigation system		—	—	❍	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			4AT					
Curb weight (C.W.)	Front	kgf (lb)	800 (1,764)	785 (1,731)	795 (1,753)	805 (1,774)	810 (1,786)	815 (1,797)
	Rear	kgf (lb)	625 (1,378)	605 (1,334)	610 (1,345)	615 (1,356)	625 (1,378)	625 (1,378)
	Total	kgf (lb)	1,425 (3,142)	1,390 (3,064)	1,405 (3,097)	1,420 (3,131)	1,435 (3,164)	1,440 (3,175)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)	1,930 (4,255)
Option	Vehicle Dynamics Control		—	—	—	❍	❍	❍
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	❍	❍	❍	❍	❍
	Winter pack		—	—	—	—	—	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		❍	—	❍	—	❍	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	—	—	❍	❍	❍
	Curtain airbag		❍	—	—	❍	❍	❍
	Sunroof		❍	—	—	❍	❍	❍
	Navigation system		—	—	—	—	—	❍
	Self levelizer		—	—	—	—	—	—
	Grade up		—	❍	❍	❍	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

2. WAGON MODEL

• LHD model

Option code★1			EC					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Dual range)					
Curb weight (C.W.)	Front	kgf (lb)	750 (1,653)	765 (1,686)	770 (1,698)	770 (1,698)	775 (1,709)	785 (1,731)
	Rear	kgf (lb)	610 (1,345)	610 (1,345)	610 (1,345)	610 (1,345)	635 (1,400)	645 (1,422)
	Total	kgf (lb)	1,360 (2,998)	1,375 (3,031)	1,380 (3,042)	1,380 (3,042)	1,410 (3,109)	1,430 (3,153)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	❍
	A/C		—	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	❍	❍
	Sunroof		—	—	—	—	❍	❍
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			4AT					
Curb weight (C.W.)	Front	kgf (lb)	760 (1,676)	775 (1,709)	780 (1,720)	780 (1,720)	785 (1,731)	790 (1,742)
	Rear	kgf (lb)	610 (1,345)	610 (1,345)	610 (1,345)	610 (1,345)	635 (1,400)	640 (1,410)
	Total	kgf (lb)	1,370 (3,020)	1,385 (3,053)	1,390 (3,064)	1,390 (3,064)	1,420 (3,131)	1,430 (3,153)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	—	—	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	❍	❍
	Sunroof		—	—	—	—	❍	❍
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Dual range)					
Curb weight (C.W.)	Front	kgf (lb)	770 (1,698)	780 (1,720)	775 (1,709)	780 (1,720)	780 (1,720)	785 (1,731)
	Rear	kgf (lb)	620 (1,367)	625 (1,378)	620 (1,367)	625 (1,378)	620 (1,367)	630 (1,389)
	Total	kgf (lb)	1,390 (3,064)	1,405 (3,097)	1,395 (3,075)	1,405 (3,097)	1,400 (3,086)	1,415 (3,120)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	❍	❍
	Winter pack		—	—	—	—	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	—	❍	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	—	—	—
	Sunroof		—	—	—	—	—	—
	Navigation system		—	—	❍	❍	❍	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Dual range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	790 (1,742)	800 (1,764)	780 (1,720)	790 (1,742)	785 (1,731)
	Rear	kgf (lb)	645 (1,422)	655 (1,444)	660 (1,455)	620 (1,367)	625 (1,378)	620 (1,367)
	Total	kgf (lb)	1,430 (3,153)	1,445 (3,186)	1,460 (3,219)	1,400 (3,086)	1,415 (3,120)	1,405 (3,097)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)
Option	Vehicle Dynamics Control		—	—	❍	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	❍	—	—	—
	Leather interior		❍	❍	❍	—	—	—
	Winter pack		❍	❍	❍	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	❍	❍	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		❍	❍	❍	—	—	—
	Sunroof		❍	❍	❍	—	—	—
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			4AT					
Curb weight (C.W.)	Front	kgf (lb)	790 (1,742)	785 (1,731)	795 (1,753)	800 (1,764)	805 (1,775)	815 (1,797)
	Rear	kgf (lb)	625 (1,378)	625 (1,378)	630 (1,389)	645 (1,422)	655 (1,444)	660 (1,455)
	Total	kgf (lb)	1,415 (3,120)	1,410 (3,109)	1,425 (3,142)	1,445 (3,186)	1,460 (3,219)	1,475 (3,252)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)
Option	Vehicle Dynamics Control		—	—	—	❍	❍	❍
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	❍
	Leather interior		—	❍	❍	❍	❍	❍
	Winter pack		—	❍	❍	❍	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		❍	—	❍	—	❍	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	—	—	❍	❍	❍
	Sunroof		—	—	—	❍	❍	❍
	Navigation system		❍	❍	❍	—	—	❍
	Self levelizer		—	—	—	—	—	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC			K4		
Model			3.0 L DOHC			2.0 L SOHC		
			AWD					
			3.0 R			2.0 i		
			5AT			5MT (Dual range)		
Curb weight (C.W.)	Front	kgf (lb)	880 (1,940)	890 (1,962)	890 (1,962)	760 (1,676)	750 (1,653)	765 (1,686)
	Rear	kgf (lb)	640 (1,410)	665 (1,466)	665 (1,466)	610 (1,345)	610 (1,345)	610 (1,345)
	Total	kgf (lb)	1,520 (3,351)	1,555 (3,428)	1,555 (3,428)	1,370 (3,020)	1,360 (2,998)	1,375 (3,031)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	2,050 (4,519)	2,050 (4,519)	2,050 (4,519)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)
Option	Vehicle Dynamics Control		❍	❍	❍	—	—	—
	Cruise control		❍	❍	❍	—	—	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		❍	❍	❍	—	—	—
	Winter pack		❍	❍	❍	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	—	❍
	Side airbag		❍	❍	❍	—	—	❍
	Curtain airbag		—	❍	❍	—	—	—
	Sunroof		—	❍	❍	—	—	—
	Navigation system		—	—	❍	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KS	K4			KS
Model			2.0 L SOHC				
			AWD				
			2.0 i				
			5MT (Dual range)	4AT			
Curb weight (C.W.)	Front	kgf (lb)	760 (1,676)	770 (1,698)	775 (1,709)	785 (1,731)	770 (1,698)
	Rear	kgf (lb)	610 (1,345)	610 (1,345)	610 (1,345)	635 (1,400)	610 (1,345)
	Total	kgf (lb)	1,370 (3,020)	1,380 (3,042)	1,385 (3,053)	1,420 (3,131)	1,380 (3,042)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)
Option	Vehicle Dynamics Control		—	—	—	—	—
	Cruise control		—	—	❍	—	—
	McIntosh audio		—	—	—	—	—
	Leather interior		—	—	—	—	—
	Winter pack		—	—	—	—	—
	15 inch tire		—	—	—	—	—
	17 inch tire		—	—	—	—	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		—	—	❍	❍	—
	Curtain airbag		—	—	—	❍	—
	Sunroof		—	—	—	❍	—
	Navigation system		—	—	—	—	—
	Self levelizer		—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			K4					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Dual range)				4AT	
Curb weight (C.W.)	Front	kgf (lb)	780 (1,720)	780 (1,720)	790 (1,742)	790 (1,742)	790 (1,742)	790 (1,742)
	Rear	kgf (lb)	635 (1,400)	645 (1,422)	650 (1,433)	655 (1,444)	635 (1,400)	645 (1,422)
	Total	kgf (lb)	1,415 (3,120)	1,425 (3,142)	1,440 (3,175)	1,445 (3,186)	1,425 (3,142)	1,435 (3,164)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)	1,945 (4,288)	1,945 (4,288)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	❍	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	❍	❍	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	❍	❍	❍	—	❍
	Sunroof		❍	❍	❍	❍	❍	❍
	Navigation system		—	—	—	❍	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			K4				
Model			2.5 L SOHC				3.0 L DOHC
			AWD				
			2.5 i				3.0 R, 3.0 R-A
			4AT				5AT
Curb weight (C.W.)	Front	kgf (lb)	800 (1,764)	795 (1,753)	800 (1,764)	810 (1,785)	890 (1,962)
	Rear	kgf (lb)	650 (1,433)	645 (1,422)	650 (1,433)	650 (1,433)	665 (1,466)
	Total	kgf (lb)	1,450 (3,196)	1,440 (3,175)	1,450 (3,196)	1,460 (3,219)	1,555 (3,428)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	2,050 (4,519)
Option	Vehicle Dynamics Control		—	—	—	❍	❍
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—
	Leather interior		—	❍	❍	❍	❍
	Winter pack		—	—	—	❍	—
	15 inch tire		—	—	—	—	—
	17 inch tire		❍	—	❍	❍	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍
	Curtain airbag		❍	❍	❍	❍	❍
	Sunroof		❍	❍	❍	❍	❍
	Navigation system		—	—	—	❍	—
	Self levelizer		—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.0 L SOHC					
			AWD					
			2.0 i					
			5MT (Dual range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	770 (1,698)	775 (1,709)	790 (1,742)	780 (1,720)	785 (1,731)	800 (1,764)
	Rear	kgf (lb)	610 (1,345)	615 (1,356)	640 (1,410)	610 (1,345)	615 (1,356)	640 (1,410)
	Total	kgf (lb)	1,380 (3,042)	1,390 (3,064)	1,430 (3,153)	1,390 (3,064)	1,400 (3,086)	1,440 (3,175)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)	1,925 (4,244)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	—	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	❍	—	—	❍	—
	17 inch tire		—	—	❍	—	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	❍	—	—	❍
	Curtain airbag		—	—	❍	—	—	❍
	Sunroof		—	—	❍	—	—	❍
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.0 L DOHC turbo			2.5 L SOHC		
			AWD					
			2.0 GT			2.5 i		
			5AT			5MT (Dual range)		
Curb weight (C.W.)	Front	kgf (lb)	845 (1,863)	850 (1,874)	860 (1,896)	775 (1,709)	780 (1,720)	785 (1,731)
	Rear	kgf (lb)	635 (1,400)	645 (1,422)	665 (1,466)	620 (1,367)	625 (1,378)	645 (1,422)
	Total	kgf (lb)	1,480 (3,263)	1,495 (3,296)	1,525 (3,362)	1,395 (3,075)	1,405 (3,097)	1,430 (3,153)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	2,010 (4,431)	2,010 (4,431)	2,010 (4,431)	1,935 (4,266)	1,935 (4,266)	1,935 (4,266)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	❍	❍	—	—	—
	Leather interior		—	❍	❍	—	—	—
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	❍	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	—	—	❍
	Curtain airbag		—	—	❍	—	—	❍
	Sunroof		—	—	❍	—	—	❍
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.5 L SOHC					
			AWD					
			2.5 i					
			5MT (Dual range)		4AT			
Curb weight (C.W.)	Front	kgf (lb)	795 (1,753)	805 (1,774)	780 (1,720)	790 (1,742)	795 (1,753)	800 (1,764)
	Rear	kgf (lb)	650 (1,433)	660 (1,455)	620 (1,667)	625 (1,378)	640 (1,410)	650 (1,433)
	Total	kgf (lb)	1,445 (3,186)	1,465 (3,230)	1,400 (3,086)	1,415 (3,120)	1,435 (3,164)	1,450 (3,197)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,935 (4,266)	1,935 (4,266)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)
Option	Vehicle Dynamics Control		—	❍	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	❍	—	—	—	—
	Leather interior		—	❍	—	—	—	—
	Winter pack		—	❍	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		❍	❍	—	❍	—	❍
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	—	—	❍	❍
	Curtain airbag		❍	❍	—	—	❍	❍
	Sunroof		❍	❍	—	—	❍	❍
	Navigation system		—	❍	—	—	—	—
	Self levelizer		—	—	—	—	—	—
	Grade up		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA				
Model			2.5 L SOHC				
			AWD				
			2.5 i				
			4AT				
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	790 (1,742)	800 (1,764)	810 (1,786)	815 (1,797)
	Rear	kgf (lb)	620 (1,367)	630 (1,389)	645 (1,422)	650 (1,433)	660 (1,455)
	Total	kgf (lb)	1,405 (3,097)	1,420 (3,131)	1,445 (3,186)	1,460 (3,219)	1,470 (3,241)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)	1,945 (4,288)
Option	Vehicle Dynamics Control		—	❍	❍	❍	❍
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	❍
	Leather interior		❍	❍	❍	❍	❍
	Winter pack		—	—	—	—	❍
	15 inch tire		—	—	—	—	—
	17 inch tire		—	❍	—	❍	❍
	A/C		❍	❍	❍	❍	❍
	Side airbag		—	—	❍	❍	❍
	Curtain airbag		—	—	❍	❍	❍
	Sunroof		—	—	❍	❍	❍
	Navigation system		—	—	—	—	❍
	Self levelizer		—	—	—	—	—
	Grade up		❍	❍	❍	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

3. OUTBACK

• LHD model

Option code★1			EC					
Model			2.5 L SOHC					
			AWD					
			OBK 2.5 i					
			5MT (Dual range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	795 (1,753)	800 (1,764)	795 (1,753)	805 (1,774)	810 (1,785)
	Rear	kgf (lb)	645 (1,422)	670 (1,477)	675 (1,488)	645 (1,422)	670 (1,477)	675 (1,488)
	Total	kgf (lb)	1,430 (3,153)	1,465 (3,230)	1,475 (3,252)	1,440 (3,175)	1,475 (3,252)	1,485 (3,274)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,960 (4,321)	1,960 (4,321)	1,960 (4,321)	1,970 (4,343)	1,970 (4,343)	1,970 (4,343)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		—	❍	❍	—	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	❍	—	—	❍
	Winter pack		—	❍	❍	—	❍	❍
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—	❍	❍	—	❍	❍
	Sunroof		—	❍	❍	—	❍	❍
	Navigation system		—	—	❍	—	—	❍
	Self levelizer		—	❍	❍	❍	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EC				K4	
Model			3.0 L DOHC				2.5 L SOHC	
			AWD					
			OBK 3.0 R, OBK 3.0 R-A				OBK 2.5 i	
			5AT				5MT (Dual range)	
Curb weight (C.W.)	Front	kgf (lb)	885 (1,951)	890 (1,962)	900 (1,984)	900 (1,984)	785 (1,731)	795 (1,753)
	Rear	kgf (lb)	660 (1,455)	660 (1,455)	685 (1,510)	685 (1,510)	645 (1,422)	670 (1,477)
	Total	kgf (lb)	1,545 (3,406)	1,550 (3,417)	1,585 (3,494)	1,585 (3,494)	1,430 (3,153)	1,465 (3,230)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	2,060 (4,542)	2,060 (4,542)	2,060 (4,542)	2,060 (4,542)	1,960 (4,321)	1,960 (4,321)
Option	Vehicle Dynamics Control		—	❍	❍	❍	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio			—	—	—	—	—
	Leather interior		❍	❍	❍	❍	—	—
	Winter pack		❍	❍	❍	❍	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		—		❍	❍	—	❍
	Sunroof		—	—	❍	❍	—	❍
	Navigation system		—	—	—	❍	—	—
	Self levelizer		❍	❍	❍	❍	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KS			K4		
Model			2.5 L SOHC					
			AWD					
			OBK 2.5 i					
			5MT (Dual range)			4AT		
Curb weight (C.W.)	Front	kgf (lb)	785 (1,731)	795 (1,753)	795 (1,753)	795 (1,753)	805 (1,774)	810 (1,785)
	Rear	kgf (lb)	640 (1,410)	655 (1,444)	660 (1,455)	645 (1,422)	670 (1,477)	670 (1,477)
	Total	kgf (lb)	1,425 (3,142)	1,450 (3,196)	1,455 (3,208)	1,440 (3,175)	1,475 (3,252)	1,480 (3,263)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,960 (4,321)	1,960 (4,321)	1,960 (4,321)	1,970 (4,343)	1,970 (4,343)	1,970 (4,343)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	—	❍	—	—	❍
	Winter pack		—	—	—	—	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	—	❍	❍	❍
	Curtain airbag		—	—	—	—	❍	❍
	Sunroof		—	❍	❍	—	❍	❍
	Navigation system		—	—	—	—	—	—
	Self levelizer		—	—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KS			K4	
Model			2.5 L SOHC			3.0 L DOHC	
			AWD				
			OBK 2.5 i			OBK 3.0 R, OBK 3.0 R-A	
			4AT			5AT	
Curb weight (C.W.)	Front	kgf (lb)	795 (1,753)	805 (1,774)	805 (1,774)	900 (1,984)	890 (1,962)
	Rear	kgf (lb)	640 (1,410)	655 (1,444)	660 (1,455)	685 (1,510)	685 (1,510)
	Total	kgf (lb)	1,435 (3,164)	1,460 (3,219)	1,465 (3,230)	1,585 (3,494)	1,575 (3,472)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,970 (4,343)	1,970 (4,343)	1,970 (4,343)	2,060 (4,542)	2,060 (4,542)
Option	Vehicle Dynamics Control		—	—	—	❍	—
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—
	Leather interior		—	—	❍	❍	❍
	Winter pack		—	—	—	—	—
	15 inch tire		—	—	—	—	—
	17 inch tire		—	—	—	—	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		—	—	—	❍	❍
	Curtain airbag		—	—	—	❍	❍
	Sunroof		—	❍	❍	❍	❍
	Navigation system		—	—	—	—	—
	Self levelizer		—	—	—	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

• RHD model

Option code★1			EK					
Model			2.5 L SOHC					3.0 L DOHC
			AWD					
			OBK 2.5 i					OBK 3.0 R, OBK 3.0 R-A
			5MT (Dual range)		4AT			5AT
Curb weight (C.W.)	Front	kgf (lb)	800 (1,764)	790 (1,742)	810 (1,785)	800 (1,764)	815 (1,797)	895 (1,973)
	Rear	kgf (lb)	675 (1,488)	645 (1,422)	670 (1,477)	645 (1,422)	670 (1,477)	680 (1,499)
	Total	kgf (lb)	1,475 (3,252)	1,435 (3,164)	1,480 (3,263)	1,445 (3,186)	1,485 (3,274)	1,575 (3,472)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	1,960 (4,321)	1,960 (4,321)	1,970 (4,343)	1,970 (4,343)	1,970 (4,343)	2,060 (4,542)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		❍	—	❍	—	❍	—
	Winter pack		❍	—	❍	—	❍	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		❍	❍	❍	❍	❍	❍
	Curtain airbag		❍	—	❍	—	❍	❍
	Sunroof		❍	—	❍	—	❍	❍
	Navigation system		—	—	—	—	❍	—
	Self levelizer		❍	❍	❍	❍	❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			EK	
Model			3.0 L DOHC	
			AWD	
			OBK 3.0 R, OBK 3.0 R-A	
			5AT	
Curb weight (C.W.)	Front	kgf (lb)	905 (1,995)	905 (1,995)
	Rear	kgf (lb)	685 (1,510)	685 (1,510)
	Total	kgf (lb)	1,590 (1,301)	1,590 (1,301)
Maximum permissible axle weight (M.P.A.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)
Maximum permissible weight (M.P.W.)	Total	kgf (lb)	2,060 (4,542)	2,060 (4,542)
Option	Vehicle Dynamics Control		❍	❍
	Cruise control		❍	❍
	McIntosh audio		—	—
	Leather interior		❍	❍
	Winter pack		❍	❍
	15 inch tire		—	—
	17 inch tire		—	—
	A/C		❍	❍
	Side airbag		❍	❍
	Curtain airbag		❍	❍
	Sunroof		❍	❍
	Navigation system		—	❍
	Self levelizer		❍	❍

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA					
Model			2.5 L SOHC					
			AWD					
			OBK 2.5 i					
			5MT (Dual range)				4AT	
Curb weight (C.W.)	Front	kgf (lb)	790 (1,742)	800 (1,764)	800 (1,764)	805 (1,774)	800 (1,764)	810 (1,785)
	Rear	kgf (lb)	640 (1,410)	665 (1,466)	670 (1,477)	670 (1,477)	640 (1,410)	665 (1,466)
	Total	kgf (lb)	1,430 (3,153)	1,465 (3,230)	1,470(3,241)	1,475 (3,252)	1,440 (3,175)	1,475 (3,252)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,960 (4,321)	1,960 (4,321)	1,960 (4,321)	1,960 (4,321)	1,970 (4,343)	1,970 (4,343)
Option	Vehicle Dynamics Control		—	—	—	—	—	—
	Cruise control		❍	❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—	—
	Leather interior		—	❍	❍	❍	—	❍
	Winter pack		—	—	—	❍	—	—
	15 inch tire		—	—	—	—	—	—
	17 inch tire		—	—	—	—	—	—
	A/C		❍	❍	❍	❍	❍	❍
	Side airbag		—	—	❍	❍	—	—
	Curtain airbag		—	—	❍	❍	—	—
	Sunroof		—	❍	❍	❍	—	❍
	Navigation system		—	—	—	❍	—	—
	Self levelizer		—	❍	❍	—	—	❍
	Grade up		—	—	—	❍	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

Option code★1			KA				
Model			2.5 L SOHC		3.0 L DOHC		
			AWD				
			OBK 2.5 i		OBK 3.0 R, OBK 3.0 R-A		
			4AT		5AT		
Curb weight (C.W.)	Front	kgf (lb)	810 (1,785)	810 (1,785)	885 (1,951)	900 (1,984)	905 (1,995)
	Rear	kgf (lb)	670 (1,477)	675 (1,488)	655 (1,444)	685 (1,510)	685 (1,510)
	Total	kgf (lb)	1,480 (3,263)	1,485 (3,274)	1,540 (3,395)	1,585 (3,494)	1,590 (1,301)
Unladen mass (U.W.)	Front	kgf (lb)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)	1,040 (2,293)
	Rear	kgf (lb)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)	1,060 (2,336)
Gross vehicle mass (G.V.M.)	Total	kgf (lb)	1,970 (4,343)	1,970 (4,343)	2,060 (4,542)	2,060 (4,542)	2,060 (4,542)
Option	Vehicle Dynamics Control		—	—	—	❍	❍
	Cruise control		❍	❍	❍	❍	❍
	McIntosh audio		—	—	—	—	—
	Leather interior		❍	❍	—	❍	❍
	Winter pack		—	—	—	—	❍
	15 inch tire		—	—	—	—	—
	17 inch tire		—	—	—	—	—
	A/C		❍	❍	❍	❍	❍
	Side airbag		❍	❍	—	❍	❍
	Curtain airbag		❍	❍	—	❍	❍
	Sunroof		❍	❍	—	❍	❍
	Navigation system		—	❍	—	—	❍
	Self levelizer		❍	❍	❍	❍	❍
	Grade up		—	—	—	—	—

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

PRECAUTION

PC

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1. Precaution

A: CAUTION

Please clearly understand and adhere to the following general precautions. They must be strictly followed to avoid minor or serious injury to the person doing the work or people in the area.

1. ABS

Handle the ABS as a total system. Do not disassemble or attempt to repair parts which are not instructed in this manual. Follow the instructions in this manual during performing the maintenance of ABSCM&H/U. To disassemble parts without instructions could prevent the ABS system from operating when needed or cause it to operate incorrectly and result in injury.

2. VEHICLE DYNAMICS CONTROL (VDC)

Handle the VDC as a total system. Do not disassemble or attempt to repair individual parts. Doing so could prevent the VDC system from operating when needed or cause it to operate incorrectly and result in injury.

3. BRAKE FLUID

If brake fluid gets in your eyes or on your skin, do the following:

• Wash out your eyes and seek immediate medical attention.

• Wash your skin with soap and then rinse thoroughly with water.

4. RADIATOR FAN

The radiator fan may rotate without warning, even when the engine is not ON. Do not place your hand, cloth, tools or other items near the fan at any time.

5. ROAD TEST

Always conduct road tests in accordance with traffic rules and regulations to avoid bodily injury and interrupting traffic.

6. AIRBAG

To prevent bodily injury from unexpected deployment of airbags and unnecessary maintenance, follow the instructions in this manual when performing maintenance on the airbag components or nearby, and the airbag wiring harnesses or nearby.

To prevent unexpected deployment, turn the ignition switch to OFF and disconnect the ground cable from battery, then wait at least 20 seconds to discharge electricity before beginning work.

7. AIRBAG DISPOSAL

To prevent bodily injury from unexpected airbag deployment, do not dispose airbag modules in the same way as other refuse. Follow the special instructions for disposal in this manual. Follow all government regulations concerning disposal of refuse.

8. AIRBAG MODULE

Adhere to the following when handing and storing the airbag module to prevent bodily injury from unexpected deployment:

• Do not hold the harnesses or connectors to carry the module.

• Do not face the bag in the direction that it opens towards yourself or other people.

• Do not face the bag in the direction that it opens towards the floor or walls.

9. AIRBAG SPECIAL TOOL

To prevent unexpected deployment, only use special tools.

10.WINDOW

Always wear safety glasses when working around any glass to prevent glass fragments from damaging your eyes.

11.WINDOW ADHESIVE

Always use the recommended or equivalent adhesive when attaching glass to prevent it from coming loose and falling, resulting in accidents and injury.

NOTE

NT

Page
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1. Note

A: NOTE

This is the information that can improve the efficiency of maintenance and assure the sound work.

1. FASTENERS NOTICE

Fasteners are used to prevent the parts from damage, dislocation and play due to looseness. Fasteners must be tightened to the specified torque.
Do not apply paint, lubricant, rust retardant or other substance to the surface around bolts, nuts, etc. Doing so will make it difficult to obtain the correct torque and result in looseness and other problem.

2. STATIC ELECTRICITY DAMAGE

Do not touch the control modules, connectors, logic boards and other such parts when there is a possibility of static electricity. Always use a static electricity prevention cord or touch grounded metal for the elimination of static electricity before conducting work.

3. BATTERY

When removing the battery terminal, always be sure to turn the ignition switch to OFF to prevent electrical damage of the control module from overcurrent. Be sure to remove the battery ground cable first.

4. SERVICE PARTS

Use genuine parts for maximum performance and maintenance when conducting repairs. Subaru/FHI will not be responsible for poor performance resulting from the use of parts except for genuine parts.

5. PROTECTING VEHICLE UNDER MAINTENACE

Make sure to attach the fender cover, seat covers, etc. before work.

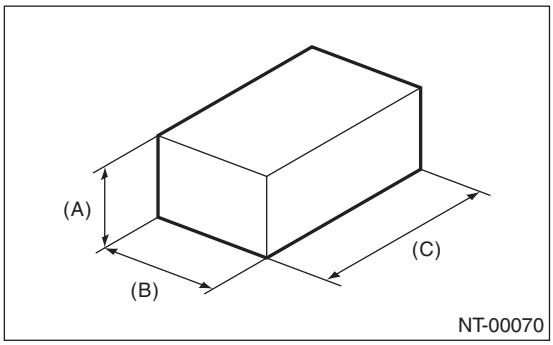
6. ENSURING SECURITY DURING WORK

When working in a group of two or more, perform the work with calling each other to ensure mutual safety.

7. LIFTS AND JACKS

When using a lift or shop jack to raise a vehicle, or using rigid rack to support a vehicle, always follow instructions concerning jack-up points and weight limits to prevent the vehicle from falling, which could result in injury. Be especially careful that the vehicle is balanced before raising it. Be sure to set the wheel stoppers when jacking-up only the front or rear side of the vehicle.

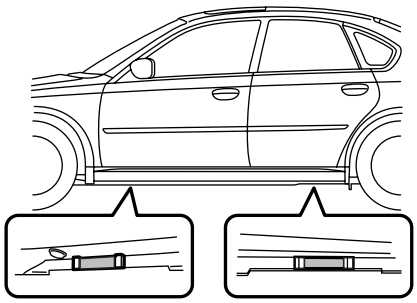
NOTE:
• When using a lift, follow its operation manual before work.
• Do not work or leave unattended while the vehicle is supported with jack, support it with rigid racks.
• Be sure to use the rigid racks with rubber attached to cradle to support the vehicle.
• When using a plate lift, use a rubber attachment.



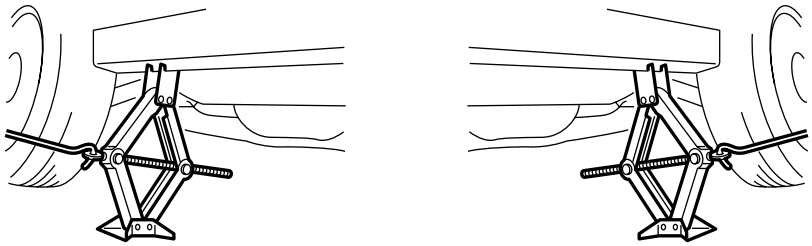
(A) 80 mm (3.1 in) or more
(B) 100 — 150 mm (3.94 — 5.91 in)
(C) 120 — 190 mm (4.72 — 7.48 in)

• Align the cushion rubber end of plate lift with the end of rubber attachment (portion b). Also, align the protrusion portion of the supporting locations with the end of attachment (portion a).
• Do not use the plate lift whose attachment does not reach the supporting locations.

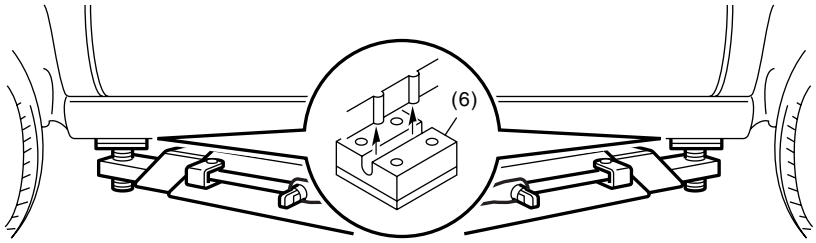
(1)



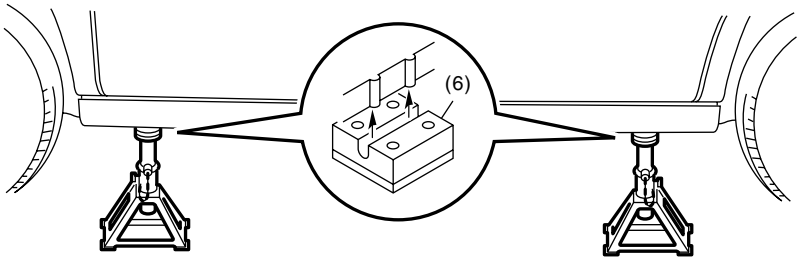
(2)



(3)



(4)



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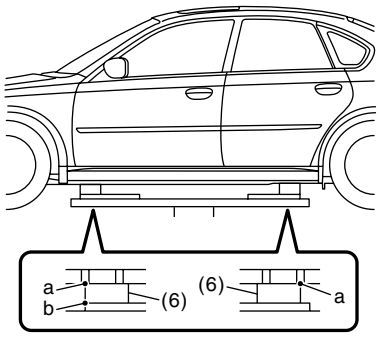
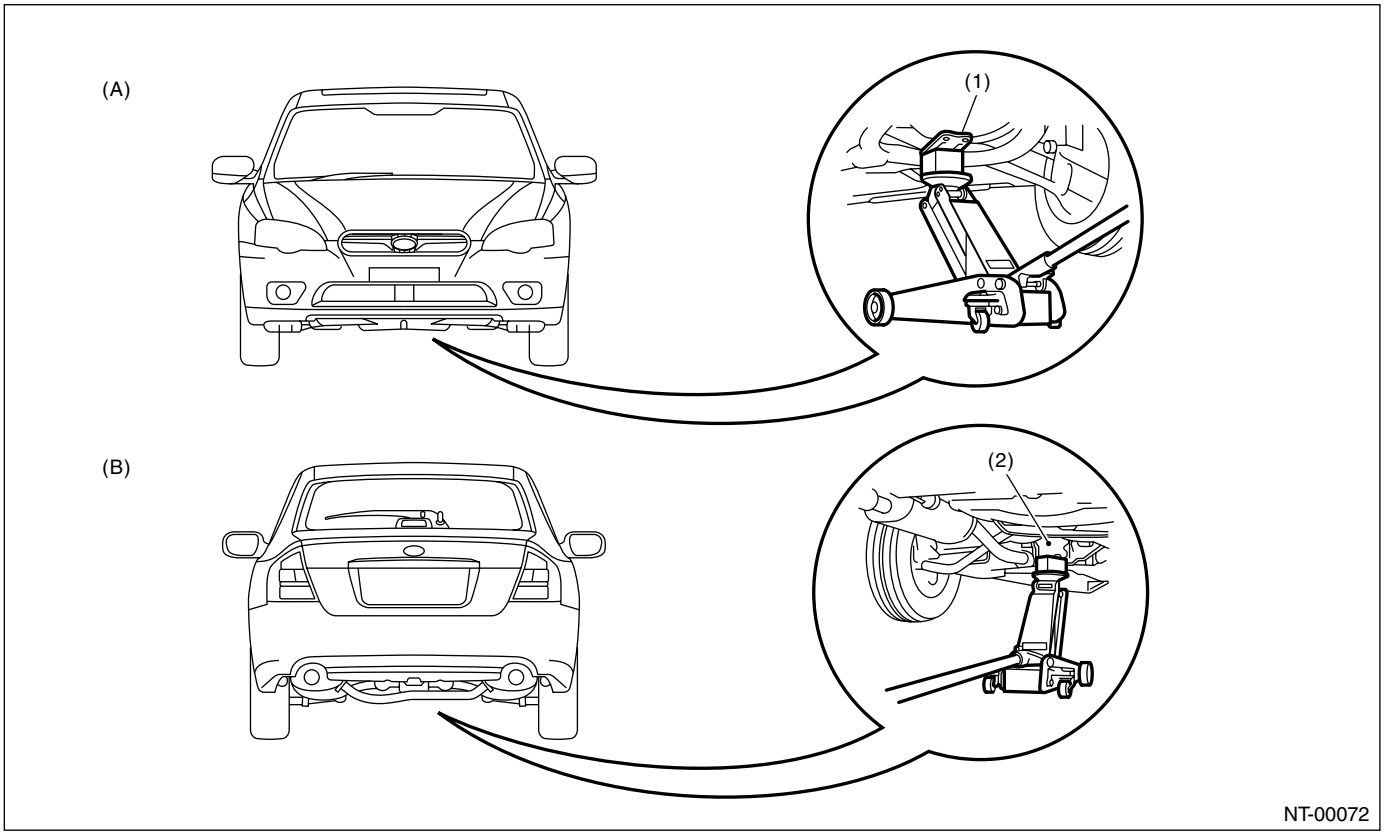


NT-00086

(1) Supporting locations
(2) Pantograph jack
(3) Swing arm lift
(4) Rigid rack
(5) Plate lift
(6) Attachment

NOTE



(A) Front

(B) Rear

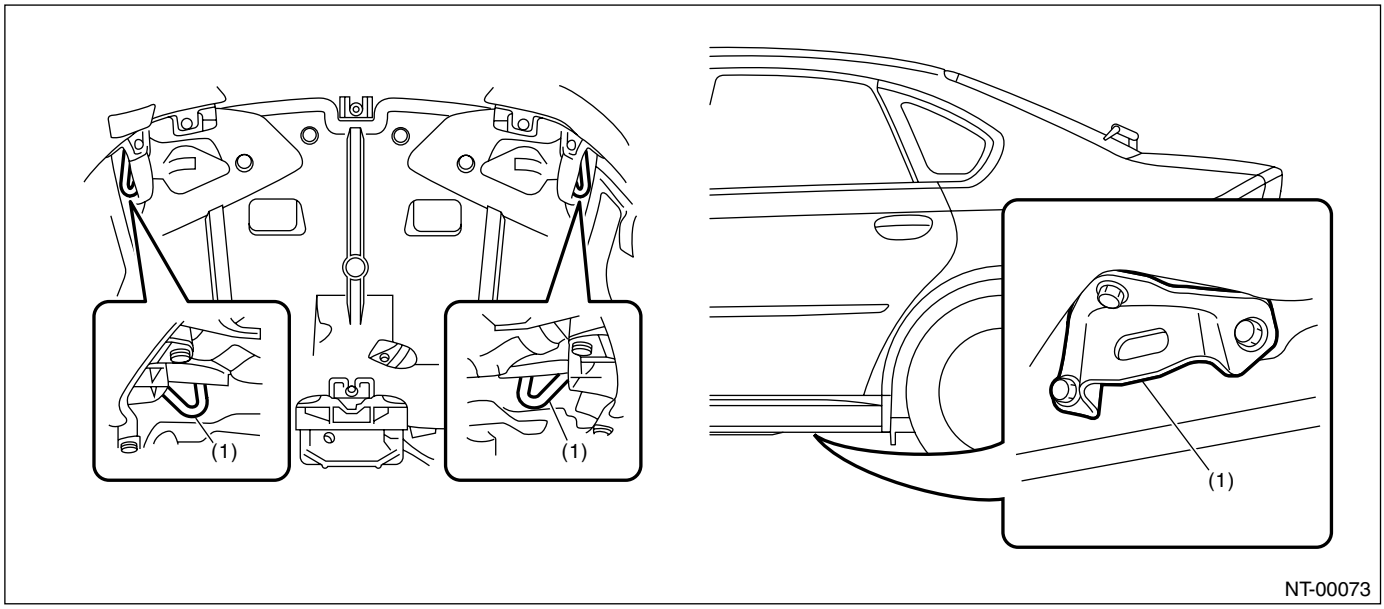
(1) Front crossmember

(2) Rear differential

8. TIE DOWNS

Tie downs are used when transporting vehicles and when using the chassis dynamo. Attach tie-down only to the specified locations on the vehicle.

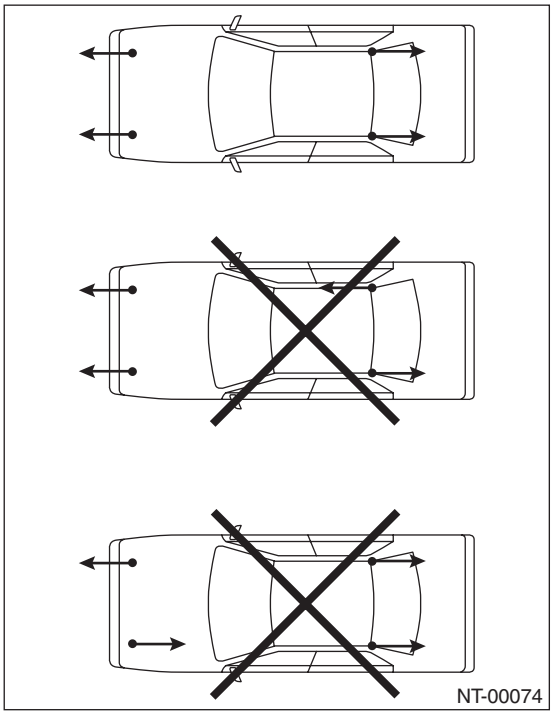
- TIE-DOWN LOCATION



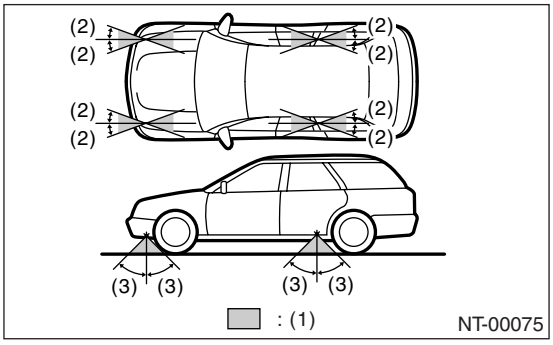
(1) Hook for tie-down

NOTE

• CHAIN DIRECTION AT TIE-DOWN CONDITION



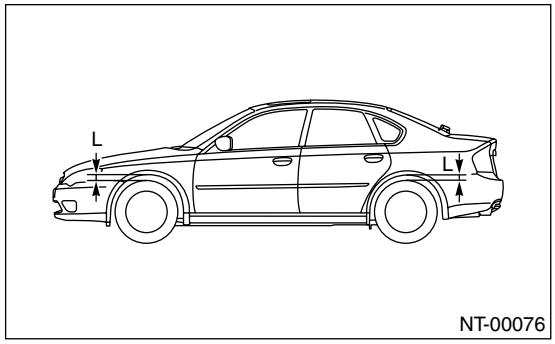
• CHAIN PULLING RANGE AT TIE-DOWN CONDITION



(1) Chain pulling range at tie-down condition
(2) 20°
(3) 45°

• VEHICLE SINKING VOLUME AT TIE-DOWN CONDITION

Measure the distance between the highest tire point and highest arch point before and after tie-down. Difference of measurement value (sinking volume) shall be within 50 mm (1.97 in) and make sure to fix the vehicle securely.

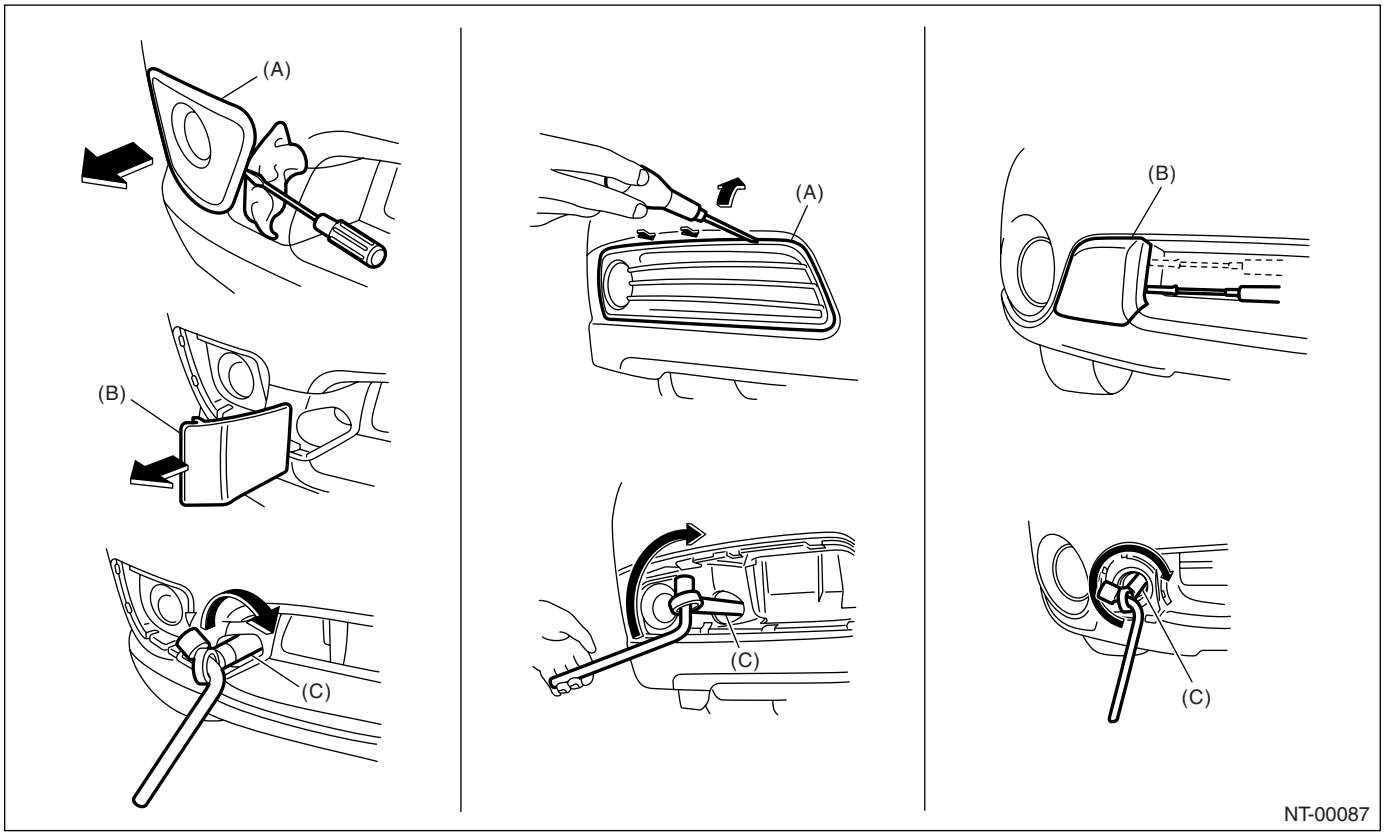


9. TOWING

Avoid towing vehicles except when the vehicle cannot be driven. For models with AWD, AT or VTD, use a loader instead of towing. When towing other vehicles, pay attention to the following to prevent hook or vehicle damage resulting from excessive weight.

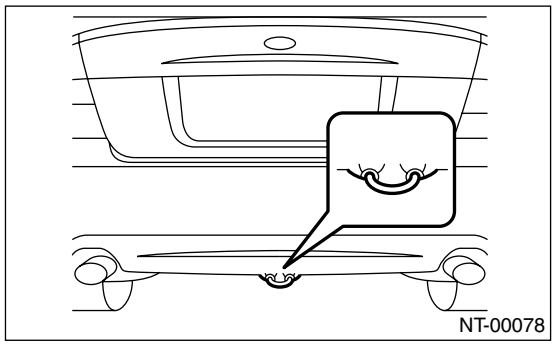
- Do not tow other vehicles with a front tie-down hook.
- Make sure the towing vehicle is heavier than the towed vehicle.
- FRONT

  Remove the fog light cover (except for OUTBACK model) and hook cover, and then install the hook.



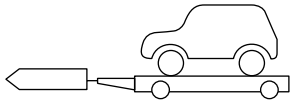
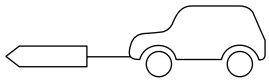
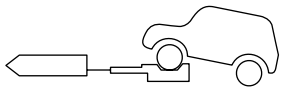
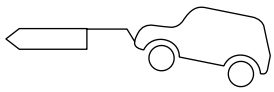
(A) Fog light cover (except for OUTBACK model)
(B) Hook cover
(C) Hook

- REAR



NOTE

• NOTES

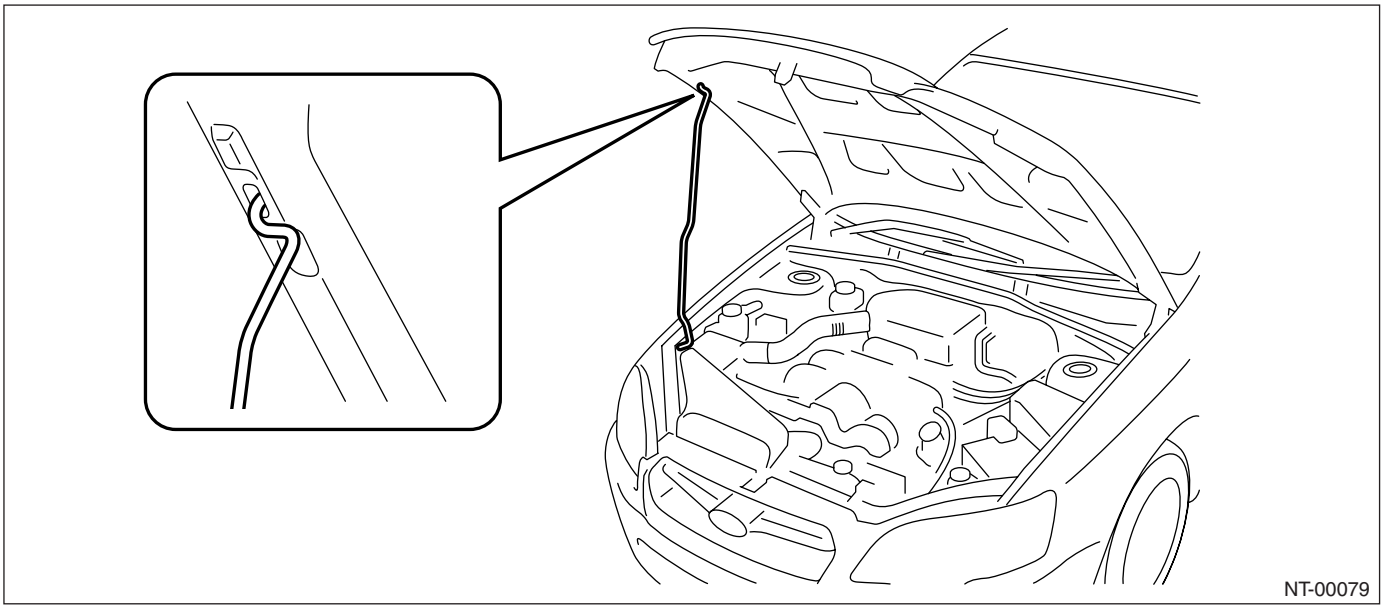
Towing	Notes	MT	AT
Lifting up four wheels (On a trailer)  NT-00023	Towing the vehicle after lifting up all four wheels is a basic rule for AWD model.	❍	❍
Rope  NT-00024	• Check if both front and rear wheels are rotated normally. • AT model driving conditions: Allow driving speed less than 30 km/h (19 MPH). Allow driving distance less than 30 km (19 miles).	❍	▲
Raising the front wheels  NT-00025	Prohibited for full-time AWD model.	×	×
Lifting up the front wheels  NT-00026	• Prohibited, due to damage on bumper, front grille, etc. • Do not raise the vehicle with bumper.	×	×

Marked ❍: OK, Marked ×: Prohibited, Marked ▲: Conditionally OK.

CAUTION:
- **Check ATF, gear oil and rear differential oil before driving.**
- **Place the shift lever in "N" position during towing.**
- **Do not lift up the rear wheels to avoid unsteady rotation.**
- **Turn the ignition key to "ACC", then check the steering wheel moves freely.**
- **Release the parking brake to avoid tire dragging.**
- **Since the power steering does not work, be careful for the heavy steering effort (When engine is stopped)**
- **Since the servo brake does not work, be careful that the brake is not applied effectively. (When engine is stopped)**
- **In case of the malfunction of internal transmission or drive system, lift up four wheels (on a trailer) for towing.**

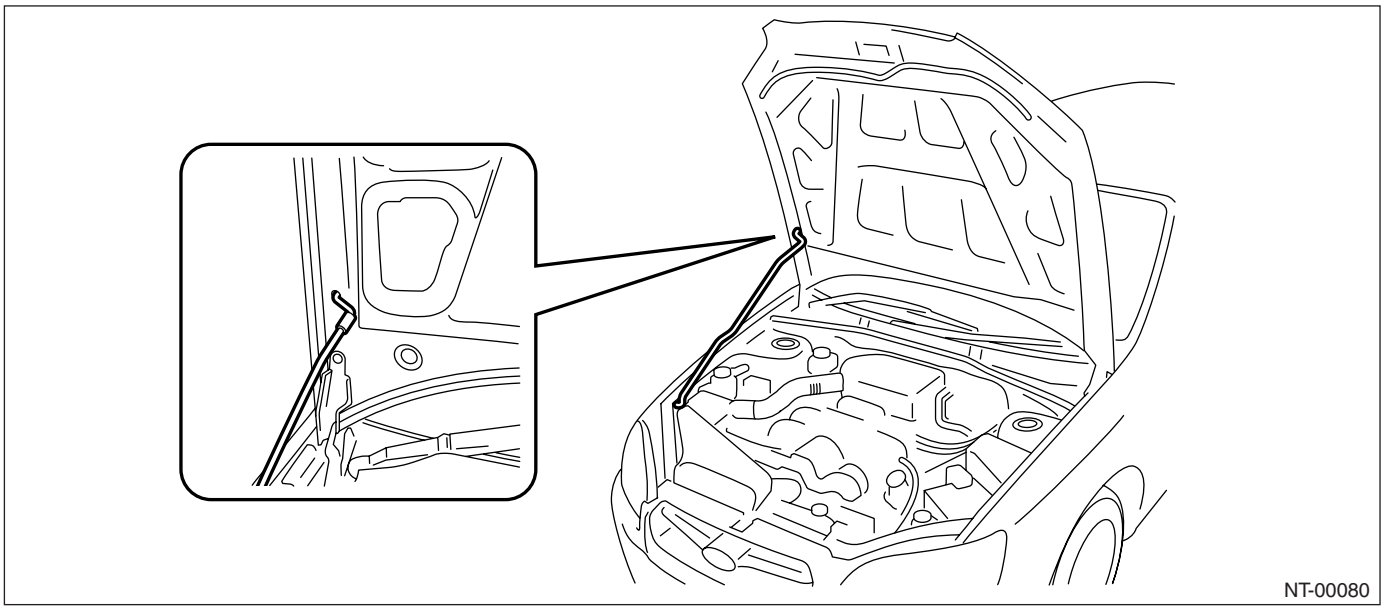
10.FRONT HOOD STAY INSTALLATION

- AT THE CHECK AND GENERAL MAINTENANCE



- WHEN WIDER HOOD OPENING IS NECESSARY

Set the stay into the hole of lower hood as shown in the figure below.

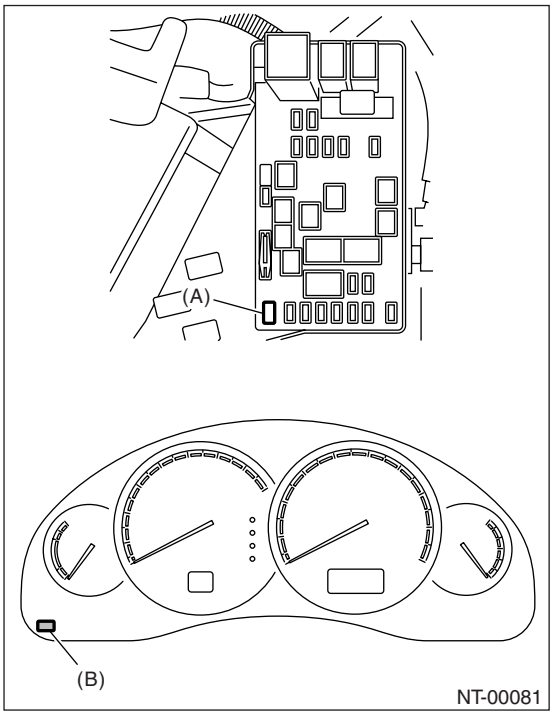


11.GENERAL SCAN TOOL

Using general scan tools will greatly improve the efficiency of repairing engine electronic controls. Subaru Select Monitor can be used to diagnose the engine, ABS, air conditioner and other parts.

12.AWD CIRCUIT MEASURES

1) Full-time AWD MT model
Since viscous coupling (limited slip differential) is used in the center differential, cut-off of AWD circuit cannot be carried out.
2) Full-time AWD 5AT model
Since VTD type is used in the center differential, cut-off of AWD circuit cannot be carried out.
3) Full-time AWD 4AT model
Insert a spare fuse into FWD fuse holder in the fuse box located in the left side of engine room to select the FWD. Since electronically controlled MT-P hydraulic multi-plate clutch is adapted for center differential, select FWD. When maintenance is performed with jack-up or on the free roller, check the illumination of AWD warning light in the combination meter.

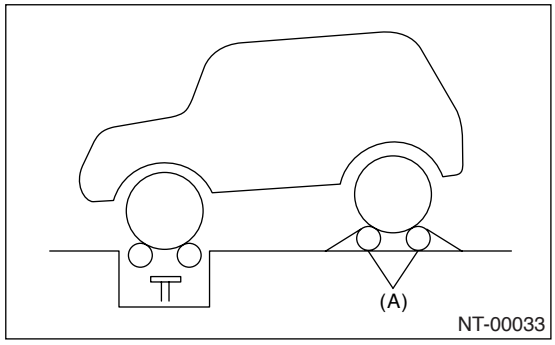


(A) FWD fuse holder
(B) AWD warning light

13.SPEEDOMETER TEST

1) Rear wheel free roller system
(1) Set the free roller on the floor of rear wheel side securely according to the wheel base and rear tread of the vehicle.
(2) Let the vehicle ride on the tester and free roller gently.

CAUTION:
Fix the vehicle using a pulling metal (chain or wire) to the front and rear towing hooks or tie-down hook to prevent the lateral runout of front wheels and springing out of vehicle.



(A) Free roller

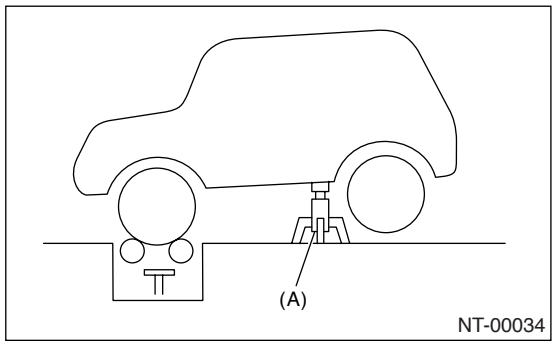
(3) Set the speedometer tester.
(4) Conduct the speedometer test work.

CAUTION:
Do not operate the clutch quickly and do not accelerate or decelerate suddenly during work.

2) Rear wheel jack-up system
(1) Set the vehicle on speedometer tester.

CAUTION:
Fix the vehicle using a pulling metal (chain or wire) to the front and rear towing hooks or tie-down hook to prevent the lateral runout of front wheels and springing out of vehicle.

(2) Jack up the rear wheels and set the rigid racks to the specified locations of side sill.



(A) Rigid rack

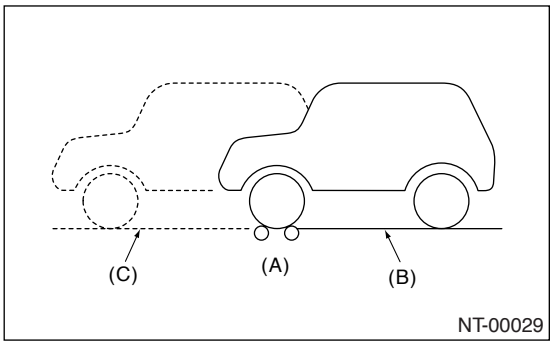
(3) Conduct the speedometer test work.

CAUTION:
Do not operate the clutch quickly and do not accelerate or decelerate suddenly during work.

14.BRAKE TEST

1) Full-time AWD MT model
(1) Perform this test after driving the vehicle 2 to 3 km (1.24 to 1.86 miles) on road in order to stabilize the viscous torque of viscous coupling.
(2) Keep the front or rear wheels on the ground for this test.

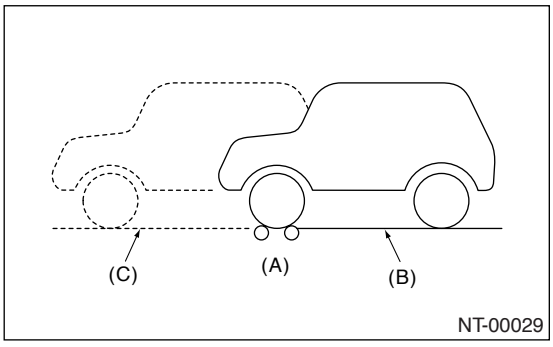
NOTE:
Effect of the viscous torque on braking force will be added approx. 25 kg compared with FWD model.



(A) Brake tester
(B) Position for measuring front wheel
(C) Position for measuring rear wheel

(3) When the brake dragging force is large.
• Check the dragging of brake pad or brake shoe.
• Since it may be affected by the viscosity of viscous couping, jack up either of the front or rear two wheels to check the each wheel rotation condition with the viscous coupling affection removed.

2) Full-time AWD AT model
(1) Keep the front or rear wheels on the ground during measurement.



(A) Brake tester
(B) Position for measuring front wheel
(C) Position for measuring rear wheel

(2) When the brake dragging force is large.
• Check the dragging of brake pad or brake shoe.

Specifications:

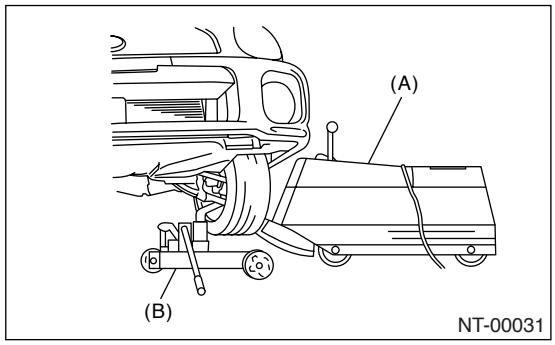
	Braking force
Rear wheel total	More than 10% of load on front or rear wheels
Difference between right and left wheels	Less than 8% of load on front or rear wheels
Grand total	More than 50% of vehicle weight at the time of test

• When measurement is difficult to carry out because both of front wheels are locked, check if break force measurement in this condition conforms to grand total.

15.ON THE CAR WHEEL BALANCING

CAUTION:
• Carry out this procedures after measuring the balance of each single tire.
• Set the vehicle so that the front and rear wheels are same height.
• Release the parking brake during measurement.
• Rotate each wheel by hands, and make sure it rotates without dragging.
• Do not operate the clutch quickly and do not accelerate or decelerate suddenly during work.
• When an error is indicated during engine drive, do not use the motor drive together.

1) Set the rigid rack to the specified locations of side sill, jack up the front or rear two wheels of non-measuring side and set the pickup stands to two wheels of measuring side.



(A) Balancer body
(B) Pickup stand

2) For drive wheel, drive the tires with engine for measurement.
3) For non-drive wheel, drive the tires from the on the car wheel balancer for measurement.

NOTE

IDENTIFICATION

ID

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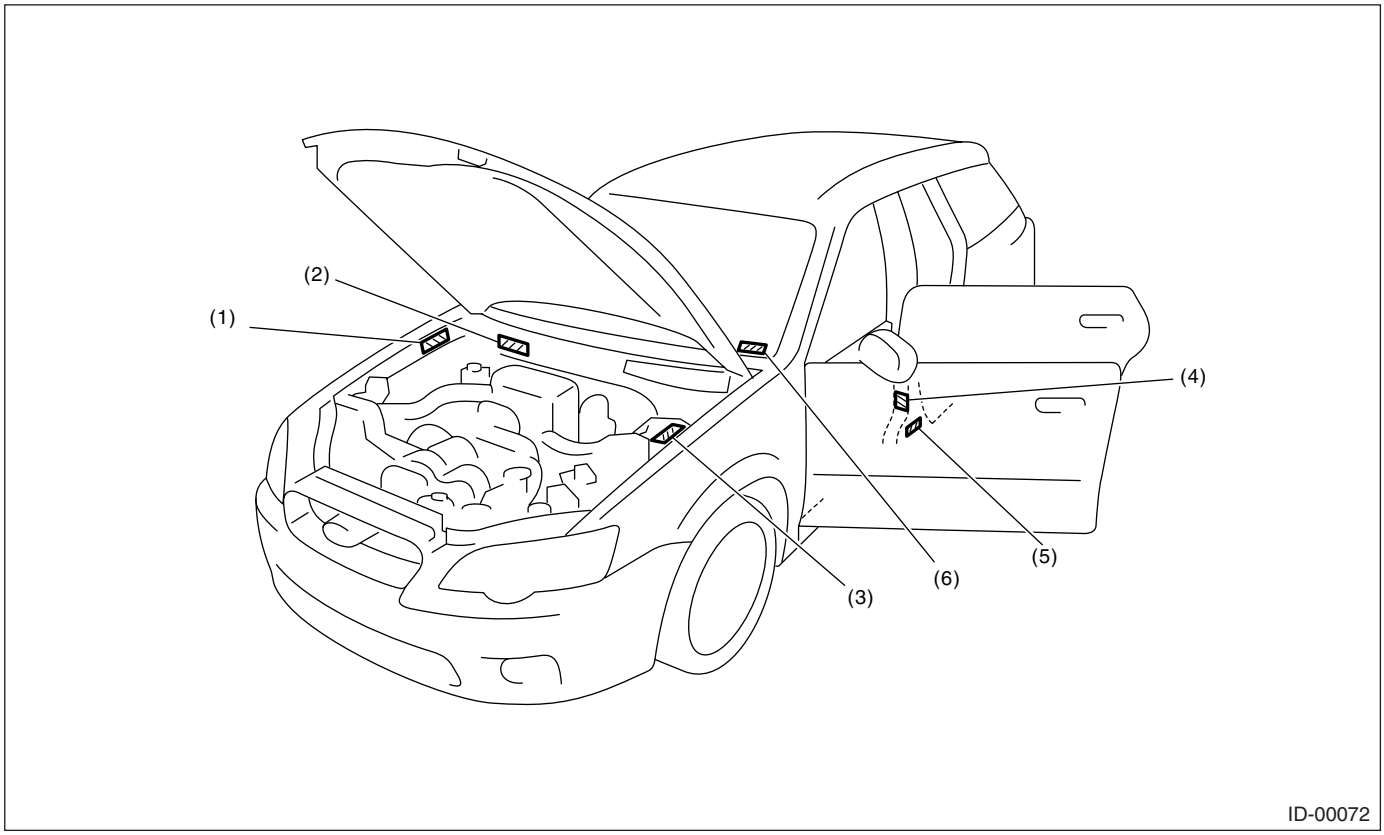
1. Identification

A: IDENTIFICATION

1. IDENTIFICATION NUMBER AND LABEL LOCATIONS

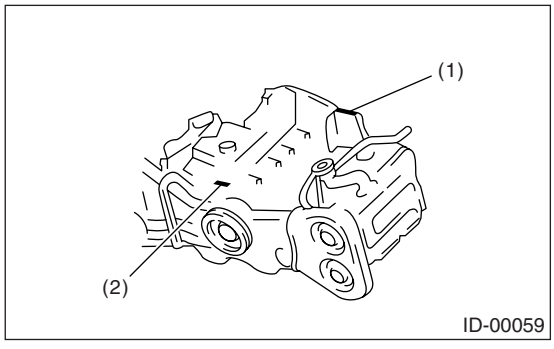
The V.I.N. (Vehicle Identification Numbers) is used to classify the vehicle.

- **POSITIONING OF THE PLATE LABEL FOR IDENTIFICATION**



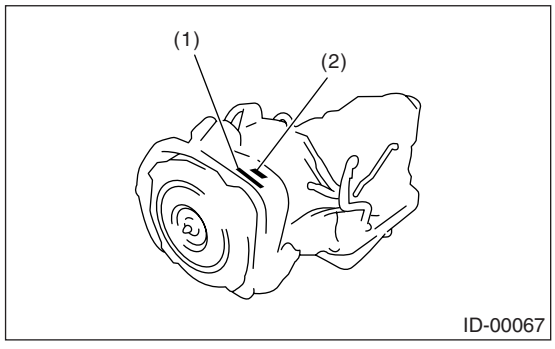
(1) ID plate (EC and EK model)
ADR compliance plate (KA model)
(2) Vehicle identification number (VIN)
(3) Model number plate
(4) Tire inflation pressure label (Driver side) (KA model)
Tire inflation pressure label (Driver side) (Except for KA model)
(5) Saudi Arabia plate (Saudi Arabia model)
Built date plate (KA model)
(6) Vehicle identification number (VIN) (EK and KA model)

- **ENGINE**



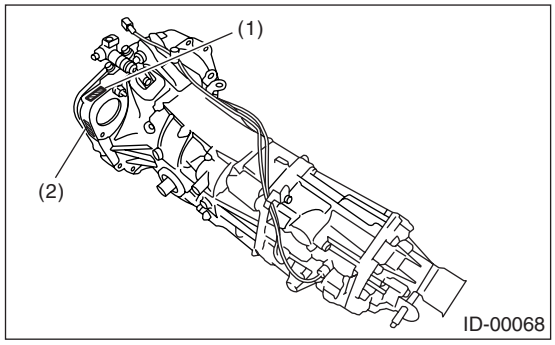
(1) Engine serial number (Punch mark)
(2) Engine type (Crankcase upper side)

- **AUTOMATIC TRANSMISSION**



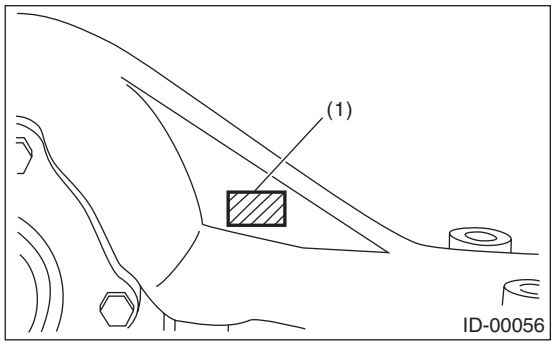
(1) AT type label
(2) Transmission serial number label

- **MANUAL TRANSMISSION**



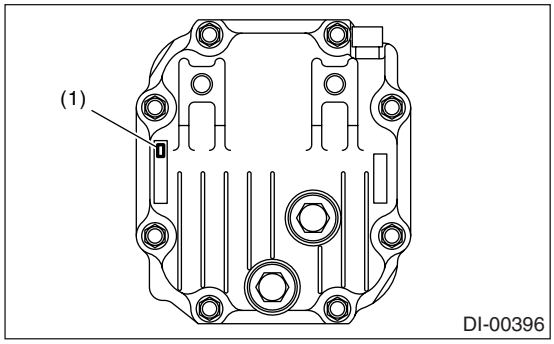
(1) Transmission serial No.
(2) MT type label

- **REAR DIFFERENTIAL**
  T-TYPE



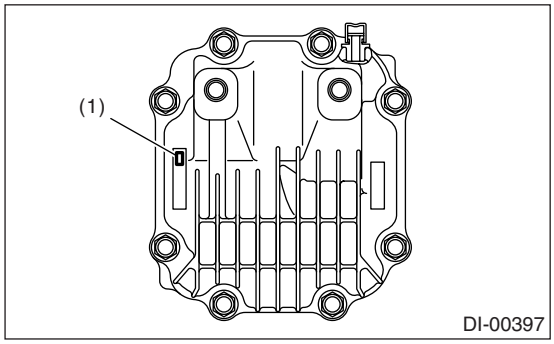
(1) Type (white paint)

VA1-TYPE



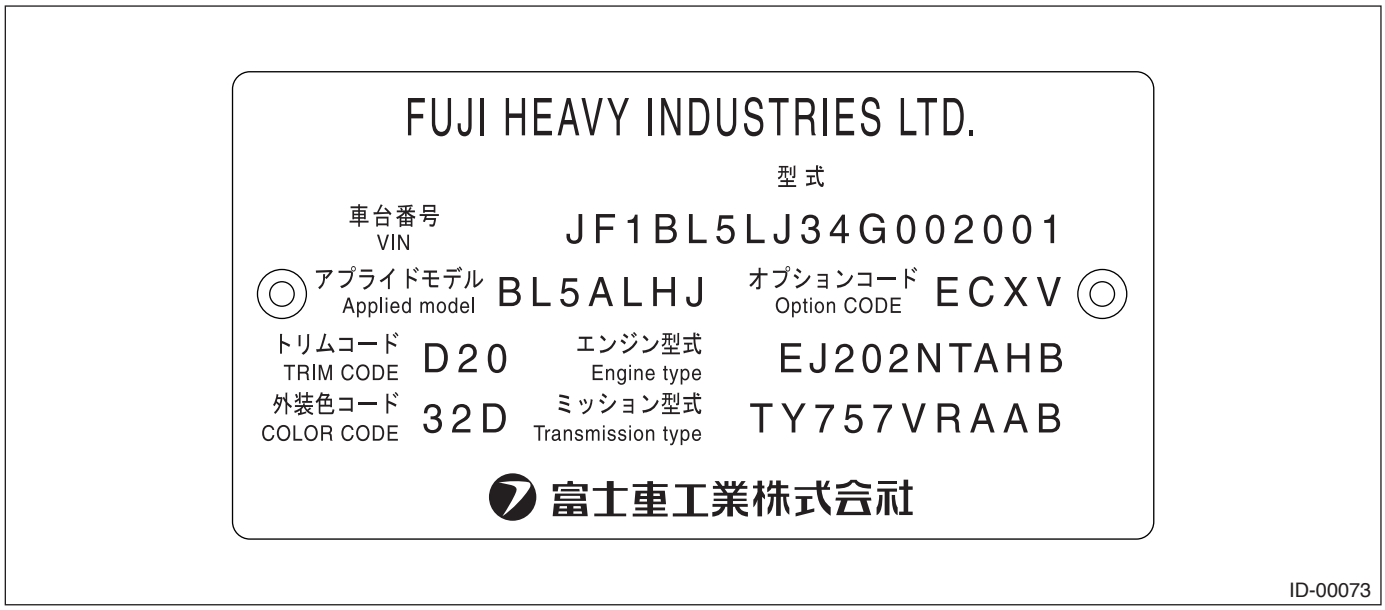
(1) Type (label)

VA2-TYPE



(1) Type (label)

- **MODEL NUMBER PLATE**



2. MEANING OF V.I.N.

The meaning of the V.I.N. is as follows:

• EC, EK, KA AND K4 MODEL

]JF1BL5LJ34G002001[

The starting and ending brackets ( ] [ ) are stop marks.

Digits	Code	Meaning	Details
1 — 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made (Except for KA OUTBACK model) JF2: Passenger car, FHI made (KA OUTBACK model)
4	B	Car line	LEGACY
5	L	Body type	L: Sedan P: Wagon
6	5	Displacement	5: 2.0 L AWD 9: 2.5 L AWD E: 3.0 L AWD
7	L	Steering position	L: LHD (Left-hand drive model) K: RHD (Right-hand drive model)
8	J	Engine & transmission	J: SOHC MPI 5MT Single range K: SOHC MPI 5MT Dual range L: SOHC MPI 4AT-SS U: DOHC MPI 5AT-SS V: DOHC MPI Turbo 5AT-SS
9	3	Drive type	3: Full-time AWD Single range 4: Full-time AWD Dual range 5: AWD AT A: AWD AT OUTBACK B: Full-time AWD Dual range OUTBACK
10	4	Model year	4: 2004MY
11	G	Factory location	G: FHI (Gunma)
12 — 17	002001	Serial number	From 002001

• KS MODEL

]JF1BL54MX4G002001[

The starting and ending brackets ( ] [ ) are stop marks.

Digits	Code	Meaning	Details
1 — 3	JF1	Manufacturer body area	JF1: Passenger car, FHI made
4	B	Car line	LEGACY
5	L	Body type	L: Sedan P: Wagon
6	5	Displacement	5: 2.0 L AWD 9: 2.5 L AWD
7	4	Grade	4: 2.0i 6: 2.5i 8: OUTBACK 2.5 i
8	M	Restraint	M: Manual belts, dual airbag
9	X	Check digit	0 — 9 & X
10	4	Model year	4: 2004MY
11	G	Transmission type	G: Full-time AWD 5MT Single range H: Full-time AWD 4AT J: Full-time AWD 5MT Dual range
12 — 17	002001	Serial number	From 002001

3. MODEL NUMBER PLATE

The model number plate indicates the type, V.I.N. <Ref. to ID-4, MEANING OF V.I.N., IDENTIFICATION, Identification.>, applied model, option code, trim code, engine type, transmission type and the exterior color code. This information is helpful when placing orders for parts.

• **BL5ALHJ**

Digits	Code	Meaning	Details
1	B	Series	LEGACY
2	L	Body type	L: Sedan P: Wagon
3	5	Engine displacement Drive system Suspension system	5: 2.0 L AWD 9: 2.5 L AWD E: 3.0 L AWD
4	A	Model year	A: 2004MY
5	L	Destination	K: Right-hand drive model market L: Left-hand drive model market
6	H	Grade	B: 2.0 GT H: 2.0 i J: 2.5 i L: 3.0 R M: 3.0 R-A N: 3.0 R P: 3.0 R-A R: OUTBACK 2.5 i V: OUTBACK 3.0 R W: OUTBACK 3.0 R-A
7	J	Transmission, fuel feed system	J: SOHC MPI 5MT K: SOHC MPI Dual range 5MT L: SOHC MPI 4AT TIP V: DOHC MPI Turbo 5AT TIP U: DOHC MPI 5AT TIP

The engine and transmission type are as follows:

• **ENGINE**

EJ202NTAHB

Digits	Code	Meaning	Details
1 and 2	EJ	Engine type	EJ: 4 cylinders EZ: 6 cylinders
3 and 4	20	Displacement	20: 2.0L 25: 2.5L 30: 3.0L
5	2	Fuel feed system	2: D-MPI-NA (SOHC)-B 3: MPI-NA (SOHC) D: MPI-NA (DOHC, H6) X: MPI Twin scroll single turbo
6	N	Detailed specifications	Used when ordering parts. See the parts catalog for details.
7	T	Transmission	L: 5AT without ATF cooler (with warmer function) P: 4AT without ATF cooler (with warmer function) S: 5MT (Flexible type flywheel) T: 5MT (Dual mass type flywheel) V: 4AT with ATF cooler (with warmer function) (H4), 5AT (H6)
8 — 10	AHB	Detailed specifications	Used when ordering parts. See the parts catalog for details.

• TRANSMISSION

TY757VRAAB

Digits	Code	Meaning	Details
1	T	Transmission	T: Transmission
2	Y	Transmission type	Y: Full-time AWD MT center differential V, G: Full-time AWD AT center differential Z: Full-time AWD AT MPT
3 and 4	75	Classification	75: 5MT 1B: 4AT 5C: 5AT
5	7	Series	LEGACY
6	V	Transmission specification	C: Full-time AWD VTD type 5AT L: Full-time AWD MPT type 4AT M: Full-time AWD VTD type 4AT V: Full-time AWD 5MT Single range with viscous coupling center differential X: Full-time AWD 5MT Dual range with viscous coupling center differential
7 — 10	RAAB	Detailed specifications	Used when ordering parts. See the parts catalog for details.

• REAR DIFFERENTIAL

XJ

Code	Reduction gear ratio	LSD
XJ	4.111	None
T2	4.111	None
VB	3.700	None
EZ	3.900	Viscous
XU	3.272	Viscous
CF	4.444	Viscous
XT	3.083	Viscous
JE	4.111	Viscous

• OPTION

ECXV

Digits	Code	Meaning	Details
1 — 2	EC	Destination	EC: For Europe (LHD model) EK: For Europe (RHD model) KS: For GCC counties K4: For Middle and South America KA: For Australia Nothing: For Hong Kong
3	X	Option equipment	A: Vehicle dynamics control, Cruise control, Power pack, 17 inch tire B: Cruise control, Winter pack, 17 inch tire E: Vehicle dynamics control, Cruise control, Power pack F: Cruise control, Winter pack G: Cruise control, 15 inch tire I: Cruise control, Winter pack, Power pack, 17 inch tire K: Cruise control, 17 inch tire S: Cruise control, Winter pack, Power pack U: Cruise control V: 17 inch tire X: Nothing Y: Vehicle dynamics control, Cruise control, Power pack, Winter pack, 17 inch tire Z: Vehicle dynamics control, Cruise control, Power pack, Winter pack 2: Cruise control, Power pack, 17 inch tire 3: Cruise control, Power pack 4: Cruise control, McIntosh audio, Power pack 5: Cruise control, McIntosh audio, Power pack, 17 inch tire
4	V	Option equipment	A: A/C B: A/C, Side airbag, Self levelizer F: A/C, Grade up pack J: A/C, Sunroof K: A/C, Side airbag, Curtain airbag, Navigation system N: A/C, Side airbag, Curtain airbag, Navigation system, Self levelizer, Sunroof O: A/C, Side airbag, Navigation system Q: A/C, Side airbag, Curtain airbag, Sunroof, Grade up pack S: A/C, Self levelizer U: A/C, Sunroof, Self levelizer V: Side airbag W: A/C, Side airbag, Curtain airbag, Sunroof X: nothing Y: A/C, Side airbag, Curtain airbag, Sunroof, Self levelizer Z: A/C, Side airbag

RECOMMENDED MATERIALS

RM

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1. Recommended Materials 2

1. Recommended Materials

A: RECOMMENDED MATERIALS

1. GENERAL

To insure the best performance, always use the specified oil, gasoline, adhesive, sealant, etc. or a substitute of equivalent quality.

2. FUEL

Always use gasoline of the same or higher octane value than specified in the owner's manual. Ignoring the specifications below will result in damage or poor operation of the engine and fuel injection system. Use the specified gasoline to correct performance.

• **Unleaded gasoline**

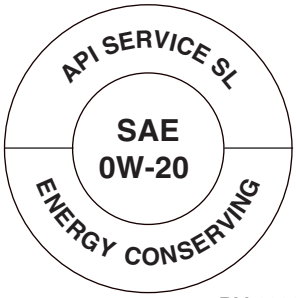
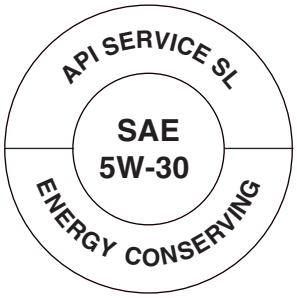
Use unleaded gasoline and not leaded gasoline for the vehicle with catalytic converter installed to reduce air pollution. Using leaded gasoline will damage the catalytic converter.

Model	Use kind	RON
2.0 L, 2.5 L	Unleaded gasoline	More than 95 RON More than 90 RON*
TURBO	Unleaded gasoline	More than 98 RON
3.0 L	Unleaded gasoline	More than 95 RON

*: KA and KS model

3. LUBRICANTS

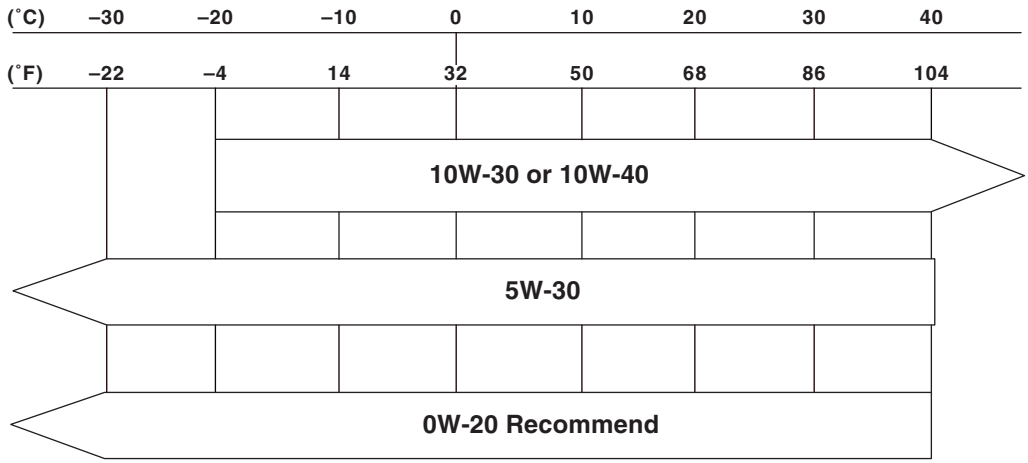
Use either the lubricants in the table below or equivalent. See the table below to choose the correct SAE viscosity.

Lubricant	Recommended			Alternative
	API Spec.	CCMC Spec.	ACEA Spec.	API Spec.
Engine oil	SL, SJ Grade “Energy conserving”, or SH  RM-00006  RM-00001 RM-00002	SL, SJ Grade “Energy conserving”, or SH	G4 or G5	A1, A2 or A3	SG, SF
Manual transmission oil	GL-5	—	—	—
AT front differential gear oil	GL-5	—	—	—
Rear differential gear oil	GL-5	—	—	—

SAE viscosity No. and applicable temperature

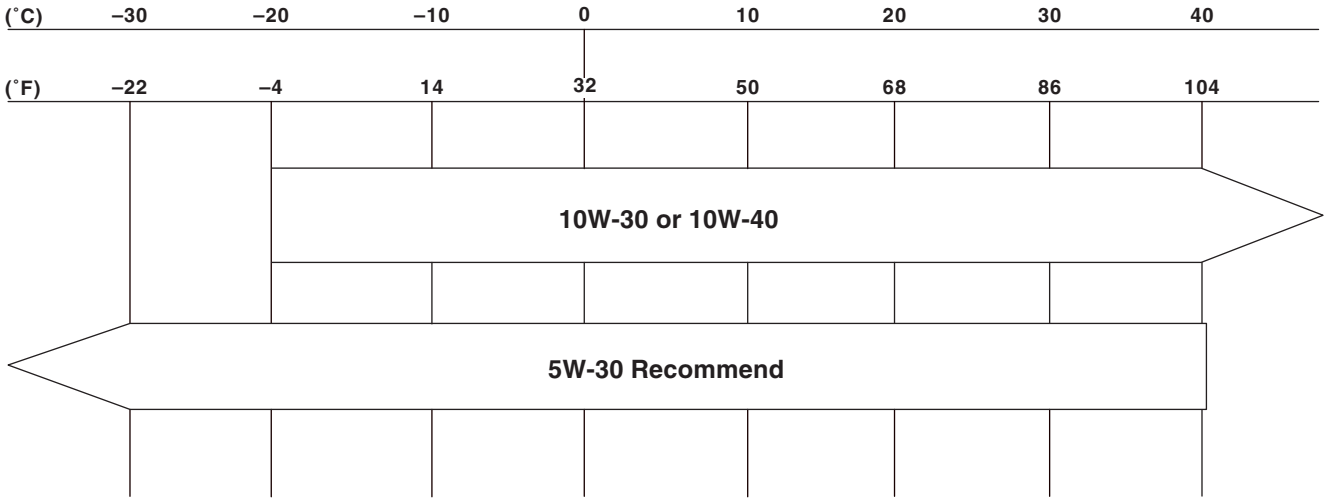
Engine oil

SOHC model



RM-00007

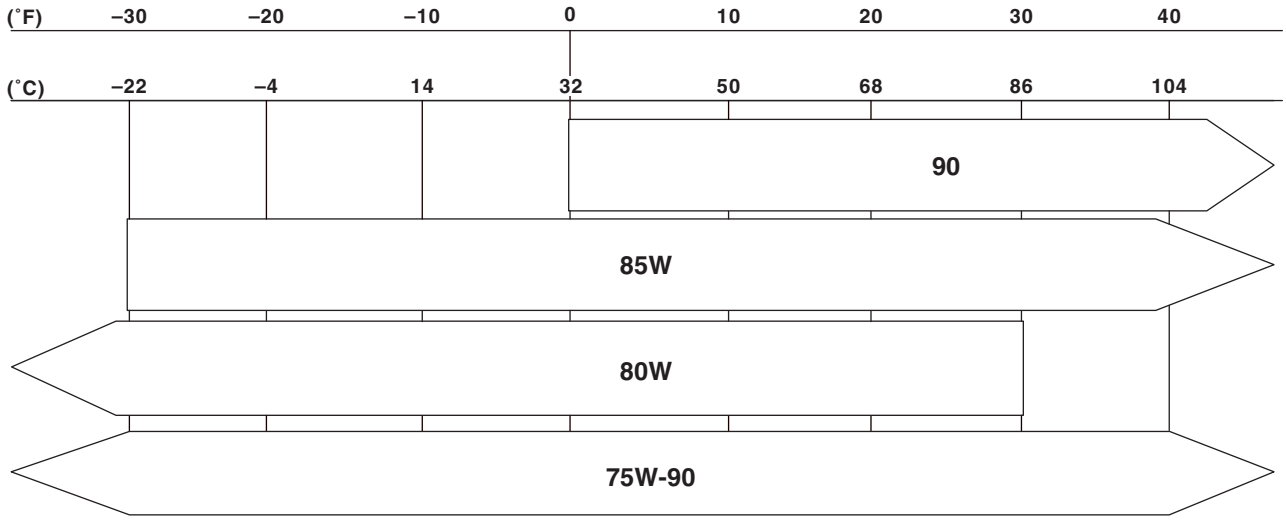
3.0 L and DOHC turbo model



RM-00003

SAE viscosity No. and applicable temperature

Manual transmission oil, rear differential gear oil and AT front differential gear oil



RM-00004

4. FLUID

Use the fluids specified in the table below. Do not mix two different kinds or makes of fluid.

CAUTION:
Be sure to use the recommended or equivalent ATF for 5AT. Using the ATF other than recommended or equivalent would be a trouble cause.

Fluid		Recommended	Item number	Alternative	Remarks
Automatic transmission fluid	4AT	SUBARU ATF	K0410Y0700	IDEMITSU: APOLLOIL ATF HP Castrol: Transmax J	If it is impossible to get recommended or alternative ATF, DEXRON III can be used.
	5AT	SUBARU ATF	K0410Y0700	IDEMITSU: ATF HP Castrol: Transmax J	—
Power steering fluid		DEXRON III	—	—	—
Brake fluid		FMVSS No. 116 DOT3	—	—	—
Clutch fluid		FMVSS No. 116 DOT3	—	—	—

5. COOLANT

Use genuine coolant to protect the engine.

Coolant	Recommended	Item number	Alternative
Coolant	SUBARU coolant	000016218	None
Water for dilution	Distilled water	—	Tap water (Soft water)

6. REFRIGERANT

Standard air conditioners on Subaru vehicles use HFC134a refrigerant. Do not mix it with other refrigerants. Also, do not use any compressor oil other than DENSO OIL 8.

Air conditioner	Recommended	Item number	Alternative
Refrigerant	HFC134a	—	None
Compressor oil	DENSO OIL 8	—	None

7. GREASE

Use the grease and supplementary lubricants shown in the table below.

Grease	Application point	Recommended	Item number	Alternative
Supplementary lubricants	• Oxygen sensor • Bolts, etc.	Spray type lubricant	—	—
Grease	MT main shaft	CLUTCH GREASE	K0879Y0501	—
	Clutch master cylinder push rod	SILICONE GREASE G-40M	004404003	—
	• Gear shift lever • Select lever • Clutch operating cylinder • Clutch pedal • Brake pedal • Clutch bearing • Clutch release lever	SUNLIGHT2	003602010	—
	• Door latch • Door striker	SILICONE GREASE G-30M	004404002	—
	Steering gearbox	VALIANT GREASE M2	003608001	—
	Disc brake (Lock pin, guide pin, piston boot)	NIGLUBE RX-2	K0779GA102	—
	Between brake pad and shim	Molykote AS-880N	K0777YA010	—
	Brake pad clip	Molykote M7439	—	—
	Front axle PTJ	NSG301	—	—
	• Front axle EBJ • Rear axle BJ • Rear axle EBJ	NTG2218-M	—	—
	Rear axle DOJ	NKG205	—	—

8. ADHESIVE

Use the adhesives shown in the table below, or equivalent.

Adhesive	Application point	Recommended	Item number	Alternative
Adhesive	Windshield, rear window glass, rear quarter glass, rear gate and body	Dow Automotive's Adhesive: Gurit-ESSEX Betaseal 1502 or equivalent Glass primer: Betawipe VP 04604, Betawipe 5001 Paint surface primer: Betaprime 5402	—	—
	Rearview mirror base	REPAIR KIT IN MR	65029FC000	—
	Soft vinyl	CEMEDINE 540	—	3M's EC-776, EC-847 or EC-1022 (Spray type)
	Momentary sealant	CEMEDINE 3000	—	ARMSTRONG's Eastman 910

9. SEAL MATERIAL

Use the seal material shown in the table below, or equivalent.

Seal material	Application point	Recommended	Item number	Alternative
Seal material	• MT transmission case • Cylinder block • Converter case • DOHC camshaft cap (Turbo model)	THREE BOND 1215	004403007	DOW CORNING's No. 7038
	Transmission oil pan (AT model)	THREE BOND 1217B	K0877YA020	—
	Engine oil pan (Except for 3.0 L model)	THREE BOND 1207C	004403012	—
	• Rear differential • Engine oil pressure switch • Cylinder head (Nipple) • Camshaft bowl-shape plug	THREE BOND 1324	004403042	—
	• Rear differential • PCV valve	THREE BOND 1105	004403010	DOW CORNING's No. 7038
	Steering adjusting screw	THREE BOND 1141	004403006	—
	• SOHC camshaft cap • Cam cap (3.0 L model) • Semicircular plug (3.0 L model) • Rocker cover (3.0 L model) • Oil pan (Pan upper) • Block (Pan upper) • Back cover (Front cover, block head, pan upper)	THREE BOND 1280B	K0877YA018	THREE BOND 1217G
	• Front sealing cover • Rear sealing cover	3M Butyl Rubber 8626	—	—

PRE-DELIVERY INSPECTION

PI

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1. Pre-delivery Inspection.....2

1. Pre-delivery Inspection

A: GENERAL DESCRIPTION

The purposes of the pre-delivery inspection (PDI) are as follows.
- Remove the additional parts used for ensuring the vehicle quality during transportation and restore the vehicle to its normal state.
- Check if the vehicle before delivery is in a normal state.
- Check for any damage to the vehicle or parts that may have taken place during transportation or storage.
- Check if the vehicle after repair is in a normal state.
- Make sure to provide a complete vehicle to the customer.

For the above reasons, all SUBARU dealers (dealerships) carry out the PDIs before delivering a vehicle. Refer to this manual unless otherwise specified.

B: PRE-DELIVERY INSPECTION (PDI) PROCEDURE

STATIC CHECKS JUST AFTER VEHICLE RECEIPT

PROCEDURE	Check point
1. Appearance check	(1) If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents. If the protective coating has been removed, visually check the body paints for damage or stains in detail. (2) Visually check the glass and light lenses for any damage, cracks or excessive gaps to the body sheet metal. (3) Visually check the plated parts for any damage.
2. Tire check	(1) Check the tires for damage, abnormal conditions, and dents on the wheels. (2) Check the tire air pressure.
3. Fuse installation	If the vehicle is about to be delivered to the customer, attach a back-up fuse.
4. Air conditioner harness connection	If the vehicle is about to be delivered to the customer, connect air conditioner harness.
5. Check the doors for lock/unlock and open/close operations.	(1) Using the key, check if the trunk lid can be locked or unlocked normally. (2) Open and close all doors to see that there are no abnormal conditions. (3) Operate the power door lock switch to check that the door (rear gate) is locked and unlocked normally.
6. Double lock operation check	Check the double lock for normal operations.
7. Check the operation of child safety lock system	Check that the child safety lock system operates normally.
8. Check the trunk lid for open/close operations.	(1) Operate the trunk lock release lever to check that the trunk opens normally. (2) Operate the opener cancel lever of trunk lock to check that it operates normally. (3) Open and close the trunk lid to see that there are no abnormal conditions.
9. Check the rear gate for lock/unlock and open/close operations.	(1) Check if the rear gate can be unlocked normally through the emergency hole. (2) Open and close the rear gate to see that there are no abnormal conditions.
10. Operation check of fuel lid opener lock release lever	Operate the fuel lid opener to check that the fuel lid is unlocked normally.
11. Accessory check	Check that the following accessories are provided. • Owner's manual • Warranty booklet • Maintenance note • Spare key • Jack • Tool set • Spare tire
12. Operation check of front hood lock release system	Operate the front hood lock release lever to check that the front hood is unlocked normally.
13. Battery	Check the battery terminals for any abnormal conditions such as rust and trace of battery fluid leaks.
14. Brake fluid	Check that the fluid level is normal.

PROCEDURE	Check point
15. Engine oil	Check that the oil level is normal.
16. Transmission gear oil	Check that the transmission gear oil level is normal.
17. AT front differential oil	Check that the AT front differential oil level is normal.
18. Engine coolant	Check that the engine coolant level is normal.
19. Clutch fluid	Check that the clutch fluid level is normal.
20. Window washer fluid	Check that the window washer fluid level is normal.
21. Front hood latch check	Check that the hood is closed and latched securely.
22. Keyless entry system	Check that the keyless entry system operates normally.
23. Seat	(1) Check the seat surfaces for stain or dirt. (2) Check the seat installation conditions and functionality.
24. Seat belt	Check the seat belt installation conditions and functionality.
25. Wheel alignment	Check that the wheel alignments are properly adjusted.

CHECKS WITH ENGINE RUNNING

PROCEDURE	Check point
26. Test mode connector	Test mode connectors
27. Immobilizer system	(1) Check that the engine starts with all keys that are equipped on vehicle. (2) 60 seconds after turning ignition switch from ON to ACC or OFF, or immediately after removing key, check that the security indicator light blinking.
28. Starting condition	Start the engine and check that the engine starts smoothly.
29. Exhaust system	Check that the exhaust noise is normal and no leaks are found.
30. Indicator and warning lights	Check that all the indicator and warning lights are gone out.
31. Clock	Check that the clock operates normally.
32. Audio	Check the radio, CD and MD player for normal operation.
33. Navigation system	(1) Check all display functions for normal operation. (2) Check the map disc (DVD) are provided on vehicle. (3) Check that the navigation system operates normally.
34. Front accessory power supply socket	Check that the front accessory power socket operates normally.
35. Lighting system	Check that the lighting system operates normally.
36. Wiper deicer	Check that the wiper deicer operates normally.
37. Rear fog light	Check that the rear fog light operates normally.
38. Illumination control	Check that the illumination control operates normally.
39. Window washer	Check that the window washer system operates normally.
40. Wiper	Check that the wiper system operates normally.
41. Power window operation check	Check the power window for normal operations.
42. Cargo fan	Check that the cargo fan operates normally.
43. Sunroof	Check that the sunroof operates normally.
44. Door mirror	Check that the remote control mirror operates normally.

DYNAMIC TEST WITH VEHICLE RUNNING

PROCEDURE	Check point
45. Brake test	Check the foot brake for normal operations.
46. Parking brake	Check the parking brake for normal operations.
47. AT shift control	Check that the AT shift patterns are correct.
48. Heater & ventilation	Check that the heater & ventilation system operates normally.
49. Air conditioner	Check that the air conditioner operates normally.
50. Cruise control	Check that the cruise control system operates normally.

CHECKS AFTER DYNAMIC TEST

PROCEDURE	Check point
51. ATF level	Check that the ATF level is correct.
52. Power steering fluid level	Check that the power steering fluid level is normal.

PROCEDURE	Check point
53. Fluid leak check	Check for fluid/oil leaks.
54. Water leak test	Spray the vehicle with water and check for water leaks.
55. Appearance check 2	(1) Remove the protective coating (if any). (2) Check the body paints for damage and stain. (3) Check the plated parts for damage and rust.

1. APPEARANCE CHECK

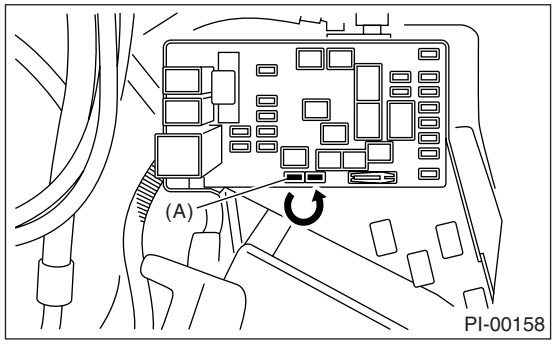
• If the vehicle is covered with protective coating, visually check the vehicle body for damage and dents.
• When the protective coating is removed, visually check the body paints for damage or stains in detail and repair as necessary.
• Visually check the windshield glass, door glasses and light lenses for any damage, cracks or excessive gaps to the body sheet metal and repair as necessary.
• Visually check the plated parts, such as the grilles and door knobs, for damage or loss of gloss and replace the parts as necessary.

2. TIRE CHECK

• Check the tires for damage, abnormal conditions, and dents on the wheels.
• Check the tire size, spare tire and tire air pressure described on the tire air pressure label (driver's side).

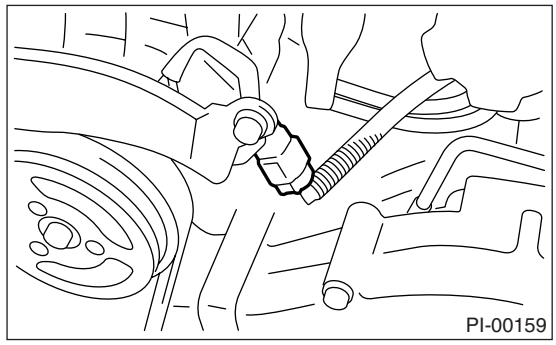
3. FUSE INSTALLATION

Fuses for the back-up circuit have been removed to prevent battery discharge. If the vehicle is about to be delivered to the customer, attach a 20 A fuse (A) as shown in the figure.



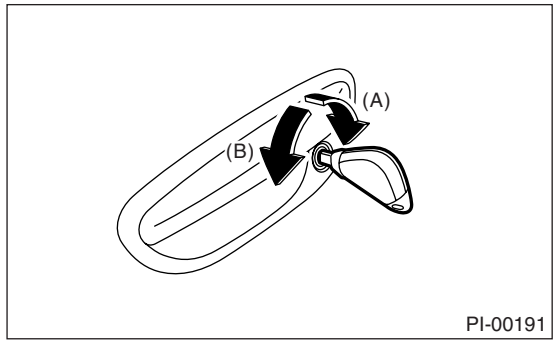
4. CONNECTION OF AIR CONDITIONER HARNESS

A vehicle just delivered has its air conditioner harness disconnected to protect the air conditioner compressor. Connect the harness as shown in the figure. (Except for 3.0 L model)



5. CHECK DOORS FOR LOCK/UNLOCK AND OPEN/CLOSE OPERATIONS

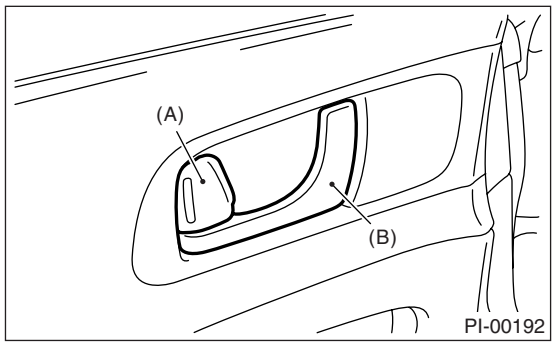
1) Using the key, lock and unlock the door several times to check for normal operation. Open and close the door several times for smooth movement.



(A) Unlock
(B) Lock

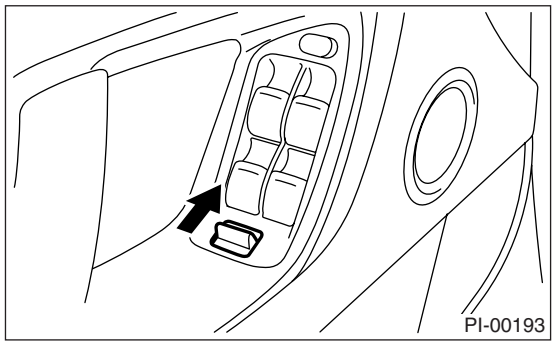
2) Completely close the driver's door, and then check the smooth movement with operating door lock knob from lock to unlock several times.
Set the door lock knob (A) to lock position. Then pull the inner remote (B) to ensure that doors will not open.

For other doors, place the door lock knob (A) to lock position and then pull the inner remote (B) to ensure that doors will not open.

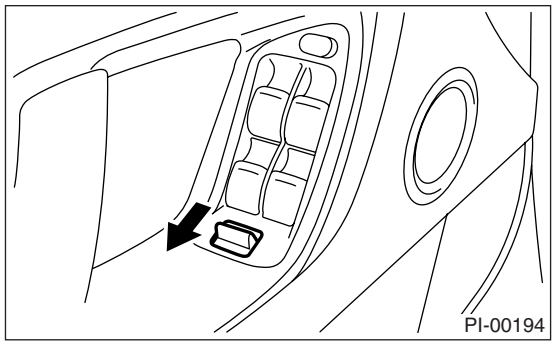


(A) Door lock knob
(B) Inner remote

3) Close all the doors, and then press the lock on power door lock switch at driver's side. Check that all doors including rear gate are locked.



4) Press the driver's side power door lock switch to unlock side. Check that all doors including rear gate are unlocked.



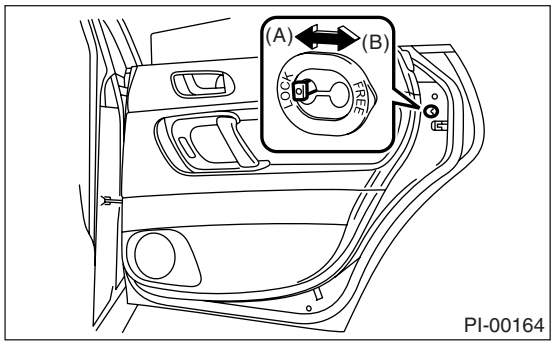
5) Insert the key to ignition switch, and open the driver's side door. Press lock on power door lock. Check that the door is not locked.

6. CHECK DOUBLE LOCK OPERATION

1) Fully open all the windows.
2) Remove the key.
3) Lock all the doors using the door key cylinder or keyless transmitter.
4) Verify that all the doors including rear gate are not unlocked when pressing power door lock switch to unlock side.
5) Verify that the door is not opened when operating door lock knob to unlock position and pulling inner remote. Perform the same check for other doors.
6) Check that all the doors are unlocked when door is unlocked using door key cylinder or keyless transmitter, or ignition switch is turned to ON.

7. CHECK OPERATION OF CHILD SAFETY LOCK SYSTEM

1) Set the child safety lock on both rear doors to the lock position.
2) Close the rear doors completely.
3) Check that the lock levers of the rear doors are in the unlock position. Then, pull inner remote of rear doors to ensure that doors will not open.



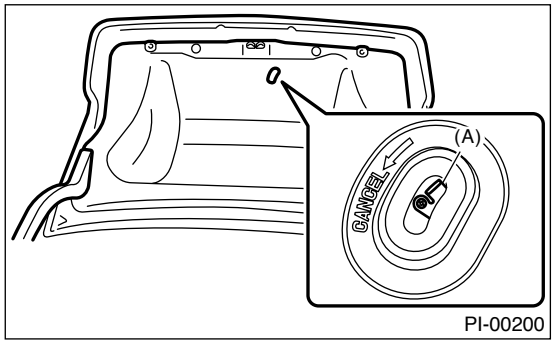
(A) Lock
(B) Unlock

4) Pull the outer handles to ensure that doors will open.

8. CHECK TRUNK LID FOR OPEN/CLOSE OPERATIONS

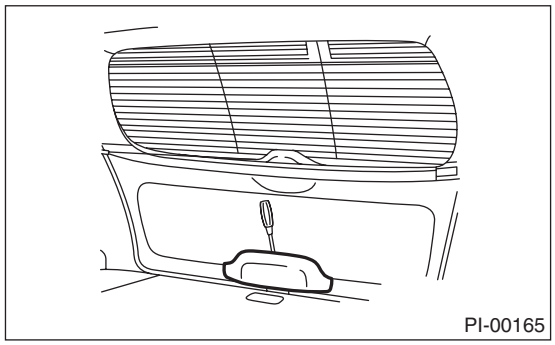
1) Operate the trunk lock release lever to check that the trunk opens normally.
2) Open and close the trunk lid several times for smooth movement.

3) Put the lever (A) in the cancel lever of trunk lid to cancel position, and close the trunk lid. Check that the trunk lid will not open even when the trunk lock release lever is operated. Also, check that the trunk lid will open with keyless transmitter, then put the lever back.

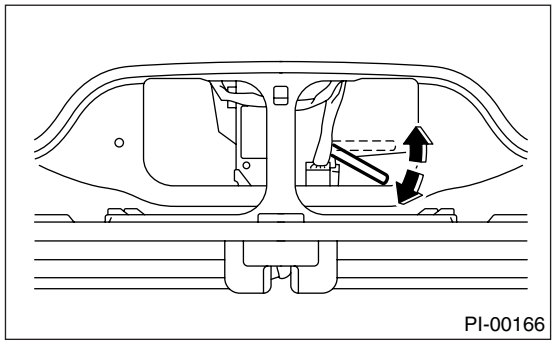


9. CHECK REAR GATE FOR LOCK/UNLOCK AND OPEN/CLOSE OPERATIONS

1) Open and close the rear gate several times for smooth movement.
2) Operate the rear gate lever to check that the rear gate is locked and unlocked normally.
(1) Remove the cover inside the rear gate.



(2) Operate the lever to check that the rear gate is locked and unlocked normally.

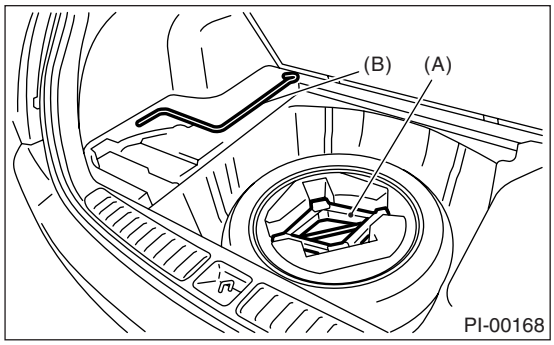


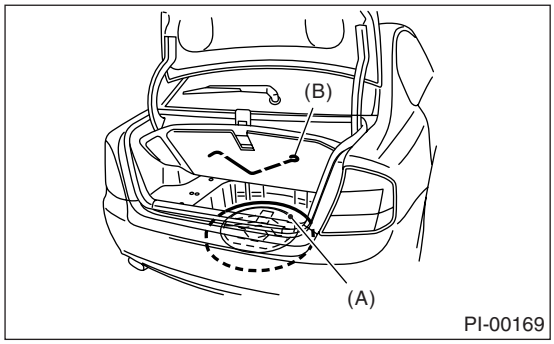
10. OPERATION CHECK OF FUEL LID OPENER LOCK RELEASE LEVER

Operate the fuel lid opener and verify that the fuel lid is unlocked normally. Check that the filler cap is securely closed.

11. ACCESSORY CHECK

Check that the following accessories are provided.
- Owner's manual
- Warranty booklet
- Maintenance note
- Spare key
- Jack
- Tool set
- Spare tire

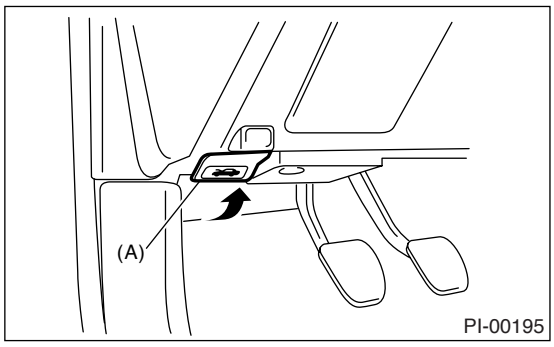




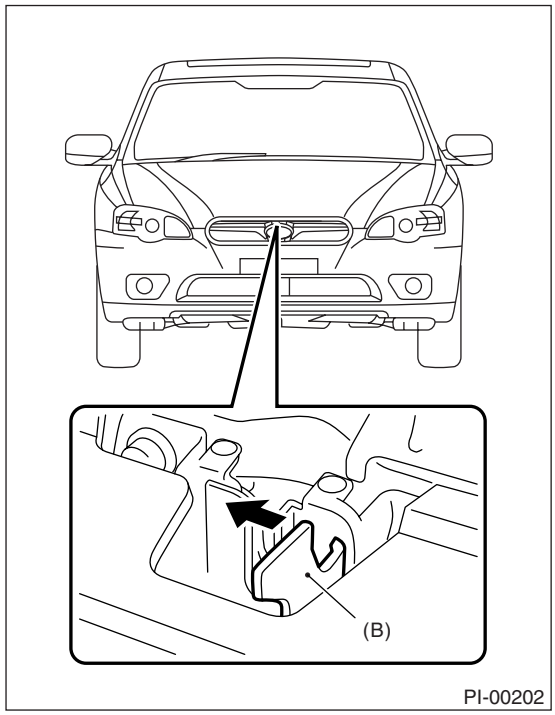
(A) Jack
(B) Jack handle

12. OPERATION CHECK OF FRONT HOOD LOCK RELEASE SYSTEM

Operate the front hood lock release lever (A) to check that the front hood is unlocked normally.

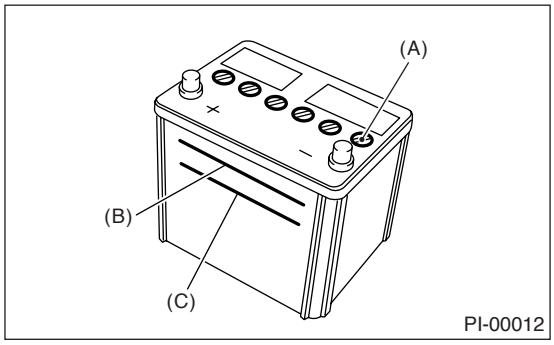


Operate the lever (B) and check that the front hood is opened normally. Support the front hood with hood stay.



13.BATTERY

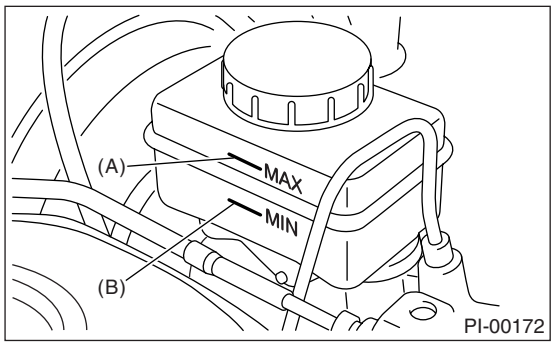
Check the battery terminals to make sure that there are no rust or corrosions due to fluid leaks. Check that the battery caps are securely tightened.



(A) Cap
(B) Upper level
(C) Lower level

14.BRAKE FLUID

Check that the brake fluid level is normal. If the amount is insufficient, carry out a brake line test to identify brake fluid leaks and check the brake operation. After that, refill the brake fluid tank with the specified type of fluid.

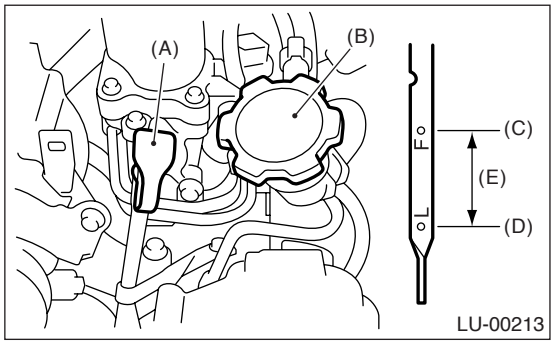


(A) MAX. level
(B) MIN. level

15.ENGINE OIL

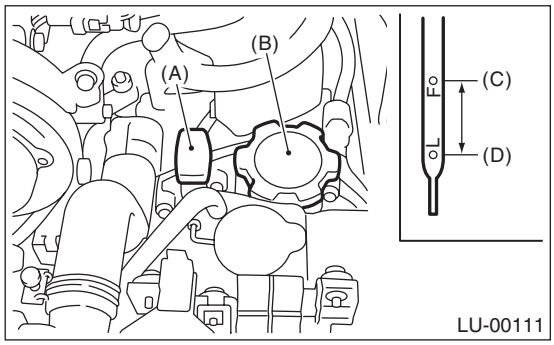
Check the engine oil amount. If the amount of oil is insufficient, check that no leaks are found. Then, add the necessary amount of the specified engine oil.

• Except for 3.0 L model



(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

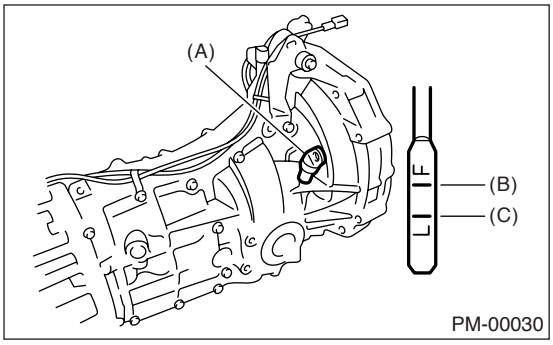
• 3.0 L model



(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level

16.TRANSMISSION GEAR OIL

Check that the transmission gear oil level is normal. If the amount of fluid is insufficient, check that no leaks are found. Then, add the necessary amount of the specified transmission gear oil.

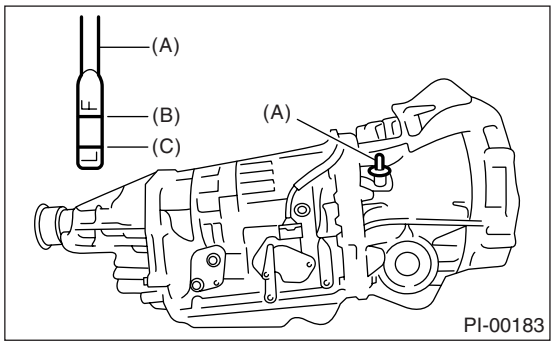


(A) Oil level gauge
(B) Upper level
(C) Lower level

17.AT FRONT DIFFERENTIAL OIL

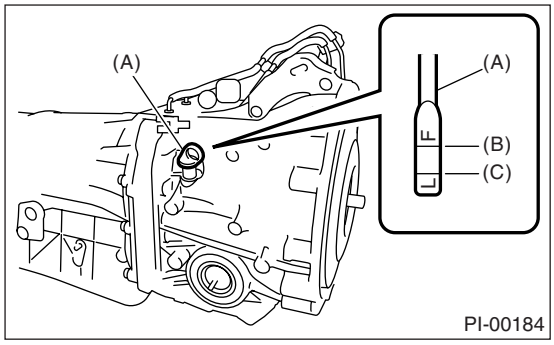
Check that the AT front differential oil level is normal. If the amount of oil is insufficient, check that no leaks are found. Then, add the necessary amount of the specified AT front differential oil.

• 4AT model



(A) Oil level gauge
(B) Upper level
(C) Lower level

• 5AT model



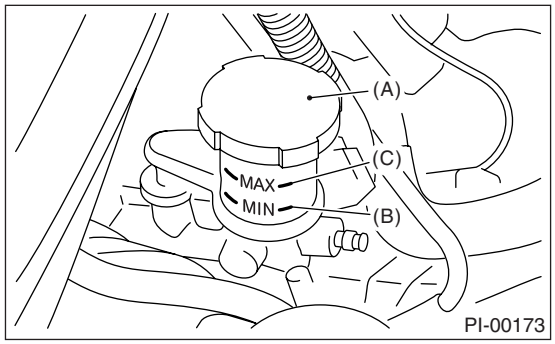
(A) Oil level gauge
(B) Upper level
(C) Lower level

18.ENGINE COOLANT

Check that the engine coolant level on the reservoir tank is normal. If the amount of engine coolant is insufficient, check that no leaks are found. Then, add the necessary amount of coolant with the specified concentration.

19.CLUTCH FLUID

Check that the clutch fluid level is normal. If the amount of fluid is insufficient, check that no leaks are found. Then, add the necessary amount of specified fluid.



(A) Reservoir tank
(B) MIN. level
(C) MAX. level

20.WINDOW WASHER FLUID

Check that the window washer fluid level is normal. If the amount is insufficient, check that no leaks are found. Then, add the necessary amount of washer fluid.

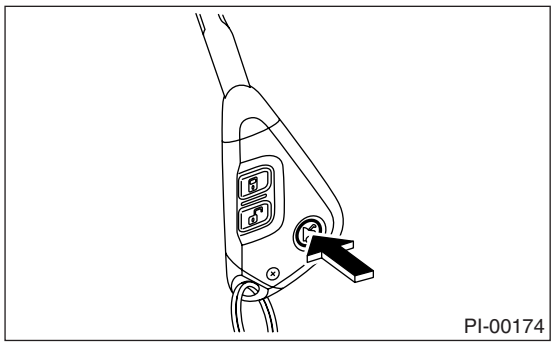
21.FRONT HOOD LATCH CHECK

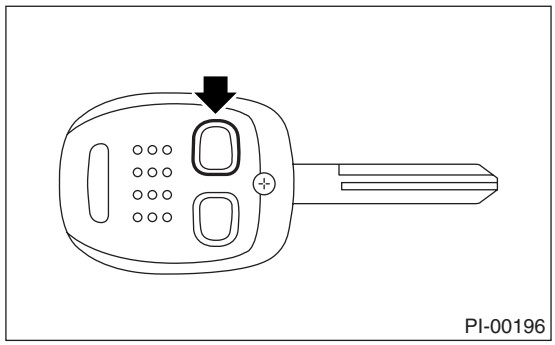
Retract the hood stay and close the front hood. Check that the front hood is securely latched.

22.KEYLESS ENTRY SYSTEM

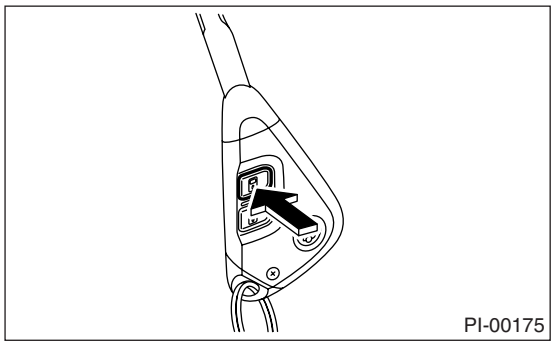
NOTE:
The following inspections show the initial settings. When the settings are different from the initial settings, use Subaru Select Monitor to check the details of each setting for inspections. <Ref. to LAN(diag)-26, OPERATION, Read Current Data.>

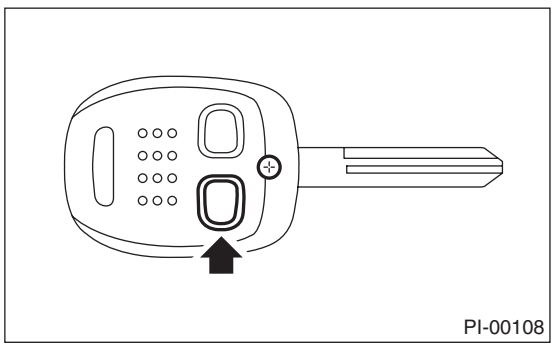
1) Fully open all the door windows.
2) Remove the key from the ignition switch and close all the doors including rear gate.
3) Press the “LOCK” or “UNLOCK” button on the keyless transmitter 1 sec. or more and check if the door window of driver seat is opened/closed.
4) Press the trunk open button (except for EK model) or “UNLOCK” button (EK model) for more than one second. Check if the trunk is unlocked and the hazard light flashes twice.



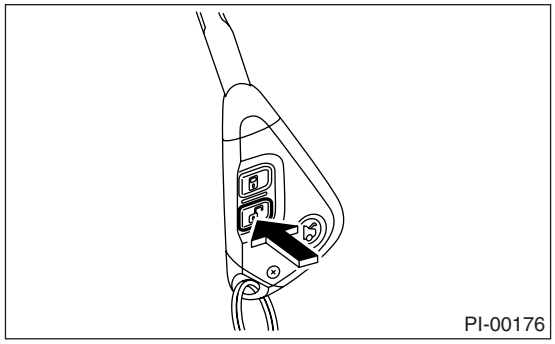


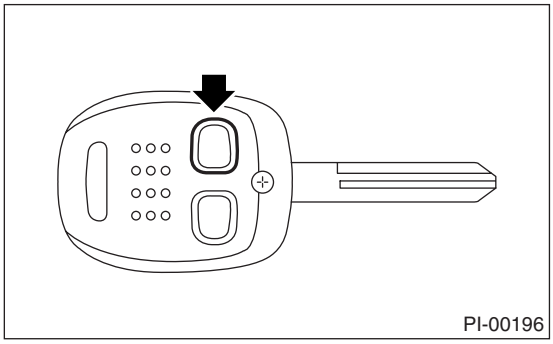
5) Press the “LOCK” button on the keyless transmitter with the trunk lock opened. Check if the all doors are locked, hazard light blinks five times and warning shows trunk open.
6) Press the “LOCK” button momentarily on the keyless transmitter. Check that all the doors are locked and room light goes off.





7) Press the “UNLOCK” button momentarily on the keyless transmitter. Check that the driver’s door is unlocked and hazard light blinks twice and room light is lit for 15 seconds.
And press the “UNLOCK” button momentarily again in 5 seconds (except for EK model). Check that all the doors including rear gate are unlocked.


PI-00176


PI-00196

8) Close all the doors including rear gate and press the “LOCK” button on the keyless transmitter. Press the “OPEN” button on the keyless transmitter and wait for 25 seconds. Check if all the doors including rear gate are locked. (Except for EK model)

23.SEAT

1) Check the seat surfaces for stains or dirt.
2) Check that each seat provides full functionality in sliding and reclining. Check all available functions of the rear seat such as a trunk-through center armrest.

24.SEAT BELT

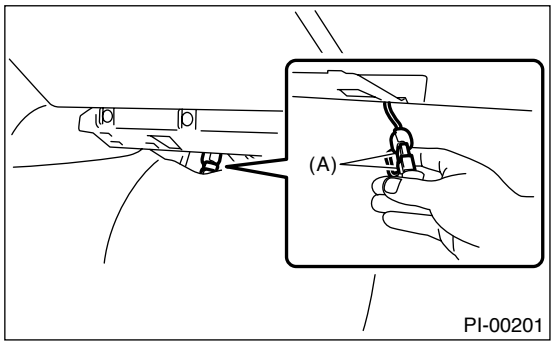
1) Check installation condition of seat belt.
2) Pull out the seat belt and then release it. Check that the belt retracts smoothly.

25.WHEEL ALIGNMENT

Check the wheel alignment. <Ref. to FS-8, Wheel Alignment.> <Ref. to RS-8, Wheel Alignment.>

26.TEST MODE CONNECTOR

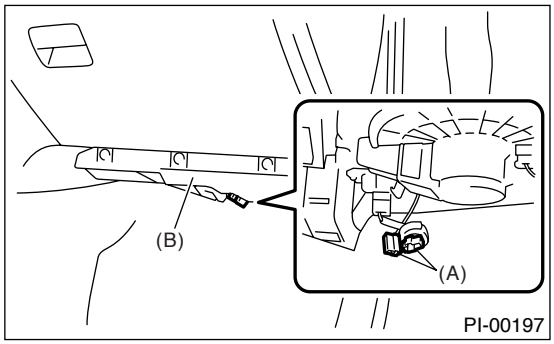
Turn the ignition switch to ON and check that the malfunction indicator light starts blinking. If the light blinks, return the ignition key to LOCK. Pull out the test mode connector from the back of glove box lower cover, and disconnect the test mode connector. Then, turn the ignition key to ON again. If the malfunction indicator light blinks at that time in spite of the disconnected test mode connector, carry out an engine diagnosis.



PI-00201

(A) Test mode connector (green)

NOTE:
If it is difficult to pull out the test mode connector, remove the glove box lower cover, and disconnect the test mode connector.



PI-00197

(A) Test mode connector (green)
(B) Glove box lower cover

27.IMMOBILIZER SYSTEM

1) Check that the engine starts with all keys that are equipped on vehicle.
2) 60 seconds after turning the ignition switch from ON to ACC or OFF, or immediately after removing the key, check that the security indicator light blinking.

NOTE:
If malfunctions occur, refer to “IMMOBILIZER (DIAGNOSIS)”.

28.STARTING CONDITION

Start the engine and check that the engine starts smoothly. If the battery voltage is low, recharge or replace the battery. If any noises are observed, immediately stop the engine and check and repair the abnormal components.

29.EXHAUST SYSTEM

Listen to the exhaust sound to see if no noises are observed. Check the exhaust leaks.

30.INDICATOR AND WARNING LIGHTS

Check that all the indicator and warning lights are off.

31.CLOCK

Check the clock for normal operations and enough accuracy.

32.AUDIO

Check the radio for full functionality and normal noise level. Also check the CD, MD unit operations.

33.NAVIGATION SYSTEM

1) Check all display function for normal operation. (For operating procedure, refer to operating manuals.)
2) Check the map disc (DVD) are provided on vehicle.
3) Check that the navigation systems operate normally.

34.FRONT ACCESSORY POWER SUPPLY SOCKET

1) Check operation for the front accessory power socket.
2) Check operation of the accessory power socket in console box.

35.LIGHTING SYSTEM

1) Check the headlight operations.
2) Check the stop light operation.
3) Check other lights for normal operations.

36.WIPER DEICER

Check that the wiper deicer operates normally.

37.REAR FOG LIGHT

Check that the rear fog light operates normally.

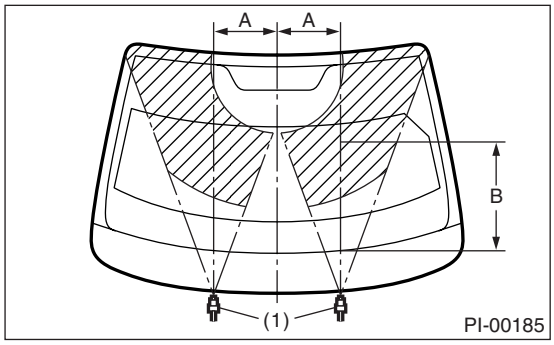
38.ILLUMINATION CONTROL

Check that the illumination control operates normally.

39.WINDOW WASHER

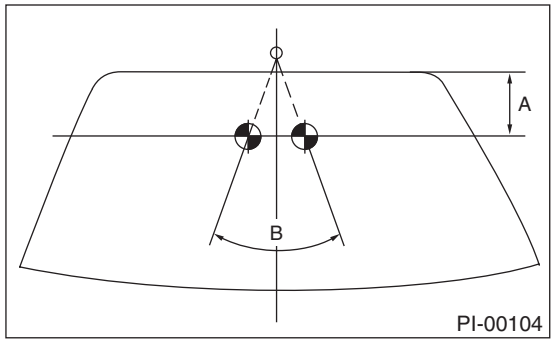
Check that the window washer system injects washer fluid to the specified area of the windshield shown in the figure.

Front injection position:
A: 250 mm (9.84 in)
B: 435 mm (17.1 in)



(1) Nozzle

Rear injection position:
Wagon model
A: 70 mm (2.8 in)
B: 70°



40.WIPER

Check the front and rear wipers for normal operations.

41.POWER WINDOW OPERATION CHECK

Operate the power window switches one by one to check that each of the power windows goes up and down without noises.

42.CARGO FAN

Check the cargo fan for normal operations.

43.SUNROOF

Check the sunroof for normal operations.

44.DOOR MIRROR

Check the remote control mirror for normal operations.

45.BRAKE TEST

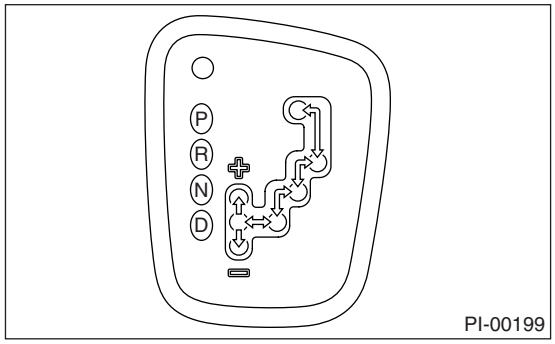
Check the foot brake for normal operations.

46.PARKING BRAKE

Check the parking brake for normal operations. When applying the parking brake with force of 200 N (20.4 kgf, 45.0 lb), check that the lever stroke of parking brake lever is 5 to 6 notches.

47.AT SHIFT CONTROL

1) Turn the ignition switch to ON.
2) While brake pedal is not depressed, check if the select lever does not move from “P” range.
3) While brake pedal is depressed, check if the select lever moves from “P” range.
4) Set the select lever to other than “P” range.
5) When the ignition switch is turned OFF, check if the ignition key switch cannot be removed.
6) Set the AT select lever to each gear position and check the shifting while driving the vehicle.



• 4AT

Selector Position	Gear Position			
	1st	2nd	3rd	4th
D	OK	OK	OK	OK
SPORT shift	OK	OK	OK	OK

• 5AT

Selector Position	Gear Position				
	1st	2nd	3rd	4th	5th
D	OK	OK	OK	OK	OK
SPORT shift	OK	OK	OK	OK	OK

48.HEATER & VENTILATION

Operate the heater and ventilation system to check for normal airflow outlet control, air inlet control, airflow capacity and heating performance.

49.AIR CONDITIONER

Operate the air conditioner. Check that the A/C compressor operates normally and enough cooling is provided.

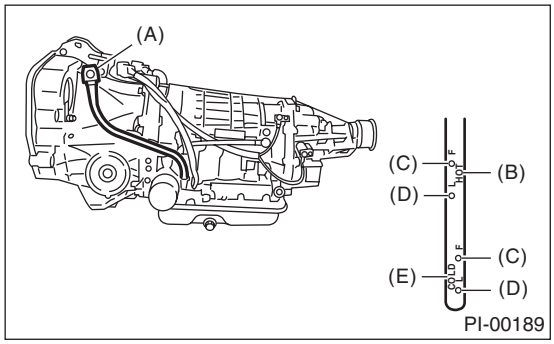
50.CRUISE CONTROL

Operate the cruise control system. Check that the system is activated and deactivated correctly.

51.ATF LEVEL

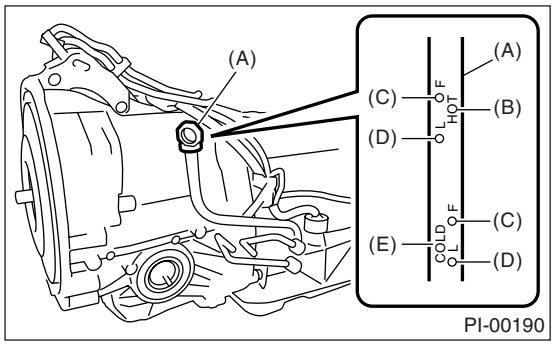
While engine is idling, check that the ATF level is normal. If the amount is insufficient, check that no leaks are found. Then add the necessary amount of the specified ATF.

• 4AT



(A) Level gauge
(B) ATF level range [70 — 80°C (158 — 176°F)] at “HOT”
(C) Upper level
(D) Lower level
(E) ATF level range [20 — 30°C (68 — 86°F)] at “COLD”

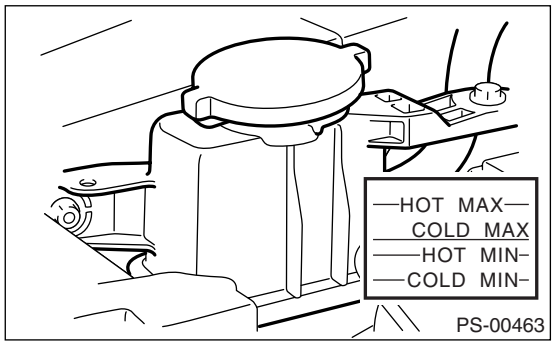
• 5AT



(A) Level gauge
(B) ATF level range [70 — 80°C (158 — 176°F)] at “HOT”
(C) Upper level
(D) Lower level
(E) ATF level range [20 — 30°C (68 — 86°F)] at “COLD”

52.POWER STEERING FLUID LEVEL

Check that the power steering fluid level is normal. If the amount is insufficient, check that no leaks are found. Then add the necessary amount of the specified power steering fluid.



53.FLUID LEAK CHECK

Check entire areas of the vehicle for any trace of coolant/oil/fluid leaks.

54.WATER LEAK TEST

Spray the vehicle with water using a hose and check that no water enters the passenger compartment.

• Before performing the water leakage test, remove anything that may obstruct the operation or which must be kept dry.

• Close all the windows and doors securely. Close the hood and trunk lid before starting the test.

• Spray the vehicle with water using a hose. The rate of water spray must be approx. 20 to 25 ℓ (5.3 to 6.6 US gal, 4.4 to 5.5 Imp gal) per minute.

When spraying water on areas adjacent to the floor and wheel house, increase the pressure. When spraying water on areas other than the floor and wheel house, decrease the pressure. But the force of water must be made strong occasionally by pressing the end of the hose.

NOTE:
Be sure to keep the hose at least 10 cm (3.9 in) from vehicle.

Check the following areas.

• Front window and body framework mating portion
• Door mating portions
• Glass mating portions
• Rear quarter window mating portions
• Rear window and body framework mating portion
• Around roof drips

If any dampness in the compartments is discovered after the water has been applied, carefully check all the areas that may have possibly contributed to the leak.

55.APPEARANCE CHECK 2

1) When vehicle body is covered with protective film, peel it off.

NOTE:

• Use of steam facilitates peeling off the warp guard.

• For the vehicle left for a long time or at low temperature, sprinkle some water heated 50 — 60°C (122 — 140°F) over the vehicle to raise its surface temperature before peeling off the wrap guard. Do not use the water heated to over 60°C (140°F).

• If the adhesive remains exists on the coated surface, soak a flannel rag, etc. with a small amount of coating wax or solvent such as oil benzene and IPA, put the soaked cloth on the remains lightly, and then wipe them off with a flannel rag, etc.

• Keep solvent from touching the resin or rubber parts. Do not use coating wax or solvent while the component surface temperature is high due to hot weather, etc.

• If the coated surface is swollen out due to seams or moisture, expose the vehicle to the sunlight for a few hours or heat the seam and swollen portions using a dryer, etc.

• Dispose of the peeled wrap guard as burnable industrial garbage.

2) Check the whole vehicle body for flaking paint, damage by transportation, corrosion, dirt, cracks or blisters.

NOTE:

• It is better to determine an inspection pattern in order to avoid missing an area, since the total inspection area is wide.

• Do not repair the body paint unless absolutely necessary. Also, if the vehicle is in need of repair to remove scratches or corroded paint, the repair area must be limited to the minimum. Re-painting and spray painting must be avoided as possible.

3) Check each window glass for scratches carefully. Slight damage may be removed by polishing with cerium oxide. (Fill a cup half with cerium oxide, and add warm water to it. Then agitate the content until it turns to wax. Apply this wax to a soft cloth, and polish the glass with it.)

4) Check each portion of the vehicle body and underside components for the formation of rust. If rust is discovered, remove it with sandpaper of #80 to #180 and treat the surface with rust preventive. After this treatment is completed, flush the portion thoroughly, and prepare the surface for repair painting.

5) Check each portion of body and all of the plated parts for deformation or distortion. Also, check each lamp lens for cracks.

6) Peel the protective tape, vinyl wrapping and identification seal attached to the following places.
- Seat
- Door trim
- Floor carpet
- Side sill
- Front hood lock release lever
- Edge rear
- Rear wiper
- Sedan rear combination light (Trunk lid opening portion)
- Roof rail
- Door mirror

PERIODIC MAINTENANCE SERVICES

PM

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1. General Description

A: GENERAL DESCRIPTION

Be sure to perform periodic maintenance in order to maintain vehicle performance and find problems before they occur.

2. Schedule

A: MAINTENANCE SCHEDULE 1

1. EUROPE AREA

For periodic maintenance of over 120,000 km (75,000 miles) or 96 months, carry out inspection by referring to the following table. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 120,000 km (75,000 miles) or 96 months.

			Maintenance interval [Number of months or km (miles), whichever occurs first]										
	Months				12	24	36	48	60	72	84	96	Remarks
	× 1,000 km		1.6	5	15	30	45	60	75	90	105	120	
	× 1,000 miles		1	3	9	19	28	38	47	56	66	75	
1	Engine oil	3.0 L		R	R	R	R	R	R	R	R	R	
		Others			R	R	R	R	R	R	R	R	
2	Engine oil filter	3.0 L		R	R	R	R	R	R	R	R	R	
		Others			R	R	R	R	R	R	R	R	
3	Spark plug	Others									R		
		3.0 L				R		R		R		R	
4	Drive belt(s)				I	I	I	I	I	I	I	I	For 3.0 L model, replace every 160,000 km (100,000 miles).
5	Camshaft drive belt										R		
6	Fuel line					I		I		I		I	
7	Air cleaner element				I	R	I	R	I	R	I	R	
8	Cooling system					I		I		I		I	
9	Coolant					R		R		R		R	
10	Clutch system					I		I		I		I	
11	Transmission oil					I		R		I		R	
12	ATF					I		R		I		R	
13	Front & rear differential					I		R		I		R	
14	Brake line					I		I		I		I	
15	Brake fluid					R		R		R		R	
16	Disc brake pads & discs				I	I	I	I	I	I	I	I	
17	Parking brake					I		I		I		I	
18	Suspension					I		I		I		I	
19	Wheel bearing											(I)	
20	Axle boots & joint				I	I	I	I	I	I	I	I	
21	Steering system					I		I		I		I	

Symbols used:
R: Replace
I: Inspection
(I): Recommended service for safe vehicle operation.

NOTE:
(1) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(2) ATF filter is maintenance free part. ATF filter needs replacement when it is physically damaged or ATF leaked.
(3) Periodic inspection and replacement of the camshaft drive chains on the 3.0 L models is not required.

2. EXCEPT FOR EUROPE AREA

For periodic maintenance of over 50,000 km (30,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 50,000 km (30,000 miles) or 48 months.

			Maintenance interval [Number of months or km (miles), whichever occurs first]					
	Months			12	24	36	48	Remarks
	× 1,000 km		5	12.5	25	37.5	50	
	× 1,000 miles		3	7.5	15	22.5	30	
1	Engine oil	3.0 L	R	R	R	R	R	
		Others		R	R	R	R	
2	Engine oil filter	3.0 L	R	R	R	R	R	
		Others		R	R	R	R	

For periodic maintenance of over 100,000 km (60,000 miles) or 48 months, carry out inspections by referring to the following tables. For a maintenance period gone beyond these tables, apply them repeatedly as a set of 100,000 km (60,000 miles) or 48 months.

			Maintenance interval [Number of months or km (miles), whichever occurs first]					
	Months			12	24	36	48	Remarks
	× 1,000 km		1.6	25	50	75	100	
	× 1,000 miles		1	15	30	45	60	
3	Spark plugs	Turbo and 3.0 L					R	
		2.5 L, 2.0 L non-turbo		R	R	R	R	
4	Drive belt(s)			I	I	I	I	For 3.0 L model, replace every 160,000 km (100,000 miles).
5	Camshaft drive belt						R	
6	Fuel line				I		I	
7	Air cleaner element			I	R	I	R	
8	Cooling system				I		I	
9	Coolant				R		R	
10	Clutch system			I	I	I	I	
11	Transmission oil				R		R	
12	ATF				R		R	
13	Front & rear differential oil				R		R	
14	Brake line			I	I	I	I	
15	Brake fluid				R		R	
16	Disc brake pads & discs			I	I	I	I	
17	Parking brake			I	I	I	I	
18	Suspension				I		I	
19	Wheel bearing						(I)	
20	Axle boots & joint			I	I	I	I	
21	Steering system (Power steering)			I	I	I	I	

Symbols used:
R: Replace
I: Inspection
(I): Recommended service for safe vehicle operation.

NOTE:
(1) When the vehicle is used in extremely dusty conditions, the air cleaner element should be replaced more often.
(2) ATF filter is maintenance free part. ATF filter needs replacement when it is physically damaged or ATF leaked.
(3) Periodic inspection and replacement of the camshaft drive chains on the 3.0 L models is not required.

B: MAINTENANCE SCHEDULE 2

1. EUROPE AREA

Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil		Replace more frequently		Replace more frequently			Replace more frequently
Engine oil filter		Replace more frequently		Replace more frequently			Replace more frequently
Fuel line	12 months				I		
	15,000 km						
	9,000 miles						
Transmission oil							Replace more frequently
ATF							Replace more frequently
Front & rear differential oil							Replace more frequently
Brake line	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Brake fluid	12 months					R	
	15,000 km						
	9,000 miles						
Brake pads	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Brake linings and drums	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Parking brake	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Suspension	12 months		I	I	I		
	15,000 km						
	9,000 miles						
Axle boots & joints	12 months	I	I		I		I
	15,000 km						
	9,000 miles						
Steering system (Power steering)	12 months		I	I	I		
	15,000 km						
	9,000 miles						

2. EXCEPT FOR EUROPE AREA

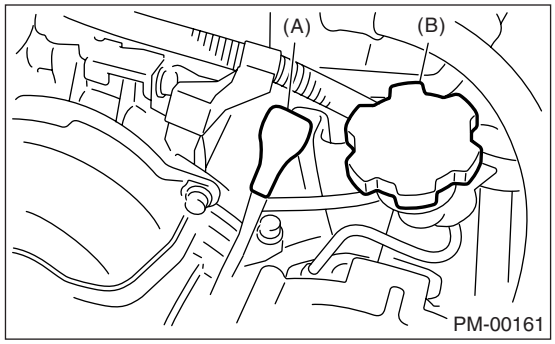
Item	Every	Repeat short distance drive	Repeat rough/muddy road drive	Extremely cold weather area	Salt or other corrosive used or coastal area	High humidity or mountain area	Repeat towing trailer
Engine oil		Replace more frequently		Replace more frequently			Replace more frequently
Engine oil filter		Replace more frequently		Replace more frequently			Replace more frequently
Fuel line	6 months				I		
	12,500 km						
	7,500 miles						
Transmission oil							Replace more frequently
ATF							Replace more frequently
Front & rear differential oil							Replace more frequently
Brake line	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Brake fluid	12 months					R	
	25,000 km						
	15,000 miles						
Brake pads	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Brake linings and drums	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Parking brake	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Suspension	6 months		I	I	I		
	12,500 km						
	7,500 miles						
Axle boots & joints	6 months	I	I		I		I
	12,500 km						
	7,500 miles						
Steering system (Power steering)	6 months		I	I	I		
	12,500 km						
	7,500 miles						

3. Engine Oil

A: REPLACEMENT

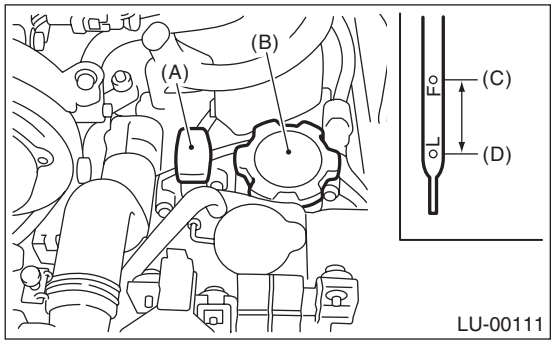
1) Open the engine oil filter cap for quick draining of engine oil.

• Except for 3.0 L model



(A) Oil level gauge
(B) Oil filler cap

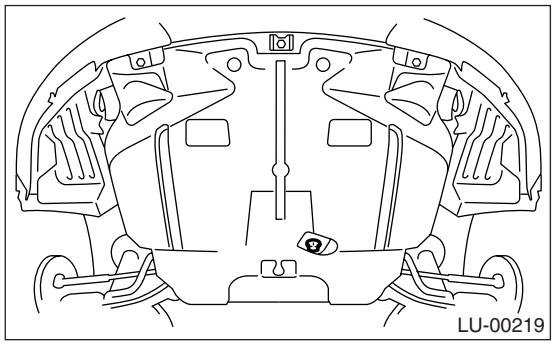
• 3.0 L model



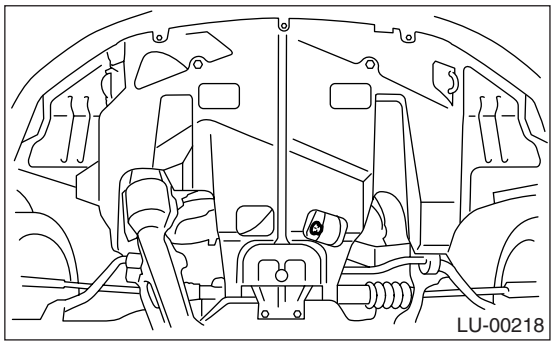
(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level

2) Drain the engine oil by removing engine oil drain plug.

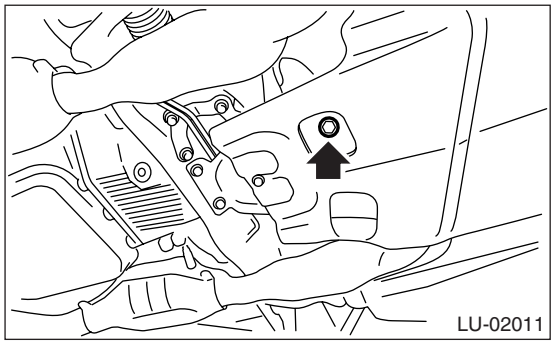
• DOHC turbo model



• 2.0 L non-turbo and 2.5 L model



• 3.0 L model

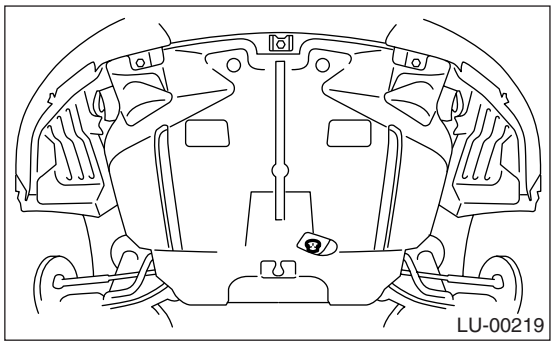


3) Tighten the engine oil drain plug after draining engine oil.

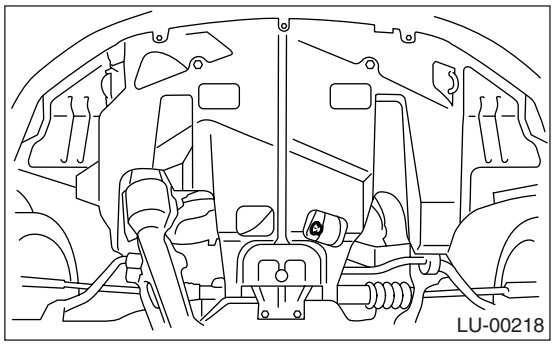
NOTE:
Use a new drain plug gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 33 ft-lb)

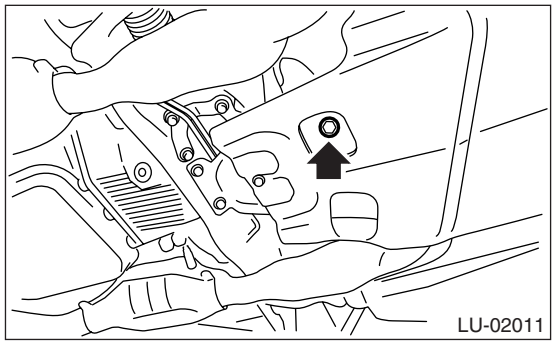
• DOHC turbo model



• 2.0 L non-turbo and 2.5 L model



• 3.0 L model



4) Fill engine oil through level gauge up to the center between upper level and lower level. Place the vehicle on a level surface when checking oil level. Use engine oil of proper quality and viscosity, selected in accordance with following.

Recommended oil:
Refer to "RM" section. <Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

Engine oil capacity

Except for 3.0 L model
Upper level:
Approx. 4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level:
Approx. 3.0 ℓ (3.2 US qt, 2.6 Imp qt)

3.0 L model
Upper level:
Approx. 5.5 ℓ (5.8 US qt, 4.8 Imp qt)
Lower level:
Approx. 4.5 ℓ (4.8 US qt, 4.0 Imp qt)

The proper viscosity oil make the engine ideal temperature, and cranking speed increased by reducing viscaus friction in hot condition.

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

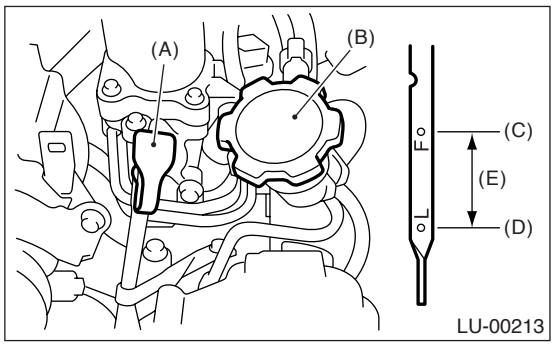
NOTE:
If the vehicle is used in areas with very high temperatures or for other heavy duty applications, the following viscosity oils must be used: API classification: SL, SJ or SH
SAE Viscosity No.: 30, 40, 10W-50, 20W-40, 20W-50.

5) Close the engine oil filler cap.
6) Start the engine and warm it up for a time.
7) After the engine stops, recheck the oil level. <Ref. to PM-8, INSPECTION, Engine Oil.>

B: INSPECTION

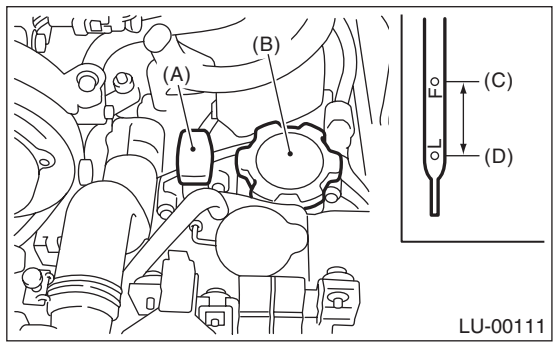
1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove it again and note the reading. If the engine oil level is below the "L" line, add oil to bring the level up to the "F" line.

• Except for 3.0 L model



(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1 ℓ (1.1 US qt, 0.9 Imp qt)

• 3.0 L model



(A) Oil level gauge
(B) Oil filler cap
(C) Upper level
(D) Lower level

5) After turning off the engine, wait a few minutes for the oil to drain back into the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level may show in the range between the "F" line and the notch mark. This is caused by thermal expansion of engine oil.
7) To prevent overfilling the engine oil, do not add oil above the "F" line when the engine is cold.

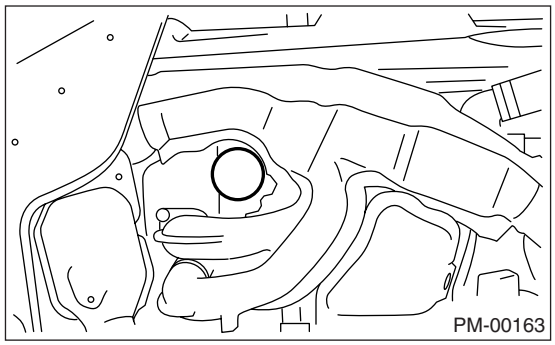
4. Engine Oil Filter

A: REPLACEMENT

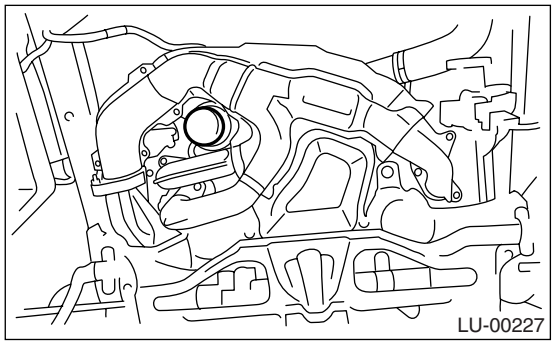
1) Remove the under cover.
2) Remove the oil filter using ST.

ST 18332AA000 OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST 18332AA010 OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))

- 2.0 L non-turbo and 2.5 L model

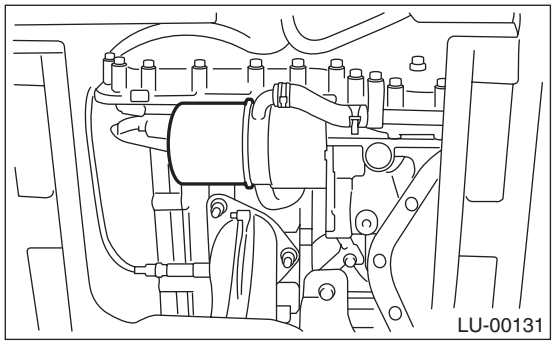


- Turbo model



ST 498547000 OIL FILTER WRENCH

- 3.0 L model



3) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.
4) Install the oil filter by turning it by hand, being careful not to damage seal rubber.
5) Tighten more (approx. 1 turn for oil filter 68 mm (2.68 in) in outer diameter, approx. 3/4 turn for oil filter 65 mm (2.56 in) in outer diameter) after the seal rubber contacts the cylinder block. Do not tighten excessively, or oil may leak.
6) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

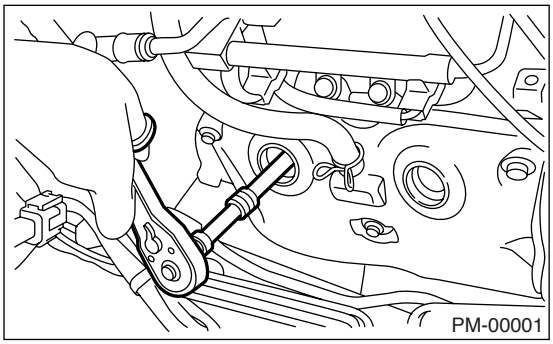
7) Check the engine oil level. <Ref. to PM-8, INSPECTION, Engine Oil.>

5. Spark Plug

A: REPLACEMENT

1. SOHC MODEL

1) Remove the intake duct and intake chamber.
2) Remove the battery.
3) Disconnect the spark plug cord.
4) Remove the spark plug with a spark plug socket.



5) Tighten the new spark plug lightly with hand, and then secure with a spark plug socket to the specified torque.

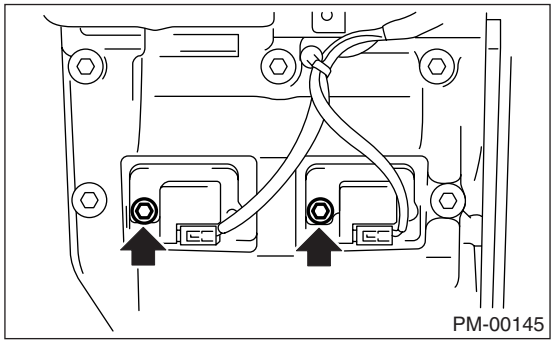
Recommended spark plug:
2.5 L EC, EK model
NGK: PFR5B-11
Except for 2.5 L EC, EK model
CHAMPION: RC10YC4

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

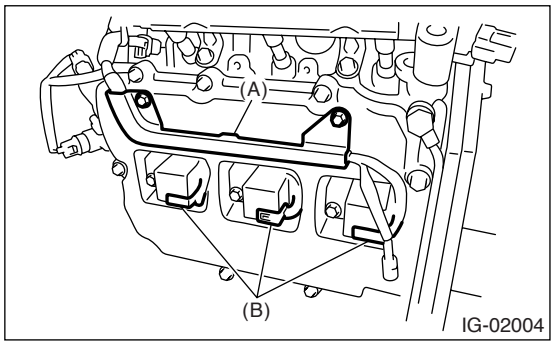
NOTE:
• Be sure to place the gasket between the cylinder head and spark plug.
• If the torque wrench is not available, tighten the spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.

2. DOHC MODEL

1) Remove the battery and battery carrier.
2) Remove the air cleaner case.
3) Detach the connector from ignition coil.
4) Remove the ignition coil.
• Except for 3.0 L model

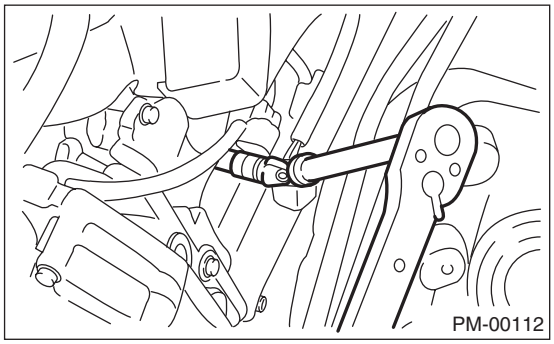


• 3.0 L model



(A) Bracket
(B) Connector

5) Remove the spark plug with a spark plug socket.



6) Tighten the new spark plug lightly with hand, and then secure with a spark plug socket to the specified torque.

Recommended spark plug:
NGK: ILFR6B

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

7) Tighten the ignition coil.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
• Be sure to place the gasket between the cylinder head and spark plug.
• If the torque wrench is not available, tighten the spark plug until gasket contacts cylinder head; then tighten further 1/4 to 1/2 turns.

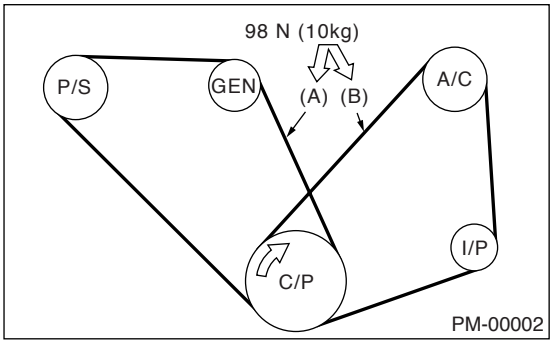
6. V-belt

A: INSPECTION

1. EXCEPT FOR 3.0 L MODEL

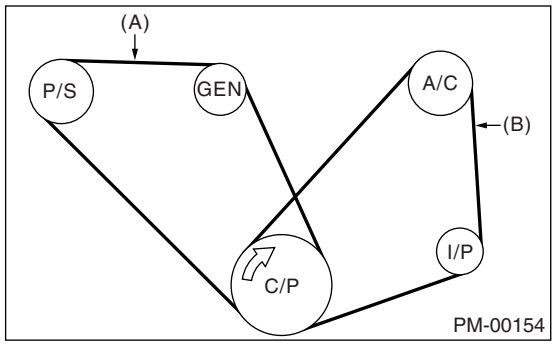
1) Replace the belts if crack, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position or idler pulley installing position. <Ref. to PM-12, REPLACEMENT, V-belt.>

Belt tension (without belt tension gauge):
(A)
When installing new one: 7 — 9 mm (0.276 — 0.354 in)
At inspection: 9 — 11 mm (0.354 — 0.433 in)
(B)
When installing new one: 7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection: 9.0 — 10.0 mm (0.354 — 0.394 in)



(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

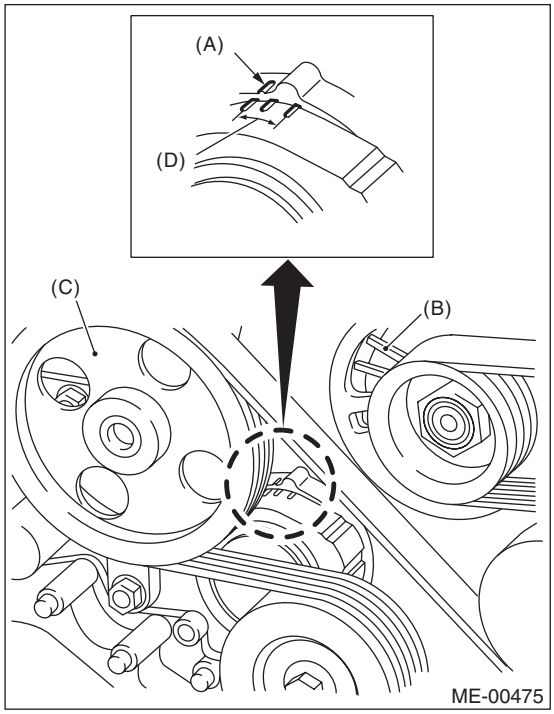
Belt tension (with belt tension gauge):
(A)
When installing new one: 640 — 785 N (65.3 — 80.0 kgf, 144 — 176 lb)
At inspection: 490 — 640 N (50 — 65 kgf, 110 — 144 lb)
(B)
When installing new one: 620 — 760 N (63 — 77 kgf, 140 — 170 lb)
At inspection: 350 — 450 N (36 — 46 kgf, 79 — 101 lb)



(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

2. 3.0 L MODEL

1) Replace the belts if crack, fraying or wear is found.
2) Check that the V-belt automatic tensioner indicator (A) is within the range (D).



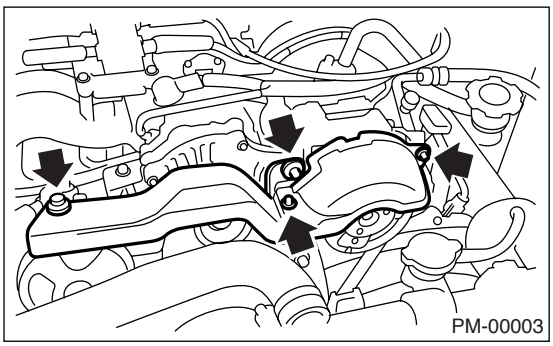
(A) Indicator
(B) Generator
(C) Power steering oil pump
(D) Service limit

B: REPLACEMENT

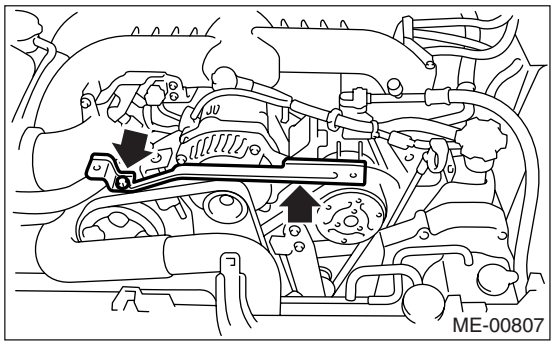
1. FRONT SIDE BELT (FOR POWER STEERING OIL PUMP AND GENERATOR)

NOTE:
Wipe off any oil and water on the belt and pulley.

1) Remove the collector cover. (If equipped)
2) Remove the V-belt covers.
• Non-turbo model

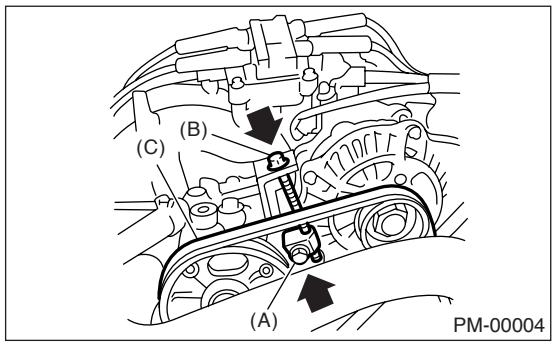


• Turbo model



3) Loosen the lock bolt (A).
4) Loosen the slider bolt (B).
5) Remove the front side belt (C).
6) Install a new V-belt, and tighten the slider bolt so as to obtain the specified belt tension.
7) Tighten the lock bolt (A).
8) Tighten the slider bolt (B).

Tightening torque:
Lock bolt
25 N·m (2.5 kgf-m, 18 ft-lb)
Slider bolt
8 N·m (0.8 kgf-m, 5.8 ft-lb)

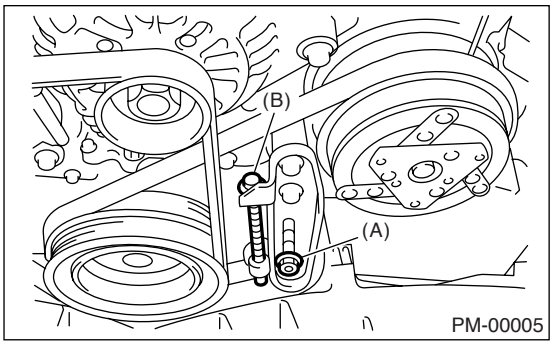


2. REAR SIDE BELT (FOR A/C)

NOTE:
Wipe off any oil and water on the belt and pulley.

1) Remove the front side belt.
2) Loosen the lock nut (A).
3) Loosen the slider bolt (B).
4) Remove the rear side belt.
5) Install a new V-belt, and tighten the slider bolt so as to obtain the specified belt tension.
6) Tighten the lock nut (A).

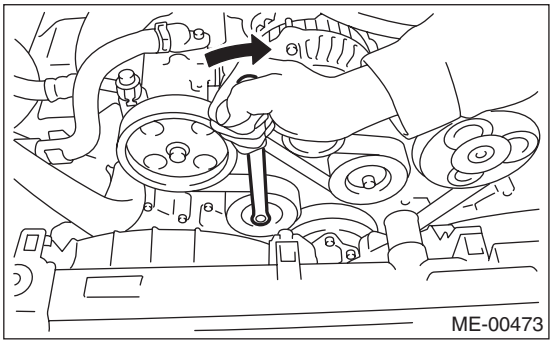
Tightening torque:
23 N·m (2.3 kgf-m, 17.0 ft-lb)



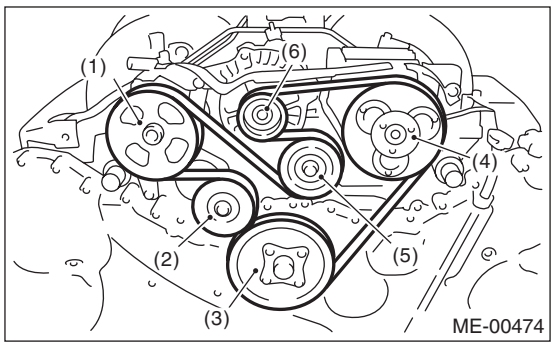
7) Install the front side belt.
• Non-turbo model <Ref. to ME(H4SO 2.0)-38, FRONT SIDE BELT, INSTALLATION, V-belt.>
• Turbo model <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, INSTALLATION, V-belt.>

3. 3.0 L MODEL

1) Fit the tool to the belt tensioner mounting bolt.
2) Turn the tool clockwise, and loosen the V-belt to remove.



3) Remove the V-belt cover.
4) Install in the reverse order of removal.



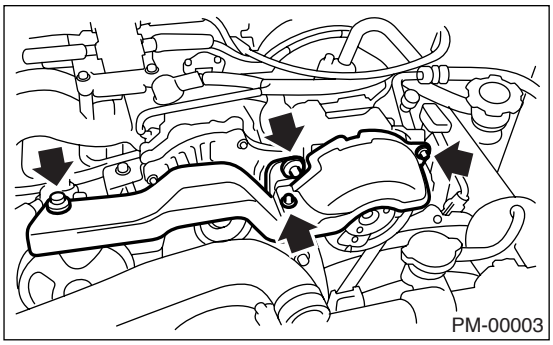
(1) Power steering oil pump
(2) Belt tension adjuster
(3) Crankshaft pulley
(4) A/C compressor
(5) Belt idler
(6) Generator

7. Timing Belt

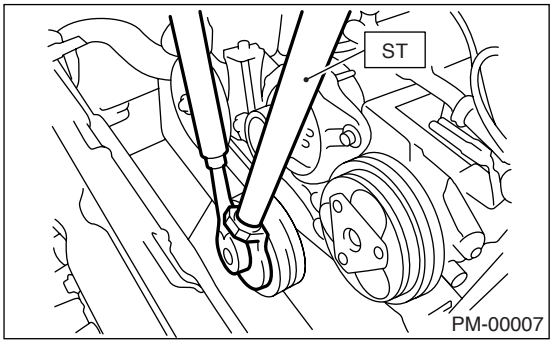
A: REPLACEMENT

1. SOHC MODEL

1) Protect the radiator with cardboard and blanket.
2) Remove the V-belt covers.

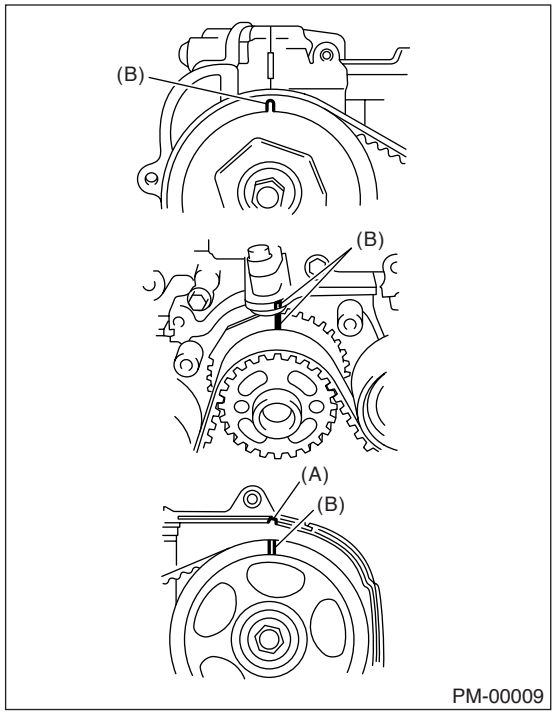


3) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, V-belt.>
4) Remove the A/C compressor V-belt tensioner.
5) Use the ST to lock the crankshaft, and remove the pulley bolt.
ST 499977100 CRANK PULLEY WRENCH



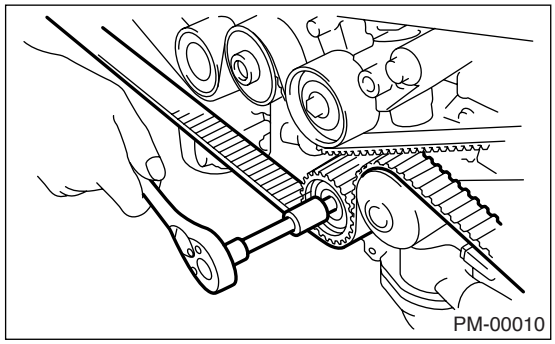
6) Remove the crank pulley.
7) Remove the belt cover (LH).
8) Remove the front timing belt cover.
9) Remove the timing belt guide. (MT model)
10) Turn the crankshaft and align the alignment marks on crankshaft, and left and right cam sprockets with notches of belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET

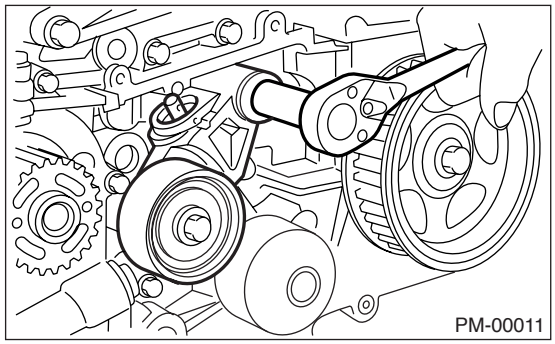


(A) Notch
(B) Alignment mark

11) Remove the belt idler.
12) Remove the belt idler (No. 2).



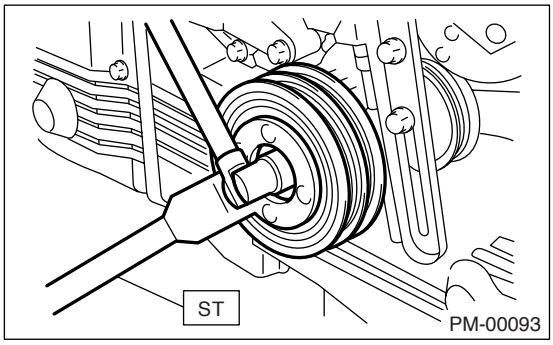
13) Remove the timing belt.
14) Remove the automatic belt tension adjuster assembly.



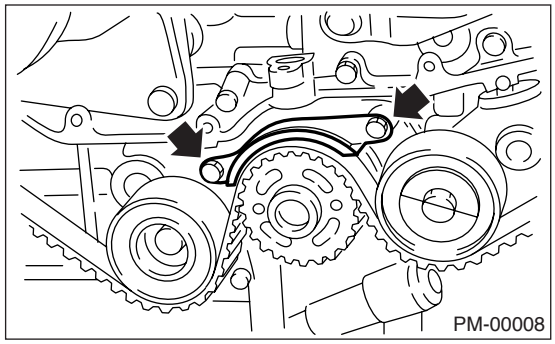
15) Install in the reverse order of removal. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>

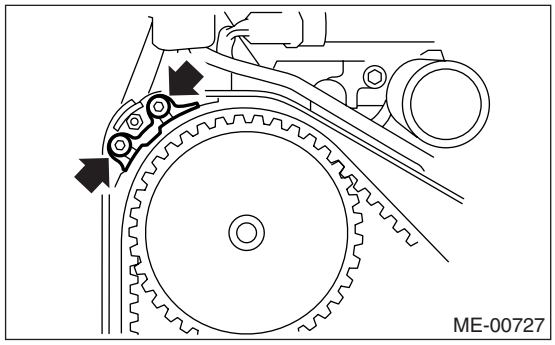
2. DOHC MODEL

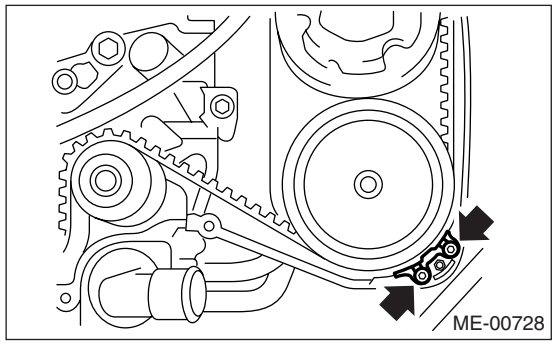
1) Protect the radiator with cardboard and blanket.
2) Remove the V-belts. <Ref. to ME(H4DOTC)-39, V-belt.>
3) Remove the A/C compressor V-belt tensioner.
4) Remove the pulley bolt. Use the ST to lock crankshaft.
• Except for turbo MT model:
ST 499977400 CRANK PULLEY WRENCH
• Turbo MT model:
ST 499977100 CRANK PULLEY WRENCH

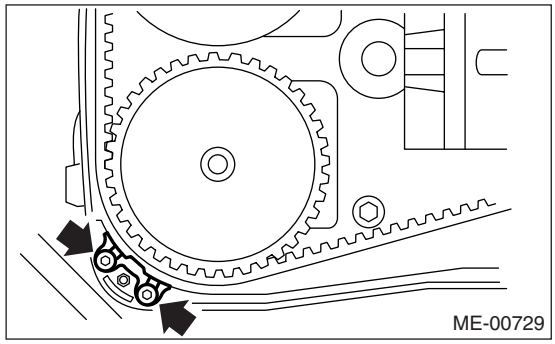


5) Remove the crank pulley.
6) Remove the belt cover (LH).
7) Remove the belt cover (RH).
8) Remove the front belt cover.
9) Remove the timing belt guide. (Except for non-turbo AT model)



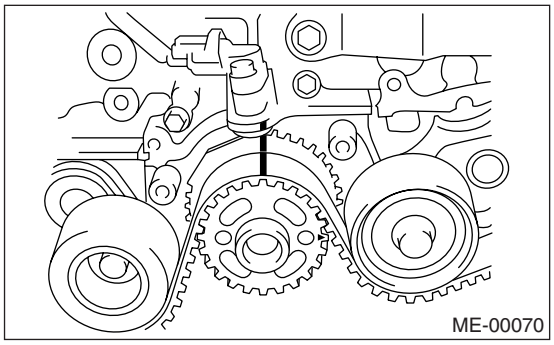


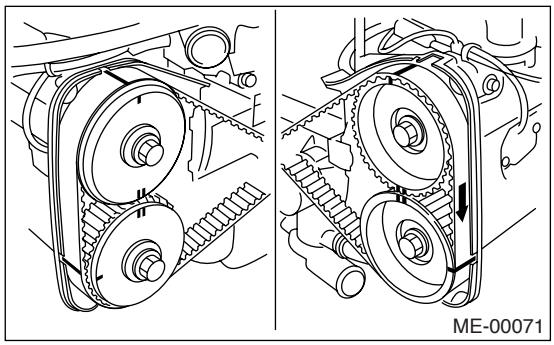




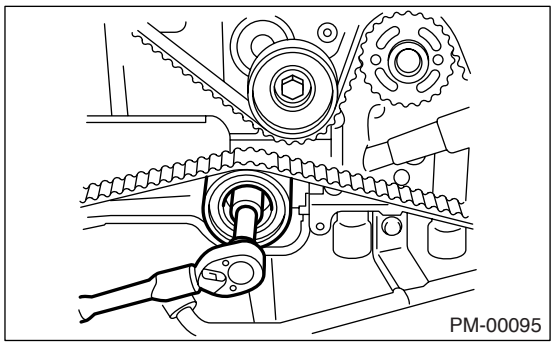
10) Turn the crankshaft and align the alignment marks on crankshaft, and left and right cam sprockets with notches of belt cover and cylinder block. Use the ST to turn crankshaft.

ST 499987500 CRANKSHAFT SOCKET

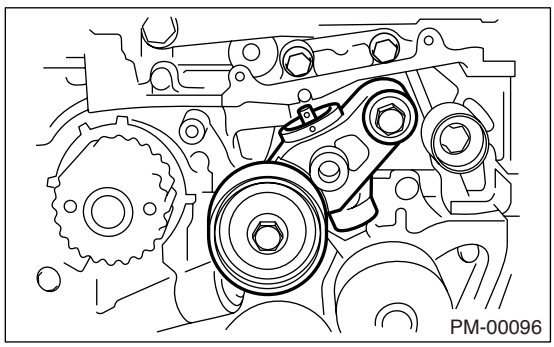




11) Remove the belt idler.



12) Remove the timing belt.
13) Remove the automatic belt tension adjuster assembly.



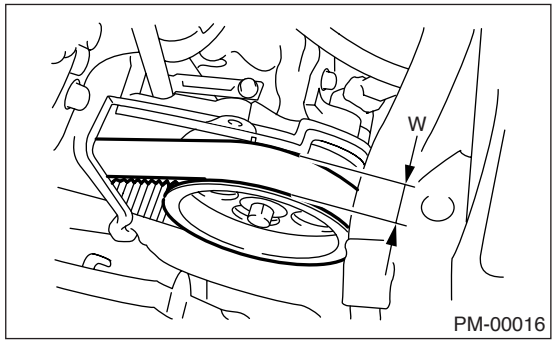
14) Install in the reverse order of removal. <Ref. to ME(H4DOTC)-43, Timing Belt.>

CAUTION:
When installing the timing belt, be sure to align all alignment marks on the belt with corresponding marks on the sprockets. If incorrectly installed, interference between pistons and valves may occur.

B: INSPECTION

1. SOHC MODEL

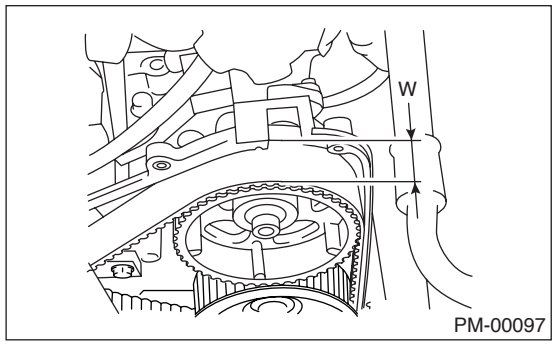
1) Remove the front timing belt cover and timing belt cover (LH).
2) While cranking engine at least four rotations, check the timing belt back surface for cracks or damage. Replace the faulty timing belt as needed.
3) Measure the timing belt width W. If it is less than 27 mm (1.06 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace the worn timing belt.



4) Install the front timing belt cover and timing belt cover (LH).

2. DOHC MODEL

1) Remove the timing belt cover (LH).
2) While cranking engine at least four rotations, check the timing belt back surface for cracks or damage. Replace the faulty timing belt as needed.
3) Measure the timing belt width W. If it is less than 30 mm (1.18 in), check idlers, tensioner, water pump pulley and cam sprocket to determine idler alignment (squareness). Replace the worn timing belt.
4) Install the timing belt cover (LH).



8. Fuel Line

A: INSPECTION

The fuel line is located mostly internally, so check pipes, areas near pipes, and engine compartment piping for rust, hose damage, loose band, etc. If faulty parts are found, repair or replace them.

- 2.0 L non-turbo and 2.5 L model

<Ref. to FU(H4SO 2.0)-53, Fuel Delivery, Return and Evaporation Lines.>

- Turbo model

<Ref. to FU(H4DOTC)-56, Fuel Delivery, Return and Evaporation Lines.>

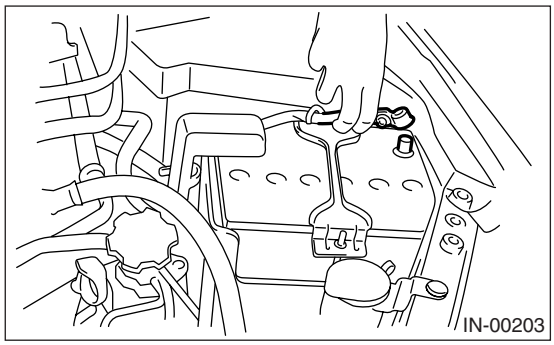
- 3.0 L model

<Ref. to FU(H6DO)-54, Fuel Delivery, Return and Evaporation Lines.>

9. Air Cleaner Element

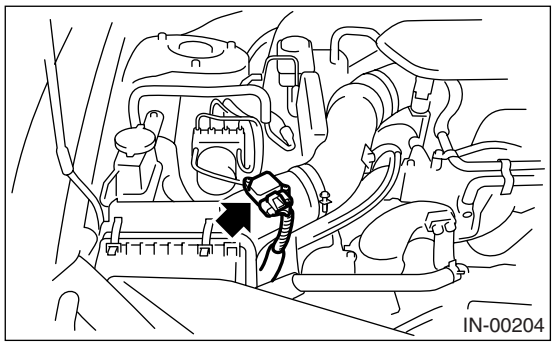
A: REPLACEMENT

1) Disconnect the ground cable from battery.

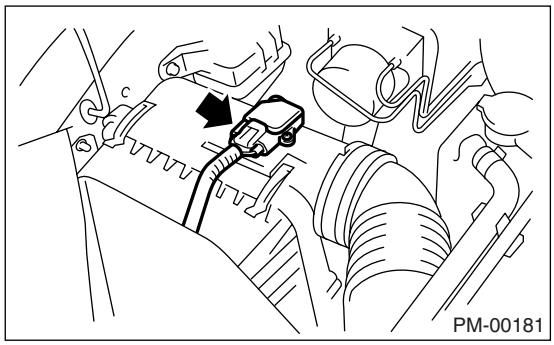


2) Disconnect the connector from mass air flow sensor. (2.0 L turbo, 3.0 L and 2.5 L EC, EK, K4 model)

• 3.0 L and 2.5 L EC, EK, K4 model



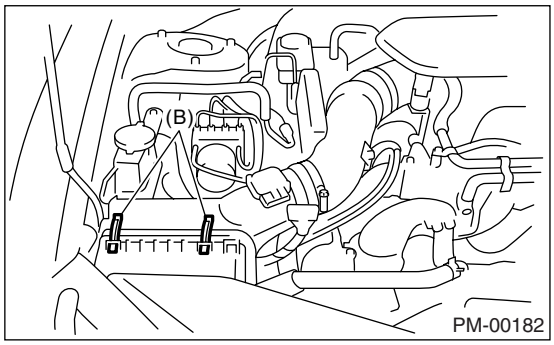
• Turbo model



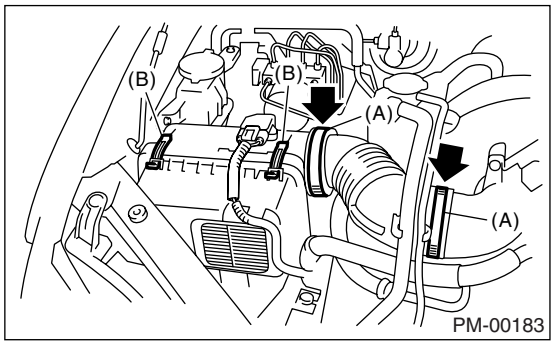
3) Loosen the clamps (A) which connect the air cleaner case to intake duct. (Turbo model)

4) Remove the clips (B) on air cleaner case.

• Non-turbo model

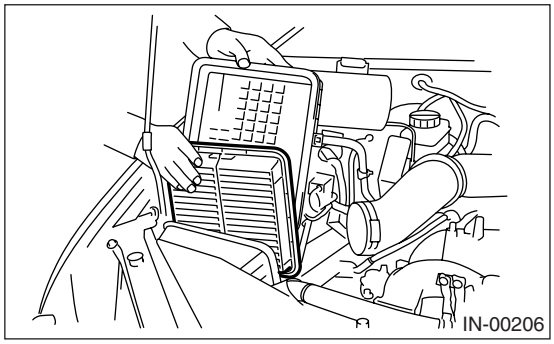


• Turbo model



5) Remove the air cleaner case (rear).

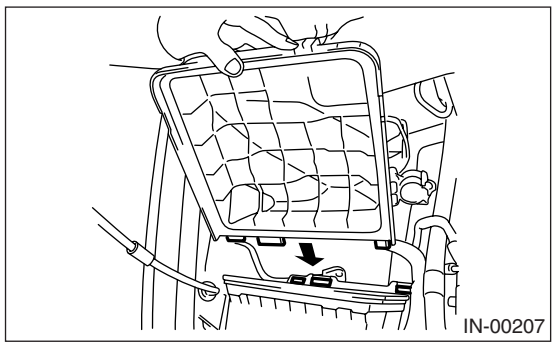
6) Remove the air cleaner element.



7) Install in the reverse order of removal.

NOTE:

• Fasten with a clip after inserting the lower tab of the case.



- Refer to “COMPONENT” for tightening torque.
  2.0 L non-turbo and 2.5 L model
  <Ref. to IN(H4SO 2.0)-2, COMPONENT, General Description.>
  Turbo model
  <Ref. to IN(H4DOTC)-2, COMPONENT, General Description.>
  3.0 L model
  <Ref. to IN(H6DO)-2, COMPONENT, General Description.>

10.Cooling System

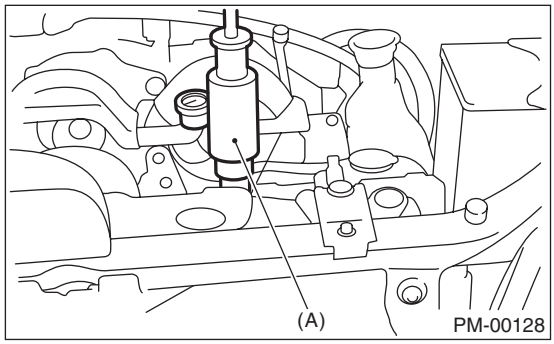
A: INSPECTION

1) To check the radiator for leakage, fill it with engine coolant, and attach the radiator cap tester (A) to the filler neck, and apply pressure. Check the following points:

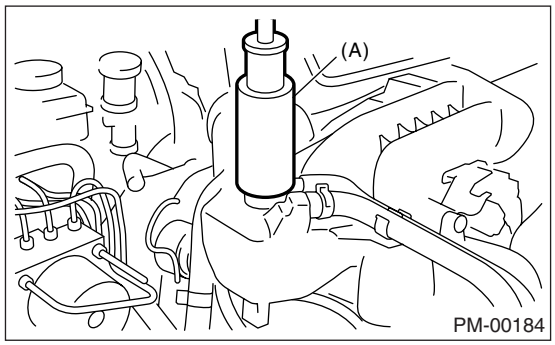
Non-turbo model:
157 kPa (1.6 kg/cm^2, 23 psi)
Turbo model:
122 kPa (1.2 kg/cm^2, 18 psi)

- Each portion of radiator for leakage
- Hose joints and other connections for leakage

NOTE:
- For turbo model, be sure to install the tester to filler tank side.
- When attaching or detaching tester or when operating tester, use special care not to deform radiator filler neck.
  - Non-turbo model



  - Turbo model



- When performing this check, be sure to keep the engine stationary and fill radiator with coolant.
- Wipe off check points before applying pressure.
- Use care not to spill coolant when detaching tester from radiator.
- Do not remove the radiator side cap. (Turbo model)

2) Check the radiator cap valve open pressure using radiator cap tester.

NOTE:
Rust or dirt on the cap may prevent valve from functioning normally: be sure to clean the cap before testing.

Raise the pressure until the needle of gauge stops and see if the pressure can be retained for five to six seconds. The radiator cap is normal if a pressure above the service limit value has been maintained for this period.

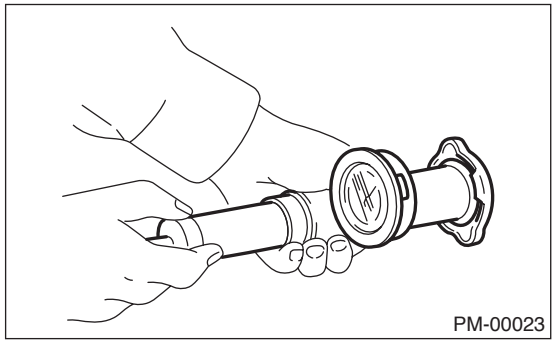
Radiator cap valve open pressure

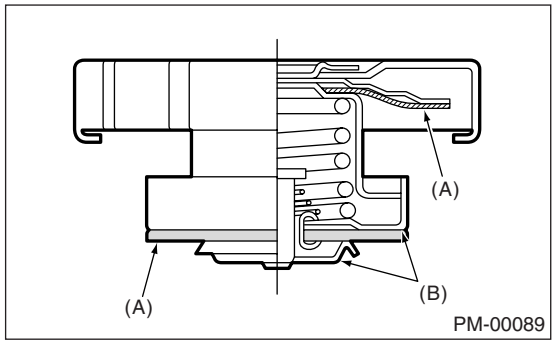
Non-turbo model
Standard:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kg/cm^2, 12 psi)

Turbo model

Filler tank side
Standard:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)
Service limit:
83 kPa (0.85 kg/cm^2, 12 psi)

Radiator side
Standard:
122 — 152 kPa (1.24 — 1.55 kg/cm^2, 18 — 22 psi)
Service limit:
112 kPa (1.14 kg/cm^2, 16 psi)





(A) Check points for deformation
(B) Check points for deformation, damage, rust

3) Start the engine, and then check it does not overheat or it is cooled excessively. If it overheats or it is cooled excessively, check the cooling system.
• 2.0 L non-turbo and 2.5 L model
<Ref. to CO(H4SO 2.0)-15, Water Pump.> <Ref. to CO(H4SO 2.0)-18, Thermostat.> <Ref. to CO(H4SO 2.0)-20, Radiator.> <Ref. to CO(H4SO 2.0)-24, Radiator Cap.>
• Turbo model
<Ref. to CO(H4DOTC)-15, Water Pump.> <Ref. to CO(H4DOTC)-17, Thermostat.> <Ref. to CO(H4DOTC)-19, Radiator.> <Ref. to CO(H4DOTC)-23, Radiator Cap.>
• 3.0 L model
<Ref. to CO(H6DO)-11, Water Pump.> <Ref. to CO(H6DO)-12, Thermostat.> <Ref. to CO(H6DO)-13, Radiator.> <Ref. to CO(H6DO)-16, Radiator Cap.>
4) Check the radiator fan operates using Subaru Select Monitor, when the coolant temperature exceeds 95°C (203°F). If it does not operate, check the radiator fan system.
• 2.0 L non-turbo and 2.5 L model
<Ref. to CO(H4SO 2.0)-8, INSPECTION, Radiator Fan System.>
• Turbo model
<Ref. to CO(H4DOTC)-9, INSPECTION, Radiator Fan System.>
• 3.0 L model
<Ref. to CO(H6DO)-7, INSPECTION, Radiator Fan System.>

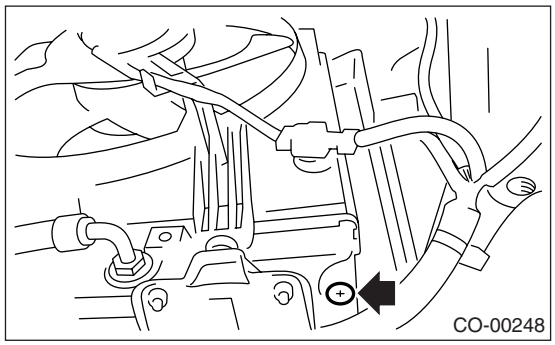
11.Engine Coolant

A: REPLACEMENT

1. REPLACEMENT OF COOLANT

WARNING:
The radiator is of the pressurized type. Do not attempt to open the radiator cap immediately after the engine has been stopped.

1) Lift-up the vehicle.
2) Remove the under cover.
3) Place a container under drain pipe.
4) Remove the drain cock to drain engine coolant into container.



5) For quick draining, open the radiator cap.

NOTE:
• For turbo model, be sure to open the radiator cap on the filler tank side.
• Be careful not to spill coolant on the floor.

6) Drain the coolant from reservoir tank.
7) Tighten the radiator drain cock securely after draining coolant.
8) Slowly pour the coolant into radiator. Pour the coolant up to air bleeder hole, and then install the cap. (Turbo model)
9) Pour the coolant from radiator filler port to neck of filler. Then, pour the coolant into reservoir tank up to “FULL” level.

Recommended engine coolant:
Refer to “RM” section. <Ref. to RM-5, COOLANT, RECOMMENDED MATERIALS, Recommended Materials.>

Coolant capacity (fill up to “FULL” level):

LHD AT model
2.0 L non-turbo and 2.5 L model (without ATF cooler (with warmer))
Approx. 6.3 ℓ (6.7 US qt, 5.5 Imp qt)
2.0 L non-turbo and 2.5 L model (with ATF cooler (with warmer))
Approx. 6.7 ℓ (7.1 US qt, 5.9 Imp qt)
3.0 L model (without ATF cooler (with warmer))
Approx. 7.2 ℓ (7.6 US qt, 6.3 Imp qt)
3.0 L model (with ATF cooler (with warmer))
Approx. 7.7 ℓ (8.1 US qt, 6.8 Imp qt)

LHD MT model
2.0 L non-turbo and 2.5 L model
Approx. 6.4 ℓ (6.8 US qt, 5.6 Imp qt)

RHD AT model
2.0 L non-turbo and 2.5 L model (without ATF cooler (with warmer))
Approx. 6.4 ℓ (6.8 US qt, 5.6 Imp qt)
2.0 L non-turbo and 2.5 L model (with ATF cooler (with warmer))
Approx. 6.8 ℓ (7.2 US qt, 6.0 Imp qt)
Turbo model
Approx. 7.3 ℓ (7.7 US qt, 6.4 Imp qt)
3.0 L model (without ATF cooler (with warmer))
Approx. 7.2 ℓ (7.6 US qt, 6.3 Imp qt)
3.0 L model (with ATF cooler (with warmer))
Approx. 7.8 ℓ (8.2 US qt, 6.9 Imp qt)

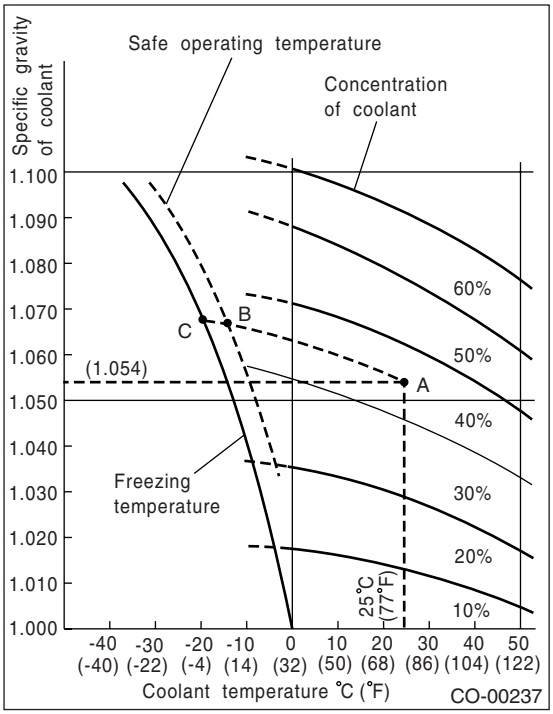
RHD MT model
2.0 L non-turbo and 2.5 L model
Approx. 6.5 ℓ (6.9 US qt, 5.7 Imp qt)

NOTE:
The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crankcase. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

10) Securely install the radiator cap.
11) Run the engine for more than five minutes at 2,000 to 3,000 rpm. (Run engine until radiator becomes hot in order to purge air trapped in cooling system.)
12) Stop the engine and wait until coolant temperature lowers. Then open the radiator cap to check coolant level and add coolant up to radiator filler neck. Next, add coolant into reservoir tank up to “FULL” level.
13) After adding coolant, securely install the radiator and reservoir tank caps.

2. RERATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERTAURE

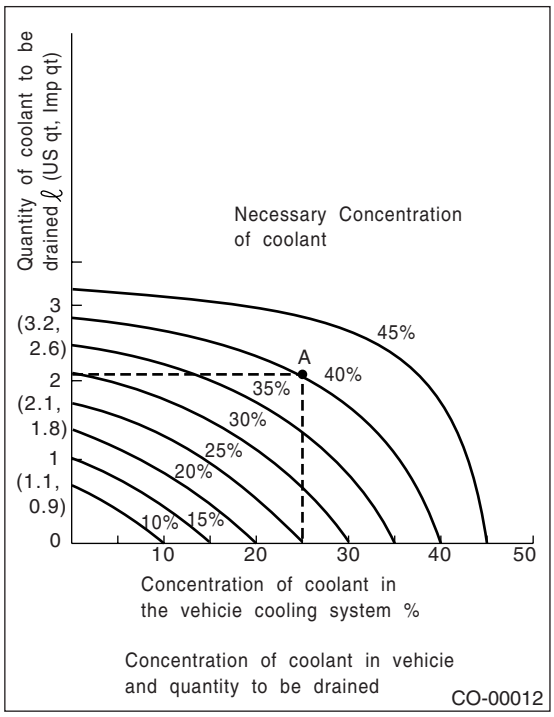
Concentration and safe operating temperature of SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F), its specific gravity is 1.054 and the concentration is 45% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



3. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

To adjust the concentration of coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.

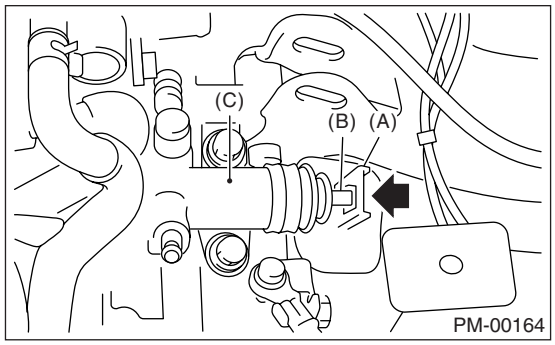
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



12.Clutch System

A: INSPECTION AND ADJUSTMENT

1) Push the release lever to retract the push rod of the operating cylinder and check if the fluid level in the clutch reservoir tank rises or not.



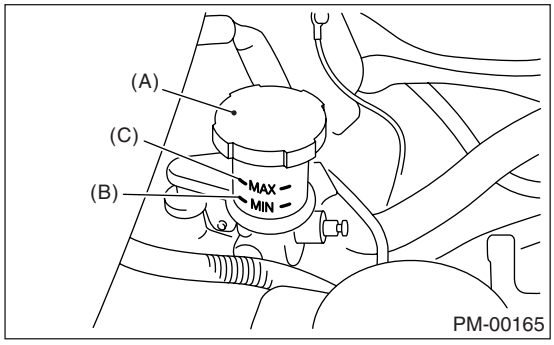
(A) Release lever
(B) Push rod
(C) Operating cylinder

2) If the fluid level rises, pedal free play is correct.
3) If the fluid level does not rise, or the push rod cannot be retracted, adjust the clutch pedal. <Ref. to CL-26, Clutch Pedal.>
4) Check the fluid level using the scale on the outside of the clutch reservoir tank (A). If the level is below “MIN” (B), inspect the clutch master cylinder, operating cylinder and hydraulic line for fluid leaks. If fluid leaks are found, repair or replace. If fluid leaks are not found, add clutch fluid to bring it up to “MAX” (C) of clutch reservoir tank.

Recommended clutch fluid:
Refer to “RM” section. <Ref. to RM-5, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

CAUTION:
Prevent the clutch fluid from being splashed over vehicle body. If the clutch fluid is splashed over vehicle body, flush it, and then wipe it up.

NOTE:
• Avoid mixing different brands of brake fluid to prevent degradation of the fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.



(A) Reservoir tank
(B) MIN. level
(C) MAX. level

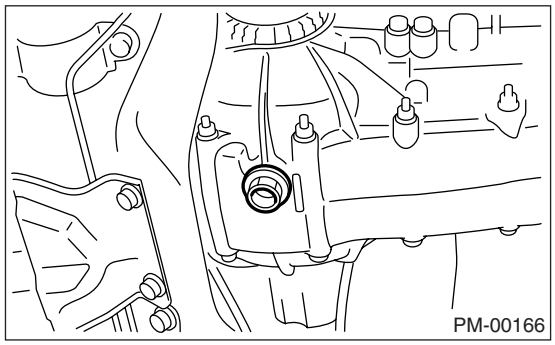
13. Transmission Gear Oil

A: REPLACEMENT

1. MANUAL TRANSMISSION

1) Drain the gear oil by removing drain plug.

NOTE:
• Before starting work, cool off the transmission gear oil well.
• If transmission gear oil adheres to the exhaust pipe, wipe it off completely.



2) Replace the gasket with new one, and then tighten the drain plug to specified torque.

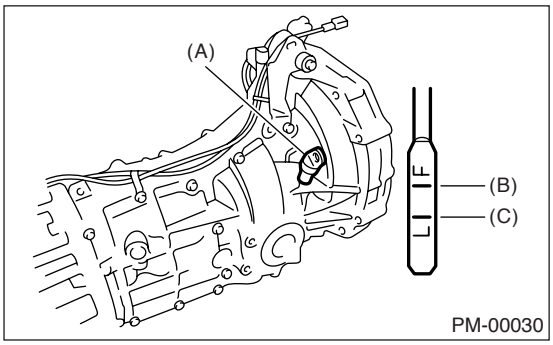
Tightening torque:
69 N·m (7.0 kgf-m, 50.6 ft-lb)

3) Fill the transmission gear oil through the oil level gauge hole up to the upper point of level gauge.

Recommended gear oil:
Refer to "RM" section. <Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

Gear oil capacity:
3.5 ℓ (3.7 US qt, 3.1 Imp qt)



(A) Oil level gauge
(B) Upper level
(C) Lower level

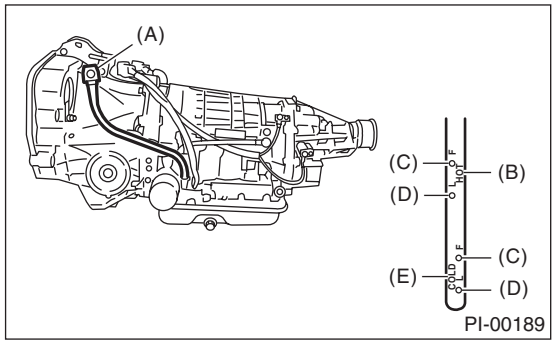
14. Automatic Transmission Fluid

A: INSPECTION

CAUTION:
The level of ATF varies with fluid temperature. Pay attention to the fluid temperature when checking ATF level.

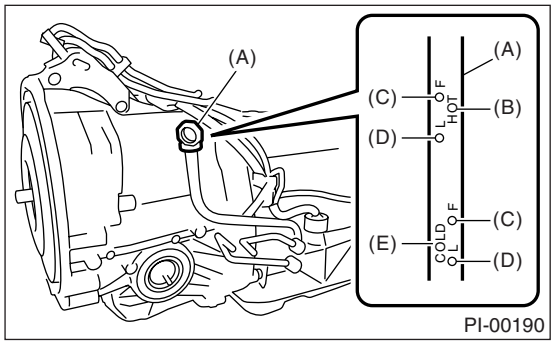
1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Make sure the vehicle is level.
3) After selecting all positions (P, R, N, D), shift the select lever in "P" range. Measure the ATF level with engine idling for one or two minutes.

• 4AT model



(A) Level gauge
(B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

• 5AT model



(A) Level gauge
(B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

4) Make sure that ATF level is above the center of upper and lower marks at "HOT" side.
5) If the ATF level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found above the center between upper and lower marks.

CAUTION:
• Use care not to exceed the upper limit level.
• Addition of ATF to the upper limit mark on "HOT" side when the ATF temperature is below 70°C (158°F) will overfilling of ATF, causing a transmission failure.

6) Check ATF level after raising ATF temperature to 70 — 80°C (158 — 176°F) by running the vehicle or by idling the engine again.
7) Check the ATF for leaks.
Check for leaks in the transmission. If there are leaks, it is necessary to repair or replace gasket, oil seals, plugs or other parts.

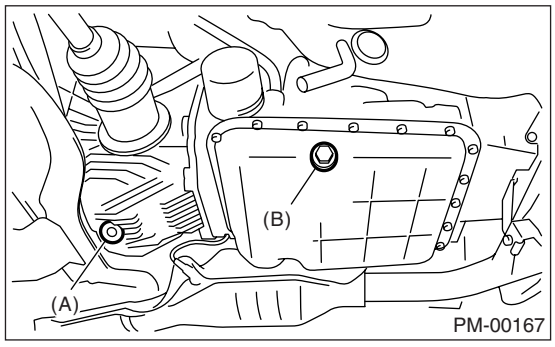
B: REPLACEMENT

1. AUTOMATIC TRANSMISSION FLUID

1) Drain the ATF by removing drain plug.

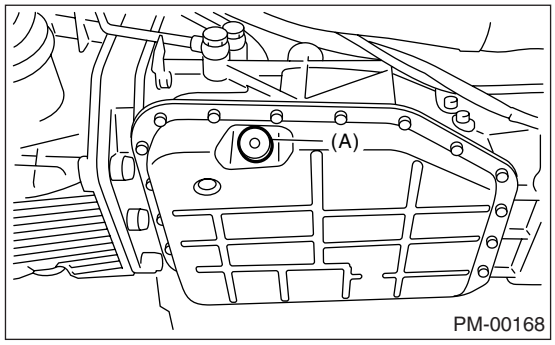
NOTE:
Before starting work, cool off the ATF well.

• 4AT model



(A) Front differential gear oil drain plug
(B) ATF drain plug

• 5AT model



(A) ATF drain plug

2) Replace the gasket with new one, and then tighten the drain plug to specified torque.

Tightening torque:
4AT model
25 N·m (2.55 kgf-m, 18.4 ft-lb)
5AT model
20 N·m (2.0 kgf-m, 4.5 ft-lb)

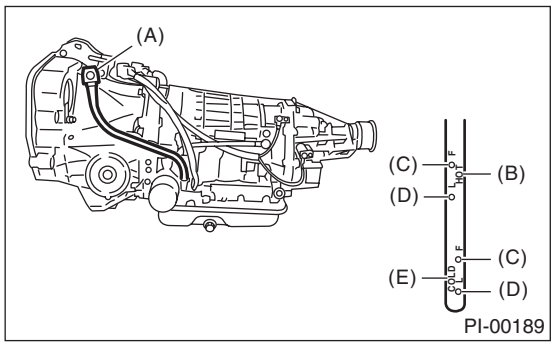
3) Pour ATF from the ATF charge pipe.

Recommended ATF:
Refer to "RM" section. <Ref. to RM-5, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

Capacity:
Fill the same amount of ATF drained.

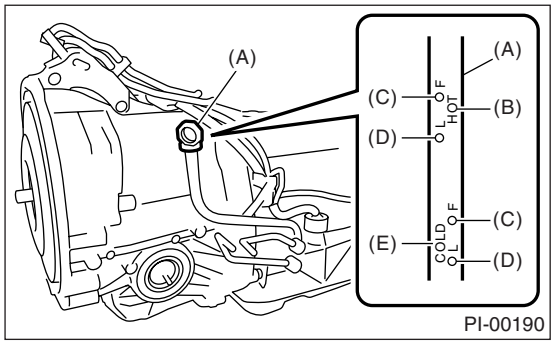
4) Check the ATF level. <Ref. to PM-26, INSPECTION, Automatic Transmission Fluid.>

• 4AT model



(A) Level gauge
(B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

• 5AT model



(A) Level gauge
(B) ATF level range at "HOT" [70 — 80°C (158 — 176°F)]
(C) Upper level
(D) Lower level
(E) ATF level range at "COLD" [20 — 30°C (68 — 86°F)]

2. ATF FILTER

NOTE:
Basically ATF filter is maintenance free, but when it has physically damaged or ATF leaked, the ATF filter needs replacement.

For the replacement procedure of ATF filter, refer to "ATF FILTER".

• 4AT model
<Ref. to 4AT-64, ATF Filter.>
• 5AT model
<Ref. to 5AT-60, ATF Filter.>

15. Front and Rear Differential Gear Oil

A: REPLACEMENT

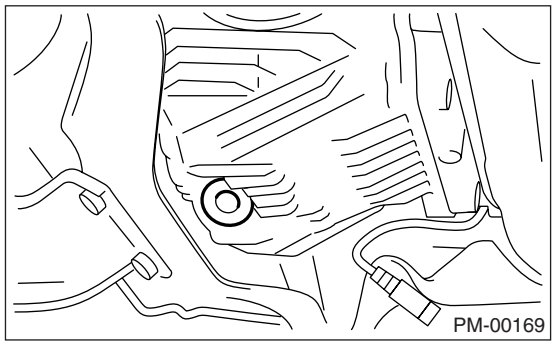
1. FRONT DIFFERENTIAL (MT MODEL)

Front differential gear oil for MT model lubricates the transmission and differential together. Refer to "Transmission Oil" for replacement procedure. <Ref. to PM-25, Transmission Gear Oil.>

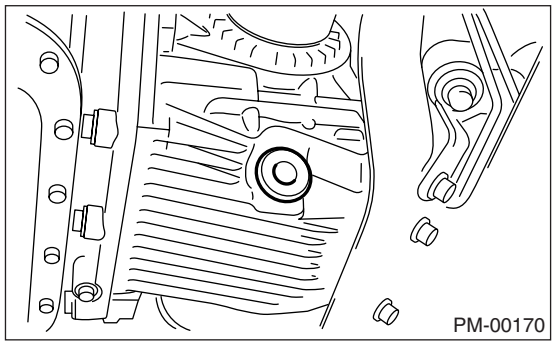
2. FRONT DIFFERENTIAL (AT MODEL)

1) Drain the differential gear oil by removing drain plug using TORX® BIT T70.

NOTE:
• Before starting work, cool off the differential gear oil well.
• If front differential gear oil adheres to the exhaust pipe, wipe it off completely.
• 4AT model



• 5AT model



2) Replace the gasket with new one, and then tighten the drain plug to specified torque.

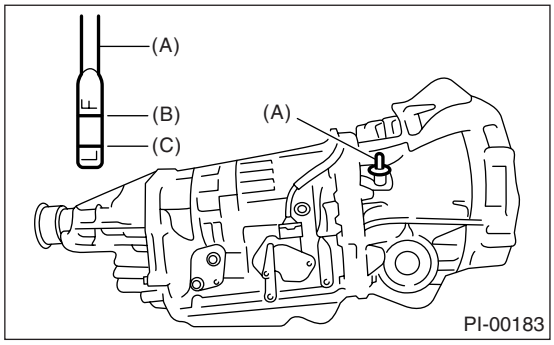
Tightening torque:
70 N·m (7.1 kgf-m, 16 ft-lb)

3) Fill differential gear oil through the oil level gauge hole up to the upper point of level gauge.

Recommended gear oil:
Refer to "RM" section. <Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

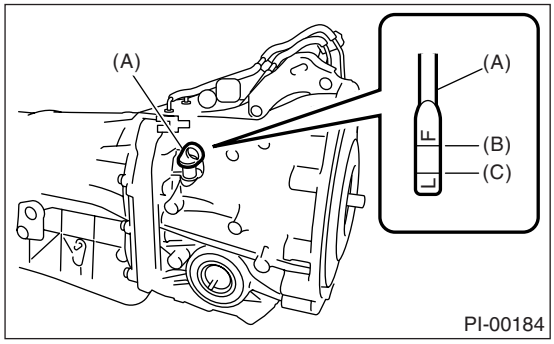
NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

Differential gear oil capacity:
4AT model
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)



(A) Oil level gauge
(B) Upper level
(C) Lower level

5AT model
1.3 — 1.5 ℓ (1.4 — 1.6 US qt, 1.1 — 1.3 Imp qt)



(A) Oil level gauge
(B) Upper level
(C) Lower level

3. REAR DIFFERENTIAL

1) Drain the oil by removing drain plug.
2) Remove the filler plug for quick draining oil.
3) Install the drain plug after draining oil.

NOTE:
• Apply liquid gasket to the drain plug threads for T-type.
• Use a new gasket for VA-type.

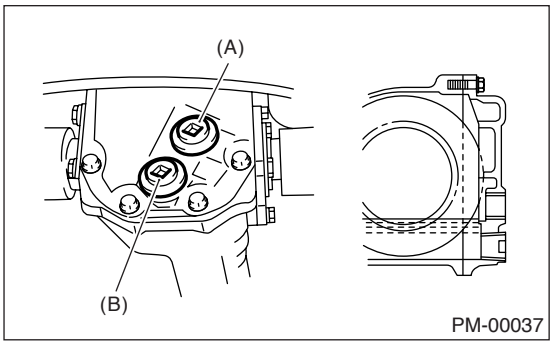
Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
T-type
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA1-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)
VA2-type
29 N·m (3.0 kgf-m, 21.4 ft-lb)

4) Pour oil to the bottom end of filler plug hole.

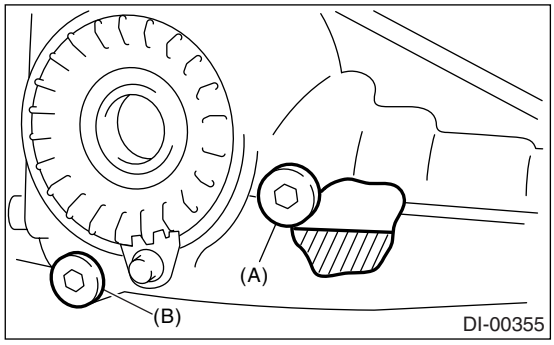
Recommended gear oil:
Refer to "RM" section. <Ref. to RM-3, LUBRICANTS, RECOMMENDED MATERIALS, Recommended Materials.>

• Except for VA2-type



(A) Filler plug
(B) Drain plug

• VA2-type



(A) Filler plug
(B) Drain plug

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.

5) Install the filler plug.

NOTE:
• Apply liquid gasket to the filer plug threads for T-type.
• Use a new aluminum gasket for VA-type.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
T-type
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)
VA1-type
34 N·m (3.5 kgf-m, 25.3 ft-lb)
VA2-type
29 N·m (3.0 kgf-m, 21.4 ft-lb)

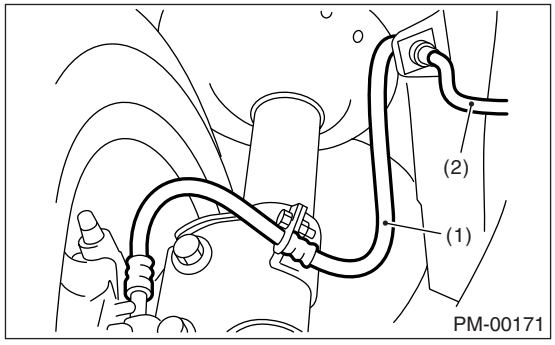
16.Brake Line

A: INSPECTION

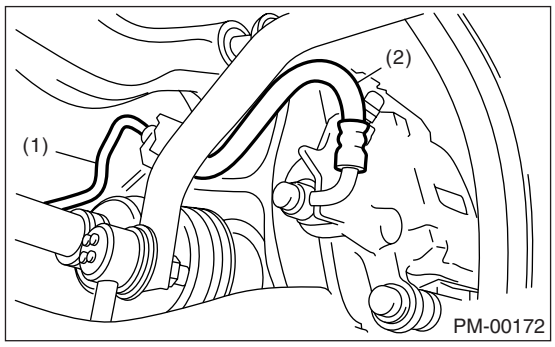
1. BRAKE LINE

1) Check for scratches, swelling, corrosion, traces of fluid leakage on the brake hoses or pipe joints.
2) Check the possibility of adjacent parts interfering with brake pipes/hoses during driving, and loose connections/clamps.
3) Check any trace of fluid leakage, scratches, etc. on master cylinder, wheel cylinder and pressure control valve.

NOTE:
• When the brake fluid level in the reservoir tank is lower than specified limit, the brake warning light on the combination meter will come on.
• Visually check the brake hose for damage. (Use a mirror where it is difficult to see)



(1) Front brake hose
(2) Front brake pipe

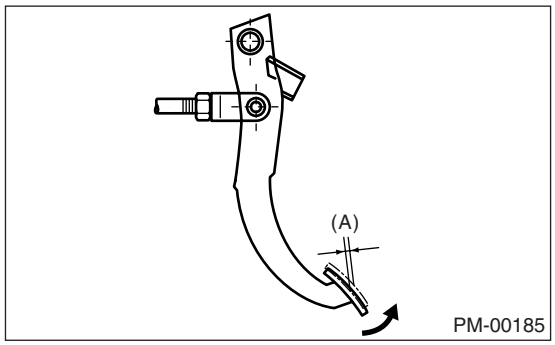


(1) Rear brake pipe
(2) Rear brake hose

2. SERVICE BRAKE

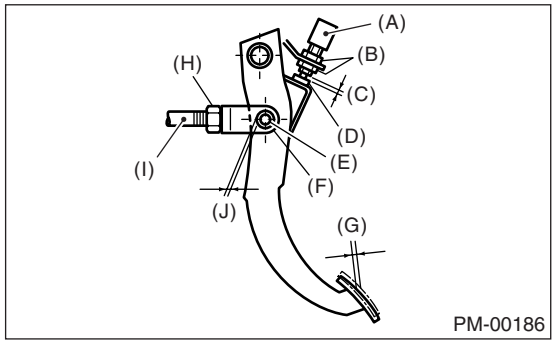
1) Check the free play of brake pedal with pulling up the force of less than 10 N (1 kgf, 2 lb).

Brake pedal free play (Pulling up direction of pedal)
0.5 — 2.0 mm (0.02 — 0.08 in)



(A) Pedal free play

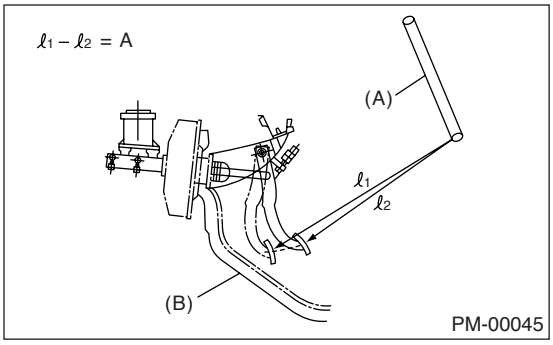
2) If the free play is out of specifications above, adjust the brake pedal as follows:
(1) Make sure the engine is off. (No vacuum is applied to brake booster.)
(2) There should be play between brake booster clevis and pin at brake pedal installing portion. [Pulling up the brake pedal pad with a force of less than 10 N (1 kgf, 2 lb) to a stroke of 0.5 to 2.0 mm (0.02 to 0.08 in).]
(3) If there is no free play between clevis pin and clevis, turn brake switch adjusting nut until the clearance between stopper and screw of brake switch becomes 0.3 mm (0.012 in).



(A) Brake switch
(B) Adjusting nut
(C) 0.3 mm (0.012 in)
(D) Stopper
(E) Clevis pin
(F) Clevis
(G) Pedal free play
(H) Lock nut
(I) Brake booster operating rod
(J) Play at pin

3) Check the pedal stroke.
While the engine is idling, depress the brake pedal with a 490 N (50 kgf, 110 lb) load and measure the distance between the brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measurements must be less than specified value. If the distance is more than specified value, there is possibility of air inside the hydraulic unit.

Brake pedal reserve distance A:
95 mm (3.7 in)/ 490 N (50 kgf, 110 lb) or less

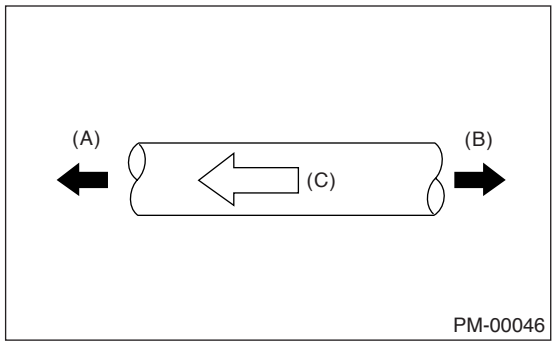


(A) Steering wheel
(B) Toe board

4) Check to see if air is in the hydraulic brake line by the feel of pedal operation. If air appears to exist in the line, bleed it from the system.
5) Check for even operation of all brakes, using a brake tester or by driving the vehicle for a short distance on a straight road.

3. BRAKE SERVO SYSTEM

1) With the engine off, depress the brake pedal several times applying the same pedal force. Make sure the travel distance should not change.
2) With the brake pedal depressed, start the engine. Make sure the pedal should move slightly toward the floor.
3) With the brake pedal depressed, stop the engine and keep the pedal depressed for 30 seconds. Make sure the pedal height should not change.
4) A check valve is built into the vacuum hose. Disconnect the vacuum hose to inspect function of check valve.
Blow compressed air into vacuum hose from its brake booster side end. Make sure air must flow out of engine side end of hose. Next, blow compressed air into hose from engine side. Make sure air should not flow out of hose.
Replace the both check valve and vacuum hose if the check valve is faulty. Engine side of vacuum hose is indicated by marking “ENG” as shown.



(A) Engine side
(B) Brake booster side
(C) ENG

5) Check the vacuum hose for cracks or other damage.

NOTE:
When installing the vacuum hose on the engine and brake booster, do not use soapy water or lubricating oil on their connections.

6) Check the vacuum hose to make sure it is tightly secured.

17.Brake Fluid

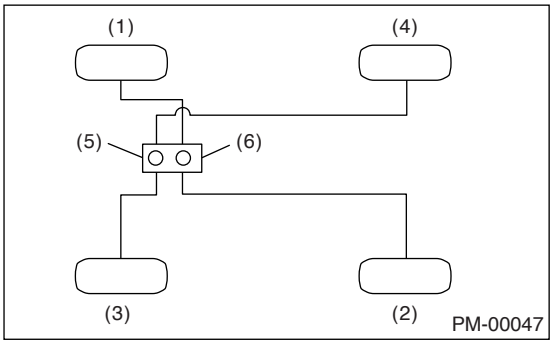
A: REPLACEMENT

1) Either jack-up the vehicle and place a rigid rack under it, or lift-up the vehicle.
2) Remove all the wheels.
3) Drain the brake fluid from master cylinder.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
Refer to "RM" section. <Ref. to RM-5, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

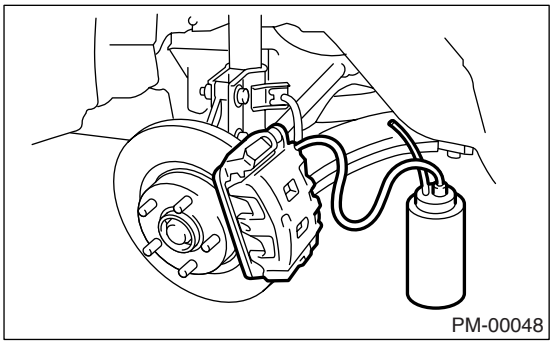
NOTE:
• Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

Air bleeding sequence (1) → (2) → (3) → (4)



(1) Front RH
(2) Rear LH
(3) Front LH
(4) Rear RH
(5) Secondary
(6) Primary

5) Install one end of a vinyl tube onto the air bleeder and insert the other end of the tube into a container to collect the brake fluid.



NOTE:
• Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operation must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approx. 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen the bleeder screw approximately 1/4 turn until a small amount of brake fluid drains into the container, and then quickly tighten the screw.
8) Repeat steps 6) and 7) until there are no air bubbles in drained brake fluid and new fluid flows through vinyl tube.

NOTE:
Add brake fluid as necessary while performing the air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold the brake pedal depressed and tighten the screw and install bleeder cap.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

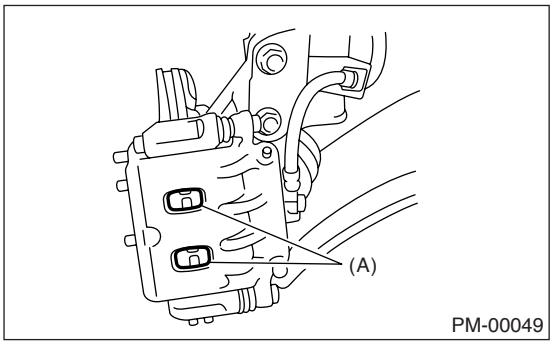
10) Bleed air from each wheel cylinder by following steps from 5) to 9).
11) Depress the brake pedal with a force of approx. 294 N (30 kgf, 66 lb) and hold it there for approx. 20 seconds. At this time check the pedal to see if it makes any unusual movement. Visually inspect the bleeder screws and brake pipe joints to confirm there is no fluid leakage.
12) Install the wheels, and drive the vehicle for a short distance between 2 to 3 km (1 to 2 miles) to confirm brakes are operating properly.

18.Disc Brake Pad and Disc

A: INSPECTION

1) Jack-up the vehicle and support with rigid racks. Then remove the wheels.
2) Visually check the pad thickness through inspection hole of disc brake assembly. Replace the pad if necessary.

NOTE:
When replacing a pad, always replace the pads for both the left and right wheels at the same time. Also replace the pad clips if they are twisted or worn.



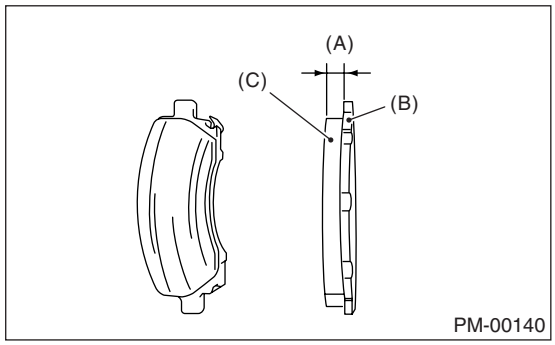
(A) Inspection hole

• Front

Pad thickness		mm (in)
Standard	15-inch	11 (0.43)
	16-inch	11 (0.43)
	17-inch	11 (0.43)
Wear limit	15-inch	1.5 (0.059)
	16-inch	1.5 (0.059)
	17-inch	1.5 (0.059)

• Rear

Pad thickness		mm (in)
Standard	Solid disc type	9 (0.35)
	Ventilated disc type	9 (0.35)
Wear limit	Solid disc type	1.5 (0.059)
	Ventilated disc type	1.5 (0.059)



(A) Pad thickness
(B) Back metal
(C) Lining

3) Check the disc rotor, and correct or replace if it is damaged or worn.
• Front

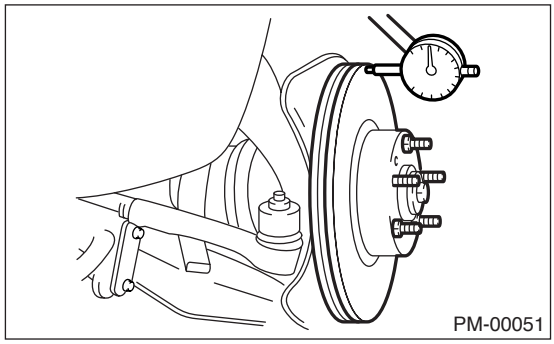
Disc rotor thickness		mm (in)
Standard	15, 16-inch	24 (0.94)
	17-inch	30 (1.18)
Wear limit	15, 16-inch	22 (0.87)
	17-inch	28 (1.10)

• Rear

Disc rotor thickness		mm (in)
Standard	Solid disc type	10 (0.39)
	Ventilated disc type	18 (0.71)
Wear limit	Solid disc type	8.5 (0.34)
	Ventilated disc type	16 (0.63)

4) Remove the caliper body. <Ref. to BR-20, Front Disc Brake Assembly.> <Ref. to BR-28, Rear Disc Brake Assembly.>
5) Tighten the wheel nuts to secure disk rotor.
6) Set a dial gauge at a point less than 10 mm (0.39 in) from outer periphery of the rotor, and then measure the disk rotor runout.

Disc rotor runout limit:
Front: 0.05 mm (0.002 in)
Rear: 0.05 mm (0.002 in)



19.Parking Brake

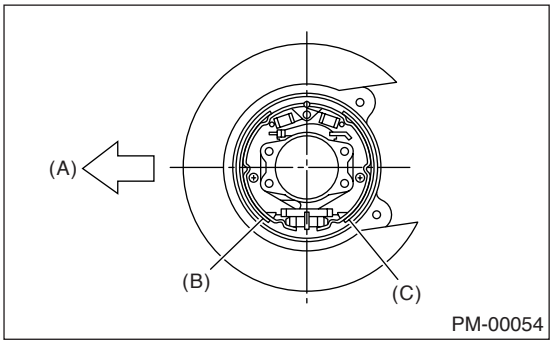
A: INSPECTION

Inspect the brake linings and disc rotor of both sides of the rear brake at the same time by removing disc rotor.

1) Inspect the brake shoes for damage or deformation and check the brake linings for wear.

NOTE:
Always replace both primary and secondary brake shoes for the left and right wheels at the same time.

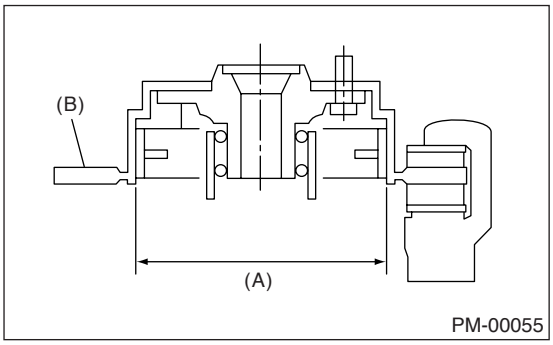
Thickness of brake lining (except for back metal):
Standard value: 3.2 mm (0.126 in)
Wear limit: 1.5 mm (0.059 in)



(A) Forward
(B) Brake shoe (Primary side)
(C) Brake shoe (Secondary side)

2) Check the inside of disk rotor for wear, dents or other damage. If the inside surface of dick rotor is streaked, correct the surface with emery cloth (#200 or more). If it is unevenly worn or tapered, correct or replace it.

Brake drum inside diameter:
Standard value: 170 mm (6.69 in)
Wear limit: 171 mm (6.73 in)



(A) Inside diameter
(B) Disc

3) If the deformation or wear of back plate, shoe, etc. is noticeable, replace them.

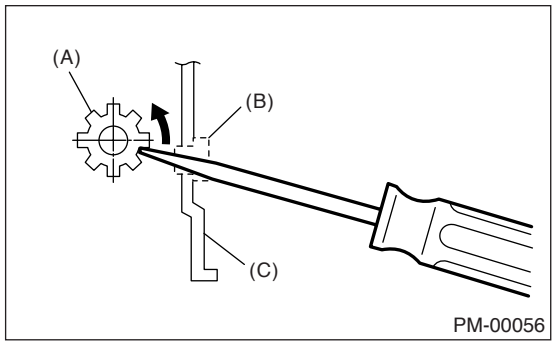
4) When the shoe return spring tension is excessively weakened, replace it.

B: ADJUSTMENT

For rear disc brake, adjust the parking brake after bleeding air.

1) Remove the rear cover (rubber) installed at back plate.

2) Turn the adjuster toward arrow mark (upward) until it is locked slightly, by using flat-tip screwdriver as shown in the illustration.



(A) Adjuster
(B) Cover (rubber)
(C) Back plate

3) Turn back (downward) the adjuster 3 to 4 notches.

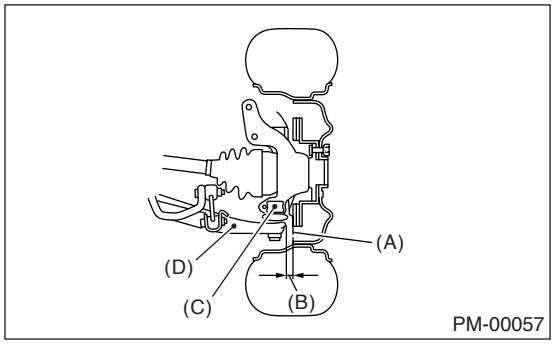
4) Install the cover (rubber) in original position correctly.

20.Suspension

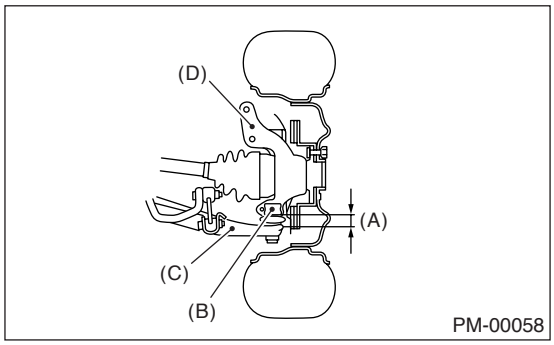
A: INSPECTION

1. SUSPENSION BALL JOINT

1) Jack-up the vehicle until front wheels are off ground.
2) Grasp the bottom of tire and move it in and out. If relative movement is observed between the brake disc cover (A) and end of front arm (D), ball joint (C) may be excessively worn.



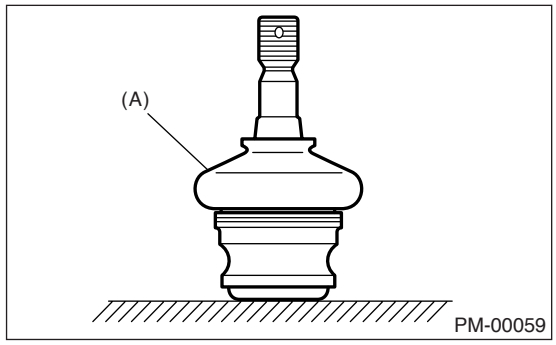
3) Grasp the end of front arm and move it up and down. Relative movement (A) between the housing (D) and front arm (C) boss indicates ball joint (B) may be excessively worn.



4) If relative movement is observed in the step 2), 3), remove and inspect the ball joint. If the free play exceeds standard value, replace the ball joint. <Ref. to FS-17, Front Ball Joint.>
5) Damage of dust seal
Visually inspect the ball joint dust seal. If it is damaged, remove the front arm. <Ref. to FS-19, Front Arm.> And measure free play of ball joint. <Ref. to FS-17, Front Ball Joint.>

(1) When looseness exceeds standard value, replace the ball joint.
(2) If the dust seal is damaged, replace with a new ball joint.

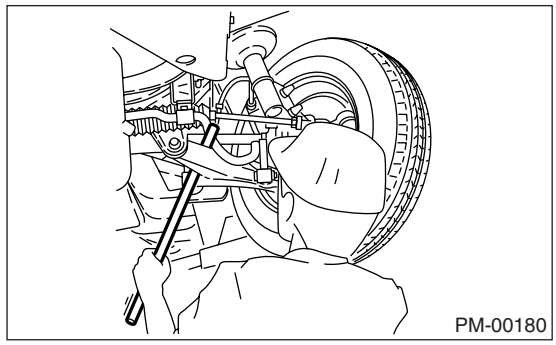
NOTE:
When the front arm ball joint has been removed or replaced, check the toe-in of front wheel. If the front wheel toe-in is not at specified value, adjust the toe-in. <Ref. to FS-8, Wheel Alignment.>



(A) Dust seal

2. FRONT, REAR SUSPENSION BUSHING

Apply pressure with tire lever etc, and inspect the bushing for wear or crack. Replace the bushings if there is wear or crack.



3. WHEEL ARCH HEIGHT

1) Unload the cargoes and set the vehicle in curb weight (empty) condition.
2) Check the wheel arch height of front and rear suspensions to ensure that they are within specified values. <Ref. to FS-8, Wheel Alignment.>
3) When the wheel arch height is out of standard, visually inspect following components and replace deformed parts.
• Suspension components [Front strut assembly and rear damper assembly]
• Parts connecting suspension and body
4) If no components are deformed, adjust the wheel arch height by replacing the suspension which wheel arch height is out of standard. <Ref. to FS-8, Wheel Alignment.> <Ref. to RS-8, Wheel Alignment.>

4. WHEEL ALIGNMENT OF FRONT SUSPENSION

1) Check the alignment of front suspension to ensure that following items conform to standard values.
- Toe-in
- Camber
- Caster
- Steering angle

<Ref. to FS-8, Wheel Alignment.>
2) When the caster angle does not conform to reference obviously, visually inspect the following components and replace deformed parts.
- Suspension components [Strut assembly, crossmember, front arm, etc.]
- Parts connecting suspension and body

3) When the toe-in and camber are out of standard value, adjust them so that they conform to standard value.
4) When the right-and-left turning angles of tire are out of standard, adjust to standard value.

5. WHEEL ALIGNMENT OF REAR SUSPENSION

1) Check the alignment of rear suspension to ensure that following items are within standard values.
- Toe-in
- Camber
- Thrust angle

<Ref. to RS-8, Wheel Alignment.>
2) When the camber angle does not conform to standard value, visually inspect the following components. If the deformation is observed, replace the damaged parts.
- Suspension components [Shock absorber, front link, rear link, upper link, rear arm, sub frame, etc]
- Parts connecting suspension and body

3) When the toe-in and thrust angle are out of standard value, adjust them so that they conform to standard value.

6. OIL LEAKAGE OF STRUT AND SHOCK ABSORBER

Visually inspect the front strut and rear shock absorber for oil leakage. Replace the front strut and rear shock absorber if oil leaks excessively.

7. TIGHTNESS OF BOLTS AND NUTS

Check the bolts and nuts for looseness. Retighten the bolts and nuts to specified torque. If the self-locking nuts and bolts are removed, replace them with new ones.
- Front suspension

<Ref. to FS-2, General Description.>
- Rear suspension

<Ref. to RS-2, General Description.>

8. DAMAGE TO SUSPENSION PARTS

Check the following parts and the fastening portion of the vehicle body for deformation or excessive rusting which impairs the suspension. If necessary, replace the damaged parts with new ones. If minor rust formation, pitting, etc. are noted, remove the rust and take rust prevention measure.
- Front suspension
  - Front arm
  - Crossmember
  - Strut
- Rear suspension
  - Sub frame
  - Front link
  - Rear link
  - Upper link
  - Rear arm
  - Shock absorber
- In the area where salt is sprayed to melt snow on a road in winter, check suspension parts for damage caused by rust every 12 months after lapse of 60 months. Take rust prevention measure as required.

21.Wheel Bearing

A: INSPECTION

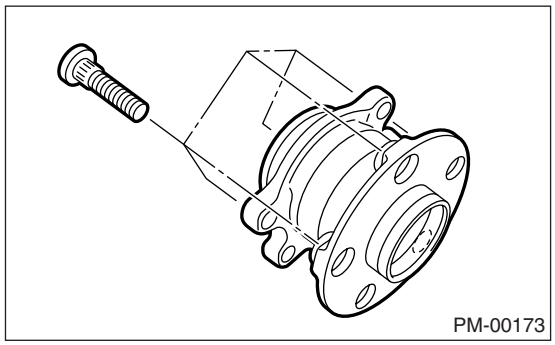
1. FRONT WHEEL BEARING

NOTE:
Inspect the condition of front wheel bearing grease.

1) Jack-up the front side of vehicle.
2) While holding the front wheel by hand, swing it in and out to check bearing free play.
3) Loosen the wheel nuts, and remove the front wheel.
4) If the bearing free play exists in step 2) above, attach a dial gauge to the hub and measure axial play in axial direction.

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Remove the bolts and self-locking nuts, and extract the front arm from front crossmember.
6) Remove the PTJ of front drive shaft from transmission. <Ref. to DS-13, Front Axle.>
7) While supporting the front drive shaft horizontally with one hand, turn the hub with the other hand to check for noise or binding.
If the hub is noisy or binds, replace the front axle.

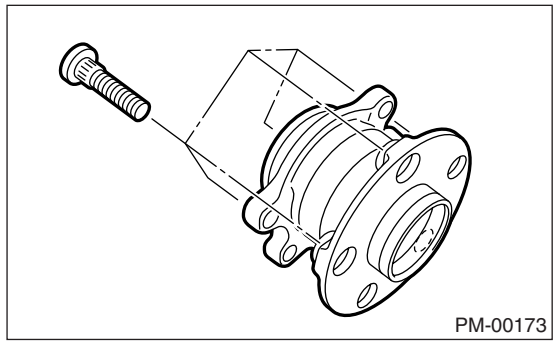


2. REAR WHEEL BEARING

1) Jack-up the rear side of vehicle.
2) While holding the rear wheel by hand, swing it in and out to check bearing free play.
3) Loosen the wheel nuts, and remove the rear wheel.
4) If the bearing free play exists in step 2) above, attach a dial gauge to the hub and measure axial play in axial direction.

Service limit:
Straight-ahead position within 0.05 mm (0.0020 in)

5) Remove the DOJ of rear drive shaft from rear differential. <Ref. to DS-26, Rear Drive Shaft.>
6) While supporting rear drive shaft horizontally with one hand, turn the hub with the other hand to check for noise or binding.
If the hub is noisy or binds, replace the rear axle.



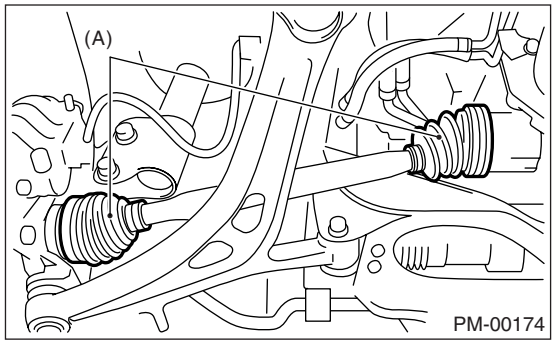
22.Axle Boots and Joints

A: INSPECTION

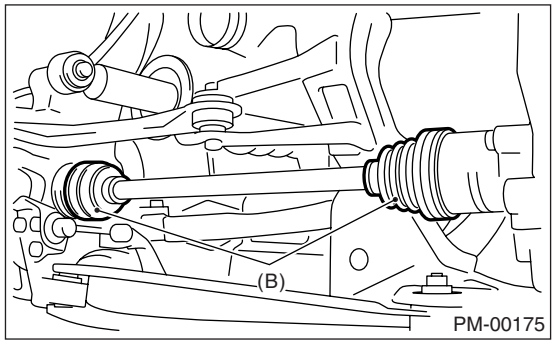
1. FRONT AND REAR AXLE BOOTS

Inspect the front axle boots (A) and rear axle boots (B) for deformation, damage or failure. If faulty, replace them with new ones. <Ref. to DS-22, Front Drive Shaft.> <Ref. to DS-26, Rear Drive Shaft.>

- Front



- Rear



2. PROPELLER SHAFT

Inspect the propeller shaft for damage or failure. If faulty, replace them with new ones. <Ref. to DS-10, Propeller Shaft.>

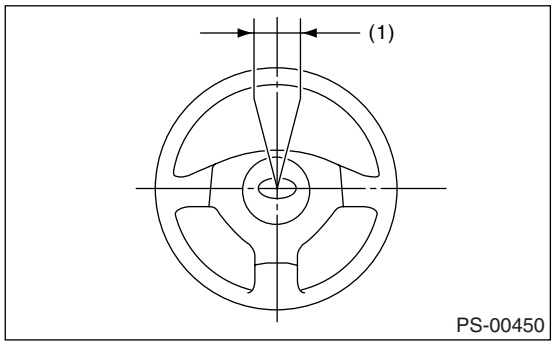
23. Steering System (Power Steering)

A: INSPECTION

1. STEERING WHEEL

1) Set the steering wheel in a straight-ahead position, and check the wheel spokes to make sure they are correctly set in their specified positions.
2) Lightly turn the steering wheel to the left and right to determine the point where front wheels start to move.
Measure the distance of the movement of steering wheel at the outer periphery of wheel.

Steering wheel free play:
0 — 17 mm (0 — 0.67 in)



(1) Steering wheel free play

Move the steering wheel vertically toward the shaft to ascertain if there is play in the direction.

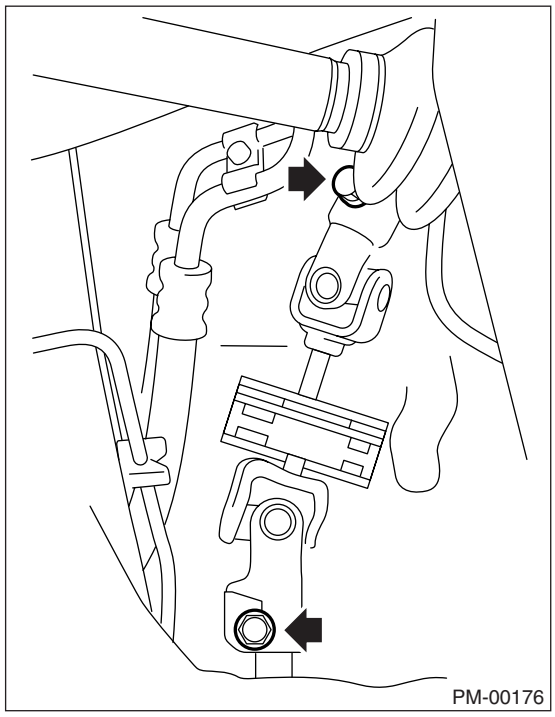
Maximum permissible play:
0.5 mm (0.020 in)

3) Drive the vehicle and check the following items during operation.
(1) Steering force:
The effort required for steering should be smooth and even at all points, and should not vary.
(2) Pulled to one side:
Steering wheel should not be pulled to either side while driving on a level surface.
(3) Wheel runout:
Steering wheel should not show any sign of runout.
(4) Return factor:
Steering wheel should return to its original position after it has been turned and then released.

2. STEERING SHAFT JOINT

When the steering wheel free play is excessive, disconnect the universal joint of steering shaft and check it for any play and yawing torque (at the point of the crossing direction). Also inspect for any damage to sealing or worn serrations. If the joint is loose, retighten the mounting bolts to the specified torque.

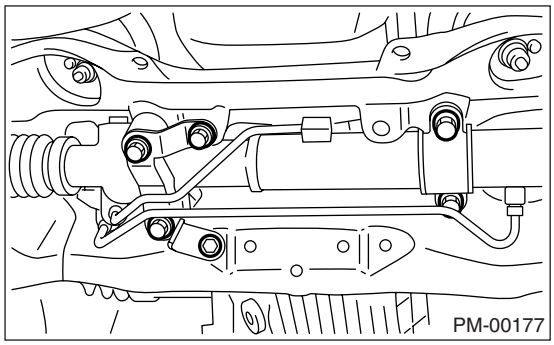
Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)



3. GEARBOX

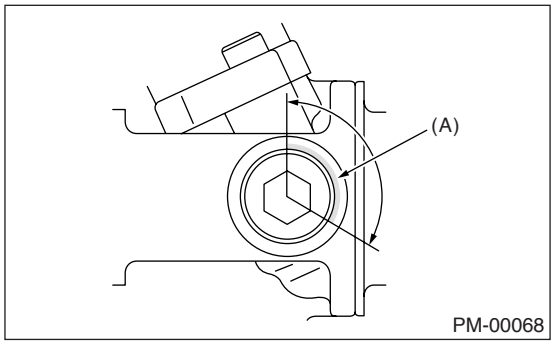
1) With the vehicle placed on a level surface, turn the steering wheel 90° in both the left and right directions.
While the wheel is being rotated, reach under the vehicle and check for looseness in gearbox.

Tightening torque:
59 N·m (6.0 kgf-m, 43.4 ft-lb)



2) Check the boot for damage, cracks or deterioration.

3) With the vehicle placed on a level surface, quickly turn the steering wheel to the left and right.
While steering wheel is being rotated, check the gear backlash. If any noise is noticed, adjust the gear backlash.
4) Adjustment for LHD model
(1) Apply liquid gasket to at least 1/3 of entire perimeter of adjusting screw thread.
(2) Tighten adjusting screw to 25 N·m (2.5 kgf-m, 18.0 ft-lb) and then loosen.
(3) Tighten adjusting screw to 3.9 N·m (0.40 kgf-m, 2.9 ft-lb) and then loosen 20°.
5) Adjustment for RHD model
(1) Apply liquid gasket to at least 1/3 of entire perimeter of adjusting screw thread.
(2) Tighten adjusting screw to 9.8 N·m (1.0 kgf-m, 7.2 ft-lb) and then loosen.
(3) Tighten adjusting screw to 4.9 N·m (0.50 kgf-m, 3.6 ft-lb) and then loosen.
(4) Tighten adjusting screw to 4.9 N·m (0.50 kgf-m, 3.6 ft-lb) and then loosen 37°.



(A) Apply liquid gasket to at least 1/3 of entire perimeter

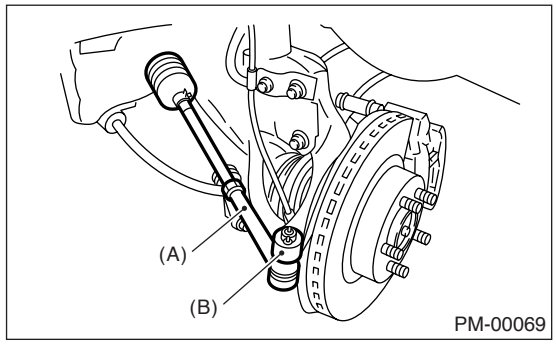
6) Install the lock nut. While holding adjusting screw with a wrench, tighten the lock nut using ST.
ST 926230000 SPANNER

Tightening torque (lock nut):
LHD model
25 N·m (2.5 kgf-m, 18.0 ft-lb)
RHD model
39 N·m (4.0 kgf-m, 28.9 ft-lb)

Hold the adjusting screw with a wrench to prevent it from turning while tightening the lock nut.

4. TIE-ROD

1) Check the tie-rod and tie-rod ends for bends, scratches or other damage.



(A) Tie-rod end
(B) Knuckle arm

2) Check the connections of knuckle ball joints for play, inspect for damage on dust seals, and check free play of ball studs. If castle nut is loose, retighten it to the specified torque, then tighten further up to 60° until cotter pin hole is aligned.

Tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

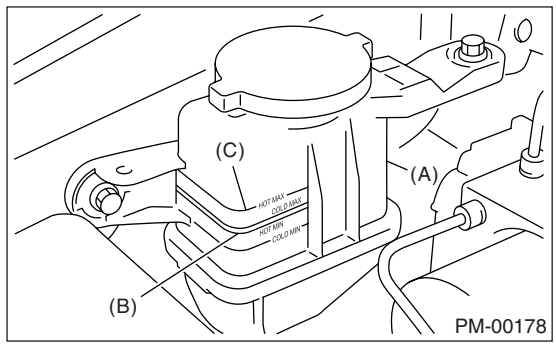
3) Check the lock nut on the tie-rod for tightness. If it is loose, retighten it to the specified torque.

Tightening torque:
83 N·m (8.5 kgf-m, 61.5 ft-lb)

5. POWER STEERING FLUID LEVEL

NOTE:
• At power steering fluid temperature 20°C (68°F); read the fluid level on the “COLD” side.
• At power steering fluid temperature 80°C (176°F); read the fluid level on the “HOT” side.

1) Place the vehicle with engine “OFF” on a level surface.
2) Remove the cover. (3.0 L and turbo model)
3) Check the fluid level using the scale on the outside of the reservoir tank (A). If the level is below “MIN” (B), add fluid to bring it up to “MAX” (C).



NOTE:
If fluid level is at MAX level or above, drain fluid to keep the level in the specified range of indicator by using a syringe or the like.

Recommended fluid:
Refer to "RM" section. <Ref. to RM-5, FLUID, RECOMMENDED MATERIALS, Recommended Materials.>

Fluid capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

6. POWER STEERING FLUID FOR LEAKS

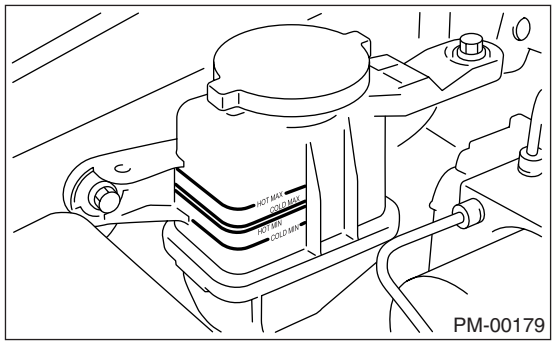
Inspect the underside of oil pump and gearbox of power steering system, hoses, pipes and their couplings for fluid leaks.
If the fluid leaks are found, retighten their fitting bolts (or nuts) and/or replace their parts.

NOTE:
• Wipe the leaked fluid off after correcting fluid leaks.
• Also pay attention to clearances between hoses (or pipes) and other parts when inspecting fluid leaks.

7. HOSES OF OIL PUMP FOR DAMAGES

Check the pressure hose and return hose of oil pump for crack, swell or damage. Replace the hose with a new one if necessary.

NOTE:
Prevent hoses from turning and/or bending when installing hoses.



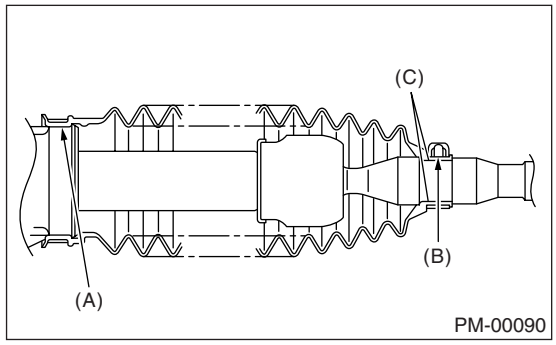
8. POWER STEERING PIPES FOR DAMAGES

Check the power steering pipes for corrosion and damage.
Replace the pipes with new ones if necessary.

9. GEARBOX BOOTS

Inspect both sides of the gearbox boot as follows, and correct the defects if necessary.
1) Positions (A) and (B) of the gearbox boot are fitted correspondingly in grooves (A) and (B) of the gearbox and rod (C).
2) Clips are fitted outside of positions (A) and (B) of boot.
3) Boot does not have crack and hole.

NOTE:
Rotate the position (B) of gearbox boot against the twist of it produced by adjustment of toe-in, etc. Apply grease to the groove (C).



10.FITTING BOLTS AND NUTS

Inspect the fitting bolts and nuts of oil pump and bracket for looseness, and retighten them if necessary.
Inspect and/or retighten them when engine is cold.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
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FUEL INJECTION (FUEL SYSTEMS)

FU(H4SO 2.0)

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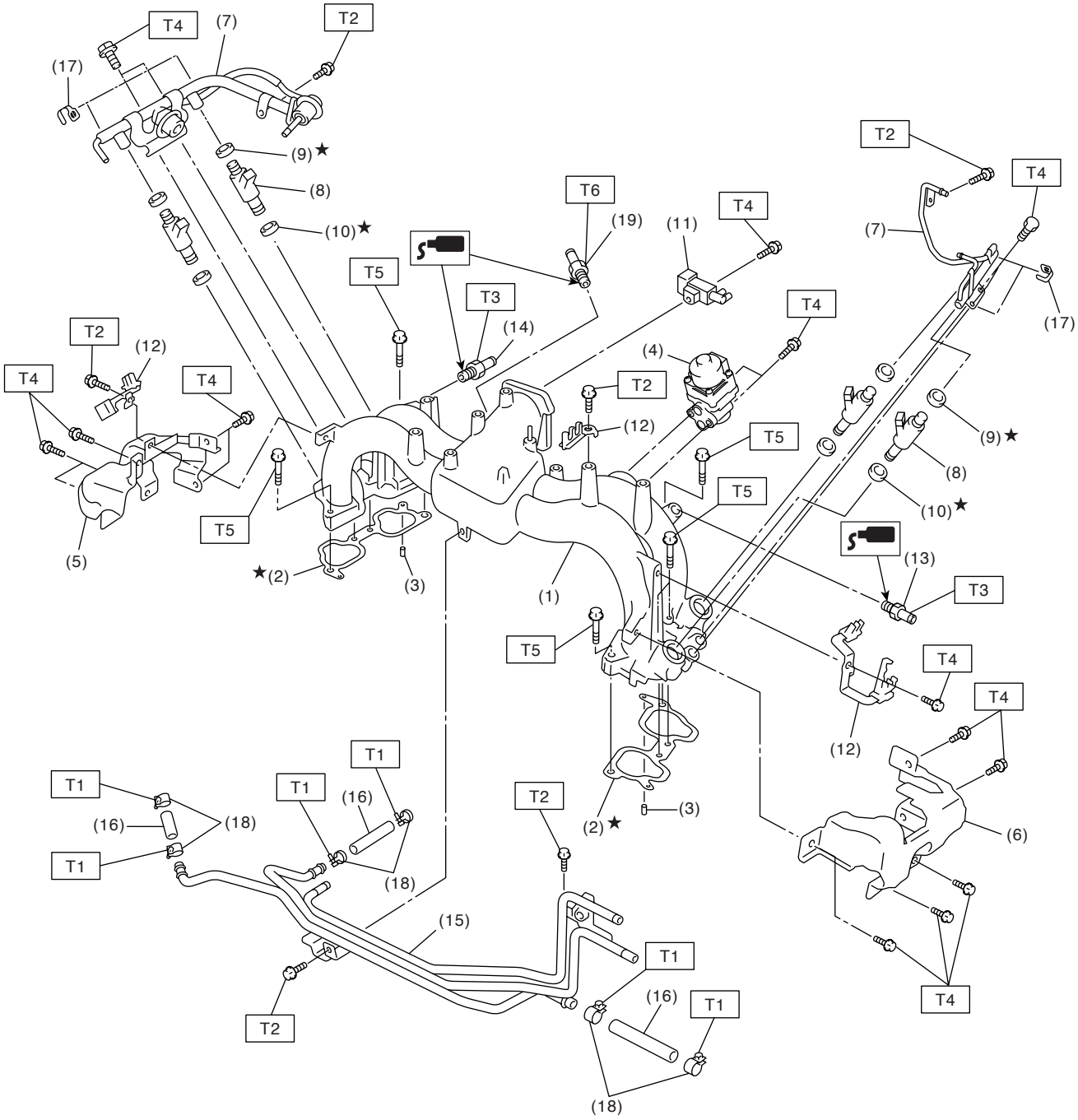
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	441 — 686 kPa (4.50 — 7.00 kg/cm^2, 64.0 — 99.5 psi)
	Discharge	75 ℓ (19.8 US gal, 16.5 Imp gal)/h or more [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

1. INTAKE MANIFOLD

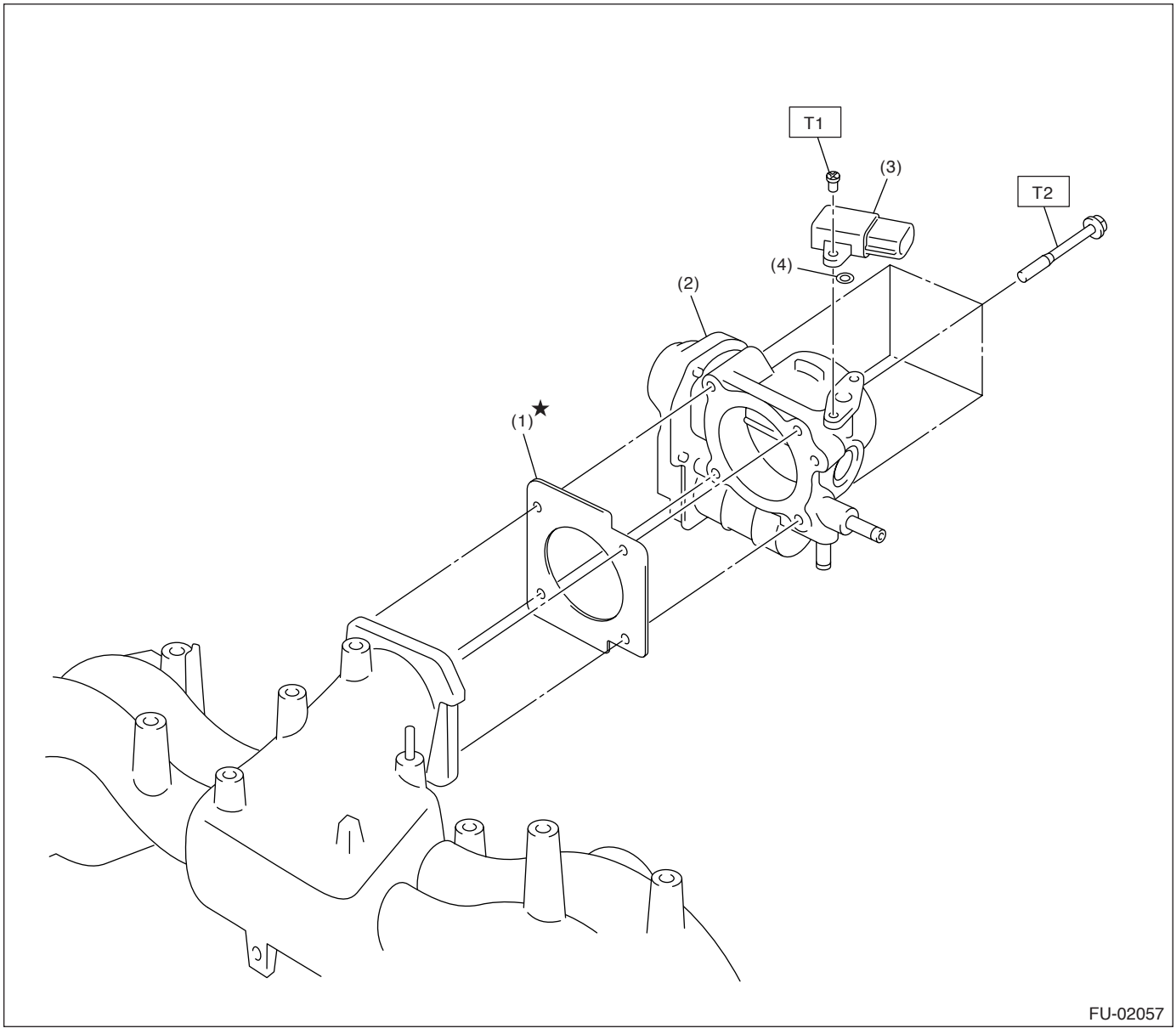


FU-02056

(1) Intake manifold
(2) Gasket
(3) Guide pin
(4) EGR valve (EC, EK, K4 model)
(5) Fuel pipe protector RH
(6) Fuel pipe protector LH
(7) Fuel injector pipe
(8) Fuel injector
(9) O-ring
(10) O-ring
(11) Purge control solenoid valve
(12) Plug cord holder
(13) Nipple (LHD model)
(14) Nipple (RHD model)
(15) Fuel pipe ASSY
(16) Fuel hose
(17) Clip
(18) Clamp
(19) PCV valve

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.5 (0.15, 1.1)
T2: 6.4 (0.65, 4.7)
T3: 17 (1.7, 12.5)
T4: 19 (1.9, 13.7)
T5: 25 (2.5, 18.1)
T6: 23 (2.3, 17.0)

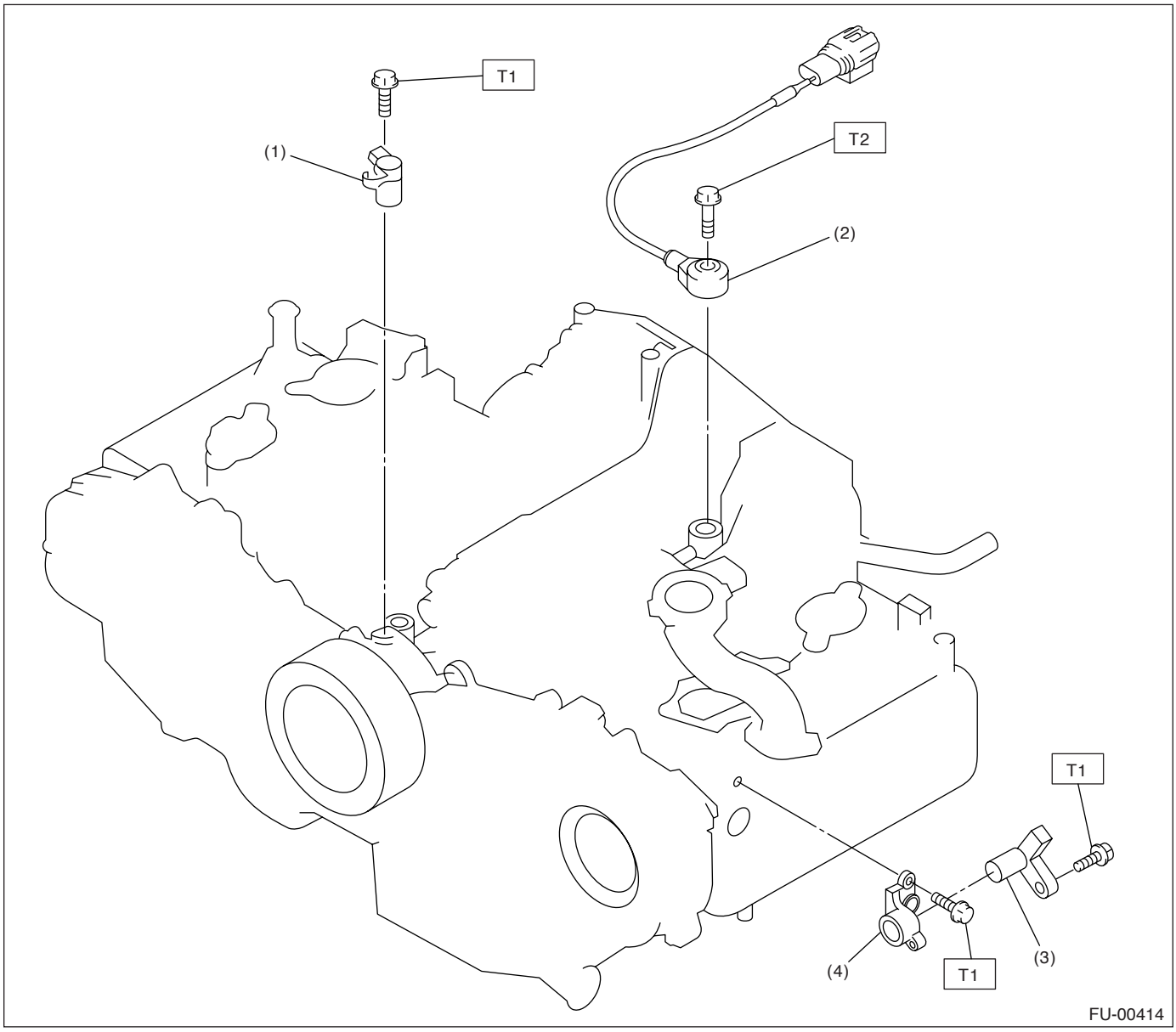
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle body
(3) Manifold absolute pressure sensor
(4) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2.0 (0.20, 1.5)
T2: 8 (0.8, 5.8)

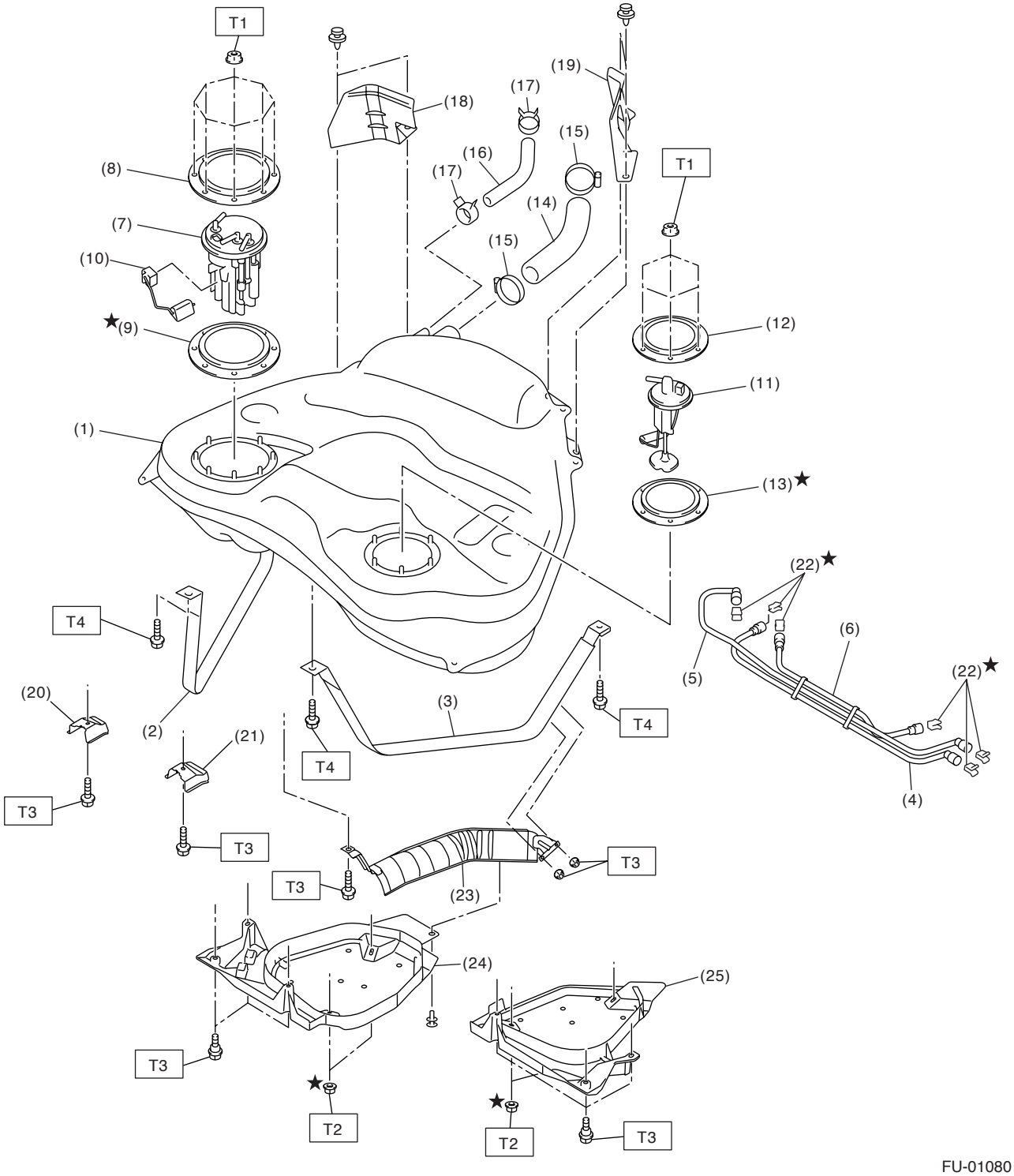
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

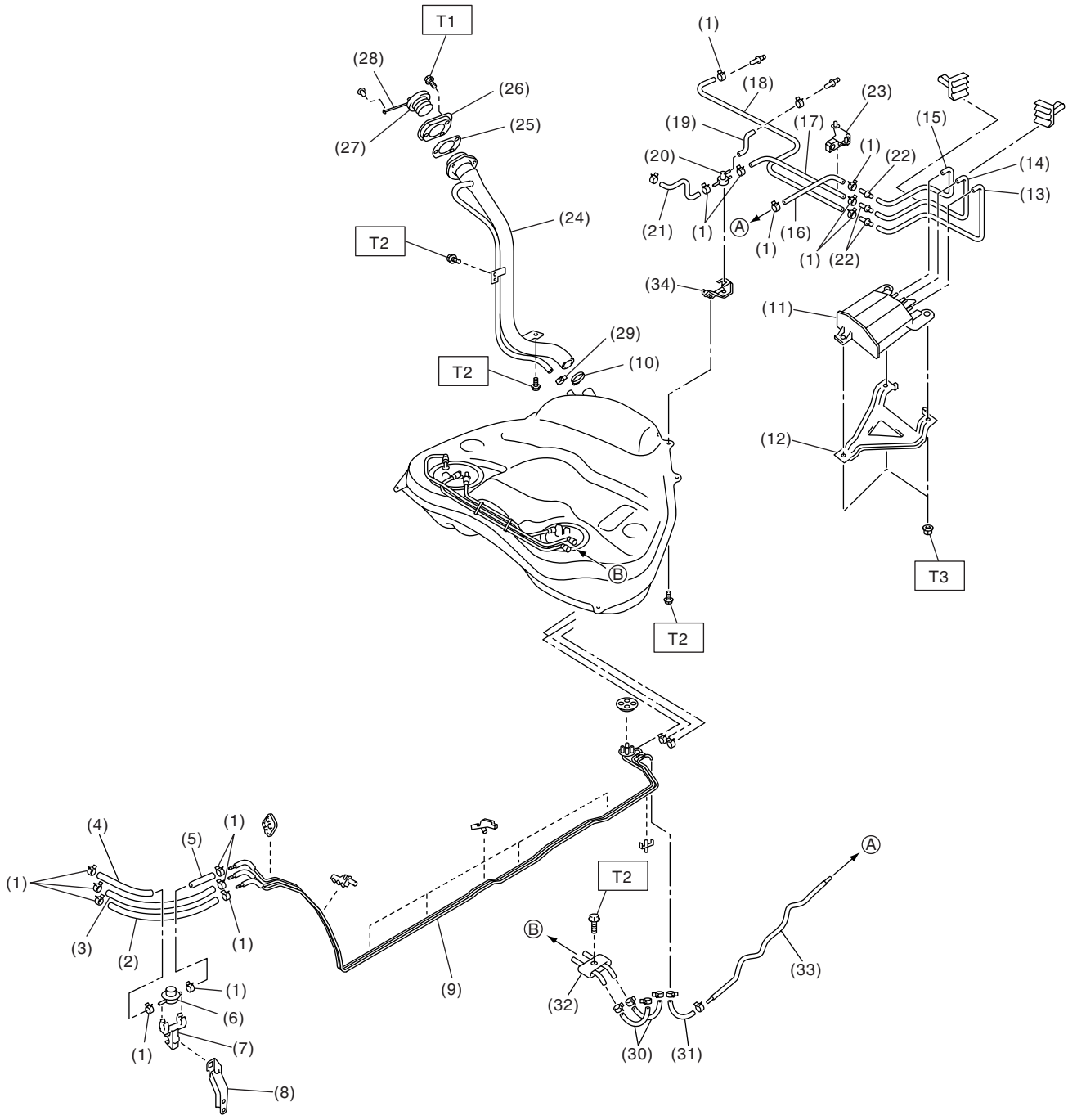


FU-01080

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump assembly
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Fuel tank protector RH (Rear)
(19) Fuel tank protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 9.0 (0.92, 6.6)
T3: 17.5 (1.78, 12.9)
T4: 33 (3.4, 25)

5. FUEL LINE



FU-01081

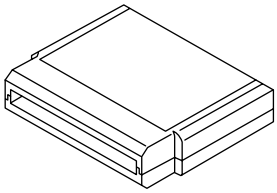
(1) Clip
(2) Fuel return hose
(3) Evaporation hose A
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel damper
(7) Fuel damper holder
(8) Fuel damper bracket
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Connector
(33) Purge pipe
(34) Two-way valve bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.2)
T2: 7.5 (0.76, 5.53)
T3: 8.3 (0.85, 6.1)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

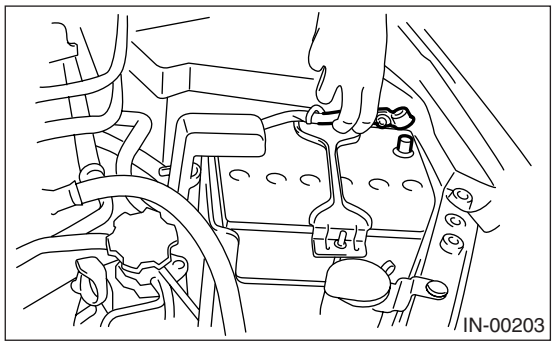
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

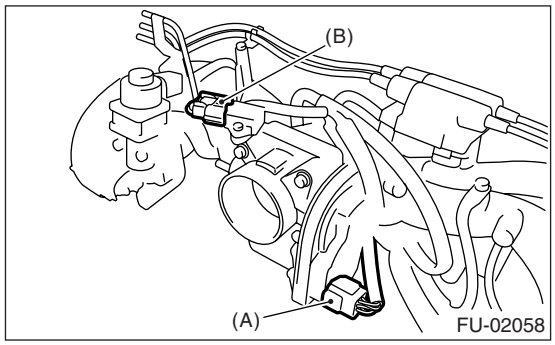
2. Throttle Body

A: REMOVAL

1) Disconnect the ground cable from battery.

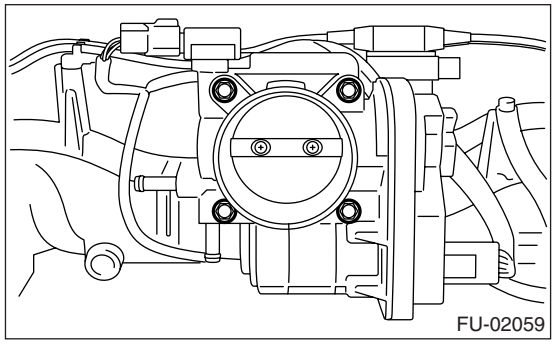


2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the connectors from the throttle position sensor and manifold absolute pressure sensor.



(A) Throttle position sensor
(B) Manifold absolute pressure sensor

4) Disconnect the engine coolant hoses from throttle body.
5) Remove the bolts which secure throttle body to intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

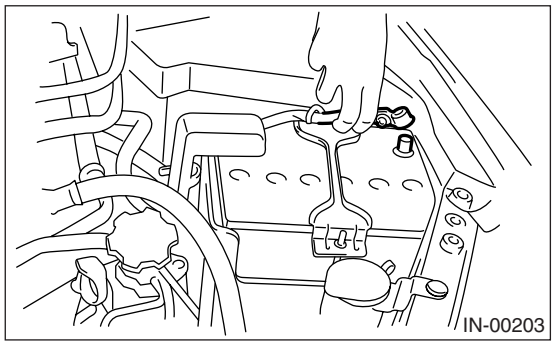
NOTE:
Use a new gasket.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

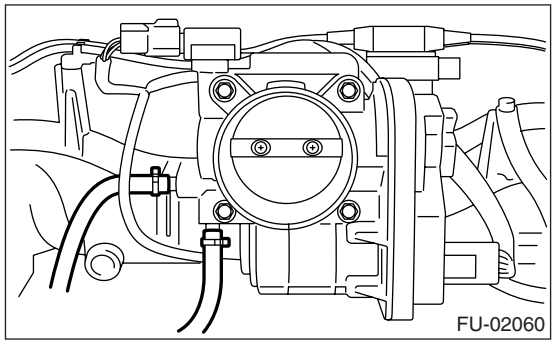
3. Intake Manifold

A: REMOVAL

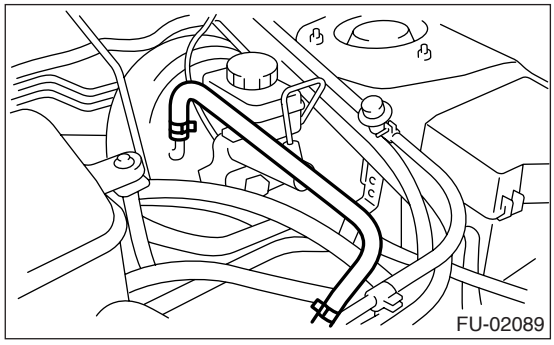
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



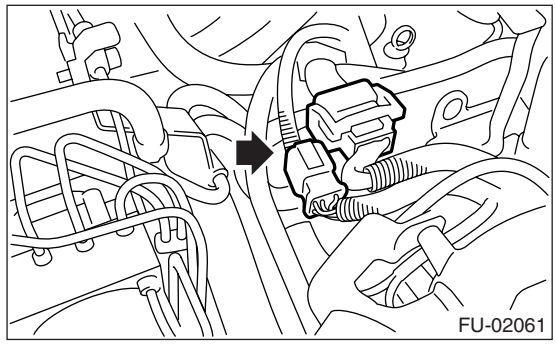
4) Remove the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
5) Disconnect the spark plug cords from spark plugs.
6) Disconnect the engine coolant hoses from throttle body.



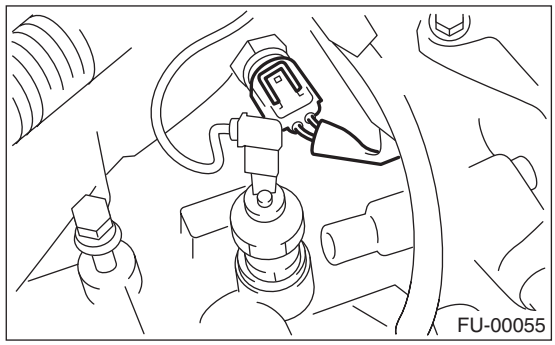
7) Disconnect the PCV hose from intake manifold.
8) Disconnect the brake booster hose.



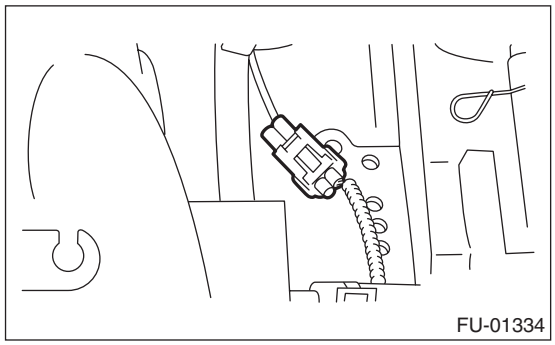
9) Disconnect the engine harness connectors from bulkhead harness connectors.



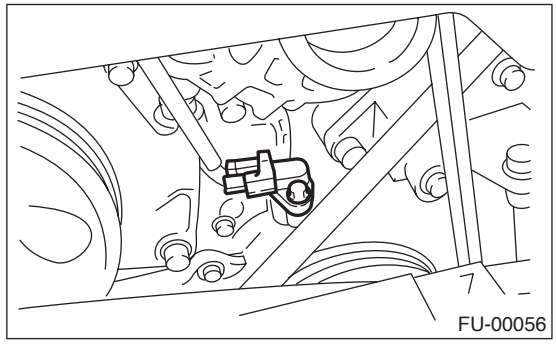
10) Disconnect the connectors from engine coolant temperature sensor.



11) Disconnect the knock sensor connector.

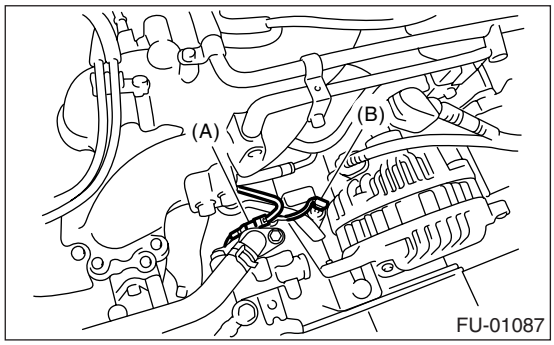


12) Disconnect the connector from crankshaft position sensor.

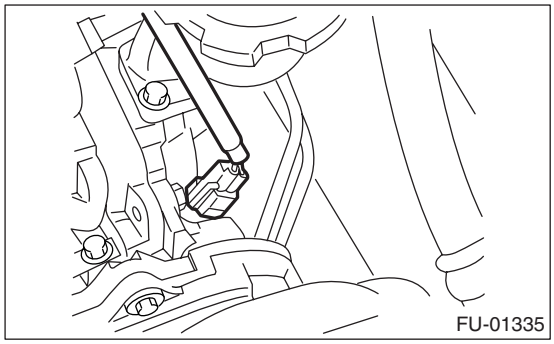


13) Disconnect the connector from power steering pump switch (A).

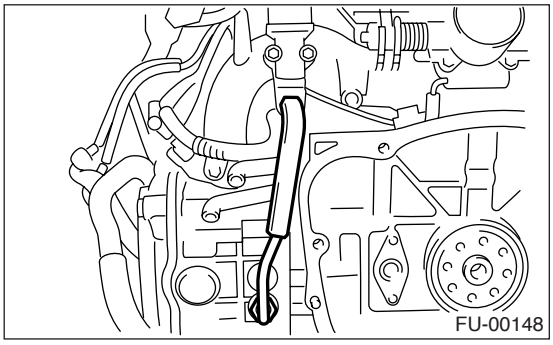
14) Disconnect the connector from oil pressure switch (B).



15) Disconnect the connector from camshaft position sensor.

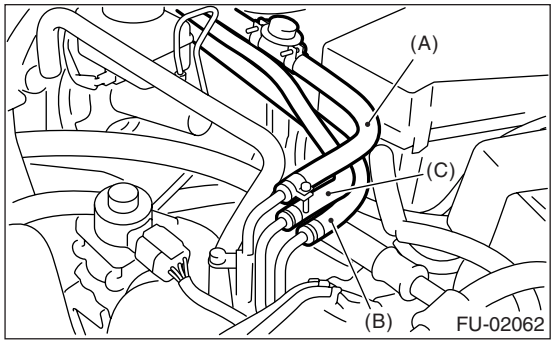


16) Remove the EGR pipe from intake manifold. (EC, EK, K4 model)



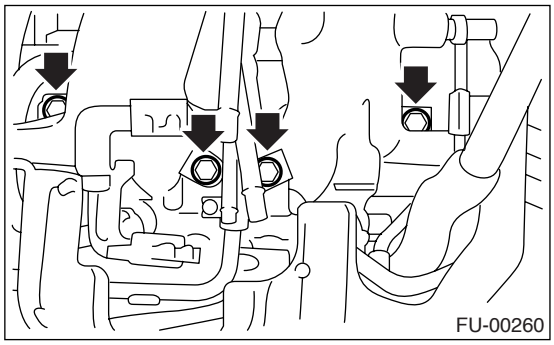
17) Disconnect the fuel hoses from fuel pipes.

WARNING:
- **Be careful not to spill fuel.**
- **Catch the fuel from hoses using a container or cloth.**



(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

18) Remove the bolts which secure intake manifold to cylinder head.



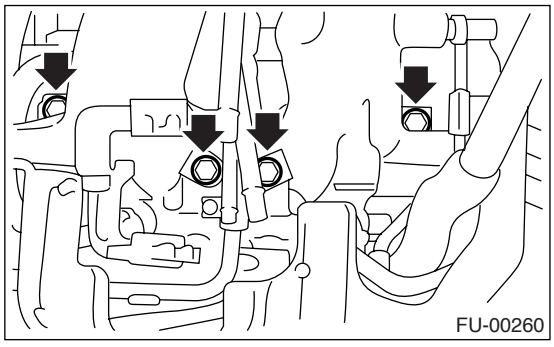
19) Remove the intake manifold.

B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

NOTE:
Use a new gasket.

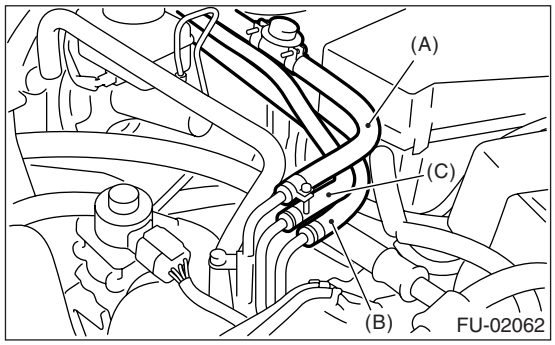
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Connect the fuel hoses.

NOTE:
If fuel hoses or clamps are damaged, replace them with new ones.

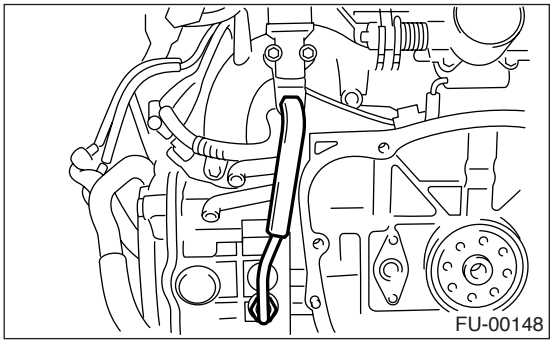
Tightening torque (Hose clamp screw):
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)



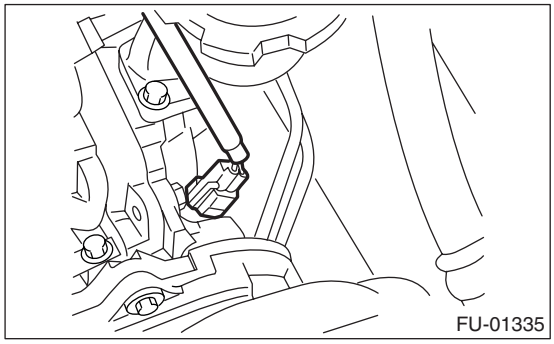
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

3) Install the EGR pipe to intake manifold. (EC, EK, K4 model)

Tightening torque:
34 N·m (3.4 kgf-m, 24.6 ft-lb)

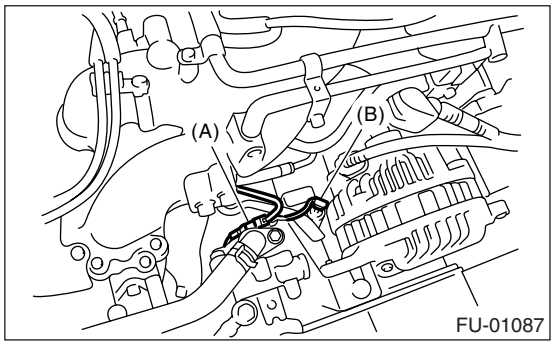


4) Connect the connector to camshaft position sensor.

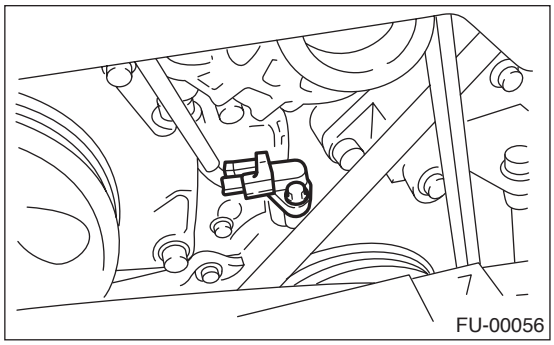


5) Connect the connector to power steering pump switch (A).

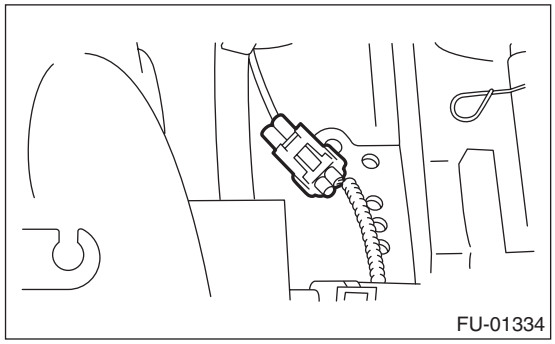
6) Connect the connector to oil pressure switch (B).



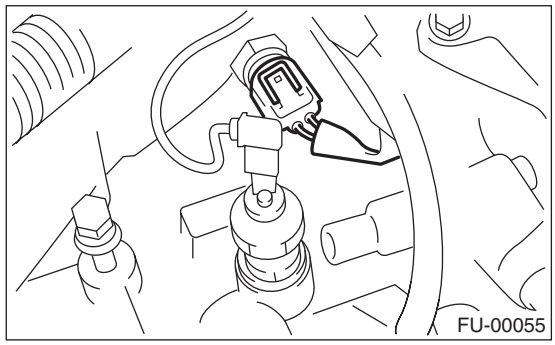
7) Connect the connector to crankshaft position sensor.



8) Connect the knock sensor connector.

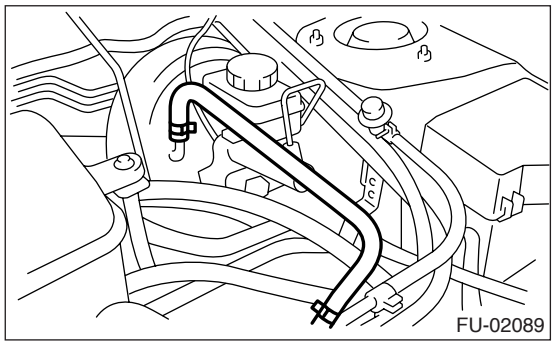


9) Connect the connectors to engine coolant temperature sensor.

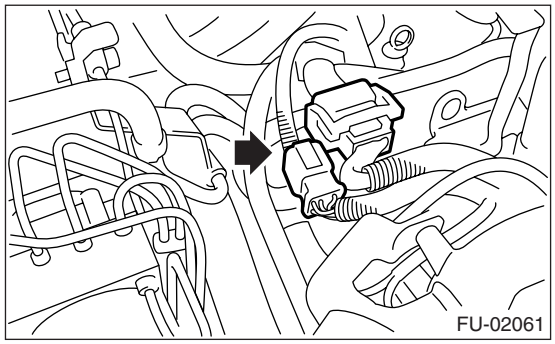


10) Connect the PCV hose to intake manifold.

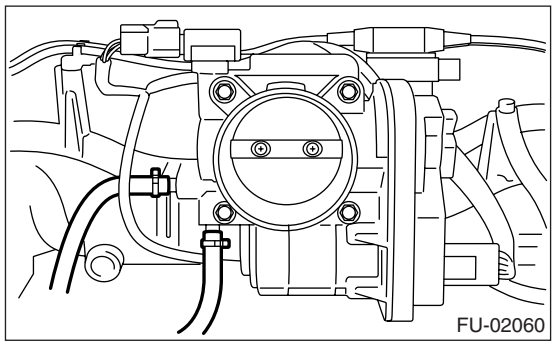
11) Connect the brake booster hose.



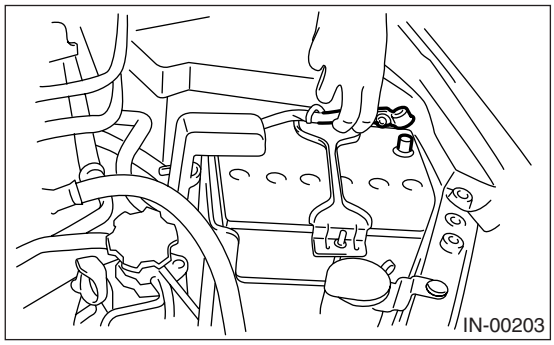
12) Connect the engine harness connectors to bulkhead harness connectors.



13) Connect the engine coolant hoses to throttle body.

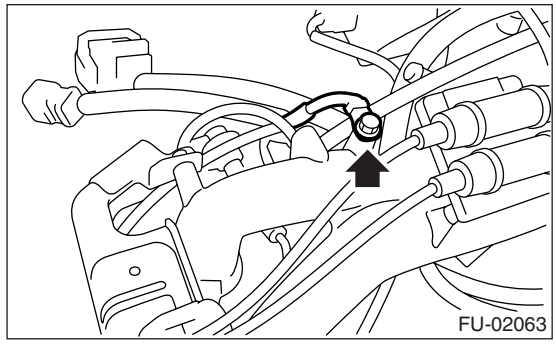


14) Connect the spark plug cords to spark plugs.
15) Install the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
16) Install the fuse of fuel pump to main fuse box.
17) Connect the battery ground cable to battery.

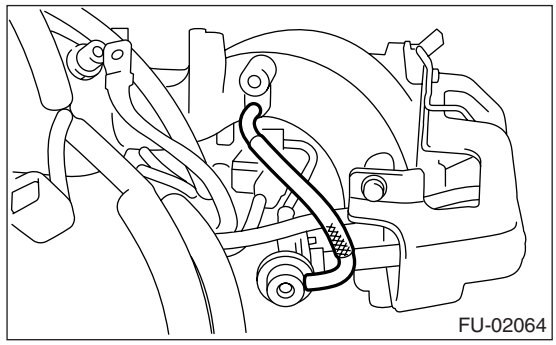


C: DISASSEMBLY

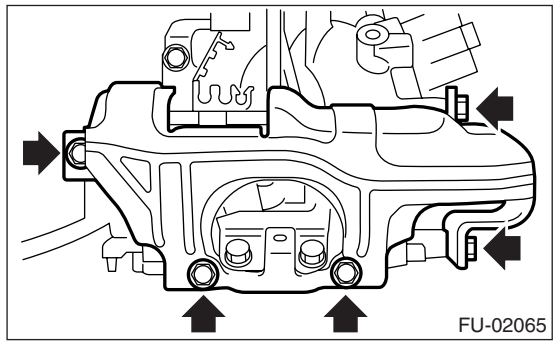
1) Disconnect the engine ground terminal from intake manifold.



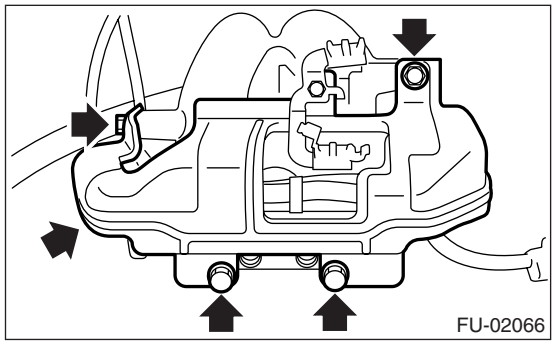
2) Remove the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, REMOVAL, Ignition Coil & Ignitor ASSY.>
3) Remove the throttle body. <Ref. to FU(H4SO 2.0)-10, REMOVAL, Throttle Body.>
4) Remove the EGR valve. (EC, EK, K4 model) <Ref. to FU(H4SO 2.0)-28, REMOVAL, EGR Valve.>
5) Disconnect the pressure regulator vacuum hose from intake manifold.



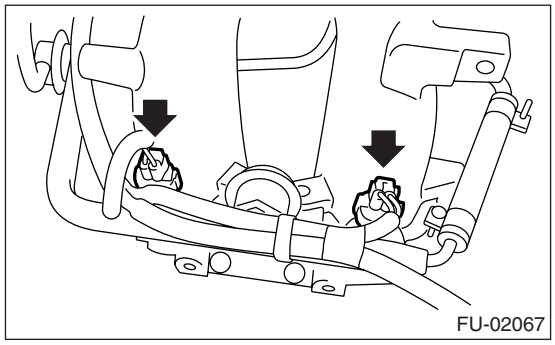
6) Remove the fuel pipe protector LH.



7) Remove the fuel pipe protector RH.

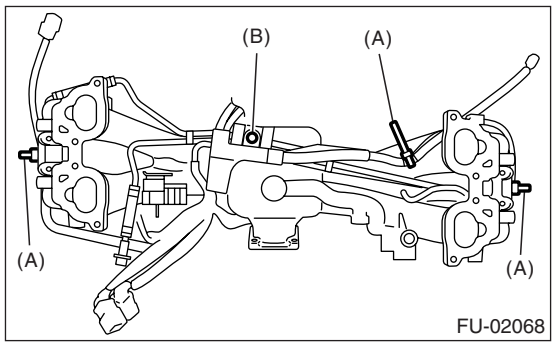


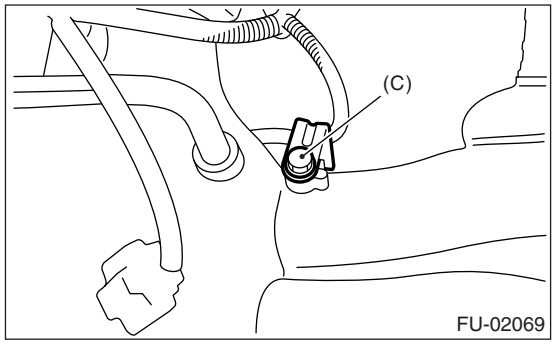
8) Disconnect the connectors from fuel injector.



9) Remove the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, REMOVAL, Purge Control Solenoid Valve.>

10) Remove the harness band (A) and bolts (B), (C) which secure engine harness to intake manifold.

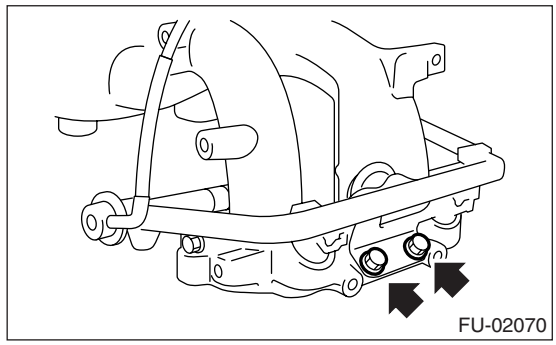


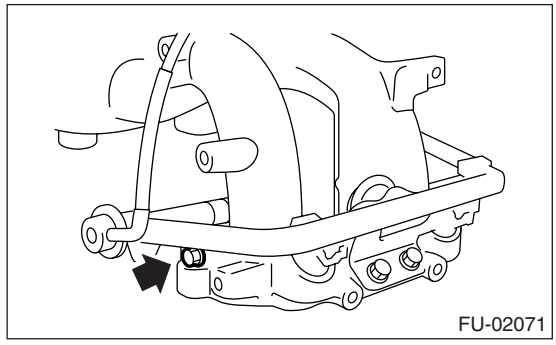


11) Remove the engine harness from intake manifold.

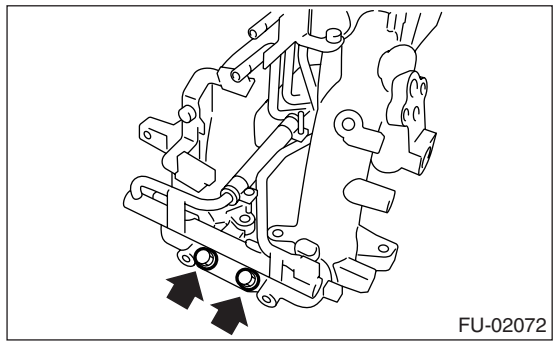
12) Remove the bolts which install injector pipe on the intake manifold as shown in the figure.

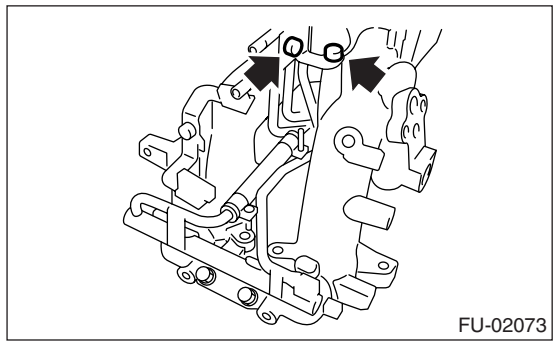
- RH side





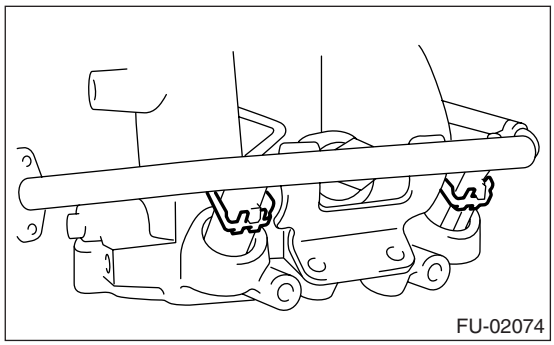
- LH side





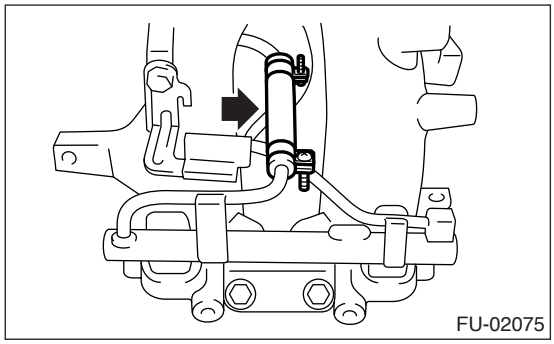
13) Remove the fuel injector.

(1) Remove the clip which secures fuel injector from injector pipe.

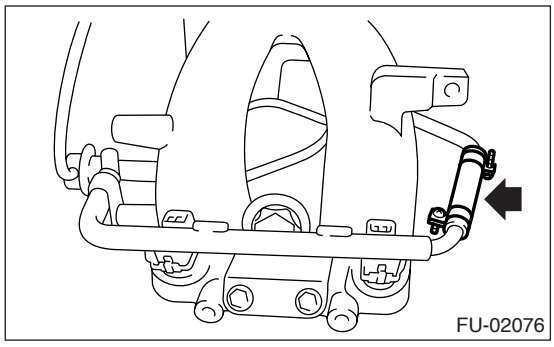


(2) Remove the fuel injector with lifting up the fuel injector pipe.

14) Loosen the clamp which holds fuel injector pipe LH to fuel hose, and then disconnect the pipe from fuel hose.

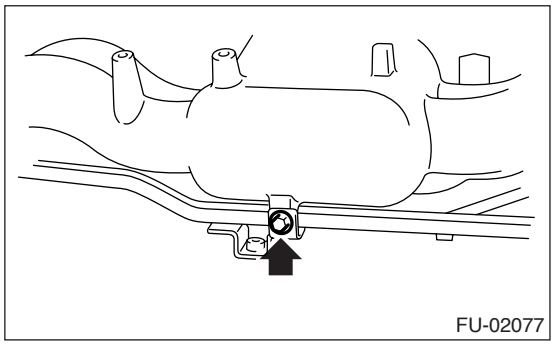


15) Loosen the clamp which holds fuel injector pipe RH to fuel hose, and then disconnect the pipe from fuel hose.



16) Remove the fuel injector pipe.

17) Remove the bolt which installs fuel pipes on intake manifold.



18) Remove the fuel pipe assembly and pressure regulator, from intake manifold.

D: ASSEMBLY

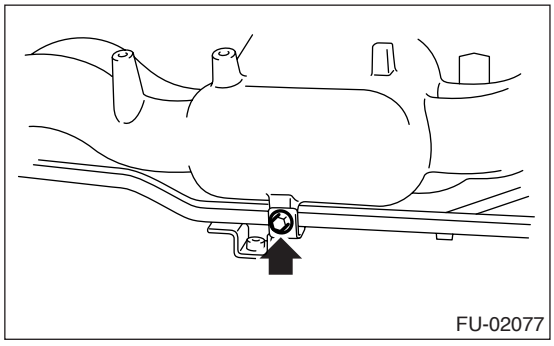
1) Install the fuel pipe assembly and pressure regulator to intake manifold.

NOTE:
- Use a new gasket.
- When assembling the nipple, apply liquid gasket.

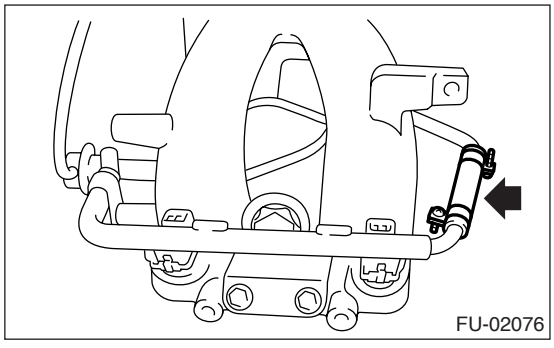
Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

2) Tighten the bolt which installs fuel pipes on intake manifold.

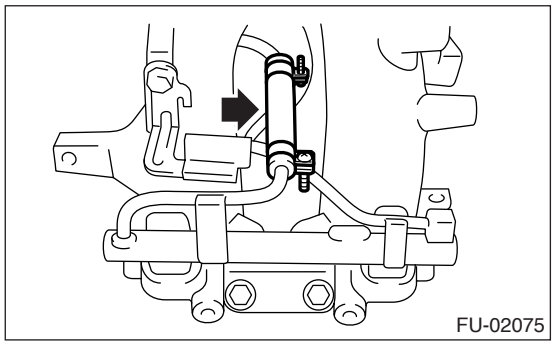
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



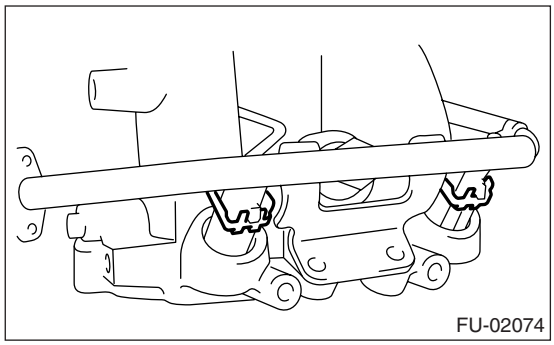
3) Connect the fuel injector pipe RH to fuel hose, and tighten the clamp screw.



4) Connect the fuel injector pipe LH to fuel hose, and tighten the clamp screw.

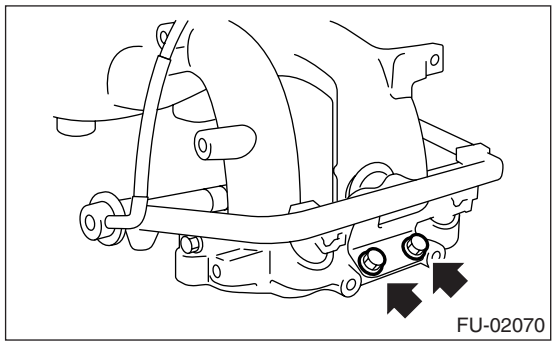

FU-02075

5) Install the fuel injectors.
6) Install the clip which secures fuel injector.

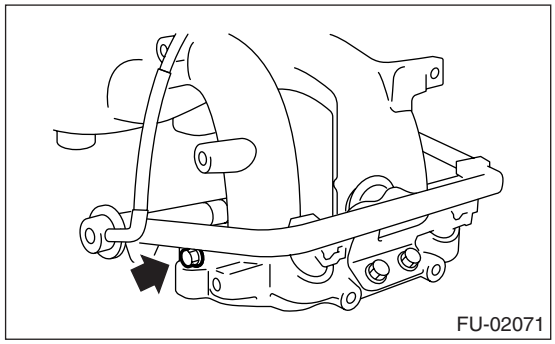

FU-02074

7) Tighten the bolts which install injector pipe on intake manifold.
• RH side

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

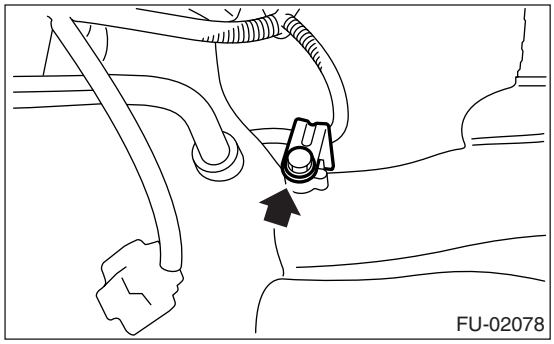

FU-02070

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

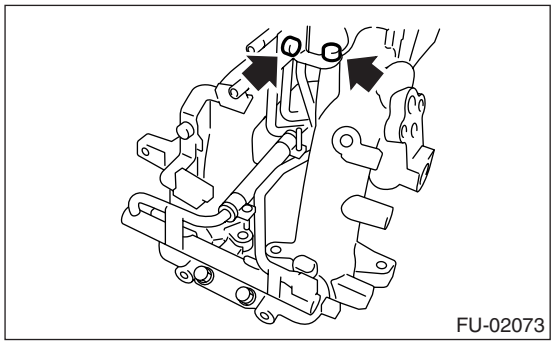

FU-02071

• LH side

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)


FU-02078

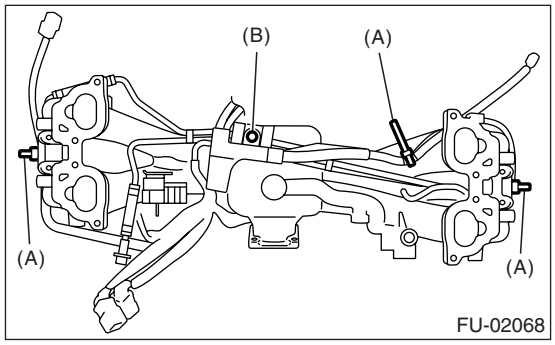
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

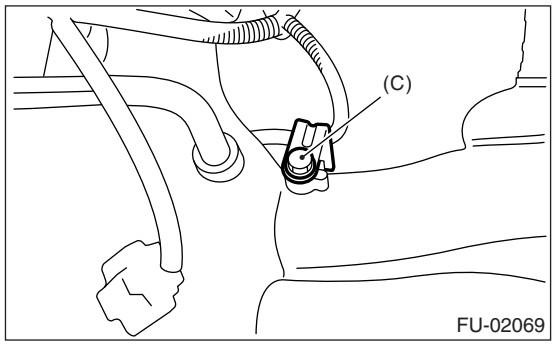

FU-02073

8) Install the engine harness onto intake manifold.

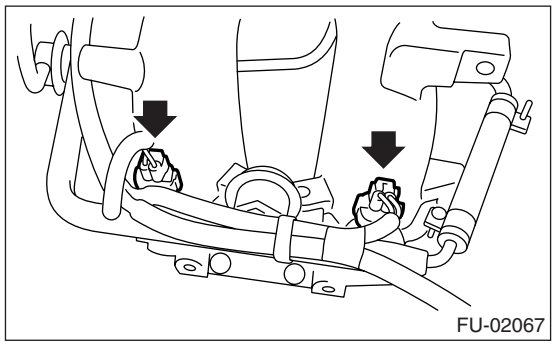
9) Secure the engine harness with harness band (A) and bolts (B), (C).

Tightening torque:
(B): 16 N·m (1.6 kgf-m, 11.8 ft-lb)
(C): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



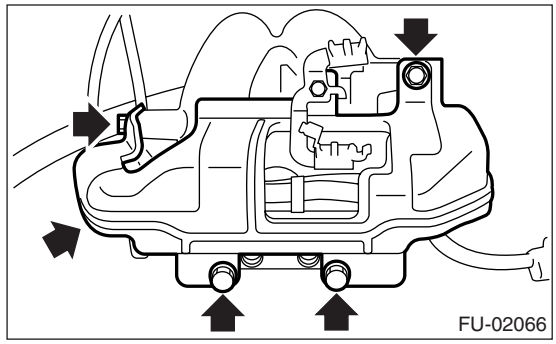


10) Install the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, INSTALLATION, Purge Control Solenoid Valve.>
11) Connect the connectors to fuel injector.



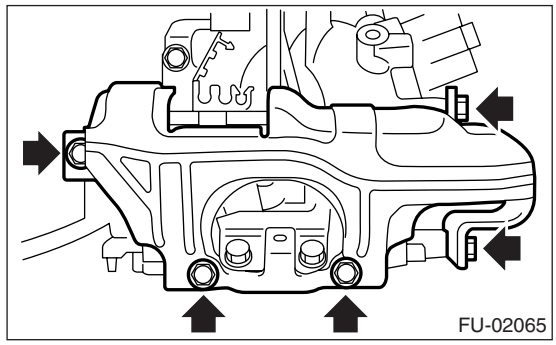
12) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

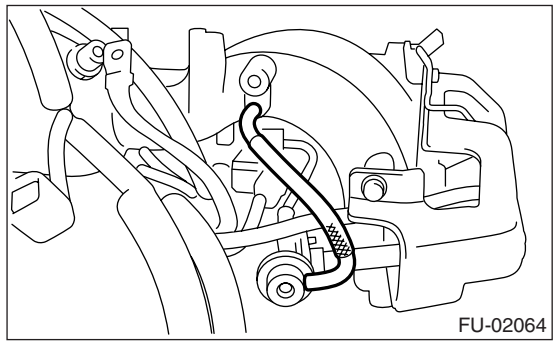


13) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

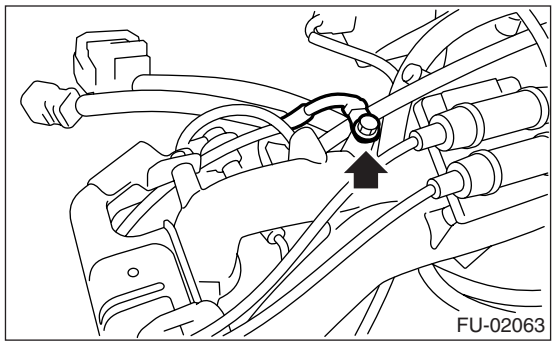


14) Connect the pressure regulator vacuum hose to intake manifold.



15) Install the EGR valve. (EC, EK, K4 model) <Ref. to FU(H4SO 2.0)-28, INSTALLATION, EGR Valve.>
16) Install the throttle body to intake manifold. <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>
17) Install the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, INSTALLATION, Ignition Coil & Ignitor ASSY.>
18) Install the engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



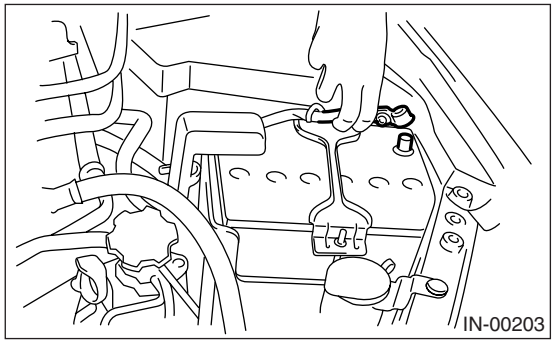
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not damaged and the connections are tightened firmly.

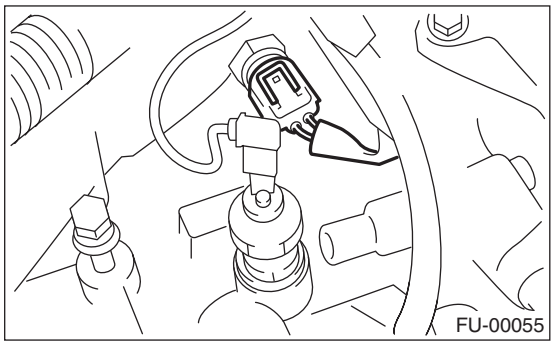
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
3) Disconnect the connectors from engine coolant temperature sensor.



4) Remove the engine coolant temperature sensor.

B: INSTALLATION

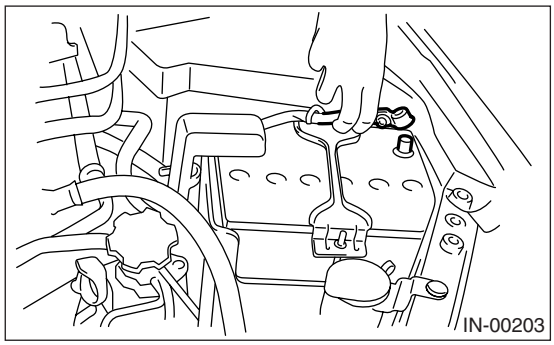
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

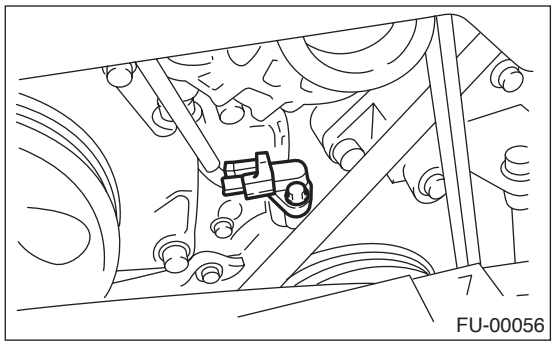
5. Crankshaft Position Sensor

A: REMOVAL

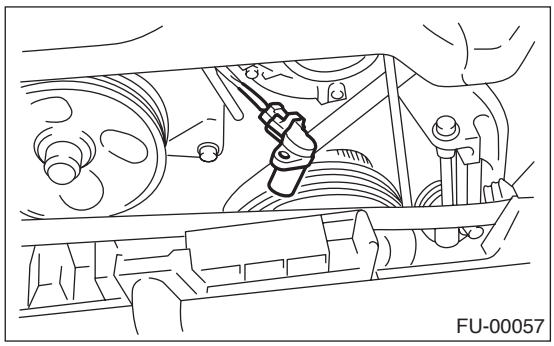
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs crankshaft position sensor to cylinder block.



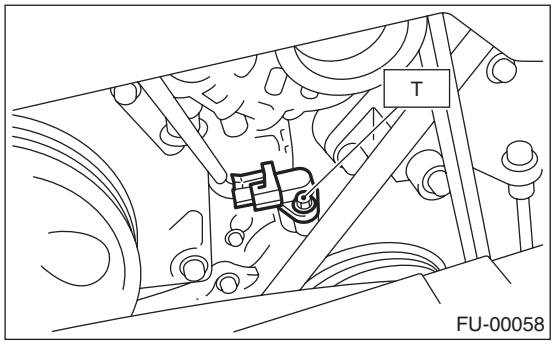
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

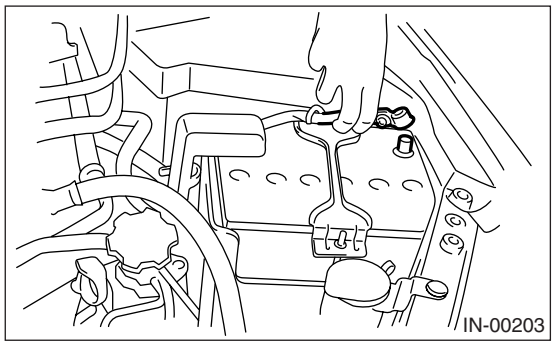
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



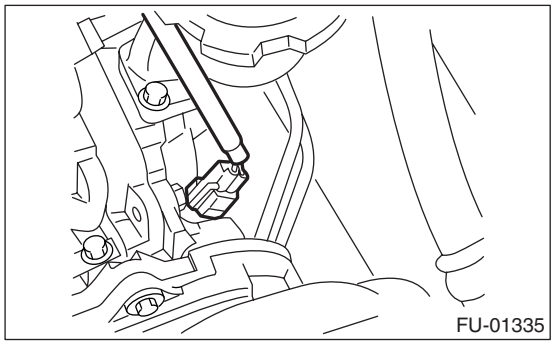
6. Camshaft Position Sensor

A: REMOVAL

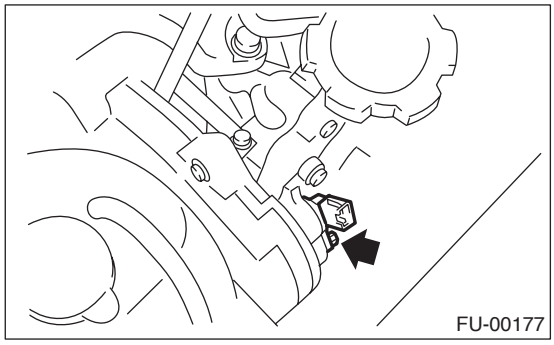
1) Disconnect the ground cable from battery.



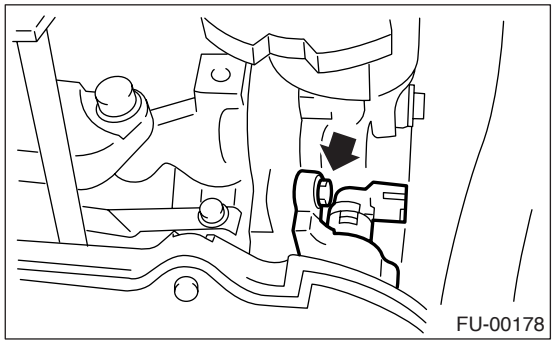
2) Disconnect the connector from camshaft position sensor.



3) Remove the bolt which installs camshaft position sensor to the support.

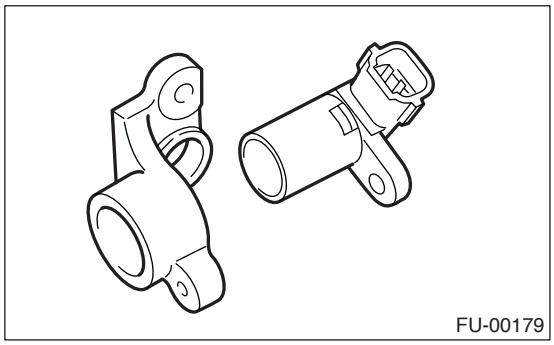


4) Remove the bolt which installs camshaft position sensor support to camshaft cap LH.



5) Remove the camshaft position sensor and the support as a unit.

6) Remove the camshaft position sensor itself.



B: INSTALLATION

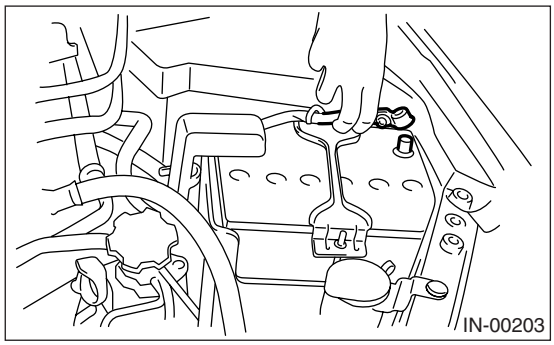
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

7. Knock Sensor

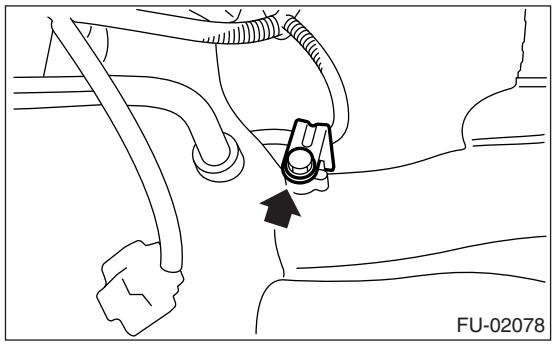
A: REMOVAL

1) Disconnect the ground cable from battery.

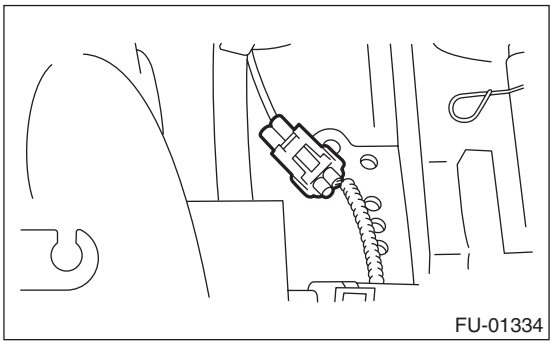


2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>

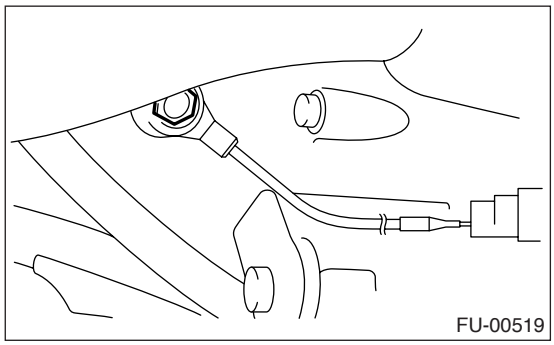
3) Remove the harness bracket from intake manifold.



4) Disconnect the knock sensor connector.



5) Remove the knock sensor from cylinder block.

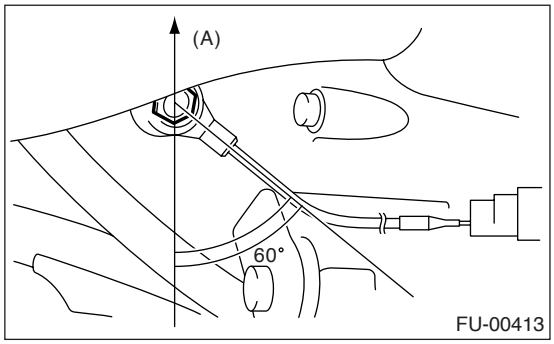


B: INSTALLATION

1) Install the knock sensor to cylinder block.

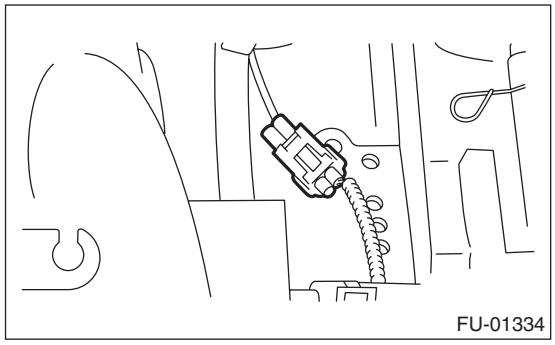
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to the engine rear.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)



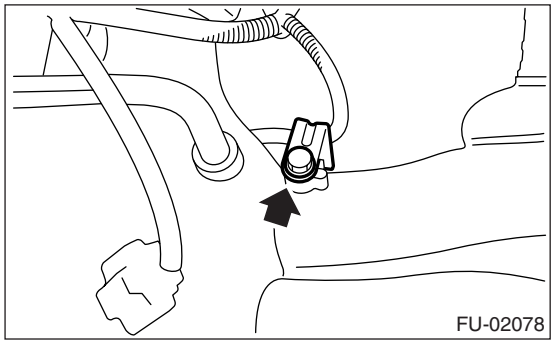
(A) Front side

2) Connect the knock sensor connector.



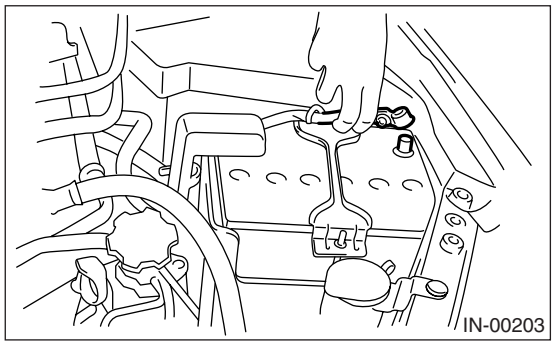
3) Install the harness bracket to intake manifold.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



4) Install the air cleaner case.
<Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.>

5) Connect the battery ground cable to battery.



8. Throttle Position Sensor

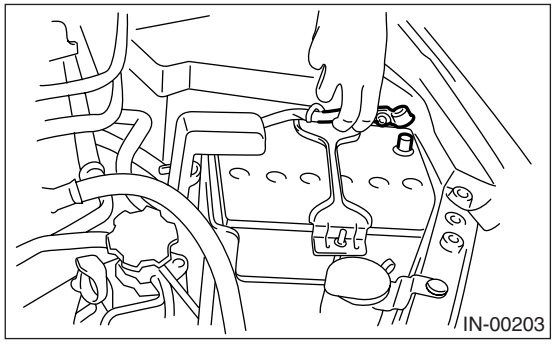
A: SPECIFICATION

Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body.
Refer to “Throttle Body” for removal and installation procedure. <Ref. to FU(H4SO 2.0)-10, REMOVAL, Throttle Body.> <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>

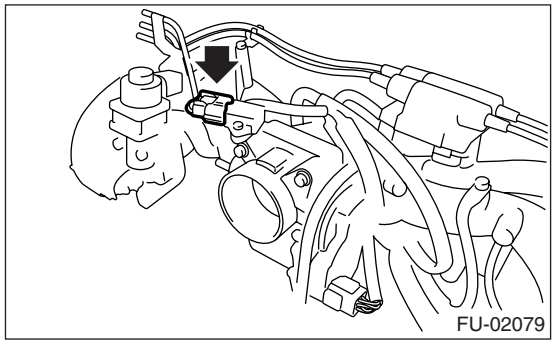
9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from manifold absolute pressure sensor.



3) Remove the manifold absolute pressure sensor from throttle body.

B: INSTALLATION

Install in the reverse order of removal.

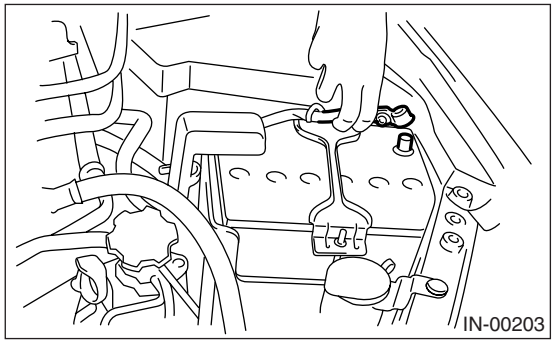
NOTE:
Use new O-rings.

Tightening torque:
2.0 N·m (0.20 kgf-m, 1.5 ft-lb)

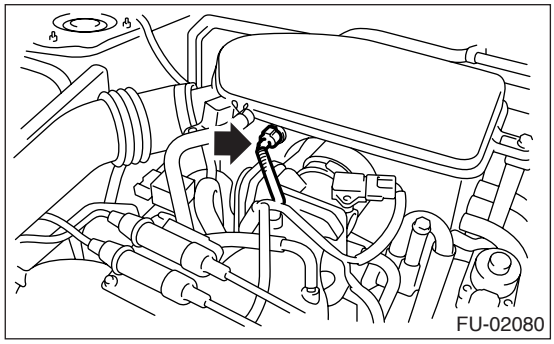
10.Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from intake air temperature sensor.
3) Remove the intake air temperature sensor.



B: INSTALLATION

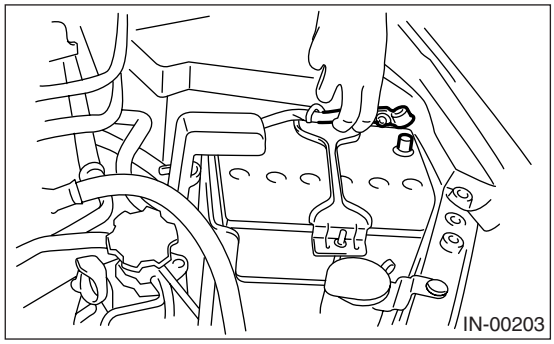
Install in the reverse order of removal.

11.EGR Valve

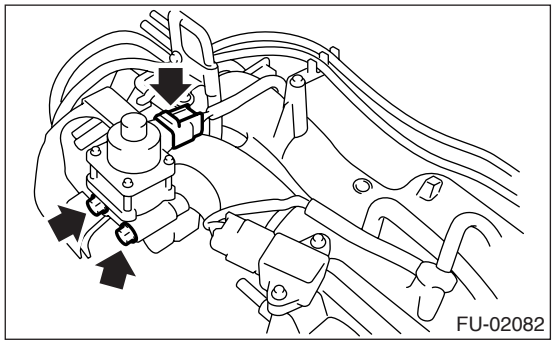
A: REMOVAL

NOTE:
EGR valve is equipped to EC, EK and K4 model.

1) Disconnect the ground cable from battery.



2) Disconnect the connector from EGR valve.
3) Remove the EGR valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

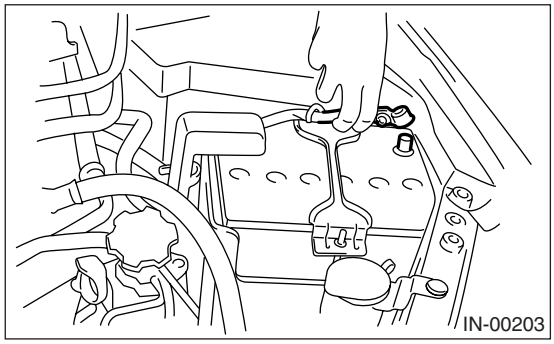
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

12.Fuel Injector

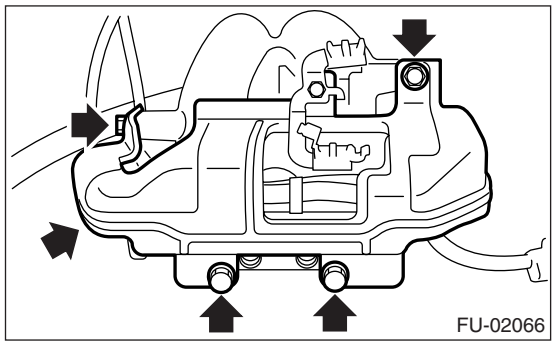
A: REMOVAL

1. RH SIDE

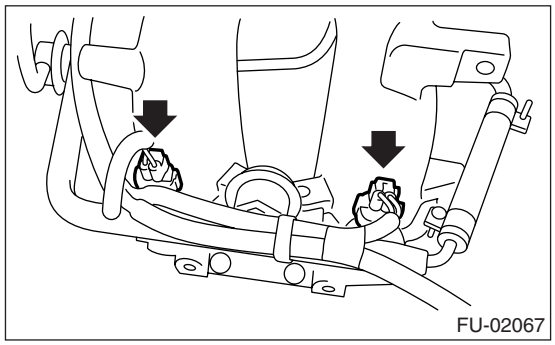
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



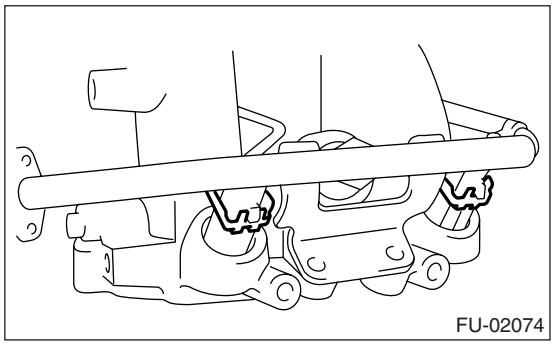
4) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).
6) Remove the fuel pipe protector RH.



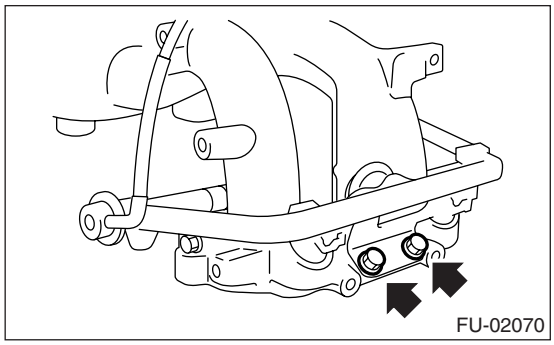
7) Disconnect the connector from fuel injector.

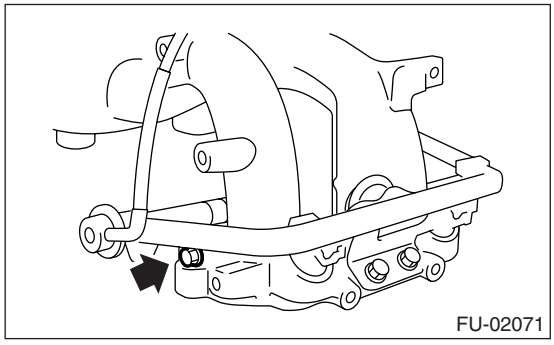


8) Remove the clip which secure fuel injector.



9) Remove the bolts which hold fuel injector pipe onto intake manifold.



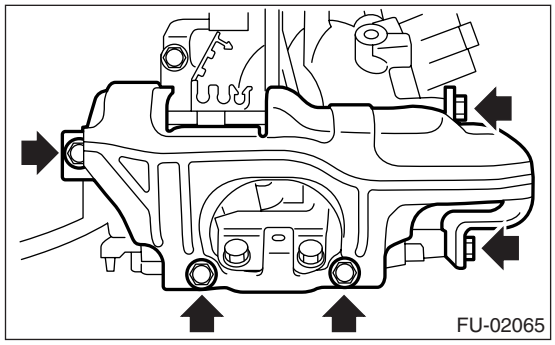


10) Remove the fuel injector while lifting up the fuel injector pipe.

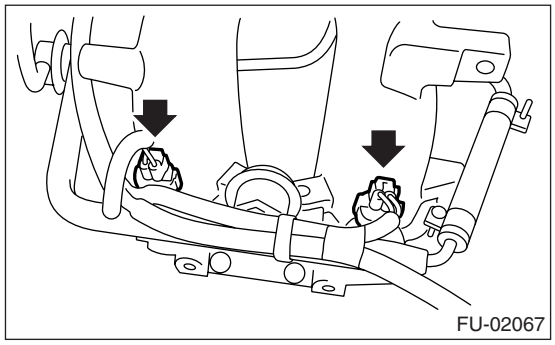
2. LH SIDE

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the battery.
4) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).

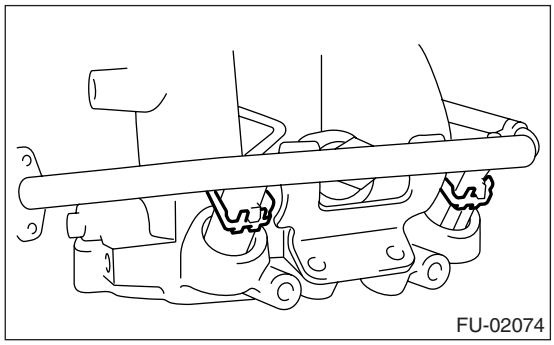
5) Remove the fuel pipe protector LH.


FU-02065

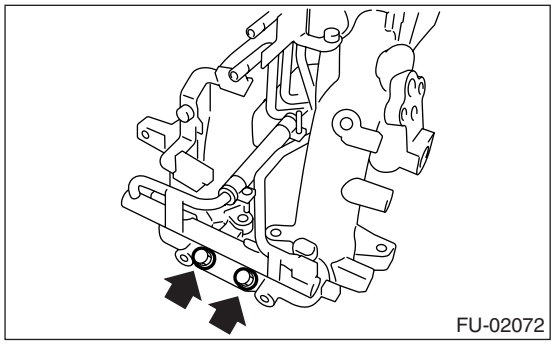
6) Disconnect the connector from fuel injector.

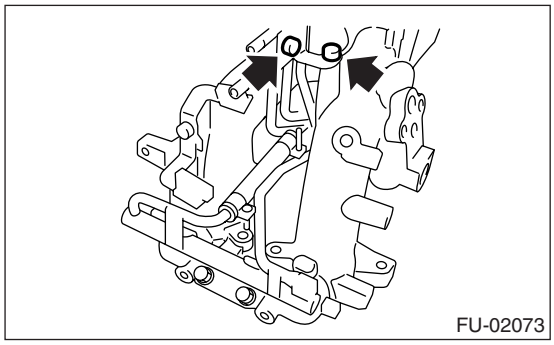

FU-02067

7) Remove the clips which secure fuel injector.


FU-02074

8) Remove the bolts which hold fuel injector pipe onto intake manifold.


FU-02072


FU-02073

9) Remove the fuel injector while lifting up the fuel injector pipe.

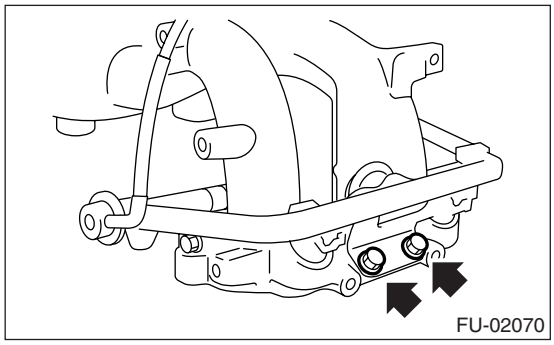
B: INSTALLATION

1. RH SIDE

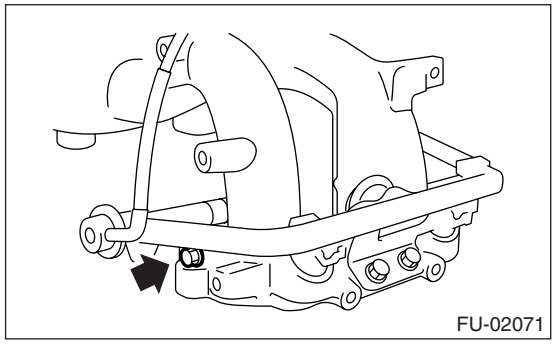
Install in the reverse order of removal.

NOTE:
Use new O-rings.

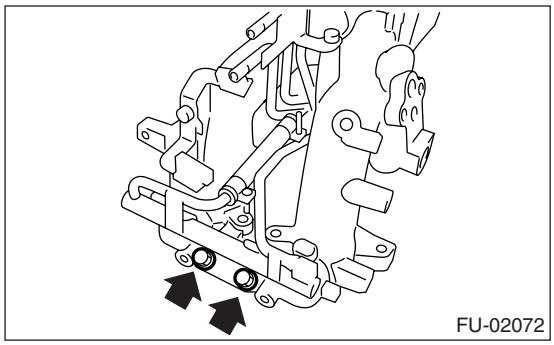
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)


FU-02070

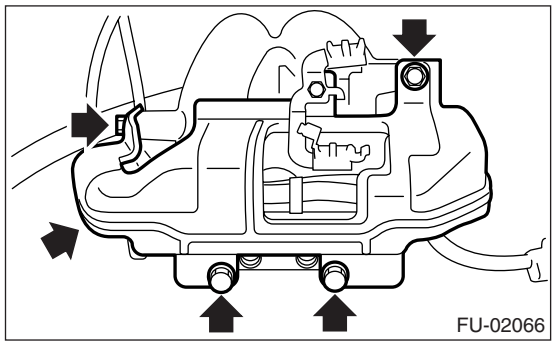
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



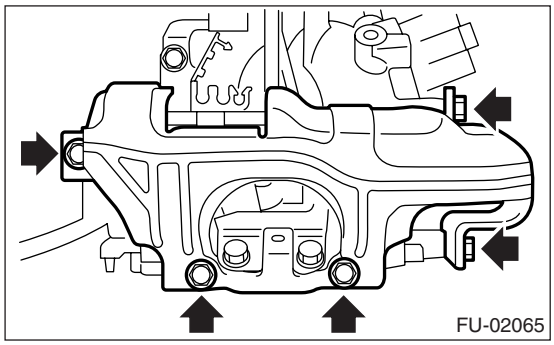
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

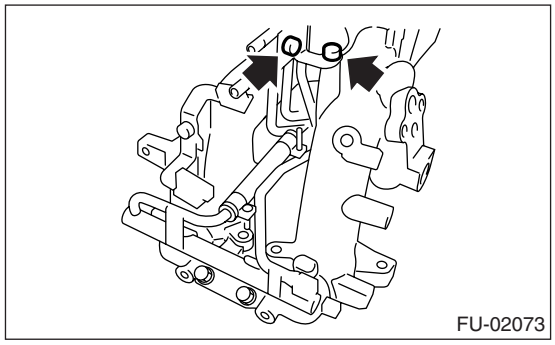


2. LH SIDE

Install in the reverse order of removal.

NOTE:
Use new O-rings.

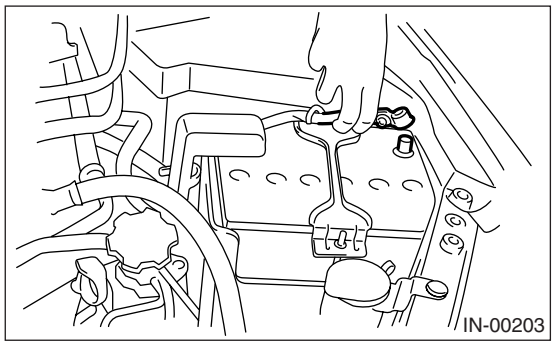
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



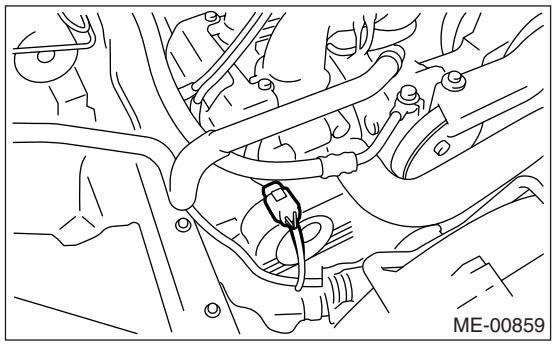
13.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

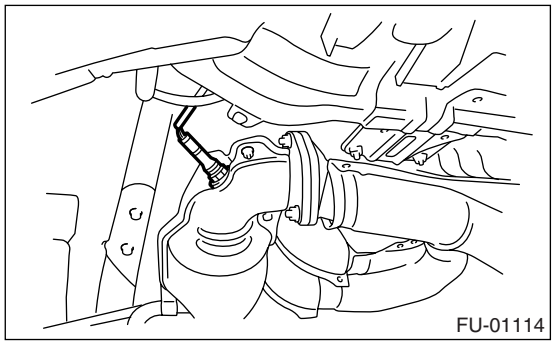


2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
3) Remove the connector of front oxygen (A/F) sensor.



4) Remove the clip holding harness.
5) Lift-up the vehicle.
6) Remove the under cover.
7) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
8) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the front oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

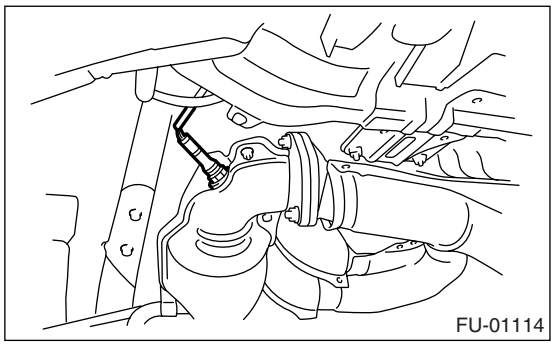
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

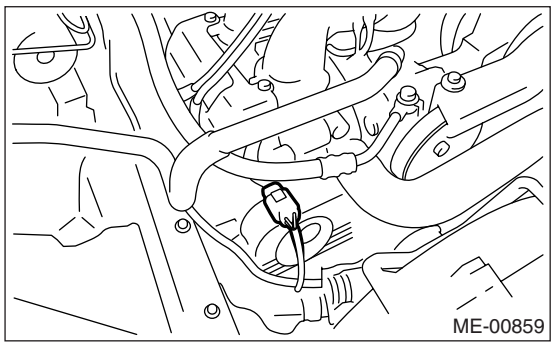
CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

2) Install the front oxygen (A/F) sensor.

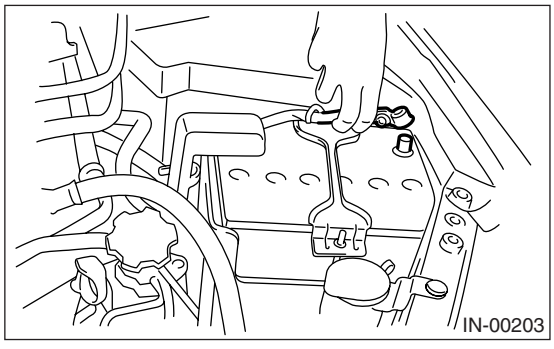
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Install the under cover.
4) Lower the vehicle.
5) Hold the harness with clip.
6) Connect the connector of front oxygen (A/F) sensor.



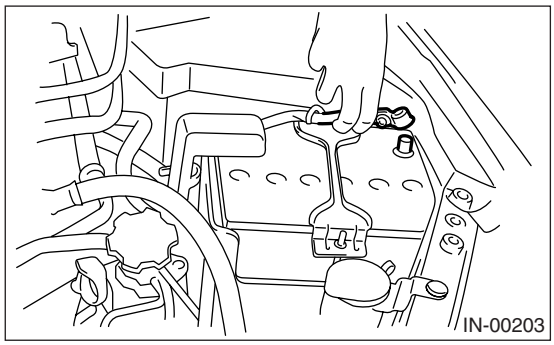
7) Install the air intake duct. <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
8) Connect the battery ground cable to battery.



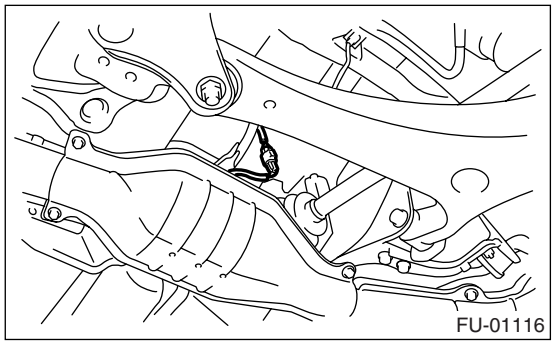
14.Rear Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

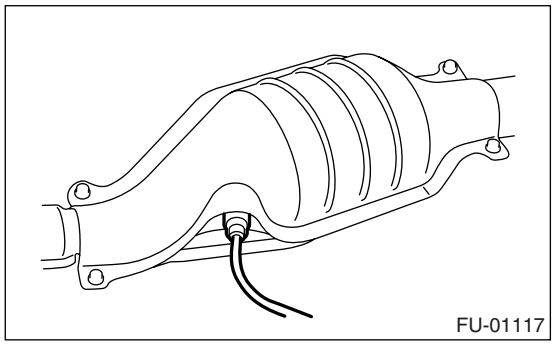


2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.



4) Remove the clip holding harness.
5) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
6) Remove the rear oxygen sensor.

CAUTION:
When removing the rear oxygen sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

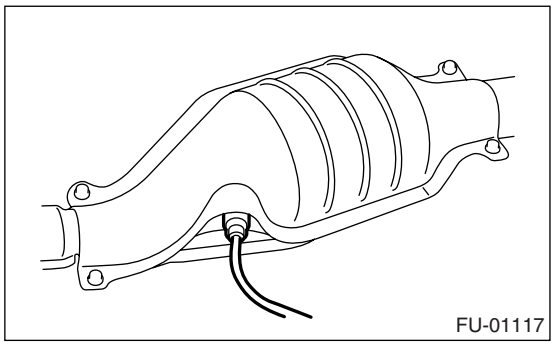
1) Before installing rear oxygen sensor, apply anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

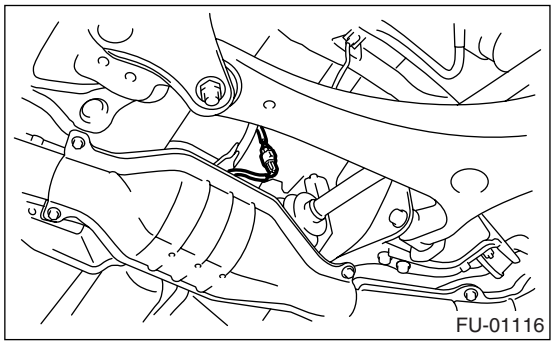
CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

2) Install the rear oxygen sensor.

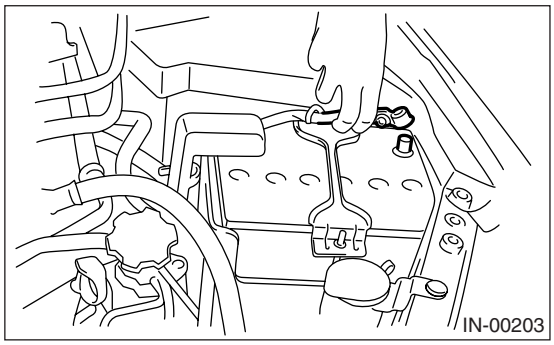
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Hold the harness with clip.
4) Connect the connector to rear oxygen sensor.



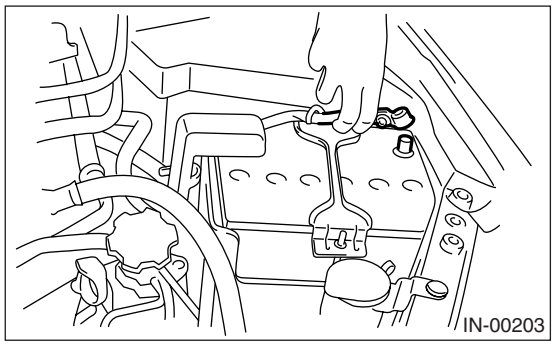
5) Lower the vehicle.
6) Connect the battery ground cable to battery.



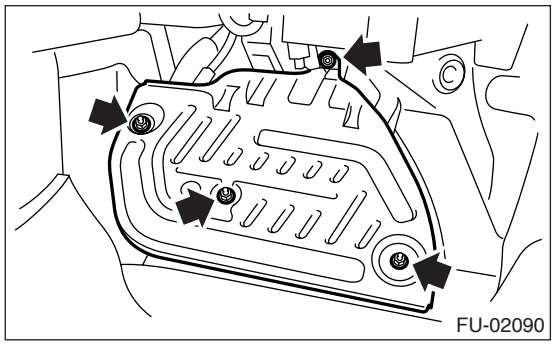
15.Engine Control Module (ECM)

A: REMOVAL

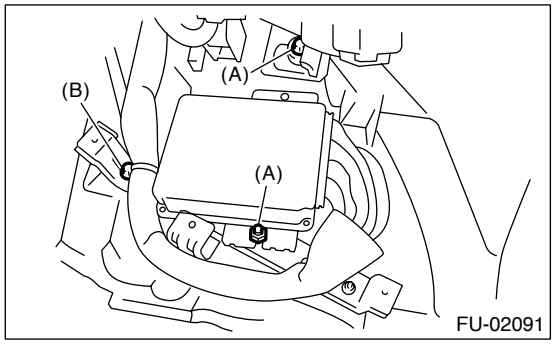
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger's side. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

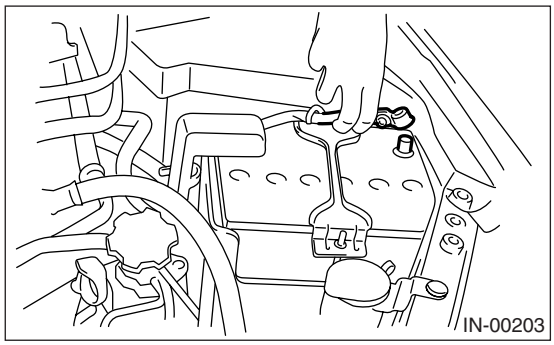
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

16.Main Relay

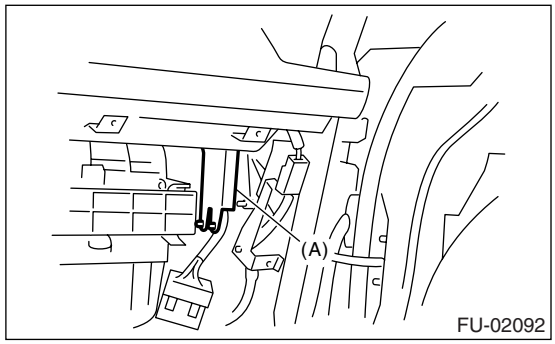
A: REMOVAL

1) Disconnect the ground cable from battery.

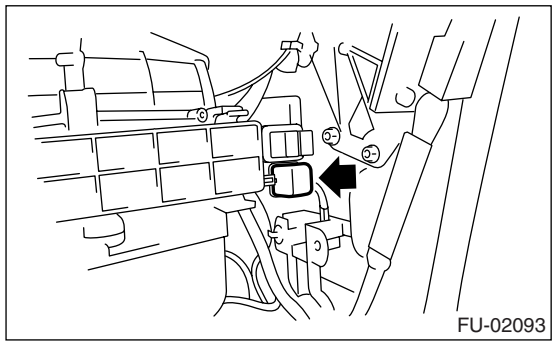


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



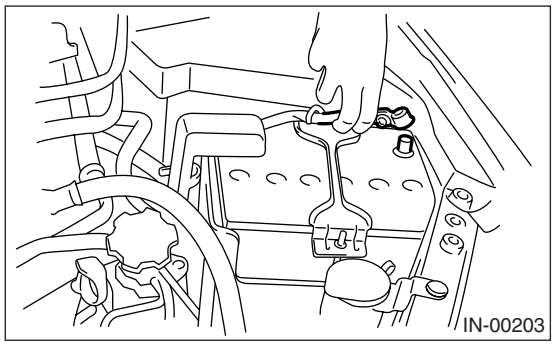
B: INSTALLATION

Install in the reverse order of removal.

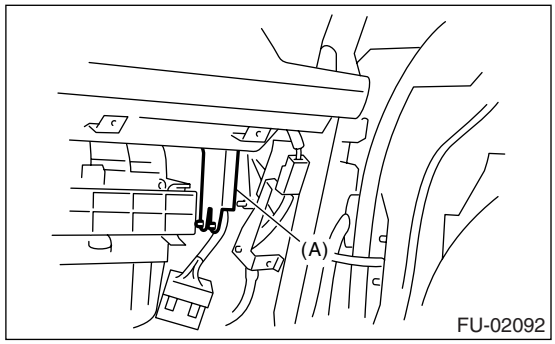
17.Fuel Pump Relay

A: REMOVAL

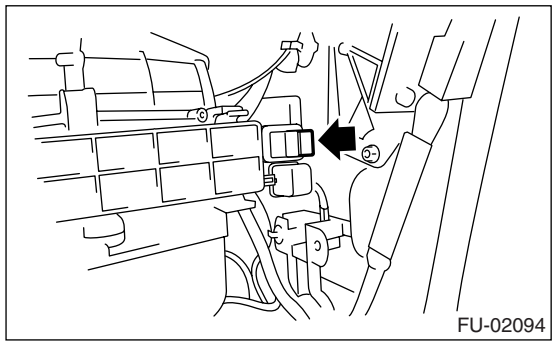
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



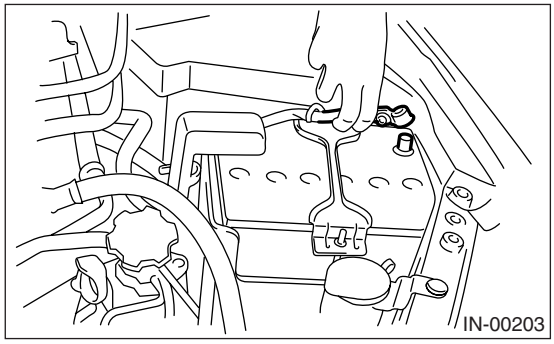
B: INSTALLATION

Install in the reverse order of removal.

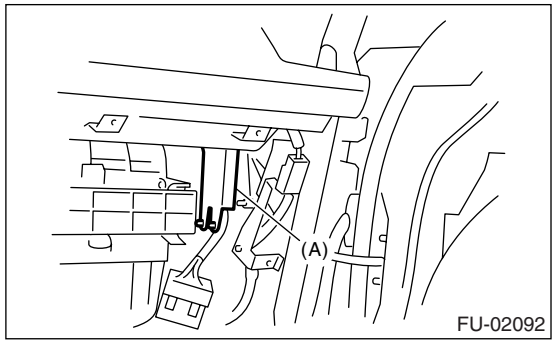
18. Electronic Throttle Control Relay

A: REMOVAL

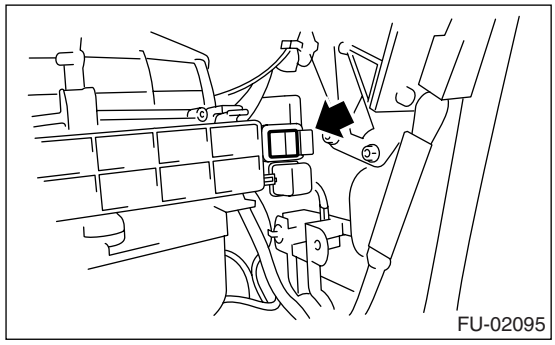
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from electric control throttle relay.



B: INSTALLATION

Install in the reverse order of removal.

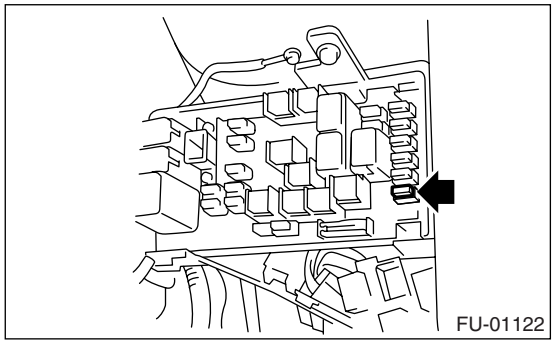
19.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuse of fuel pump from main fuse box.

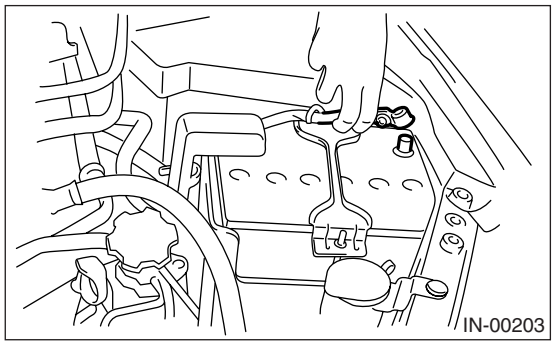


2) Start the engine and run until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

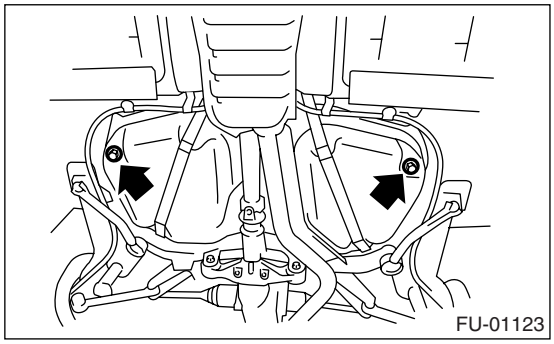
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

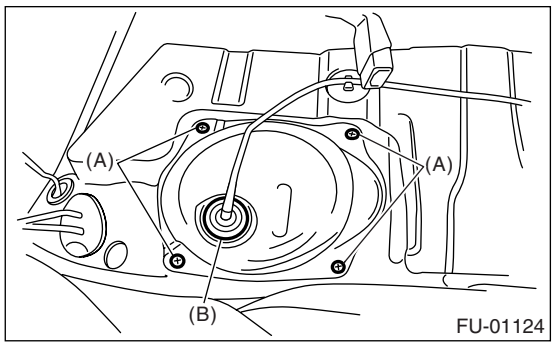
Tightening torque:
Nut
9.0 N·m (0.92 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

20.Fuel Tank

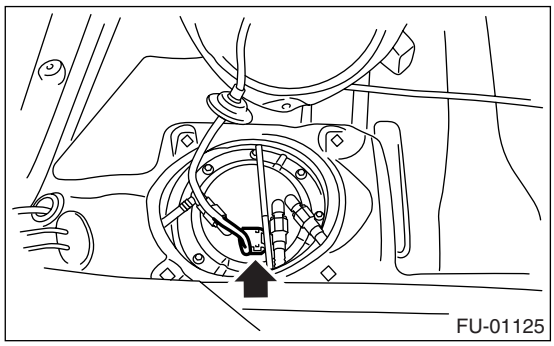
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

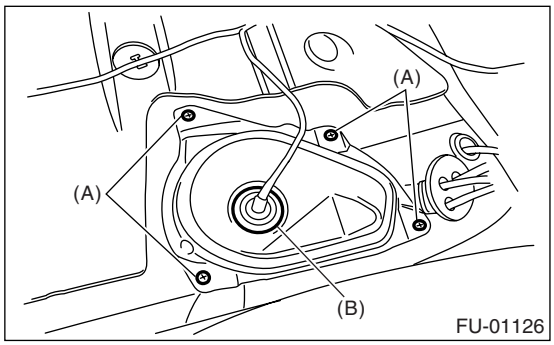
1) Set the vehicle on a lift.
2) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from the fuel tank.
<Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Remove the service hole cover from fuel pump.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



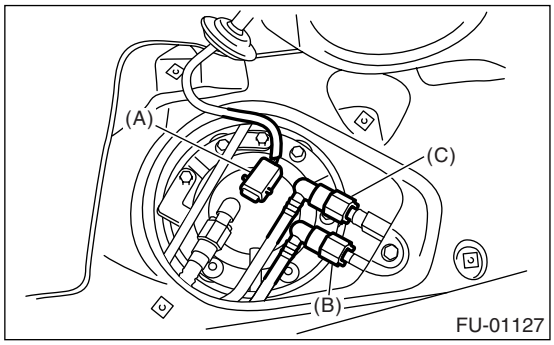
6) Disconnect the connector from fuel pump.



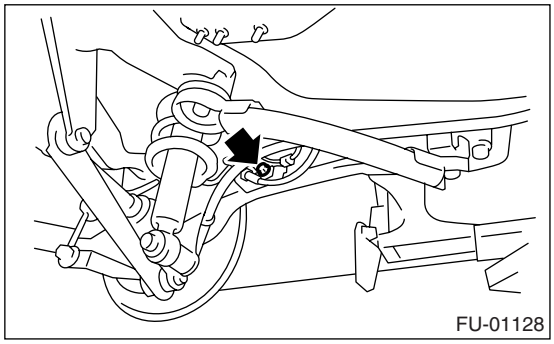
7) Remove the service hole cover from fuel sub level sensor.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



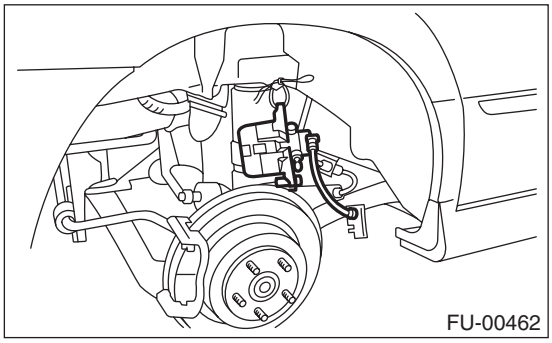
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector from the fuel delivery (B) and return hose (C). <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



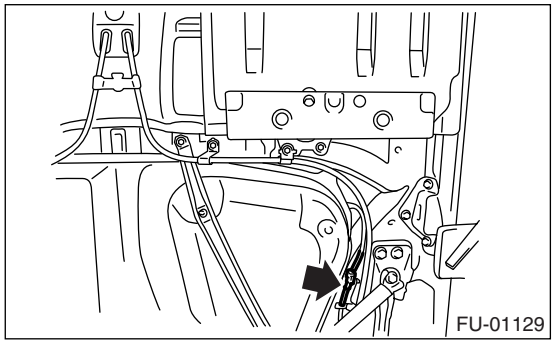
10) Remove the rear wheels.
11) Remove the bolts which secure rear brake hose installation bracket.



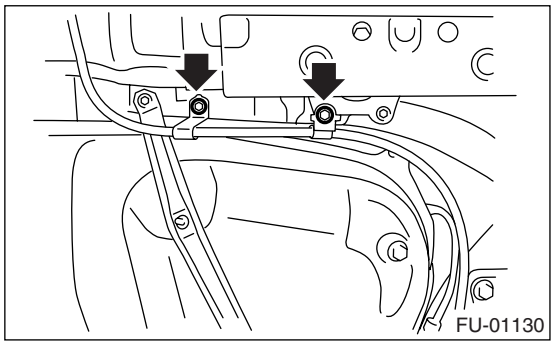
12) Remove the rear brake caliper and tie it to the side of vehicle body.

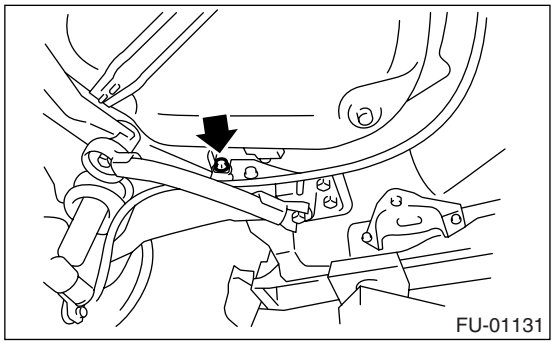


13) Remove the parking brake cable from parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
14) Lift-up the vehicle.
15) Remove the rear exhaust pipe.
<Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install parking brake cable clamp.

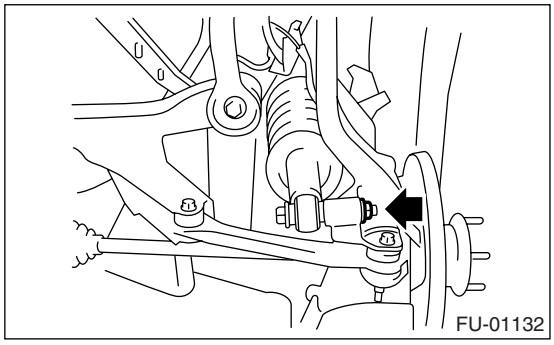




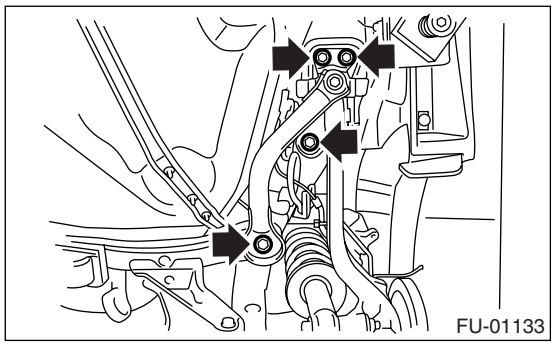
20) Remove the rear suspension assembly.

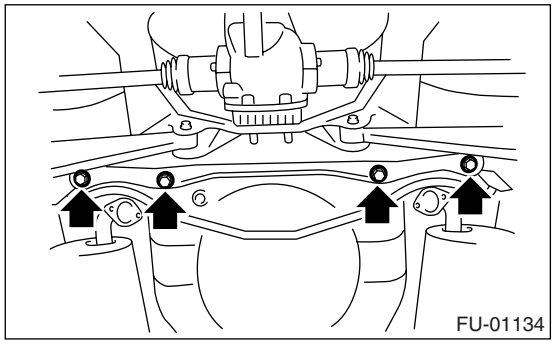
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs rear shock absorber to rear suspension arm.



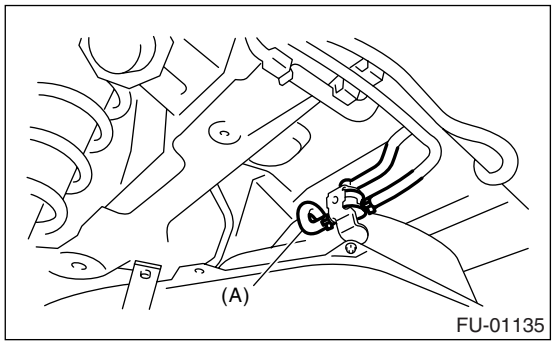
(3) Remove the bolts which secure rear suspension assembly to body.



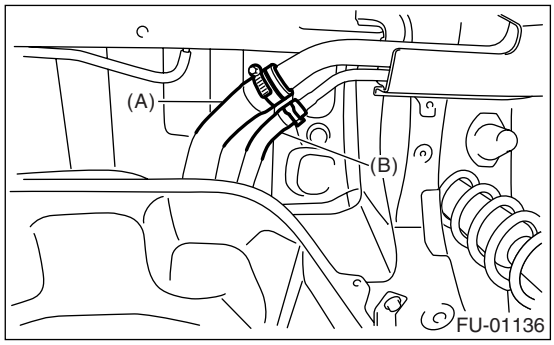


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

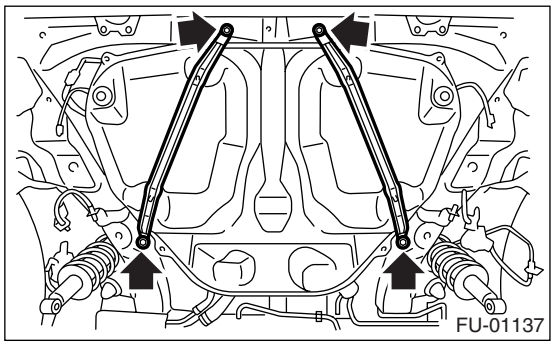


22) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands and dismount the fuel tank from vehicle.

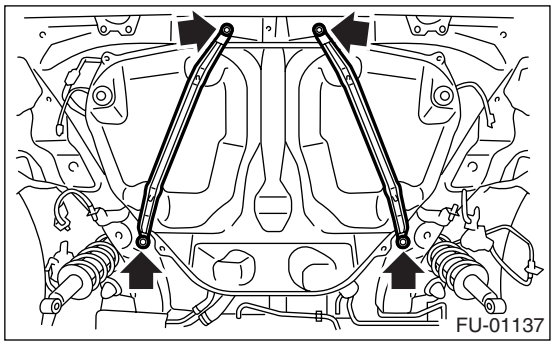
WARNING:
A helper is required to perform this work.



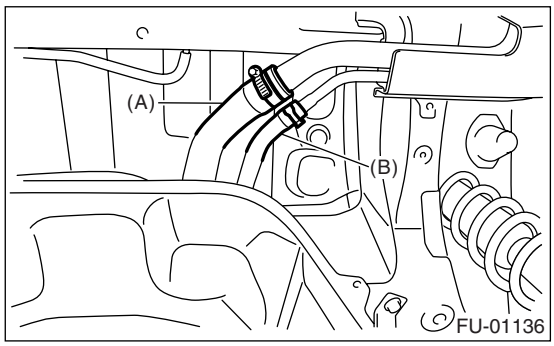
B: INSTALLATION

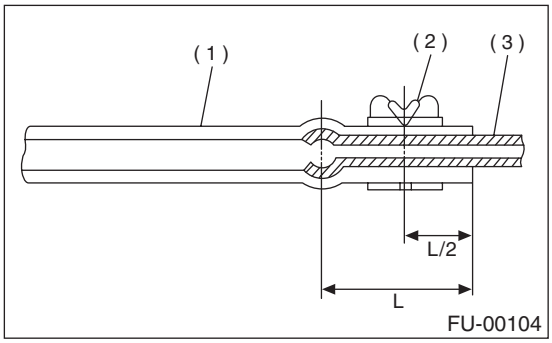
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

WARNING:
A helper is required to perform this work.



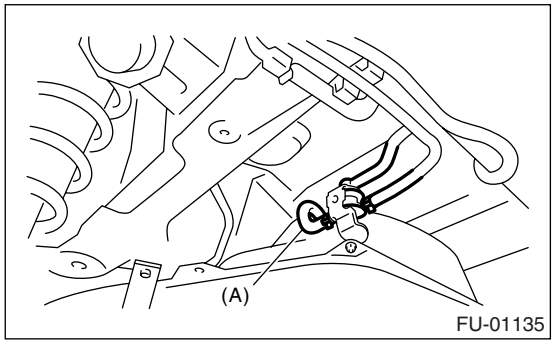
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipe

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolts of fuel tank band.

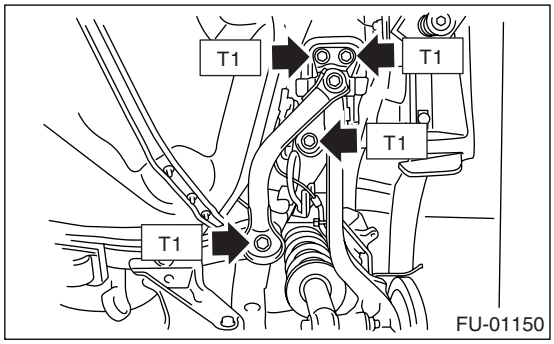
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

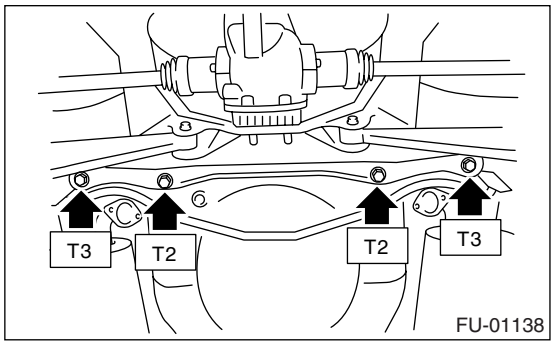
5) Install the rear suspension assembly.

CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Support the rear suspension assembly, and then tighten the bolts which secure rear suspension assembly to body.

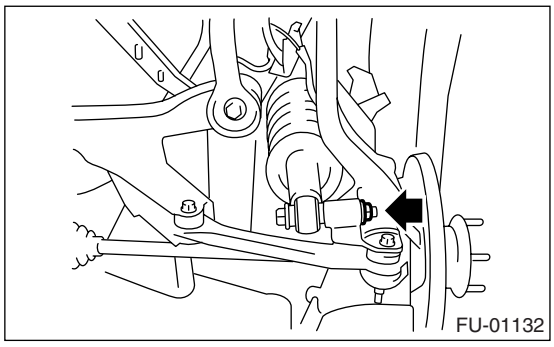
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.2 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





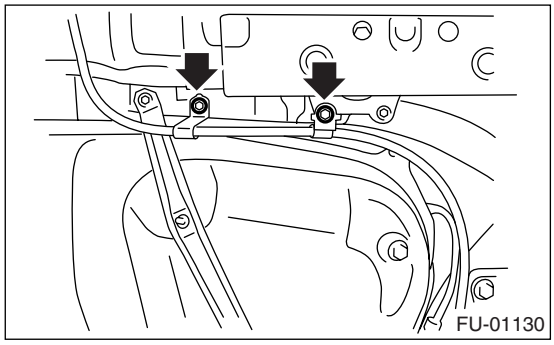
(3) Tighten the bolts which install rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

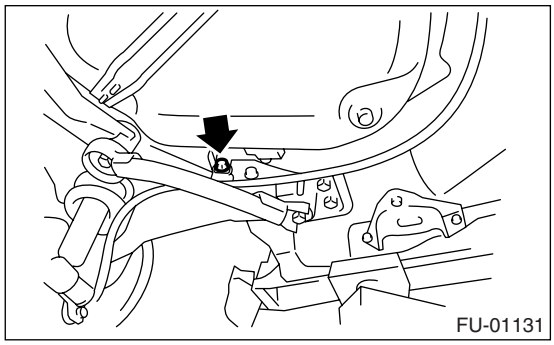


6) Tighten the bolts which install parking brake cable clamp.

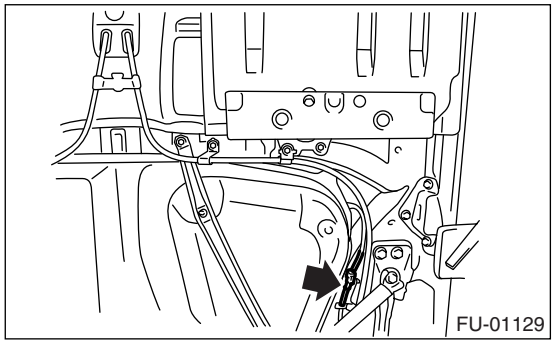
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

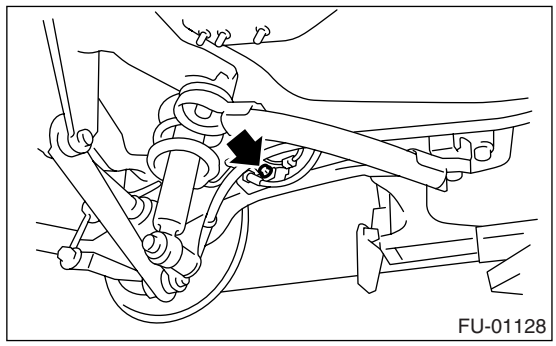


7) Connect the connector to ABS wheel speed sensor.



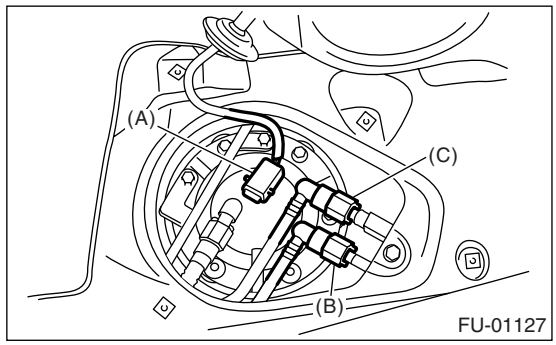
8) Install the heat shield cover.
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe.
<Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-8, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolt which secures rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

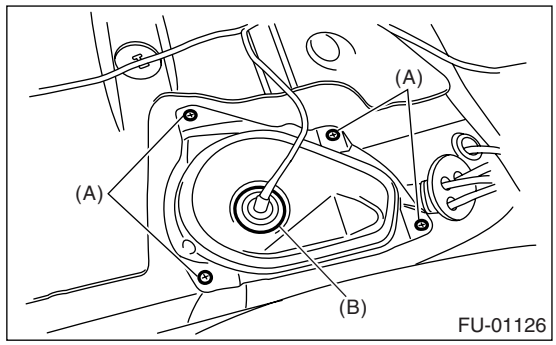


15) Install the rear wheels.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector to the fuel delivery (B) and return hose (C).
<Ref. to FU(H4SO 2.0)-54, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

NOTE:
Be careful not to misconnect the delivery side and return side.

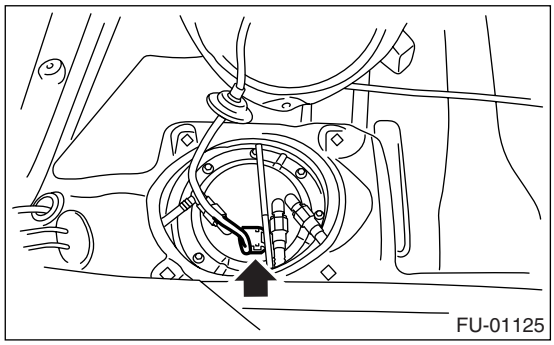


19) Install the service hole cover of fuel sub level sensor.

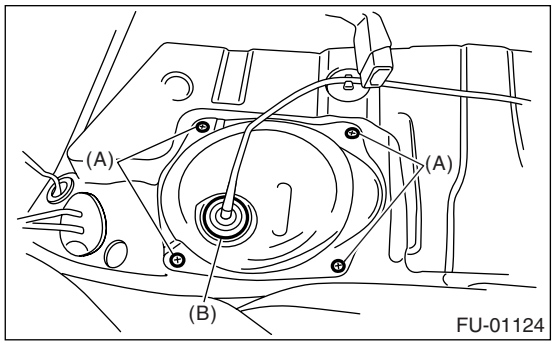


(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

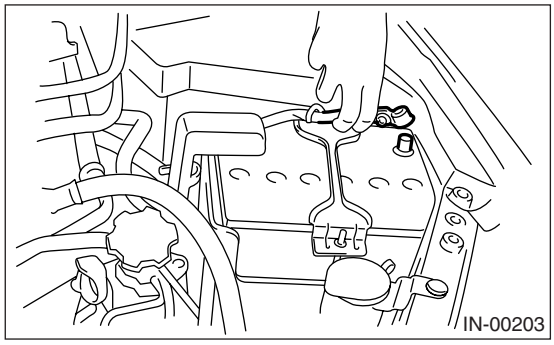
1) Check that the fuel tank is not holed, cracked, or otherwise damaged.
2) Make sure that the fuel hoses and fuel pipes are not cracked and those connections are tight.

21.Fuel Filler Pipe

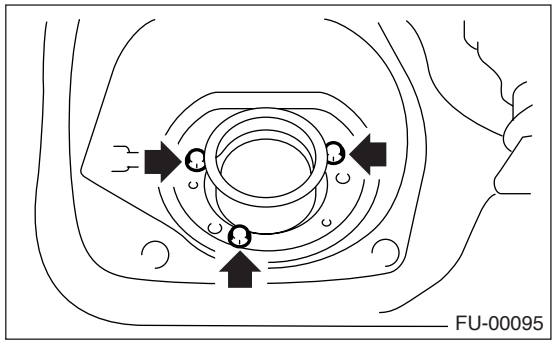
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

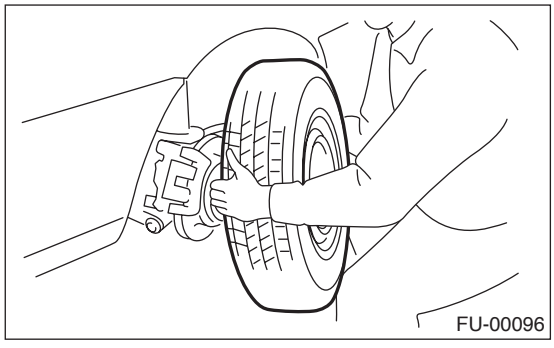
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the filler cap.
3) Disconnect the ground cable from battery.



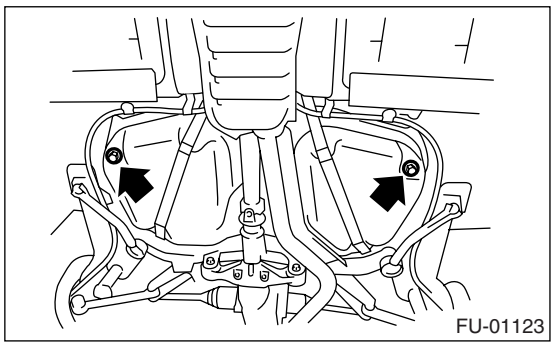
4) Remove the screws which secure the packing.



5) Lift-up the vehicle.
6) Remove the rear wheel RH.



7) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.

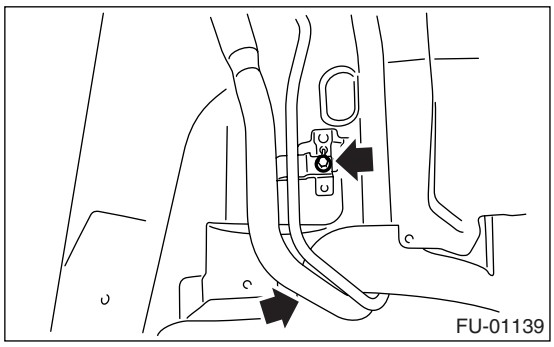


8) Tighten the fuel drain plug.

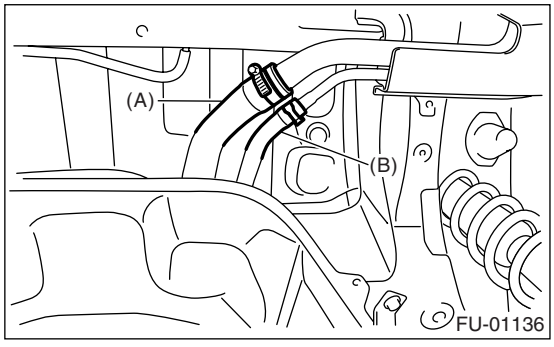
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

9) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
10) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
11) Remove the bolts which hold fuel filler pipe bracket on the body.



12) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

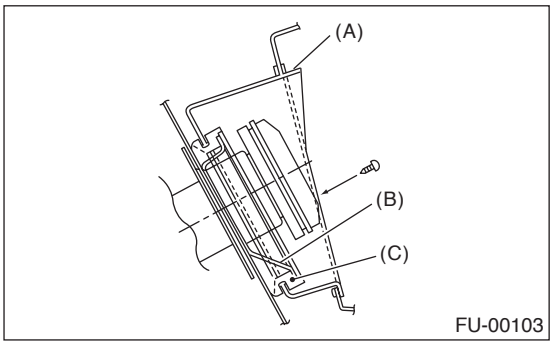


13) Remove the fuel filler pipe to under side of the vehicle.

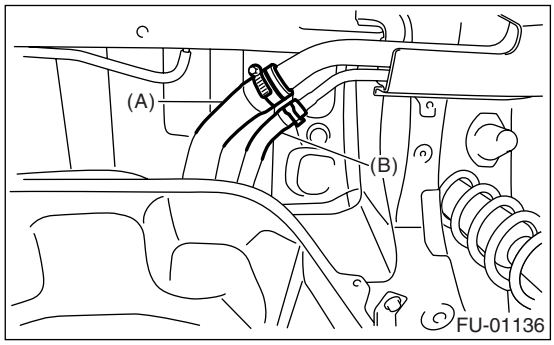
B: INSTALLATION

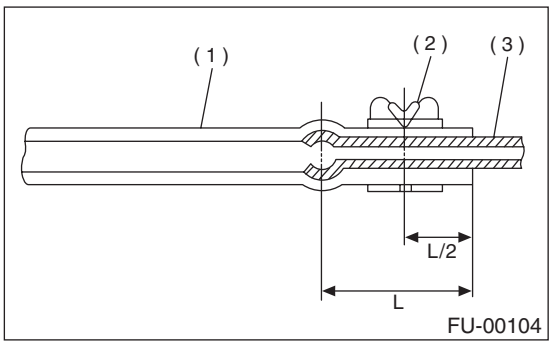
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward the inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.

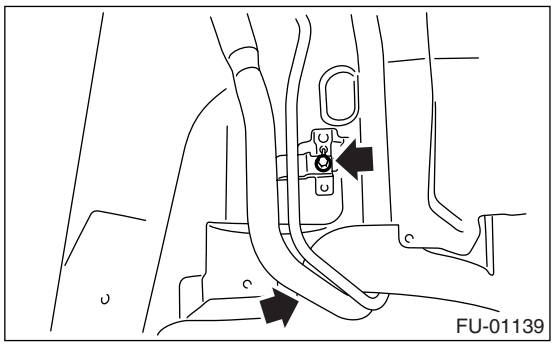




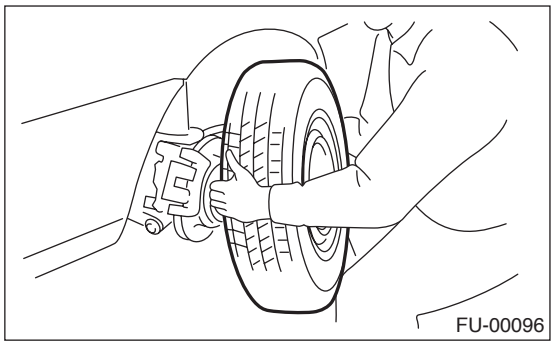
(1) Hose
(2) Clip or clamp
(3) Pipe

5) Tighten the bolts which hold fuel filler pipe bracket on the body.

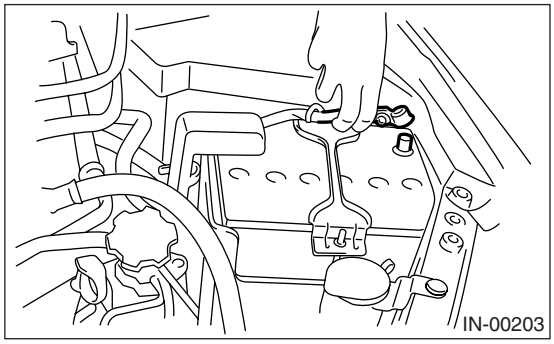
Tightening torque:
7.5 N·m (0.75 kgf-m, 5.4 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Install the fuse of fuel pump to main fuse box.
11) Connect the battery ground cable to battery.



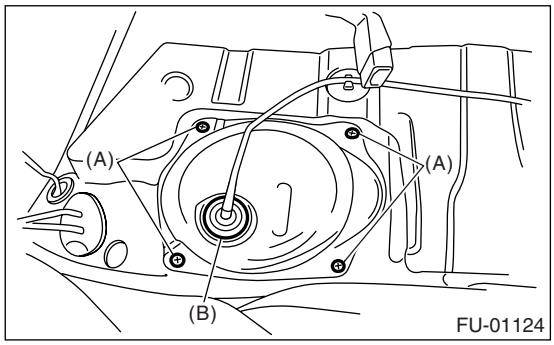
22.Fuel Pump

A: REMOVAL

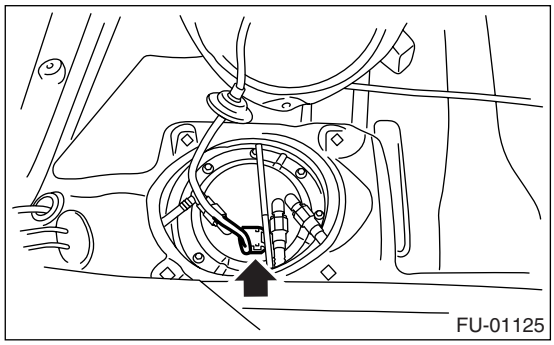
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain fuel. <Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
3) Remove the rear seat.
4) Remove the service hole cover.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.

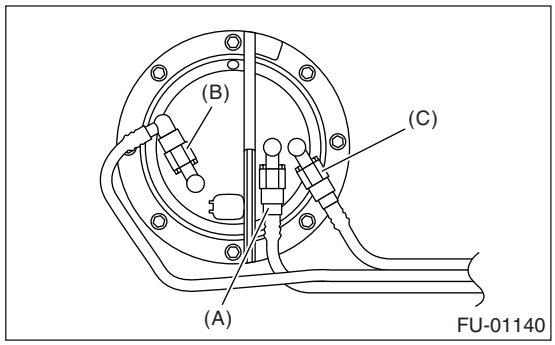


5) Disconnect the connector from fuel pump.



6) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

7) Remove the nuts which install fuel pump assembly onto fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

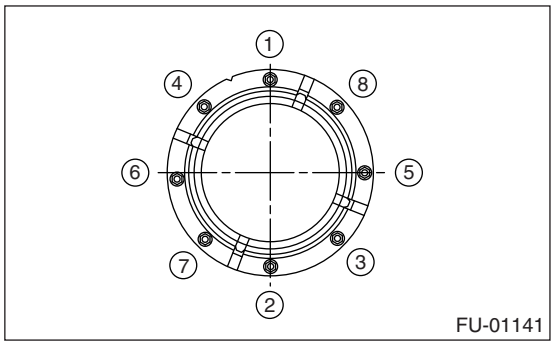
8) Take off the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

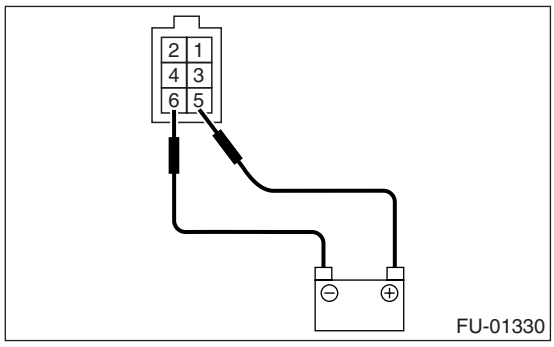


C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump and apply the battery power supply to check whether the pump operates.

WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply to ON and OFF on the battery side.**

• Do not run fuel pump for a long time under non-load condition.



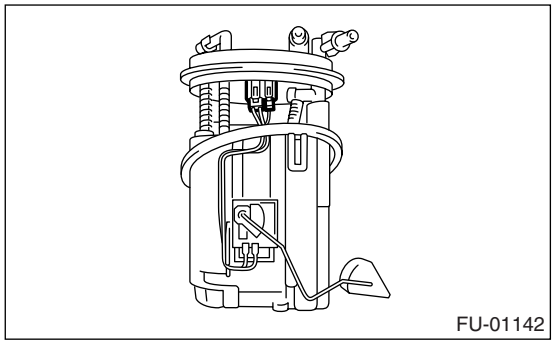
23.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. <Ref. to FU(H4SO 2.0)-47, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

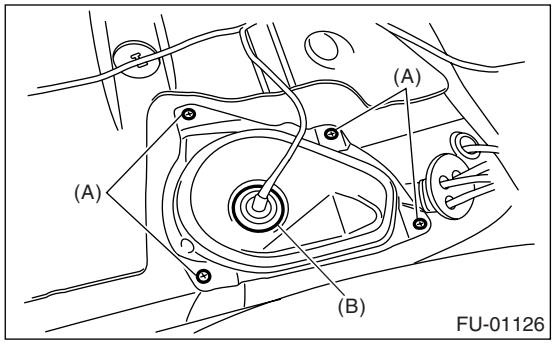
Install in the reverse order of removal.

24.Fuel Sub Level Sensor

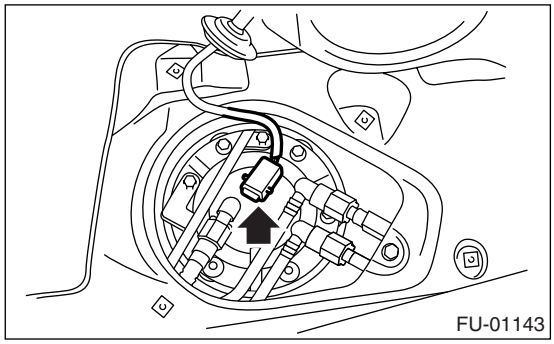
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

1) Drain fuel. <Ref. to FU(H4SO 2.0)-38, DRAINING FUEL, PROCEDURE, Fuel.>
2) Remove the rear seat.
3) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down under the body and remove the service hole cover.

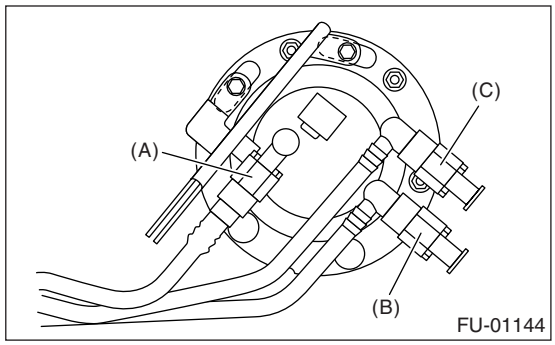


4) Disconnect the connector from fuel sub level sensor.



5) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4SO 2.0)-53, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>

6) Remove the bolts which install the fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

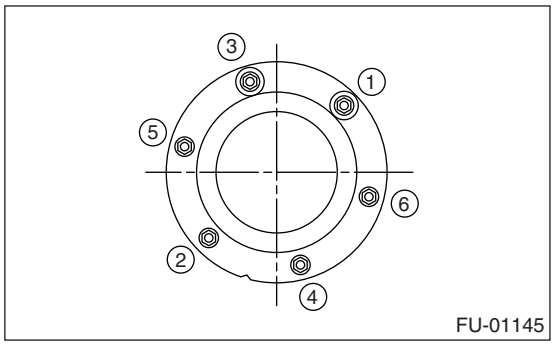
7) Remove the fuel sub level sensor.

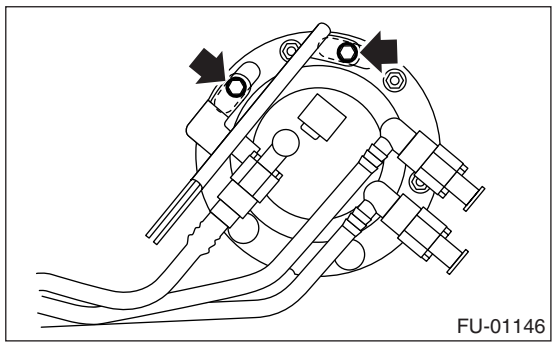
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)





25.Fuel Filter

A: SPECIFICATION

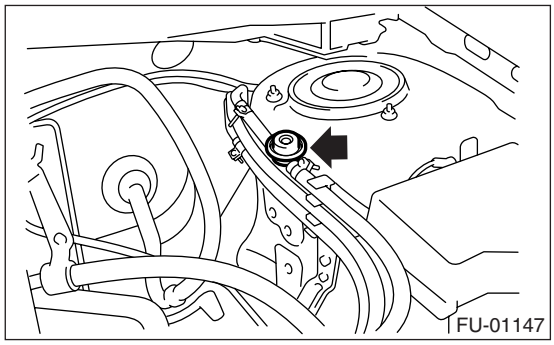
Fuel filter forms a unit with fuel pump.
Refer to Fuel Pump for removal and installation.
<Ref. to FU(H4SO 2.0)-47, REMOVAL, Fuel Pump.>
<Ref. to FU(H4SO 2.0)-47, INSTALLATION, Fuel Pump.>

26.Fuel Damper Valve

A: REMOVAL

1. DELIVERY SIDE

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel delivery line.



2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for removal. <Ref. to FU(H4SO 2.0)-14, DISASSEMBLY, Intake Manifold.>

B: INSTALLATION

1. DELIVERY SIDE

Install in the reverse order of removal.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

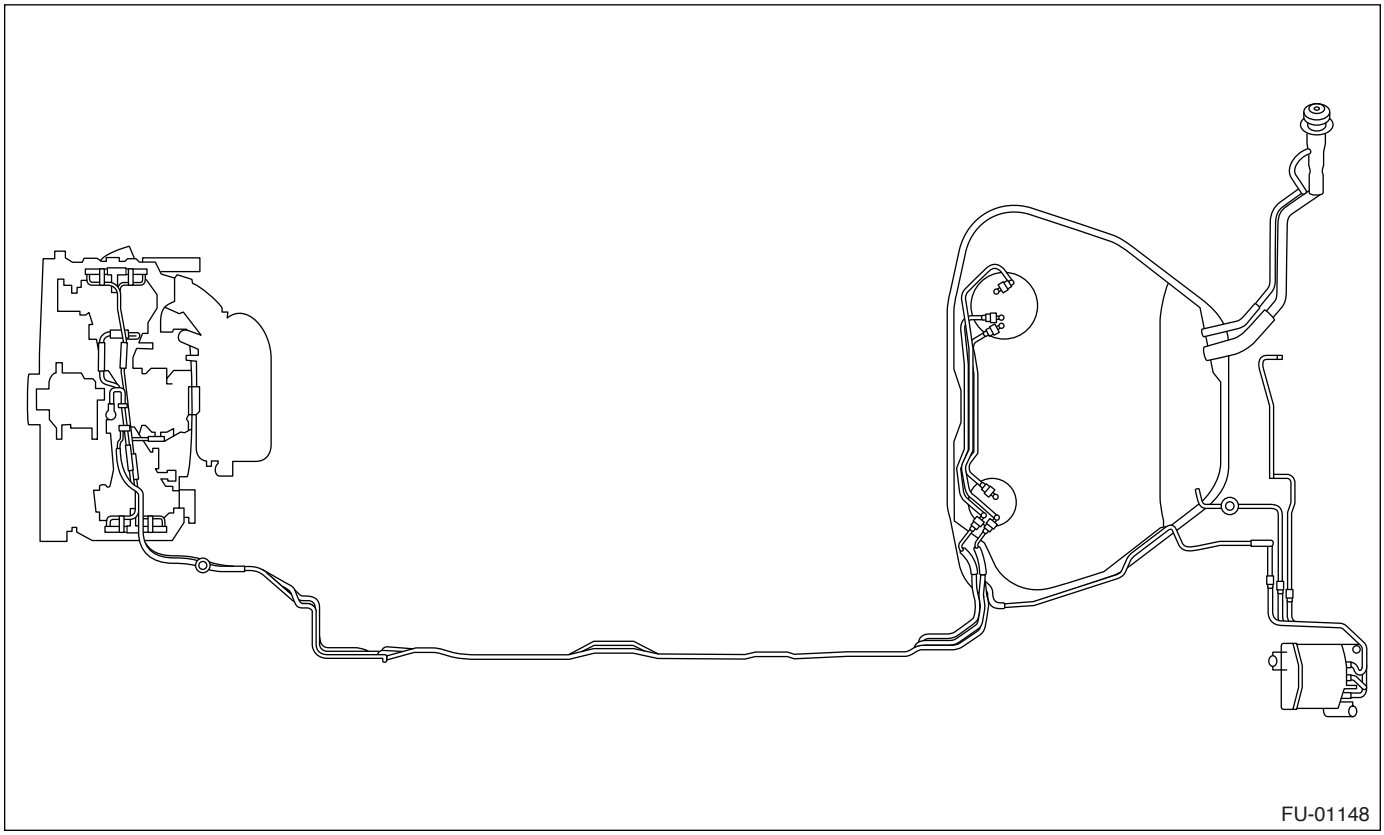
2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for installation. <Ref. to FU(H4SO 2.0)-16, ASSEMBLY, Intake Manifold.>

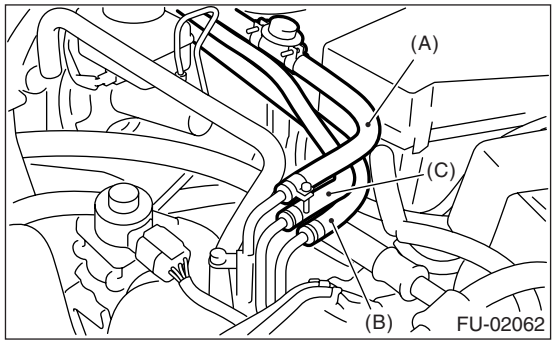
27.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.

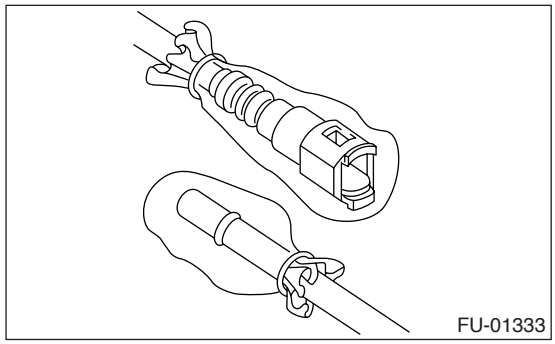


6) In the engine compartment, disconnect the fuel delivery hoses, return hoses and evaporation hose.



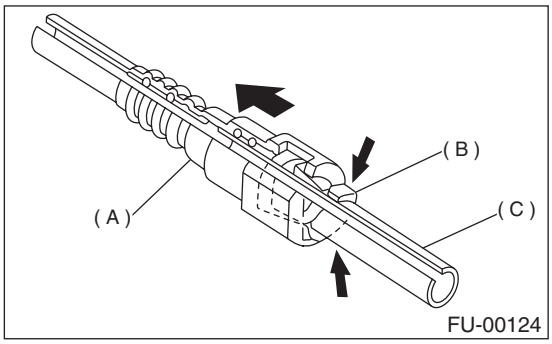
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

7) Lift-up the vehicle.
8) Remove the fuel tank. <Ref. to FU(H4SO 2.0)-39, REMOVAL, Fuel Tank.>
9) Separate the quick connector on fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A) and push retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

CAUTION:
Always use a new retainer.

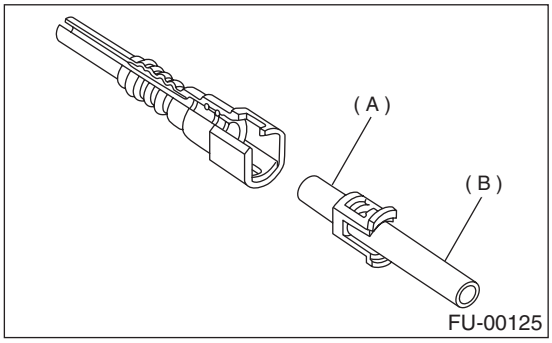


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

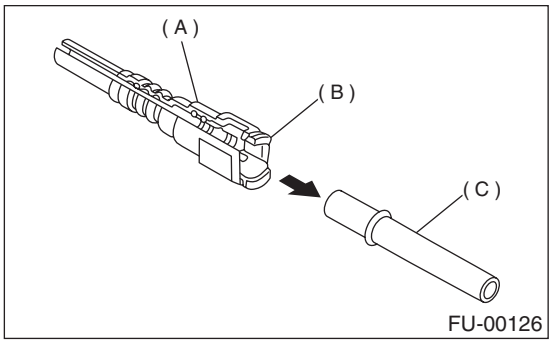
1) Connect the quick connector on fuel line.

CAUTION:
• Always use a new retainer.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



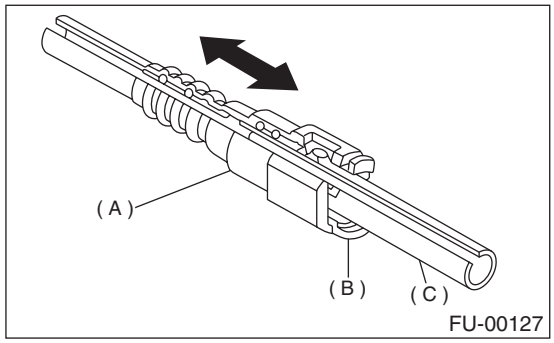
(A) Seal surface
(B) Pipe

(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.

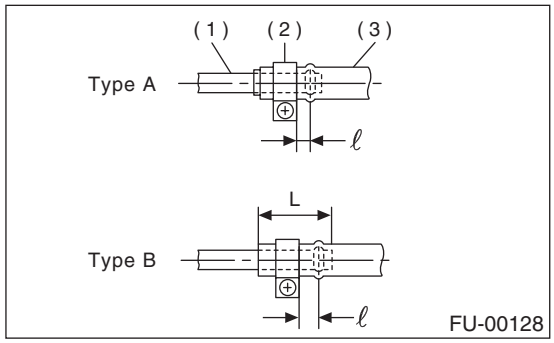


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount of inserting is specified.
Type B: When the amount of inserting is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

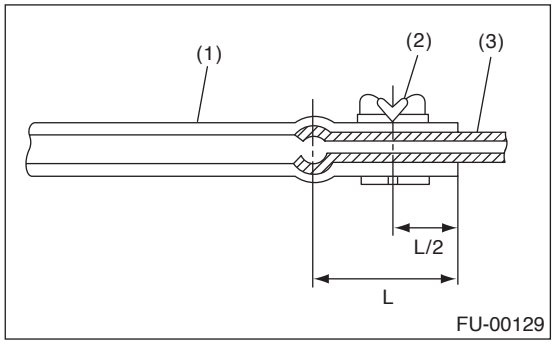


(1) Pipe
(2) Clamp
(3) Hose

3) Connect the return hose and evaporation hose to pipe by approx. 15 mm (0.59 in) from the hose end.

Fuel return hose:
L = 22.5±2.5 mm (0.885±0.098 in)
Fuel evaporation hose:
L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure that the fuel pipe and fuel hose connections are tightened firmly.

28.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump does not operate.	
	❍ Defective terminal contact.	Inspect contact, especially ground, and tighten it securely.
	❍ Trouble in electromagnetic or electronic circuit parts.	Replace the faulty parts.
2)	Decline of fuel pump function.	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose.	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out of fuel		
1)	Loosened joints of the fuel pipe.	Retightening.
2)	Cracked fuel pipe, hose and fuel tank.	Replace.
3)	Defective welding part on the fuel tank.	Replace.
4)	Defective drain packing of the fuel tank.	Replace.
5)	Clogged or bent air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)	Defective packing air tightness on the fuel saucer.	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor.	Replace.
2)	Defective operation of fuel meter.	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump.	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using water removing agent, follow the cautions noted on the bottle.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4SO 2.0)

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3. Rear Catalytic Converter 4
4. EGR Valve 5
5. Canister 6
6. Purge Control Solenoid Valve 7
7. Two-way Valve 9
8. PCV Valve 10

1. General Description

A: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

The front and rear catalytic converters are integrated into center exhaust pipe as a unit; therefore, refer to “Center Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-10, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converters are integrated into center exhaust pipe as a unit; therefore, refer to “Center Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

The front and rear catalytic converters are integrated into center exhaust pipe as a unit; therefore, refer to “Center Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-10, REMOVAL, Center Exhaust Pipe.>

B: INSTALLATION

The front and rear catalytic converters are integrated into center exhaust pipe as a unit; therefore, refer to “Center Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Center Exhaust Pipe.>

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. EGR Valve

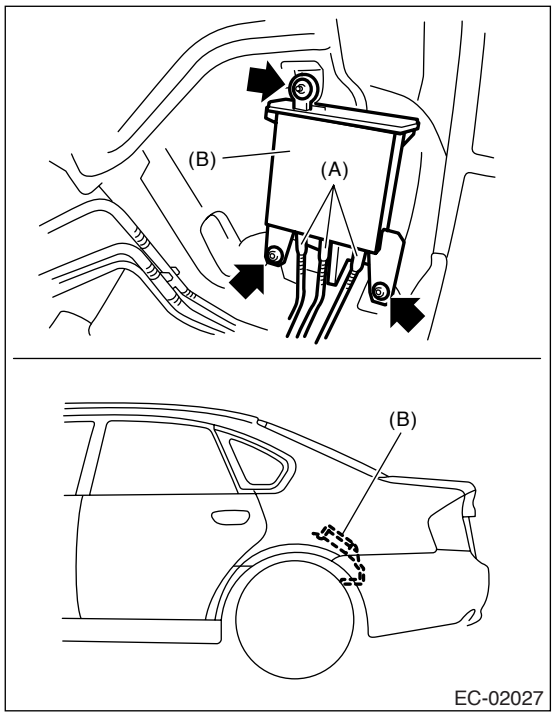
A: SPECIFICATION

Refer to “EGR Valve” for removal and installation. <Ref. to FU(H4SO 2.0)-28, EGR Valve.> or <Ref. to FU(H4SO 2.5)-30, EGR Valve.>

5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the rear wheel LH.
3) Remove the mud guard LH.
4) Remove the protector. (Sedan model)
5) Disconnect the quick connector (A).
6) Remove the canister (B) from body.

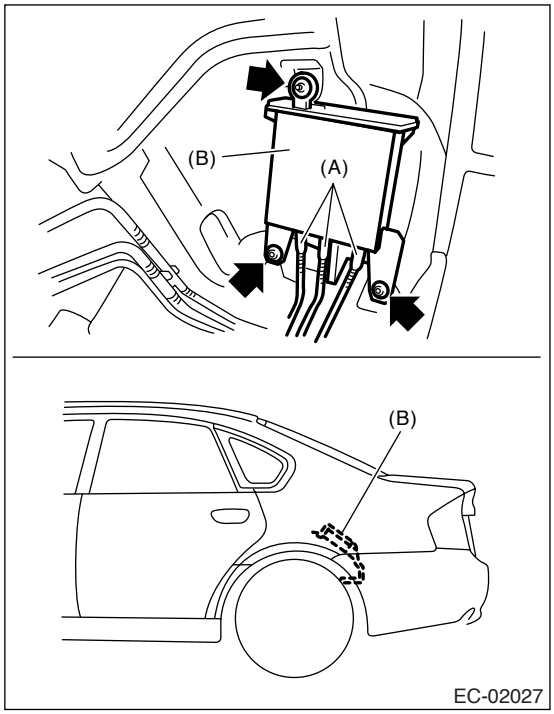


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure there are no damage or dust on the connection of quick connector. If necessary, clean the seal surface of pipe.

Tightening torque:
8.3 N·m (0.85 kgf-m, 6.1 ft-lb)



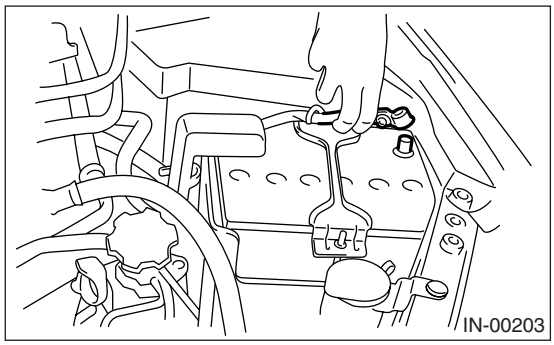
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

6. Purge Control Solenoid Valve

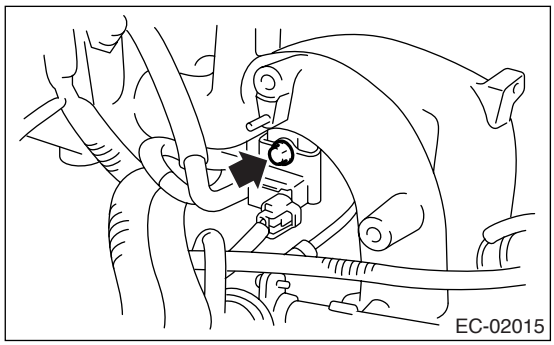
A: REMOVAL

1) Disconnect the ground cable from battery.

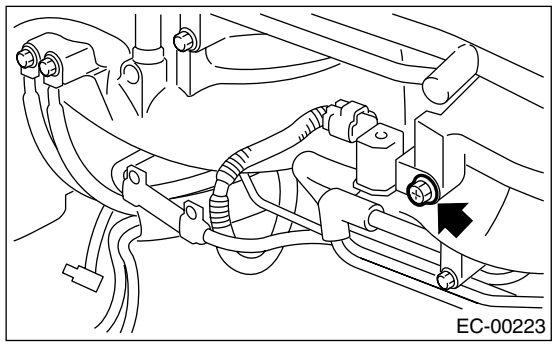


2) Disconnect the connector and hoses of purge control solenoid valve, and then remove the purge control solenoid valve.

• 2.0 L model



• 2.5 L model

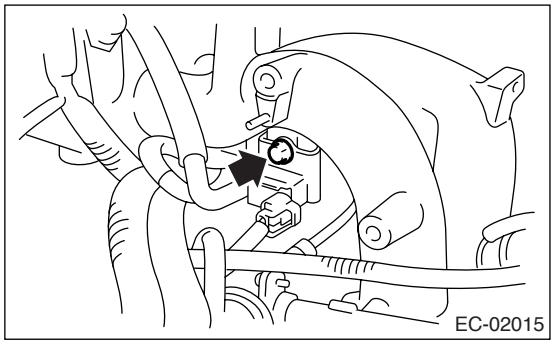


B: INSTALLATION

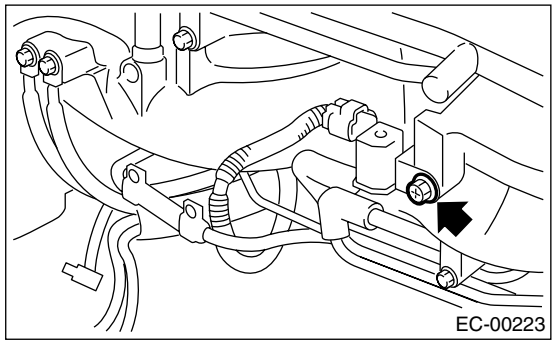
Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)

• 2.0 L model

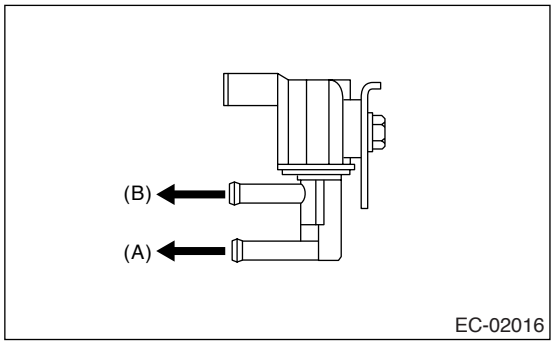


• 2.5 L model

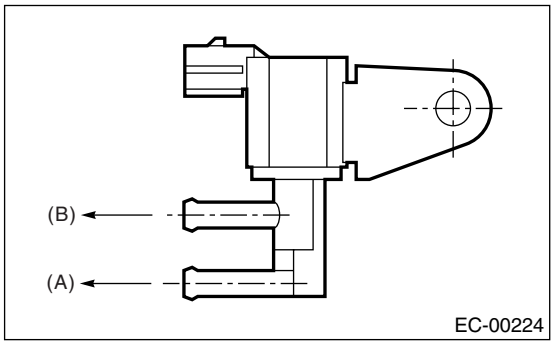


NOTE:
Connect the evaporation hose as shown in the figure.

• 2.0 L model



• 2.5 L model



(A) To fuel pipe (Evaporation line)
(B) To intake manifold

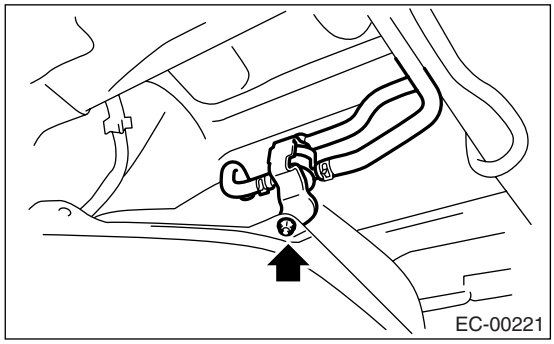
C: INSPECTION

Make sure the hoses are not cracked or loose.

7. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Disconnect the evaporation hoses from two-way valve.
3) Remove the two-way valve as a unit with bracket from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

C: INSPECTION

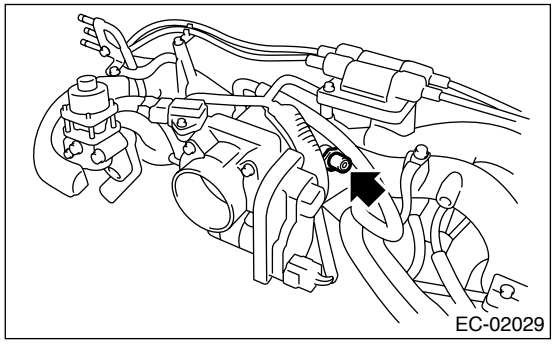
Make sure the hoses are not cracked or loose.

8. PCV Valve

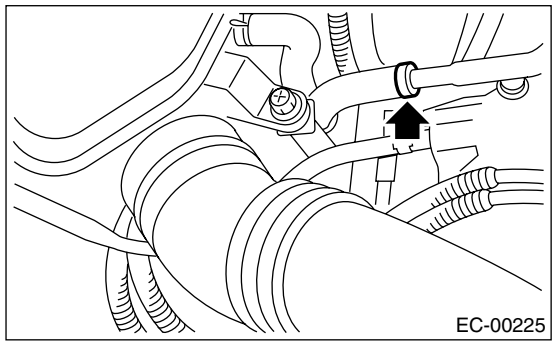
A: REMOVAL

Disconnect the PCV hose and remove the PCV valve.

- 2.0 L model



- 2.5 L model



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the bolt threads of PCV valve. (2.0 L model)

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
23 N·m (2.3 kgf-m, 17 ft-lb)

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

INTAKE (INDUCTION)

IN(H4SO 2.0)

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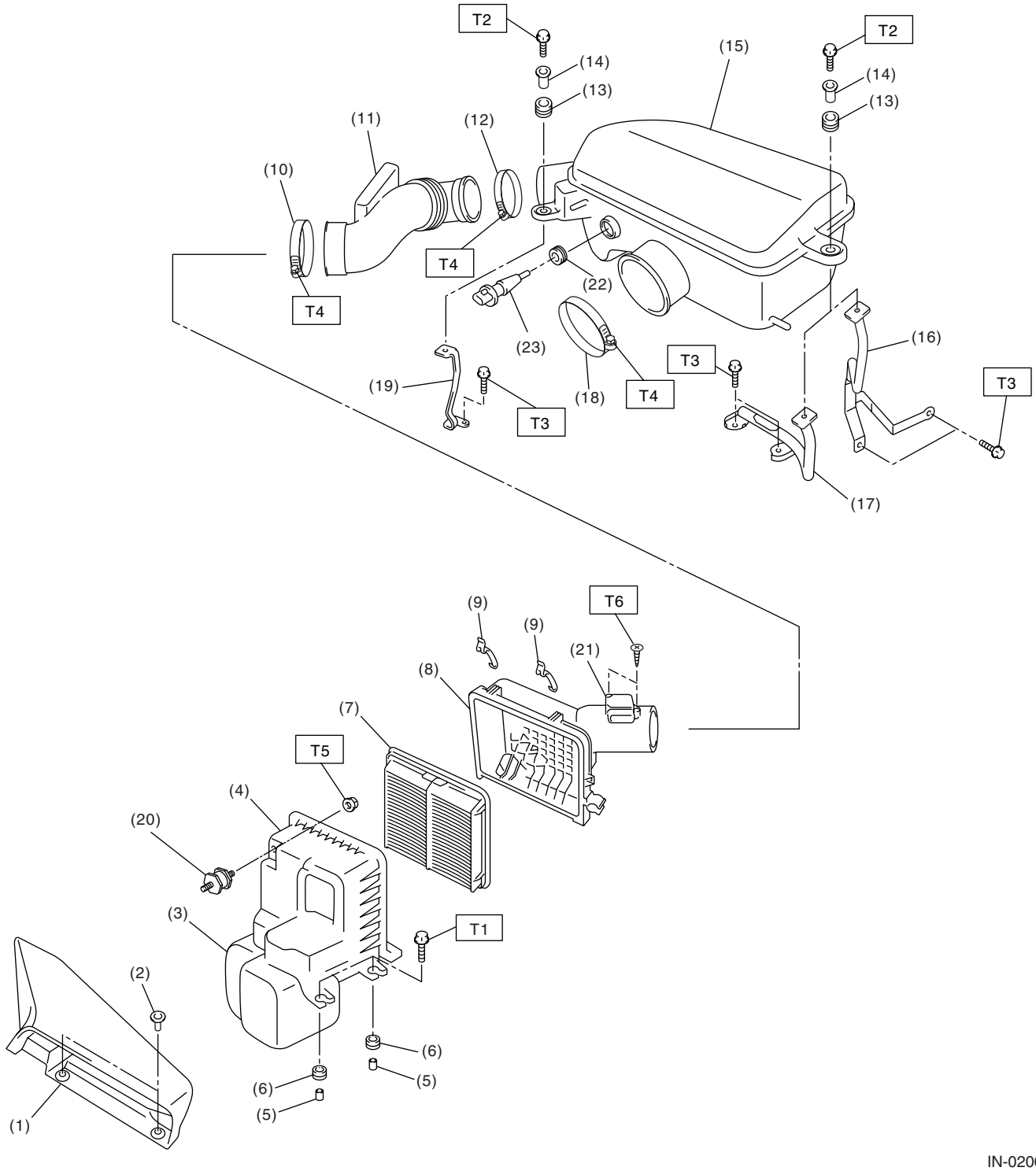
2. Air Cleaner Element 5
3. Air Cleaner Case 6
4. Air Intake Chamber 8
5. Air Intake Duct 9
6. Resonator Chamber 10

1. General Description

A: COMPONENT



IN-02004

(1) Air intake duct
(2) Clip
(3) Resonator chamber
(4) Air cleaner case (front)
(5) Spacer
(6) Cushion
(7) Air cleaner element
(8) Air cleaner case (rear)
(9) Clip
(10) Clamp
(11) Intake duct
(12) Clamp
(13) Cushion
(14) Spacer
(15) Air intake chamber
(16) Stay LH (MT model)
(17) Stay LH (AT model)
(18) Clamp
(19) Stay RH
(20) Cushion
(21) Mass air flow and intake air temperature sensor (2.5 L EC, EK, K4 model)
(22) Bushing (Except for 2.5 L EC, EK, K4 model)
(23) Intake air temperature sensor (Except for 2.5 L EC, EK, K4 model)

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6.0 (0.6, 4.4)*
T2:	*6.5 (0.66, 4.8)*
T3:	*16 (1.6, 11.6)*
T4:	*3.0 (0.3, 2.2)*
T5:	*7.5 (0.76, 5.5)*
T6:	*1.0 (0.10, 0.7)*

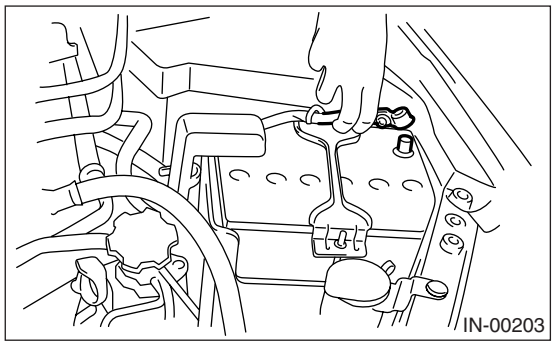
B: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

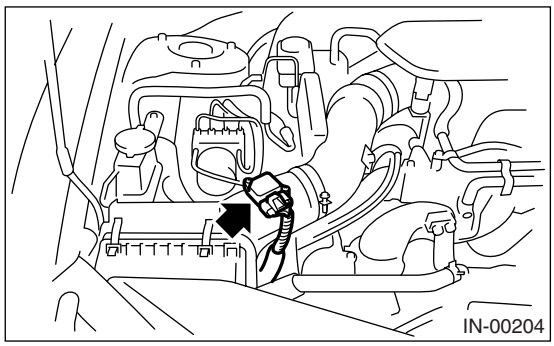
2. Air Cleaner Element

A: REMOVAL

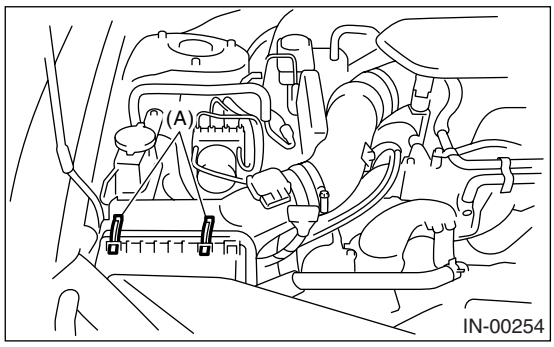
1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor. (2.5 L EC, EK, K4 model)



3) Remove the clip (A) from upper side of air cleaner case.



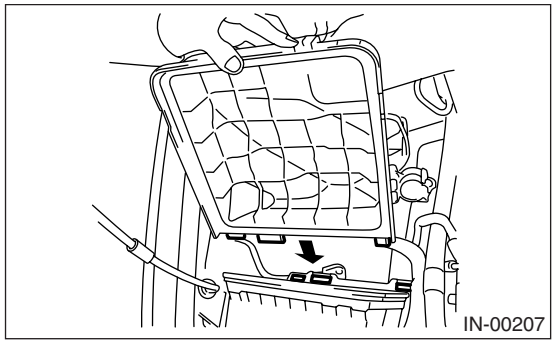
4) Pull the air cleaner case (rear) to rearward of the vehicle, and then remove the air cleaner element.

NOTE:
Be careful that the power steering hose is secured to the under side of air cleaner case (rear).

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Fasten the air cleaner case (rear) with a clip after inserting the lower tab of the case.



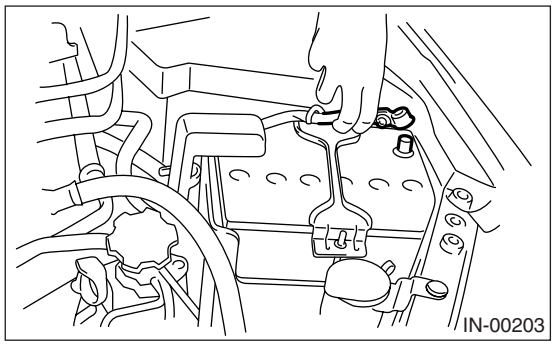
C: INSPECTION

Replace if excessively damaged or dirty.

3. Air Cleaner Case

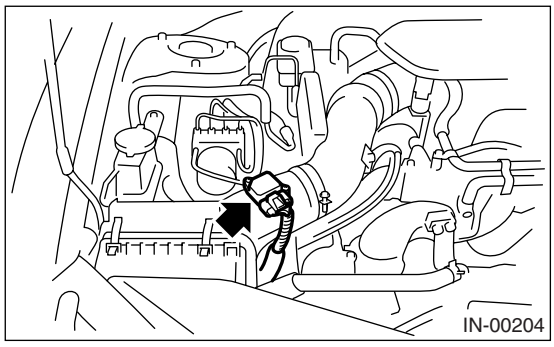
A: REMOVAL

1) Disconnect the ground cable from battery.



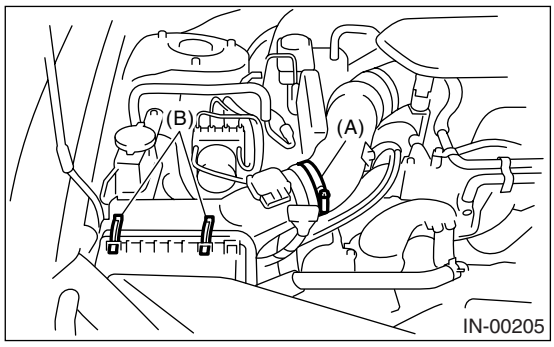
2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>

3) Disconnect the connector from mass air flow and intake air temperature sensor. (2.5 L EC, EK, K4 model)

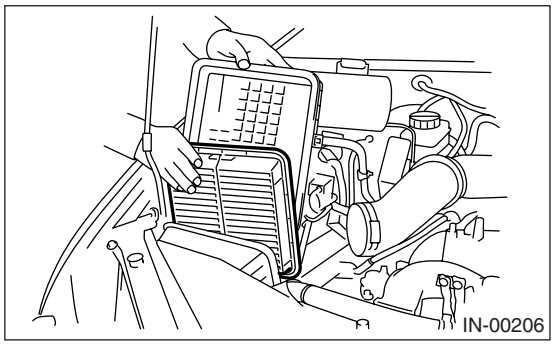


4) Loosen the clamp (A) which connects the air cleaner case to intake duct.

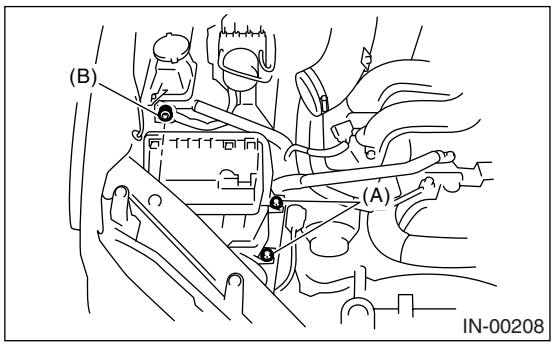
5) Remove the clip (B) from upper side of air cleaner case.



6) Remove the air cleaner case (rear) and air cleaner element.



7) Remove the bolt (A) and nut (B) which hold the air cleaner case on body.

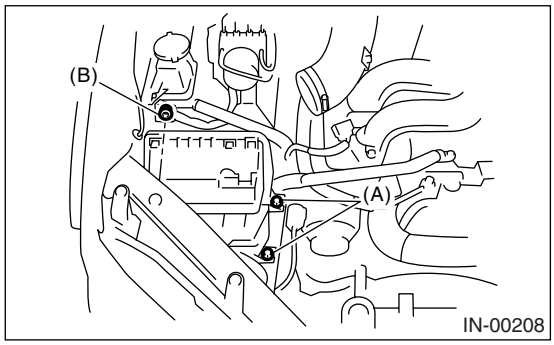


8) Remove the air cleaner case (front).

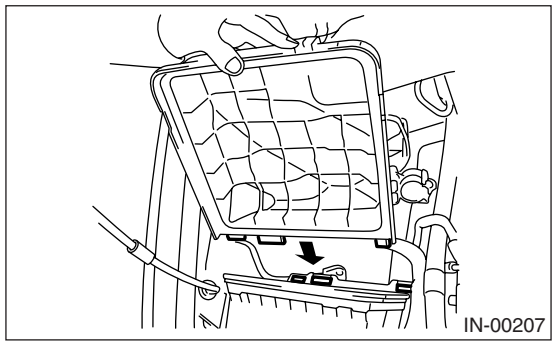
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Bolt (A): 6.0 N·m (0.6 kgf-m, 4.4 ft-lb)
Nut (B): 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



NOTE:
Fasten with a clip after inserting the lower tab of the case.



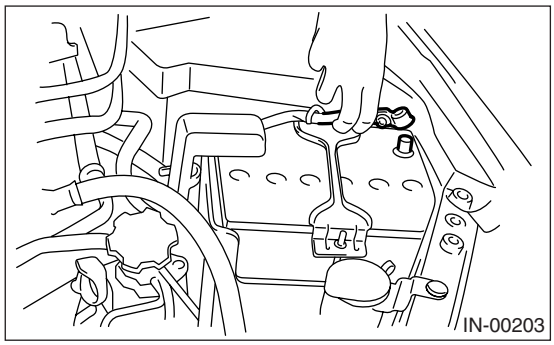
C: INSPECTION

Check for cracks or loose connection.

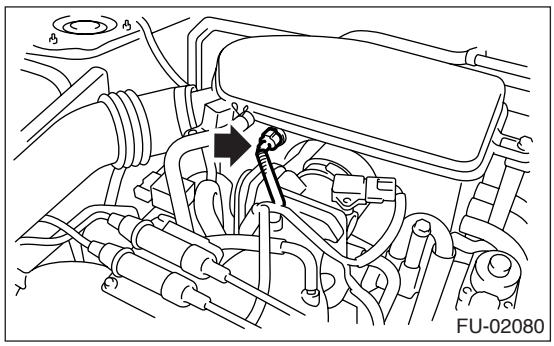
4. Air Intake Chamber

A: REMOVAL

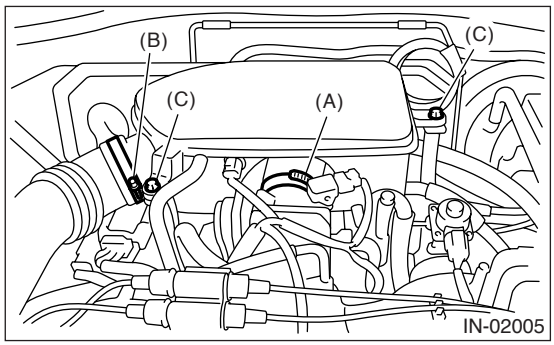
1) Disconnect the ground cable from battery. (Except for EC, EK, K4 model)



2) Disconnect the connector from intake air temperature sensor. (Except for EC, EK, K4 model)



3) Loosen the clamp (A) which connects the air intake chamber to throttle body.
4) Loosen the clamp (B) which connects the intake duct to air intake chamber.
5) Remove the bolt (C) which secures the air intake chamber to the stay.

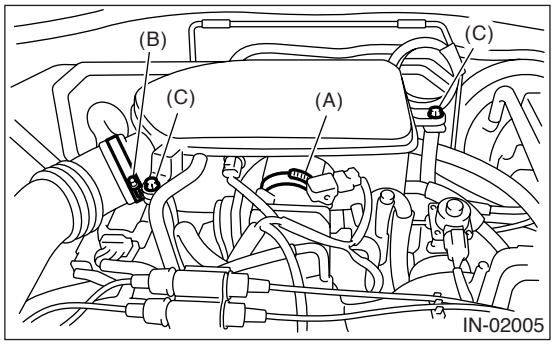


6) Disconnect the three parts of blow-by hose, and remove the air intake chamber.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Clamp (A), (B)
3.0 N·m (0.3 kgf-m, 2.2 ft-lb)
Bolt (C)
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



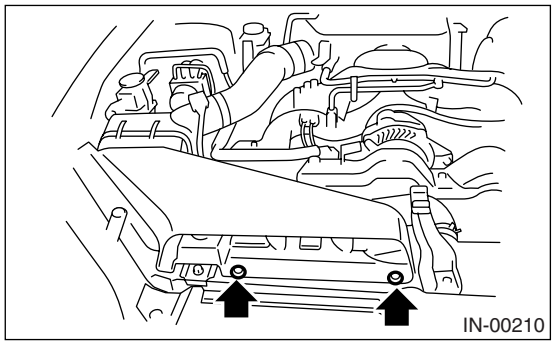
C: INSPECTION

1) Check for cracks or loose connections.
2) Inspect that no foreign objects in the air intake chamber.

5. Air Intake Duct

A: REMOVAL

1) Remove the clips which install the air intake duct on the front side of body.
2) Remove the air intake duct.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Check for cracks or loose connections.
2) Inspect that no foreign objects in the air intake duct.

6. Resonator Chamber

A: REMOVAL

Refer to “Air Cleaner Case” for removal procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>

B: INSTALLATION

Refer to “Air Cleaner Case” for installation procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.>

C: INSPECTION

Check for cracks or loose connections.

ENGINE SECTION 1

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MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
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IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
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EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

MECHANICAL

ME(H4SO 2.0)

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1. General Description

A: SPECIFICATION

	Model			2.0 L	2.5 L
Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine	
	Valve system mechanism			Belt driven, single over-head camshaft, 4-valve/ cylinder	
	Bore × Stroke	mm (in)		92 × 75 (3.62 × 2.95)	99.5 × 79.0 (3.917 × 3.110)
	Displacement	cm^3 (cu in)		1,994 (121.67)	2,457 (150)
	Compression ratio			10.0	
	Compression pressure (at 350 rpm)	kPa (kg/cm^2, psi)		1,020 — 1,275 (10.4 — 13.0, 148 — 185)	
	Number of piston rings			Pressure ring: 2, Oil ring: 1	
	Intake valve timing		Open	BTDC 2°	BTDC 2°
			Close	ABDC 54°	ABDC 56°
	Exhaust valve timing		Open	BBDC 39°	BBDC 50°
			Close	ATDC 5°	ATDC 8°
	Valve clearance	mm (in)	Intake	0.20±0.04 (0.0079±0.0016)	
			Exhaust	0.25±0.04 (0.0098±0.0016)	
	Idle speed [at neutral position on MT, or “P” or “N” range on AT]	rpm		650±100 (No load) 800±100 (A/C ON)	
	Ignition order			1 → 3 → 2 → 4	
	Ignition timing	BTDC/rpm		13°±10°/650	

NOTE:
US: undersize OS: oversize

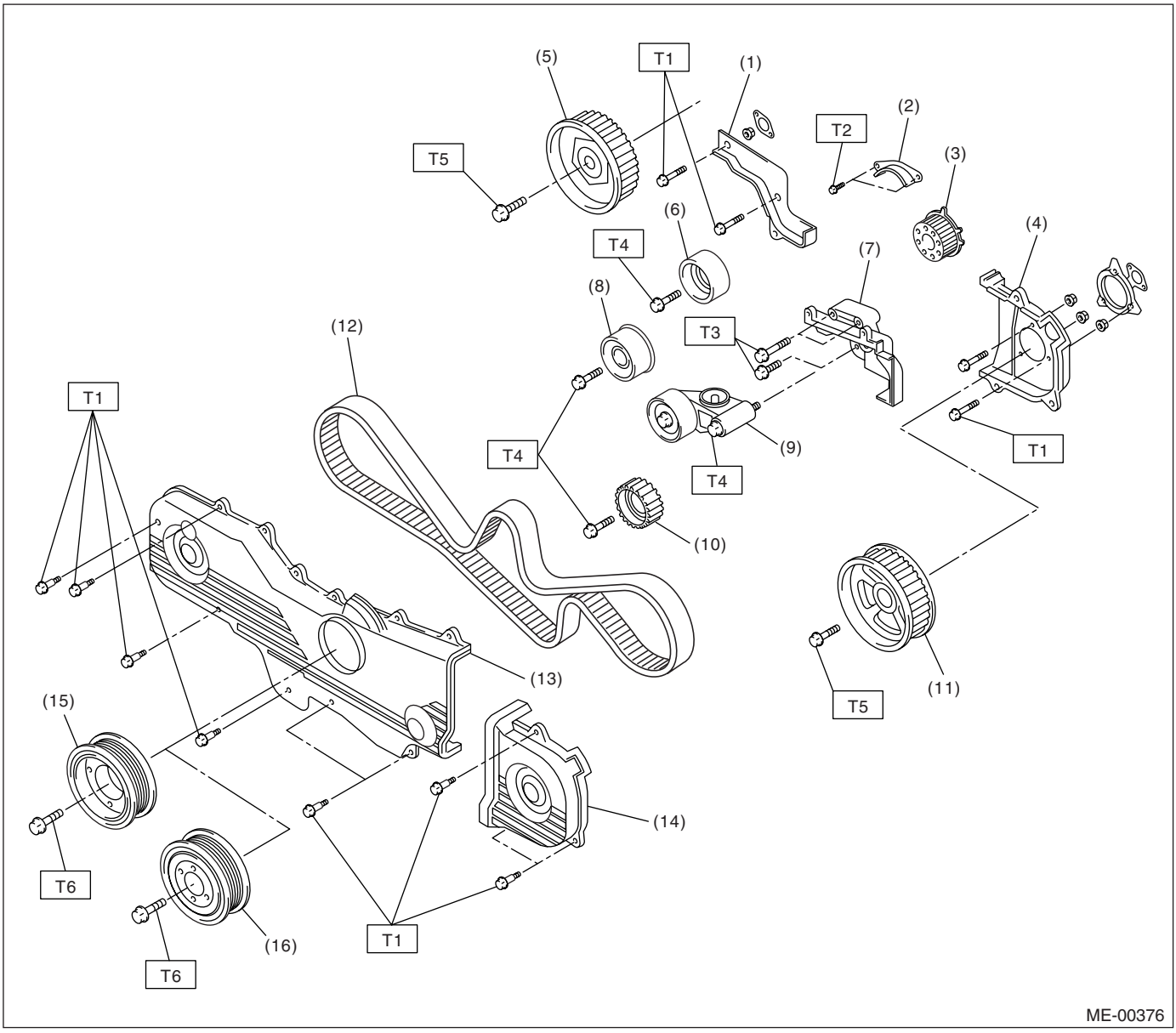
Belt tension adjuster	Protrusion of adjuster rod	mm (in)			5.2 — 6.2 (0.205 — 0.244)
Belt tensioner	Spacer O.D.	mm (in)			17.955 — 17.975 (0.7069 — 0.7077)
	Tensioner bushing I.D.	mm (in)			18.00 — 18.08 (0.7087 — 0.7118)
	Clearance between spacer and bushing	mm (in)		Standard	0.025 — 0.125 (0.0010 — 0.0049)
	Side clearance of spacer	mm (in)		Standard	0.20 — 0.55 (0.0079 — 0.0217)
Valve rocker arm	Clearance between shaft and arm	mm (in)		Standard	0.020 — 0.054 (0.0008 — 0.0021)
Camshaft	Bend limit				0.020 (0.00079)
	Side clearance	mm (in)		Standard	0.030 — 0.090 (0.0012 — 0.0035)
	Cam lobe height	mm (in)	2.0 L Intake	Standard	39.646 — 39.746 (1.5609 — 1.5648)
			2.0 L Exhaust	Standard	39.351 — 39.451 (1.5493 — 1.5532)
			2.5 L Intake	Standard	39.485 — 39.585 (1.5545 — 1.5585)
			2.5 L Exhaust	Standard	39.904 — 40.004 (1.5710 — 1.5750)
	Camshaft journal O.D.	mm (in)			31.928 — 31.945 (1.2570 — 1.2577)
	Camshaft journal hole I.D.	mm (in)			32.000 — 32.018 (1.2598 — 1.2605)
	Oil clearance	mm (in)		Standard	0.055 — 0.090 (0.0022 — 0.0035)
Cylinder Head	Surface warpage limit (mating with cylinder block)	mm (in)			0.03 (0.001)
	Grinding limit	mm (in)			0.1 (0.004)
	Standard height	mm (in)			97.5 (3.84)

Valve seat	Refacing angle				90°
	Contacting width mm (in)		Intake	Standard	0.8 — 1.4 (0.03 — 0.055)
			Exhaust	Standard	1.2 — 1.8 (0.047 — 0.071)
Valve guide	Inside diameter mm (in)				6.000 — 6.012 (0.2362 — 0.2367)
	Protrusion above head mm (in)			Intake	20.0 — 21.0 (0.787 — 0.827)
				Exhaust	16.5 — 17.5 (0.650 — 0.689)
Valve	Head edge thickness mm (in)		Intake	Standard	0.8 — 1.2 (0.03 — 0.047)
			Exhaust	Standard	1.0 — 1.4 (0.039 — 0.055)
	Stem outer diameters mm (in)			Intake	5.950 — 5.965 (0.2343 — 0.2348)
				Exhaust	5.945 — 5.960 (0.2341 — 0.2346)
	Valve stem gap mm (in)		Standard	Intake	0.035 — 0.062 (0.0014 — 0.0024)
				Exhaust	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)			Intake	120.6 (4.75)
				Exhaust	121.7 (4.79)
Valve springs	Free length mm (in)				54.30 (2.1378)
	Squareness				2.5°, 2.4 mm (0.094 in)
	Tension/spring height N (kgf, lb)/mm (in)			Set	214 — 246 (22 — 25, 48 — 55)/ 45.0 (1.772)
				Lift	526 — 582 (54 — 59, 119 — 130)/ 34.7 (1.366)
Cylinder block	Surface warpage limit (mating with cylinder head) mm (in)				0.025 (0.00098)
	Grinding limit mm (in)				0.1 (0.004)
	Standard height mm (in)				201.0 (7.91)
	Cylinder inner diameter mm (in)	2.0 L	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
				B	91.995 — 92.005 (3.6218 — 3.6222)
		2.5 L	Standard	A	99.505 — 99.515 (3.9175 — 3.9179)
				B	99.495 — 99.505 (3.9171 — 3.9175)
	Taper mm (in)			Standard	0.015 (0.0006)
	Out-of-roundness mm (in)			Standard	0.010 (0.0004)
	Piston clearance mm (in)			Standard	−0.010 — 0.010 (−0.00039 — 0.00039)
	Boring limit mm (in)				0.5 (0.020)
Piston	Outer diameter mm (in)	2.0 L	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
				B	91.995 — 92.005 (3.6219 — 3.6222)
			0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6325)
			0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)
		2.5 L	Standard	A	99.505 — 99.515 (3.9175 — 3.9179)
				B	99.495 — 99.505 (3.9171 — 3.9175)
			0.25 (0.0098) OS		99.745 — 99.765 (3.9270 — 3.9278)
			0.50 (0.0197) OS		99.995 — 100.015 (3.9368 — 3.9376)
	Piston pin standard diameter mm (in)				23.000 — 23.006 (0.9055 — 0.9057)
Piston pin	Outer diameter mm (in)				22.994 — 23.000 (0.9053 — 0.9055)
	Standard clearance between piston and piston pin mm (in)				0.004 — 0.008 (0.0002 — 0.0003)
	Degree of fit				Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston Ring	Ring closed gap mm (in)		Top ring		Standard 0.20 — 0.35 (0.0079 — 0.0138)
			Second ring	2.0 L	Standard 0.40 — 0.50 (0.0157 — 0.0197)
				2.5 L	Standard 0.35 — 0.50 (0.0138 — 0.0197)
			Oil ring		Standard 0.20 — 0.50 (0.0079 — 0.0197)
	Ring groove gap mm (in)		Top ring		Standard 0.040 — 0.080 (0.0016 — 0.0031)
			Second ring		Standard 0.030 — 0.070 (0.0012 — 0.0028)

Connecting Rod	Bend twist per 100 mm (3.94 in) in length	mm (in)	Limit		0.10 (0.0039)
	Side clearance of large end	mm (in)	Standard		0.070 — 0.330 (0.0028 — 0.0130)
Bearing of large end	Oil clearance	mm (in)	Standard		0.016 — 0.044 (0.00063 — 0.0017)
	Bearing size (Thickness at center)	mm (in)	Standard		1.492 — 1.501 (0.0587 — 0.0591)
			0.03 (0.0012) US		1.510 — 1.513 (0.0594 — 0.0596)
			0.05 (0.0020) US		1.520 — 1.523 (0.0598 — 0.0600)
			0.25 (0.0098) US		1.620 — 1.623 (0.0638 — 0.0639)
Bush of small end	Clearance between piston pin and bushing	mm (in)	Standard		0 — 0.022 (0 — 0.0009)
Crankshaft	Bend limit			mm (in)	0.035 (0.0014)
	Crank pin	Out-of-roundness mm (in)	2.0 L		0.005 (0.0002)
			2.5 L		0.003 (0.0001)
		Cylindricality mm (in)	2.0 L		0.006 (0.0002)
			2.5 L		0.004 (0.0002)
		Grinding limit (dia.)		mm (in)	To 51.750 (2.0374)
	Crank journal	Out-of-roundness		mm (in)	0.005 (0.0002)
		Cylindricality		mm (in)	0.006 (0.0002)
		Grinding limit (dia.)		mm (in)	To 59.750 (2.3524)
	Crank pin outer diameter	mm (in)	Standard		51.984 — 52.000 (2.0466 — 2.0472)
			0.03 (0.0012) US		51.954 — 51.970 (2.0454 — 2.0461)
			0.05 (0.0020) US		51.934 — 51.950 (2.0446 — 2.0453)
			0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter	mm (in)	Standard		59.992 — 60.008 (2.3619 — 2.3625)
			0.03 (0.0012) US		59.962 — 59.978 (2.3607 — 2.3613)
			0.05 (0.0020) US		59.942 — 59.958 (2.3599 — 2.3605)
			0.25 (0.0098) US		59.742 — 59.758 (2.3520 — 2.3527)
	Side clearance	mm (in)	Standard		0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance	mm (in)	Standard		0.010 — 0.030 (0.0001 — 0.0012)
Main bearing	Main bearing mm (in)	#1, #3	Standard		1.998 — 2.011 (0.0787 — 0.0792)
			0.03 (0.0012) US		2.017 — 2.020 (0.0794 — 0.0795)
			0.05 (0.0020) US		2.027 — 2.030 (0.0798 — 0.0799)
			0.25 (0.0098) US		2.127 — 2.130 (0.0837 — 0.0839)
		#2, #4, #5	Standard		2.000 — 2.013 (0.0787 — 0.0793)
			0.03 (0.0012) US		2.019 — 2.022 (0.0795 — 0.0796)
			0.05 (0.0020) US		2.029 — 2.032 (0.0799 — 0.0800)
			0.25 (0.0098) US		2.129 — 2.132 (0.0838 — 0.0839)

B: COMPONENT

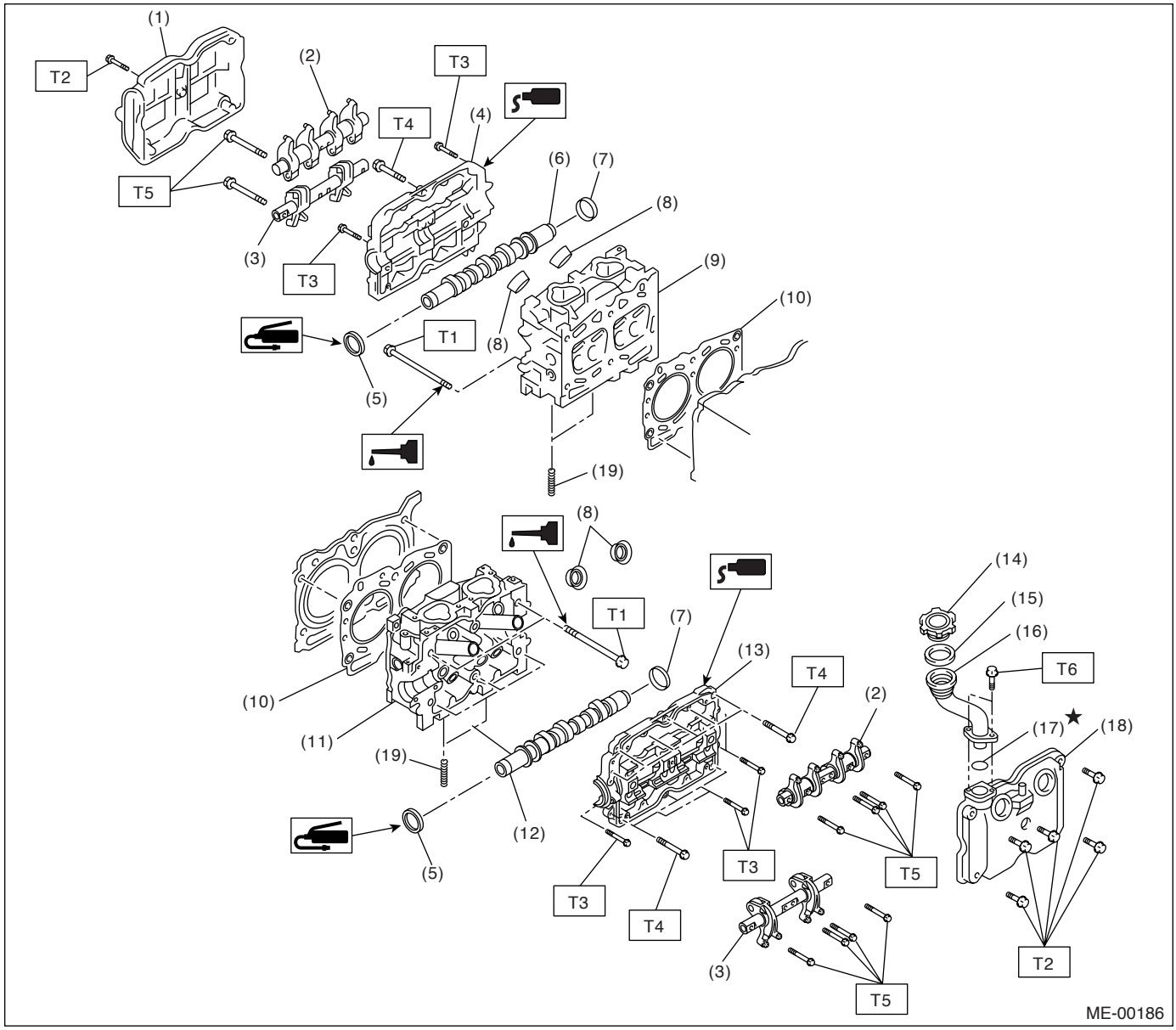
1. TIMING BELT



(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide (MT model)
(3) Crankshaft sprocket
(4) Timing belt cover No. 2 (LH)
(5) Camshaft sprocket No. 1
(6) Belt idler (No. 1)
(7) Tensioner bracket
(8) Belt idler (No. 2)
(9) Automatic belt tension adjuster ASSY
(10) Belt idler No. 2
(11) Camshaft sprocket No. 2
(12) Timing belt
(13) Front timing belt cover
(14) Timing belt cover (LH)
(15) Crank pulley (2.0 L model)
(16) Crank pulley (2.5 L model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: 78 (8.0, 57.9)
T6: <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>

2. CYLINDER HEAD AND CAMSHAFT

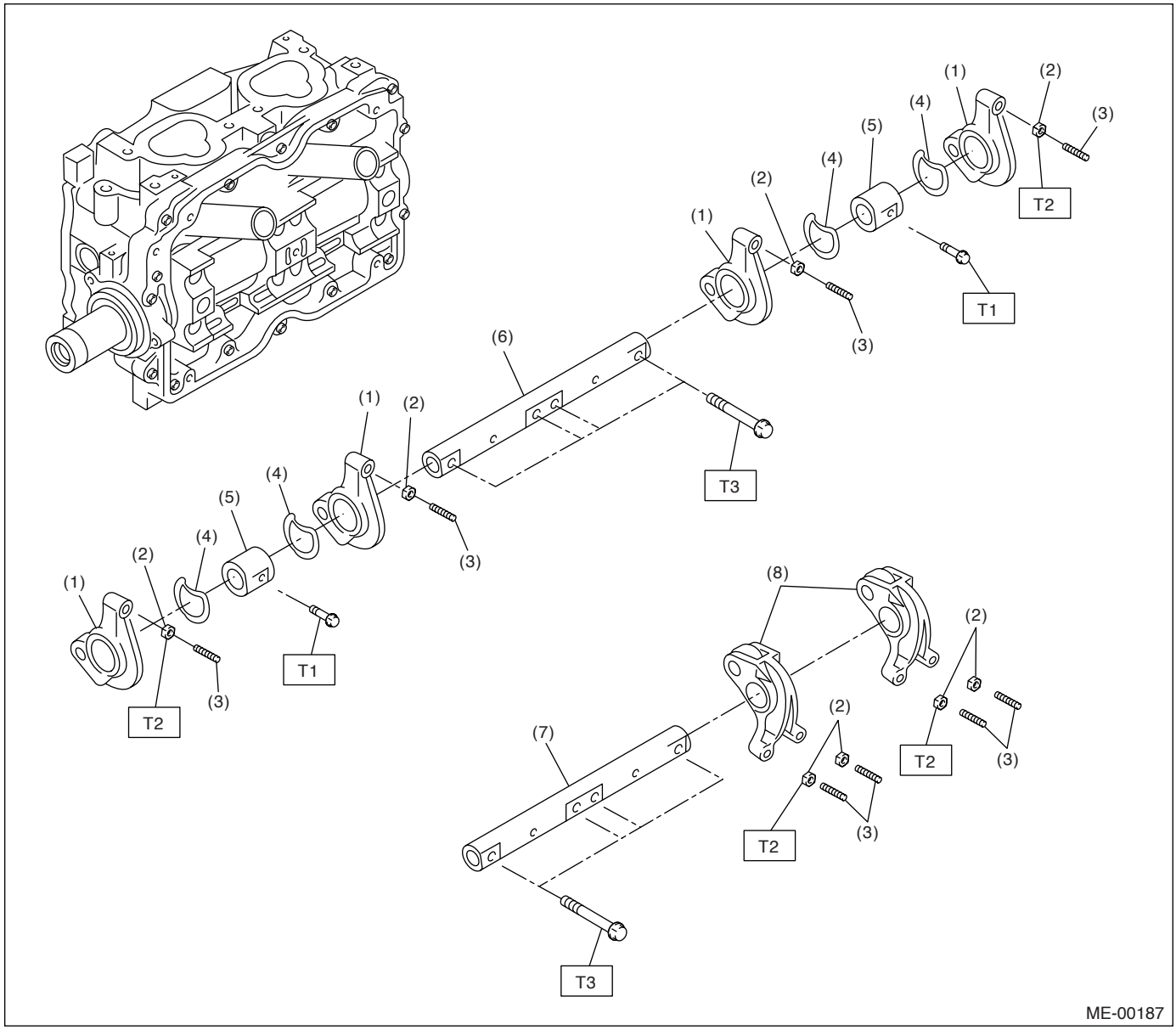


(1) Rocker cover (RH)
(2) Intake valve rocker ASSY
(3) Exhaust valve rocker ASSY
(4) Camshaft cap (RH)
(5) Oil seal
(6) Camshaft (RH)
(7) Plug
(8) Spark plug pipe gasket
(9) Cylinder head (RH)
(10) Cylinder head gasket
(11) Cylinder head (LH)
(12) Camshaft (LH)
(13) Camshaft cap (LH)
(14) Oil filler cap
(15) Gasket
(16) Oil filler duct
(17) O-ring
(18) Rocker cover (LH)
(19) Stud bolt

Tightening torque: N·m (kgf-m, ft-lb)

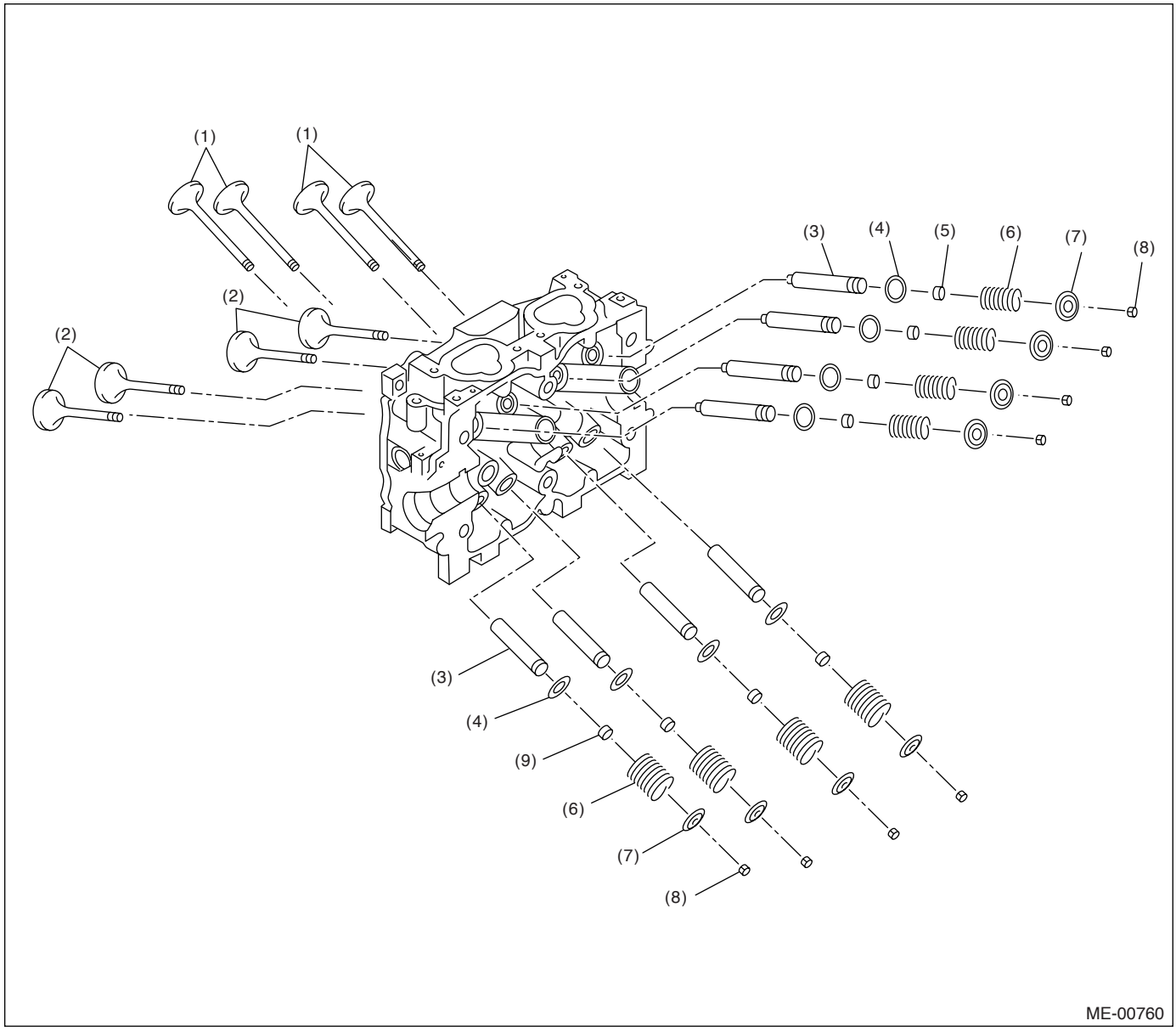
T1: <Ref. to ME(H4SO 2.0)-57, INSTALLATION, Cylinder Head.>
T2: 5 (0.5, 3.6)
T3: 10 (1.0, 7.2)
T4: 18 (1.8, 13.0)
T5: 25 (2.5, 18.1)
T6: 6.4 (0.65, 4.7)

3. VALVE ROCKER ASSEMBLY



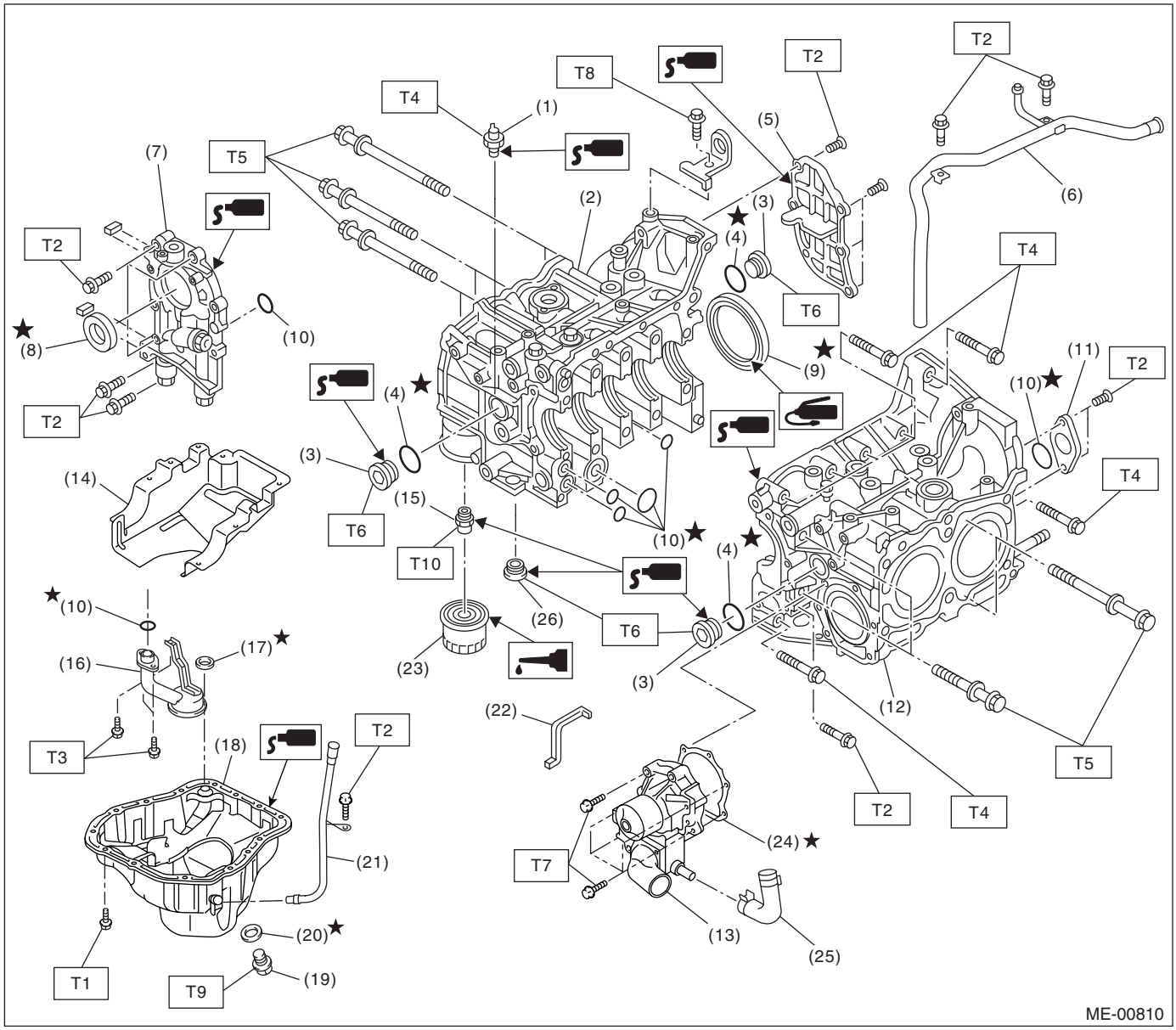
(1)	Intake valve rocker arm	(5)	Rocker shaft support	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Valve rocker nut	(6)	Intake rocker shaft	***T1: 5 (0.5, 3.6)***
(3)	Valve rocker adjust screw	(7)	Exhaust rocker shaft	***T2: 10 (1.0, 7.2)***
(4)	Spring	(8)	Exhaust valve rocker arm	***T3: 25 (2.5, 18.1)***

4. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Valve guide
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Exhaust valve oil seal

5. CYLINDER BLOCK

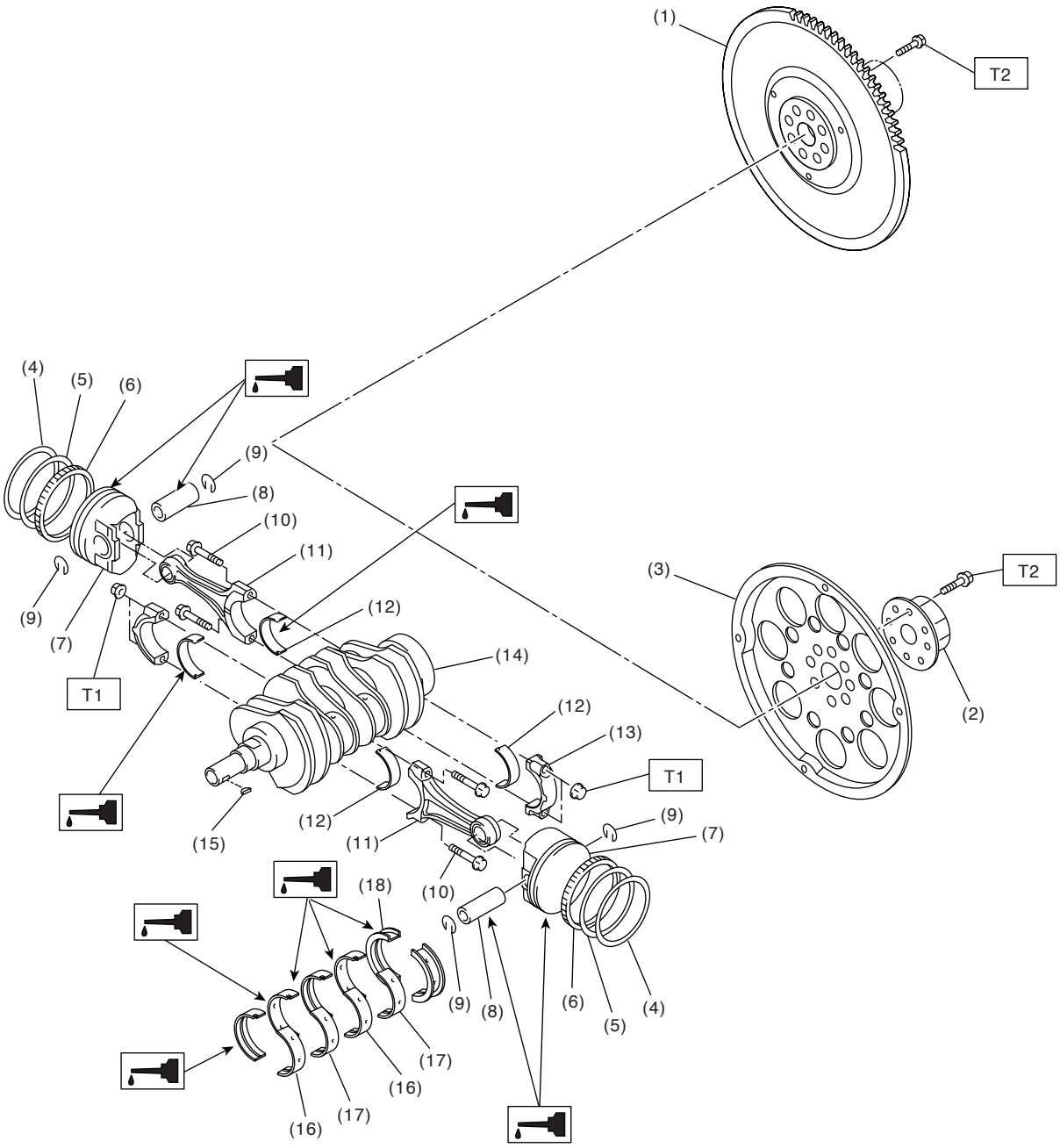


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil filter connector
(16) Oil strainer
(17) Gasket
(18) Oil pan
(19) Drain plug
(20) Metal gasket
(21) Oil level gauge guide
(22) Water pump sealing
(23) Oil filter
(24) Gasket
(25) Water pump hose
(26) Seal

Tightening torque: N·m (kgf-m, ft-lb)

T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: 25 (2.5, 18.1)
T5: <Ref. to ME(H4SO 2.0)-67, INSTALLATION, Cylinder Block.>
T6: 70 (7.1, 50.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 16 (1.6, 11.6)
T9: 44 (4.5, 33)
T10: 45 (4.6, 33.3)

6. CRANKSHAFT AND PISTON



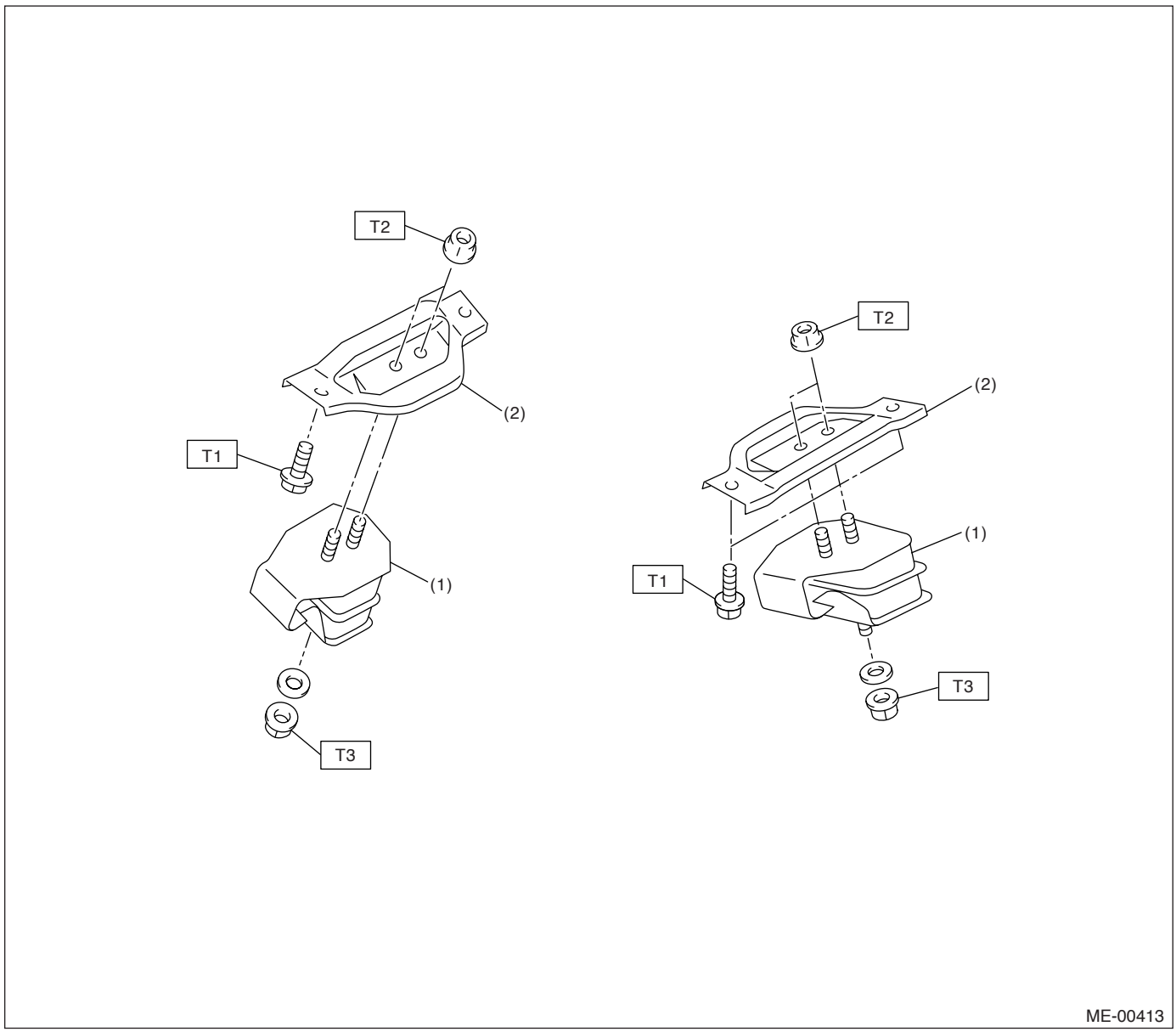
ME-00190

(1) Flywheel (MT model)
(2) Reinforcement (AT model)
(3) Drive plate (AT model)
(4) Top ring
(5) Second ring
(6) Oil ring
(7) Piston
(8) Piston pin
(9) Snap ring
(10) Connecting rod bolt
(11) Connecting rod
(12) Connecting rod bearing
(13) Connecting rod cap
(14) Crankshaft
(15) Woodruff key
(16) Crankshaft bearing #1, #3
(17) Crankshaft bearing #2, #4
(18) Crankshaft bearing #5

Tightening torque: N·m (kgf-m, ft-lb)
T1: 45 (4.6, 33.3)
T2: 72 (7.3, 52.8)

7. ENGINE MOUNTING

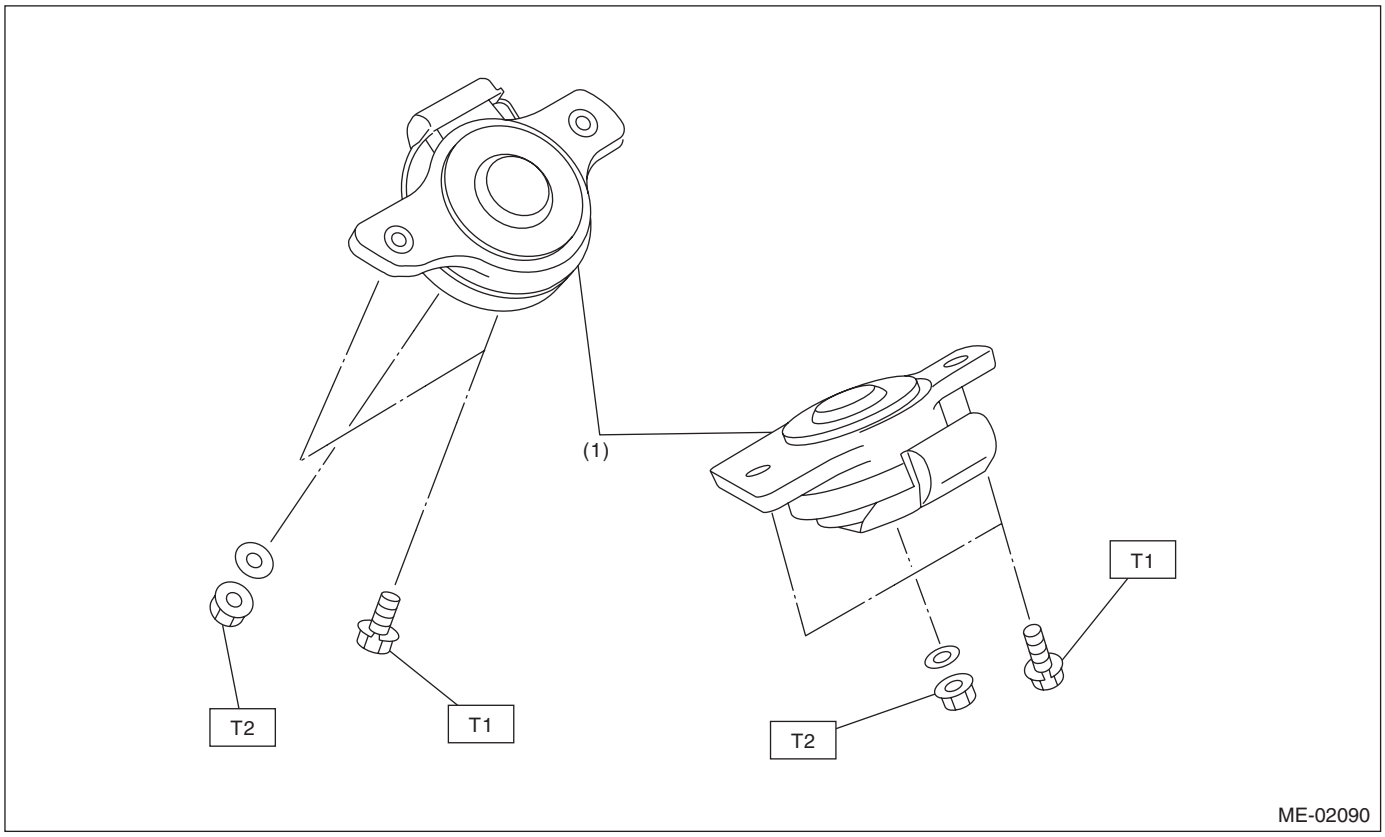
• 2.0 L model



(1) Front cushion rubber
(2) Front engine mounting bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 42 (4.3, 31.0)
T3: 85 (8.7, 63)

• 2.5 L model



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 62.7)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools, or not to stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOL

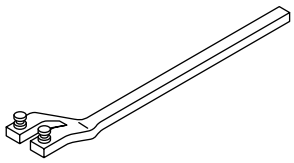
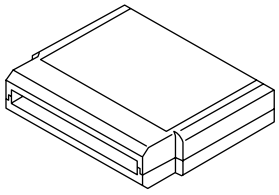
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. (LH side) • CAM SPROCKET WRENCH (499207100) can also be used.
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.

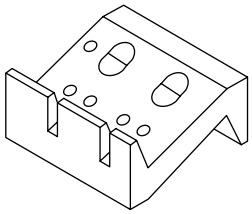
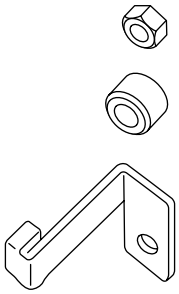
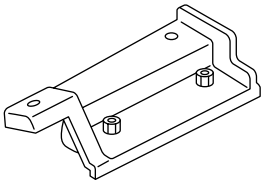
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST-498267800	498267800	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817100).

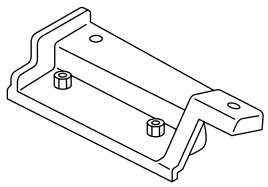
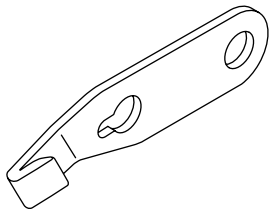
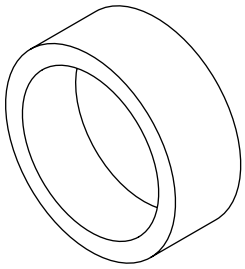
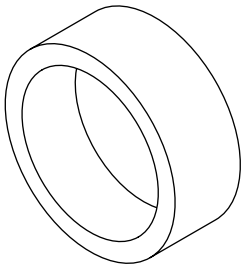
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817100).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening/tightening crank pulley bolt.
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder. (2.0 L model)
 ST-498747300	498747300	PISTON GUIDE	Used for installing piston in cylinder. (2.5 L model)

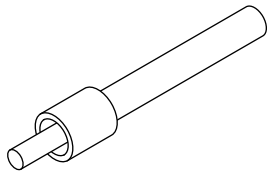
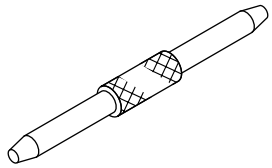
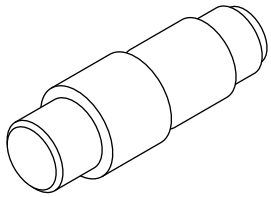
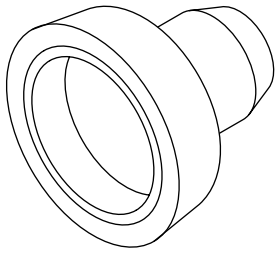
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).

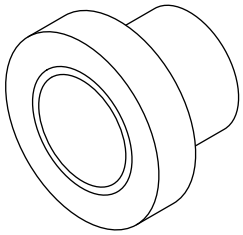
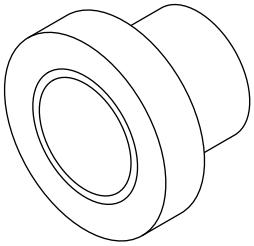
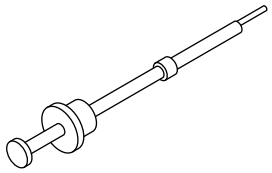
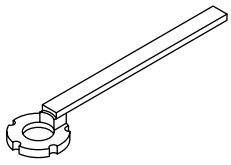
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587500	499587500	OIL SEAL INSTALLER	• Used for installing camshaft oil seal. • Used with OIL SEAL GUIDE (499597000).
 ST-499587700	499587700	CAMSHAFT OIL SEAL INSTALLER	Used for installing cylinder head plug.
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499207400	499207400	CAM SPROCKET WRENCH	Used for removing and installing cam sprocket. (RH side)

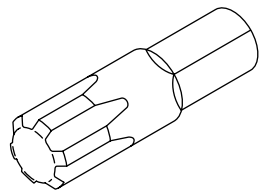
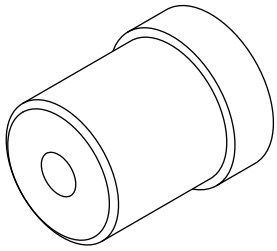
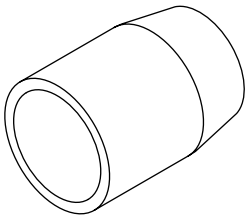
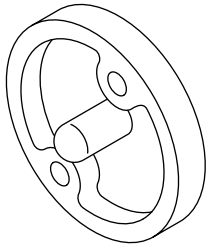
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499497000	499497000	TORX® PLUS	Used for removing and installing camshaft cap.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.
 ST-499597000	499597000	OIL SEAL GUIDE	• Used for installing camshaft oil seal. • Used with CAMSHAFT OIL SEAL INSTALLER (499587500).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

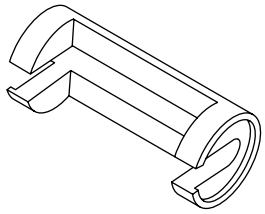
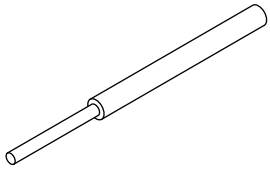
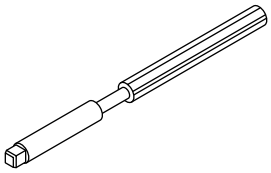
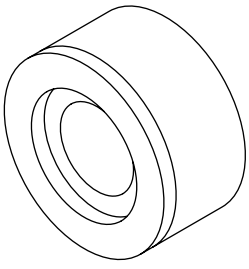
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.
 ST-499767700	499767700	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Intake side)

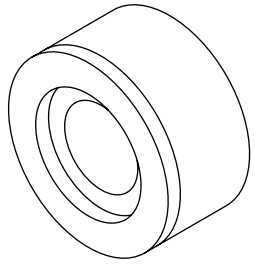
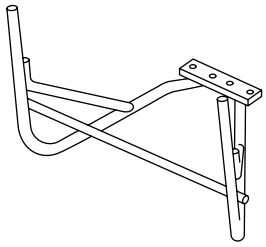
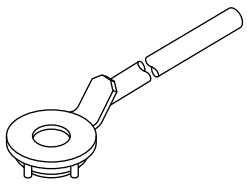
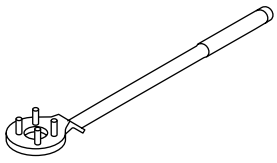
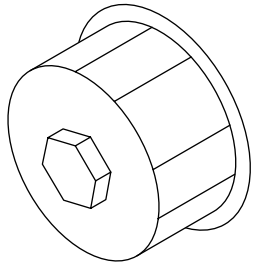
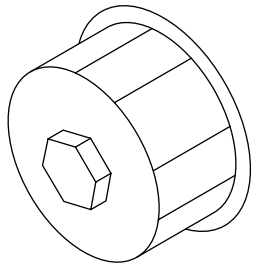
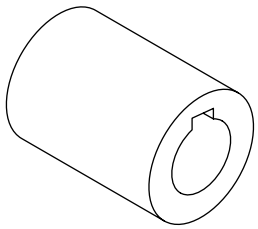
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499767800	499767800	VALVE GUIDE ADJUSTER	Used for installing valve guides. (Exhaust side)
 ST-499817100	499817100	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt. (2.5 L model)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.
Tachometer (Secondary pick-up type)	Used for measuring idle speed.
Timing light	Used for measuring ignition timing.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- V-belt
- Timing belt
- Valve rocker assembly
- Camshaft
- Cylinder head

2. Compression

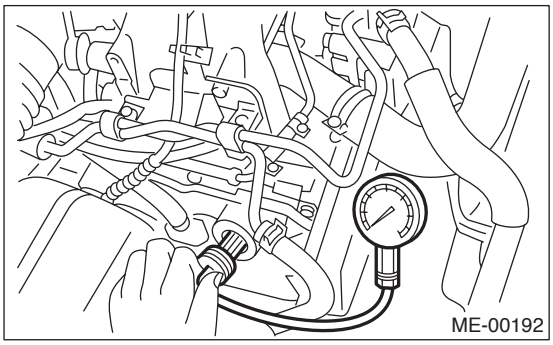
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
4) Remove all the spark plugs. <Ref. to IG(H4SO 2.0)-5, REMOVAL, Spark Plug.>
5) Fully open the throttle valve.
6) Check the starter motor for satisfactory performance and operation.
7) Hold the compression gauge tight against the spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



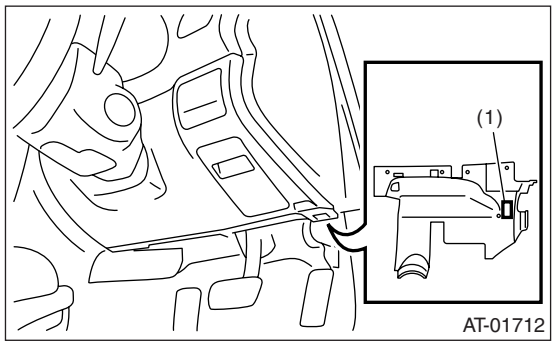
9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard:
1,020 — 1,275 kPa (10.4 — 13.0 kgf/cm^2, 148 — 185 psi)
Difference between cylinders:
49 kPa (0.5 kgf/cm^2, 7 psi) or less

3. Idle Speed

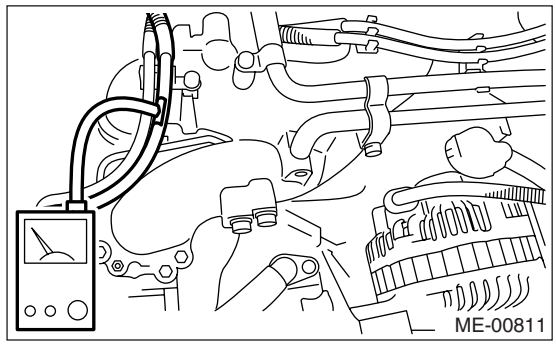
A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) When using Subaru Select Monitor, refer to the following. <Ref. to ME(H4SO 2.0)-13, SPECIAL TOOL, PREPARATION TOOL, General Description.>
   (1) Insert the cartridge to the Subaru Select Monitor.
   (2) Connect the Subaru Select Monitor to data link connector.



(1) Data link connector

   (3) Turn the ignition switch to ON, and Subaru select monitor switch to ON.
   (4) Select {Each System Check} in the Main Menu.
   (5) Select {Engine} in the Selection Menu.
   (6) Select {Current Data Display & Save} in the Engine Control System Diagnosis.
   (7) Select {Data Display} in the Data Display Menu.
   (8) Start the engine, and read engine idle speed.
5) When using the tachometer (Secondary pick-up type):
   (1) Attach the pick-up clip to No. 1 cylinder spark plug cord.
   (2) Start the engine, and read engine idle speed.



NOTE:
This ignition system provides simultaneous ignition for #1 and #2 plugs. It must be noted that some tachometers may register twice that of actual engine speed.

6) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, A/C, etc. OFF)

Idle speed [No load and gears in "N" or "P" range]:
650±100 rpm

7) Check the idle speed when loaded. (Turn the A/C switch to "ON" and operate the compressor for at least one minute before measurement.)

Idle speed [A/C "ON" and gears in "N" or "P" range]:
800±100 rpm

NOTE:
Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted. If the idle speed is out of specifications, refer to General Diagnosis Table under "Engine Control System". <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>

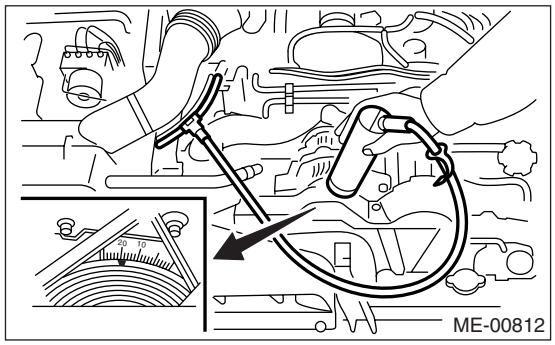
4. Ignition Timing

A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself at measurement.

1) Idle the engine.
2) To check the ignition timing, connect a timing light to #1 cylinder spark plug cord, and illuminate the timing mark with the timing light.
3) Start the engine and check the ignition timing at the following idle speed.

Ignition timing [BTDC/rpm]:
13°±10°/650

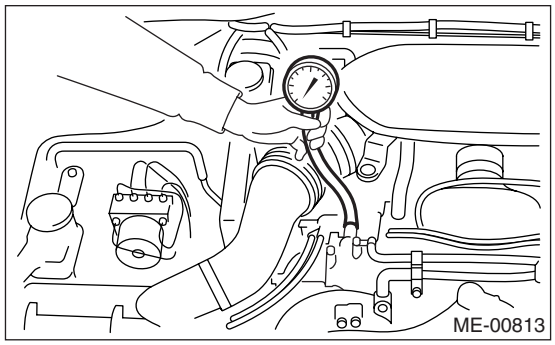


If the timing is not correct, check the ignition control system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Idle the engine.
2) Disconnect the brake vacuum hose from the intake manifold, and then install the vacuum gauge.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



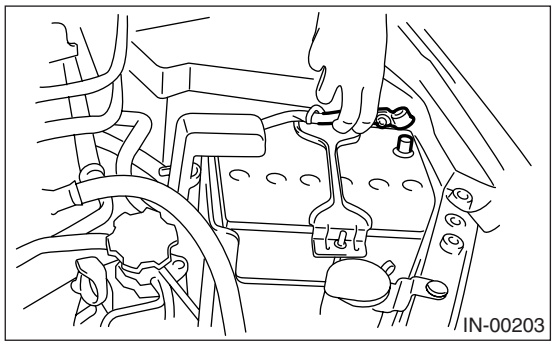
Vacuum pressure (at idling, A/C "OFF"):
Less than −60.0 kPa (−450 mmHg, −17.72 in-Hg)

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Air leakage around intake manifold gasket, disconnection or damage of vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Exhaust pressure is too high, or exhaust system is clogged.
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Valve anchoring
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system

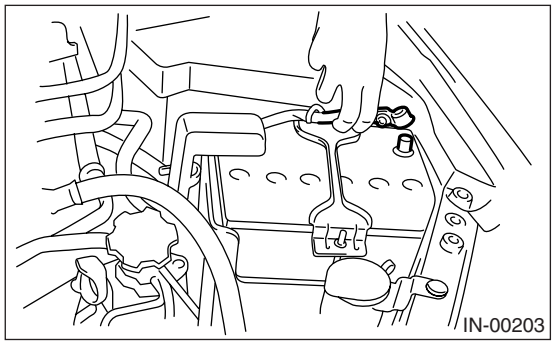
6. Engine Oil Pressure

A: INSPECTION

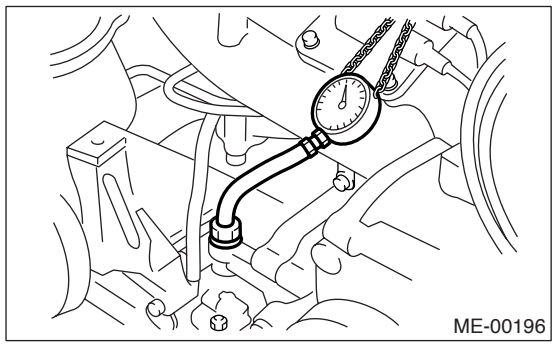
1) Disconnect the ground cable from battery.



2) Remove the generator from bracket. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
3) Disconnect the connector from oil pressure switch.
4) Remove the pressure switch from cylinder block. <Ref. to LU(H4SO 2.0)-17, REMOVAL, Oil Pressure Switch.>
5) Connect the oil pressure gauge hose to cylinder block.
6) Connect the battery ground cable to battery.



7) Start the engine, and measure oil pressure.



Oil pressure:
Standard
88 kPa (0.9 kg/cm^2, 13 psi) or more at 800 rpm
294 kPa (3.0 kg/cm^2, 43 psi) or more at 5,000 rpm

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H4SO 2.0)-19, INSPECTION, General Diagnostic Table.>
• If the oil pressure warning light is turned to ON but oil pressure is within specification, replace the oil pressure switch. <Ref. to LU(H4SO 2.0)-19, INSPECTION, General Diagnostic Table.>

NOTE:
The specified value is based on an engine oil temperature of 80°C (176°F).

8) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4SO 2.0)-17, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

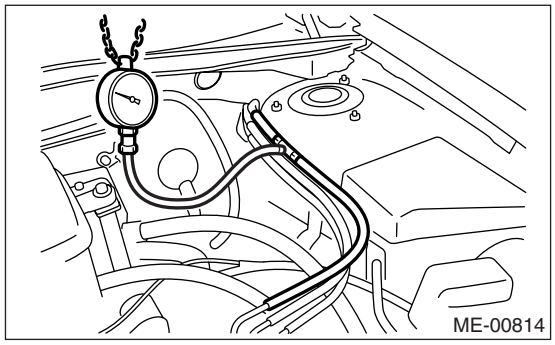
7. Fuel Pressure

A: INSPECTION

WARNING:
Before removing the fuel pressure gauge, release fuel pressure.

NOTE:
When the fuel pressure is out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the fuel delivery hose from fuel damper, and connect a fuel pressure gauge.



4) Install the fuse of fuel pump to main fuse box.
5) Start the engine.
6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)

7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard: 206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)

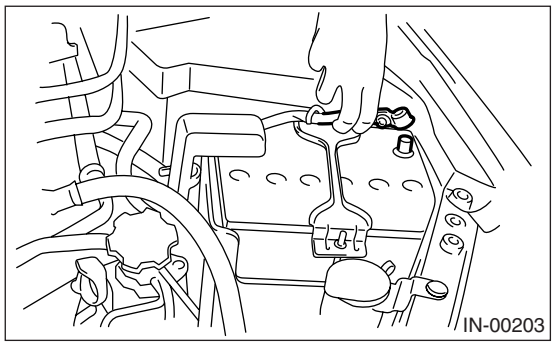
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kg/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

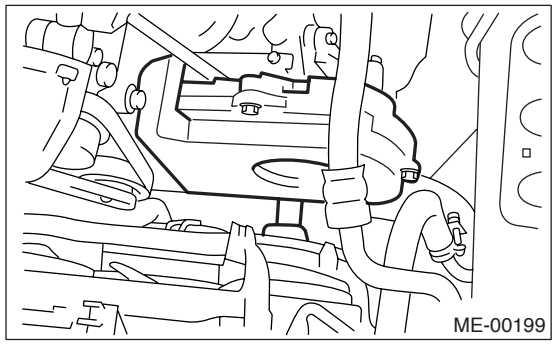
A: INSPECTION

NOTE:
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Disconnect the ground cable from battery.

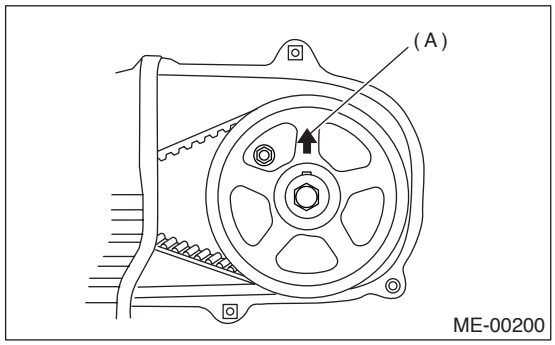


6) Remove the timing belt cover (LH).



7) When inspecting #1 and #3 cylinders:
   (1) Disconnect the spark plug cords from spark plugs RH side. <Ref. to IG(H4SO 2.0)-5, RH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (RH).
   (3) Remove the bolts, then remove the rocker cover (RH).
8) When inspecting #2 and #4 cylinders:
   (1) Disconnect the spark plug cords from spark plugs (LH Side). <Ref. to IG(H4SO 2.0)-5, LH SIDE, REMOVAL, Spark Plug.>
   (2) Disconnect the PCV hose from rocker cover (LH).
   (3) Remove the bolts, then remove the rocker cover (LH).
9) Set #1 cylinder piston to top dead center of compression stroke by rotating the crank pulley clockwise using the socket wrench.

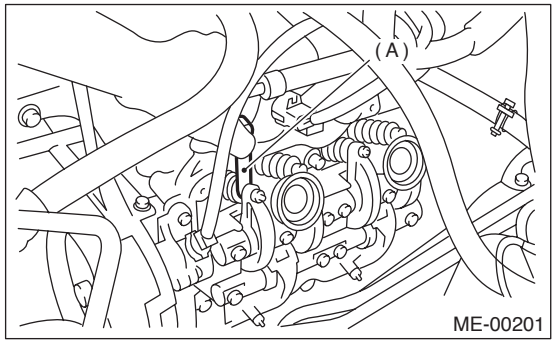
NOTE:
When the arrow mark (A) on cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.



10) Measure #1 cylinder valve clearance using thickness gauge.

CAUTION:
• Insert the thickness gauge (A) in as horizontally as possible with respect to the valve stem end face.
• Measure the exhaust valve clearances while lifting-up the vehicle.

Valve clearance (Standard):
Intake:
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust:
0.25±0.04 mm (0.0098±0.0016 in)



11) If necessary, adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>
12) Measure the valve clearance in #3, #2 and #4 cylinder in the same measurement procedure as #1 cylinder.

NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before measuring valve clearances.
• By rotating the crank pulley clockwise every 180° from the state that #1 cylinder piston is on the top dead center of compression stroke, #3, #2 and #4 cylinder pistons come to the top dead center of compression stroke in this order.

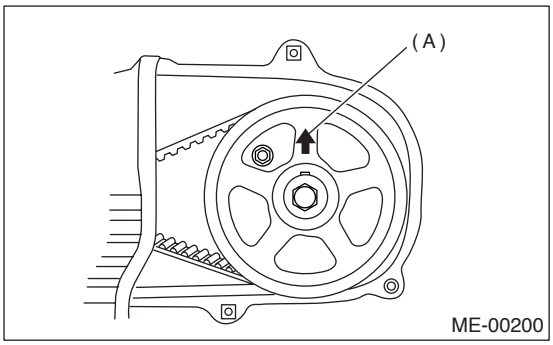
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Set #1 cylinder piston to top dead center of compression stroke by rotating the crank pulley clockwise using the socket wrench.

NOTE:
When the arrow mark (A) on cam sprocket (LH) comes exactly to the top, #1 cylinder piston is brought to the top dead center of compression stroke.

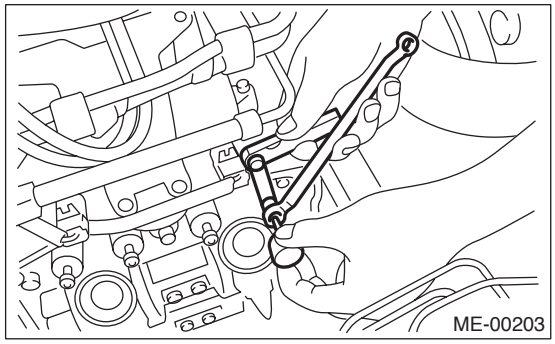


2) Adjust the #1 cylinder valve clearance.
(1) Loosen the valve rocker nut and screw.
(2) Place a suitable thickness gauge.
(3) While noting the valve clearance, tighten the valve rocker adjusting screw.
(4) When the specified valve clearance is obtained, tighten the valve rocker nut.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

CAUTION:
• Insert the thickness gauge in as horizontally as possible with respect to the valve stem end face.
• Adjust the exhaust valve clearances while lifting-up the vehicle.

Valve clearance
Intake:
0.20±0.04 mm (0.0079±0.0016 in)
Exhaust:
0.25±0.04 mm (0.0098±0.0016 in)



3) Adjust the valve clearance in #3, #2 and #4 cylinder in the same adjustment procedure as #1 cylinder.

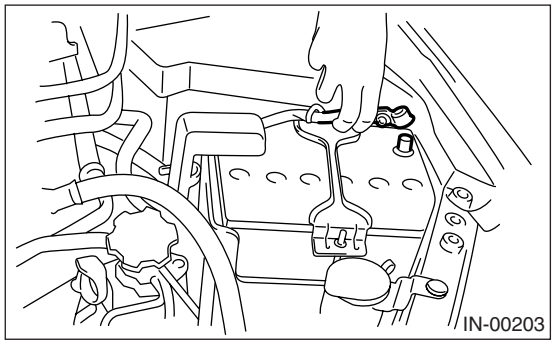
NOTE:
• Be sure to set the cylinder pistons to their respective top dead centers on compression stroke before adjusting valve clearances.
• By rotating the crank pulley clockwise every 180° from the state that #1 cylinder piston is on the top dead center of compression stroke, #3, #2 and #4 cylinder pistons come to the top dead center of compression stroke in this order.

4) Ensure the valve clearances of each cylinder are within specifications. If necessary, readjust the valve clearances.

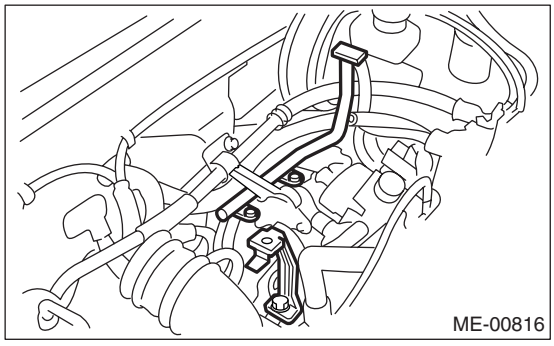
9. Engine Assembly

A: REMOVAL

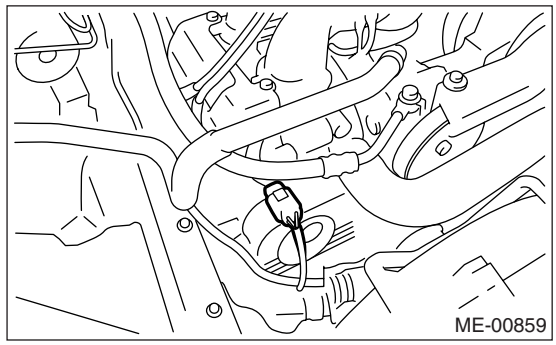
1) Set the vehicle on a lift.
2) Open the front hood fully and support with the front food stay.
3) Collect the refrigerant from A/C system. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
4) Release the fuel pressure.
<Ref. to FU(H4SO 2.0)-38, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> or <Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
5) Remove the fuel filler cap.
6) Disconnect the ground cable from battery.


IN-00203

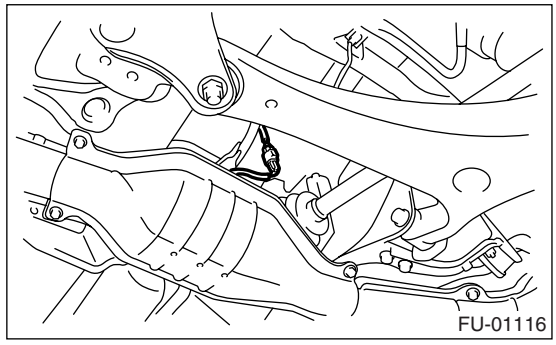
7) Remove the air intake duct, air cleaner case and air intake chamber.
<Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
8) Remove the under cover.
9) Remove the radiator from vehicle. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
10) Disconnect the A/C pressure hoses from A/C compressor.
11) Remove the air intake chamber stay.


ME-00816

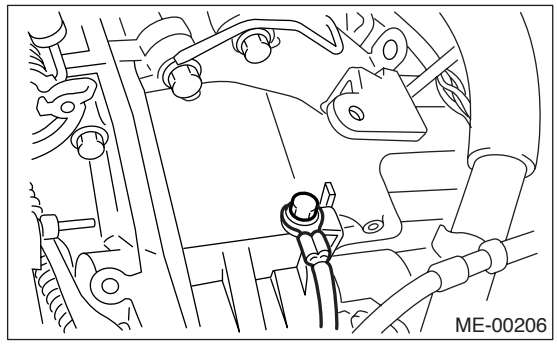
12) Disconnect the following connectors and cables.
(1) Front oxygen (A/F) sensor connector


ME-00859

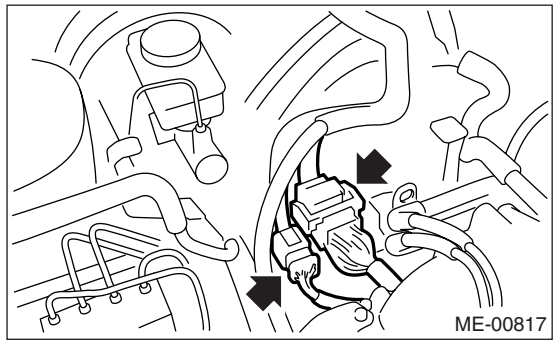
(2) Rear oxygen sensor connector


FU-01116

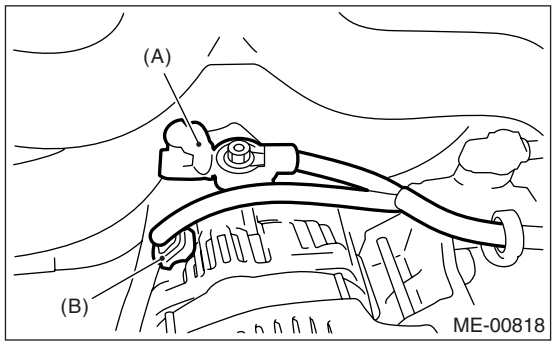
(3) Engine ground cable


ME-00206

(4) Engine harness connectors

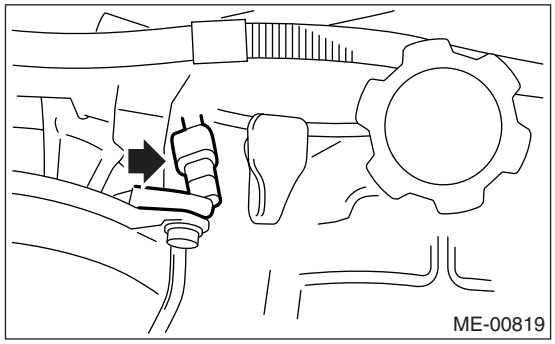

ME-00817

(5) Generator connector and terminal

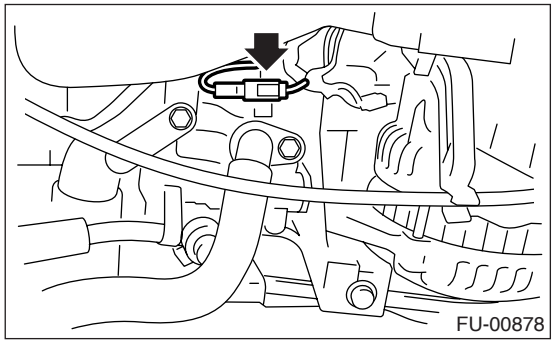


(A) Terminal
(B) Generator connector

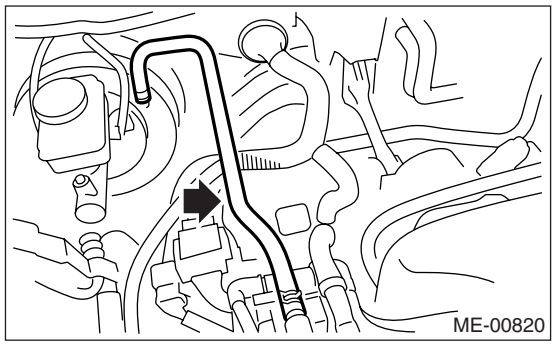
(6) A/C compressor connectors



(7) Power steering switch connector

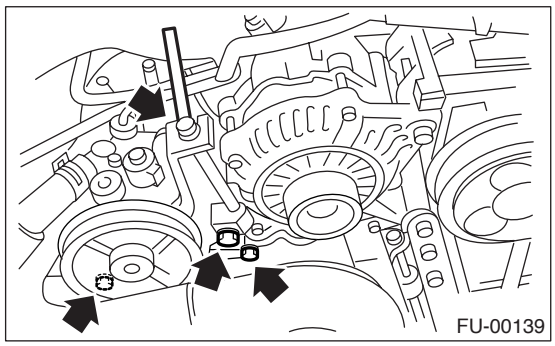


13) Disconnect the following hoses.
(1) Brake booster vacuum hose



(2) Heater inlet and outlet hoses

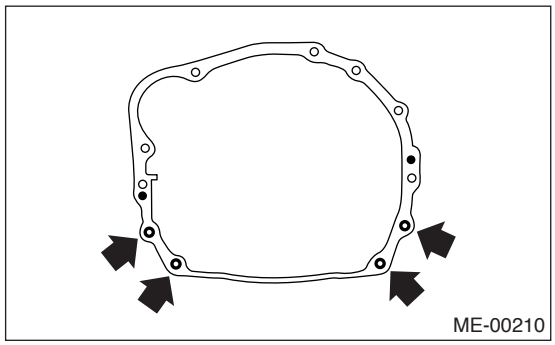
14) Remove the power steering pump from bracket.
(1) Loosen the lock bolt and slider bolt, and remove the front side belt. <Ref. to ME(H4SO 2.0)-38, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Remove the power steering pump bracket.



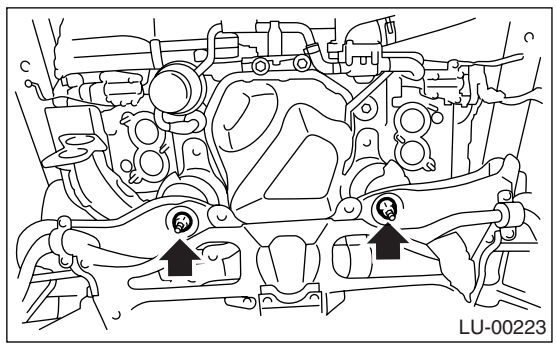
(3) Place the power steering pump on the right side wheel apron.

15) Remove the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>

16) Remove the nuts which hold lower side of transmission to engine.

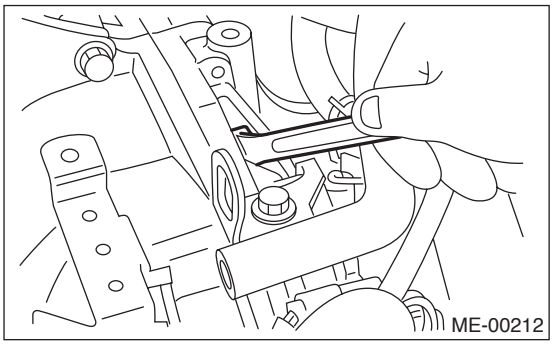


17) Remove the nuts which install front cushion rubber onto front crossmember.

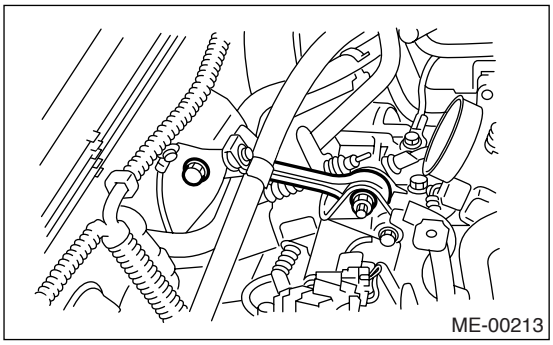


18) Separate the torque converter clutch from drive plate. (AT model)
(1) Lower the vehicle.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.

(4) Remove other bolts while rotating the engine using a socket wrench.

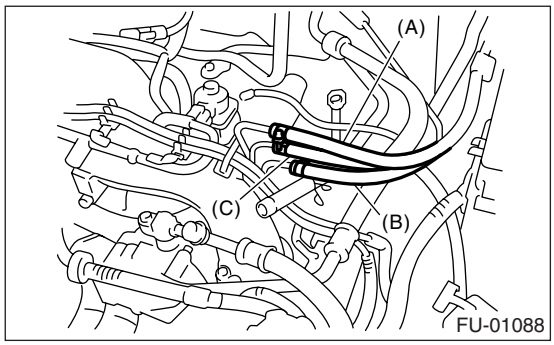


19) Remove the pitching stopper.

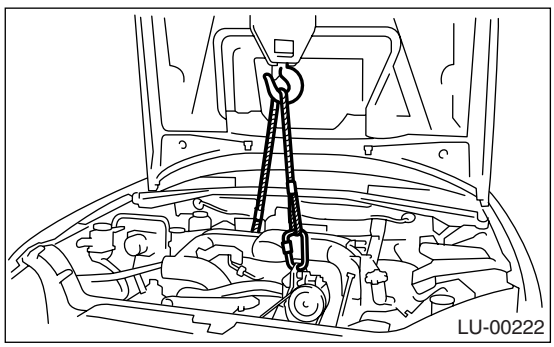


20) Disconnect the fuel delivery hose (A), return hose (B) and evaporation hose (C).

CAUTION:
• Catch fuel from the hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

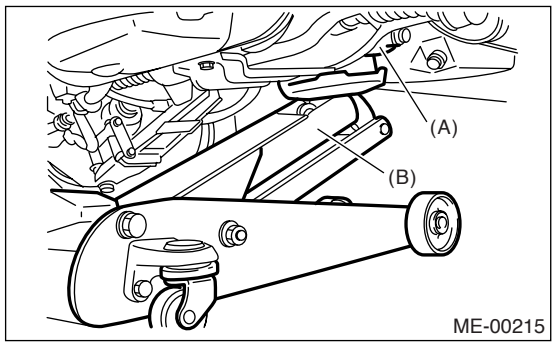


21) Support the engine with a lifting device and wire ropes.



22) Support the transmission with a garage jack.

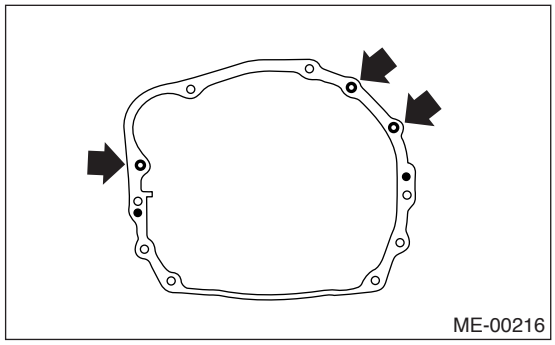
CAUTION:
• Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.



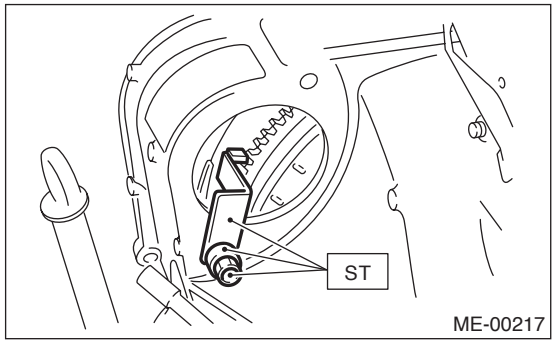
(A) Transmission
(B) Garage jack

• Before removing the engine away from transmission, check to be sure no work has been overlooked.

23) Separation of engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
(2) Remove the bolts which hold upper side of transmission to engine.



24) Set the ST to converter case. (AT model)
ST 498277200 STOPPER SET



25) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.

(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

26) Remove the front cushion rubbers.

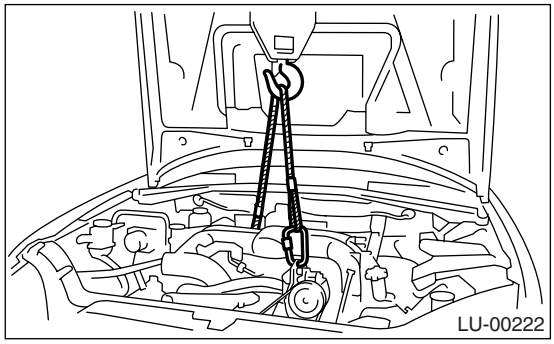
B: INSTALLATION

1) Install the front cushion rubbers.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

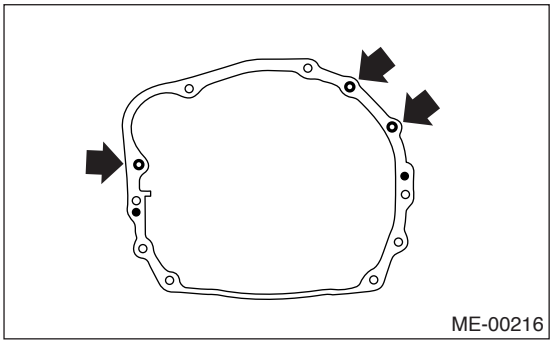
2) Position the engine in engine compartment and align it with transmission.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



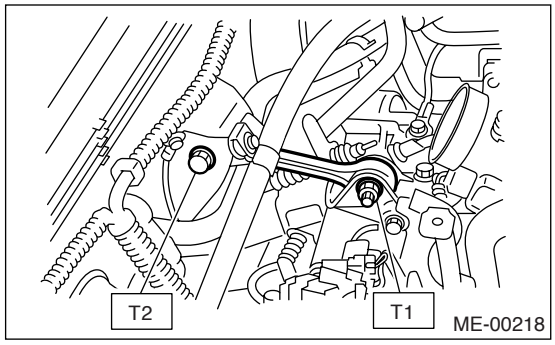
3) Apply a small amount of grease to splines of main shaft. (MT model)
4) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



5) Remove the lifting device and wire ropes.
6) Remove the garage jack.
7) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



8) Remove the ST from converter case. (AT model)

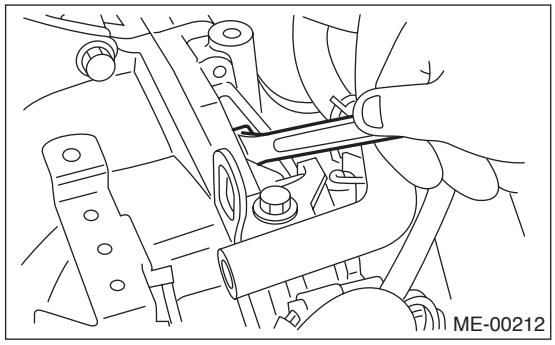
NOTE:
Be careful not to drop the ST into the converter case when removing the ST.

ST 498277200 STOPPER SET

9) Install the starter. <Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
10) Install the torque converter clutch to drive plate. (AT model)
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine using a socket wrench.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.

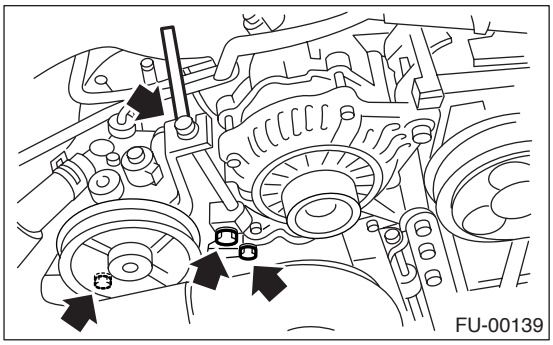
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



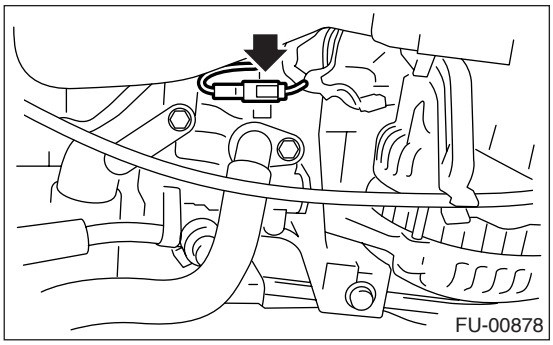
(3) Clog the service hole plug and prevent foreign matters from being mixed.

11) Install the power steering pump on bracket.
(1) Install the power steering pump on bracket, and tighten the bolts.

Tightening torque:
22 N·m (2.2 kgf-m, 16 ft-lb)



(2) Connect the power steering switch connector.

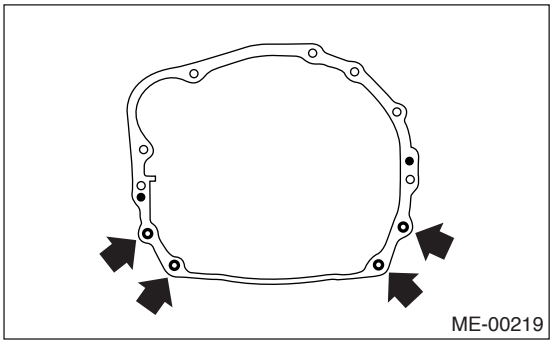


(3) Install the front side belt and adjust it. <Ref. to ME(H4SO 2.0)-38, FRONT SIDE BELT, INSTALLATION, V-belt.>

12) Lift-up the vehicle.

13) Tighten the nuts which hold lower side of transmission to engine.

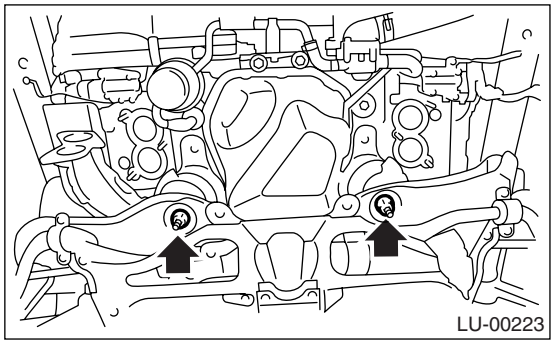
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



14) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 63 ft-lb)

NOTE:
Make sure the front cushion rubber mounting bolts are securely installed.



15) Install the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>

16) Lower the vehicle.

17) Connect the following hoses:
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose

18) Connect the following connectors:
(1) Front oxygen (A/F) sensor connector
(2) Rear oxygen sensor connector
(3) Engine ground cable

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)

(4) Engine harness connectors
(5) Generator connector and terminal
(6) A/C compressor connector

19) Install the air intake chamber stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

20) Install the A/C pressure hoses. <Ref. to AC-38, INSTALLATION, Hose and Tube.>

21) Install the radiator to vehicle. <Ref. to CO(H4SO 2.0)-21, INSTALLATION, Radiator.>

22) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

23) Install the under cover.

24) Install the battery in the vehicle, and connect cables.

25) Fill engine coolant. <Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

26) Check the ATF level and replenish it if necessary.

<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>
27) Charge the A/C system with refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
28) Remove the front hood stay, and close the front hood.
29) Take off the vehicle from a lift.

C: INSPECTION

1) Check pipes and hoses are installed firmly.
2) Check that the engine coolant and ATF are at specified levels.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4SO 2.0)-30, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 25.8 ft-lb)

C: INSPECTION

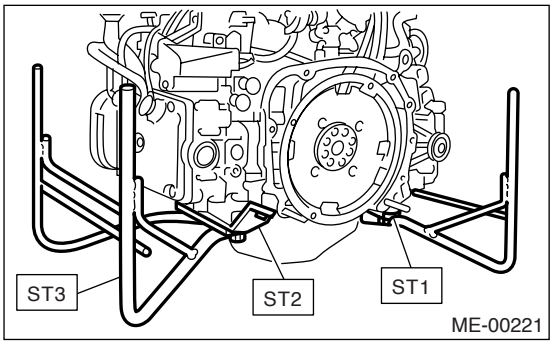
Make sure that no crack or other damages do not exist.

11.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from the body, secure it in the ST shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817100	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. The procedure for overhauling of the engine will be completed when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

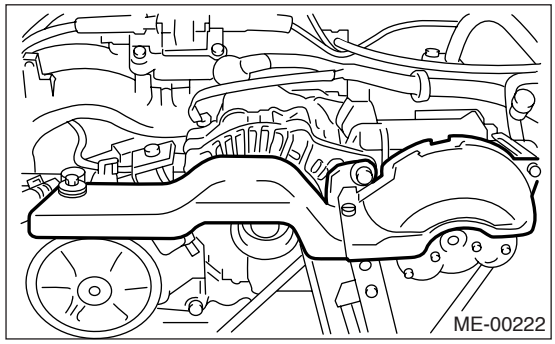
12.V-belt

A: REMOVAL

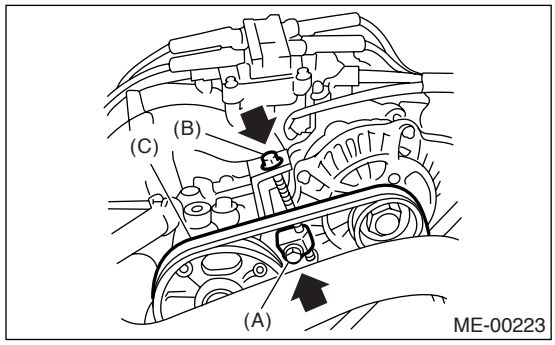
NOTE:
Perform the following procedures with the engine installed to the body.

1. FRONT SIDE BELT

1) Remove the V-belt covers.

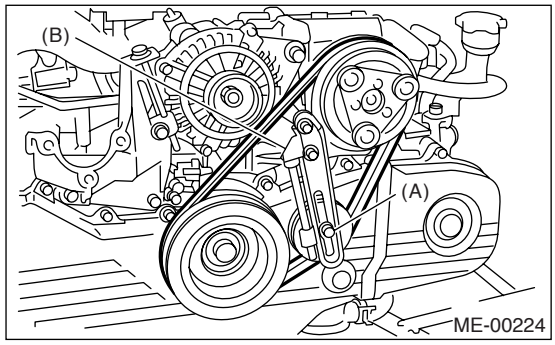


2) Loosen the lock bolt (A).
3) Loosen the slider bolt (B).
4) Remove the front side belt (C).

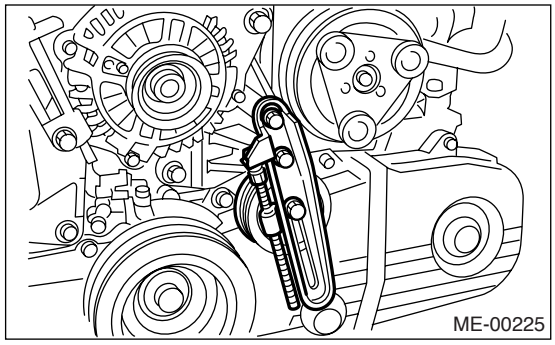


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the rear side belt.
4) Remove the belt tensioner.



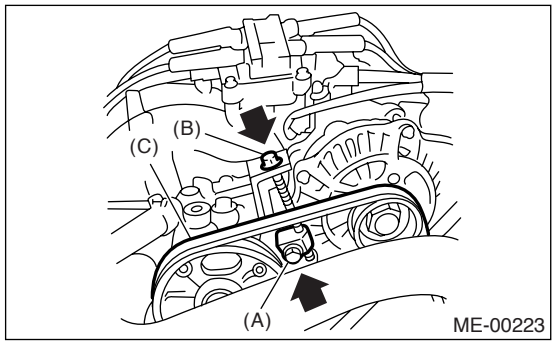
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install a V belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4SO 2.0)-39, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

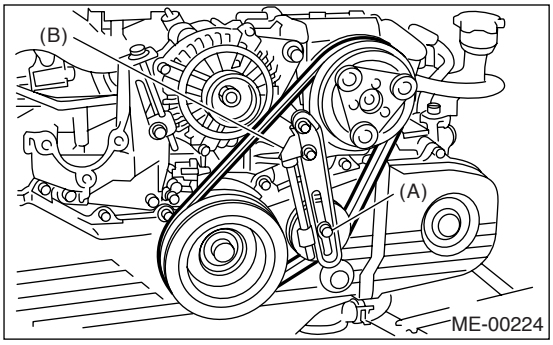
Tightening torque:
Lock bolt (A):
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2. REAR SIDE BELT

1) Install the belt tensioner.
2) Install a V belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4SO 2.0)-39, INSPECTION, V-belt.>
3) Tighten the lock nut (A).

Tightening torque:
Lock nut (A);
23 N·m (2.3 kgf-m, 17.0 ft-lb)



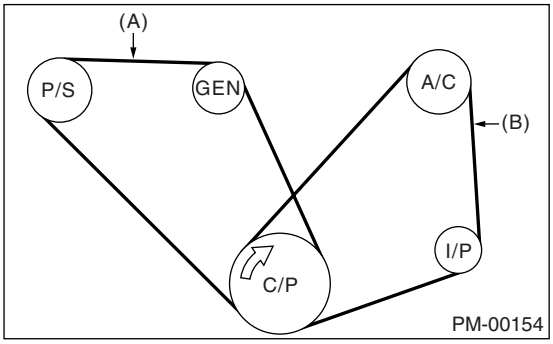
C: INSPECTION

1) Replace the belts, if cracks, fraying or wear is found.
2) Remove the V-belt cover and reservoir tank. (with belt tension gauge)
3) Check the V-belt tension and adjust it if necessary by changing the generator installing position or idler pulley installing position.

Belt tension (with belt tension gauge)

(A)
When installing new parts:
618 — 755 N (63 — 77 kgf, 139 — 170 lb)
At inspection:
490 — 640 N (50.0 — 65.3 kgf, 110.2 — 143.9 lb)

(B)
When installing new parts:
740 — 880 N (75.5 — 89.7 kgf, 166 — 198 lb)
At inspection:
350 — 450 N (35.7 — 45.9 kgf, 78.7 — 101.2 lb)

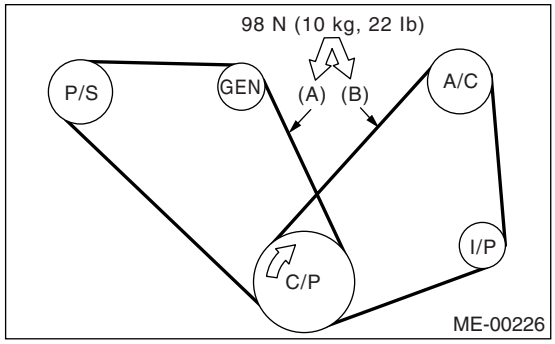


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

Belt tension (without belt tension gauge)

(A)
When installing new parts:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new parts:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)



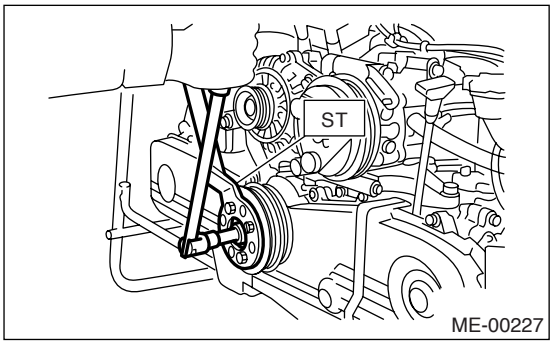
(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C Air conditioning compressor pulley
I/P Idler pulley

13.Crank Pulley

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH (2.0 L model)
ST 499977100 CRANK PULLEY WRENCH (2.5 L model)



3) Remove the crank pulley.

B: INSTALLATION

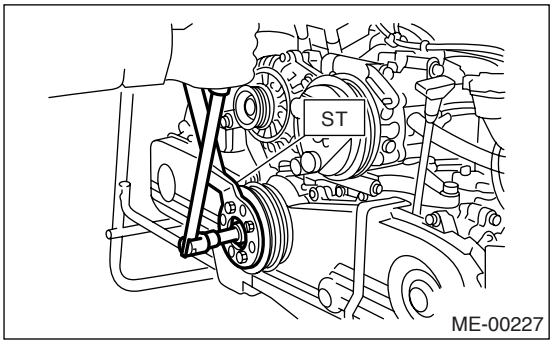
1. 2.0 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977400 CRANK PULLEY WRENCH

(1) Clean the crankshaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of the crank pulley bolt is 45° or more. Perform the following procedures when less than 45°.

CAUTION:
If the tightening angle of crank pulley bolt is less than 45°, the bolt should be damaged. In this case, the bolt must be replaced.

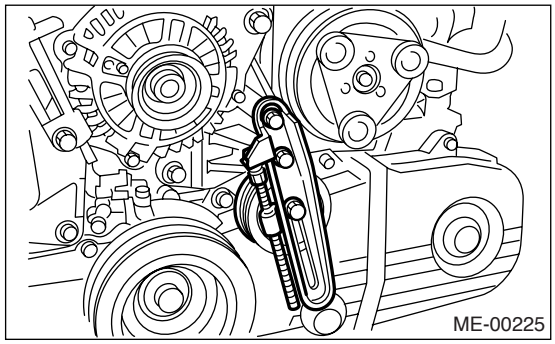
(1) Replace and clean the crank pulley bolts.

Crank pulley bolt:
Part No. 12369AA011

(2) Clean the crankshaft thread using compressed air.
(3) Apply engine oil to the crank pulley bolt seat and thread.
(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(5) Tighten the crank pulley bolts keeping them in an angle 45° — 60°.

NOTE:
Conduct the tightening procedures by confirming the turning angle of the crank pulley bolt referring to the gauge indicated on the timing belt cover.

4) Install the belt tensioner.



5) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

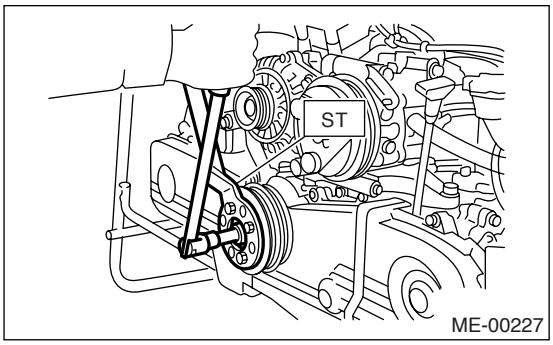
2. 2.5 L MODEL

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crankshaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
180 N·m (18.4 kgf-m, 132.8 ft-lb)



3) Confirm that the tightening angle of crank pulley bolt is 65 degrees or more. If the tightening angle of crank pulley bolt is less than 65 degrees, conduct the following procedures.

(1) Replace the crank pulley bolts and clean them.

crank pulley bolt:
12369AA011

(2) Clean the crankshaft thread using compressed air.

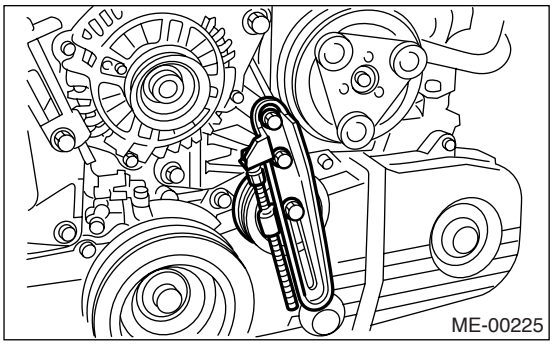
(3) Apply engine oil to the crank pulley bolt seal and thread.

(4) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).

(5) Tighten the crank pulley bolts keeping them in an angle between 65 degrees and 75 degrees.

NOTE:
Conduct the tightening procedures by confirming the turning angle of crank pulley bolt referring to the gauge indicated on timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belt. **<Ref. to ME(H4SO 2.0)-38,** INSTALLATION**, V-belt.>**

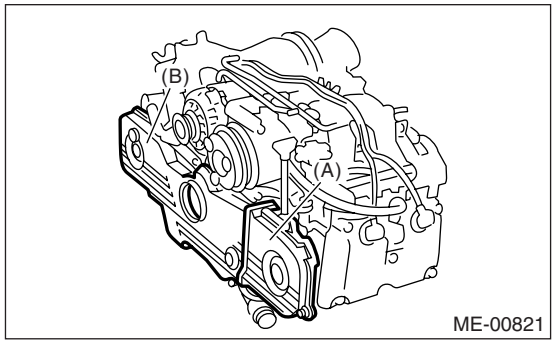
C: INSPECTION

1) Make sure the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME(H4SO 2.0)-39, INSPECTION, V-belt.>

14.Timing Belt Cover

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH).
4) Remove the front timing belt cover.



(A) Timing belt cover (LH)
(B) Front timing belt cover

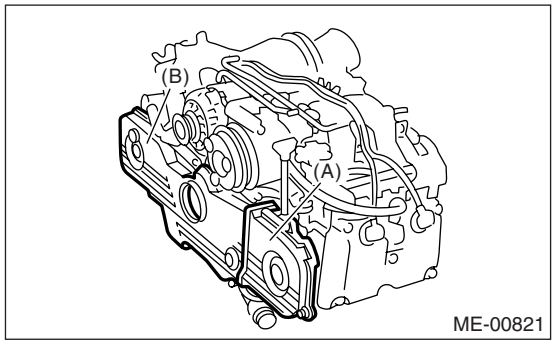
B: INSTALLATION

1) Install the front timing belt cover.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the timing belt cover (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



(A) Timing belt cover (LH)
(B) Front timing belt cover

3) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
4) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: INSPECTION

Check the cover for damage.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

MECHANICAL

ME(H4SO 2.0)

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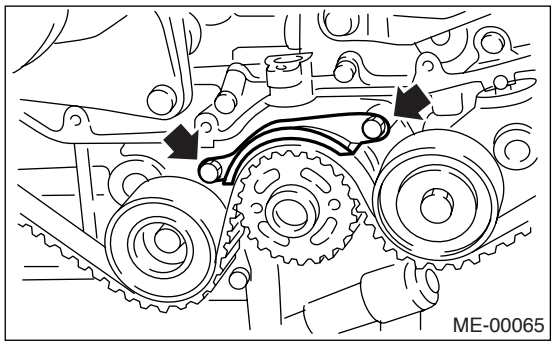
15.Timing Belt

A: REMOVAL

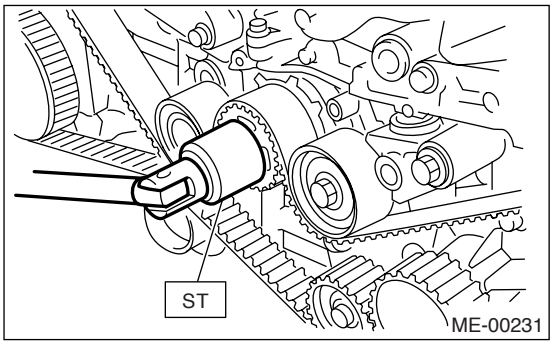
1. TIMING BELT

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt guide. (MT model)


ME-00065

5) If the alignment mark (a) or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.
   (1) To turn crankshaft, use the ST: Align the mark (a) of sprocket to the cylinder block notch (b), and then ensure the right side cam sprocket mark (c), cam cap and cylinder head matching surface (d) or left side cam sprocket mark (e), timing belt cover notch (f) are properly adjusted.

ST 499987500 CRANKSHAFT SOCKET



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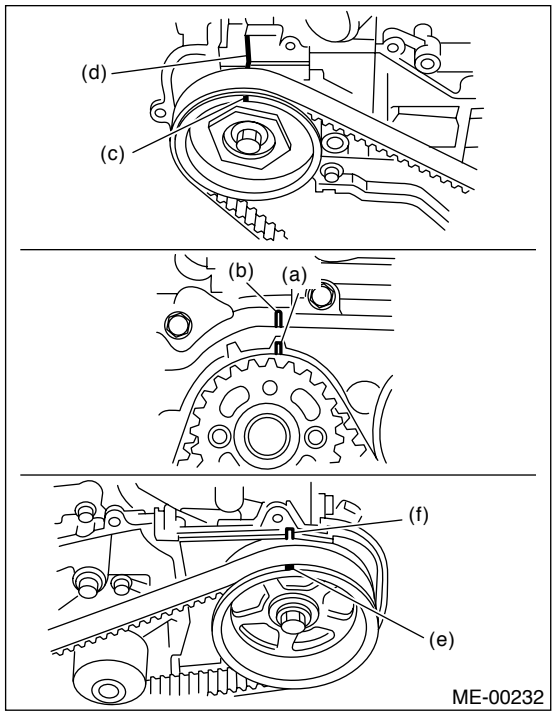
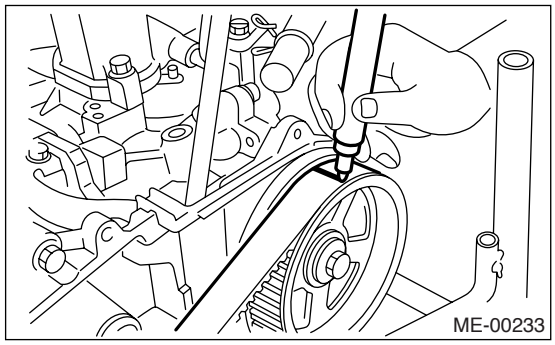
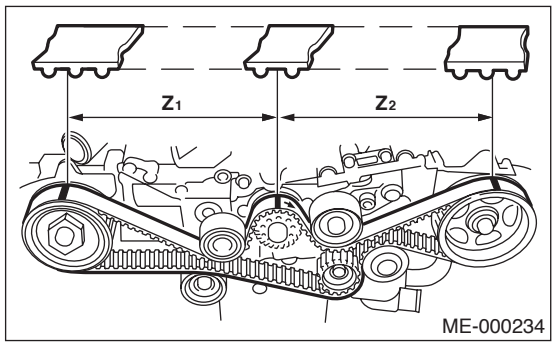


ME-00232

(2) Using white paint, put alignment marks or arrow marks on the timing belts in relation to the crank sprocket and cam sprockets.


ME-00233

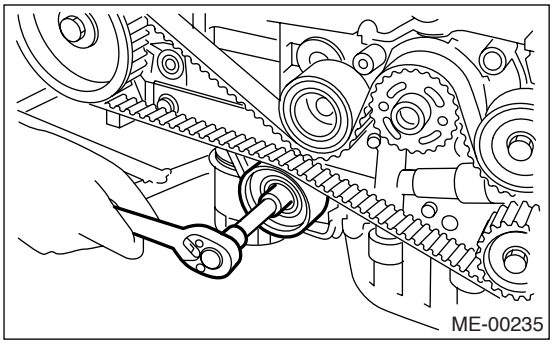
Specified data:
Z_1: Length of 46.8 teeth
Z_2: Length of 43.7 teeth



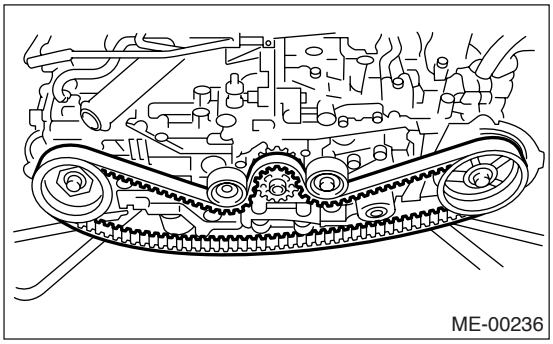
ME-000234

6) Remove the belt idler (No. 2).

7) Remove the belt idler No. 2.

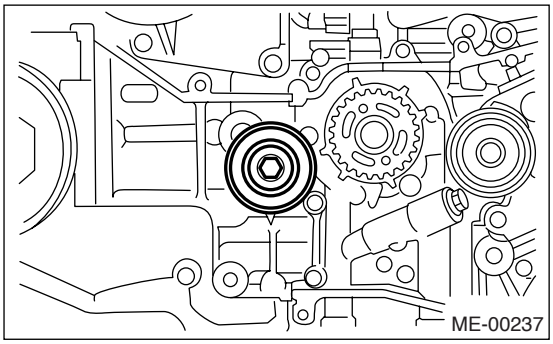


8) Remove the timing belt.

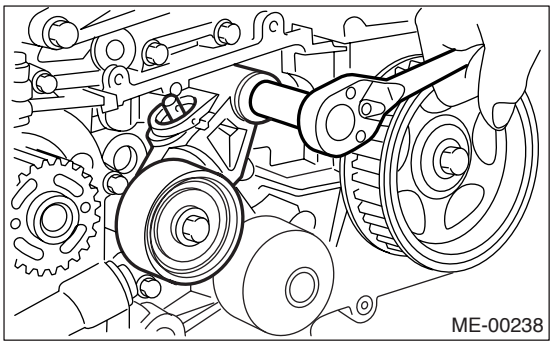


2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

1) Remove the belt idler (No. 1).



2) Remove the automatic belt tension adjuster assembly.



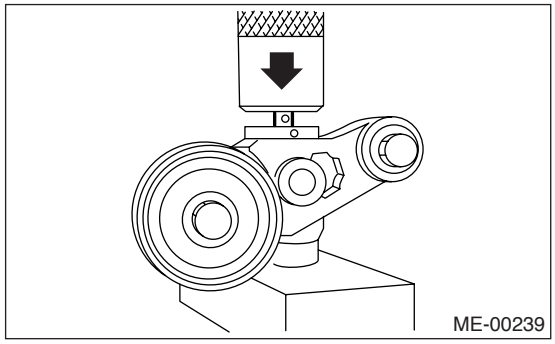
B: INSTALLATION

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

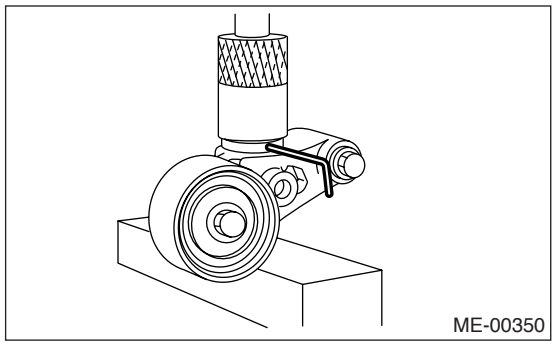
1) Preparation for installation of automatic belt tension adjuster assembly.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.
• Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kgf, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

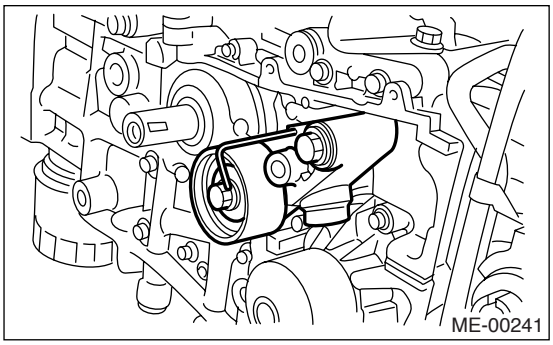


(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex wrench inserted into the stopper pin hole in cylinder, secure the adjuster rod.



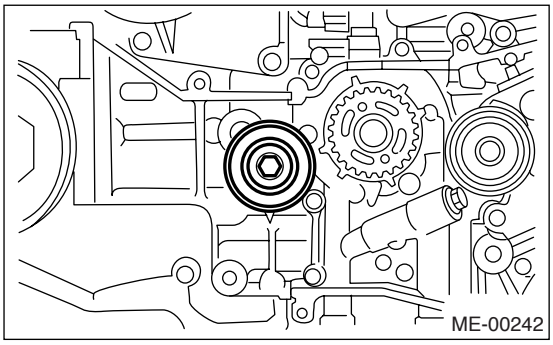
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



3) Install the belt idler (No. 1).

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



2. TIMING BELT

1) Prepare for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4SO 2.0)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

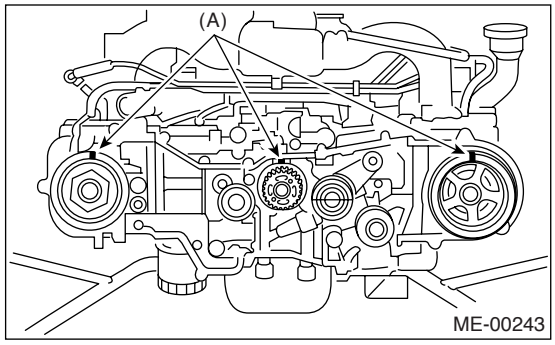
2) Installation of timing belt:

(1) Turn the cam sprocket No. 2 using ST1, and turn the cam sprocket No. 1 using ST2 so that their alignment marks (A) come to top positions.

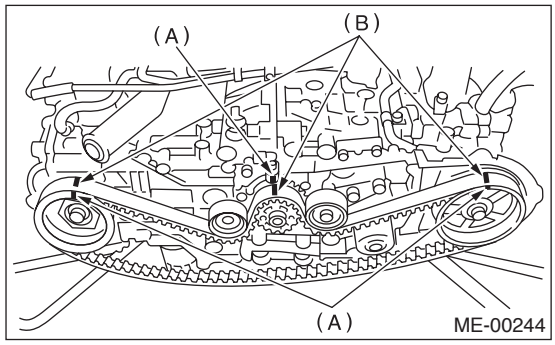
ST1 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

ST2 499207400 CAM SPROCKET WRENCH



(2) While aligning the alignment mark (B) on timing belt with the mark (A) on sprockets, position the timing belt properly.

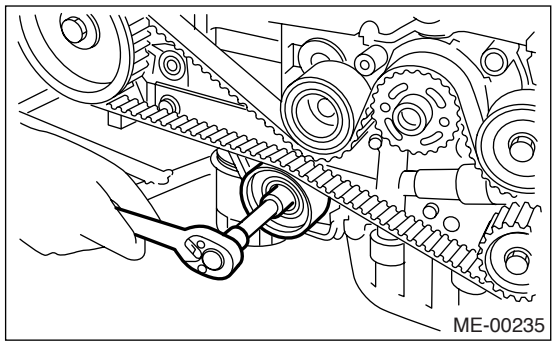


3) Install the belt idler No. 2.

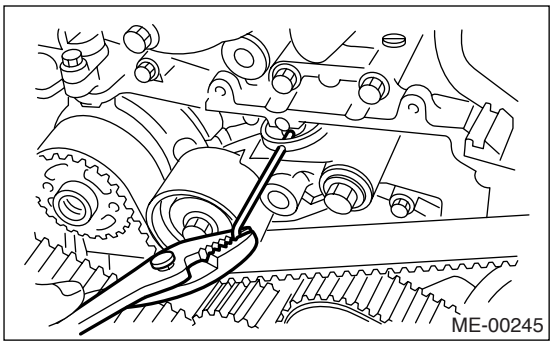
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

4) Install the belt idler (No. 2).

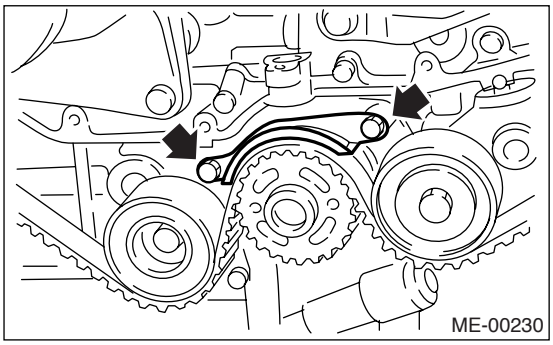
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



5) After ensuring the marks on timing belt and cam sprockets are aligned, remove the stopper pin from belt tension adjuster.

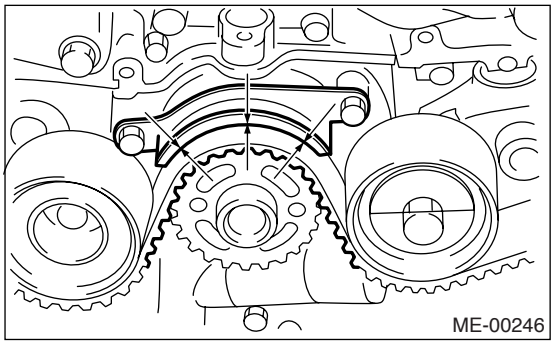

ME-00245

6) Install the timing belt guide. (MT model)
(1) Temporarily tighten the timing belt guide mounting bolts.


ME-00230

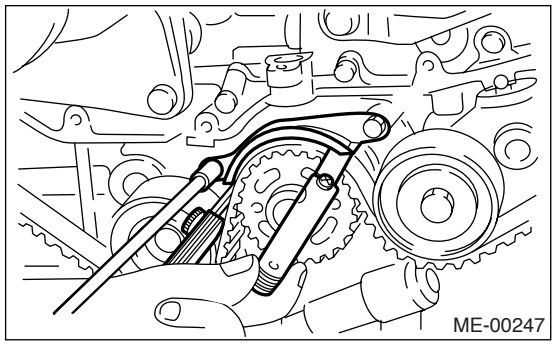
(2) Check and adjust the clearance between timing belt and timing belt guide by using thickness gauge.

Clearance:
1.0±0.5 mm (0.039±0.020 in)


ME-00246

(3) Tighten the timing belt guide mounting bolts.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)


ME-00247

7) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
8) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
9) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

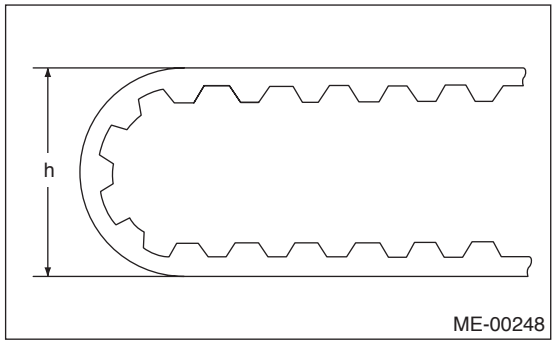
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks and wear. If any fault is found, replace the belt.
2) Check the condition of the backside of belt. If cracks are found, replace the belt.

CAUTION:
• Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the timing belt sharply.

In radial diameter h:
60 mm (2.36 in) or more



ME-00248

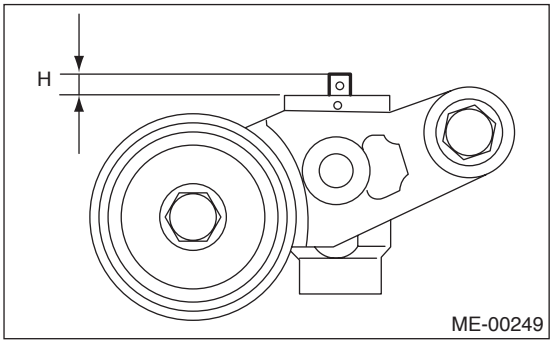
2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check the oil seals for leaks, and rod ends for abnormal wear or scratches. If necessary, replace the faulty parts.
2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lb), check it using the following procedures:
   (1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this operation two to three times.
   (2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lb) to it. Check the adjuster rod stiffness.
   (3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press the adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.

4) Measure the amount of rod protrusion beyond the body. If it is not within specifications, replace with a new one.

Amount of rod protrusion H:
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the automatic belt tension adjuster assembly if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play occurs.
3) Check the belt tension pulley for grease leakage.

4. BELT IDLER

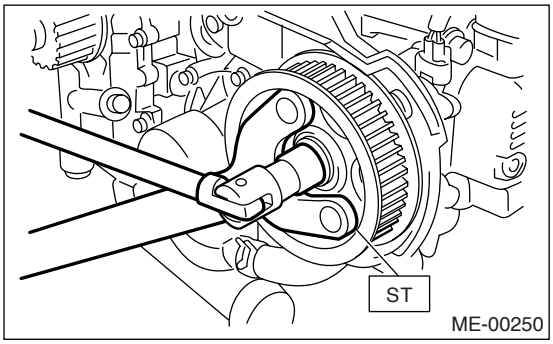
1) Check the belt idler for smooth rotation. Replace if noise or excessive play occurs.
2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the belt idler for grease leakage.

16.Cam Sprocket

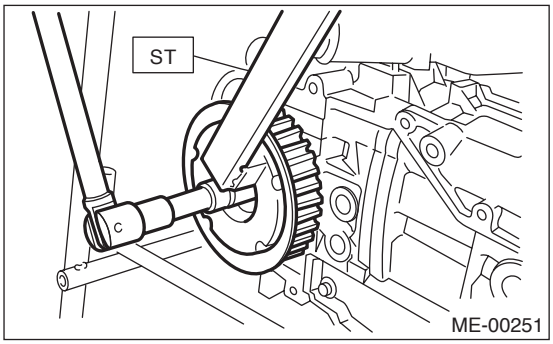
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, REMOVAL, Camshaft Position Sensor.>
6) Remove the cam sprocket No. 2. To lock the camshaft, use ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.



7) Remove the cam sprocket No. 1. To lock the camshaft, use ST.
ST 499207400 CAM SPROCKET WRENCH

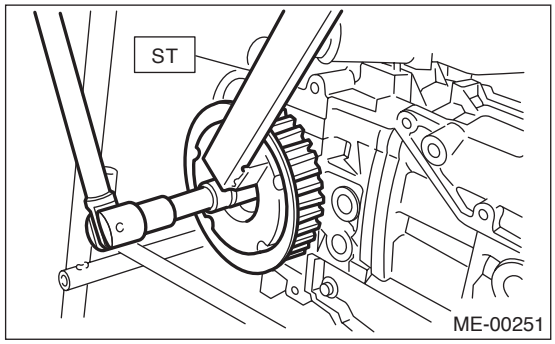


B: INSTALLATION

1) Install the cam sprocket No. 1. To lock the camshaft, use ST.
ST 499207400 CAM SPROCKET WRENCH

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

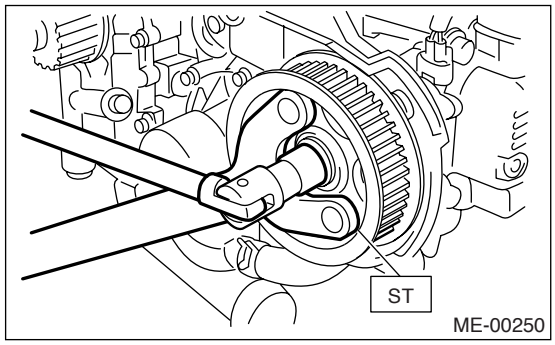
NOTE:
Do not confuse left and right side cam sprockets during installation. Cam sprocket No. 2 is identified by a protrusion used to monitor the camshaft position sensor.



2) Install the cam sprocket No. 2. To lock the camshaft, use ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



3) Install the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, INSTALLATION, Camshaft Position Sensor.>
4) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
5) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
6) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
7) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: INSPECTION

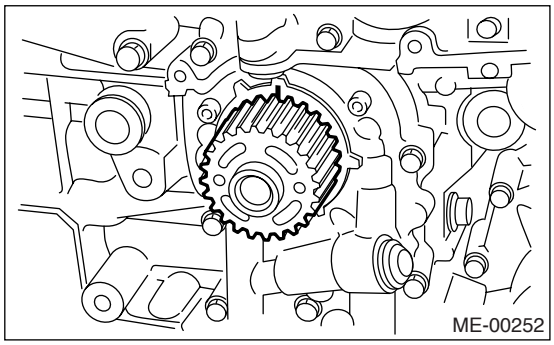
1) Check the cam sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between cam sprocket and key.

3) Check the cam sprocket protrusion used for sensor for damage and contamination of foreign matter.

17.Crank Sprocket

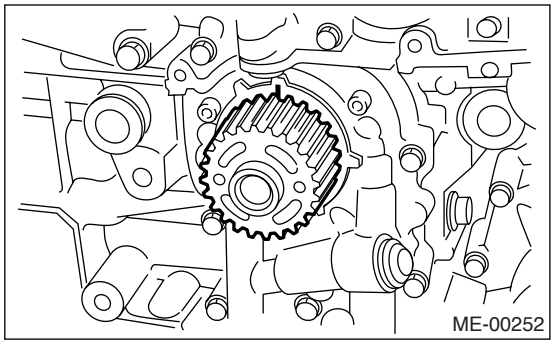
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket.



B: INSTALLATION

1) Install the crank sprocket.



2) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
3) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
4) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
6) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: INSPECTION

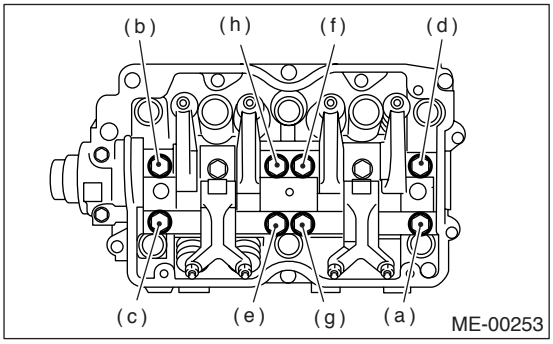
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.
3) Check the crank sprocket protrusion used for sensor for damage and contamination of foreign matter.

18. Valve Rocker Assembly

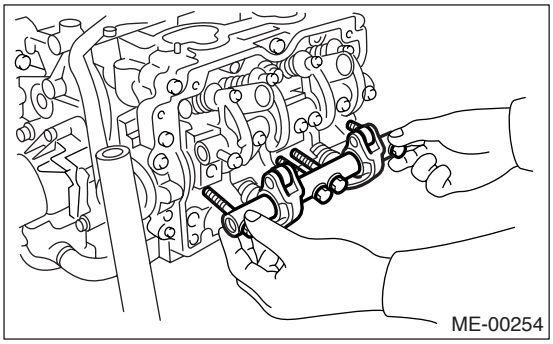
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Disconnect the PCV hose and remove the rocker cover.
7) Removal of valve rocker assembly
   (1) Remove the bolts (a) through (h) in alphabetical sequence.

NOTE:
Leave two or three threads of bolts (g) and (h) engaged in order to retain the valve rocker assembly.



   (2) Remove the valve rocker assembly.



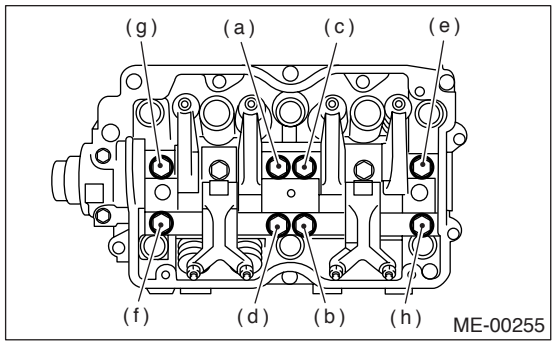
B: INSTALLATION

1) Install the valve rocker assembly.
   (1) Temporarily tighten the bolts (a) through (d) equally in order as shown in the figure.

NOTE:
Do not allow the valve rocker assembly to damage knock pins.

   (2) Tighten the bolts (e) through (h) to specified torque.
   (3) Tighten the bolts (a) through (d) to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>
3) Install the rocker cover and connect PCV hose.
4) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
5) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
6) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
7) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
8) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: DISASSEMBLY

1) Remove the bolts which secure the rocker shaft.
2) Extract the rocker shaft. Remove the valve rocker arms, springs and shaft supports from rocker shaft.

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

3) Remove the nut and adjusting screw from valve rocker.

D: ASSEMBLY

1) Install the adjusting screw and nut to valve rocker.
2) Arrange the valve rocker arms, springs and shaft supports in assembly order, and then insert the valve rocker shaft.

Tightening torque (Shaft supports installing bolts):
5 N·m (0.5 kgf-m, 3.6 ft-lb)

NOTE:
Valve rocker arms, rocker shaft and shaft supports have identification marks. Ensure the parts with same markings are properly assembled.

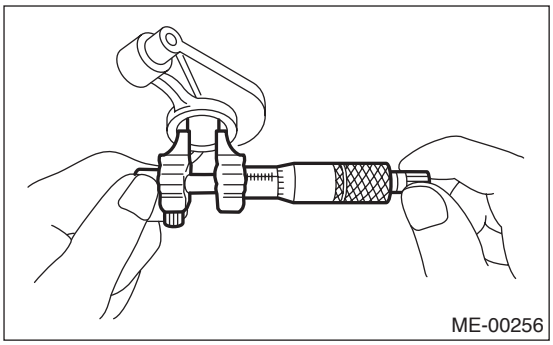
3) Install the valve rocker shaft securing bolts.

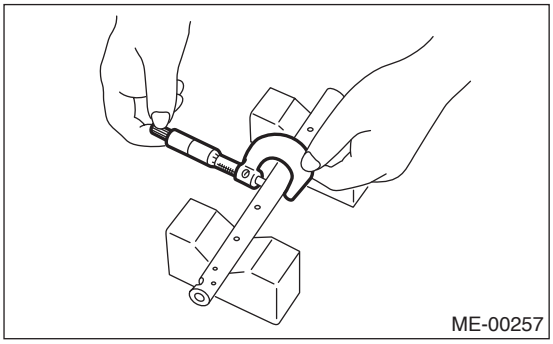
E: INSPECTION

1. VALVE ROCKER ARM AND ROCKER SHAFT

1) Measure the inner diameter of valve rocker arm and outer diameter of valve rocker shaft, and determine the difference (oil clearance) between the two values.

Clearance between arm and shaft:
Standard:
0.020 — 0.054 mm (0.0008 — 0.0021 in)


ME-00256


ME-00257

2) If the oil clearance exceeds the standard value, replace the valve rocker arm or shaft, whichever shows greater amount of wear.

Rocker arm inside diameter:
22.020 — 22.041 mm (0.8669 — 0.8678 in)

Rocker shaft diameter:
21.987 — 22.000 mm (0.8656 — 0.8661 in)

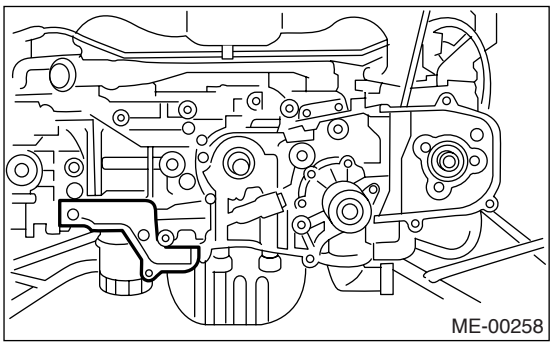
3) If the cam or valve contact surface of valve rocker arm is worn or dented excessively, replace the valve rocker arm.
4) Check that the valve rocker arm roller rotates smoothly. If not, replace the valve rocker arm.

19.Camshaft

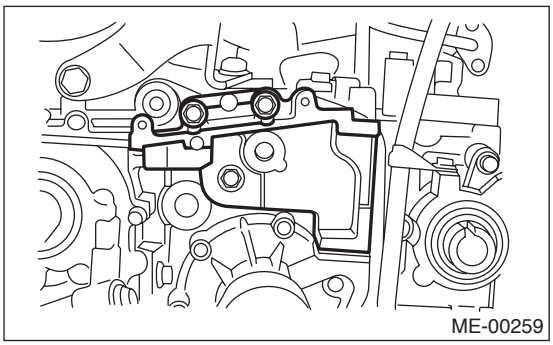
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4SO 2.0)-50, REMOVAL, Crank Sprocket.>
7) Remove the timing belt cover No. 2 (LH).
8) Remove the timing belt cover No. 2 (RH).

NOTE:
Do not damage or lose the seal rubber when removing the timing belt covers.

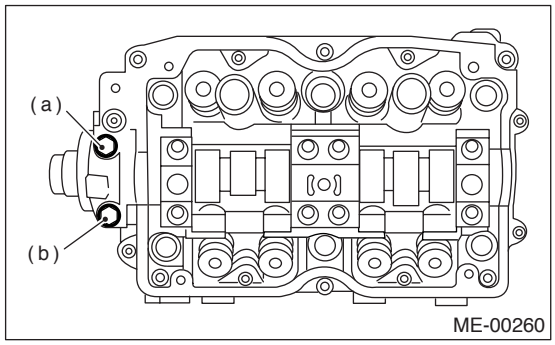

ME-00258

9) Remove the tensioner bracket.


ME-00259

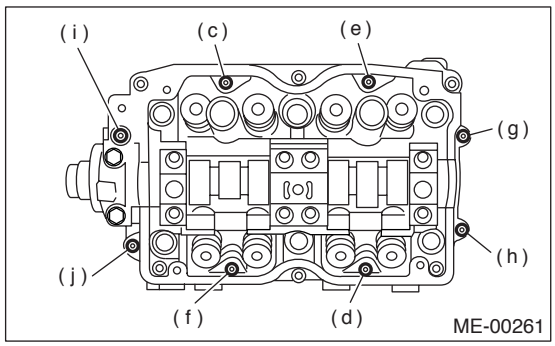
10) Remove the camshaft position sensor support. (LH side only)
11) Remove the oil level gauge guide. (LH side only)
12) Remove the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, REMOVAL, Valve Rocker Assembly.>
13) Remove the camshaft cap.

(1) Remove the bolts (a) and (b) in alphabetical sequence.



ME-00260

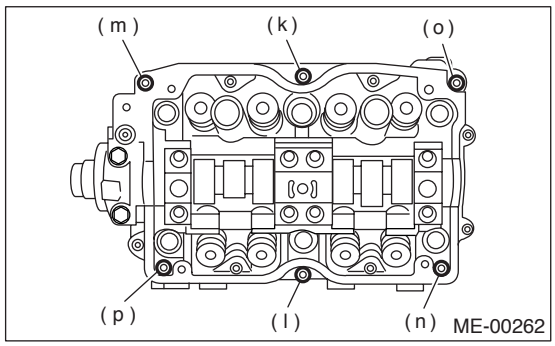
(2) Equally loosen the bolts (c) through (j) all the way in alphabetical sequence.



ME-00261

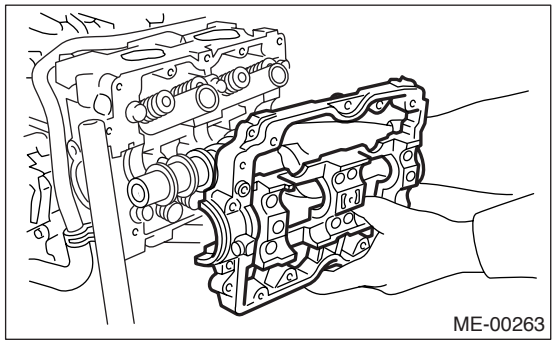
(3) Remove the bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX® PLUS



ME-00262

(4) Remove the camshaft cap.


ME-00263

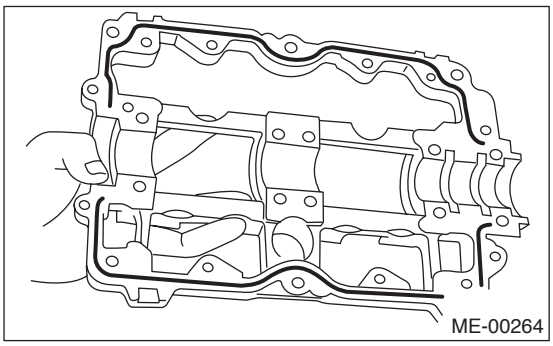
14) Remove the camshaft.
15) Remove the oil seal.
16) Remove the plug from the rear side of camshaft.

CAUTION:
• Do not remove the oil seal unless necessary.
• Do not scratch the journal surface when removing the oil seal.

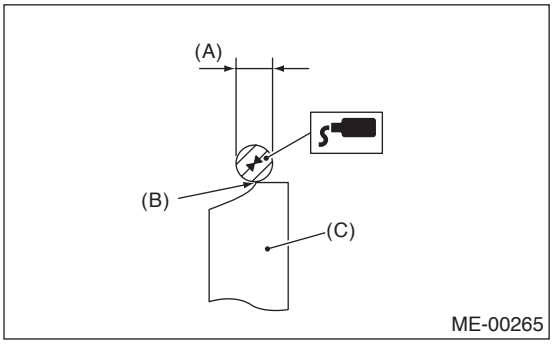
B: INSTALLATION

1) Apply a coat of engine oil to camshaft journals and install the camshaft.
2) Install the camshaft cap.
(1) Apply liquid gasket to the mating surfaces of camshaft cap.

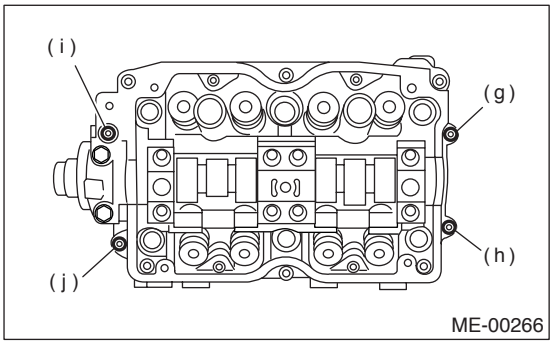
Liquid gasket:
THREE BOND 1280B (Part No. K0877YA018)



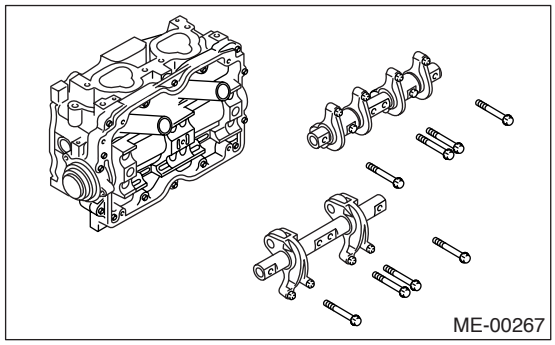
NOTE:
• Apply a coat of liquid gasket of 3 mm (0.12 in) in diameter (A) along the edge (B) of camshaft cap (C) mating surface.
• Assemble them within 20 min. after applying liquid gasket.



(2) Temporarily tighten the bolts (g) through (j) in alphabetical sequence.

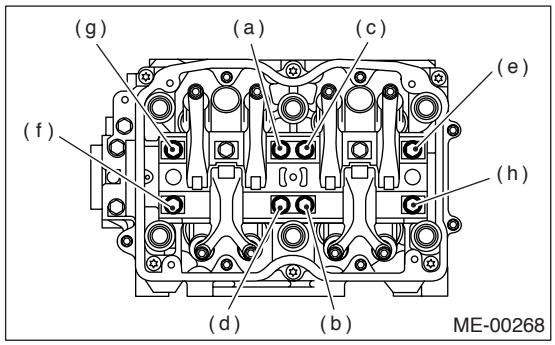


(3) Install the valve rocker assembly.



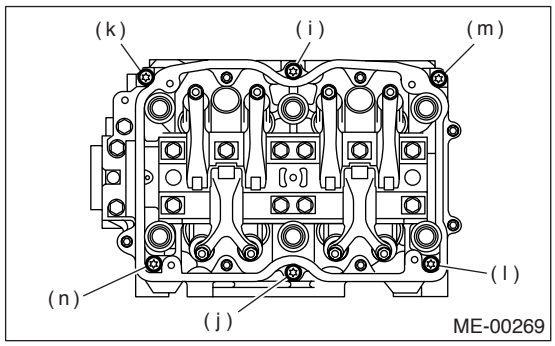
(4) Tighten the bolts (a) through (h) in alphabetical sequence.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



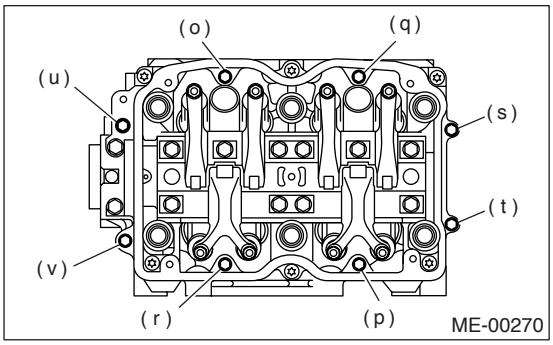
(5) Tighten the TORX® bolts (i) through (n) in alphabetical sequence using ST.
ST 499497000 TORX® PLUS

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



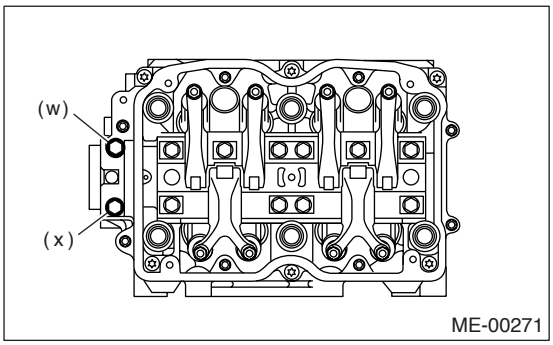
(6) Tighten the bolts (o) through (v) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



(7) Tighten the bolts (w) and (x) in alphabetical sequence.

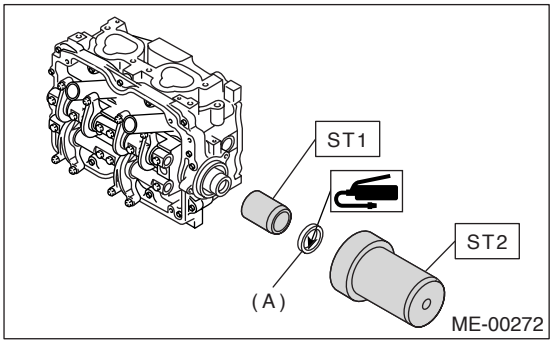
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



3) Apply a coat of grease to oil seal lips and install the oil seal (A) on camshaft using ST1 and ST2.

NOTE:
Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE
ST2 499587500 OIL SEAL INSTALLER

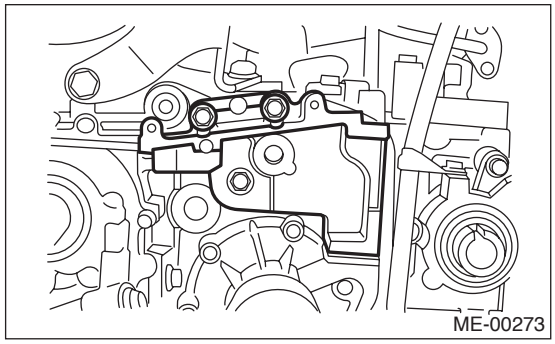


4) Install the plug using ST.

ST 499587700 CAMSHAFT OIL SEAL INSTALLER

5) Adjust the valve clearance. <Ref. to ME(H4SO 2.0)-29, ADJUSTMENT, Valve Clearance.>
6) Install the rocker cover and connect PCV hose.
7) Install the oil level gauge guide. (LH side only)
8) Install the camshaft position sensor support. (LH side only)
9) Install the tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

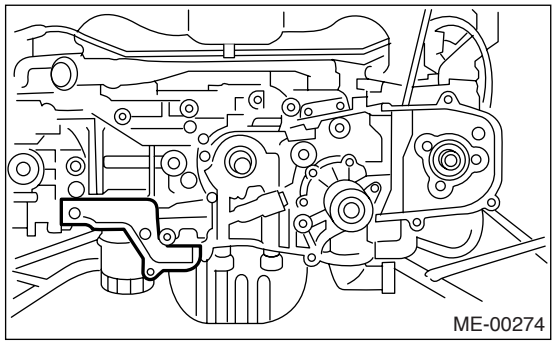


10) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

11) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



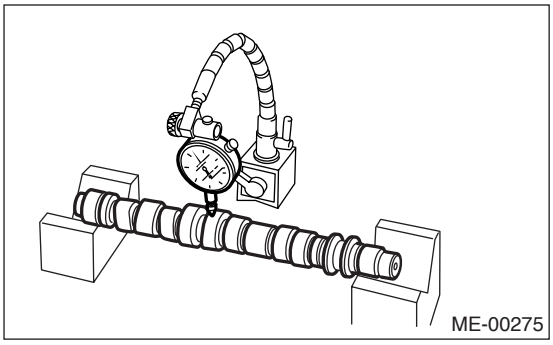
12) Install the crank sprocket.
<Ref. to ME(H4SO 2.0)-50, INSTALLATION, Crank Sprocket.>
13) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
14) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
15) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
16) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
17) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: INSPECTION

1. CAMSHAFT

1) Measure the bend, and repair or replace if necessary.

Service limit:
0.020 mm (0.00079 in)



2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outer diameter of camshaft journal and inner diameter of cylinder head journal, and determine the difference (oil clearance) between the two values. If the oil clearance exceeds standard value, replace the camshaft or cylinder head as necessary.

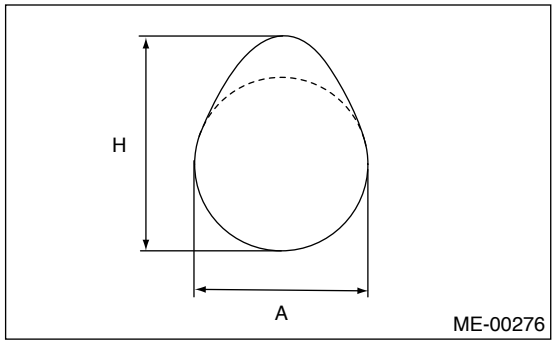
		Unit: mm (in)
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

4) Check the cam face condition, and remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds the limit, replace it.

Cam height: H:

Model	Parts		Unit: mm (in)
2.0 L	Intake	Standard	39.646 — 39.746 (1.5609 — 1.5648)
	Exhaust	Standard	39.351 — 39.451 (1.5493 — 1.5532)
2.5 L	Intake	Standard	39.485 — 39.585 (1.5545 — 1.5585)
	Exhaust	Standard	39.904 — 40.004 (1.5710 — 1.5750)

Cam base circle diameter A:
Intake: 34.00 mm (1.3386 in)
Exhaust: 34.00 mm (1.3386 in)



2. CAMSHAFT SUPPORT

Measure the side clearance of camshaft with setting the dial gauge at end of camshaft. If side clearance exceeds the limit, replace the camshaft support.

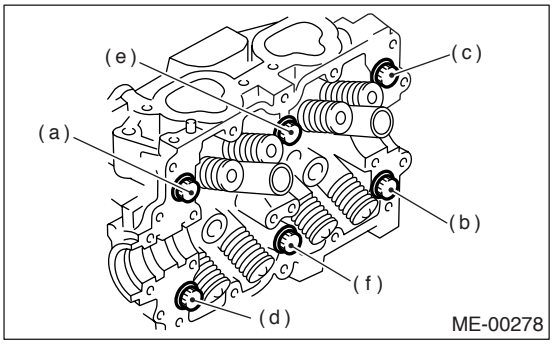
Standard:
0.030 — 0.090 mm (0.0012 — 0.0035 in)

20.Cylinder Head

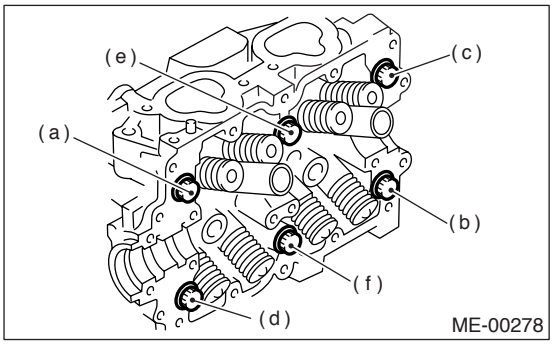
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
6) Remove the intake manifold. <Ref. to FU(H4SO 2.0)-11, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs the A/C compressor bracket on cylinder head.
8) Remove the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, REMOVAL, Valve Rocker Assembly.>
9) Remove the camshaft. <Ref. to ME(H4SO 2.0)-53, REMOVAL, Camshaft.>
10) Remove the cylinder head bolts in alphabetical sequence as shown in the figure.

NOTE:
Leave bolts (a) and (c) engaged by three or four threads to prevent the cylinder head from falling.



11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
12) Remove the bolts (a) and (c) to remove the cylinder head.



13) Remove the cylinder head gasket.

CAUTION:
Be careful not to scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the right side cylinder head.

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

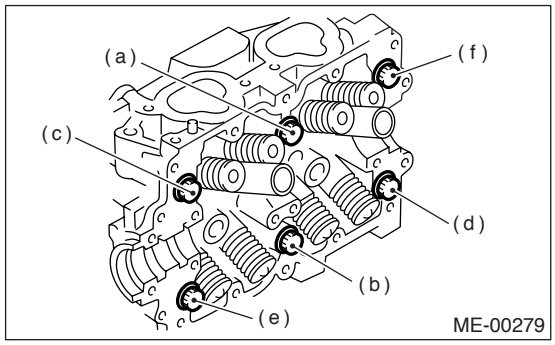
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder block and cylinder head.**

2) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° in reverse order of installation, and back them off again by 180°.
(4) Tighten all bolts to 42 N·m (3.9 kgf-m, 31 ft-lb) in alphabetical sequence.
(5) Tighten all bolts by 80° — 90° in alphabetical sequence.
(6) Tighten all bolts by 40° — 45° in alphabetical sequence.

NOTE:
Do not tighten the bolts more than 45°.

(7) Further tighten bolts (a) and (b) by 40°— 45°.

NOTE:
Ensure the total “re-tightening angle” in the [former two steps], do not exceed 90°.



3) Install the camshaft. <Ref. to ME(H4SO 2.0)-54, INSTALLATION, Camshaft.>
4) Install the valve rocker assembly. <Ref. to ME(H4SO 2.0)-51, INSTALLATION, Valve Rocker Assembly.>
5) Install the A/C compressor bracket on cylinder head.
6) Install the intake manifold.
<Ref. to FU(H4SO 2.0)-12, INSTALLATION, Intake Manifold.>

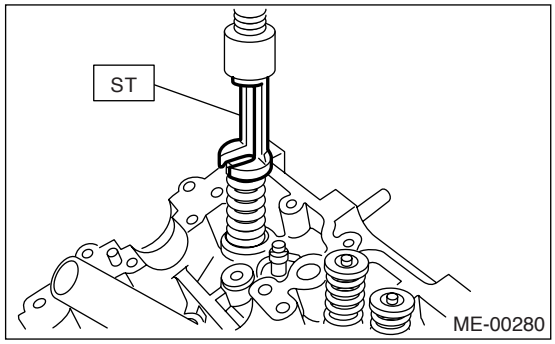
7) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
8) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
9) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
10) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
11) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>

C: DISASSEMBLY

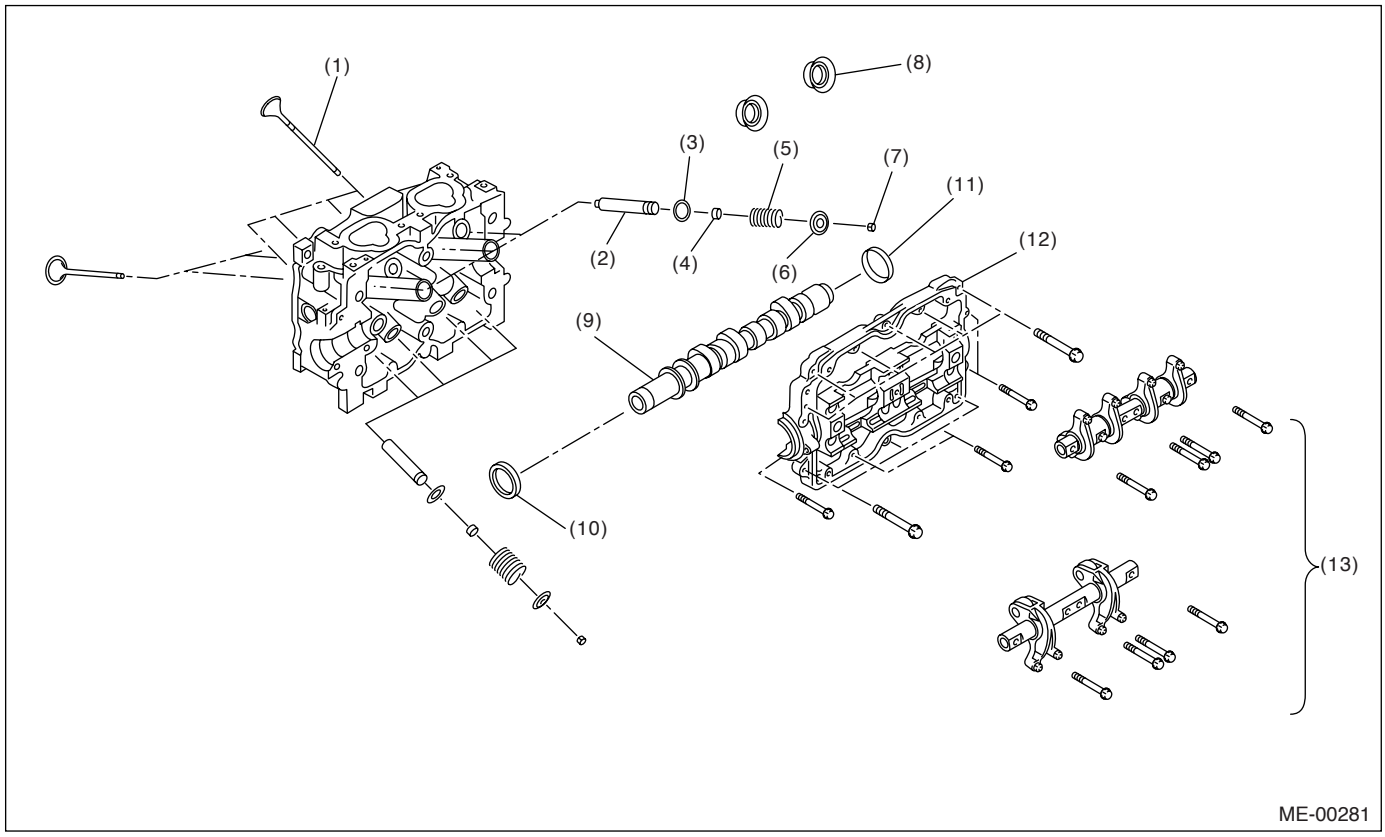
1) Place the cylinder head on the ST.
ST 498267800 CYLINDER HEAD TABLE
2) Set the ST on valve spring. Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



D: ASSEMBLY



(1) Valve
(2) Valve guide
(3) Valve spring seat
(4) Oil seal
(5) Valve springs
(6) Retainer
(7) Retainer key
(8) Spark plug gasket
(9) Camshaft
(10) Oil seal
(11) Plug
(12) Camshaft cap
(13) Valve rocker ASSY

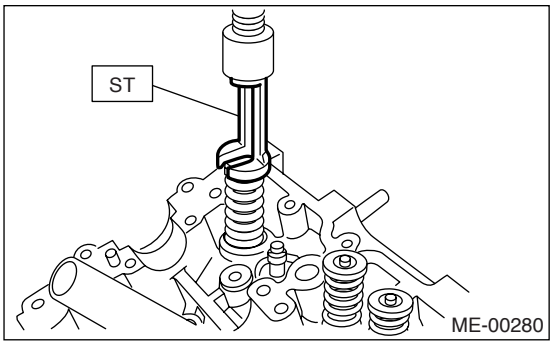
1) Installation of valve spring and valve:
(1) Place the cylinder head on the ST.
ST 498267800 CYLINDER HEAD TABLE
(2) Coat the stem of each valve with engine oil and insert the valve into valve guide.

CAUTION:
Use extreme care not to damage the oil lips when inserting the valve into valve guide.

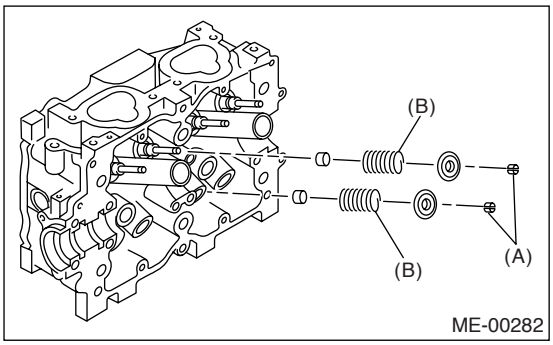
(3) Install the valve spring and retainer.

NOTE:
Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.

(4) Set the ST on valve spring.
ST 499718000 VALVE SPRING REMOVER



(5) Compress the valve spring and fit the valve spring retainer key.



(A) Retainer key
(B) Valve springs

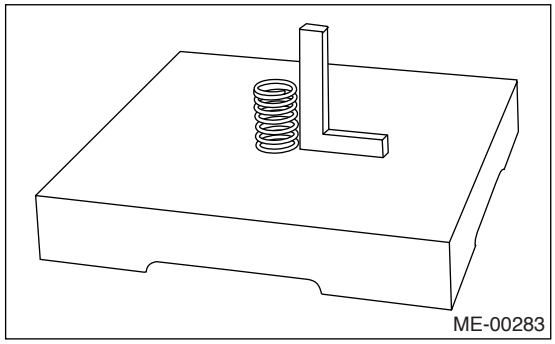
(6) After installing, tap the valve spring retainers lightly with a plastic hammer for better seating.

E: INSPECTION

1. VALVE SPRING

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard value presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top of spring using a try square.

Free length mm (in)		54.30 (2.1378)
Tension/spring height N (kgf, lb)/mm (in)	Set	214 — 246 (22 — 25, 48 — 55)/45.0 (1.772)
	Lift	526 — 582 (54 — 59, 119 — 130)/34.7 (1.366)
Squareness		2.5°, 2.4 mm (0.094 in)



2. INTAKE AND EXHAUST VALVE OIL SEAL

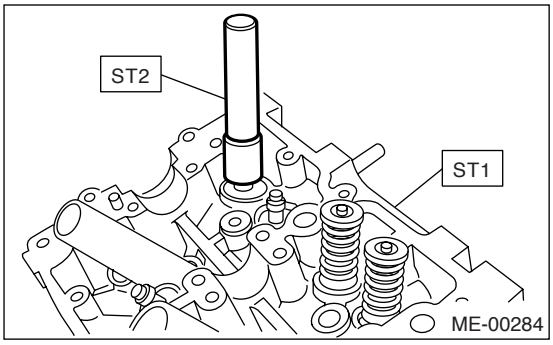
In the following case, pinch and remove the oil seal from valve using pliers, and then replace it with a new one.
• When the lip is damaged.
• When the spring is out of the specified position.
• When readjusting the surfaces of intake valve and valve sheet.
• When replacing the intake valve guide.
1) Place the cylinder head on ST1.
2) Using ST2, press-fit the oil seal.

CAUTION:
• Apply engine oil to oil seal before press-fitting.
• When press-fitting the oil seal, do not use a hammer or strike in.
• Differentiate between the intake valve oil seal and exhaust valve oil seal by noting their difference in color.

ST1 498267800 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

Color of rubber part:
Intake [Black]
Exhaust [Brown]

Color of spring part:
Intake [Silver]
Exhaust [Silver]



F: ADJUSTMENT

1. CYLINDER HEAD

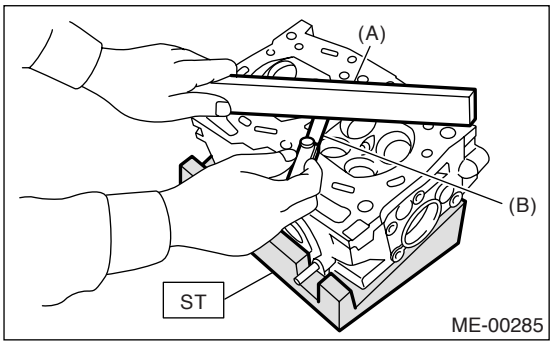
1) Make sure that no crack or other damage do not exist. In addition to visual inspection, inspect important areas by means of red lead check.
Also make sure the gasket installing surface shows no trace of gas and water leaks.
2) Place the cylinder head on the ST.
ST 498267800 CYLINDER HEAD TABLE
3) Measure the warping of the cylinder head surface that mates with crankcase using a straight edge and thickness gauge.
If the warping exceeds the limit, regrind the surface with a surface grinder.

Warping limit:
0.03 mm (0.0012 in)

Grinding limit:
0.1 mm (0.004 in)

Standard height of cylinder head:
97.5 mm (3.839 in)

NOTE:
Uneven torque for the cylinder head bolts can cause warping. When reassembling, pay special attention to the torque so as to tighten evenly.

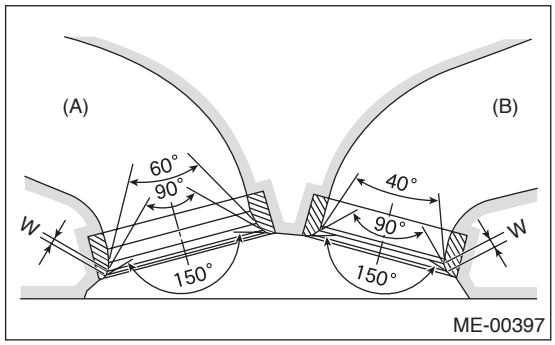


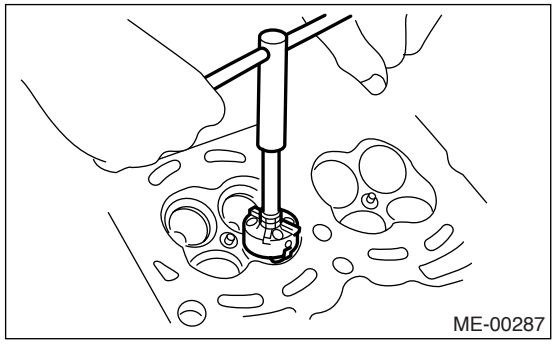
(A) Straight edge
(B) Thickness gauge

2. VALVE SEAT

Inspect the intake and exhaust valve seats, and correct the contact surfaces with a valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:
Standard
Intake (A)
0.8 — 1.4 mm (0.03 — 0.055 in)
Exhaust (B)
1.2 — 1.8 mm (0.047 — 0.071 in)





3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring respectively the outer diameter of valve stem and inner diameter of valve guide with a micrometer.

Clearance between the valve guide and valve stem:

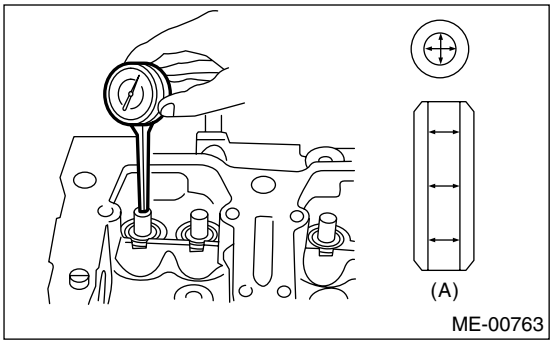
Standard

Intake

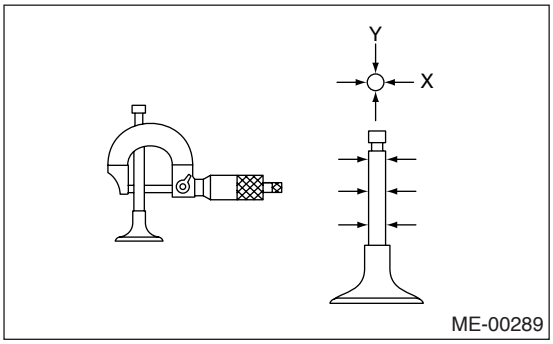
0.035 — 0.062 mm (0.0014 — 0.0024 in)

Exhaust

0.040 — 0.067 mm (0.0016 — 0.0026 in)



(A) Valve guide



2) If the clearance between valve guide and stem exceeds the standard value, replace the valve guide or valve itself whichever shows greater amount of wear. See the following procedure for valve guide replacement.

Valve guide inner diameter:

6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:

Intake

5.950 — 5.965 mm (0.2343 — 0.2348 in)

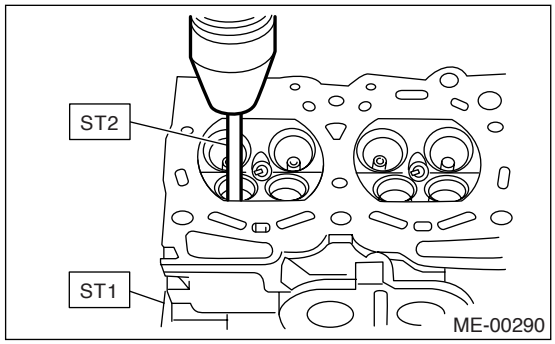
Exhaust

5.945 — 5.960 mm (0.2341 — 0.2346 in)

(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.

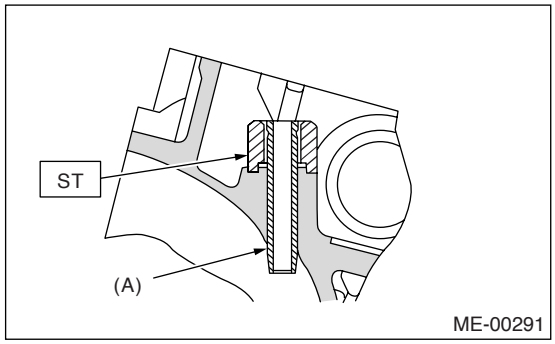
(2) Insert ST2 into the valve guide and press it down to remove the valve guide.

ST1 498267800 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place the ST as shown in the figure.

Intake side:
ST 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST 499767800 VALVE GUIDE ADJUSTER

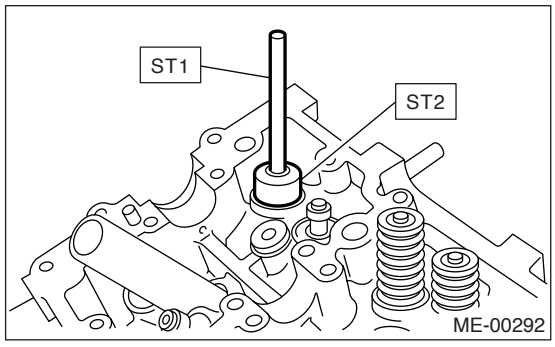


(A) Valve guide

(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.

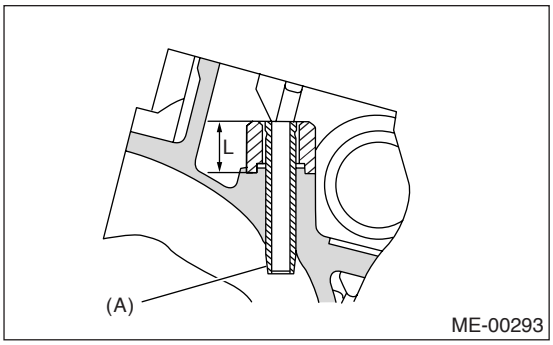
(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert the ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
Intake side:
ST2 499767700 VALVE GUIDE ADJUSTER
Exhaust side:
ST2 499767800 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
Intake
20.0 — 21.0 mm (0.787 — 0.827 in)
Exhaust
16.5 — 17.5 mm (0.650 — 0.689 in)

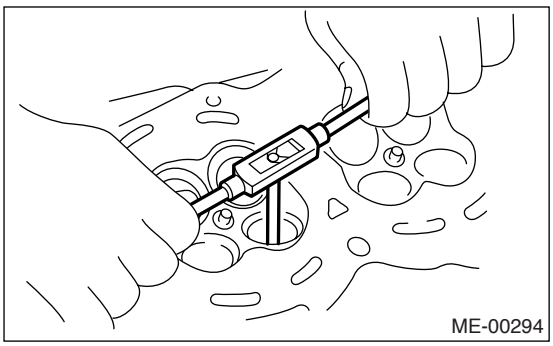


(A) Valve guide

(7) Ream the inside of valve guide using ST. Put the reamer in valve guide, and rotate the reamer slowly clockwise while pushing it lightly. Bring the reamer back while rotating it clockwise. After reaming, clean the valve guide to remove chips.

CAUTION:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chip, use a new reamer or remedy the reamer.

ST 499767400 VALVE GUIDE REAMER



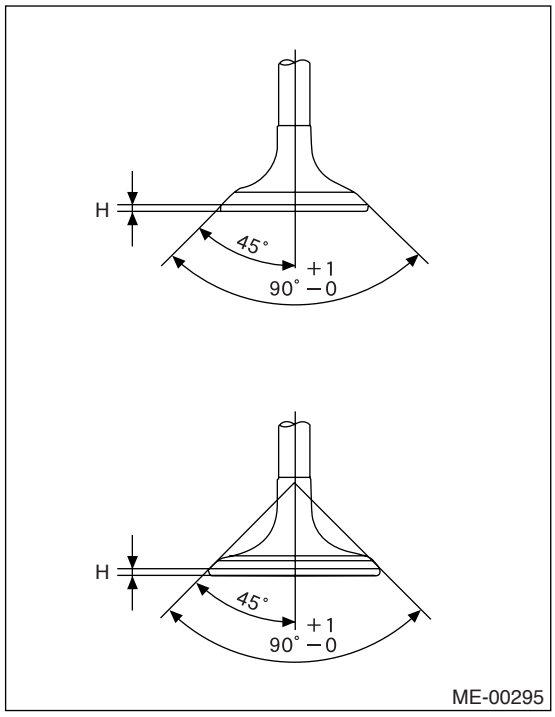
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn or deformed, or if "H" exceed the standard value.

H:
Intake
Standard: 0.8 — 1.2 mm (0.03 — 0.047 in)
Exhaust
Standard: 1.0 — 1.4 mm (0.039 — 0.055 in)

Valve overall length:
Intake
120.6 mm (4.75 in)
Exhaust
121.7 mm (4.79 in)



2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. <Ref. to ME(H4SO 2.0)-60, VALVE SEAT, ADJUSTMENT, Cylinder Head.> Install a new intake valve oil seal after lapping.

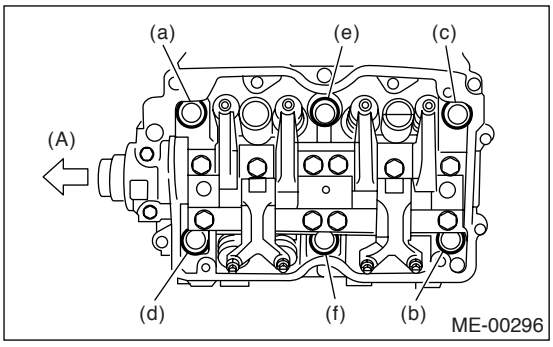
21.Cylinder Block

A: REMOVAL

NOTE:
Before conducting this procedure, drain the engine oil completely.

1) Remove the intake manifold. <Ref. to FU(H4SO 2.0)-11, REMOVAL, Intake Manifold.>
2) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
3) Remove the crank pulley. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
4) Remove the timing belt cover. <Ref. to ME(H4SO 2.0)-42, REMOVAL, Timing Belt Cover.>
5) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, REMOVAL, Timing Belt.>
6) Remove the cam sprocket. <Ref. to ME(H4SO 2.0)-48, REMOVAL, Cam Sprocket.>
7) Remove the crank sprocket. <Ref. to ME(H4SO 2.0)-40, REMOVAL, Crank Pulley.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the rocker cover.
10) Remove the cylinder head bolts in alphabetical sequence as shown in the figure.

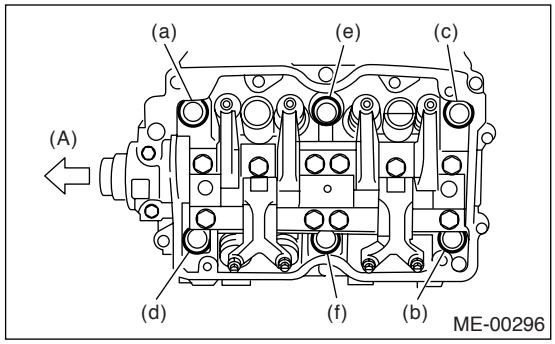
NOTE:
Leave bolts (a) and (c) engaged by three or four threads to prevent the cylinder head from falling.



(A) Front side

11) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.

12) Remove the bolts (a) and (c) to remove the cylinder head.



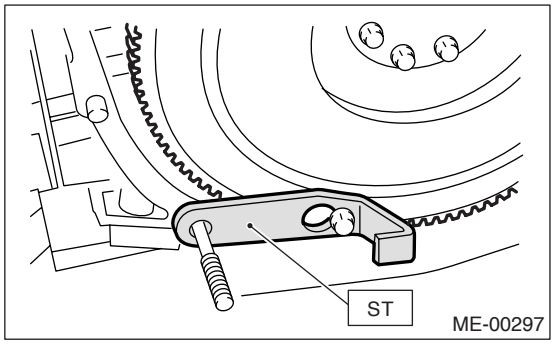
(A) Front side

13) Remove the cylinder head gasket.

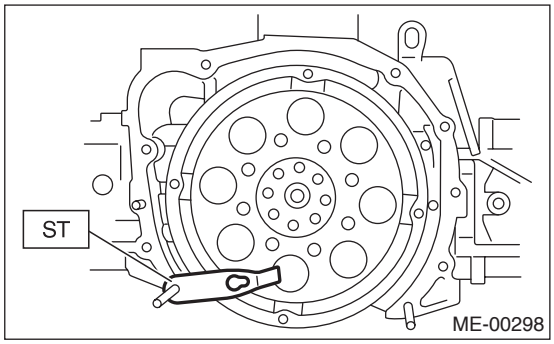
NOTE:
Do not scratch the mating surface of cylinder head and cylinder block.

14) Similarly, remove the right side cylinder head.
15) Remove the clutch housing cover. (MT model)
16) Remove the flywheel (MT model) or drive plate (AT model).
Lock the crankshaft using ST.
ST 498497100 CRANKSHAFT STOPPER

- MT model

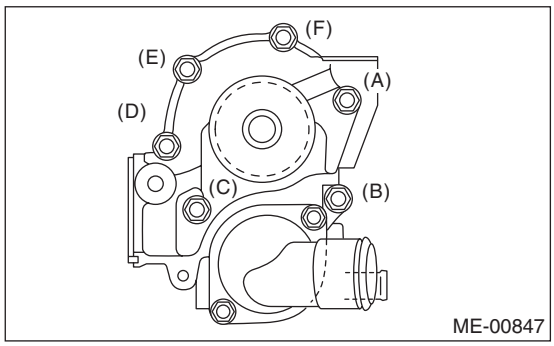


- AT model



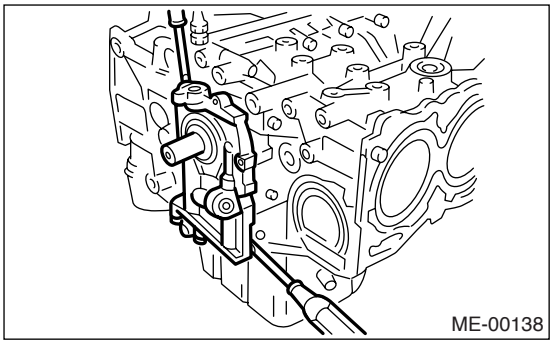
17) Remove the oil separator cover.
18) Remove the water by-pass pipe for heater.

19) Remove the water pump after loosening the bolts in alphabetical sequence as shown in the figure.



20) Remove the oil pump from cylinder block.
Use a flat tip screwdriver as shown in the figure when removing the oil pump.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.

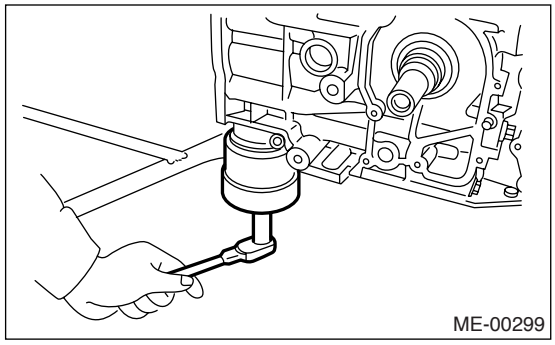


21) Remove the oil pan.
(1) Place the cylinder block to face the #2 and #4 piston side upward.
(2) Remove the bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

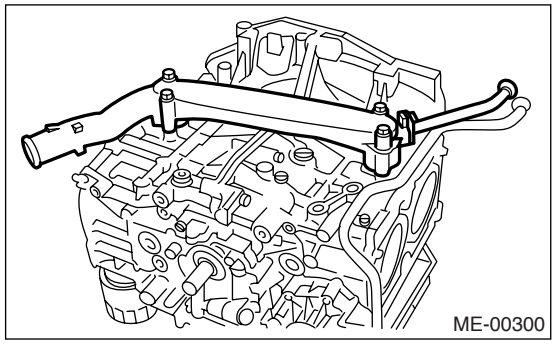
NOTE:
Do not use a screwdriver or similar tools in place of oil pan cutter.

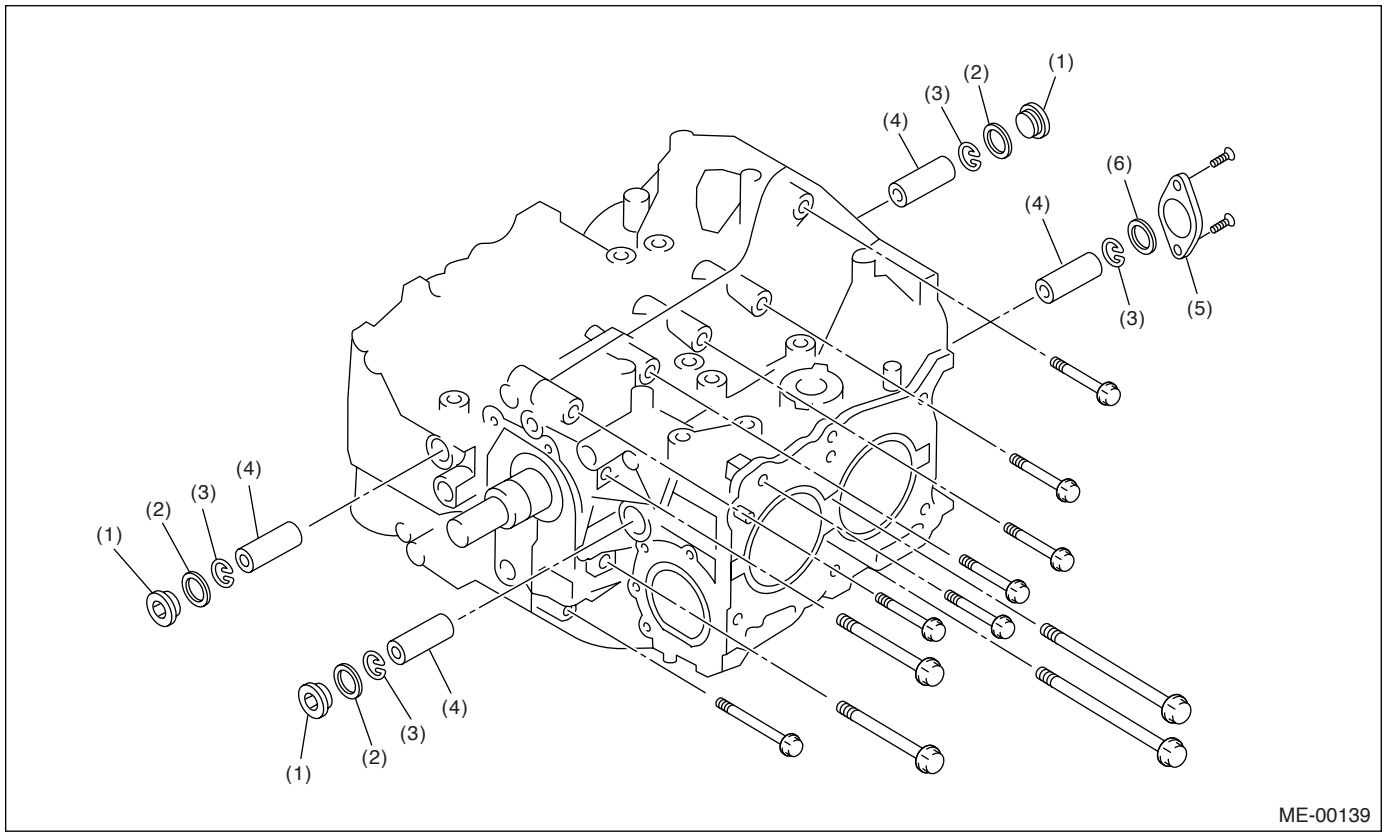
22) Remove the oil strainer stay.
23) Remove the oil strainer.
24) Remove the baffle plate.

25) Remove the oil filter.



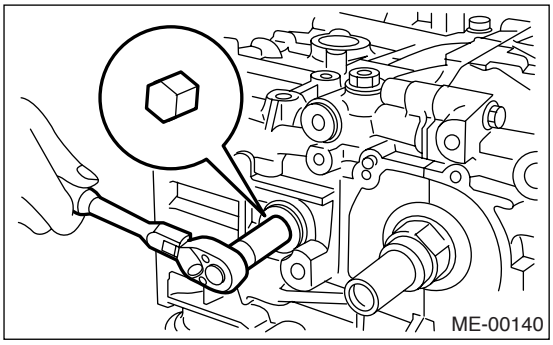
26) Remove the water pipe.



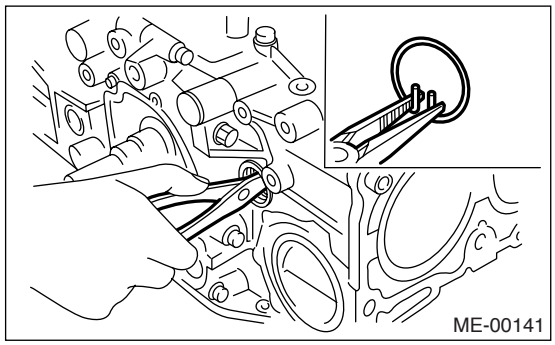


(1) Service hole plug
(2) Gasket
(3) Snap ring
(4) Piston pin
(5) Service hole cover
(6) O-ring

27) Remove the service hole cover and service hole plugs using a hexagon wrench (14 mm).

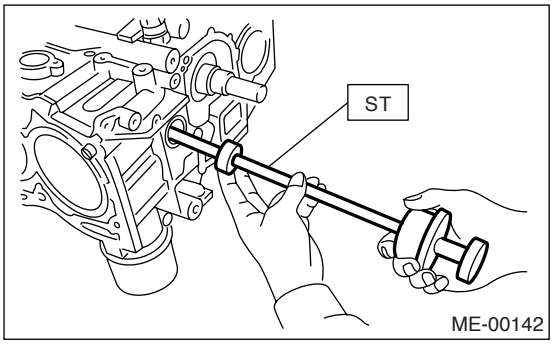


28) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston snap ring through service hole of #1 and #2 cylinders.



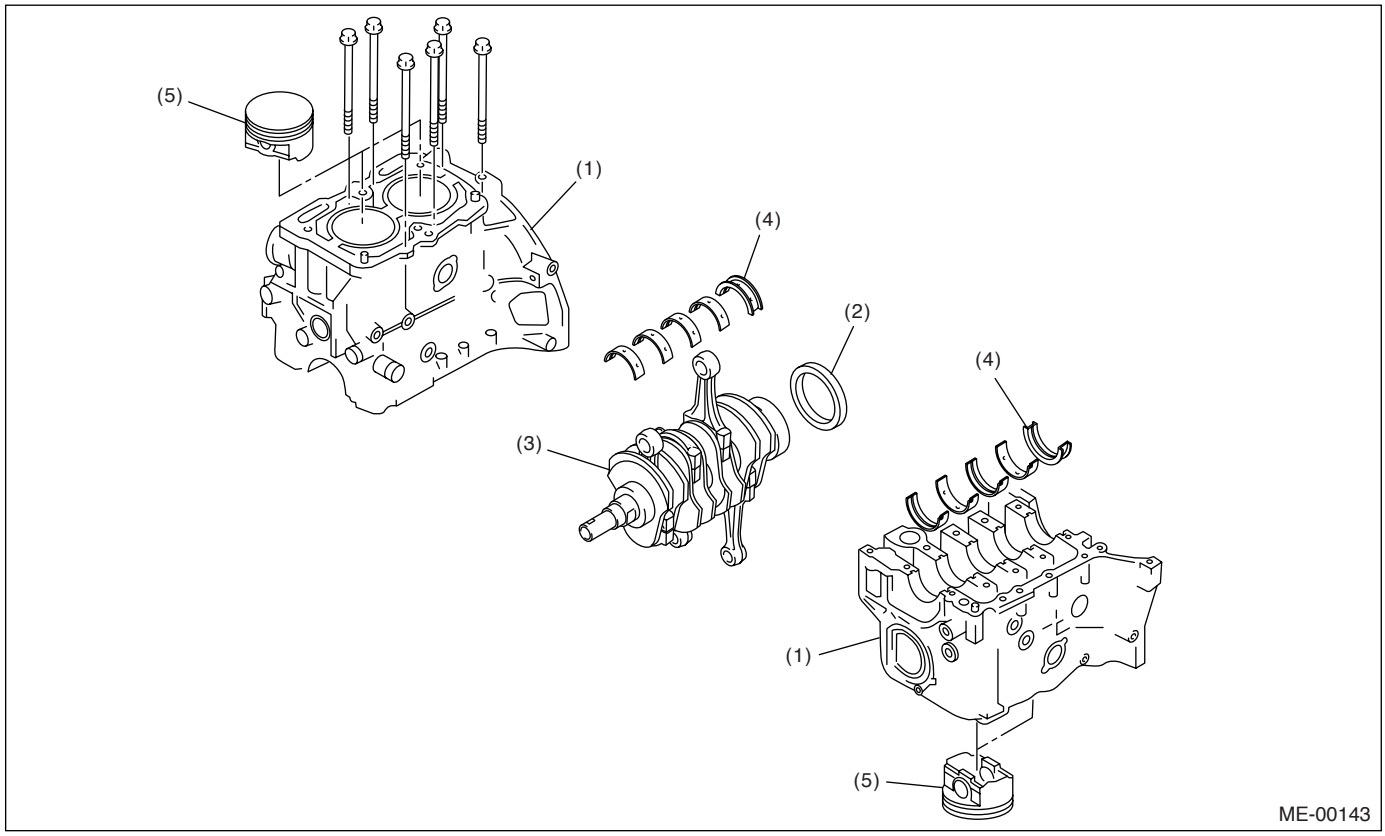
29) Draw out the piston pin from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

NOTE:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



30) Similarly remove the piston pins from #3 and #4 pistons.
31) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.
32) Back off the bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.
33) Set up the cylinder block so that #1 and #3 cylinders are on the upper side, then remove the cylinder block connecting bolts.
34) Separate the cylinder block (RH) and (LH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall or damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

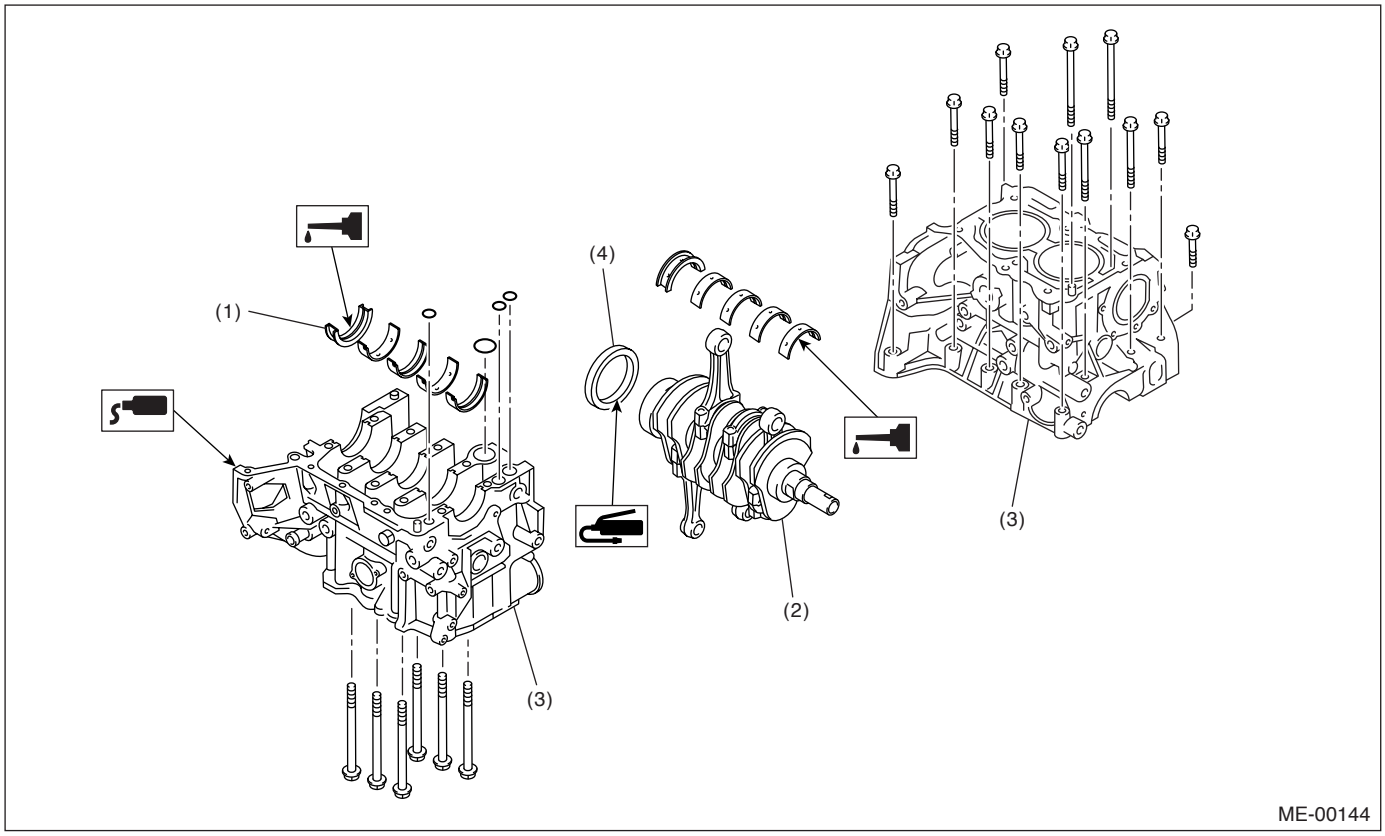
35) Remove the rear oil seal.
36) Remove the crankshaft together with connecting rod.
37) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:
Be careful not to confuse the crankshaft bearing combination. Press the bearing at the end opposite to locking lip.

38) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:
Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION



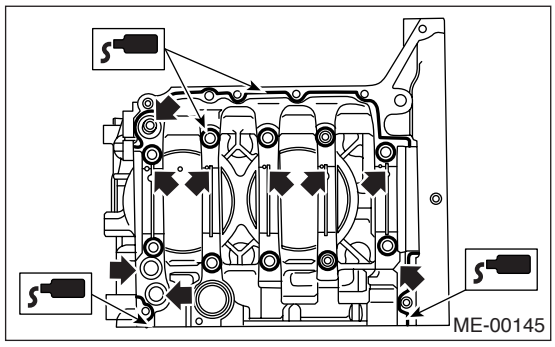
(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

NOTE:
Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.

1) Position the crankshaft on the #2 and #4 cylinder block.
2) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

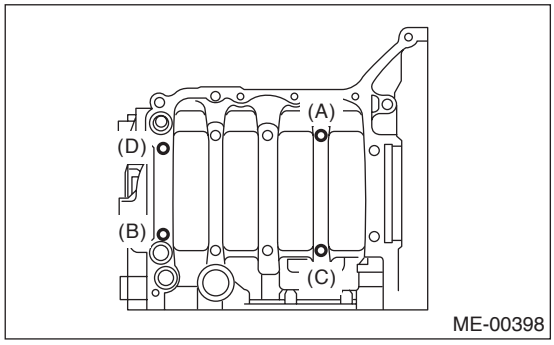
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:
Do not allow liquid gasket to flow into O-ring grooves, oil passages, bearing grooves, etc.



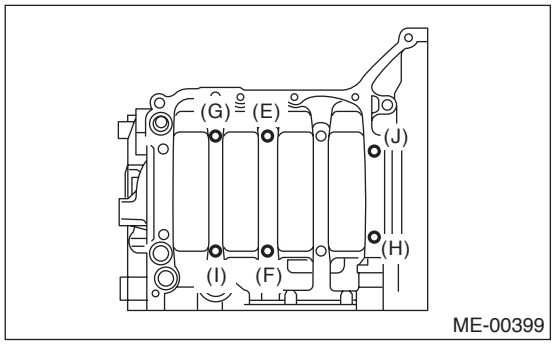
3) Tighten the 10 mm cylinder block connecting bolts on LH side (A — D) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



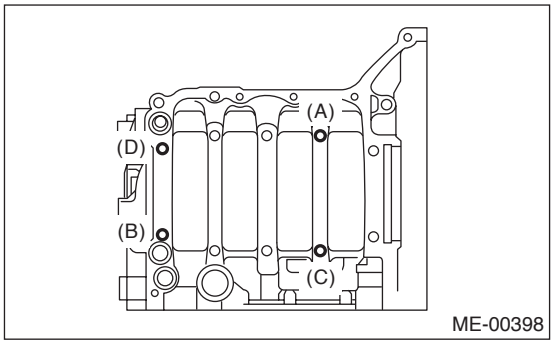
4) Tighten the 10 mm cylinder block connecting bolts on RH side (E — J) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



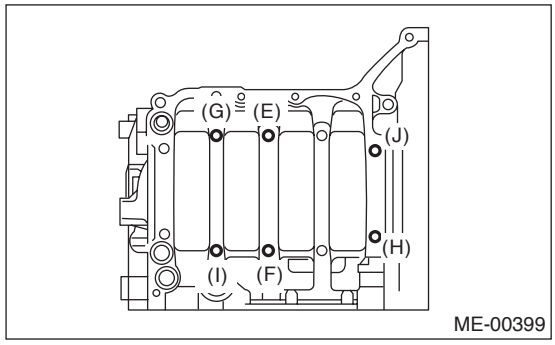
5) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:
(A), (C): 20 N·m (2.0 kgf-m, 14.8 ft-lb)
(B), (D): 15 N·m (1.5 kgf-m, 10.8 ft-lb)

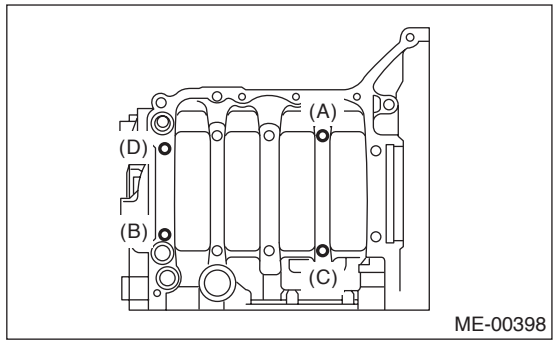


6) Further tighten the RH side bolts (E — J) in alphabetical sequence.

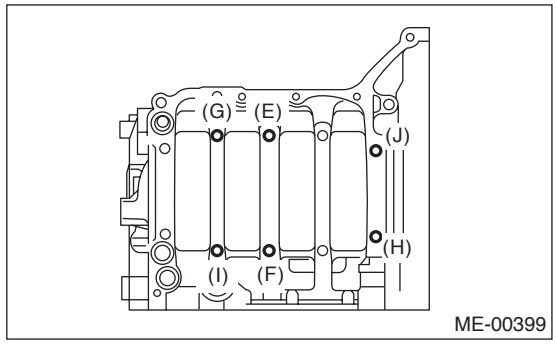
Tightening torque:
(E), (F), (G), (I): 20 N·m (2.0 kgf-m, 14.8 ft-lb)
(H), (J): 18 N·m (1.8 kgf-m, 13.3 ft-lb)



7) Further tighten the LH side bolts (A — D) to 90° in alphabetical sequence.

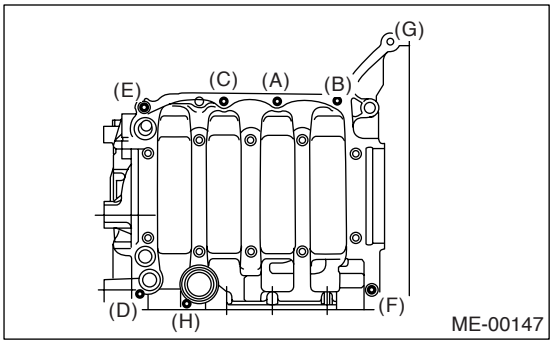


8) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.

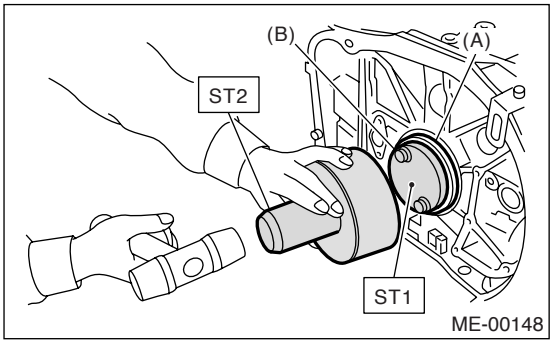


9) Tighten the 8 mm and 6 mm cylinder block connecting bolts on LH side (A — H) in alphabetical sequence.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

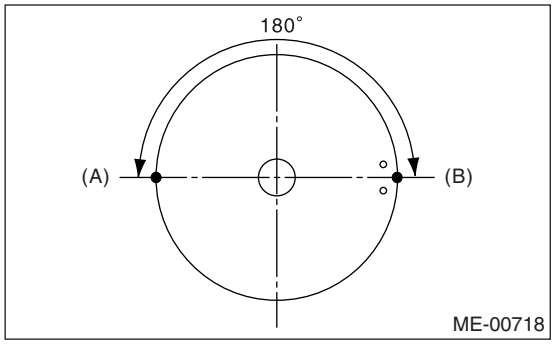


10) Install the rear oil seal using ST1 and ST2.
ST1 499597100 OIL SEAL GUIDE
ST2 499587200 OIL SEAL INSTALLER

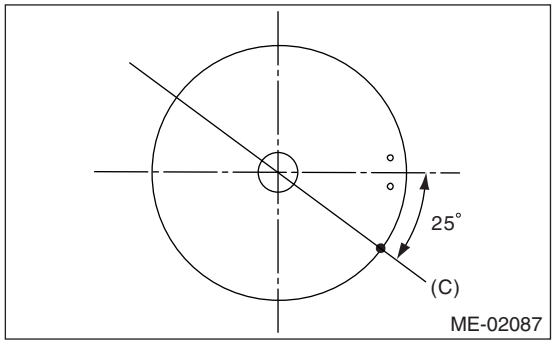


(A) Rear oil seal
(B) Flywheel attaching bolt

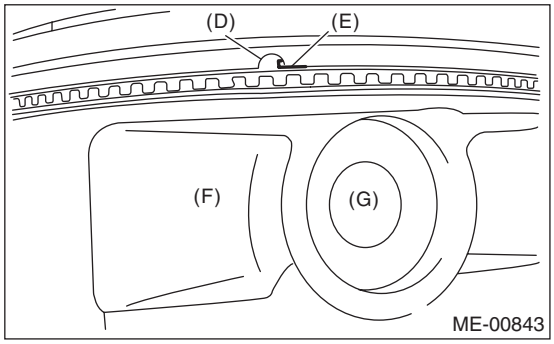
11) Position the top ring gap at (A) or (B) in the figure.
12) Position the second ring gap at 180° on the reverse side of the top ring gap.



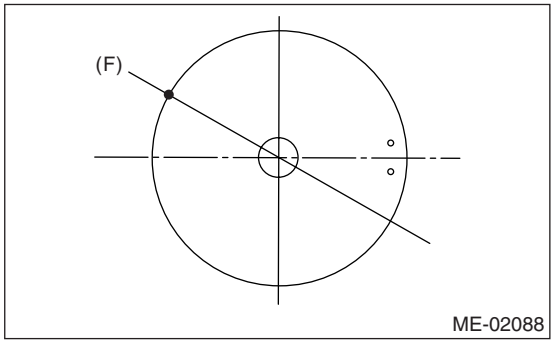
13) Position the upper rail gap at (C) in the figure.



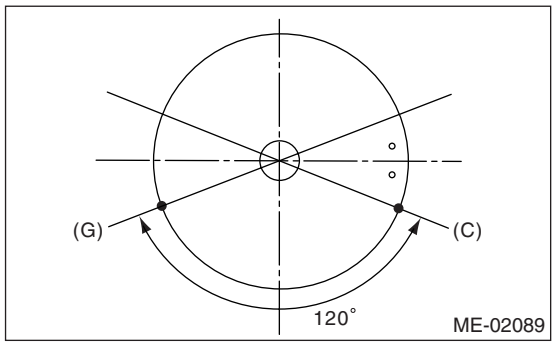
14) Align the upper rail spin stopper (E) to the side hole (D) on the piston.



15) Position the expander gap at 180° on the reverse side of (C) that shown (F) in the figure.



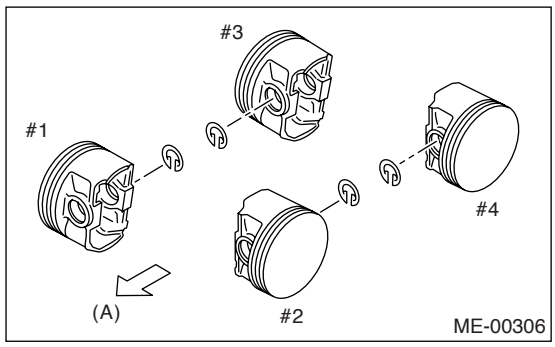
16) Position the lower rail gap at 120° on counterclockwise of (C) that shown (G) in the figure.



CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

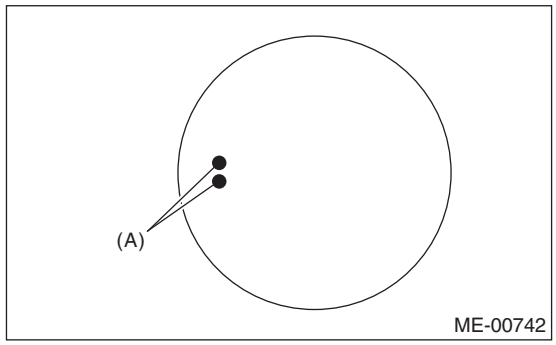
17) Install the snap ring.
Install snap rings in the piston holes located opposite to the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new snap rings.

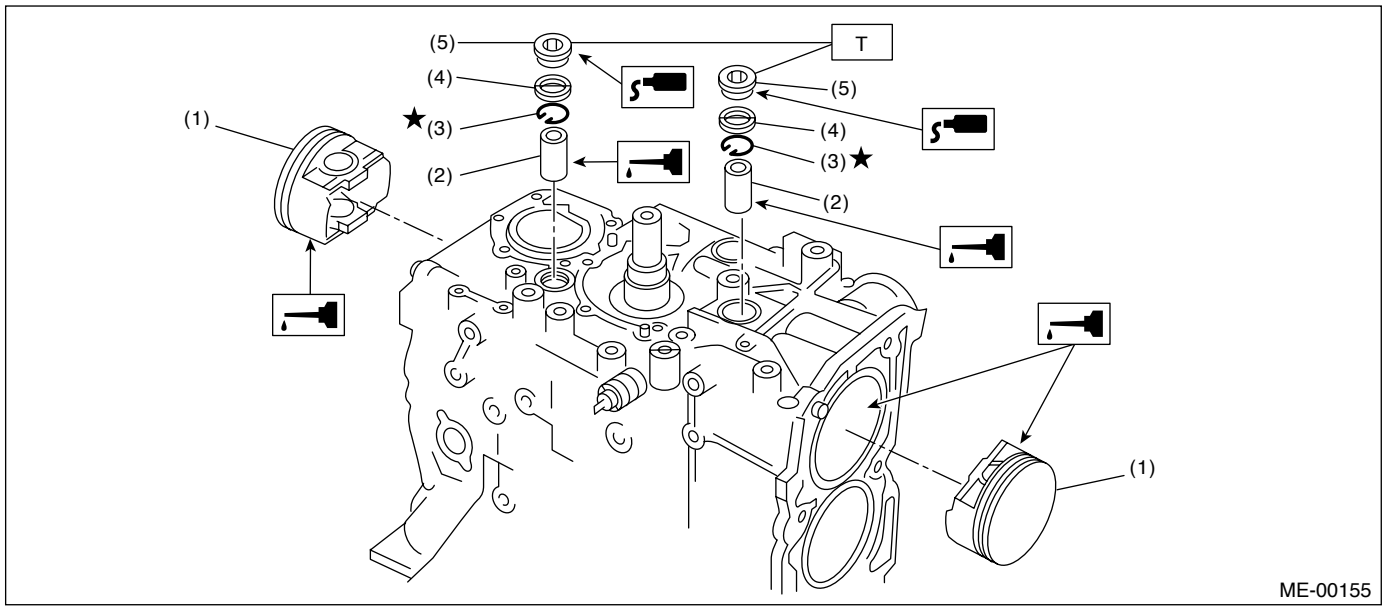


(A) Front side

CAUTION:
Piston front mark faces towards the front of engine.



(A) Front mark



(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug

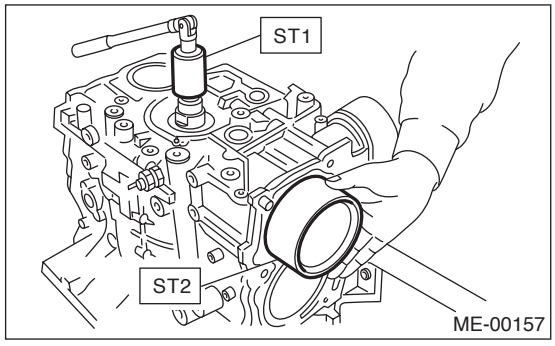
Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.1, 50.6)

18) Install the piston.
(1) Place the cylinder block to face the #1 and #2 cylinder side upward.
(2) Using ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

ST1 499987500 CRANKSHAFT SOCKET

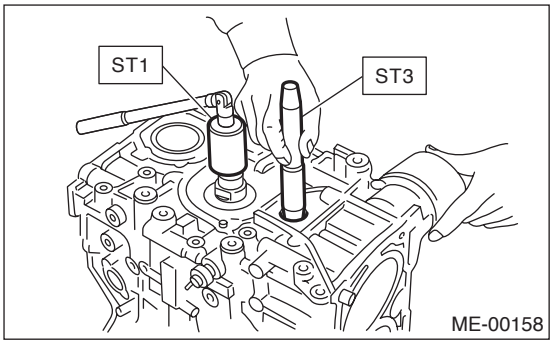
(3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST 2 398744300 PISTON GUIDE (2.0 L model)
ST 2 498747300 PISTON GUIDE (2.5 L model)



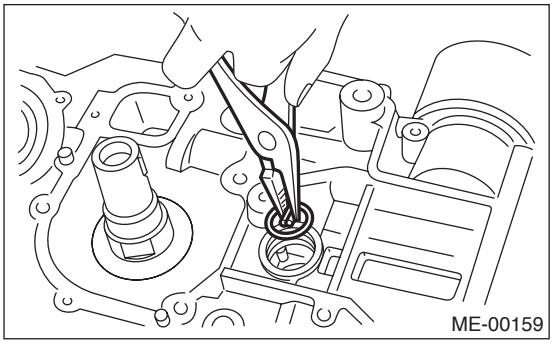
19) Install the piston pin.
(1) Apply a coat of engine oil to ST3.
(2) Insert ST3 into the service hole to align piston pin hole with connecting rod small end.

ST3 499017100 PISTON PIN GUIDE



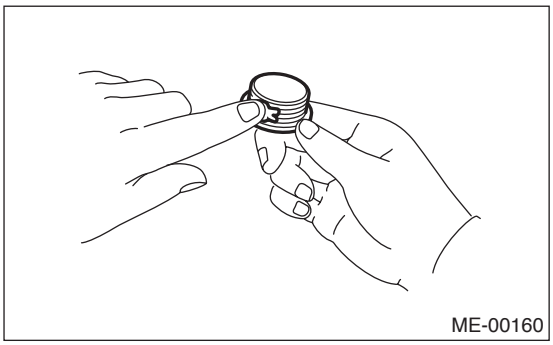
(3) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
(4) Install the snap ring.

NOTE:
Use new snap rings.



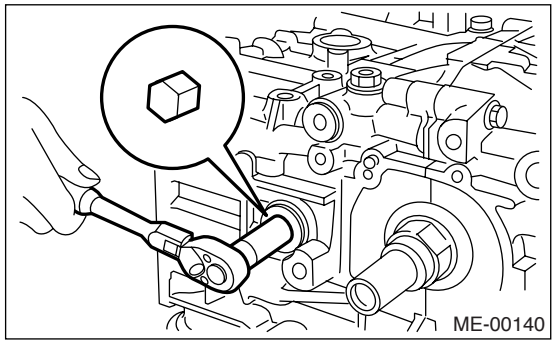
(5) Apply liquid gasket around the service hole plug.

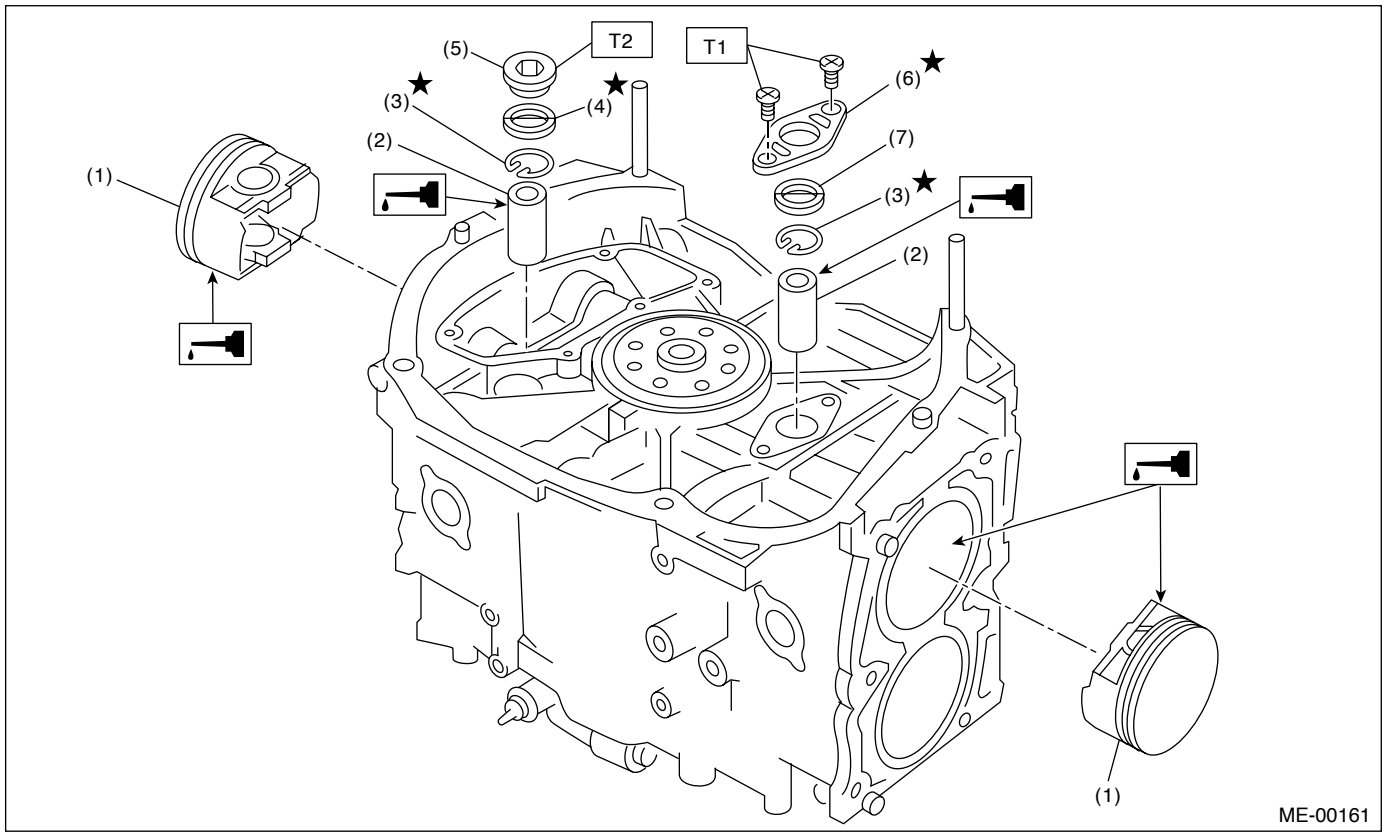
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(6) Install the service hole plug and gasket.

NOTE:
Use a new gasket.



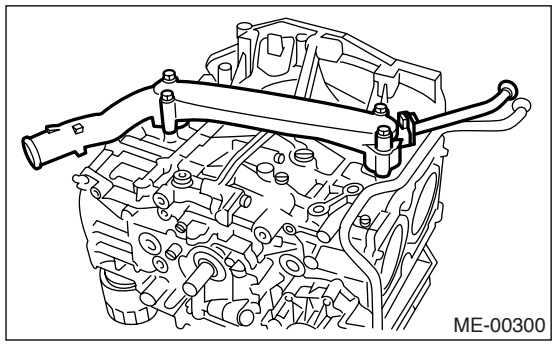


(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 70 (7.1, 50.6)

(7) Place the cylinder block to face the #3 and #4 cylinder side upward. Following the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

20) Install the water pipe.



21) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

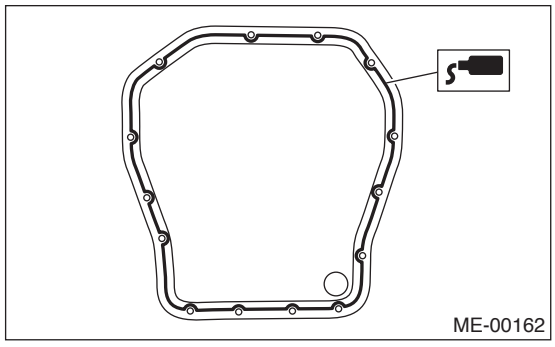
22) Install the oil strainer and O-ring.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

23) Install the oil strainer stay.

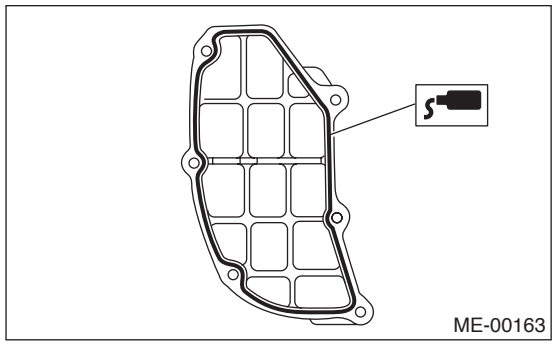
24) Apply liquid gasket to mating surfaces and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



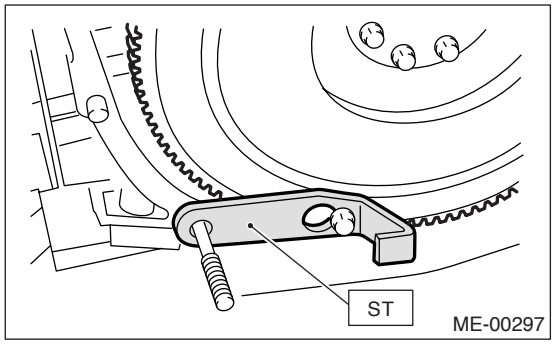
25) Apply liquid gasket to mating surfaces and install the oil separator cover.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



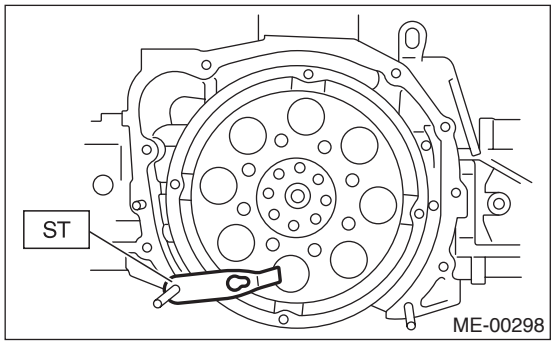
26) Install the flywheel. (MT model)
<Ref. to CL-16, INSTALLATION, Flywheel.>
To lock the crankshaft, use the ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

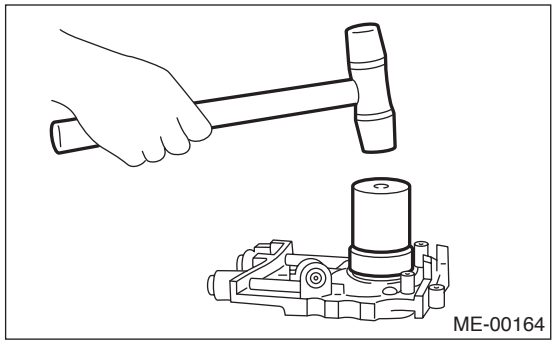


27) Install the drive plate.
To lock the crankshaft, use the ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

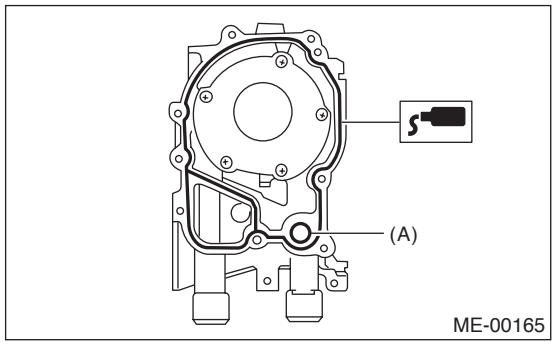


28) Install the housing cover.
29) Installation of oil pump:
(1) Discard the front oil seal after removal. Replace with a new one using ST.
ST 499587100 OIL SEAL INSTALLER



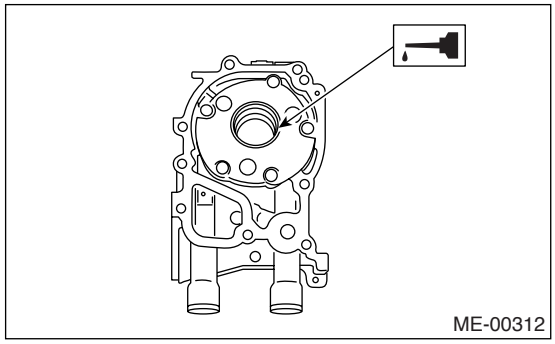
(2) Apply liquid gasket to the matching surface of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of oil seal.



(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

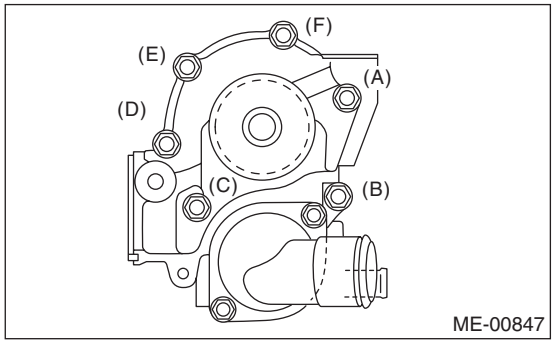
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
• Do not forget to install the O-ring and seal when installing the oil pump.
• Align the flat surface of oil pump's inner rotor with crankshaft before installation.

30) Install the water pump and gasket.

Tightening torque:
First: 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second: 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
• Be sure to use a new gasket.
• When installing the water pump, tighten bolts in two stages in alphabetical sequence as shown in the figure.

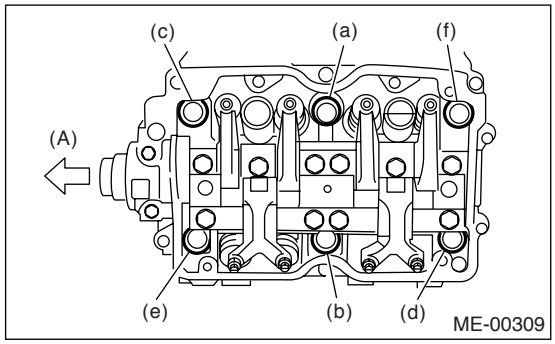


31) Install the water by-pass pipe for heater.
32) Install the oil filter.
33) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 22 ft-lb) in alphabetical sequence.
Then tighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
(3) Back off all bolts by 180° first; and back them off again by 180°.
(4) Tighten the bolts (a) and (b) to 34 N·m (3.5 kgf-m, 25 ft-lb).
(5) Tighten the bolts (c), (d), (e) and (f) to 15 N·m (1.5 kgf-m, 11 ft-lb).
(6) Tighten all bolts by 80° — 90° in alphabetical sequence.

CAUTION:
Do not tighten the bolts more than 90°.

(7) Further tighten all bolts by 80° — 90° in alphabetical sequence.

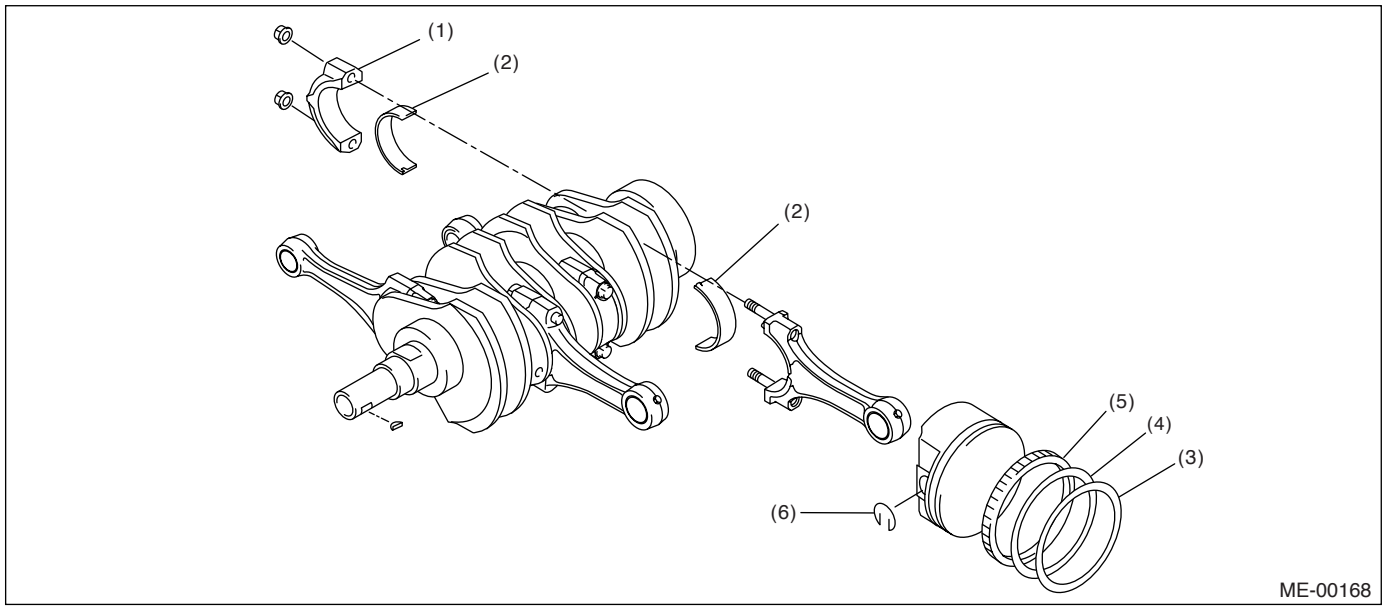
CAUTION:
Ensure the total "re-tightening angle" of the step (6) and (7) does not exceed 180°.



(A) Front side

34) Install the oil level gauge guide and tighten the bolt (left side only).
35) Install the rocker cover.
36) Install the crank sprocket.
<Ref. to ME(H4SO 2.0)-50, INSTALLATION, Crank Sprocket.>
37) Install the cam sprocket. <Ref. to ME(H4SO 2.0)-48, INSTALLATION, Cam Sprocket.>
38) Install the timing belt. <Ref. to ME(H4SO 2.0)-44, INSTALLATION, Timing Belt.>
39) Install the timing belt cover.
<Ref. to ME(H4SO 2.0)-42, INSTALLATION, Timing Belt Cover.>
40) Install the crank pulley. <Ref. to ME(H4SO 2.0)-40, INSTALLATION, Crank Pulley.>
41) Install the generator and A/C compressor brackets on cylinder head.
42) Install the V-belts. <Ref. to ME(H4SO 2.0)-38, INSTALLATION, V-belt.>
43) Install the intake manifold.
<Ref. to FU(H4SO 2.0)-12, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Snap ring

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

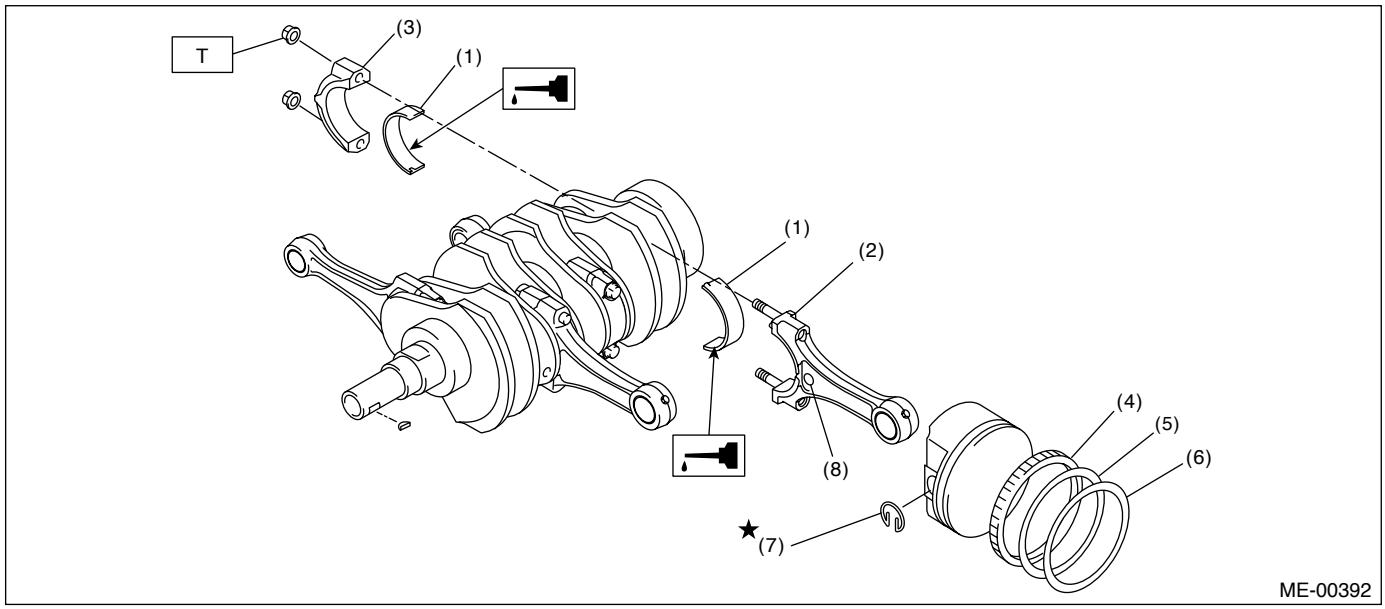
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order, to prevent confusion.

3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order, to prevent confusion.

5) Remove the snap ring.

D: ASSEMBLY



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Snap ring
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 45 (4.6, 33.3)

1) Apply oil to the surfaces of the connecting rod bearings.
2) Install the connecting rod bearings on connecting rods and connecting rod caps.
3) Position each connecting rod with the marked side facing forward, and install it.
4) Install the connecting rod cap with connecting rod nut.
Ensure the arrow on connecting rod cap faces toward front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

5) Install the expander, lower rail and upper rail in this order by hand. Install the second ring and top ring with a piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect the cylinder block surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.025 mm (0.00098 in)

Grinding limit:
0.1 mm (0.004 in)

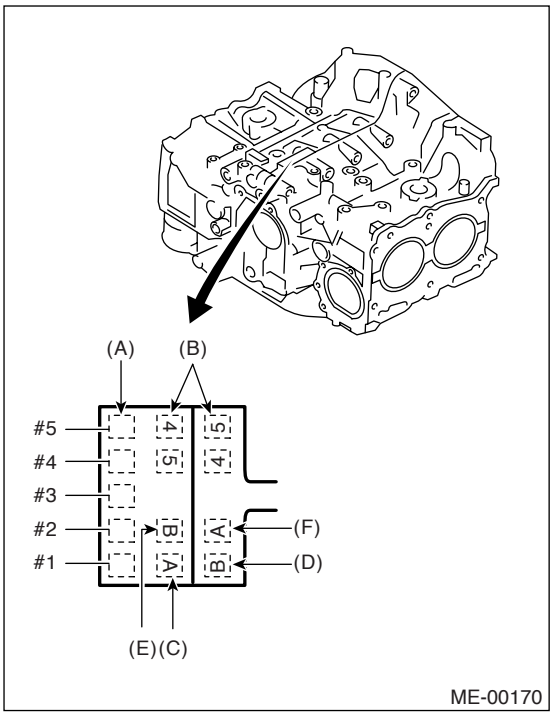
Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
• Measurement should be performed at a temperature of 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines in selecting a standard piston.

Standard diameter:
2.0 L model
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6218 — 3.6222 in)
2.5 L model
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)



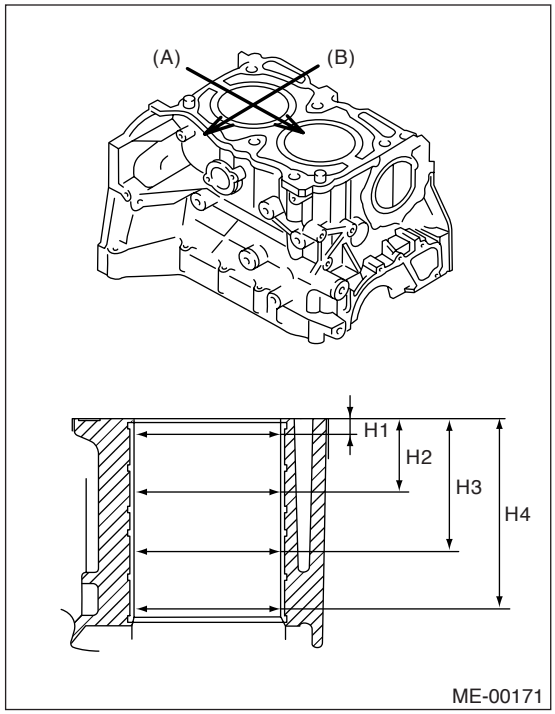
(A) Main journal size mark
(B) Cylinder block (RH)-(LH) combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder:
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights as shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)



(A) Piston pin direction
(B) Thrust direction
H1 10 mm (0.39 in)
H2 45 mm (1.77 in)
H3 80 mm (3.15 in)
H4 115 mm (4.53 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height as shown in the figure. (Thrust direction)

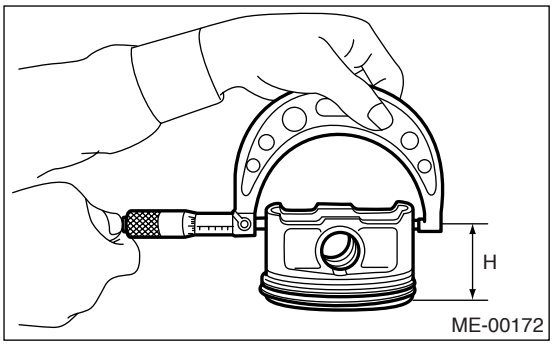
NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
2.0 L model
40.0 mm (1.575 in)
2.5 L model
37.0 mm (1.457 in)

Standard
2.0 L model
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6219 — 3.6222 in)
2.5 L model
A: 99.505 — 99.515 mm (3.9175 — 3.9179 in)
B: 99.495 — 99.505 mm (3.9171 — 3.9175 in)

0.25 mm (0.0098 in) oversize
2.0 L model
92.245 — 92.265 mm (3.6317 — 3.6325 in)
2.5 L model
99.745 — 99.765 mm (3.9270 — 3.9278 in)

0.50 mm (0.0197 in) oversize
2.0 L model
92.495 — 92.515 mm (3.6415 — 3.6423 in)
2.5 L model
99.995 — 100.015 mm (3.9368 — 3.9376 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
–0.010 — 0.010 mm (–0.00039 — 0.00039 in)

6) Boring and honing
(1) If the value of taper, out-of-roundness, or cylinder-to-piston clearance measured exceeds the standard value or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only. Nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds limit* after boring and honing, replace the cylinder block.

****: 2.0 L model***
92.515 mm (3.6423 in)

2.5 L model
100.015 mm (3.9376 in)

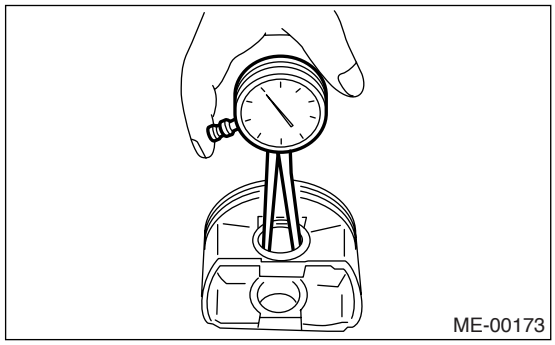
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention when measuring the cylinder diameter.

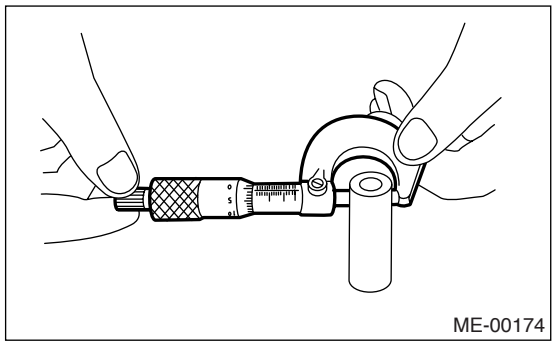
Limit of cylinder boring:
0.5 mm (0.020 in)

3. PISTON AND PISTON PIN

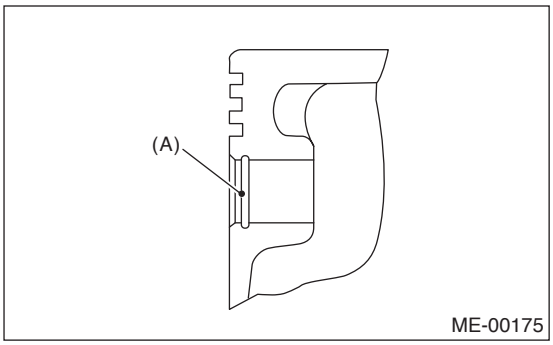
1) Check the pistons and piston pins for damage, cracks and wear, and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4SO 2.0)-76, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is not within the standard value, replace the piston. Or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Clearance between piston hole and piston pin:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)





4) Check the snap ring installation groove (A) on the piston for burr. If necessary, remove burr from the groove so that the piston pin can lightly move.

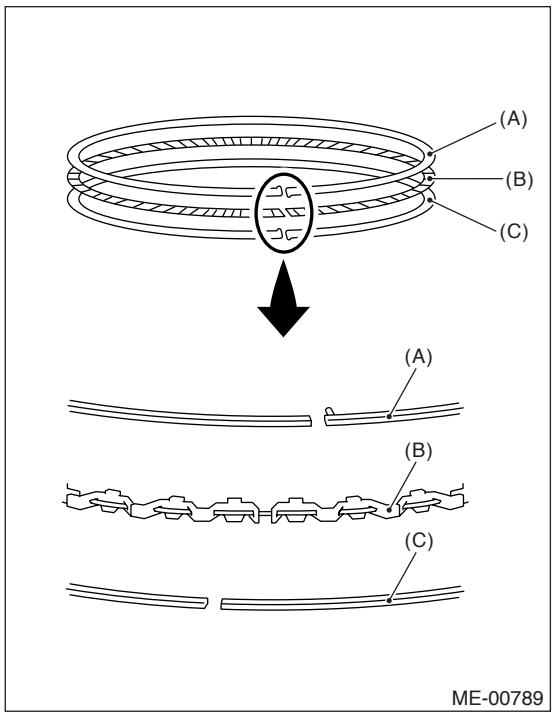


5) Check the piston pin snap ring for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

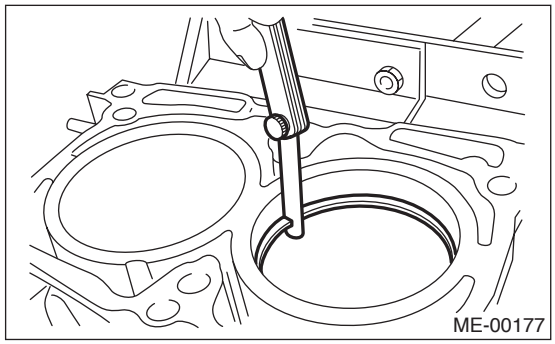
CAUTION:
• Mark is displayed on the end of top and second rings. When installing the rings to the piston, face these marks upward.
• Oil ring consists of the upper rail, expander and lower rail. Be careful about the direction of rail when installing the oil ring to piston.



(A) Upper rail
(B) Expander
(C) Lower rail

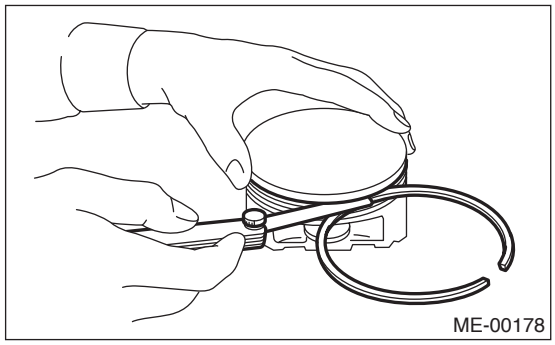
2) Clean the piston ring groove and piston ring.
3) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

			Standard mm (in)
Piston ring gap	Top ring		0.20 — 0.35 (0.0079 — 0.0138)
	Second ring	2.0 L	0.40 — 0.50 (0.0157 — 0.0197)
		2.5 L	0.35 — 0.50 (0.0138 — 0.0197)
	Oil ring rail		0.20 — 0.50 (0.0079 — 0.0197)



4) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

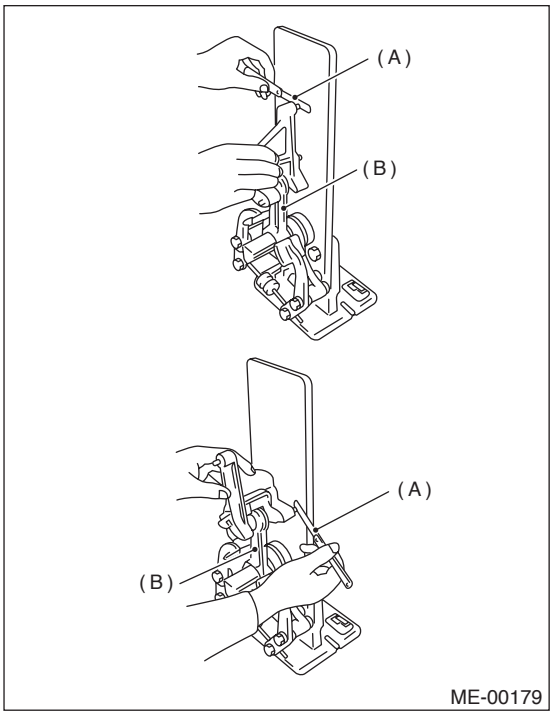
		Standard mm (in)
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

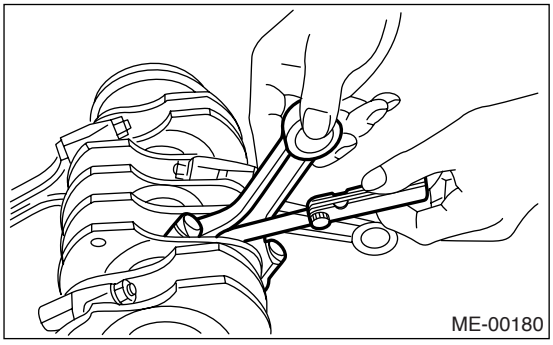
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). If side clearance exceeds the limit, replace the connecting rod.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within the specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

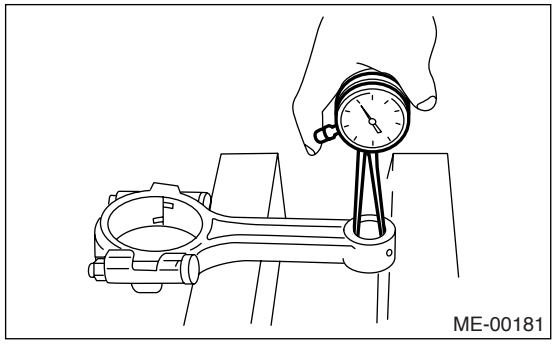
Connecting rod oil clearance:
Standard
0.016 — 0.044 mm (0.00063 — 0.0017 in)

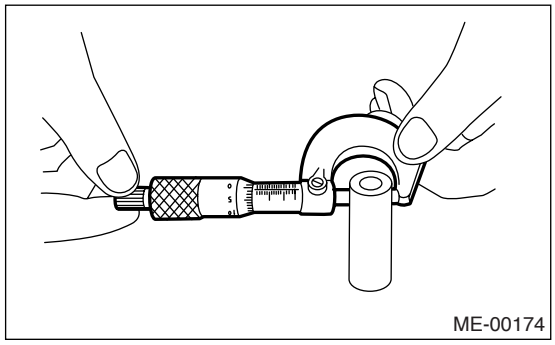
Unit: mm (in)

Bearings	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.492 — 1.501 (0.0587 — 0.0591)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.510 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.520 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.620 — 1.623 (0.0638 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

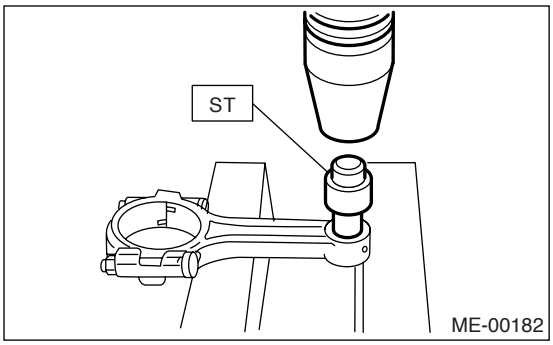
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)





7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



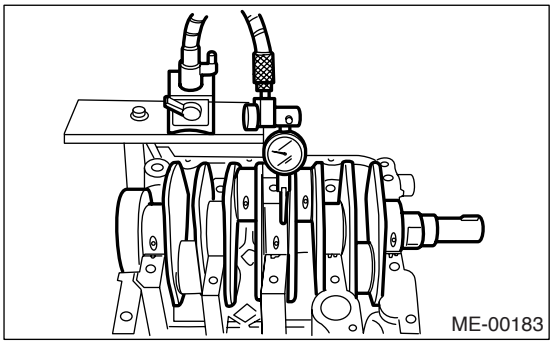
(3) Make two 3 mm (0.12 in)-holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely, and check it for cracks using red lead. Replace if faulty.
2) Measure the bend of crankshaft. If it exceeds the limit, repair or replace it.

NOTE:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings, and then measure the crankshaft bend using a dial gauge.

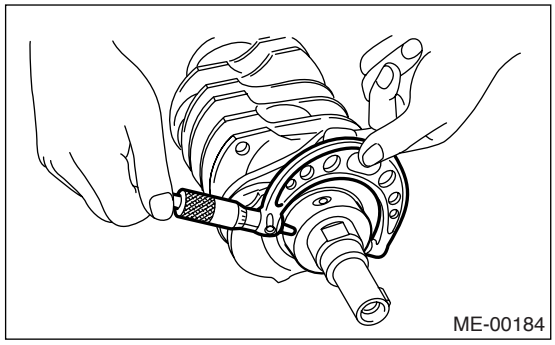
Crankshaft bend limit:
0.035 mm (0.0014 in)



3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin:
2.0 L model
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)
Grinding limit
To 51.750 mm (2.0374 in) dia.
2.5 L model
Out-of-roundness
0.003 mm (0.0001 in)
Cylindricality
0.004 mm (0.0002 in)
Grinding limit
To 51.750 mm (2.0374 in) dia.

Crank journal:
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)
Grinding limit
To 59.750 mm (2.3524 in) dia.

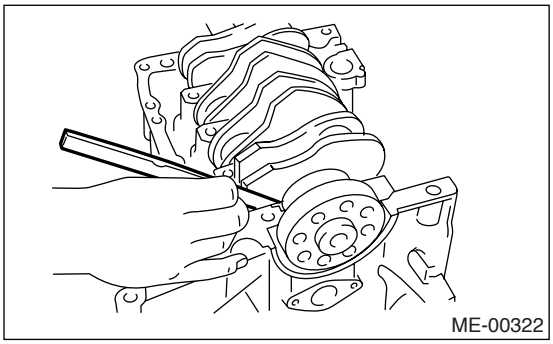


Unit: mm (in)

		Crank journal outer diameter		Crank pin outer diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.492 — 1.501 (0.0587 — 0.0591)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.510 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.520 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.620 — 1.623 (0.0638 — 0.0639)

4) Measure the side clearance of crankshaft at center bearing. If clearance exceeds the limit, replace the bearing.

Crankshaft side clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)

22.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refers to the possibility of reason for the trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

Symptom	Problem parts, etc.	Possible cause	RANK
1. Engine does not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective starter switch	C
		Defective inhibitor switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
3) Initial combustion occurs.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

Symptom	Problem parts, etc.	Possible cause	RANK
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
2. Rough idle and engine stall	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Over-heating	C
	Other	Evaporative emission control system malfunction	A
		Stuck or damaged throttle valve	B

Symptom	Problem parts, etc.	Possible cause	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Over-heating	C
		Over-cooling	C
	Other	Evaporative emission control system malfunction	A
4. Surging	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Cooling system	Over-heating	B
	Other	Evaporative emission control system malfunction	C

Symptom	Problem parts, etc.	Possible cause	RANK
5. Engine does not return to idle.	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Other	Stuck or damaged throttle valve	A
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Over-heating	B
	Other	Evaporative emission control system malfunction	B
7. After burning in exhaust system	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C
	Other	Evaporative emission control system malfunction	C
8. Knocking	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
	Cooling system	Over-heating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter seal	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

Symptom	Problem parts, etc.	Possible cause	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C

23.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn camshaft main bearing • Worn connecting rod bearing (big end)
	Oil pressure is normal.	Damaged engine mounting
High-pitched clank (Spark knock)	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is 1,000 to 2,000 rpm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn camshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam gear • Worn camshaft journal bore in crankcase
Squeaky sound	—	Insufficient generator lubrication
Rubbing sound	—	Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting with case/adjacent part
Valve tappet noise	—	Incorrect valve clearance

NOTE*)
When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, carry out the clear memory mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and inspection mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.> after connecting the fuel injector connector.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

EXHAUST

EX(H4SO 2.0)

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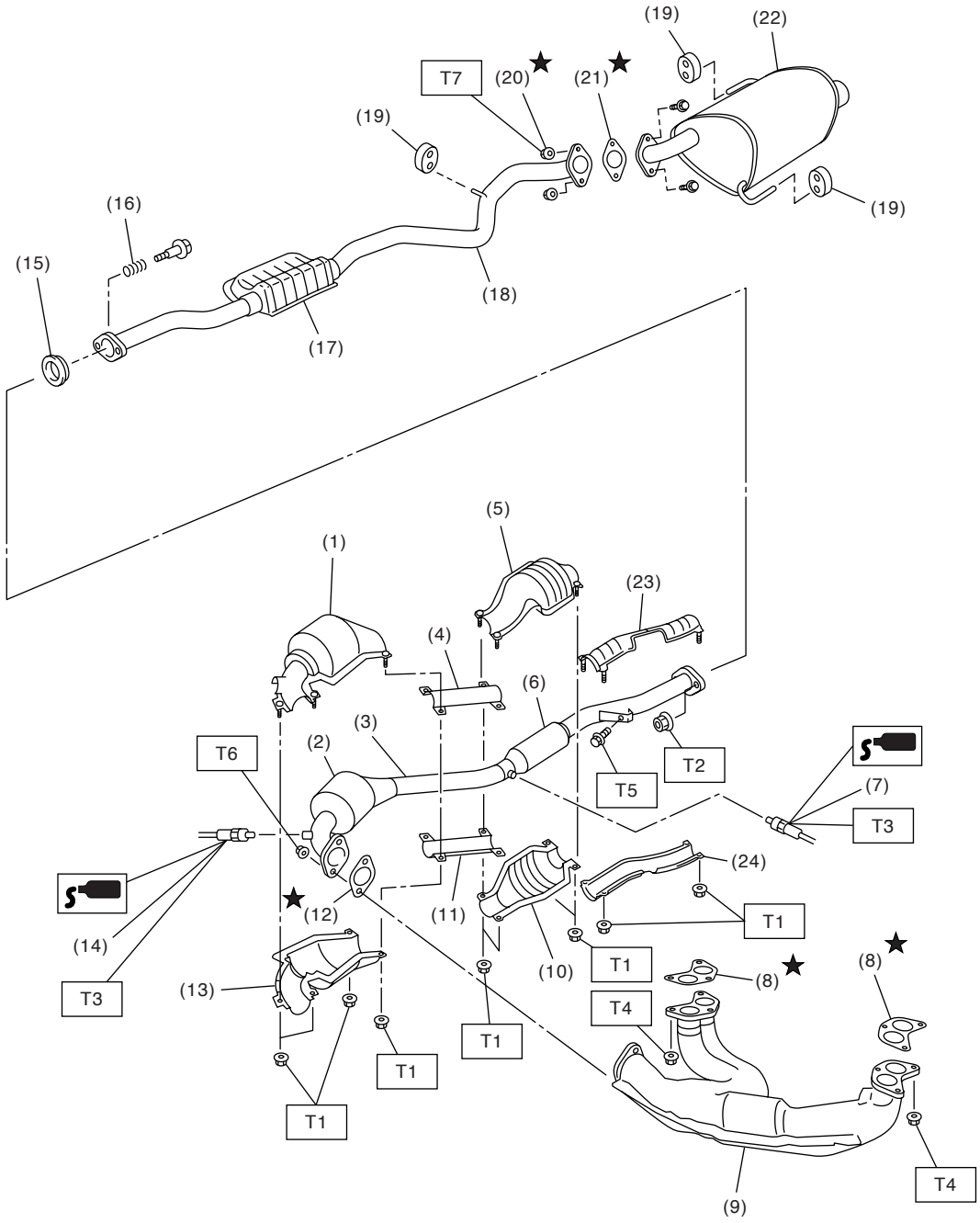
2. Front Exhaust Pipe....7
3. Center Exhaust Pipe 10
4. Rear Exhaust Pipe 11
5. Muffler 13

1. General Description

A: COMPONENT

• 2.0 L model

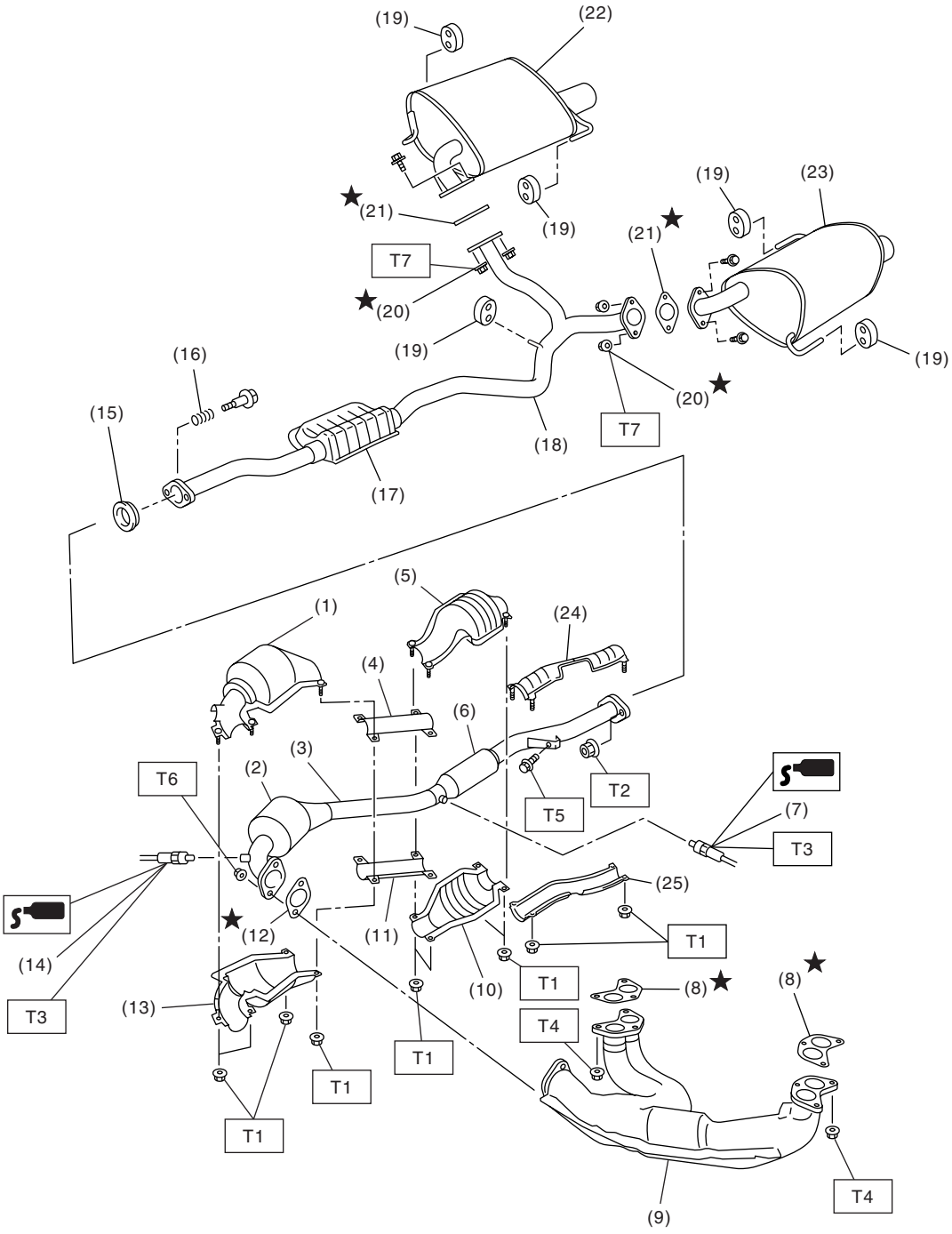


EX-02020

(1) Front catalytic converter upper cover
(2) Front catalytic converter
(3) Center exhaust pipe
(4) Center exhaust pipe upper cover
(5) Rear catalytic converter upper cover
(6) Rear catalytic converter
(7) Rear oxygen sensor
(8) Gasket
(9) Front exhaust pipe
(10) Rear catalytic converter lower cover
(11) Center exhaust pipe lower cover
(12) Gasket
(13) Front catalytic converter lower cover
(14) Front oxygen (A/F) sensor
(15) Gasket
(16) Spring
(17) Chamber
(18) Rear exhaust pipe
(19) Cushion rubber
(20) Self-locking nut
(21) Gasket
(22) Muffler
(23) Rear exhaust pipe upper cover
(24) Rear exhaust pipe lower cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 40.8 (4.2, 30.1)
T7: 48 (4.9, 35.4)

• 2.5 L model



EX-02012

(1) Front catalytic converter upper cover
(2) Front catalytic converter
(3) Center exhaust pipe
(4) Center exhaust pipe upper cover
(5) Rear catalytic converter upper cover
(6) Rear catalytic converter
(7) Rear oxygen sensor
(8) Gasket
(9) Front exhaust pipe
(10) Rear catalytic converter lower cover
(11) Center exhaust pipe lower cover
(12) Gasket
(13) Front catalytic converter lower cover
(14) Front oxygen (A/F) sensor
(15) Gasket
(16) Spring
(17) Chamber
(18) Rear exhaust pipe
(19) Cushion rubber
(20) Self-locking nut
(21) Gasket
(22) Muffler (RH)
(23) Muffler (LH)
(24) Rear exhaust pipe upper cover
(25) Rear exhaust pipe lower cover

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 40.8 (4.2, 30.1)
T7: 48 (4.9, 35.4)

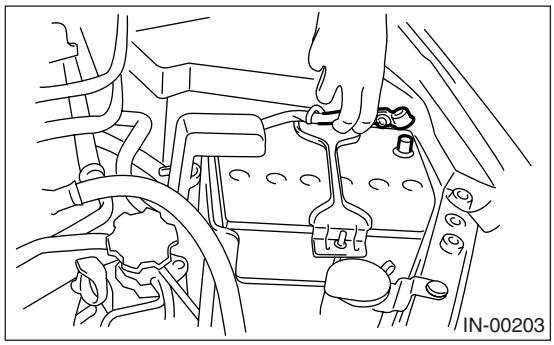
B: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

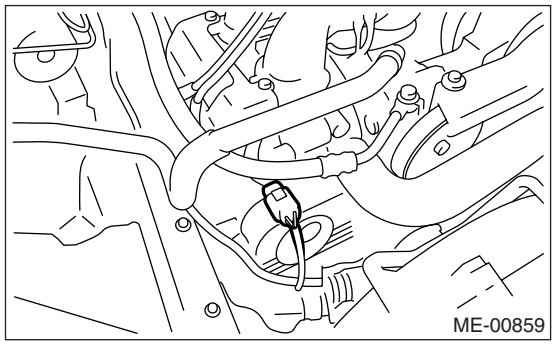
2. Front Exhaust Pipe

A: REMOVAL

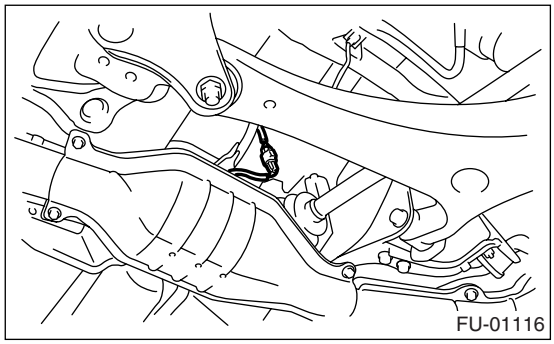
1) Disconnect the ground cable from battery.



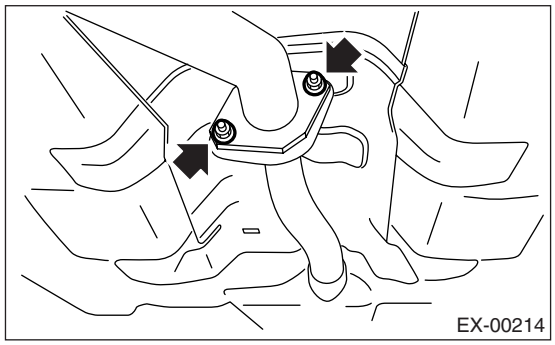
2) Disconnect the front oxygen (A/F) sensor connector.



3) Lift-up the vehicle.
4) Disconnect the rear oxygen sensor connector.

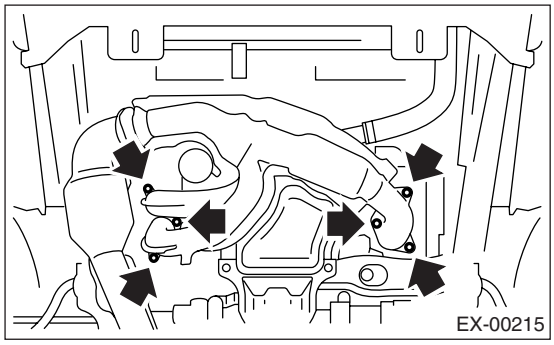


5) Separate the center exhaust pipe from rear exhaust pipe.

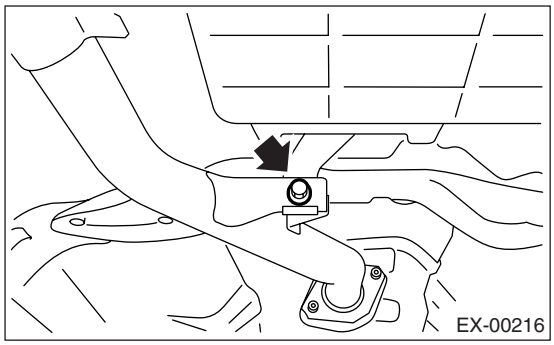


6) Remove the under cover.
7) Remove the nuts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front and center exhaust pipe assembly.



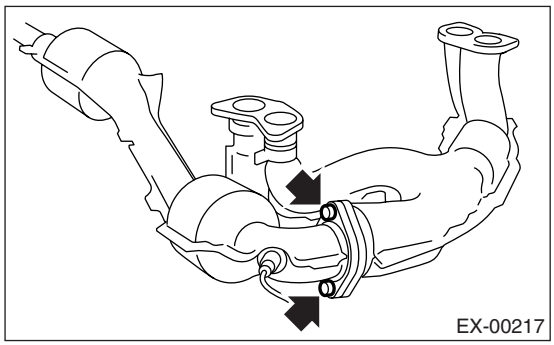
8) Remove the bolt which holds center exhaust pipe to hanger bracket.



9) Remove the front and center exhaust pipe assembly from the vehicle.

CAUTION:
• Be careful not to let the front and center exhaust pipe assembly fall off when removing as it is quite heavy.
• After removing the front and center exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.

10) Separate the front exhaust pipe from center exhaust pipe.



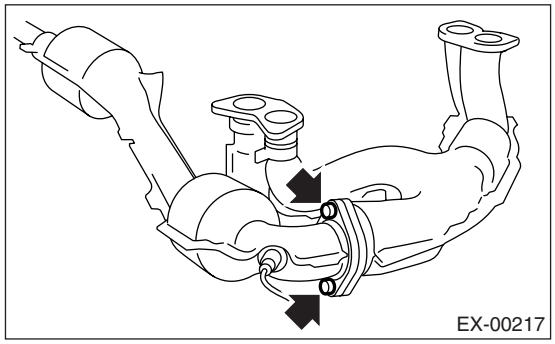
11) Remove the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H4SO 2.0)-32, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.0)-33, REMOVAL, Rear Oxygen Sensor.> or <Ref. to FU(H4SO 2.5)-34, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.5)-35, REMOVAL, Rear Oxygen Sensor.>

B: INSTALLATION

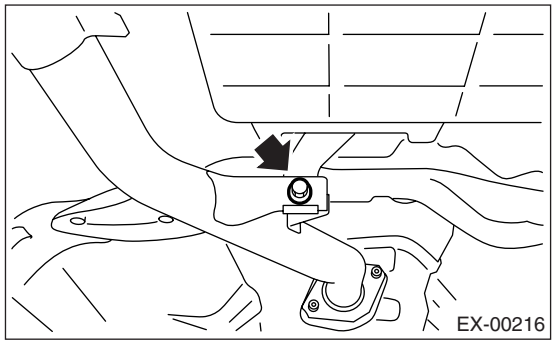
1) Install the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H4SO 2.0)-32, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.0)-33, INSTALLATION, Rear Oxygen Sensor.> or <Ref. to FU(H4SO 2.5)-34, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H4SO 2.5)-35, INSTALLATION, Rear Oxygen Sensor.>
2) Install the front exhaust pipe to center exhaust pipe.

NOTE:
Use a new gasket.

Tightening torque:
40.8 N·m (4.2 kgf-m, 30.1 ft-lb)

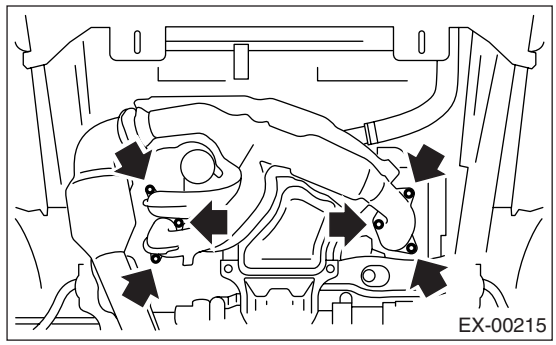


3) Install the front and center exhaust pipe assembly to the vehicle.
4) Temporarily tighten the bolt which holds the center exhaust pipe to hanger bracket.



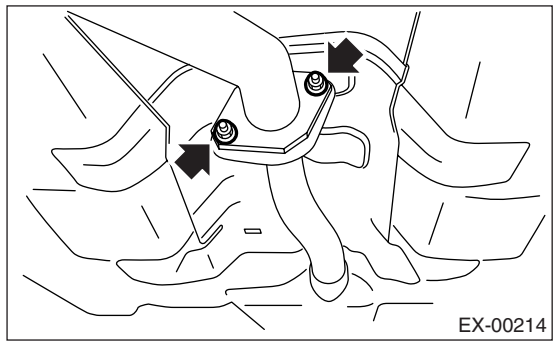
5) Install the nuts to cylinder head which hold front exhaust pipe.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)



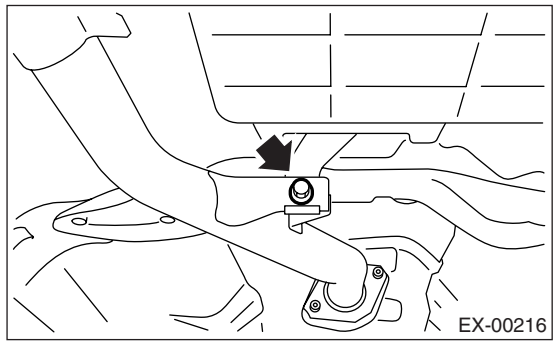
6) Install the under cover.
7) Tighten the bolts which install the center exhaust pipe to rear exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

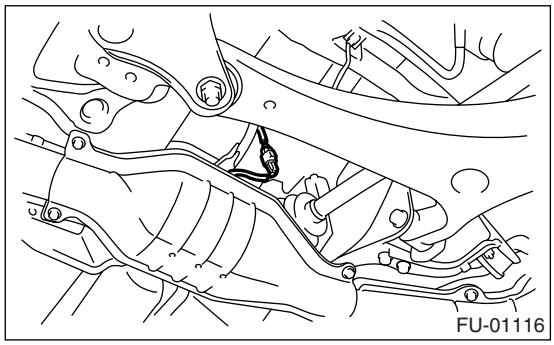


8) Tighten the bolt which holds the center exhaust pipe to hanger bracket.

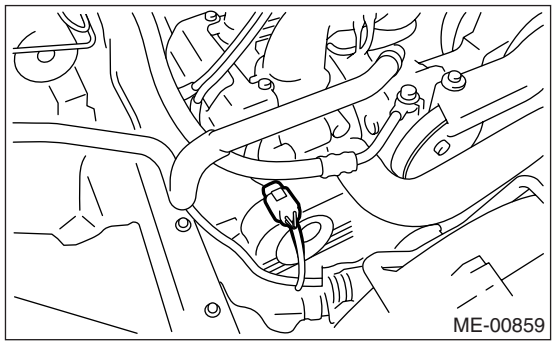
Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



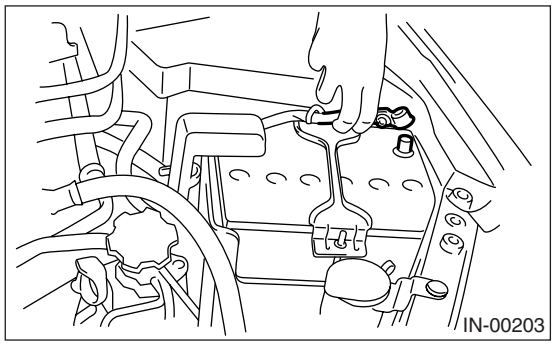
9) Connect the rear oxygen sensor connector.



10) Lower the vehicle.
11) Connect the front oxygen (A/F) sensor connector.



12) Connect the battery ground cable to battery.



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Center Exhaust Pipe

A: REMOVAL

After removing the center and front exhaust pipes as one unit, separate them. Refer to “Front Exhaust Pipe” for removal procedure. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>

B: INSTALLATION

Install the center exhaust pipe and front exhaust pipe as one unit. Refer to “Front Exhaust Pipe” for installation procedure. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>

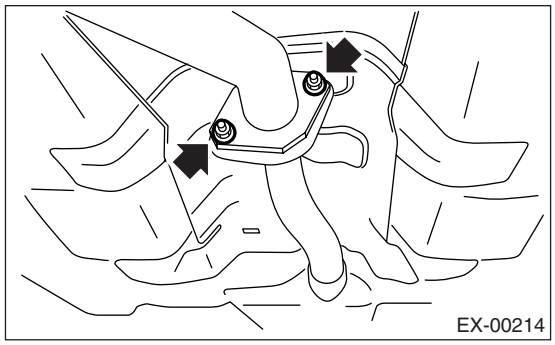
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Rear Exhaust Pipe

A: REMOVAL

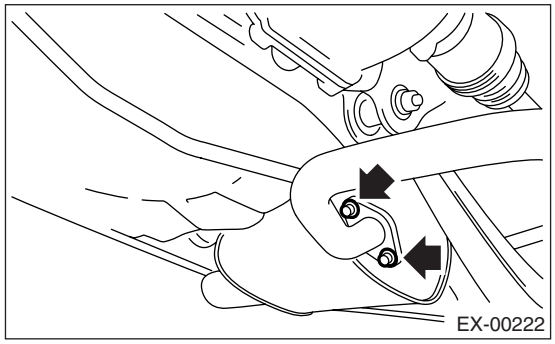
1) Separate the rear exhaust pipe from center exhaust pipe.



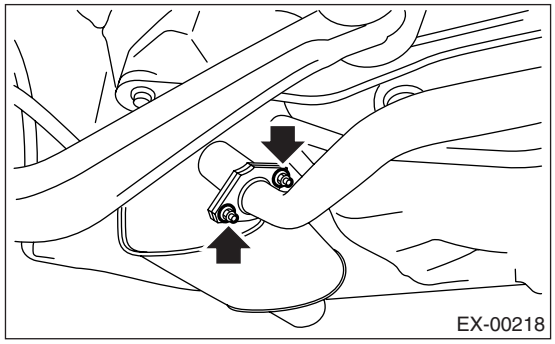
2) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.

- LH side

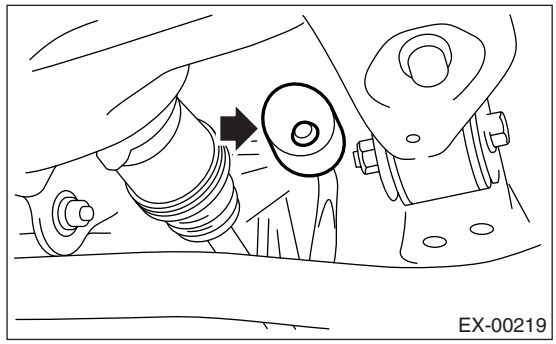


- RH side (2.5 L model)



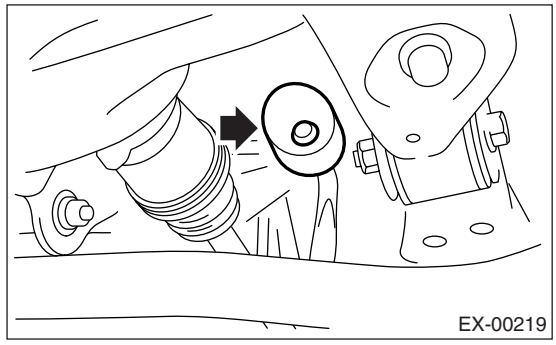
3) Apply a coat of spray type lubricant to mating area of cushion rubber.

4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

1) Apply a coat of spray type lubricant to mating area of cushion rubber.
2) Install the rear exhaust pipe bracket to cushion rubber.

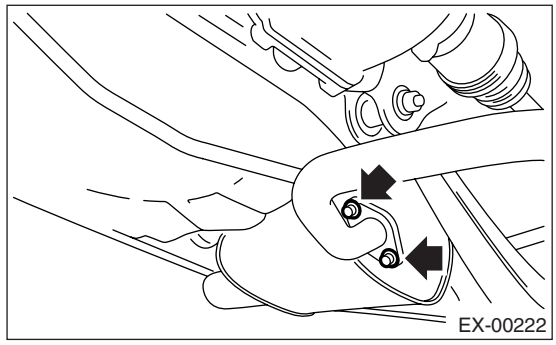


3) Install the rear exhaust pipe to muffler.

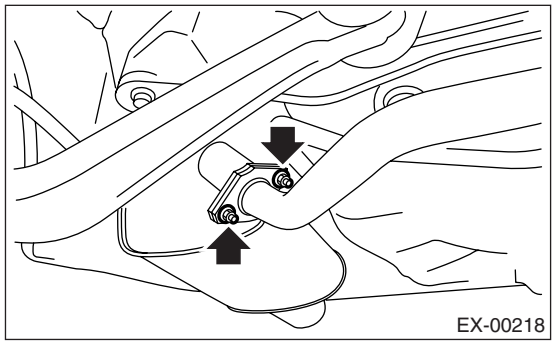
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

- LH side

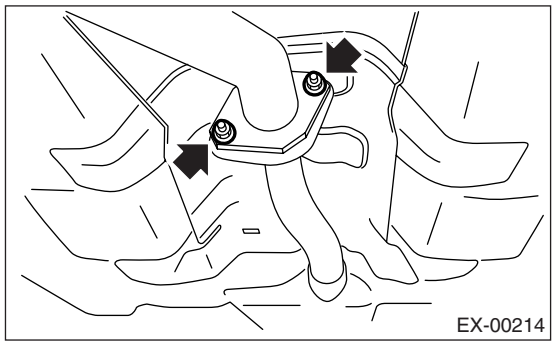


• RH side (2.5 L model)



4) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



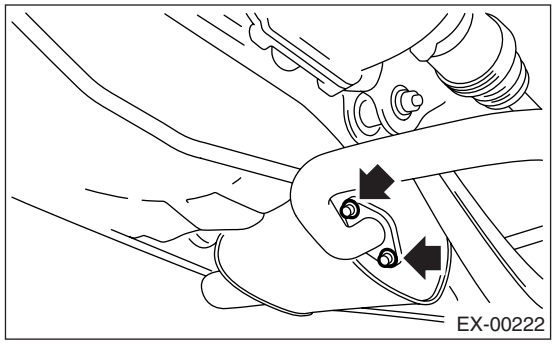
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

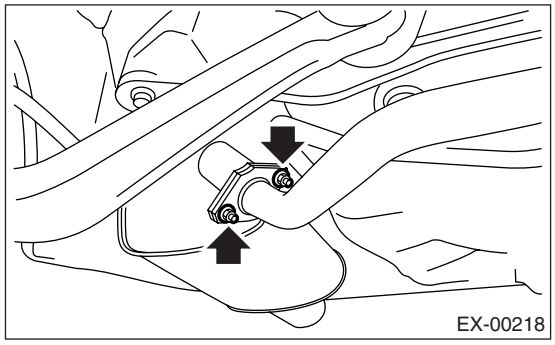
5. Muffler

A: REMOVAL

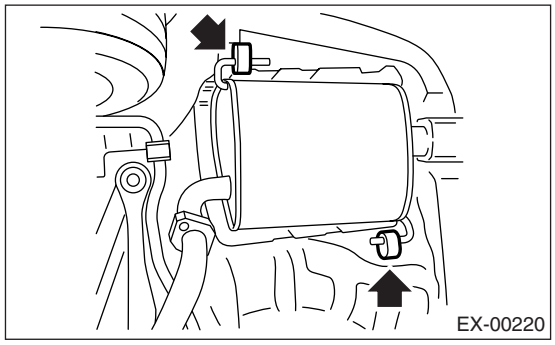
1) Separate the muffler from rear exhaust pipe.
• LH side



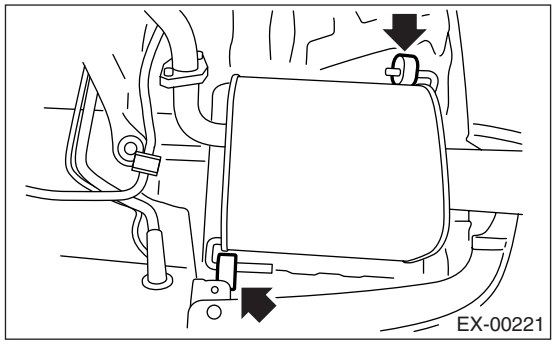
• RH side (2.5 L model)



2) Apply a coat of spray type lubricant to mating area of cushion rubber.
• LH side



• RH side (2.5 L model)



3) Remove the front and rear cushion rubber, and then remove the muffler.

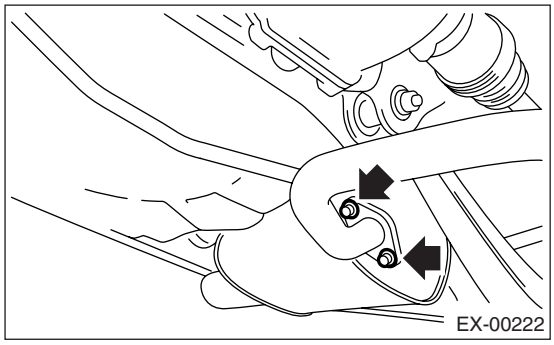
B: INSTALLATION

Install in the reverse order of removal.

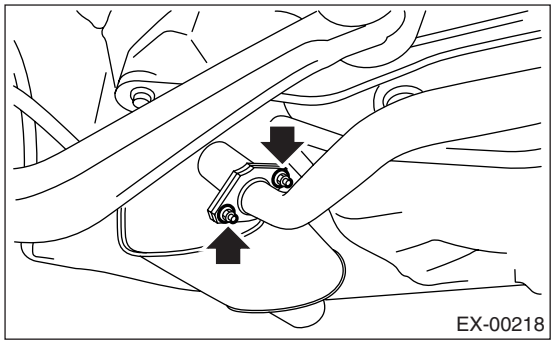
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

• LH side



• RH side (2.5 L model)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

Muffler

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

COOLING

CO(H4SO 2.0)

		Page
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3.	Engine Coolant	13
4.	Water Pump	15
5.	Thermostat	18
6.	Radiator	20
7.	Radiator Cap	24
8.	Radiator Main Fan and Fan Motor	25
9.	Radiator Sub Fan and Fan Motor	27
10.	Reservoir Tank	29
11.	Engine Cooling System Trouble in General	30

1. General Description

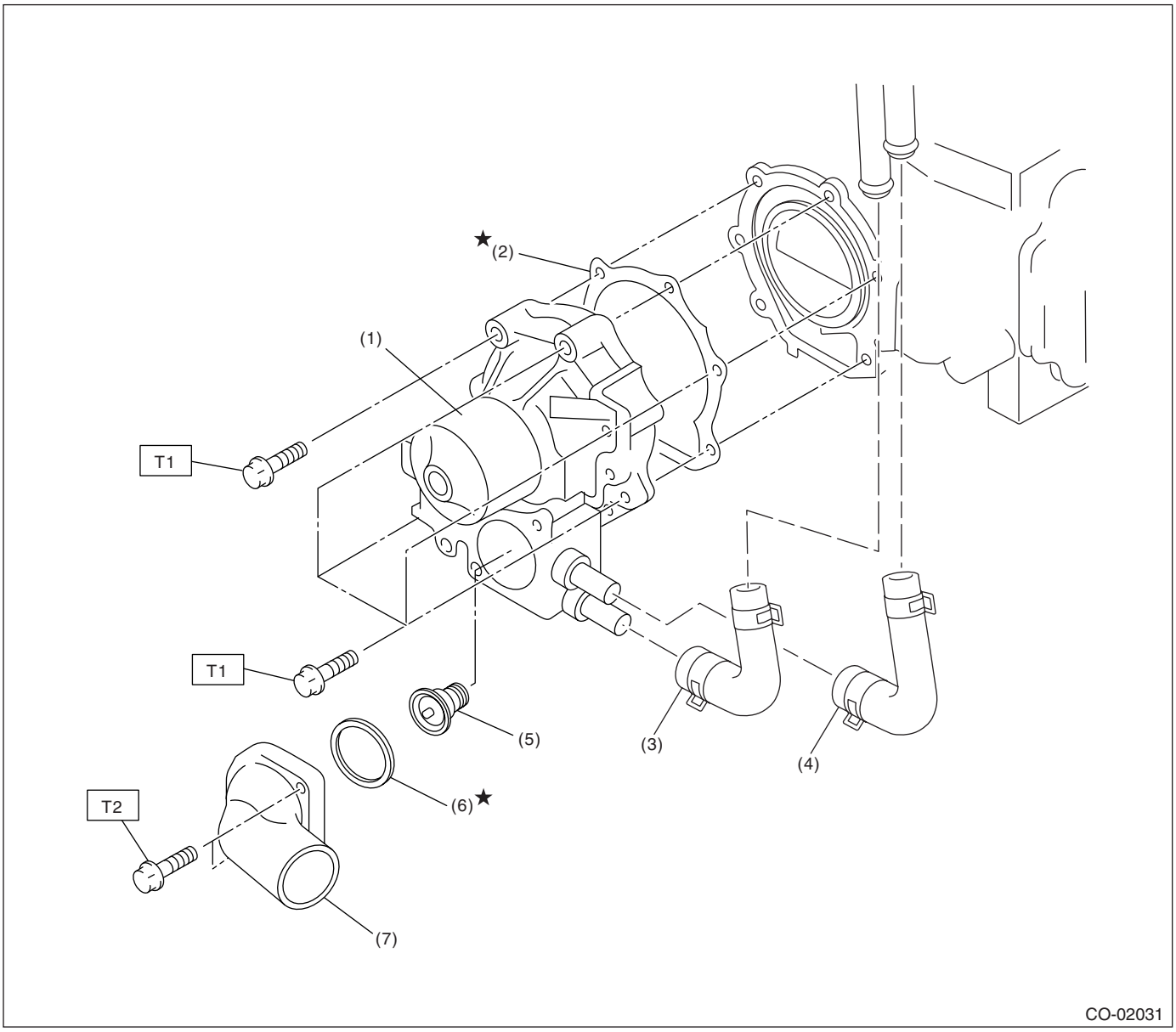
A: SPECIFICATION

Cooling system				Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)				MT: approx. 6.5 (6.9, 5.7) AT: approx. 6.4 (6.8, 5.6) (Model without ATF warmer) AT: approx. 6.8 (7.1, 6.0) (Model with ATF warmer)
Water pump	Type			Centrifugal impeller type
	Discharge performance I	Discharge ℓ (US gal, Imp gal) /min		20 (5.3, 4.4)
		Pump speed — Discharge pressure		760 rpm — 2.9 kPa (0.3 mAq)
		Engine coolant temperature		85°C (185°F)
	Discharge performance II	Discharge ℓ (US gal, Imp gal) /min		100 (26.4, 22.0)
		Pump speed — Discharge pressure		3,000 rpm — 49.0 kPa (5.0 mAq)
		Engine coolant temperature		85°C (185°F)
	Discharge performance III	Discharge ℓ (US gal, Imp gal) /min		200 (52.8, 44.0)
		Pump speed — Discharge pressure		6,000 rpm — 225.4 kPa (23.0 mAq)
		Engine coolant temperature		85°C (185°F)
	Impeller diameter mm (in)			76 (2.99)
	Number of impeller vanes			8
	Pump pulley diameter mm (in)			60 (2.36)
	Clearance between impeller and case	Standard mm (in)		0.5 — 1.5 (0.020 — 0.06)
Thermostat	Type			Wax pellet type
	Starting temperature to open			80 — 84°C (176 — 183°F)
	Fully opens			95°C (203°F)
	Valve lift mm (in)			9.0 (0.354) or more
	Valve bore mm (in)			35 (1.38)
Radiator fan	Motor input	Main fan		90 W
		Sub fan		90 W
	Fan diameter / Blades	Main fan		300 mm (11.81 in) /4
		Sub fan		300 mm (11.81 in) /5
Radiator	Type			Down flow, pressure type
	Core dimensions	Width × Height × Thickness mm (in)		687.4 × 340 × 16 (27.06 × 13.39 × 0.63)
	Pressure range in which cap valve is open kPa (kg/cm^2, psi)			Above: 108±15, or more (1.1±0.15, 16±2) Below: –1.0 — –4.9, or less (–0.01 — –0.05, –0.1 — –0.7)
	Fins			Corrugated fin type
Reservoir tank	Capacity ℓ (US qt, Imp qt)			0.45 (0.48, 0.40)

Vehicle speed	A/C compressor load	Engine coolant temperature		
		95°C (203°F) or less	96 — 99°C (203 — 210°F)	100°C (212°F) or more
		Operation of radiator fan	Operation of radiator fan	Operation of radiator fan
19 km/h (12 MPH) or less	OFF	OFF	Low-Speed	High-Speed
	Low	Low-Speed	Low-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
20 — 69 km/h (12 — 43 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	High-Speed	High-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
70 — 105 km/h (43 — 65 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	Low-Speed	High-Speed	High-Speed
106 km/h (66 MPH) or more	OFF	OFF	OFF	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	OFF	Low-Speed	High-Speed

B: COMPONENT

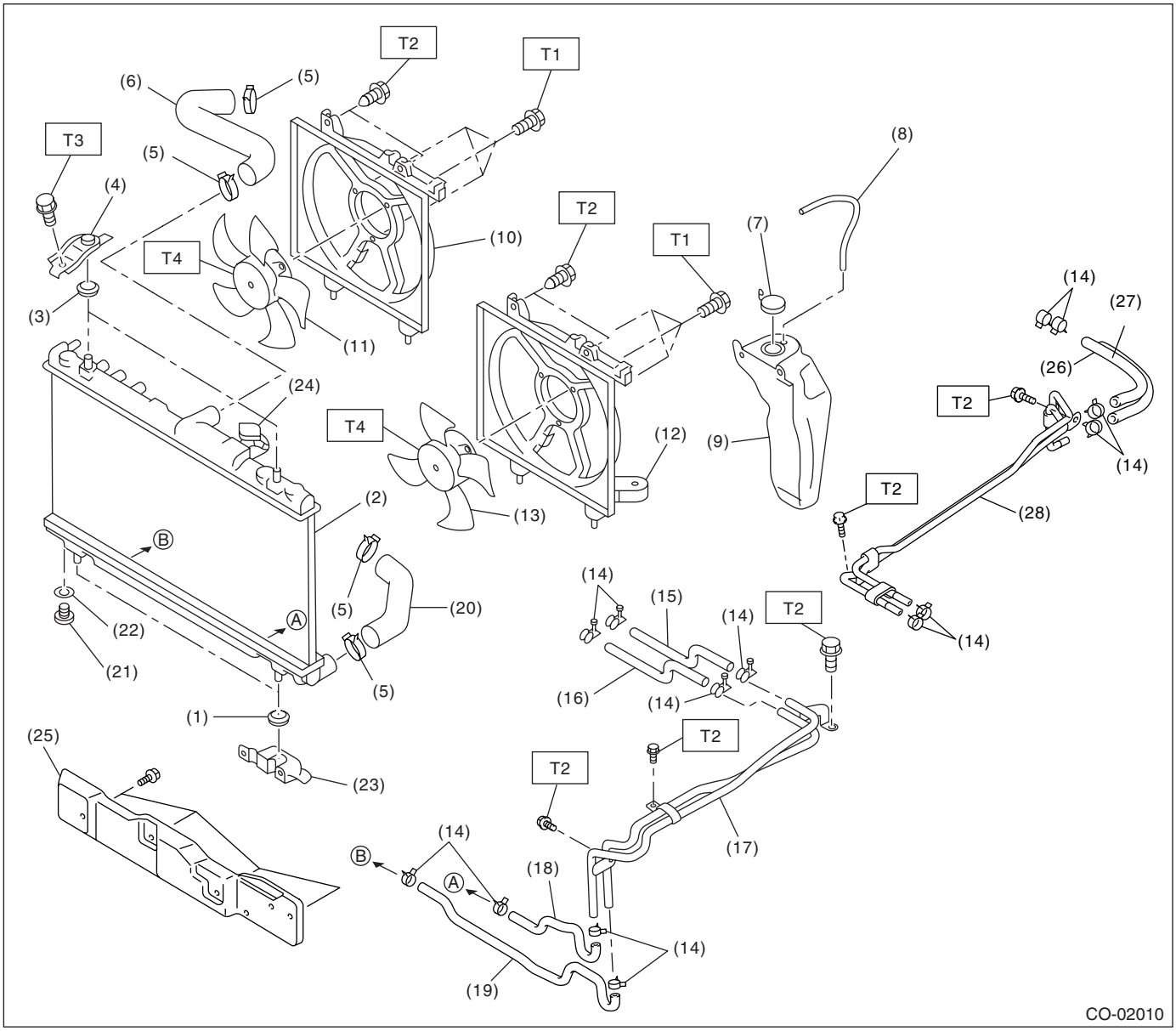
1. WATER PUMP



(1) Water pump ASSY
(2) Gasket
(3) Heater by-pass hose
(4) ATF warmer by-pass hose (Model with ATF warmer)
(5) Thermostat
(6) Gasket
(7) Thermostat cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T2: 12 (1.2, 8.7)

2. RADIATOR AND RADIATOR FAN



(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Over flow hose
(9) Engine coolant reservoir tank
(10) Radiator sub fan shroud
(11) Radiator sub fan, radiator sub fan motor assembly
(12) Radiator main fan shroud
(13) Radiator main fan, radiator main fan motor assembly
(14) ATF hose clamp (AT model)
(15) ATF inlet hose A (Model without ATF warmer)
(16) ATF outlet hose A (Model without ATF warmer)
(17) ATF pipe (Model without ATF warmer)
(18) ATF outlet hose B (Model without ATF warmer)
(19) ATF inlet hose B (Model without ATF warmer)
(20) Radiator outlet hose
(21) Radiator drain plug
(22) O-ring
(23) Radiator lower bracket
(24) Radiator cap
(25) Heat shield cover (Model without ATF warmer)
(26) ATF inlet hose A (Model with ATF warmer)
(27) ATF outlet hose A (Model without ATF warmer)
(28) ATF pipe (Model with ATF warmer)

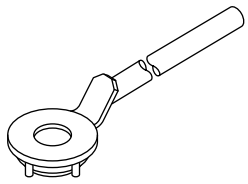
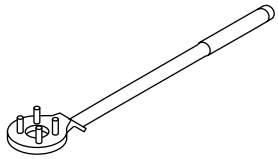
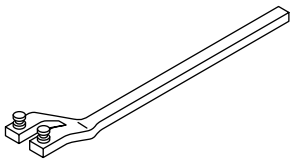
Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 7.5 (0.76, 5.5)
T3: 12 (1.2, 8.9)
T4: 3.4 (0.35, 2.5)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

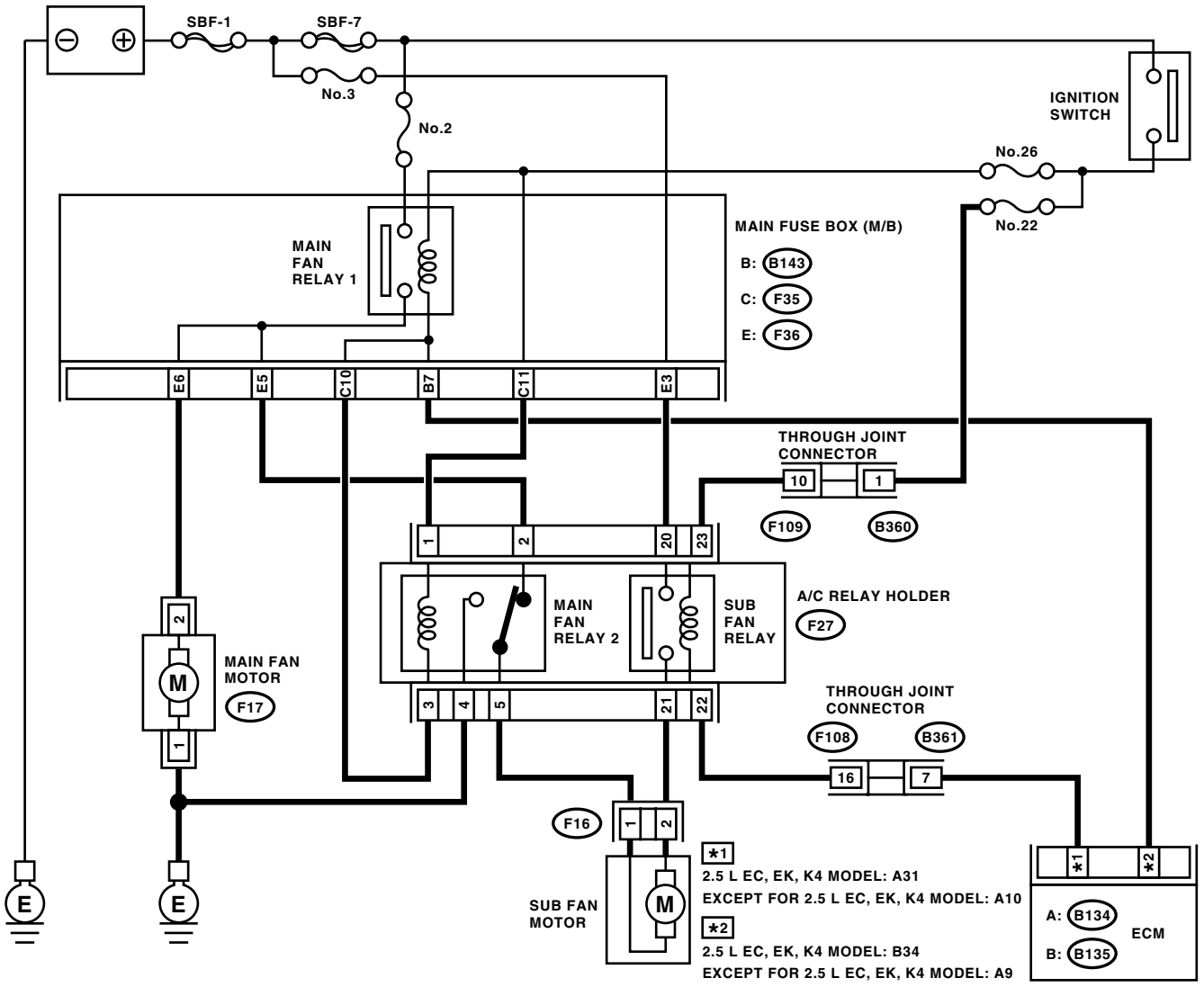
D: PREPARATION TOOL

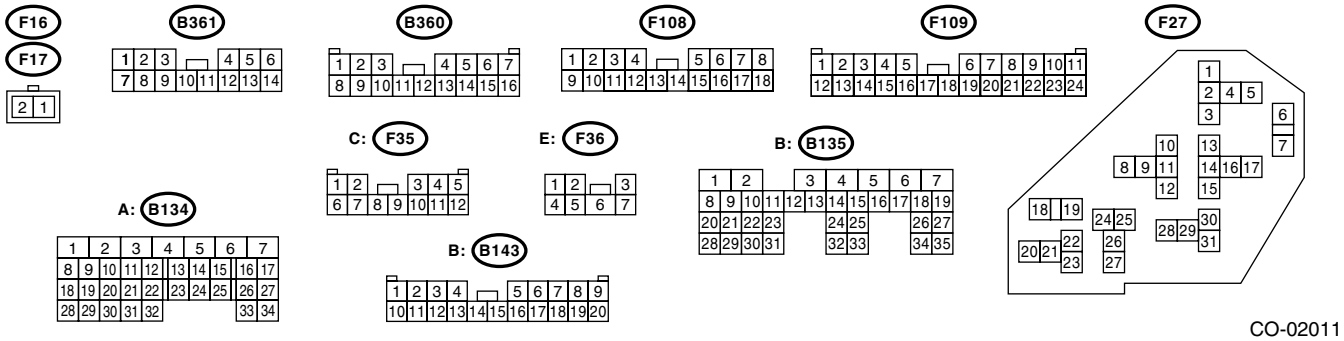
1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt. (2.5 L model)
 ST18231AA010	18231AA010	CAM SPROCKET WRENCH	• Used for removing and installing cam sprocket. • CAM SPROCKET WRENCH (499207100) can also be used.

2. Radiator Fan System

A: WIRING DIAGRAM





CO-02011

B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is more than 96°C (205°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOMS:

Radiator main and sub fan do not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> <Ref. to EN(H4SO 2.5)(diag)-42, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at low speed?	Go to step **2.**	Go to step **3.**
2	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Subaru Select Monitor Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> <Ref. to EN(H4SO 2.5)(diag)-42, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at high speed?	Radiator fan system is normal.	Go to step **27.**
3	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 20 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**

	Step	Check	Yes	No
4	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **6.**
5	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 3. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
6	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
7	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan relay terminals. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Replace the sub fan relay.
8	**CHECK SUB FAN RELAY.** 1) Connect the battery to terminals No. 22 and No. 23 of sub fan relay. 2) Measure the resistance between sub fan relay terminals. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the sub fan relay.
9	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** 1) Disconnect the connector from sub fan motor. 2) Measure the resistance of harness between sub fan relay terminal and sub fan motor connector. ***Connector & terminal*** ***(F16) No. 2 — (F27) No. 21:***	Is the resistance less than 1 Ω?	Go to step **10.**	Measure the open circuit of harness between sub fan relay terminal and sub fan motor connector.
10	**CHECK HARNESS BETWEEN SUB FAN MOTOR CONNECTOR AND MAIN FAN RELAY 2 CONNECTOR.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance of harness between sub fan motor connector and main fan relay 2 connector. ***Connector & terminal*** ***(F16) No. 1 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open harness between sub fan motor connector and main fan relay 2 connector.
11	**CHECK POOR CONTACT.** Check the poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **12.**
12	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of sub fan motor, and the ground (–) terminal to terminal No. 1.	Does the sub fan rotate?	Go to step **13.**	Replace the sub fan motor.
13	**CHECK MAIN FAN RELAY 2.** Measure the resistance of main fan relay 2. ***Terminals*** ***No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the main fan relay 2.

	Step	Check	Yes	No
14	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 2 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F27) No. 2:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness between main fan relay 2 terminal and main fan motor connector.
15	**CHECK MAIN FAN MOTOR AND GROUND CIRCUIT.** Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the open circuit in harness between main fan motor connector and chassis ground.
16	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **17.**
17	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of main fan motor, and the ground (−) terminal to terminal No. 1.	Does the main fan rotate?	Go to step **18.**	Replace the main fan motor.
18	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between sub fan relay terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4 model*** ***(B134) No. 31 — (F27) No. 22:*** ***Except for 2.5 L EC, EK, K4 model*** ***(B134) No. 10 — (F27) No. 22:***	Is the resistance less than 1 Ω?	Go to step **19.**	Repair the open circuit in harness between sub fan relay terminal and ECM.
19	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).> <Ref. to EN(H4SO 2.5)(diag)-33, Read Diagnostic Trouble Code (DTC).>
20	**CHECK MAIN FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from A/C relay holder. 3) Measure the resistance of terminal in main fan relay 1 switch.	Is the resistance more than 1 MΩ?	Go to step **21.**	Replace the main fan relay 1.
21	**CHECK MAIN FAN RELAY 1.** 1) Connect the battery to terminal of main fan relay 1 coil. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω?	Go to step **22.**	Replace the main fan relay 1.

	Step	Check	Yes	No
22	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 1 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F36) No. 6:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit of harness between main fan relay 1 terminal and main fan motor connector.
23	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between main fan relay 1 terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4 model*** ***(B135) No. 34 — (B143) No. 7:*** ***Except for 2.5 L EC, EK, K4 model*** ***(B134) No. 9 — (B143) No. 7:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness between main fan relay 1 terminal and ECM.
24	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM.** Measure the resistance between main fan relay 2 terminal and ECM connector. ***Connector & terminal*** ***2.5 L EC, EK, K4 model*** ***(B135) No. 34 — (F27) No. 3:*** ***Except for 2.5 L EC, EK, K4 model*** ***(B134) No. 9 — (F27) No. 3:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit of harness between main fan relay 2 terminal and ECM.
25	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 2 and No. 26. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **26.**
26	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there a poor contact in ECM connector?	Repair the poor contact in ECM connector.	Repair the power supply circuit for main fuse box.
27	**CHECK OPERATION OF RADIATOR FAN.** Check if the sub fan rotates when both fans do not rotate at high speed under the step 2.	Does the sub fan rotate?	Go to step **20.**	Go to step **28.**
28	**CHECK GROUND CIRCUIT OF MAIN FAN RELAY 2.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **29.**	Repair the open circuit in harness between main fan relay 2 and chassis ground.
29	**CHECK POWER SUPPLY TO MAIN FAN RELAY 2.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **30.**	Repair the power supply line.

Step		Check	Yes	No
30	**CHECK MAIN FAN RELAY 2.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 2. 3) Measure the resistance of main fan relay 2. ***Terminals*** ***(F27) No. 2 — (F27) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **31.**	Replace the main fan relay 2.
31	**CHECK MAIN FAN RELAY 2.** 1) Connect the battery to terminals No. 1 and No. 3 of main fan relay 2. 2) Measure the resistance of main fan relay 2. ***Terminals*** ***(F27) No. 4 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **23.**	Replace the main fan relay 2.

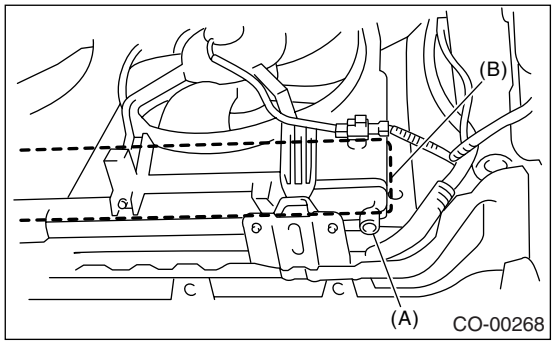
3. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain plug to drain engine coolant into container.

NOTE:
Remove the radiator cap so that engine coolant will drain faster.



(A) Drain plug
(B) Heat shield cover

4) Install the drain plug.

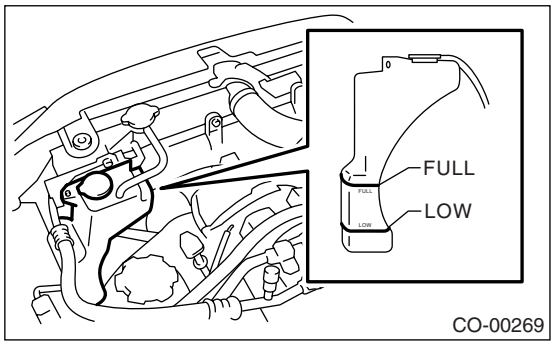
2. FILLING OF ENGINE COOLANT

1) Fill engine coolant into the radiator up to the filler neck position.

Coolant capacity (fill up to "FULL" level):
MT model:
6.5 ℓ (6.9 US qt, 5.7 Imp qt)
AT model (model without ATF warmer):
6.4 ℓ (6.8 US qt, 5.6 Imp qt)
AT model (model with ATF warmer):
6.8 ℓ (7.2 US qt, 6.0 Imp qt)

NOTE:
The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

2) Fill engine coolant into the reservoir tank up to "FULL" level.

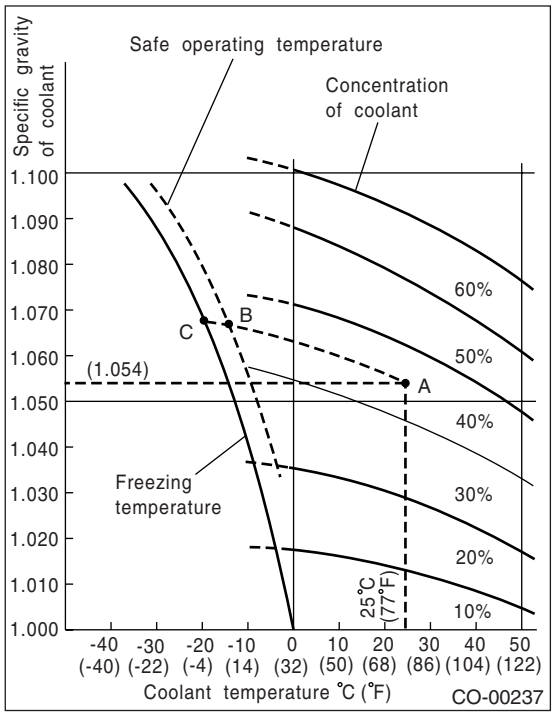


3) Warm-up the engine completely for more than five minutes at 2,000 to 3,000 rpm.
4) If the engine coolant level drops in radiator, add engine coolant to filler neck position.
5) If the engine coolant level drops from "FULL" level of reservoir tank, add engine coolant to "FULL" level.
6) Attach the radiator cap and reservoir tank cap properly.

B: INSPECTION

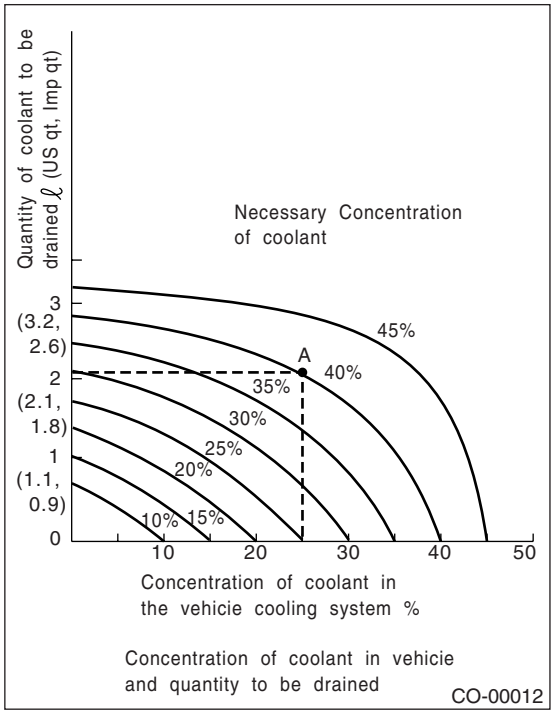
1. RELATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERTAURE

The concentration and safe operating temperature of SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 45% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

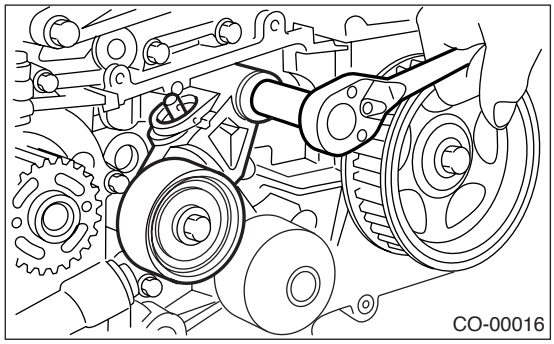
To adjust the concentration of coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



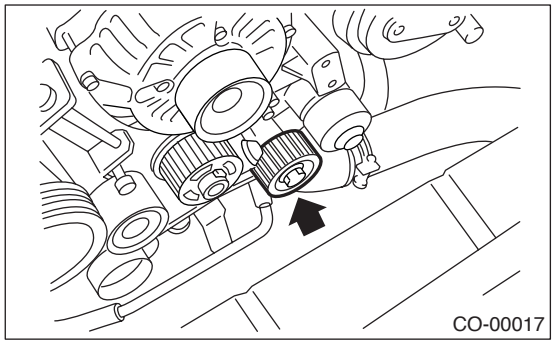
4. Water Pump

A: REMOVAL

1) Remove the radiator. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
2) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
3) Remove the timing belt. <Ref. to ME(H4SO 2.0)-43, TIMING BELT, REMOVAL, Timing Belt.>
4) Remove the automatic belt tension adjuster.

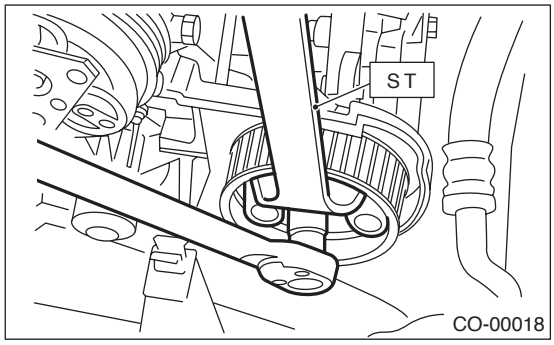

CO-00016

5) Remove the belt idler No. 2.


CO-00017

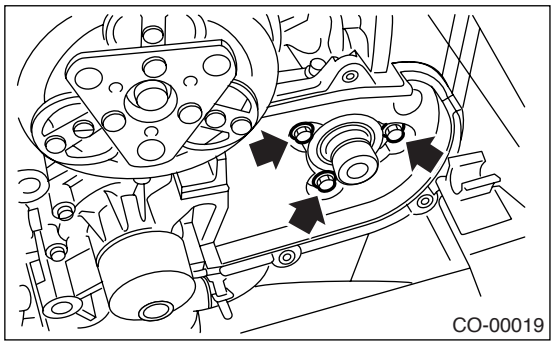
6) Remove the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

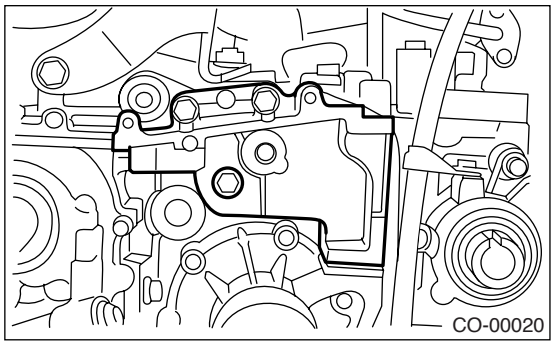


CO-00018

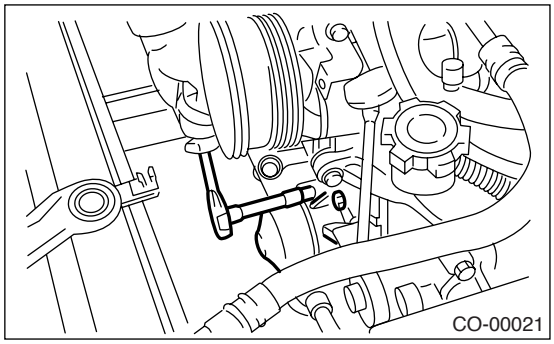
7) Remove the belt cover No. 2 (LH).


CO-00019

8) Remove the tensioner bracket.


CO-00020

9) Disconnect the hose from water pump.
10) Remove the water pump.

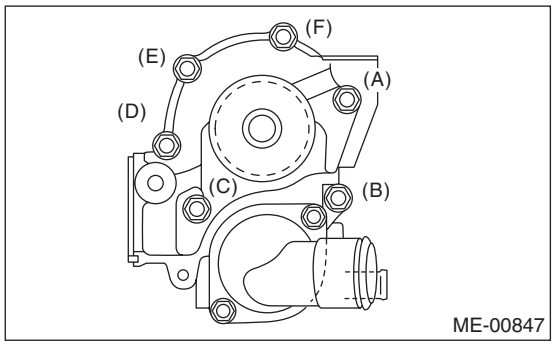

CO-00021

B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

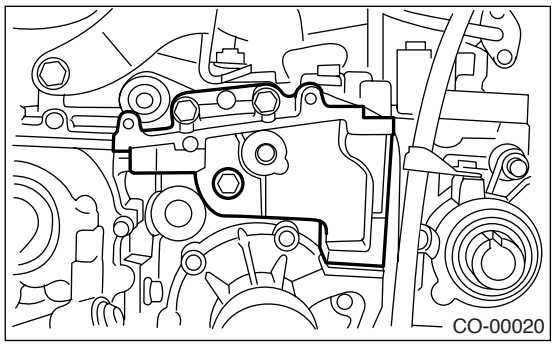
NOTE:
• Use a new gasket.
• When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in figure.

Tightening torque:
First:
12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



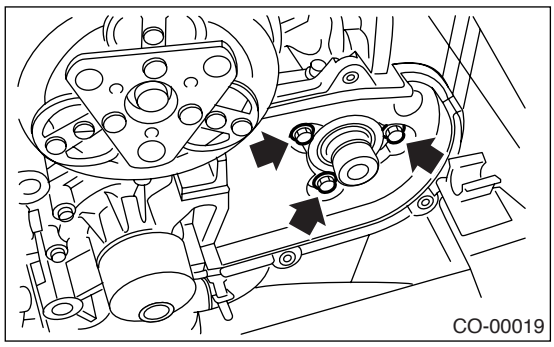
2) Connect the hose to the water pump.
3) Install the tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



4) Install the belt cover No. 2 (LH).

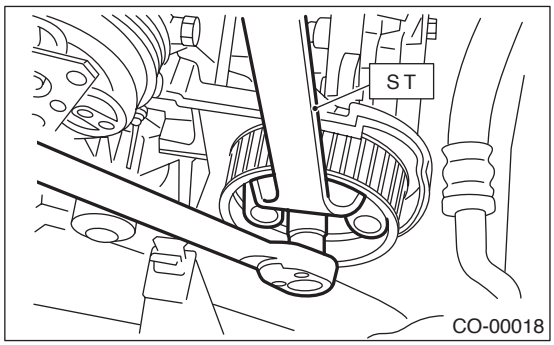
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



5) Install the cam sprocket (LH) using ST.
ST 18231AA010 CAM SPROCKET WRENCH

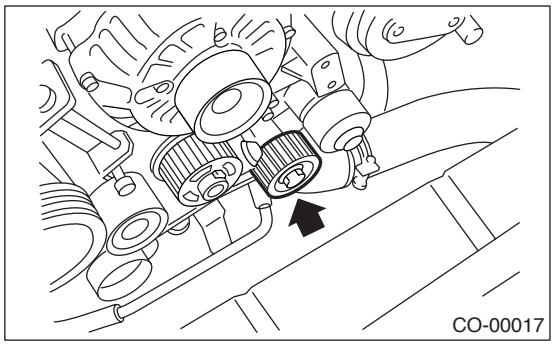
NOTE:
CAM SPROCKET WRENCH (499207100) can also be used.

Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



6) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

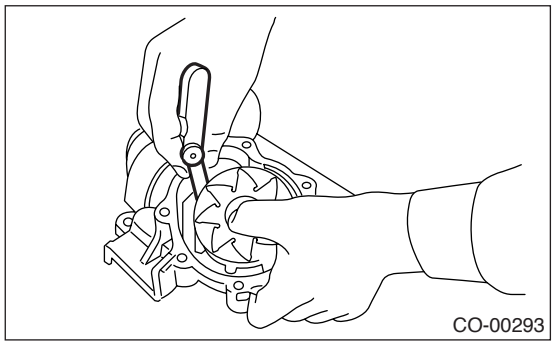


7) Install the automatic belt tension adjuster to which tension rod is held with pin. <Ref. to ME(H4SO 2.0)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>
8) Install the timing belt. <Ref. to ME(H4SO 2.0)-45, TIMING BELT, INSTALLATION, Timing Belt.>
9) Install the V-belts. **<Ref. to ME(H4SO 2.0)-38,** INSTALLATION**, V-belt.>**
10) Install the radiator. <Ref. to CO(H4SO 2.0)-21, INSTALLATION, Radiator.>

C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Make sure the impeller is not deformed or damaged.
4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard value
0.5 — 1.5 mm (0.020 — 0.060 in)

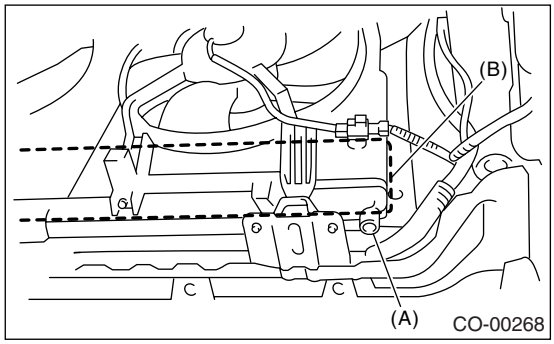


5) After water pump installation, check the pulley shaft for engine coolant leaks and noise. If leaks or noise are noted, replace the water pump assembly.

5. Thermostat

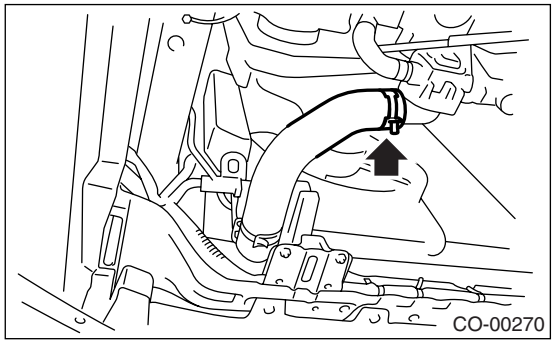
A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain engine coolant completely.
<Ref. to CO(H4SO 2.0)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

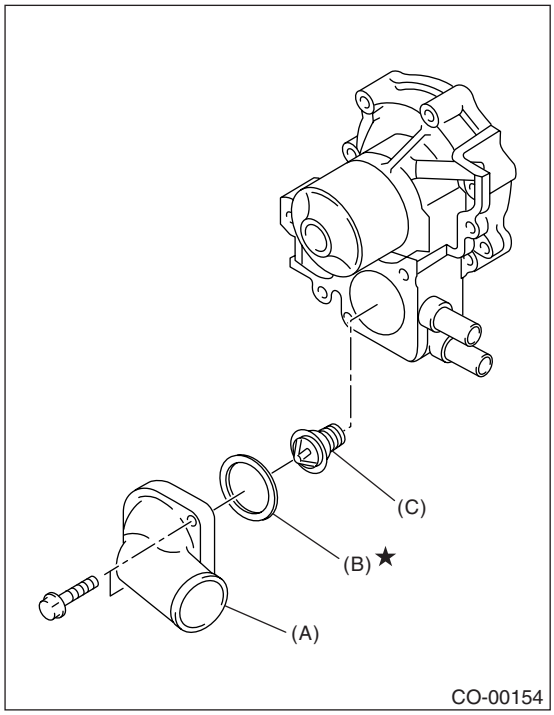


(A) Drain plug
(B) Heat shield cover

5) Disconnect the radiator outlet hose from thermostat cover.



6) Remove the thermostat cover and gasket, and then remove the thermostat.



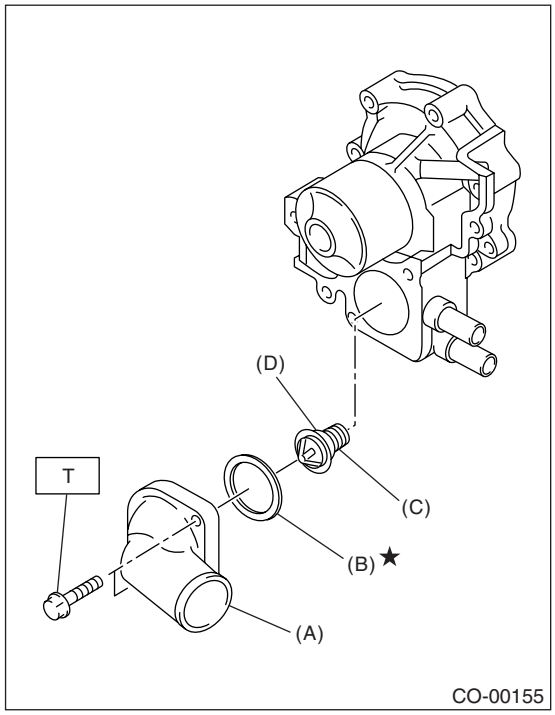
(A) Thermostat cover
(B) Gasket
(C) Thermostat

B: INSTALLATION

1) Install a gasket to thermostat, and install the thermostat and gasket to water pump as a unit. Then, install the thermostat cover.

NOTE:
• When reinstalling the thermostat, use a new gasket.
• The thermostat must be installed with the jiggle pin facing to the up side.

Tightening torque:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



(A) Thermostat cover
(B) Gasket
(C) Thermostat
(D) Jiggle pin

2) Connect the radiator outlet hose to thermostat cover.
3) Install the under cover.
4) Lower the vehicle.
5) Fill with engine coolant. <Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

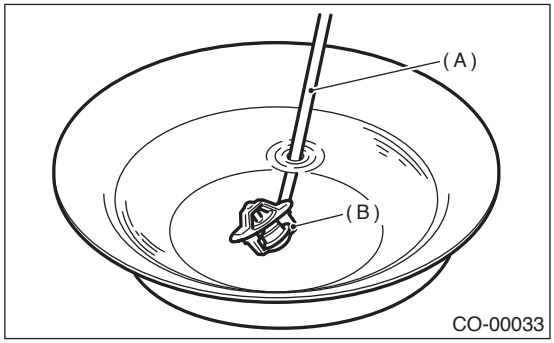
C: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.
• Inspection method
Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starting temperature to open:
80 — 84°C (176 — 183°F)

Fully opens:
95°C (203°F)

Valve lift:
9.0 mm (0.354 in) or more

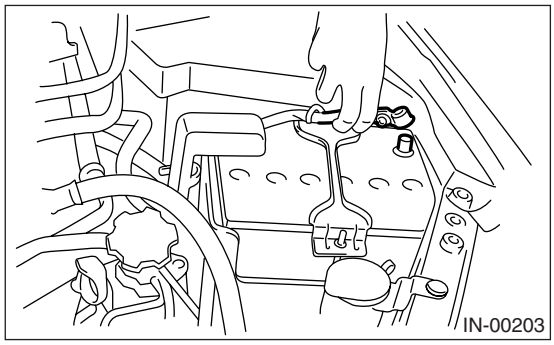


(A) Thermometer
(B) Thermostat

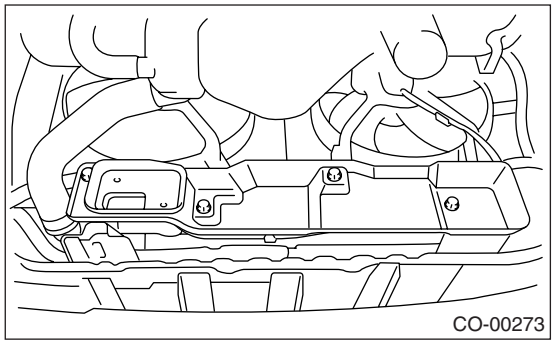
6. Radiator

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.

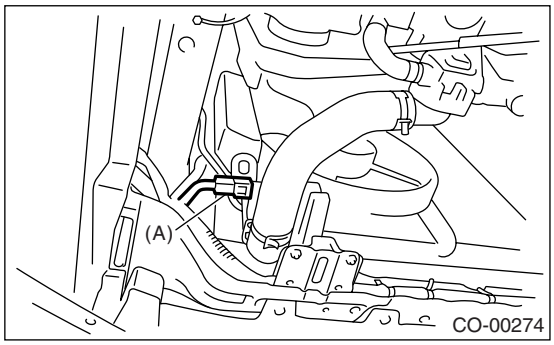


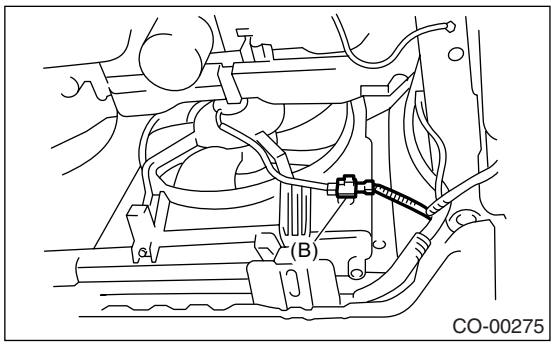
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the heat shield cover from radiator. (Model without ATF warmer)



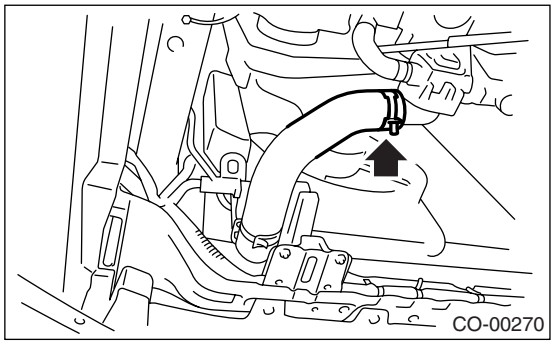
6) Drain engine coolant completely.
<Ref. to CO(H4SO 2.0)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

7) Disconnect the connector (A) of radiator main fan motor and connector (B) of sub fan motor.

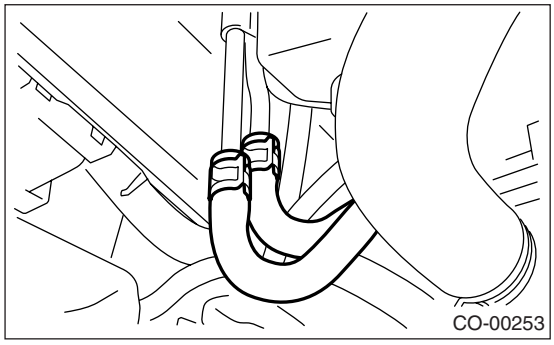




8) Disconnect the radiator outlet hose from thermostat cover.

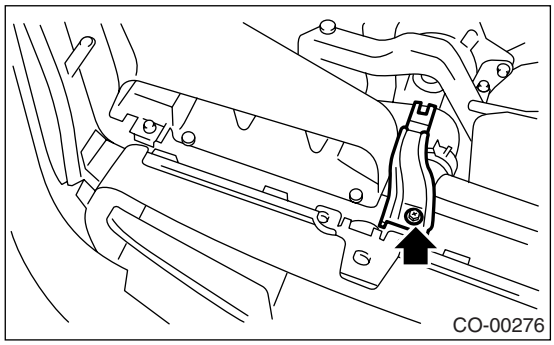


9) Disconnect the ATF cooler hoses from ATF pipes. (Model without ATF warmer)
Plug the ATF pipe to prevent ATF leaks.

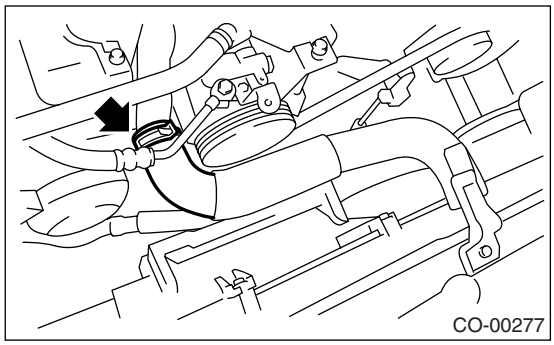


10) Lower the vehicle.
11) Disconnect the over flow hose.
12) Remove the reservoir tank. <Ref. to CO(H4SO 2.0)-29, REMOVAL, Reservoir Tank.>

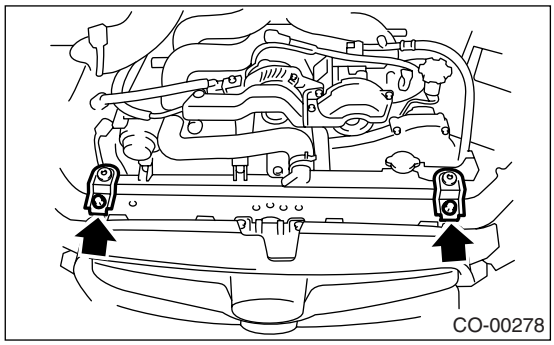
13) Remove the hood stay holder.



14) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
15) Disconnect the radiator inlet hose from engine.



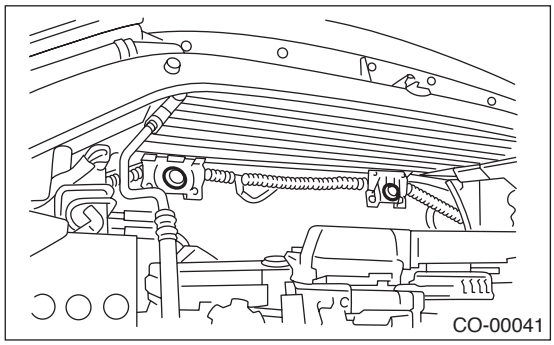
16) Remove the radiator upper brackets.



17) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to holes on the radiator lower bracket.

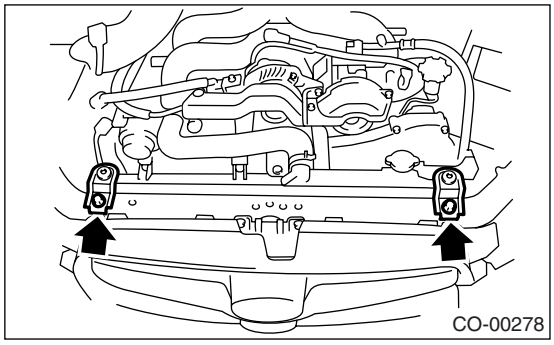


2) Install the radiator to vehicle.

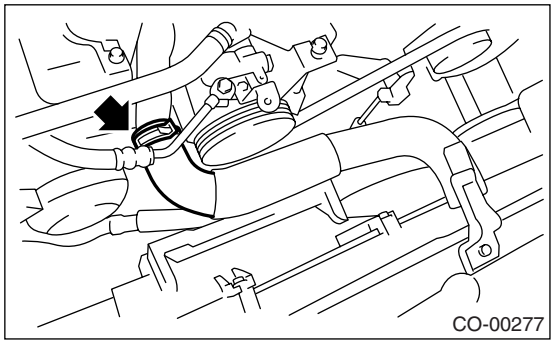
NOTE:
Make pins on the lower side of radiator be fitted into the radiator lower cushions on body side.

3) Install the radiator upper brackets and tighten the bolts.

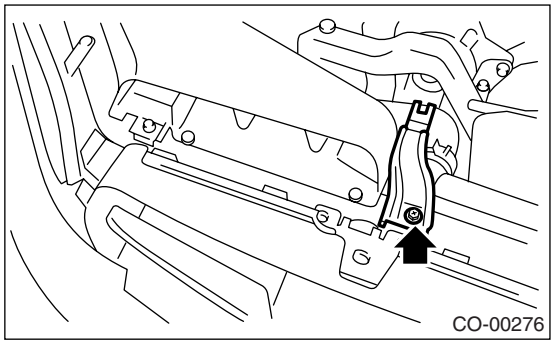
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



4) Connect the radiator inlet hose.

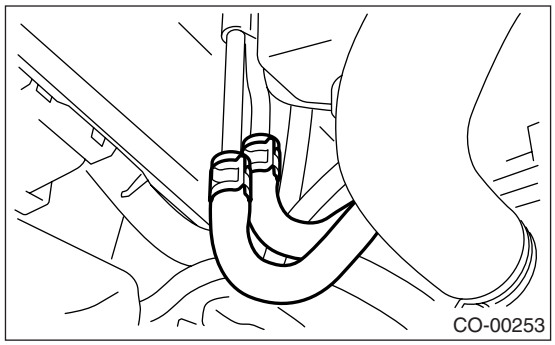


5) Install the air intake duct. <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
6) Install the hood stay holder.

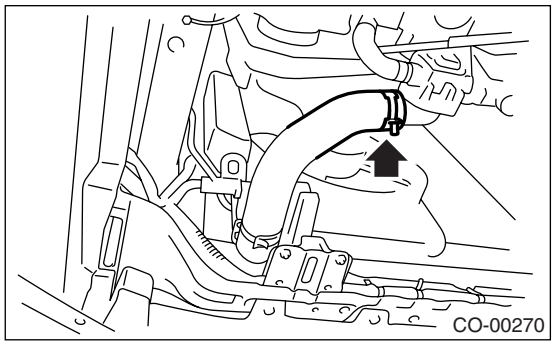


7) Install the reservoir tank. <Ref. to CO(H4SO 2.0)-29, INSTALLATION, Reservoir Tank.>
8) Connect the over flow hose.
9) Lift-up the vehicle.

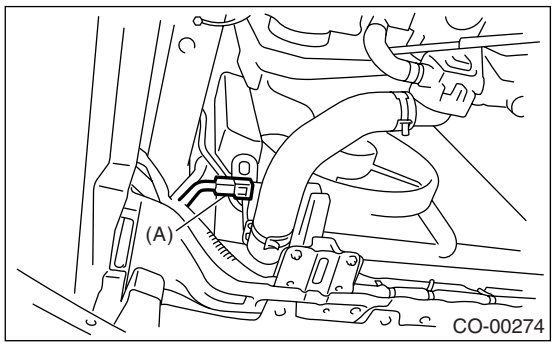
10) Connect the ATF cooler hoses. (Model without ATF warmer)

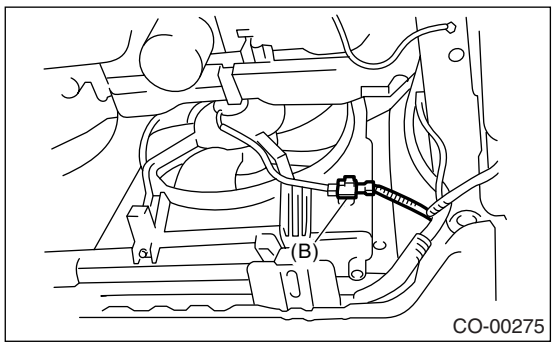


11) Connect the radiator outlet hose.

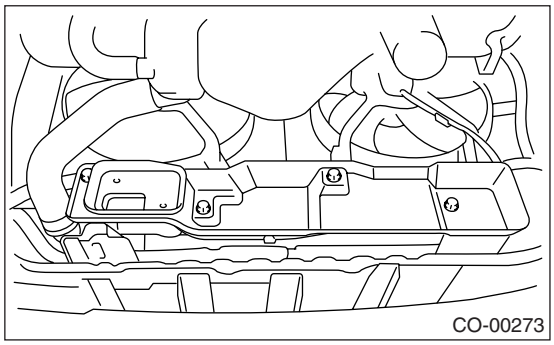


12) Connect the connector (A) to radiator main fan motor and connector (B) to sub fan motor.

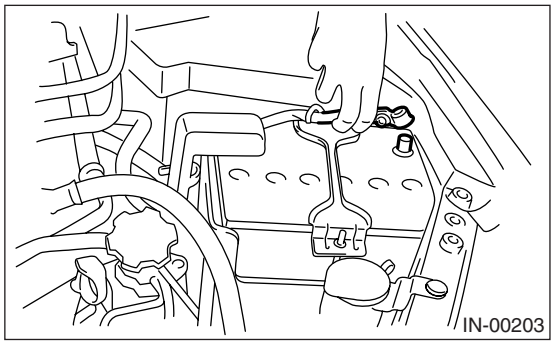




13) Install the heat shield cover. (Model without ATF warmer)



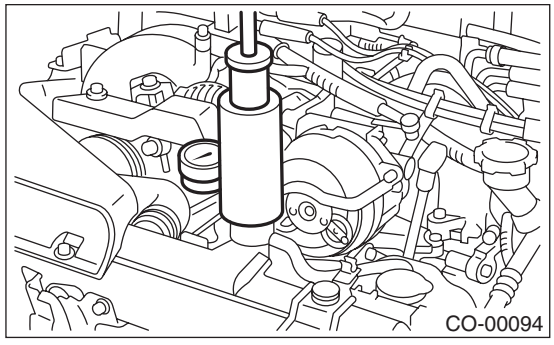
14) Install the under cover.
15) Lower the vehicle.
16) Connect the battery ground cable to battery.



17) Fill with engine coolant. <Ref. to CO(H4SO 2.0)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
18) Check the ATF level. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

C: INSPECTION

1) Remove the radiator cap, top off the radiator with coolant, and then attach the tester in place of cap.



2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to the radiator to check if:
- Engine coolant leaks at/around radiator.
- Engine coolant leaks at/around hoses or connections.

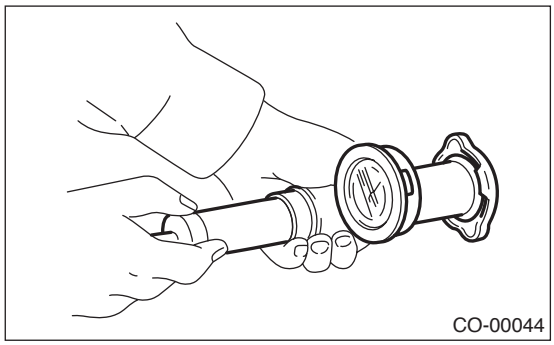
CAUTION:
- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**

• Be careful to prevent engine coolant from spurting out when removing tester.
• Be careful not to deform the filler neck of radiator when installing or removing the tester.

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)

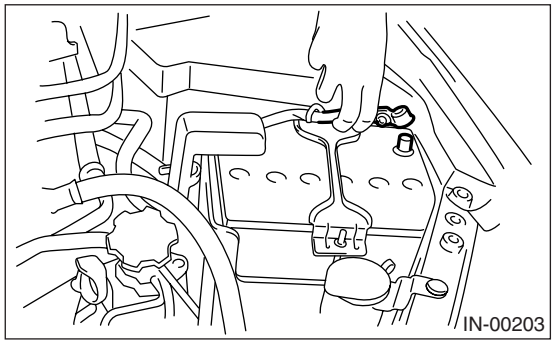
Service limit pressure:
83 kPa (0.85 kg/cm^2, 12 psi)

CAUTION:
Be sure to remove foreign matter and rust from the cap in advance, otherwise results of pressure test will be incorrect.

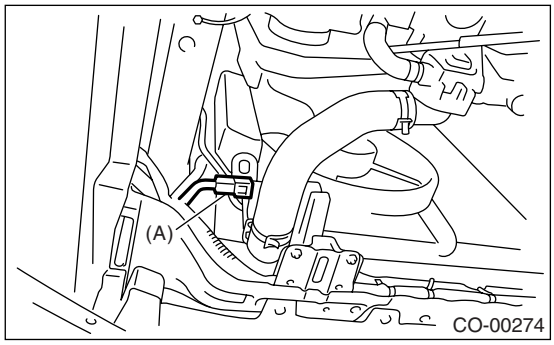
8. Radiator Main Fan and Fan Motor

A: REMOVAL

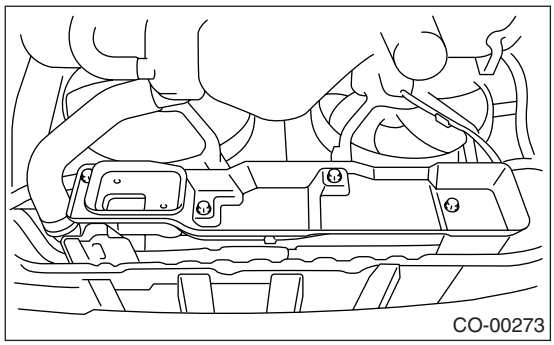
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



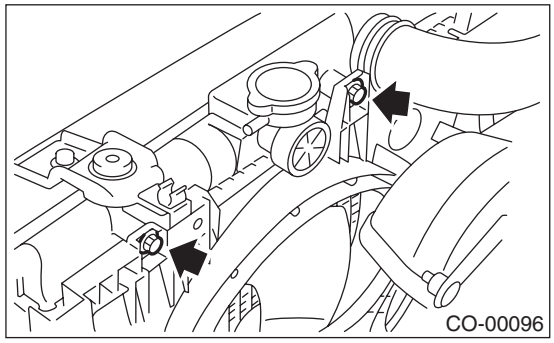
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector (A) of main fan motor.



6) Remove the heat shield cover. (Model without ATF warmer)



7) Remove the ATF hose from the clip of radiator main fan motor assembly. (Model without ATF warmer)
8) Lower the vehicle.
9) Disconnect the over flow hose.
10) Remove the reservoir tank. <Ref. to CO(H4SO 2.0)-29, REMOVAL, Reservoir Tank.>
11) Remove the bolts which hold the radiator main fan shroud to radiator.



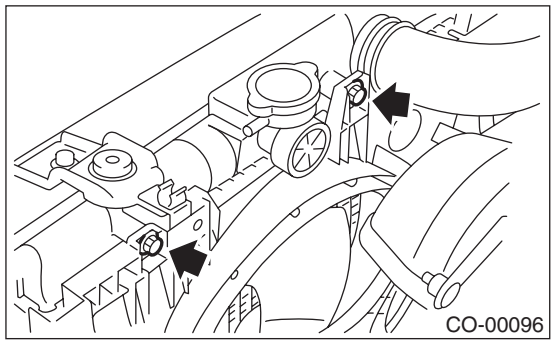
12) Remove the radiator main fan motor assembly.

B: INSTALLATION

Install in the reverse order of removal.

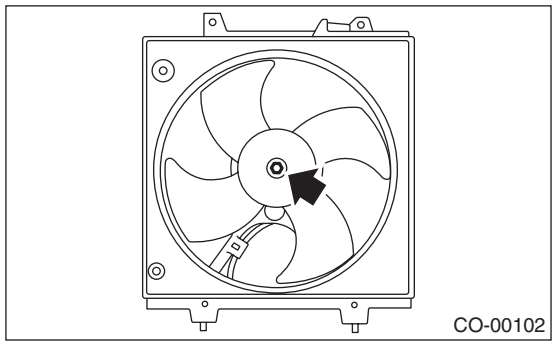
NOTE:
When the radiator main fan motor assembly cannot be installed, loosen the bolts which secure radiator sub fan motor assembly.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

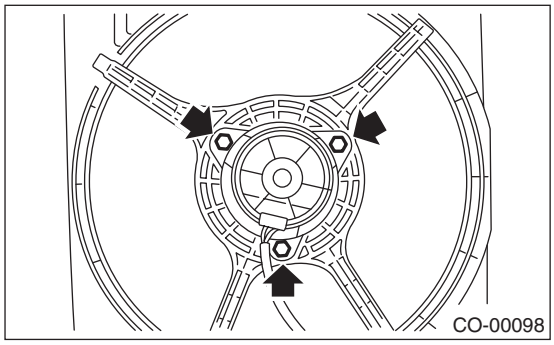


C: DISASSEMBLY

1) Remove the clip which holds motor connector onto the shroud.
2) Remove the nut which holds the fan onto fan motor and shroud.



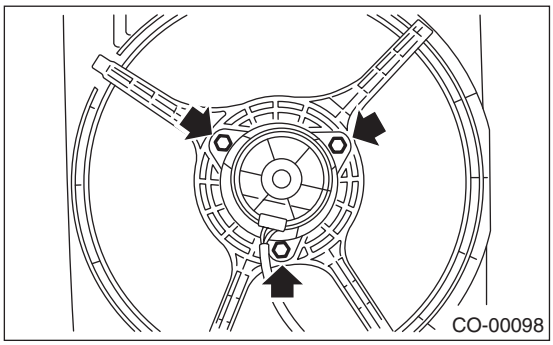
3) Remove the bolts which install fan motor onto the shroud.



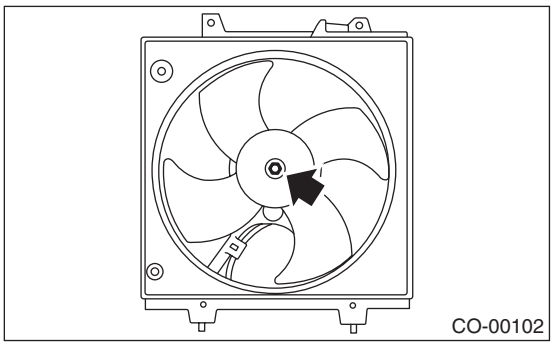
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



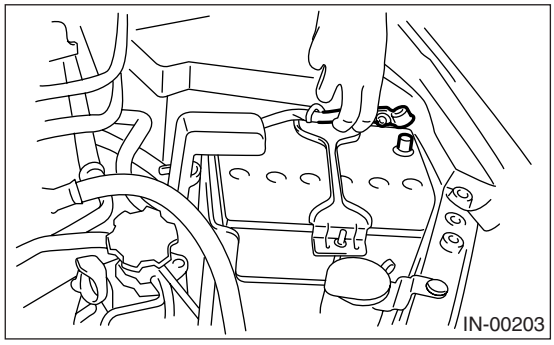
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



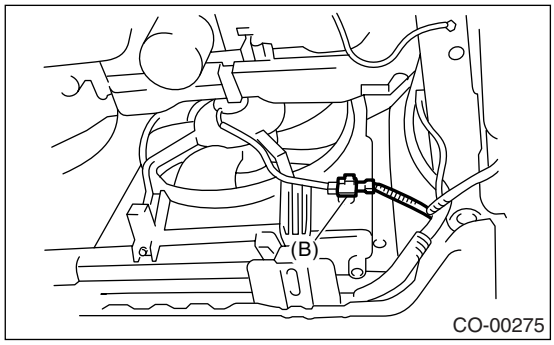
9. Radiator Sub Fan and Fan Motor

A: REMOVAL

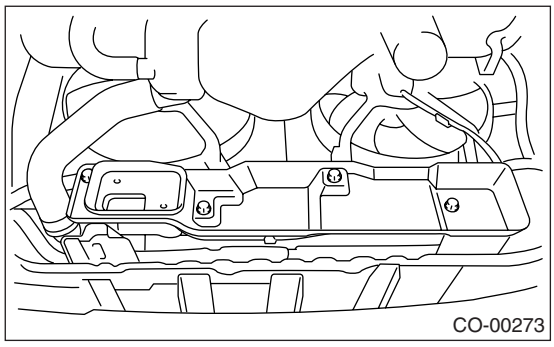
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



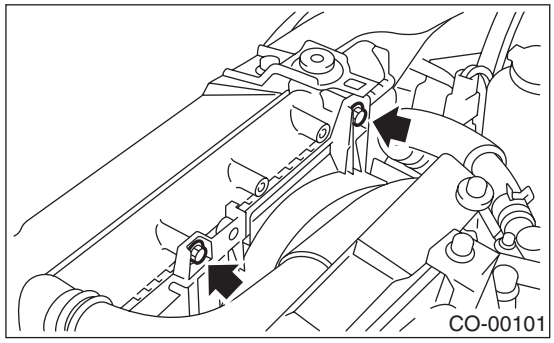
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the connector (B) of sub fan motor.



6) Remove the heat shield cover. (Model without ATF warmer)



7) Remove the ATF hose from the clip of radiator sub fan motor assembly. (Model without ATF warmer)
8) Lower the vehicle.
9) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
10) Remove the bolts which hold the radiator sub fan shroud to radiator.

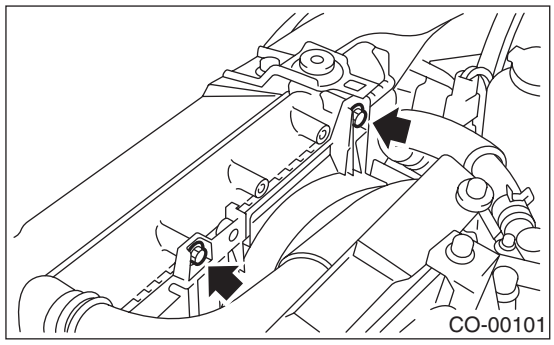


11) Remove the radiator sub fan motor assembly from the lower side of vehicle.

B: INSTALLATION

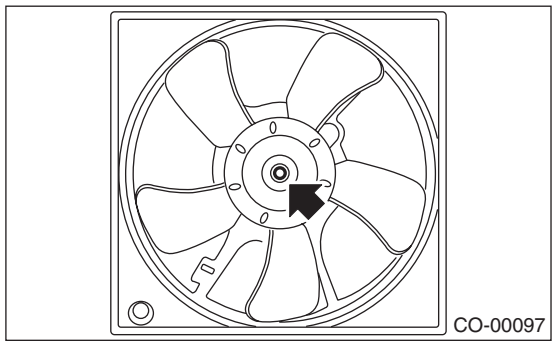
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

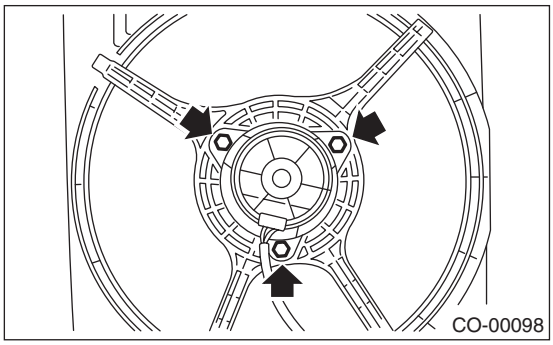


C: DISASSEMBLY

1) Remove the clip which holds the fan motor connector onto shroud.
2) Remove the nut which holds fan onto the fan motor and shroud assembly.



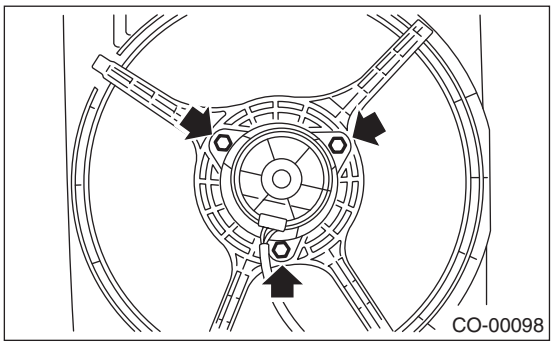
3) Remove the bolts which install fan motor onto the shroud.



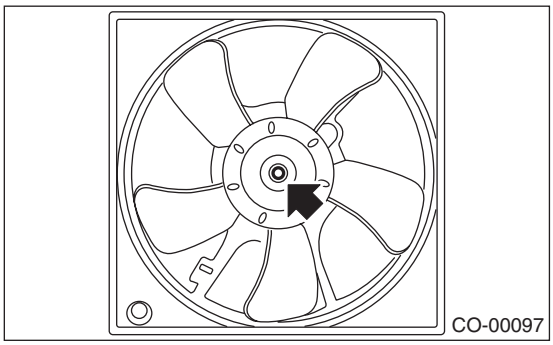
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



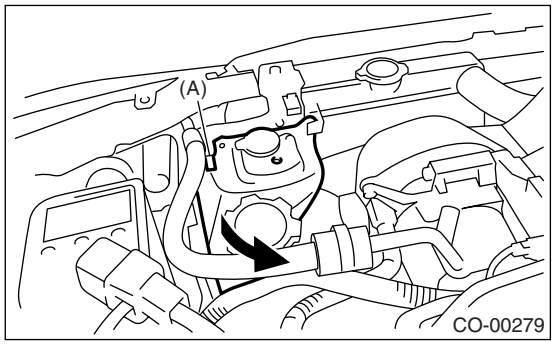
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



10.Reservoir Tank

A: REMOVAL

1) Disconnect the over flow hose.
2) Pull out the reservoir tank to the direction of arrow while pushing the pawl (A).



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the engine coolant level is between “FULL” and “LOW”.

11.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on timing belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair ignition control system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean, repair or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Correct or replace.
	n. Dragging brake	Adjustment.
	o. Defective radiator fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace them.
Over-cooling	a. Ambient temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Correct or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Correct or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Correct or replace.
	f. Damaged or cracked thermostat case	Correct or replace.
	g. Leakage from radiator	Correct or replace.
Strange noise	a. Defective timing belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

LUBRICATION

LU(H4SO 2.0)

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2.	Oil Pressure System	6
3.	Engine Oil	8
4.	Oil Pump	10
5.	Oil Pan and Strainer	14
6.	Oil Pressure Switch	17
7.	Engine Oil Filter	18
8.	General Diagnostic Table	19

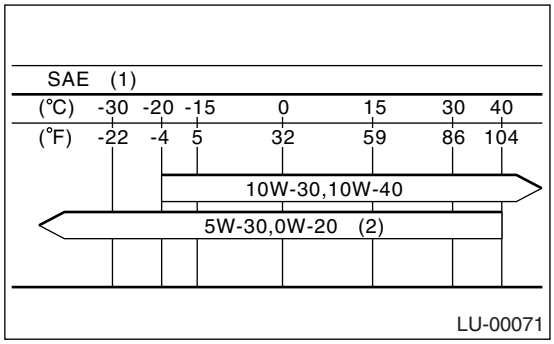
1. General Description

A: SPECIFICATION

Lubrication method				Forced lubrication
OIL PUMP	Pump type			Trochoid type
	Number of teeth	Inner rotor		9
		Outer rotor		10
	Outer rotor diameter × thickness		mm (in)	78 × 7 (3.07 × 0.28)
	Tip clearance between inner and outer rotors		Standard value mm (in)	0.04 — 0.14 (0.0016 — 0.0055)
	Side clearance between inner rotor and pump case		Standard value mm (in)	0.02 — 0.07 (0.0008 — 0.0028)
	Case clearance between outer rotor and pump case		Standard value mm (in)	0.10 — 0.175 (0.0039 — 0.0069)
	Performance at 80°C (176°F)	600 rpm	Discharge pressure kPa (kg/cm^2, psi)	98 (1.0, 14)
			Discharge rate ℓ (US qt, Imp qt)/min.	3.2 (3.4, 2.8)
		5,000 rpm	Discharge pressure kPa (kg/cm^2, psi)	294 (3.0, 43)
			Discharge rate ℓ (US qt, Imp qt)/min.	32.6 (34.4, 28.7)
	Relief valve working pressure		kPa (kg/cm^2, psi)	490 (5.0, 71)
Oil filter	Filter type			Full-flow filter type
	Filtration area cm^2 (sq in)		Outer diameter 68 mm	800 (124)
			Outer diameter 65 mm	470 (73)
	By-pass valve opening pressure		kPa (kg/cm^2, psi)	157 (1.60, 22.8)
	Outer diameter × width mm (in)		Outer diameter 68 mm	68 × 65 (2.68 × 2.56)
			Outer diameter 65 mm	65 × 74.4 (2.56 × 2.93)
	Installation screw specifications			M 20 × 1.5
Oil pressure switch	Type			Immersed contact point type
	Working voltage — wattage			12 V — 3.4 W or less
	Warning light activation pressure		kPa (kg/cm^2, psi)	14.7 (0.15, 2.1)
	Proof pressure		kPa (kg/cm^2, psi)	981 (10, 142) or more
Oil capacity (at replacement)			ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)

Recommended oil:

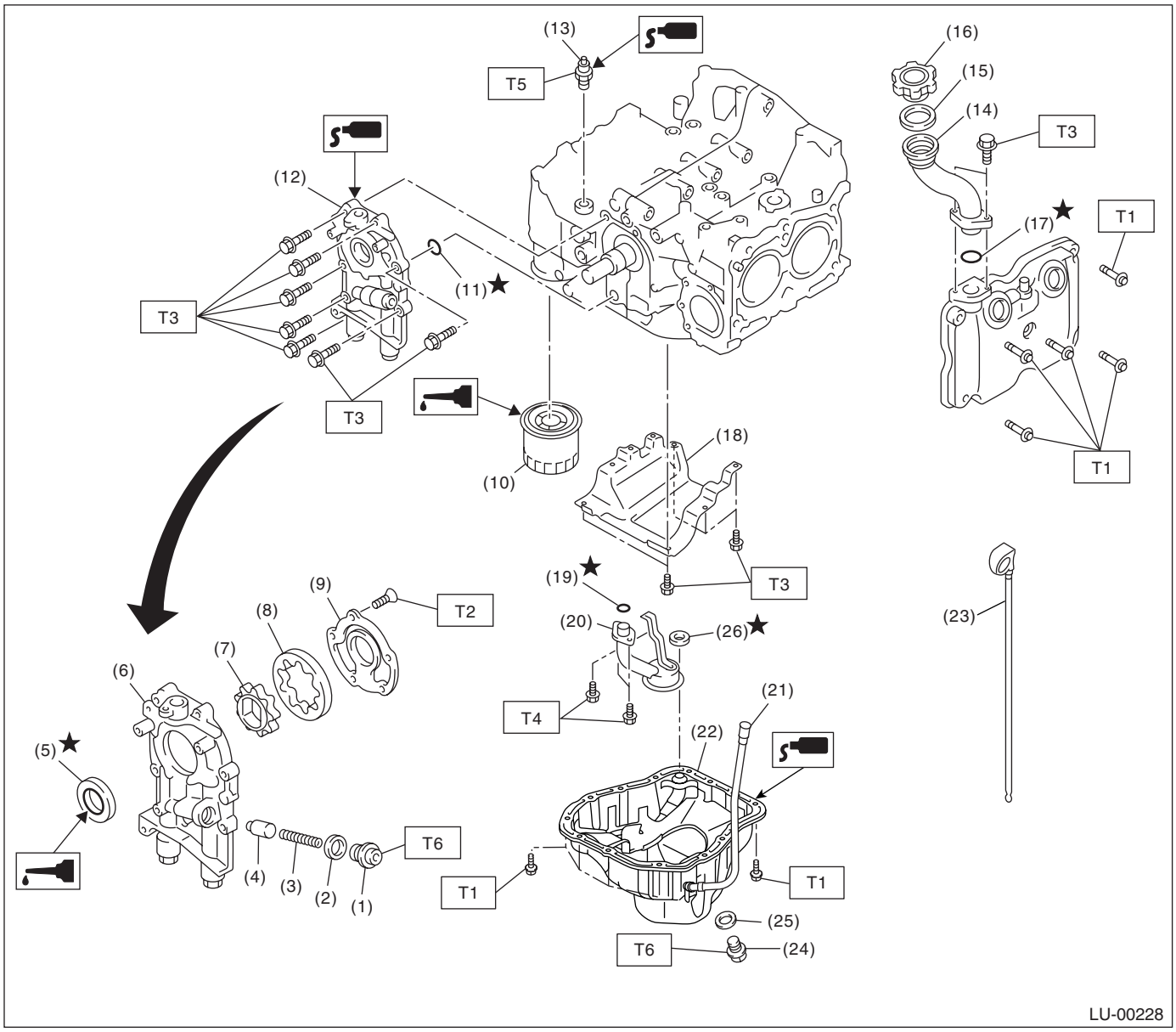
API classification SL, SJ with the "Energy Conserving" logo is printed, or SH (if you cannot obtain the oil with SL, SJ or SH grades, you may use SG, SF grades "ENERGY CONSERVING" oil.)
ACEA specification, A1, A2 or A3
CCMC specification, G4 or G5
New API certification mark (Star burst mark) label is on the container.



(1) SAE viscosity No. and applicable temperature
(2) Recommend

CAUTION:
When replacing oil, use only SUBARU genuine engine oil.

B: COMPONENT



(1) Plug
(2) Gasket
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) O-ring
(16) Oil filler cap
(17) O-ring
(18) Baffle plate
(19) O-ring
(20) Oil strainer
(21) Oil level gauge guide
(22) Oil pan
(23) Oil level gauge
(24) Drain plug
(25) Metal gasket
(26) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 5.4 (0.55, 4.0)
T3: 6.4 (0.65, 4.7)
T4: 10 (1.0, 7.2)
T5: 25 (2.5, 18.1)
T6: 44 (4.5, 32.5)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOL

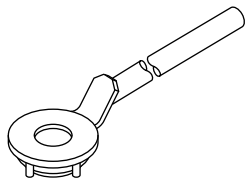
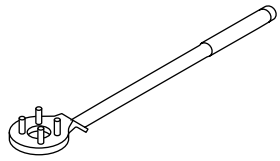
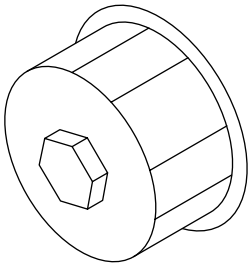
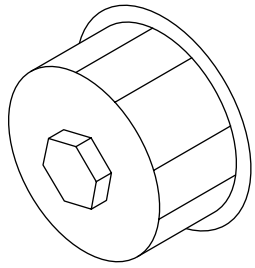
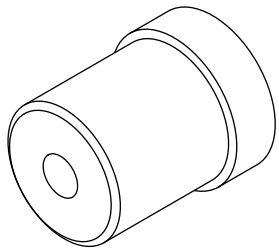
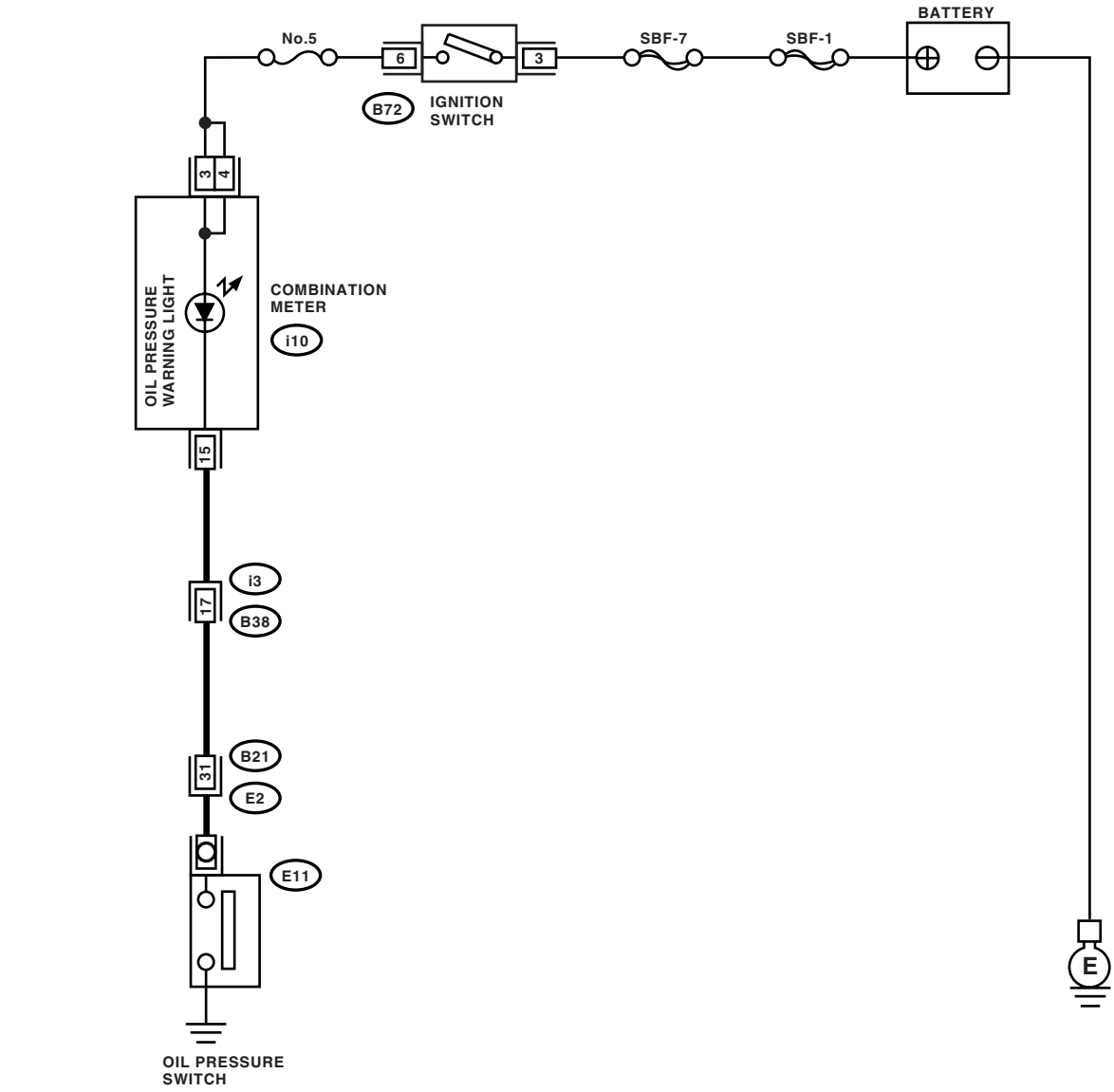
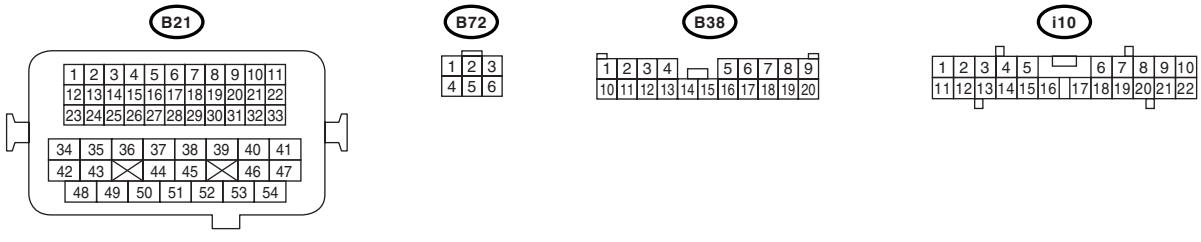
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.0 L model)
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt. (2.5 L model)
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil seal into oil pump.

2. Oil Pressure System

A: WIRING DIAGRAM





LU-00229

B: INSPECTION

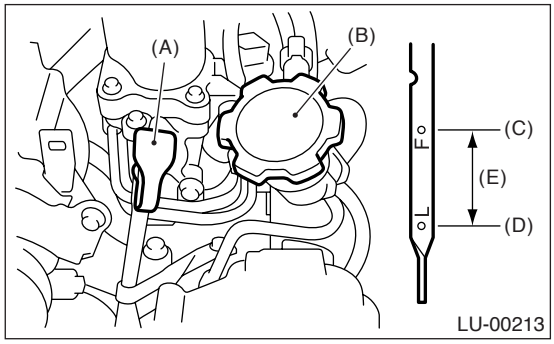
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1)Turn the ignition switch to ON (engine OFF). 2)Check the warning light of combination meter.	Does the warning light illuminate?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from oil pressure switch. 3)Turn the ignition switch to ON. 4)Measure the voltage of harness between oil pressure switch connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Measure the resistance of the combination meter. ***Connector & terminal*** ***(i10) No. 3 — (i10) No. 15:*** ***(i10) No. 4 — (i10) No. 15:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and properly orientated.
4) Remove it again and check the engine oil level. If the engine oil level is below “L” line, add oil to bring the level up to “F” line.
5) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level show in the range between “F” line and the notch mark. This is caused by thermal expansion of the engine oil.

NOTE:
To prevent overfilling the engine oil, do not add oil above “F” line when the engine is cold.

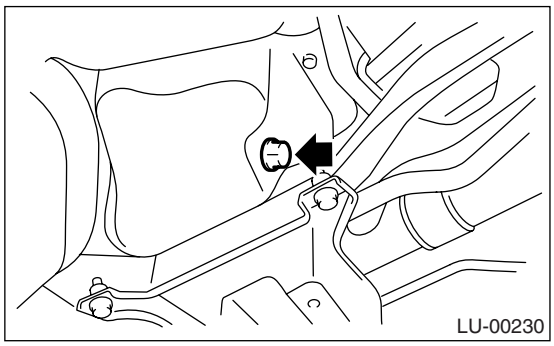


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

B: REPLACEMENT

1) Open the engine oil filler cap for quick draining of the engine oil.
2) Lift-up the vehicle.
3) Drain engine oil by loosening the engine oil drain plug.

NOTE:
Prepare a container for draining of engine oil.



4) Tighten the engine oil drain plug after draining the engine oil.

NOTE:
Use a new drain plug gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

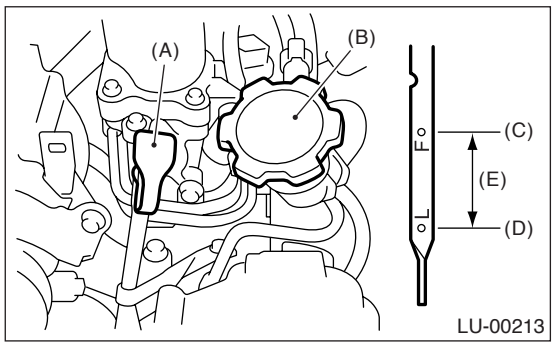
5) Use the engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to upper level on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

Recommended oil:
Refer to “SPECIFICATION” for the recommended oil. <Ref. to LU(H4SO 2.0)-2, SPECIFICATION, General Description.>

Engine oil capacity:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

6) Close the engine oil filler cap.
7) Start the engine and warm it up for a time.

8) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

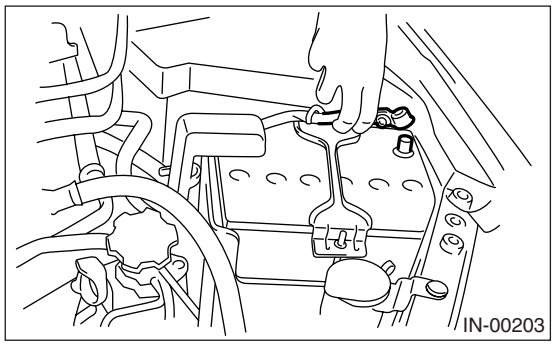


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

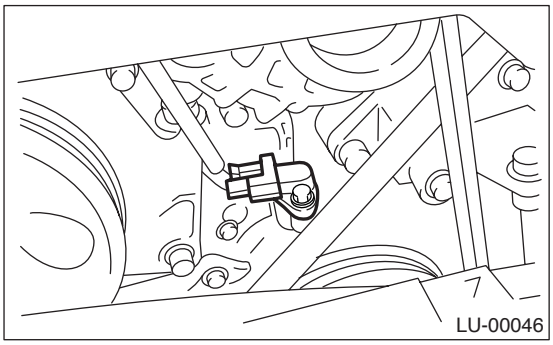
4. Oil Pump

A: REMOVAL

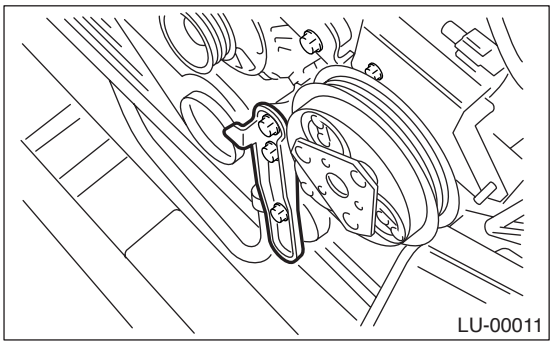
1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Remove the under cover.
4) Lower the vehicle.
5) Remove the radiator. <Ref. to CO(H4SO 2.0)-20, REMOVAL, Radiator.>
6) Remove the crankshaft position sensor.

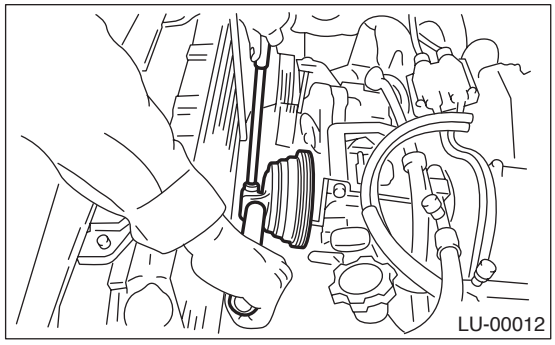


7) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.>
8) Remove the belt tensioner.

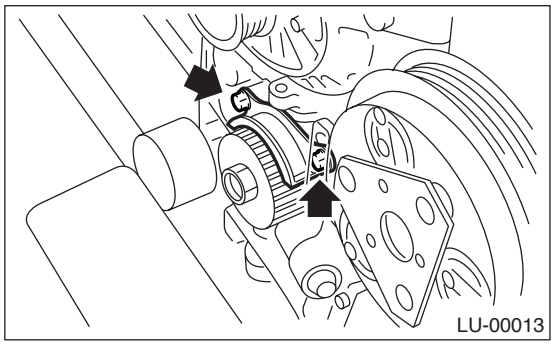


9) Remove the crank pulley using ST.

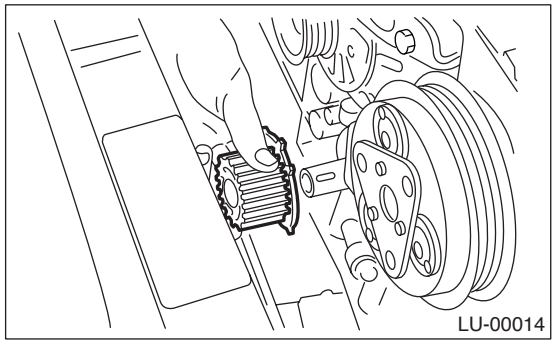
ST	499977400	CRANK PULLEY WRENCH (2.0 L model)
ST	499977100	CRANK PULLEY WRENCH (2.5 L model)



10) Remove the water pump. <Ref. to CO(H4SO 2.0)-15, REMOVAL, Water Pump.>
11) Remove the timing belt guide. (MT model)

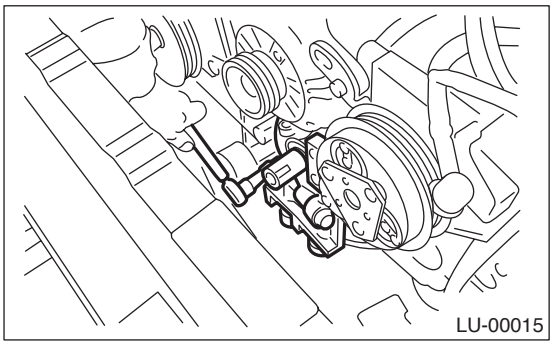


12) Remove the crank sprocket.



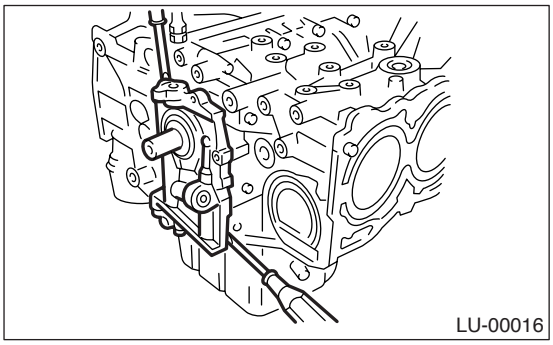
13) Remove the bolts which install oil pump onto cylinder block.

NOTE:
When disassembling and checking the oil pump, loosen the relief valve plug before removing the oil pump.


LU-00015

14) Remove the oil pump by using flat tip screwdriver.

CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.

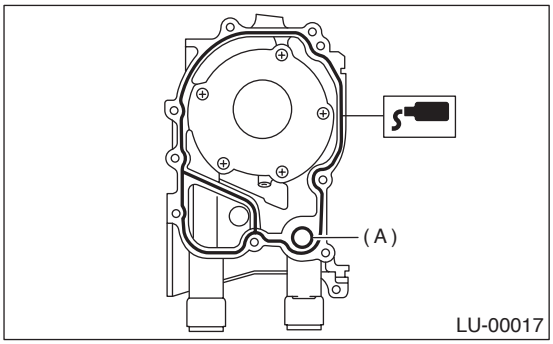

LU-00016

B: INSTALLATION

Install in the reverse order of removal.
Perform the following.
1) Apply liquid gasket to the matching surfaces of oil pump.

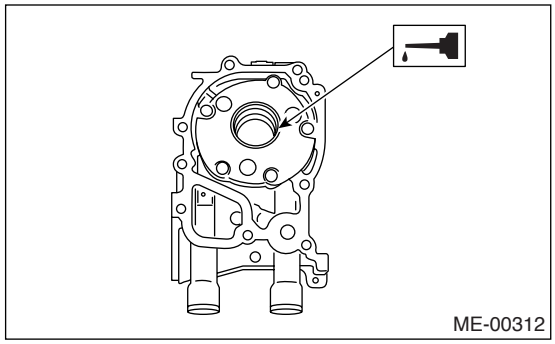
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

2) Replace the O-ring (A) with a new one.



LU-00017

3) Apply a coat of engine oil to the inside of oil seal.

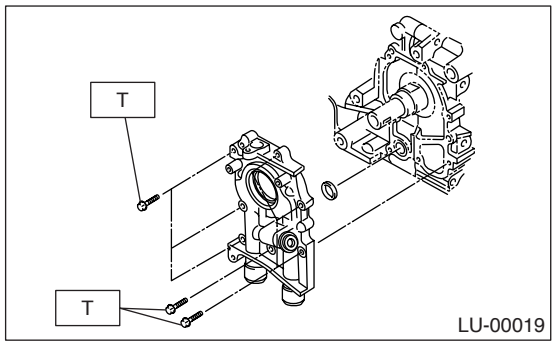

ME-00312

4) Position the oil pump, aligning the notched area with the crankshaft, and push the oil pump straight.

CAUTION:
- **Make sure the oil seal lip is not folded.**
- **Be careful not to scratch oil seal when installing oil pump on cylinder block.**

5) Install the oil pump.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

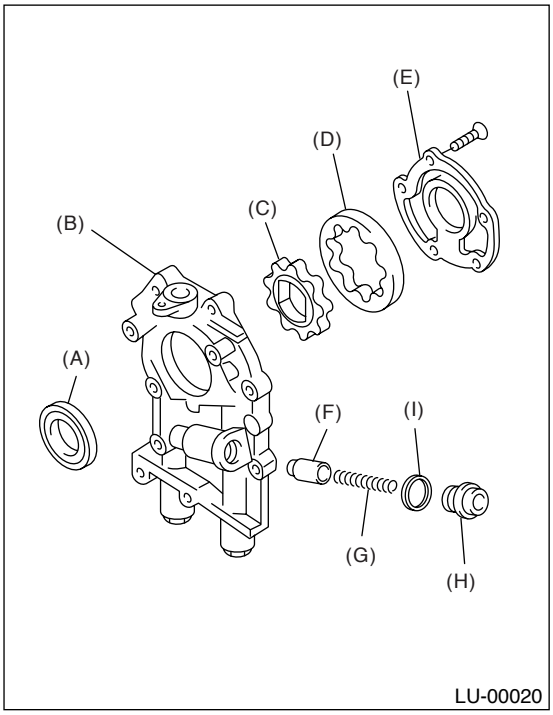


LU-00019

C: DISASSEMBLY

Remove the screws which secure oil pump cover and then disassemble oil pump. Inscribe alignment marks on the inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before disassembling the oil pump, remove the relief valve.

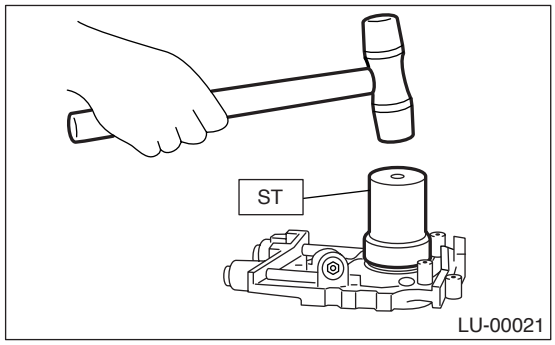


(A) Oil seal
(B) Oil pump case
(C) Inner rotor
(D) Outer rotor
(E) Oil pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

D: ASSEMBLY

1) Install the front oil seal using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.

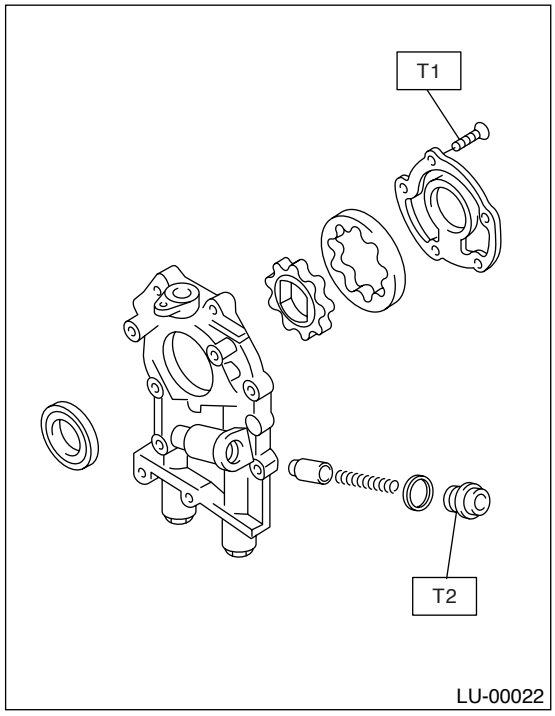


2) Apply a coat of engine oil to the inner and outer rotors.
3) Install the inner and outer rotors in their original positions.
4) Install the oil relief valve and relief valve spring and plug.

NOTE:
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:
T1: 5.4 N·m (0.55 kgf-m, 4.0 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

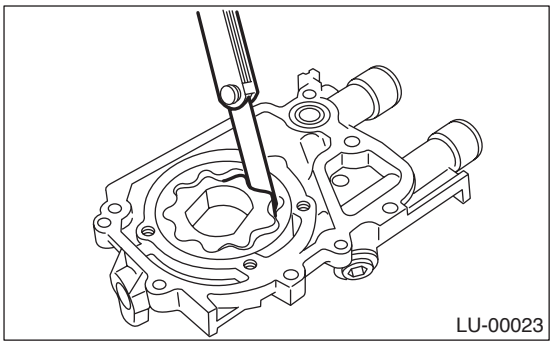


E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance is out of the standard value, replace the rotors as a matched set.

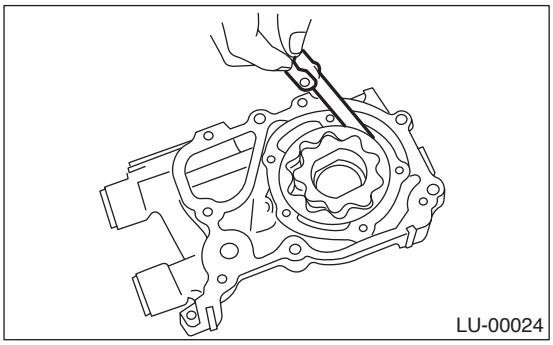
Tip clearance:
Standard value
0.04 — 0.14 mm (0.0016 — 0.0055 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and oil pump rotor housing. If the clearance is out of the standard value, replace the oil pump case.

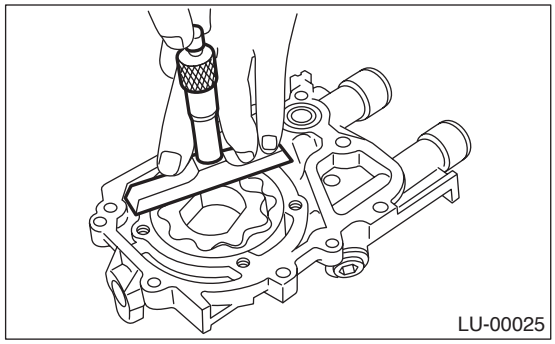
Case clearance:
Standard value
0.10 — 0.175 mm (0.0039 — 0.0069 in)



3. SIDE CLEARANCE

Measure the clearance between oil pump inner rotor and pump cover. If the clearance is out of the standard value, replace the rotor or oil pump case.

Side clearance:
Standard value
0.02 — 0.07 mm (0.0008 — 0.0028 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
72.8 mm (2.866 in)
Installed length
54.7 mm (2.154 in)
Load when installed
81.3 N (8.29 kgf, 18.24 lb)

5. OIL PUMP CASE

Check the worn shaft hole, clogged oil passage, worn rotor chamber, cracks and other faults.

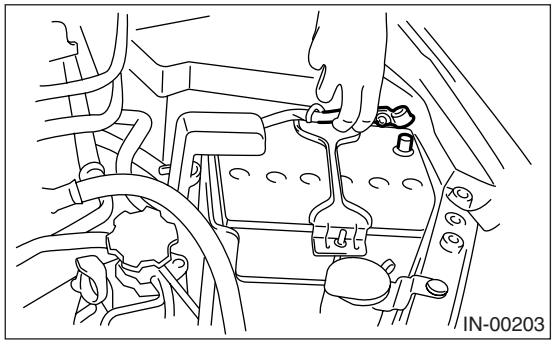
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc, and replace if defective.

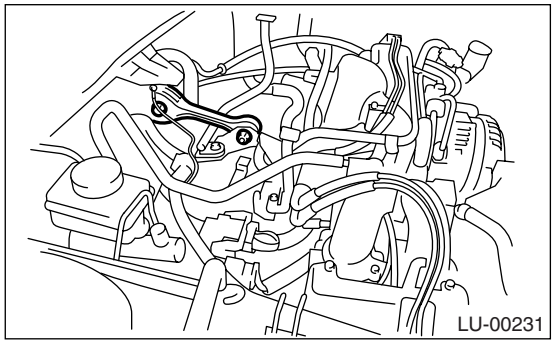
5. Oil Pan and Strainer

A: REMOVAL

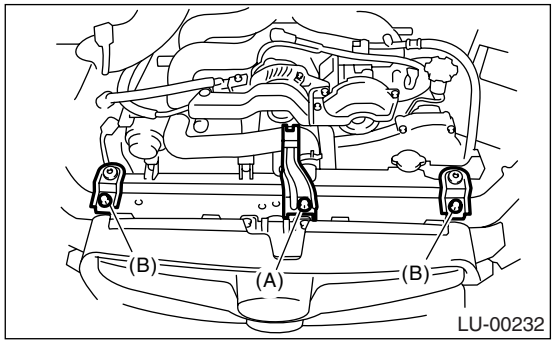
1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Disconnect the ground cable from battery.



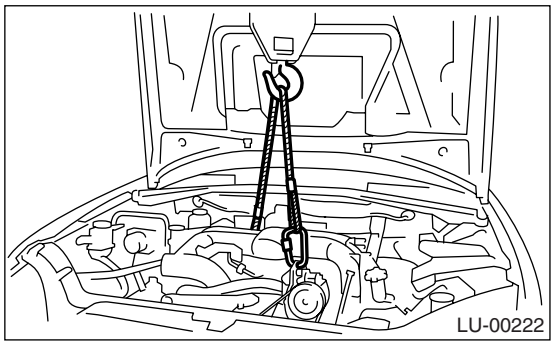
4) Remove the air intake duct and air cleaner case. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
5) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
6) Remove the pitching stopper.



7) Remove the hood stay holder (A) and radiator upper brackets (B).



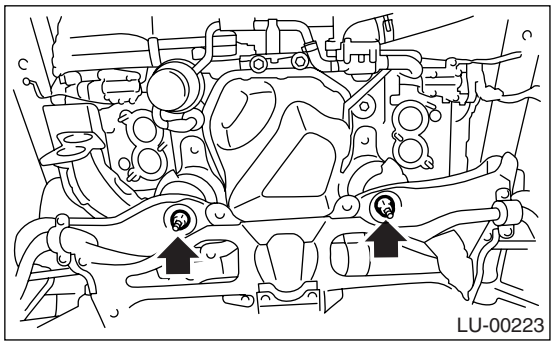
8) Support the engine with a lifting device and wire ropes.



9) Lift-up the vehicle.

CAUTION:
When lifting up the vehicle, raise up wire ropes at the same time.

10) Remove the under cover.
11) Drain engine oil. <Ref. to LU(H4SO 2.0)-8, REPLACEMENT, Engine Oil.>
12) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-10, REMOVAL, Center Exhaust Pipe.>
13) Remove the nuts which install front cushion rubber onto front crossmember.

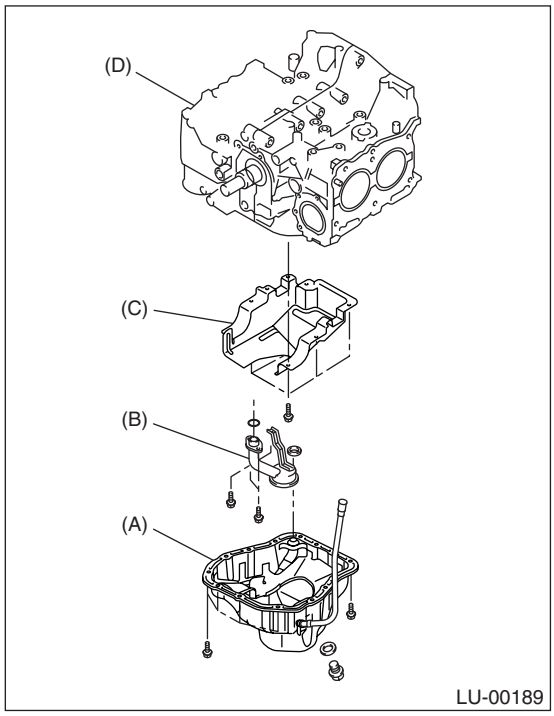


14) Remove the bolts which install oil pan on cylinder block with engine raised up.
15) Insert the oil pan cutter blade into the clearance between cylinder block and oil pan.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

16) Remove the oil strainer.

17) Remove the baffle plate.



(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

B: INSTALLATION

CAUTION:
Before installing the oil pan, clean the mating surface of oil pan and cylinder block.

1) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

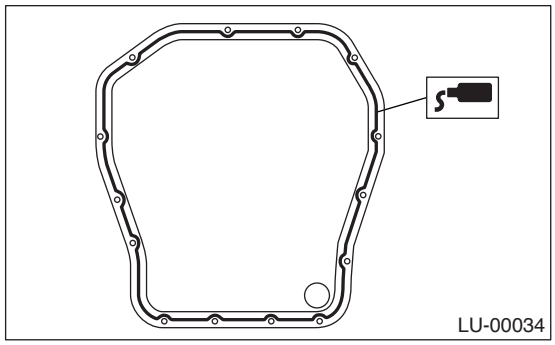
2) Install the oil strainer onto baffle plate.

NOTE:
Replace O-ring with new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

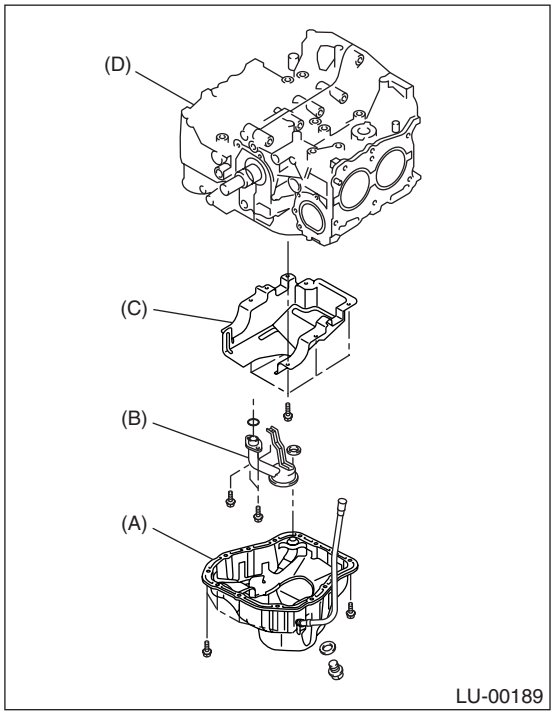
3) Apply liquid gasket to the mating surfaces and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



4) Tighten the bolts which install oil pan onto cylinder block.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

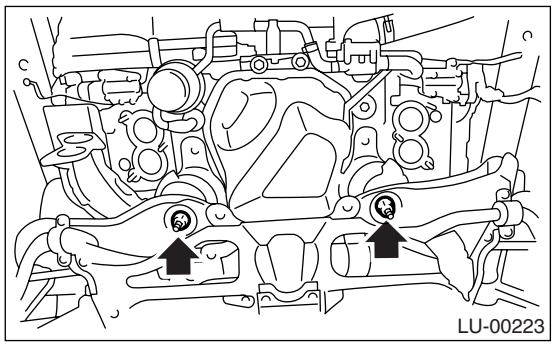


(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

5) Lower the engine onto front crossmember.

6) Tighten the nuts which install front cushion rubber onto front crossmember.

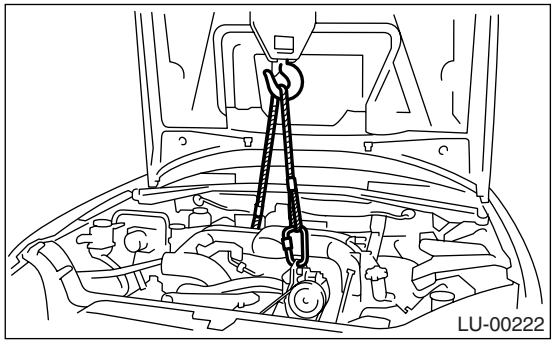
Tightening torque:
69 N·m (7.0 kgf-m, 50.9 ft-lb)



7) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Center Exhaust Pipe.>
8) Install the under cover.
9) Lower the vehicle.

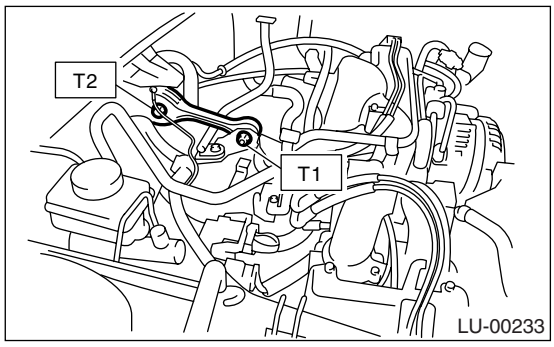
CAUTION:
When lowing the vehicle, lower the lift-up device and wire ropes at the same time.

10) Remove the lifting device and wire ropes.

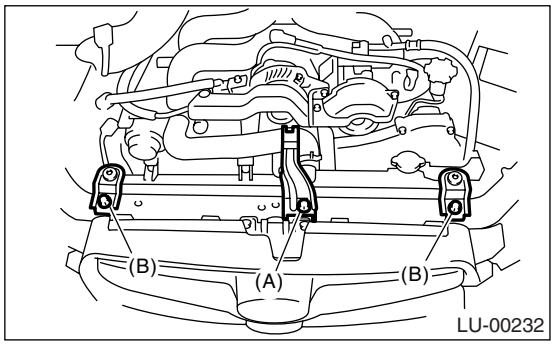


11) Install the pitching stopper.

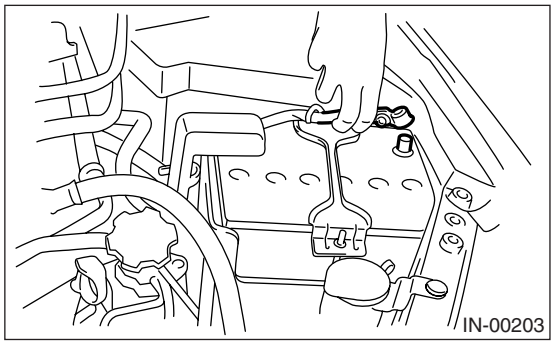
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



12) Install the hood stay holder (A) and radiator upper brackets (B).



13) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
14) Install the air intake duct and air cleaner case.
<Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.>
15) Install the front wheels.
16) Connect the battery ground cable to battery.



17) Fill engine oil. <Ref. to LU(H4SO 2.0)-8, INSPECTION, Engine Oil.>

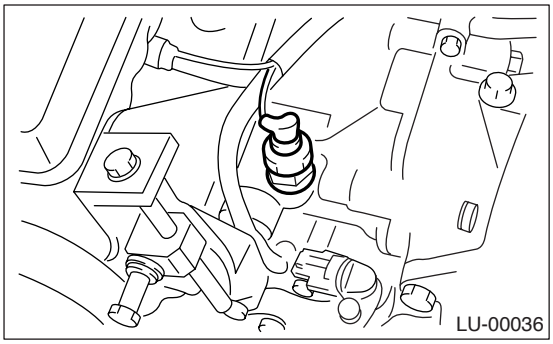
C: INSPECTION

Visually check that the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

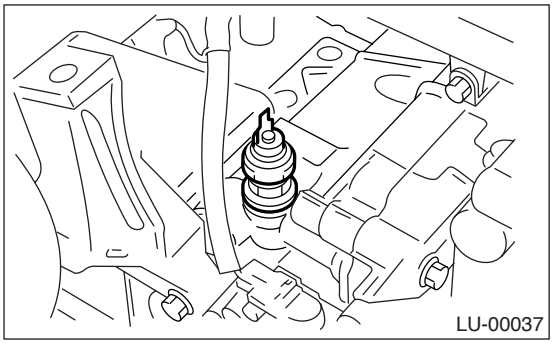
6. Oil Pressure Switch

A: REMOVAL

1) Remove the generator from bracket.
<Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
2) Disconnect the terminal from oil pressure switch.



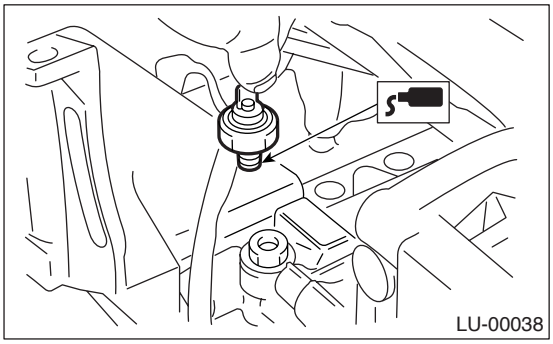
3) Remove the oil pressure switch.



B: INSTALLATION

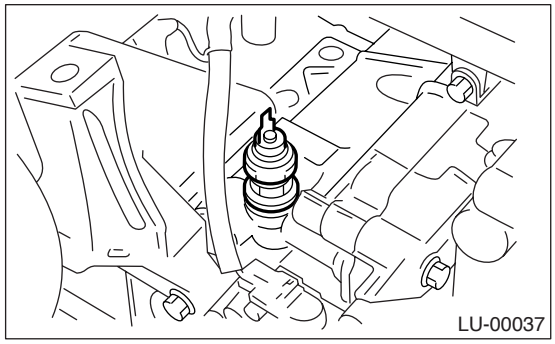
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

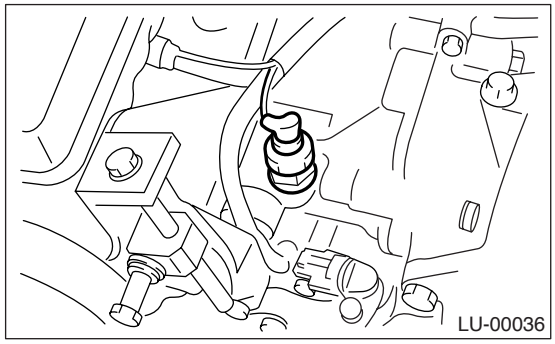


2) Install the oil pressure switch onto engine block.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



3) Connect the terminal to oil pressure switch.



4) Install the generator to bracket.
<Ref. to SC(H4SO 2.0)-14, INSTALLATION, Generator.>

C: INSPECTION

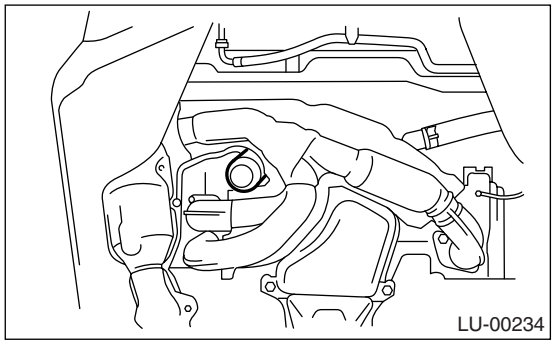
Check the oil pressure switch installation portion for oil leakage and oil seepage.

7. Engine Oil Filter

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the oil filter using ST.

ST	18332AA000	OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST	18332AA010	OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))



B: INSTALLATION

1) Clean the oil filter installing surface on cylinder block.
2) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.
3) Install the oil filter turning it by hand, being careful not to damage the seal rubber.
4) Tighten more after the seal rubber contacts the cylinder block.

NOTE:
• In case of oil filter in outer diameter 68 mm (2.68 in), tighten by approx. one turn.
• In case of oil filter in outer diameter 65 mm (2.56 in), tighten by approx. 2/3 to 3/4 turn.
• Over-tightening may cause oil leak.

C: INSPECTION

1) After installing the oil filter, run engine and make sure that no oil is leaking around the seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H4SO 2.0)-8, INSPECTION, Engine Oil.>

8. General Diagnostic Table

A: INSPECTION

Before performing diagnosis, make sure that the engine oil level is correct and no oil leakage exists.

Symptom	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogging of oil filter	Replace.
		Malfunction of oil by-pass valve in oil filter	Clean or replace.
		Malfunction of oil relief valve in oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not come on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1) — 2).

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

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MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
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IGNITION	IG(H4SO 2.0)
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SPEED CONTROL SYSTEMS

SP(H4SO 2.0)

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2. Accelerator Pedal.....4

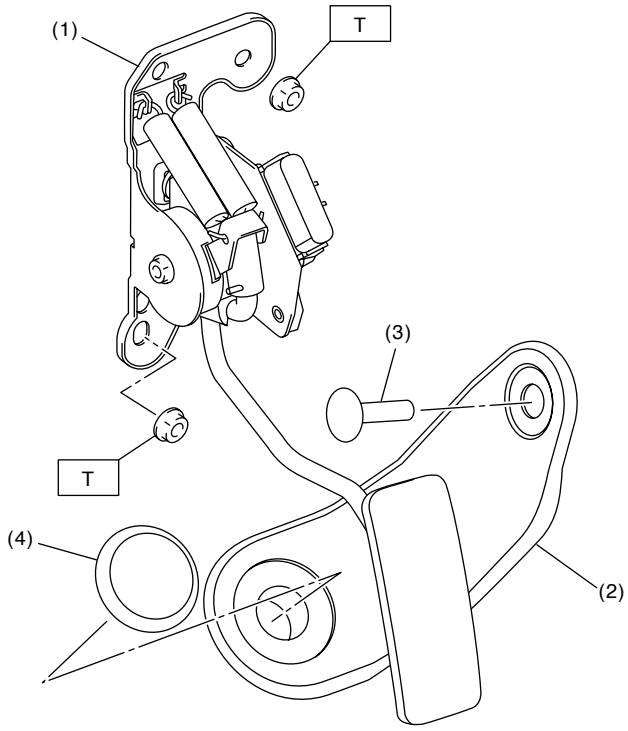
1. General Description

A: SPECIFICATION

Accelerator pedal	Stroke	At pedal pad	LHD model	50 — 63 mm (1.97 — 2.48 in)
			RHD model	53 — 65 mm (2.09 — 2.56 in)

B: COMPONENT

• LHD model

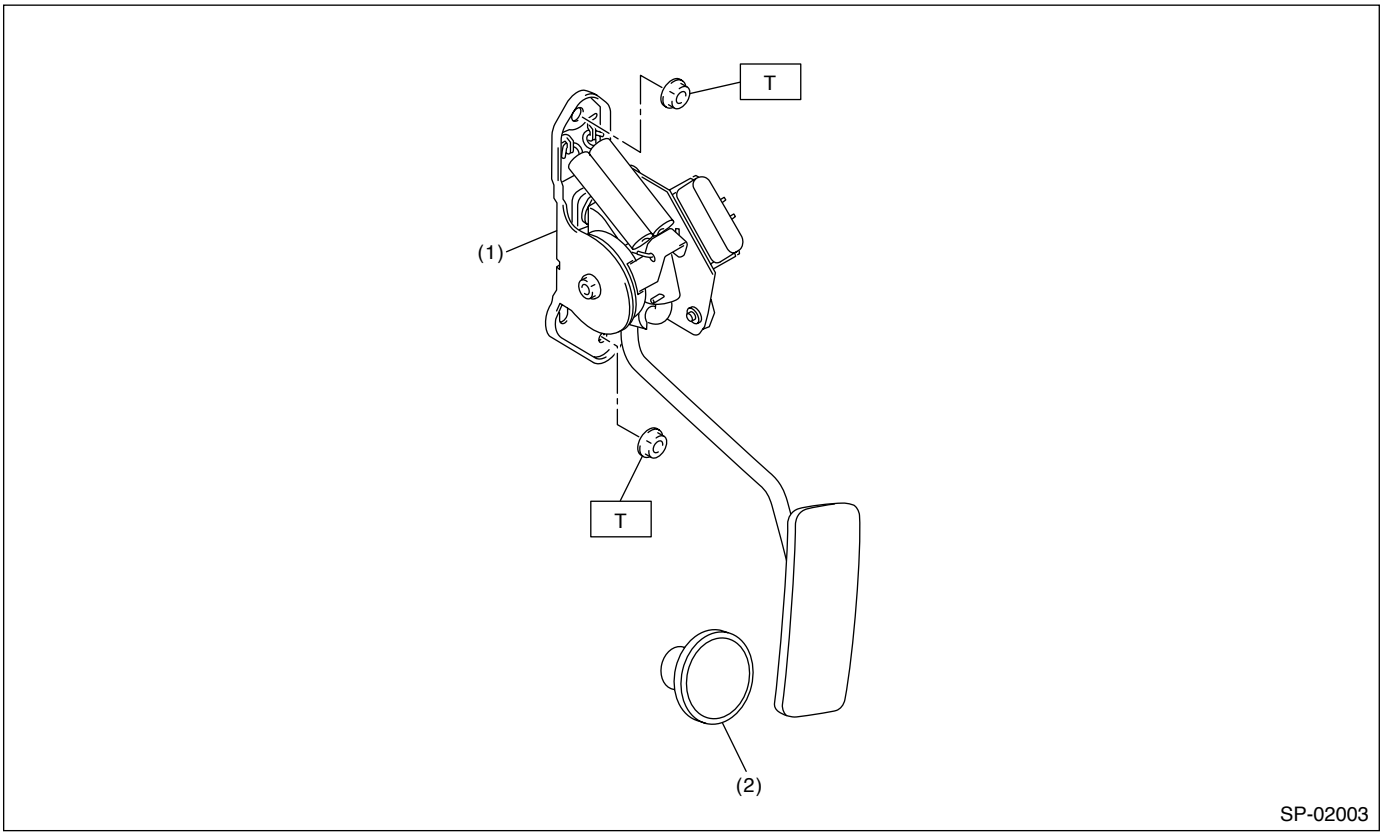


SP-02002

(1) Accelerator pedal ASSY
(2) Accelerator plate
(3) Clip
(4) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.8, 13.0)

• RHD model



(1) Accelerator pedal ASSY
(2) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T: 18 (1.8, 13.0)

C: CAUTION

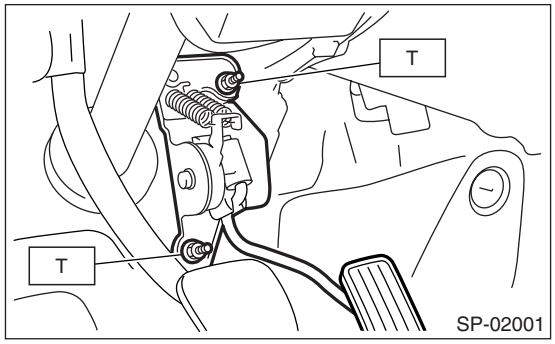
• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Accelerator Pedal

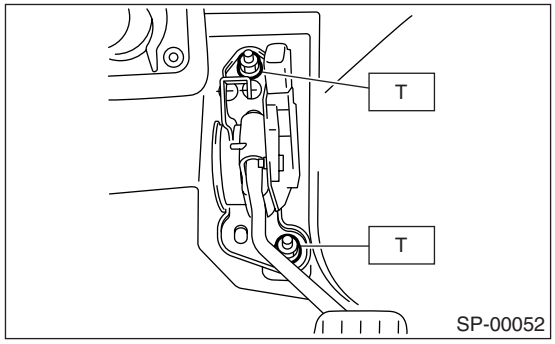
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the connector.
3) Remove the nut securing accelerator pedal assembly.

• LHD model



• RHD model



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

C: DISASSEMBLY

NOTE:
Accelerator pedal cannot be disassembled.

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IGNITION

IG(H4SO 2.0)

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2. Spark Plug 5
3. Ignition Coil & Ignitor ASSY 8
4. Spark Plug Cord 10

1. General Description

A: SPECIFICATION

1. 2.0 L MODEL

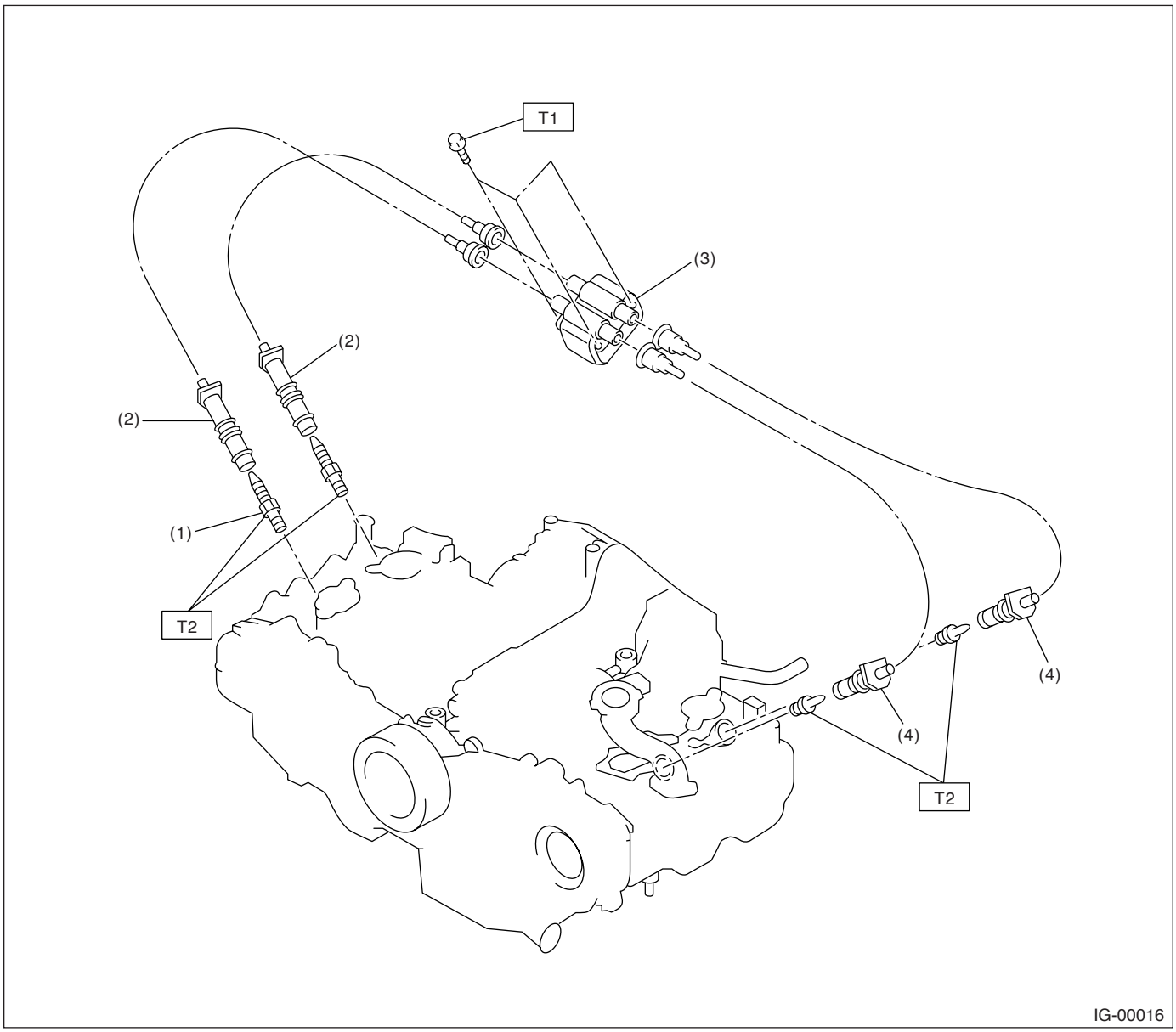
Item		Designation
Ignition coil & ignitor ASSY	Model	CM12-100C
	Manufacturer	HITACHI
	Secondary coil resistance	18.0 kΩ± 20%
Spark plug	Manufacturer and Type	CHAMPION: RC10YC4
	Thread size (diameter, pitch, length) mm	14, 1.25, 19
	Spark plug gap mm (in)	1.0 — 1.1 (0.039 — 0.043)
	Electrode	Nickel

2. 2.5 L MODEL

Item			Designation
Ignition coil & ignitor ASSY	Model		FH 0286
	Manufacturer		DIAMOND
	Secondary coil resistance		11.2 kΩ±15%
Spark plug	Manufacturer and Type	EC, EK, K4 model	NGK: PFR5B-11
		Except for EC, EK, K4 model	CHAMPION: RC10YC4
	Thread size (diameter, pitch, length) mm		14, 1.25, 19
	Spark plug gap mm (in)		1.0 — 1.1 (0.039 — 0.043)
	Electrode	EC, EK, K4 model	Platinum
		Except for EC, EK, K4 model	Nickel

B: COMPONENT

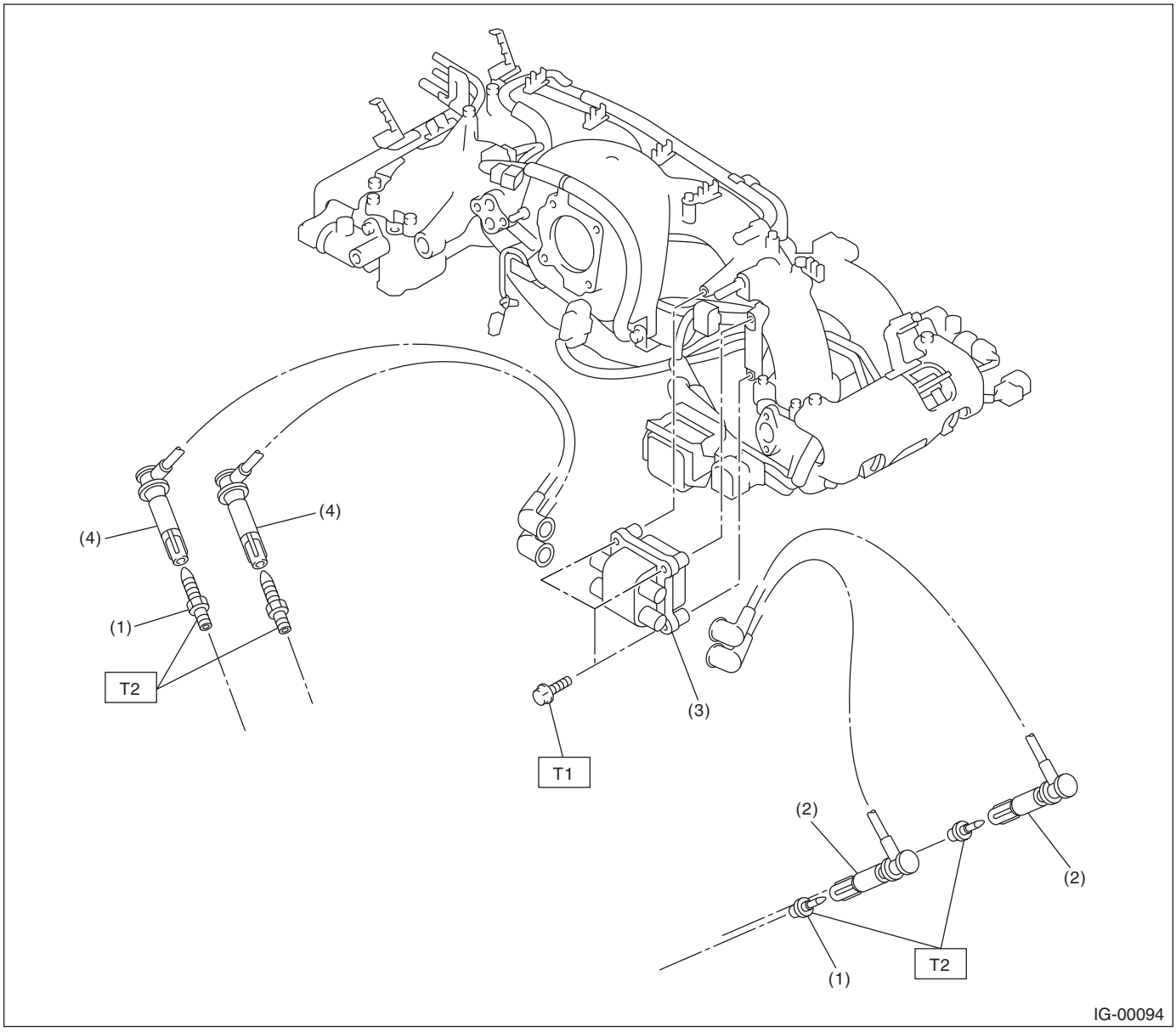
• 2.0 L model



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil & ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.2)

• 2.5 L model



(1) Spark plug
(2) Spark plug cord (#1, #3)
(3) Ignition coil & ignitor ASSY
(4) Spark plug cord (#2, #4)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 21 (2.1, 15.2)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

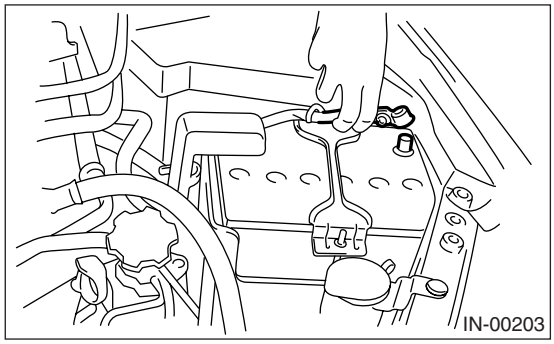
A: REMOVAL

CAUTION:
All spark plugs installed on an engine must be of the same heat range.

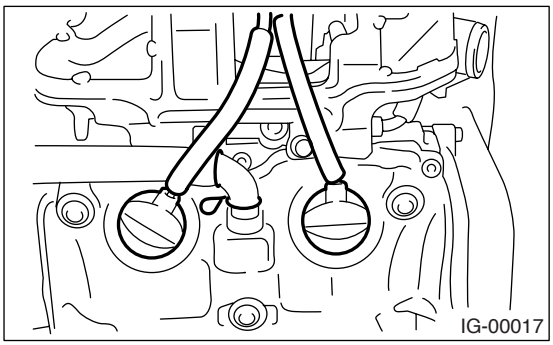
Spark plug:
<Ref. to IG(H4SO 2.0)-2, SPECIFICATION, General Description.>

1. RH SIDE

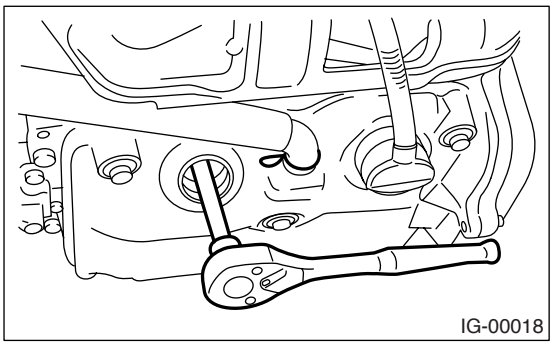
1) Disconnect the ground cable from battery.


IN-00203

2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
3) Remove the spark plug cords by pulling the boot. (Do not pull the cord itself.)

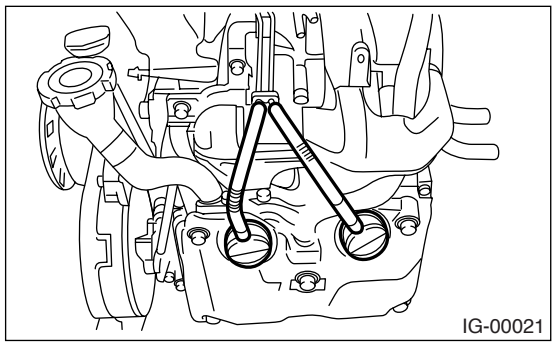

IG-00017

4) Remove the spark plug with a spark plug socket.

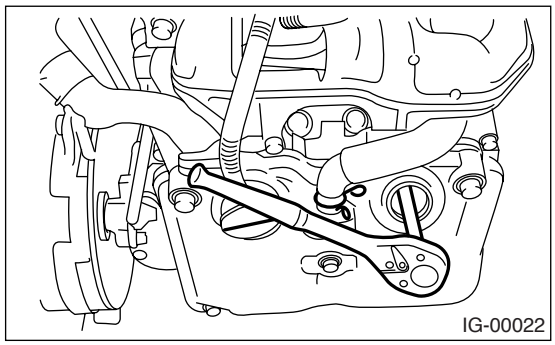

IG-00018

2. LH SIDE

1) Remove the battery.
2) Remove the spark plug cords by pulling the boot. (Do not pull the cord itself.)


IG-00021

3) Remove the spark plug with a spark plug socket.


IG-00022

B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

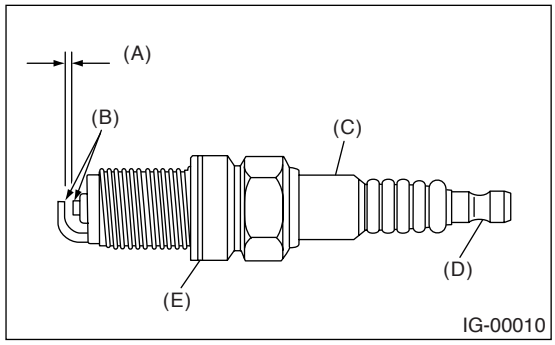
Install in the reverse order of removal.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

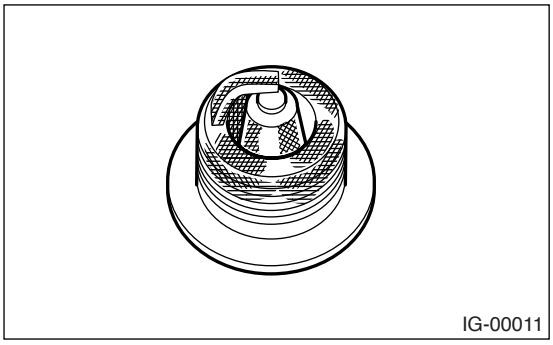
C: INSPECTION

Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.

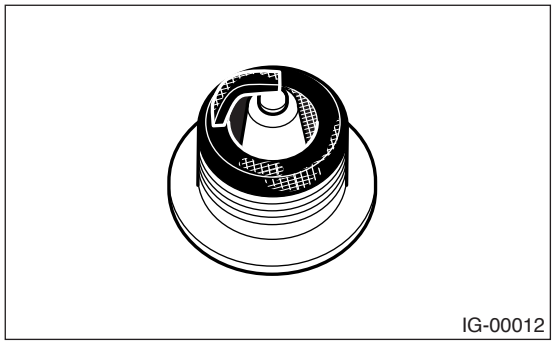


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Crack
(D) Damage
(E) Damaged gasket

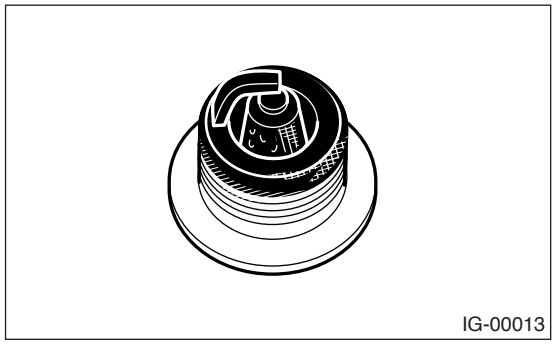
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



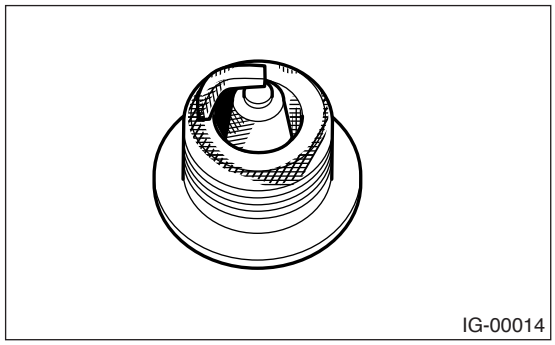
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in the city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.



4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

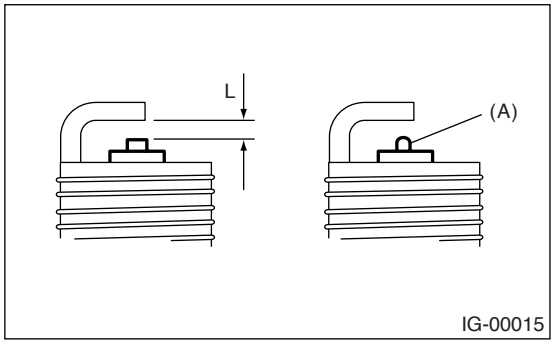


CAUTION:
Avoid using a plug cleaner because of the spark plug with a platinum tip. (2.5 L model)

D: ADJUSTMENT

Adjust the spark plug gap, if necessary, by measuring with a gap gauge. (2.0 L model)

Spark plug gap: L
1.0 — 1.1 mm (0.039 — 0.043 in)

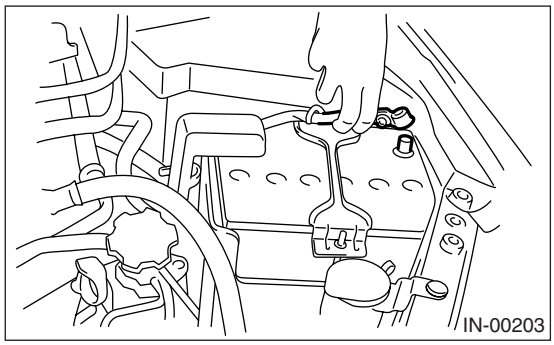


NOTE:
Replace with a new spark plug if the area (A) is worn to spherical shape.

3. Ignition Coil & Ignitor ASSY

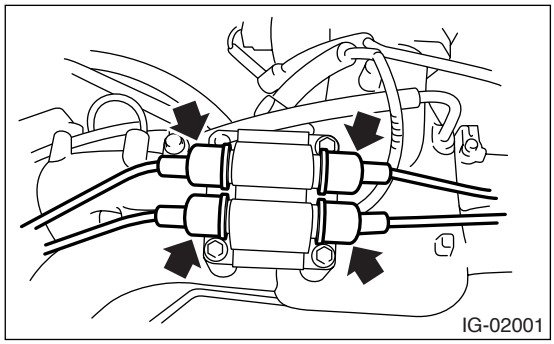
A: REMOVAL

1) Disconnect the ground cable from battery.

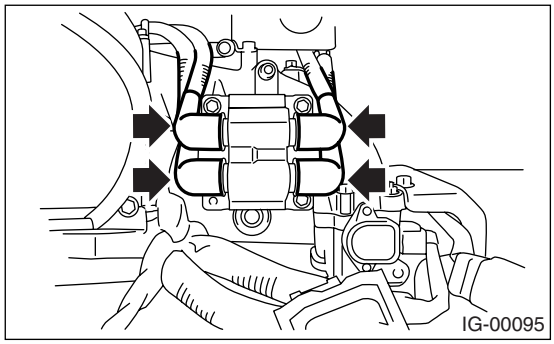


2) Disconnect the spark plug cords from ignition coil & ignitor ASSY.

• 2.0 L model



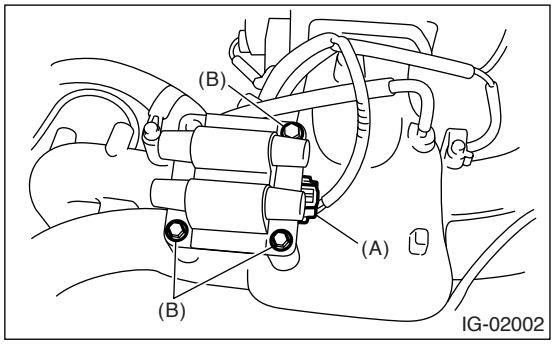
• 2.5 L model



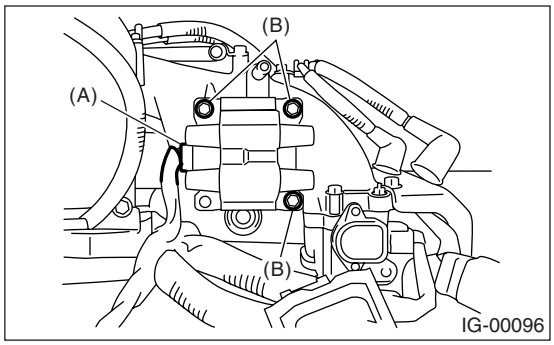
3) Disconnect the connector (A) from ignition coil & ignitor ASSY.

4) Remove the bolt (B) which secures the ignition coil & ignitor ASSY to intake manifold.

• 2.0 L model



• 2.5 L model



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
Connect the spark plug cords to correct positions. Failure to do so will damage the unit.

C: INSPECTION

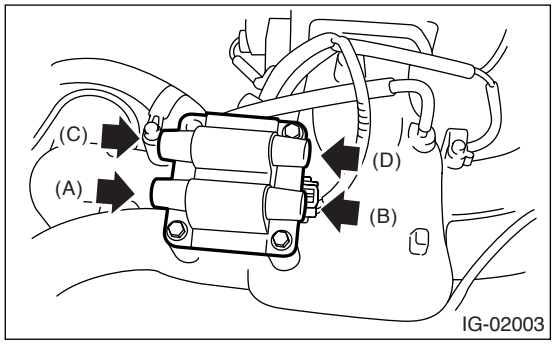
Check the following using a tester. Replace if defective.

• Secondary coil resistance

CAUTION:
• If the resistance is extremely low, it indicates the presence of a short-circuit.
• Ignitor is integrated with the coil. Therefore the resistance of primary side coil cannot be measured.

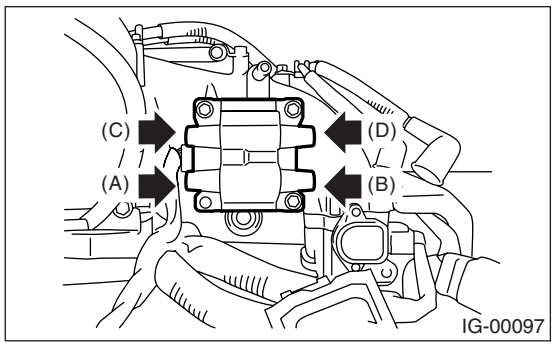
Specified resistance (2.0 L model):

[Secondary side]
Between (A) and (B)
18.0 kΩ±20%
Between (C) and (D)
18.0 kΩ±20%



Specified resistance (2.5 L model):

[Secondary side]
Between (A) and (B)
11.2 kΩ±15%
Between (C) and (D)
11.2 kΩ±15%



4. Spark Plug Cord

A: INSPECTION

Check the following items:

• Damage to cords, deformation, burning or rust formation of terminals

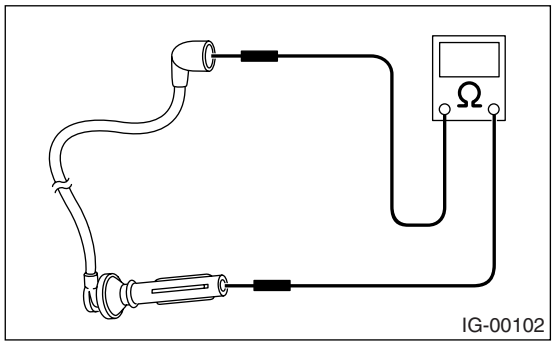
• Resistance values of cords

Resistance value (2.0 L model):

#1 cord: 5.9 — 11.1 kΩ
#2 cord: 8.8 — 14.8 kΩ
#3 cord: 6.8 — 11.7 kΩ
#4 cord: 8.8 — 14.8 kΩ

Resistance value (2.5 L model):

#1 cord: 7.1 — 12.1 kΩ
#2 cord: 12.1 — 19.9 kΩ
#3 cord: 7.7 — 13.0 kΩ
#4 cord: 12.3 — 20.2 kΩ



ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

STARTING/CHARGING SYSTEMS

SC(H4SO 2.0)

Page

1. General Description 2
2. Starter 6
3. Generator 14
4. Battery 20

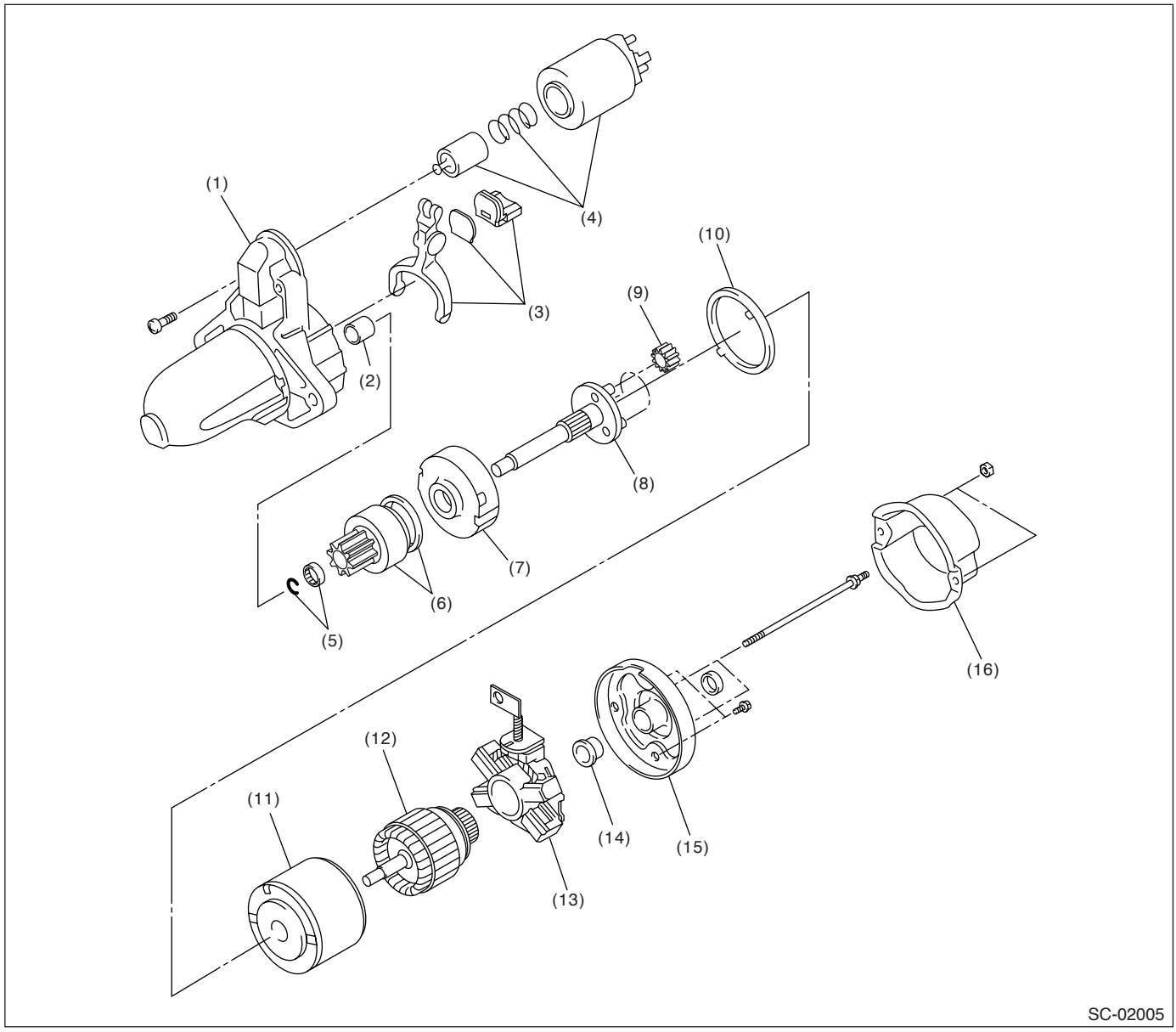
1. General Description

A: SPECIFICATION

Item			Specification	
Vehicle model			MT	AT
Starter	Type		Reduction type	
	Model		M000T30471	M000T20171
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 1.0 kW	12 V — 1.4 kW
	Revolving direction		Counterclockwise (when observed from pinion)	
	Number of pinion teeth		8	9
	No-load characteristics	Voltage	11 V	
		Current	95 A or less	90 A or less
		Rotating speed	2,500 rpm or more	2,000 rpm or more
	Load characteristics	Voltage	7.5 V	7.7 V
		Current	300 A	400 A
		Torque	8.84 N·m (0.90 kgf-m, 6.5 ft-lb) or more	16.7 N·m (1.70 kgf-m, 12.3 ft-lb) or more
		Rotating speed	870 rpm or more	710 rpm or more
	Lock characteristics	Voltage	4 V	3.5 V
		Current	680 A or less	960 A or less
		Torque	17 N·m (1.73 kgf-m, 12.5 ft-lb) or more	31 N·m (3.16 kgf-m, 22.9 ft-lb) or more
Generator	Model		Rotating-field three-phase type, voltage regulator built-in type, with load response control system	
	Model		A3TG0491	
	Manufacturer		Mitsubishi Electric	
	Voltage and output		12 V — 110 A	
	Polarity on ground side		Negative	
	Revolving direction		Clockwise (when observed from pulley side)	
	Armature connection		3-phase Y-type	
	Output current		1,500 rpm — 50 A or more 2,500 rpm — 91 A or more 5,000 rpm — 105 A or more	
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]	
Battery	Type and capacity	EC, EK, K4 model	12 V — 48 AH (55D23L)	12 V — 52 AH (65D23L) 12 V — 52 AH (75D23L)
		KS, KA model	12 V — 27 AH (34B19L) 12 V — 48 AH (55D23L)	

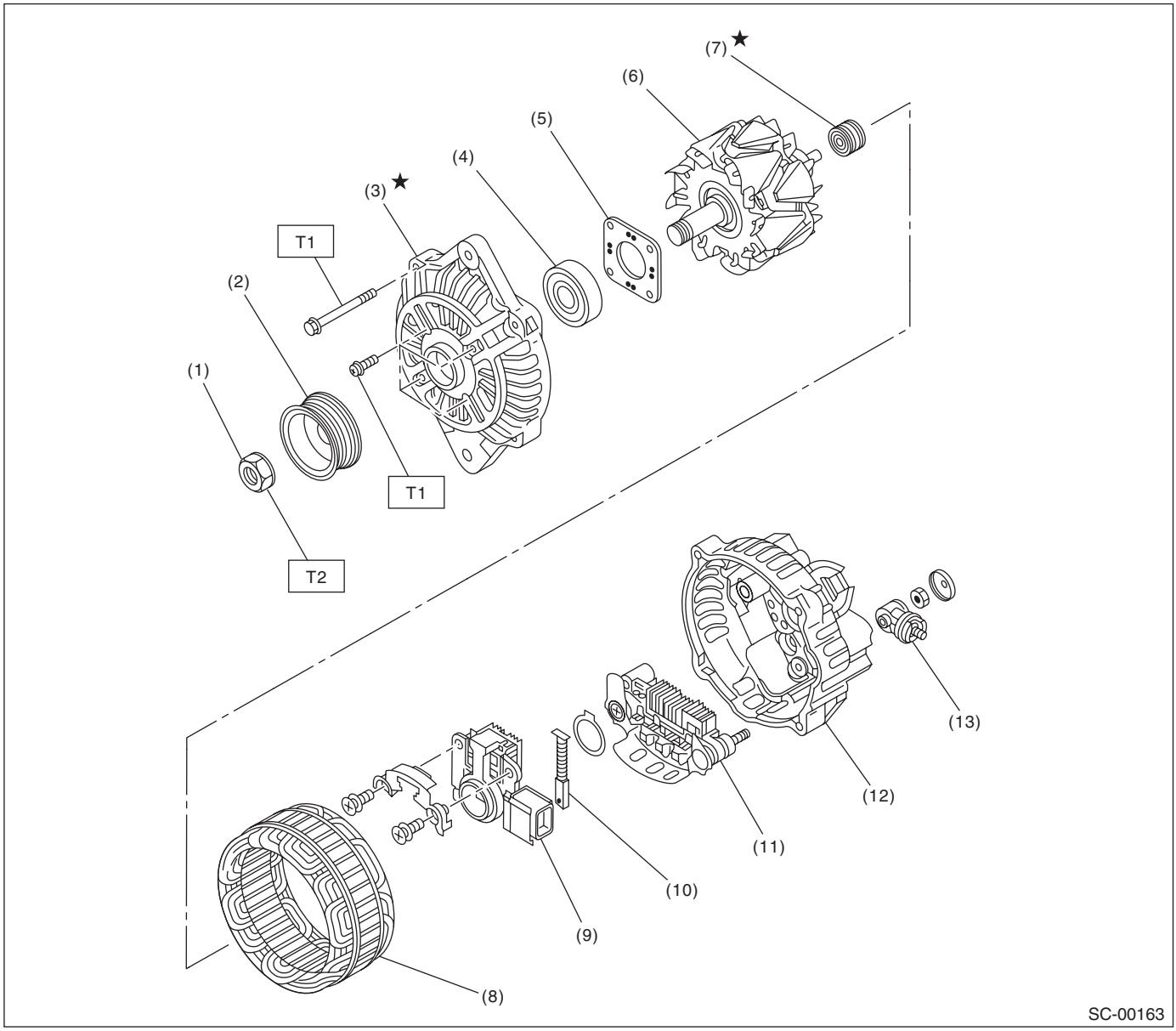
B: COMPONENT

1. STARTER



(1) Front bracket
(2) Sleeve bearing
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Overrunning clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Packing
(11) Yoke ASSY
(12) Armature
(13) Brush holder ASSY
(14) Sleeve bearing
(15) Rear cover
(16) Rear cover set

2. GENERATOR



(1) Pulley nut
(2) Pulley
(3) Front cover
(4) Ball bearing
(5) Bearing retainer
(6) Rotor
(7) Bearing
(8) Stator coil
(9) IC regulator with brush
(10) Brush
(11) Rectifier
(12) Rear cover
(13) Terminal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.7 (0.48, 3.5)
T2: 108 (11.0, 80)

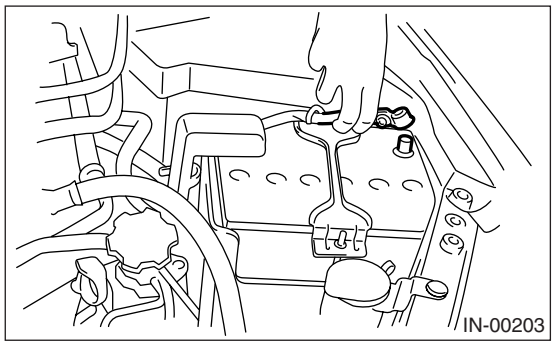
C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Starter

A: REMOVAL

1) Disconnect the ground cable from battery.

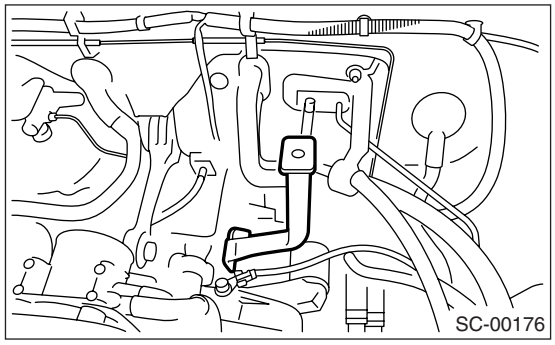


2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>

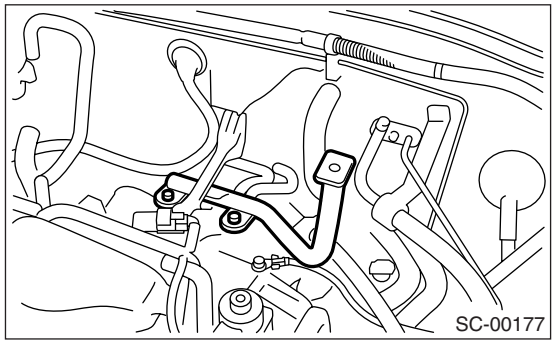
3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>

4) Remove the air intake chamber stay LH. (Non-turbo model).

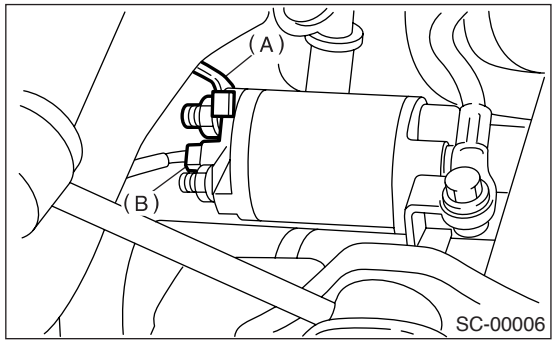
- MT model



- AT model



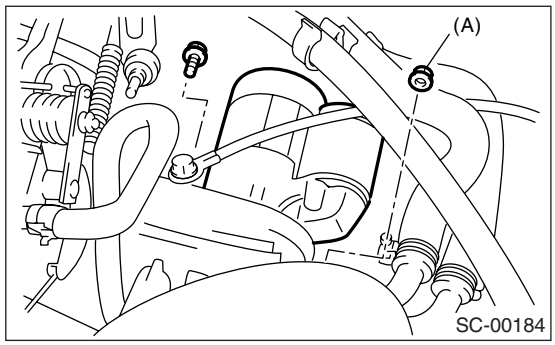
5) Disconnect the connector and terminal from starter.



(A) Terminals
(B) Connector

6) Remove the starter from transmission.

NOTE:
In case of MT model, the bolt is used in place of nut (A) shown in the figure.

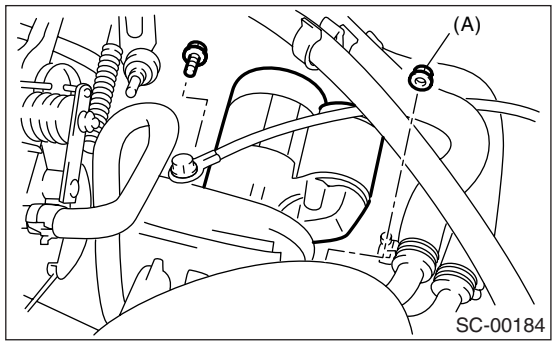


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
In case of MT model, the bolt is used in place of nut (A) shown in the figure.

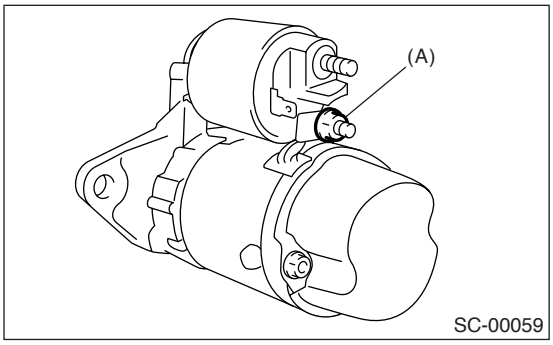
Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



C: DISASSEMBLY

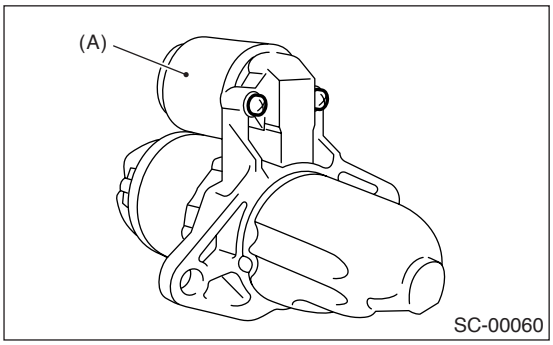
1. STARTER ASSEMBLY

1) Loosen the nut which holds terminal M of switch assembly, and then disconnect the connector.



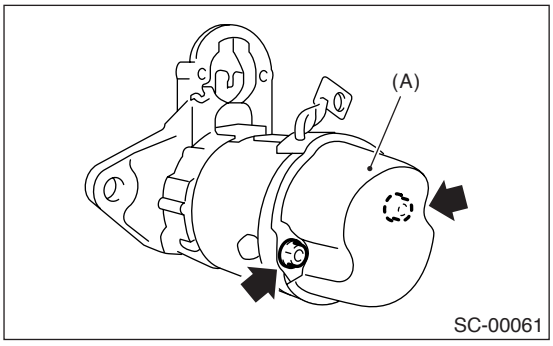
(A) Terminal M

2) Remove the bolts which hold switch assembly, and then remove the switch assembly, plunger and plunger spring from starter as a unit.



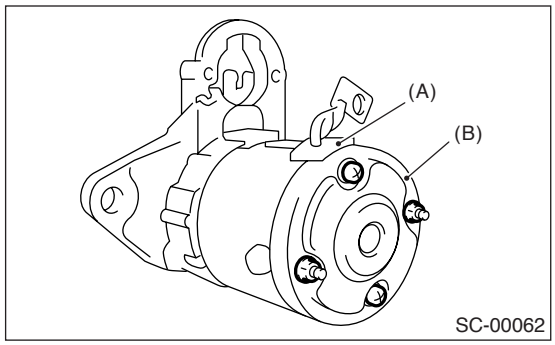
(A) Switch ASSY

3) Remove the nuts of both sides, and then remove rear cover set.



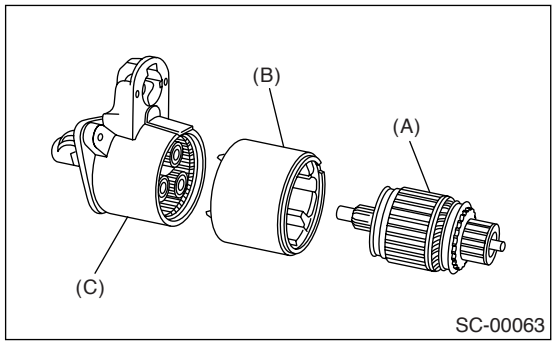
(A) Rear cover set

4) Remove the through-bolts and brush holder screws of both sides, and then detach the rear cover and brush holder assembly.



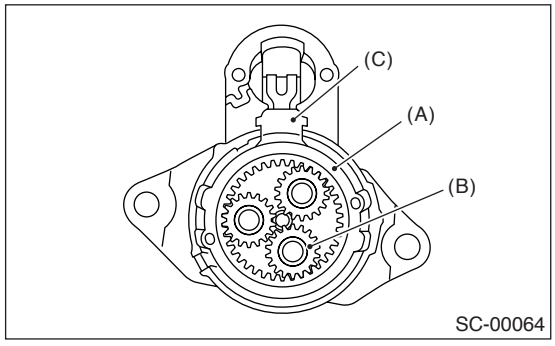
(A) Brush holder ASSY
(B) Rear cover

5) Remove the armature and yoke assembly from front bracket.



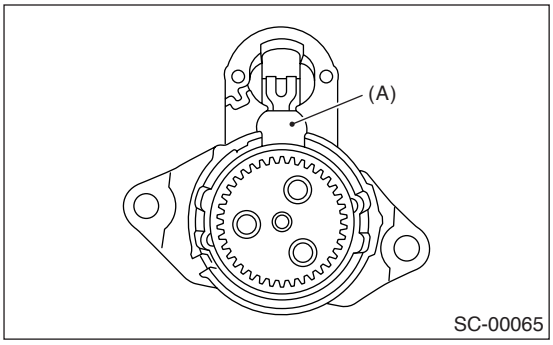
(A) Armature
(B) Yoke ASSY
(C) Front bracket

6) Remove the packing A, planetary gear and packing B.



(A) Packing A
(B) Planetary gear
(C) Packing B

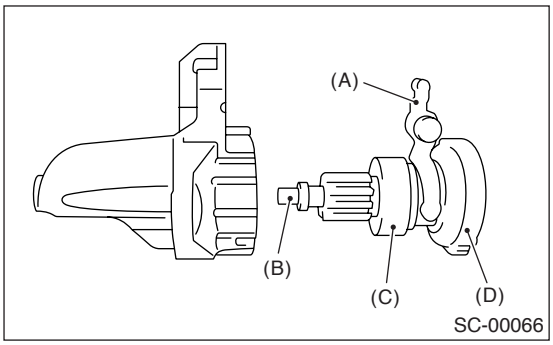
7) Remove the plate.



(A) Plate

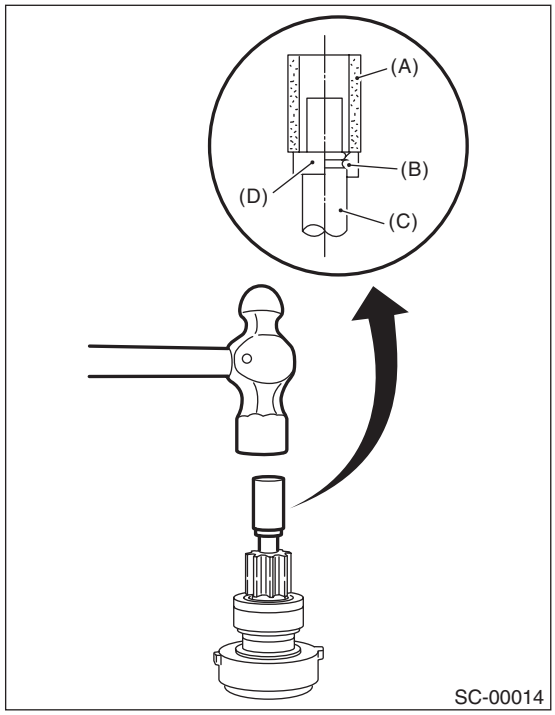
8) Remove the shaft assembly and overrunning clutch from front bracket as a unit.

NOTE:
Check the following points before removal.
- Lever direction
- Position of internal gear assembly



(A) Lever
(B) Shaft ASSY
(C) Overrunning clutch
(D) Internal gear ASSY

9) Remove the overrunning clutch from shaft assembly as follows:
(1) Remove the stopper from ring by lightly tapping the stopper with an appropriate tool (such as a fit socket wrench).
(2) Remove the ring, stopper and clutch from shaft.



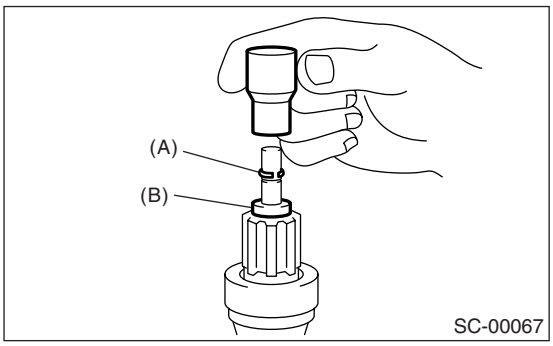
(A) Socket wrench
(B) Ring
(C) Shaft
(D) Stopper

D: ASSEMBLY

NOTE:
Apply grease to the following parts before assembly.
- Sleeve bearing
- Pinion shaft rotating part
- Shaft spline portion
- Inside of reduction system
- Lever fulcrum/Clutch rotating part

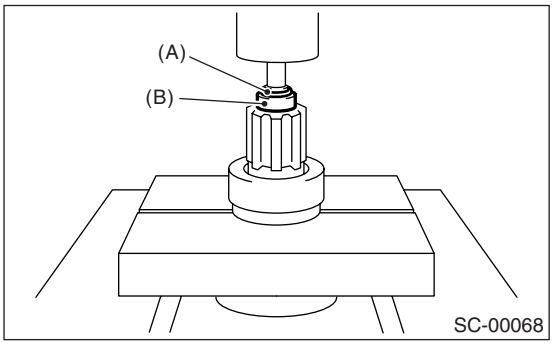
1) Install the overrunning clutch to shaft assembly.
2) Install the stopper to shaft assembly as follows.

(1) Insert the ring into the shaft groove by lightly tapping it with an appropriate tool (such as a fit socket wrench).



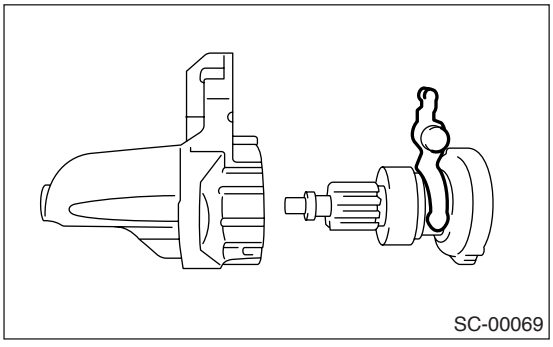
(A) Ring
(B) Stopper

(2) Install the stopper to ring using a press.

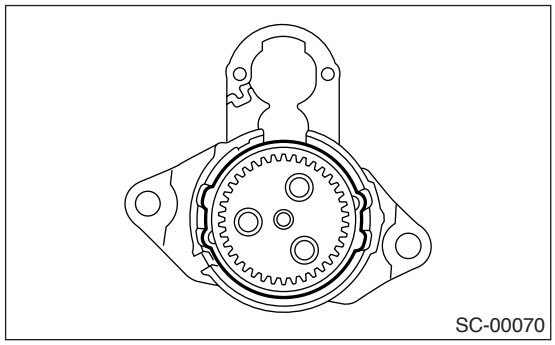


(A) Ring
(B) Stopper

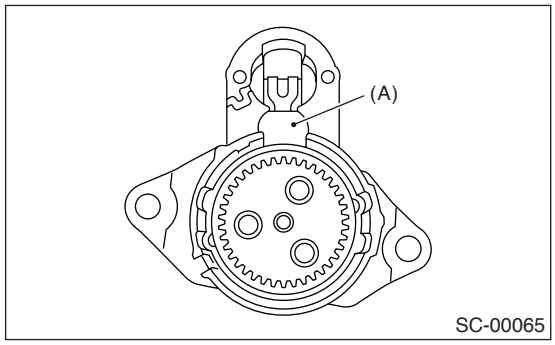
3) Install the shaft assembly to front bracket while taking care of the following points.
(1) Lever direction



(2) Internal gear position

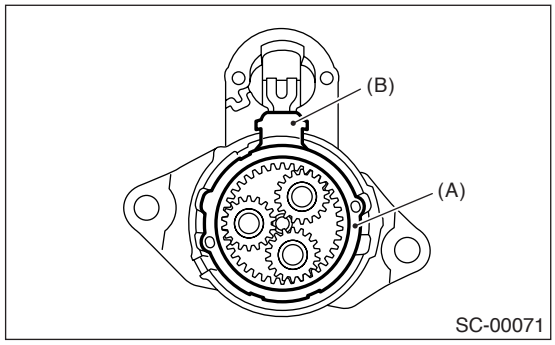


4) Install the plate.



(A) Plate

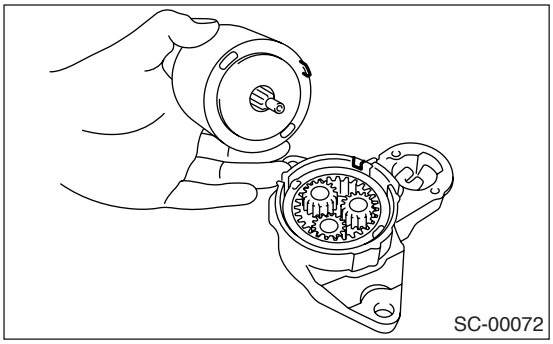
5) Install the planetary gear.
6) Install the packing A and B while taking care of installing positions.



(A) Packing A
(B) Packing B

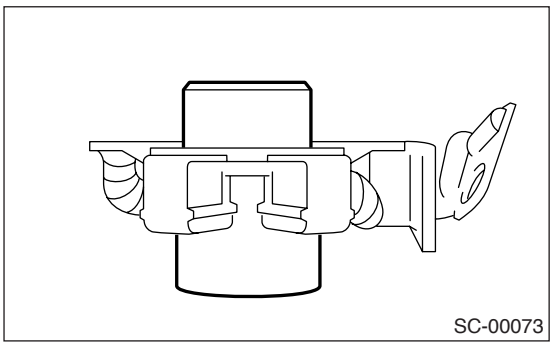
7) Install the armature to yoke assembly.

8) Install the yoke to front bracket matching front bracket to the groove of yoke assembly.

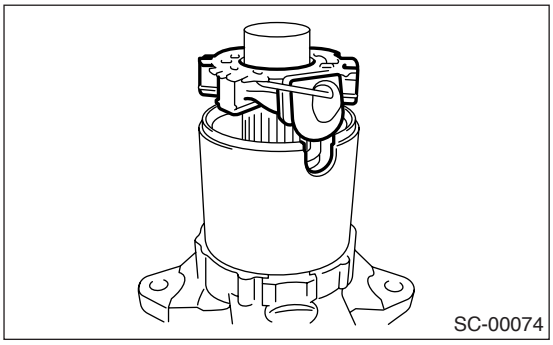

SC-00072

9) Install the brush holder to yoke assembly as follows.

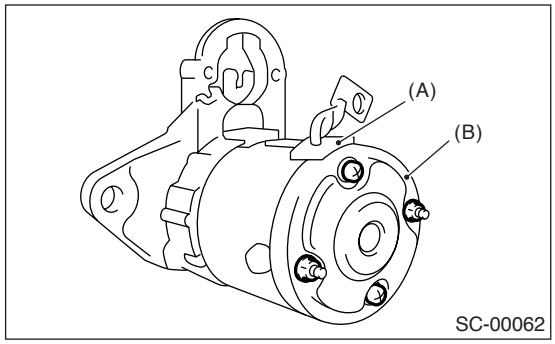
(1) Press the brush down into brush holder, and then fix the brush in that position using an appropriate tool (such as a fit socket wrench).


SC-00073

(2) Match the brush holder to groove of yoke, and then slide the brush holder into yoke assembly to install.


SC-00074

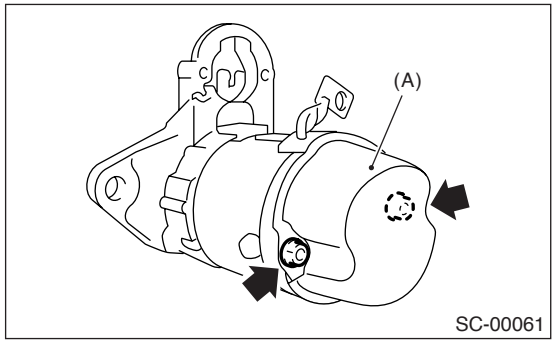
10) Install the rear cover matching it's groove to brush holder assembly.



SC-00062

(A) Brush holder ASSY
(B) Rear cover

11) Install rear cover set.



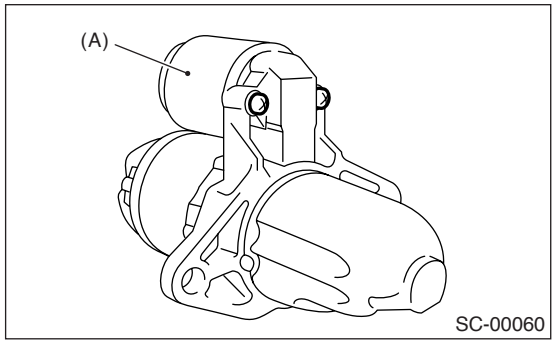
SC-00061

(A) Rear cover set

12) Install the switch assembly to front bracket as follows.

(1) Insert the plunger and plunger spring into switch assembly.

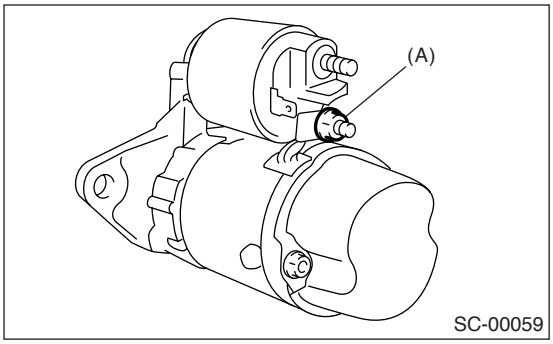
(2) Hook the plunger protrusion on lever edge to install plunger to front bracket.



SC-00060

(A) Switch ASSY

13) Connect the connector to terminal M of switch assembly.



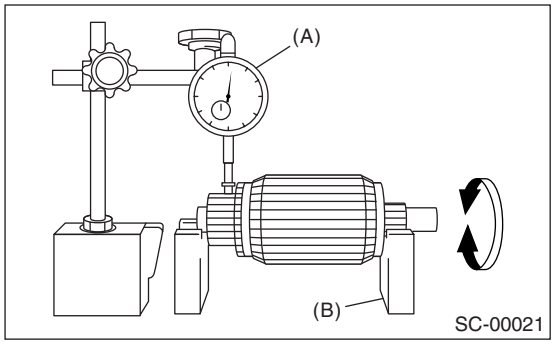
(A) Terminal M

E: INSPECTION

1. ARMATURE

1) Check the commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.
2) Run-out test
Check the commutator for run-out, and then replace if it exceeds the limit.

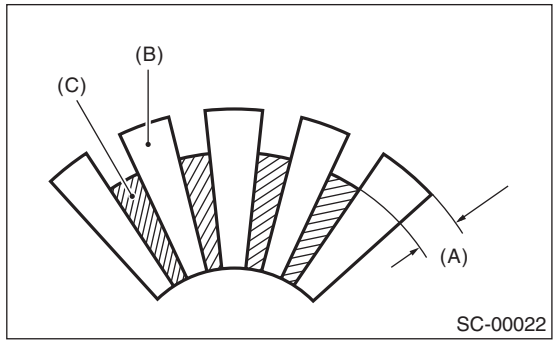
Commutator run-out:
Standard
0.05 mm (0.0020 in)
Service limit
Less than 0.10 mm (0.0039 in)



(A) Dial gauge
(B) V-block

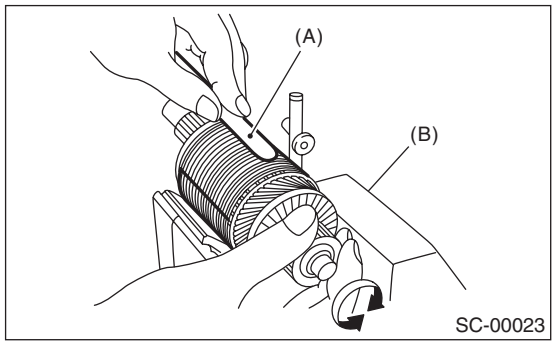
3) Depth of segment mold
Check the depth of segment mold.

Depth of segment mold:
0.5 mm (0.020 in)



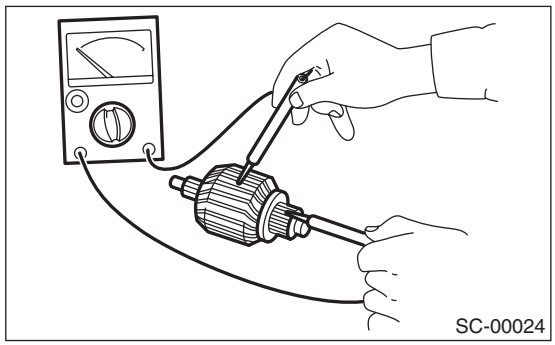
(A) Depth of mold
(B) Segment
(C) Mold

4) Armature short-circuit test
Check the armature for short-circuit by placing it on growler tester. Hold an iron sheet against the armature core while slowly rotating the armature. A short-circuited armature will cause the iron sheet to vibrate and to be attracted to core. If the iron sheet is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



(A) Iron sheet
(B) Growler tester

5) Armature ground test
Using a circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is continuity, the armature is grounded.
Replace the armature if it is grounded.



2. YOKE

Make sure the pole is set in position.

3. OVERRUNNING CLUTCH

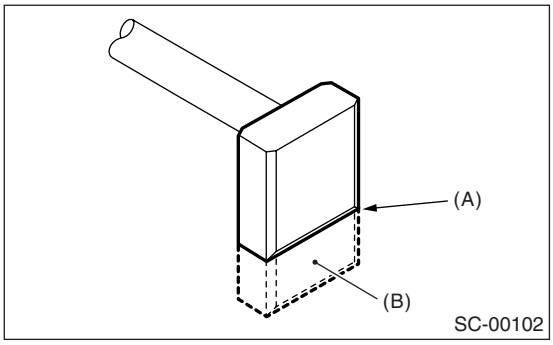
Inspect the teeth of pinion for wear and damage. Replace if it is damaged. Rotate the pinion in the right direction of rotation (counterclockwise). It should rotate smoothly. But in the opposite direction, it should be locked.

CAUTION:
Do not clean the overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER

1) Brush length
Measure the brush length, and then replace if it exceeds the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
12.3 mm (0.484 in)
Service limit
7.0 mm (0.276 in)



(A) Service limit line
(B) Brush

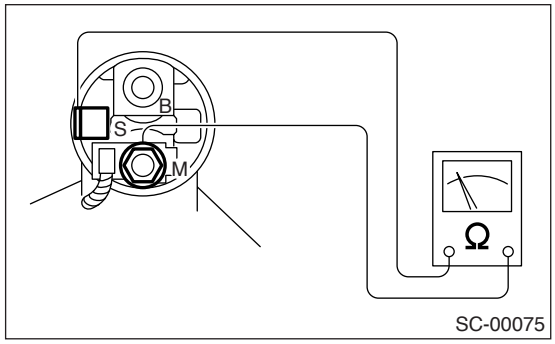
2) Brush movement
Be sure the brush moves smoothly inside brush holder.
3) Brush spring force
Measure the brush spring force with a spring scale. If it is less than the service limit, replace the brush holder.

Brush spring force:
Standard
15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lb) (when new)
Service limit
2.5 N (0.25 kgf, 0.56 lb)

5. SWITCH ASSEMBLY

Be sure there is continuity between the terminals S and M, and between terminal S and ground. Use a circuit tester (set in “ohm”).
Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:
S — M / Less than 1 Ω
S — Ground / Less than 1 Ω
M — B / More than 1 MΩ

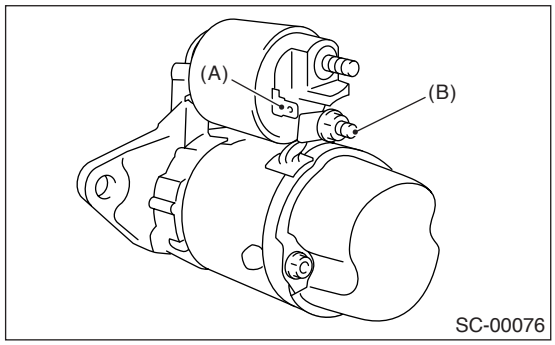


6. SWITCH ASSEMBLY OPERATION

1) Using a lead wire, connect the terminal S of switch assembly to positive terminal of battery, and starter body to ground terminal of battery. The pinion should be forced endwise on shaft.

CAUTION:
With the pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

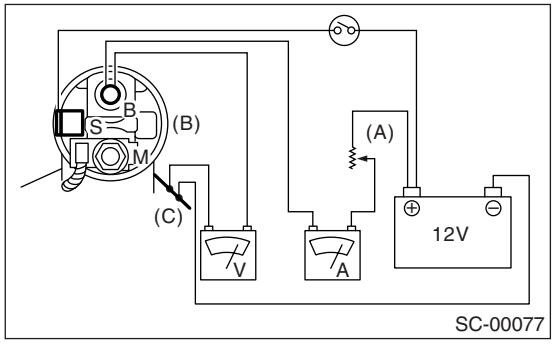
2) Disconnect the connector from terminal M. Then using a lead wire, connect the positive terminal of battery and terminal M and ground terminal to starter body.
In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



(A) Terminal S
(B) Terminal M

7. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.
Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.
For these performance tests, use the circuit shown in the figure.



(A) Variable resistance
(B) Starter body
(C) Magnetic switch

1) No-load test
With switch on, adjust the variable resistance for the voltage to obtain 11 V, read the ammeter and measure the starter speed. Compare these values with the specifications.

No-load test (Standard):

Voltage / Current
MT model
11 V / 95 A or less
AT model
11 V / 90 A or less

Rotating speed
MT model
2,500 rpm or more
AT model
2,000 rpm or more

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within specifications.

Load test (Standard):

Voltage / Load
MT model
7.5 V / 8.84 N·m (0.90 kgf-m, 6.5 ft-lb)
AT model
7.7 V / 16.7 N·m (1.70 kgf-m, 12.3 ft-lb)

Current / Speed
MT model
300 A / 870 rpm or more
AT model
400 A / 710 rpm or more

3) Lock test
With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to the specified voltage.

Lock test (Standard):

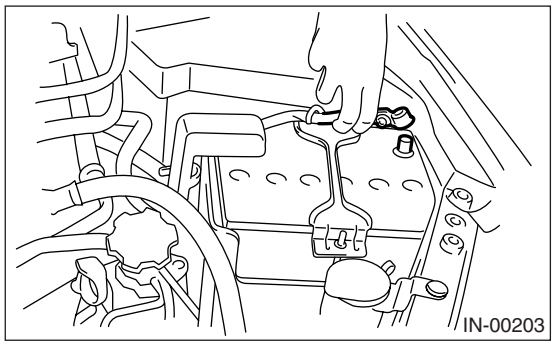
Voltage / Current
MT model
4 V / 680 A or less
AT model
3.5 V / 960 A or less

Torque
MT model
17 N·m (1.73 kgf-m, 12.5 ft-lb)
AT model
31 N·m (3.16 kgf-m, 22.9 ft-lb)

3. Generator

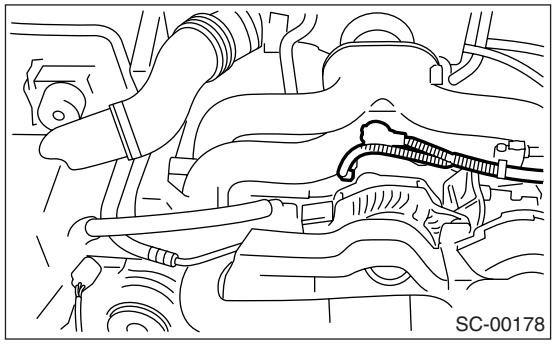
A: REMOVAL

1) Disconnect the ground cable from battery.

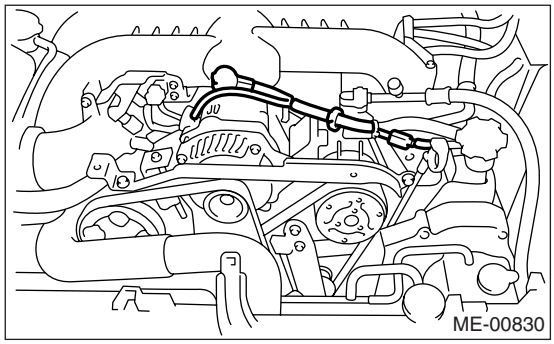


2) Disconnect the connector and terminal from generator.

- Non-turbo model



- Turbo model

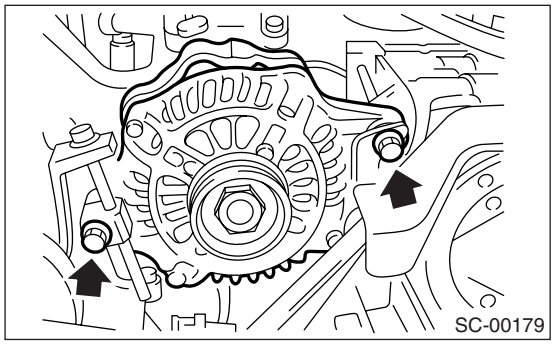


3) Remove the V-belt covers.

4) Remove the front side belts.

<Ref. to ME(H4SO 2.0)-38, FRONT SIDE BELT, REMOVAL, V-belt.> or <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, REMOVAL, V-belt.>

5) Remove the bolts which install the generator onto bracket.

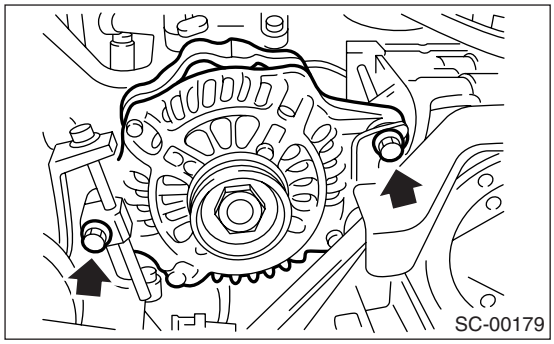


B: INSTALLATION

Install in the reverse order of removal.

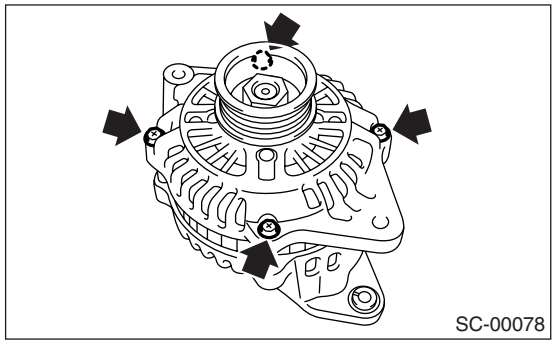
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Check and adjust the V-belt tension.
<Ref. to ME(H4SO 2.0)-39, INSPECTION, V-belt.> or <Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>

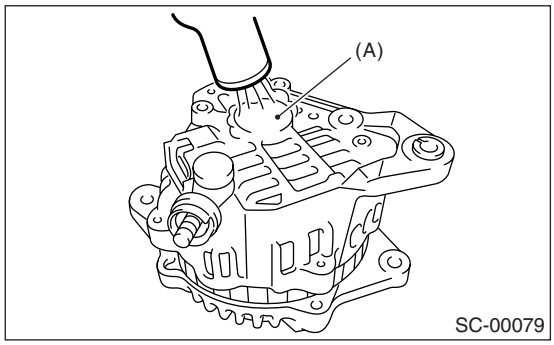


C: DISASSEMBLY

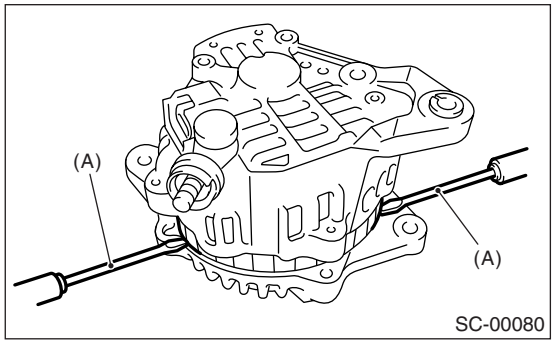
1) Remove the four through-bolts.



2) Heat portion (A) of rear cover to 50°C (122°F) with a heater drier.

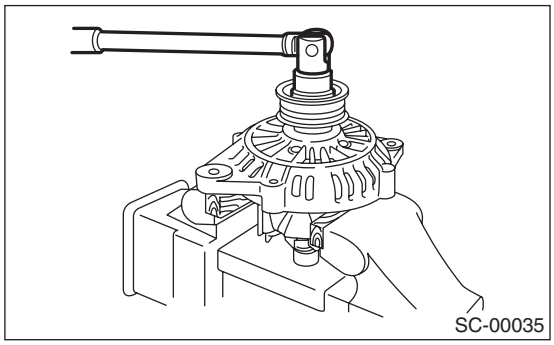


3) Then insert the tip of a flat tip screwdriver into the gap between stator core and front cover. Pry them apart to disassemble.

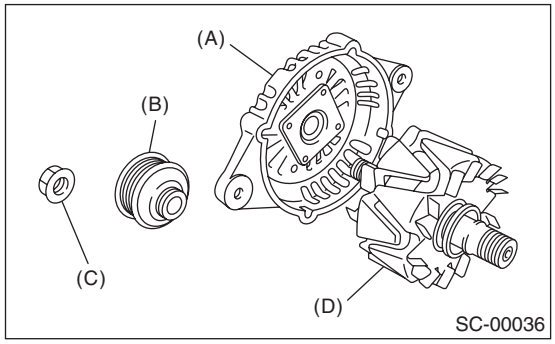


(A) Screwdriver

4) Hold the rotor with a vise and remove pulley nut.

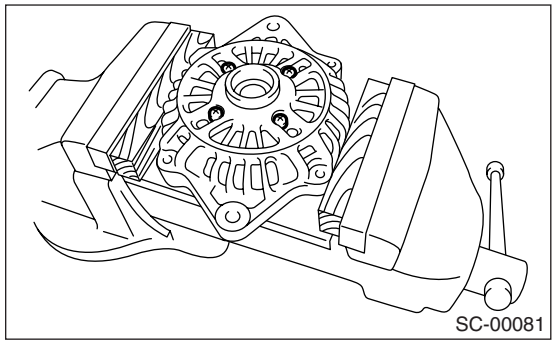


CAUTION:
When holding the rotor with a vise, place aluminum plates or wooden pieces on the vise jaws to prevent rotor from damage.

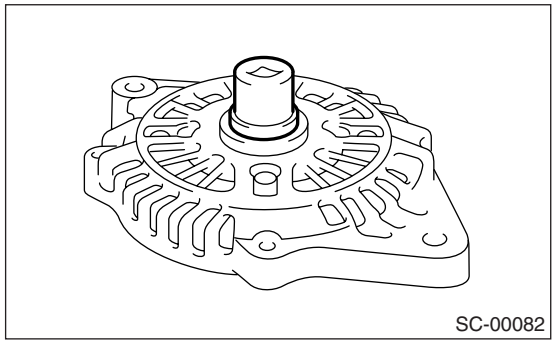


(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

5) Remove the ball bearing as follows.
(1) Remove the bolt, and then remove the bearing retainer.

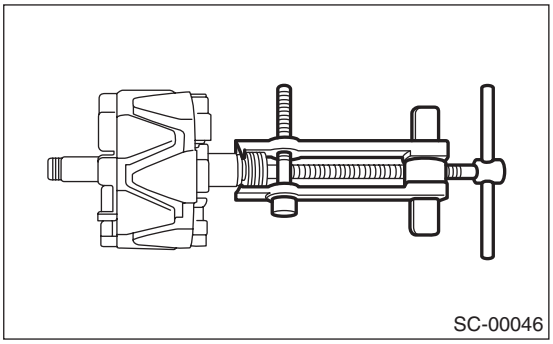


(2) Firmly install an appropriate tool (such as a fit socket wrench) to bearing inner race.



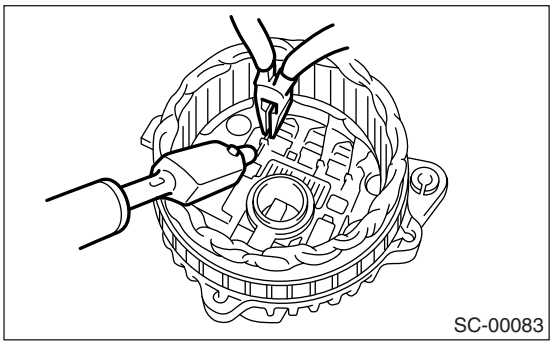
(3) Push the ball bearing off the front cover using a press.

6) Remove the bearing from rotor using a bearing puller.

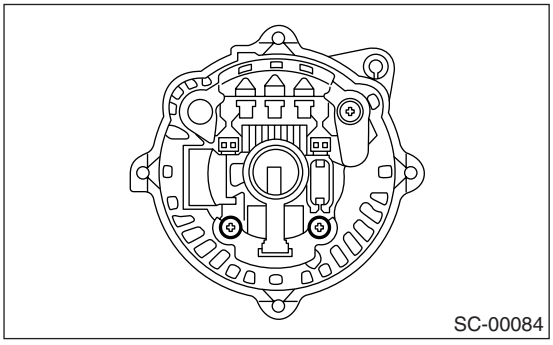

SC-00046

7) Unsolder connection between rectifier and stator coil to remove the stator coil.

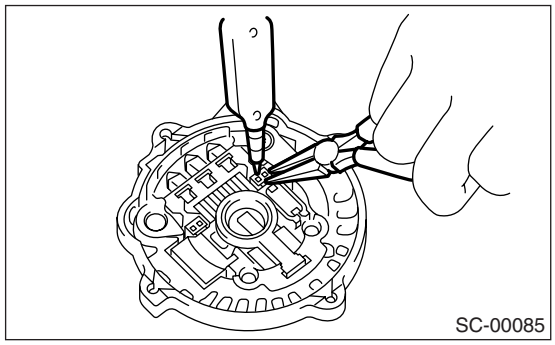
CAUTION:
Do not allow a 180 — 270 W soldering iron to contact the terminals for more than 5 seconds at once because the rectifier cannot withstand so much heat.


SC-00083

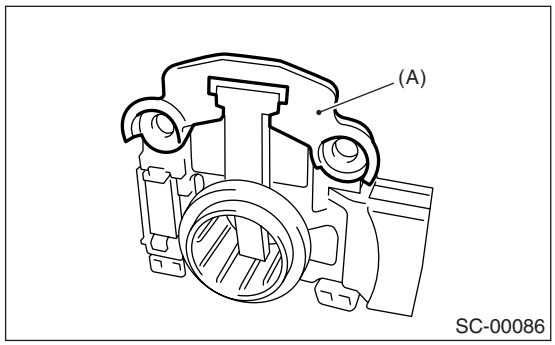
8) Remove the IC regulator as follows.
(1) Remove the screws which secure IC regulator to rear cover.


SC-00084

(2) Unsolder the connection between IC regulator and rectifier to remove the IC regulator.


SC-00085

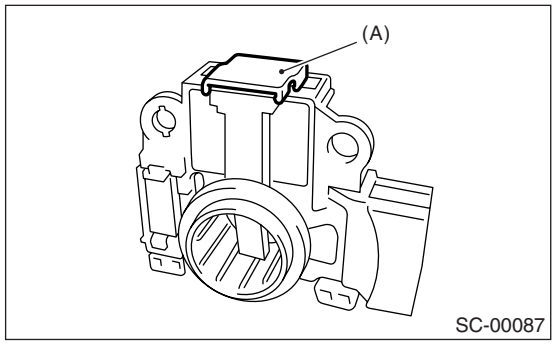
9) Remove the brush as follows.
(1) Remove cover A.



SC-00086

(A) Cover A

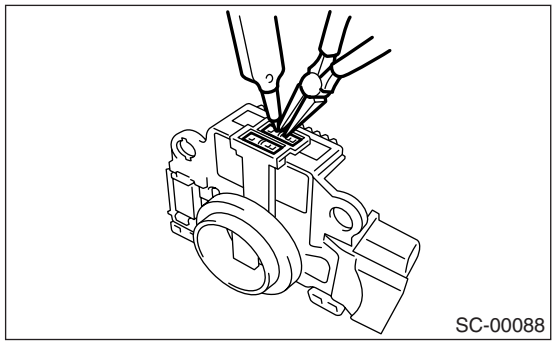
(2) Remove cover B.



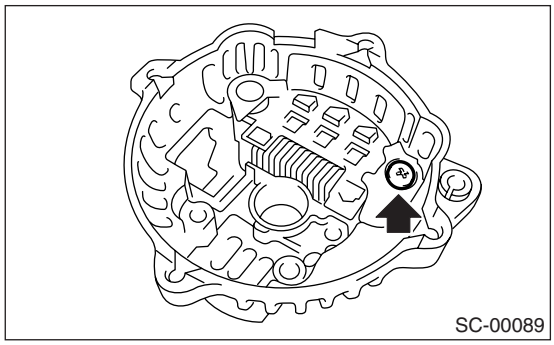
SC-00087

(A) Cover B

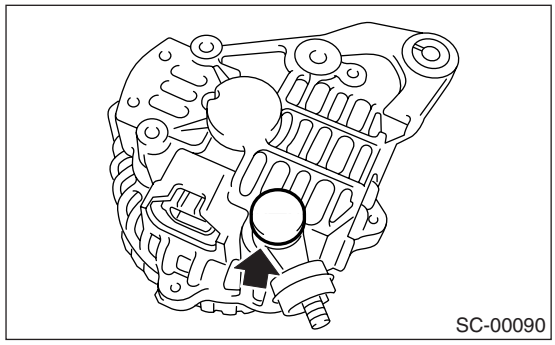
(3) Separate the brush from connection to remove.


SC-00088

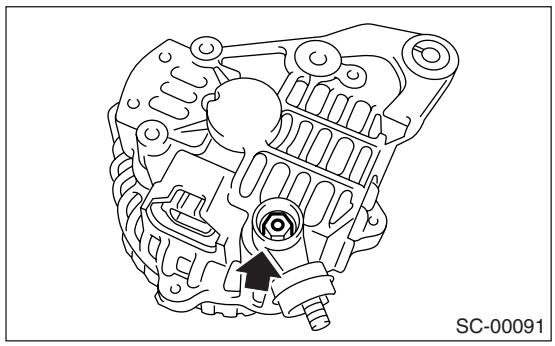
10) Remove the rectifier as follows.
(1) Remove the bolt which secures the rectifier.



(2) Remove the cover of terminal B.



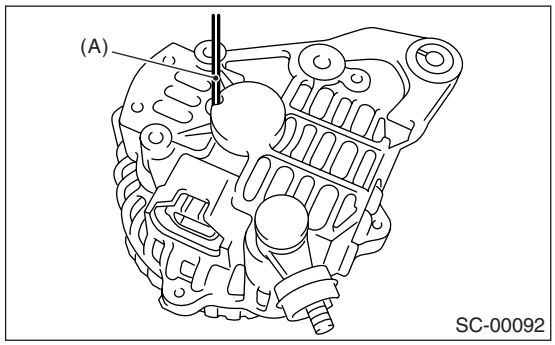
(3) Remove the nut of terminal B, and then remove the rectifier.



D: ASSEMBLY

Assemble in the reverse order of disassembly.
1) Pulling up brush
Before assembling, press the brush down into brush holder, and then fix them in that position by passing a [1 mm (0.08 in) dia. 40 to 50 mm (1.6 to 2.0 in) long] wire through the hole as shown in the figure.

CAUTION:
Be sure to remove the wire after reassembly.



(A) Wire

2) Install the ball bearing.
(1) Set the ball bearing on the front cover, and then securely install an appropriate tool (such as a fit socket wrench) to the bearing outer race.
(2) Press the ball bearing into the specified position using a press.
(3) Install the bearing retainer.
3) Press the bearing (rear side) into the rotor shaft using a press to install.
4) Heat the bearing box in rear cover [50 to 60°C (122 to 140°F)], and then press the rear bearing into rear cover.

CAUTION:
Grease should not be applied to rear bearing. Remove the oil completely if it is found on bearing box.

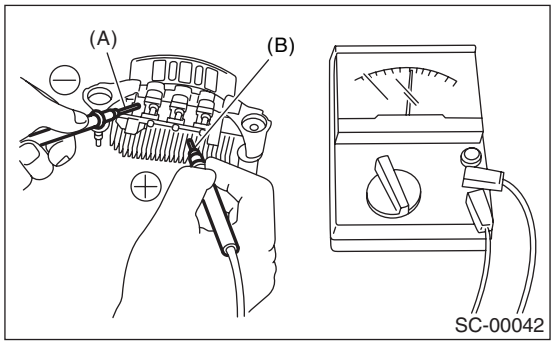
5) After reassembly, turn the pulley by hand to check that rotor turns smoothly.

E: INSPECTION

1. DIODE

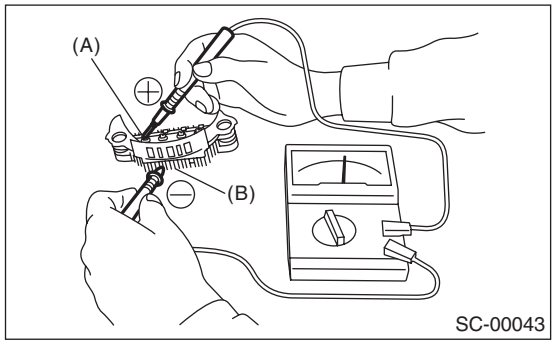
CAUTION:
Never use a mega tester (designed for reading high voltage) or any other similar instrument for this test; otherwise, the diodes may be damaged.

1) Checking positive diode
Check for continuity between the diode lead and positive side heat sink. The positive diode is in good condition if resistance is 1 Ω or less only in the direction from the diode lead to heat sink.



(A) Diode lead
(B) Heat sink (positive side)

2) Checking negative diode
Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if resistance is 1 Ω or less only in the direction from the heat sink to diode lead.



(A) Diode lead
(B) Heat sink (negative side)

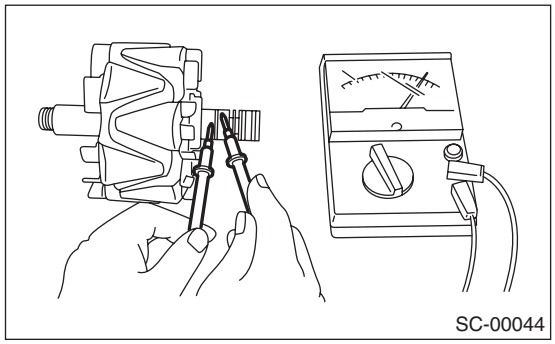
2. ROTOR

1) Slip ring surface
Inspect the slip rings for contamination or any roughness on the sliding surface. Repair the slip ring surface using a lathe or sand paper.
2) Slip ring outer diameter
Measure the slip ring outer diameter. If the slip ring is worn, replace the rotor assembly.

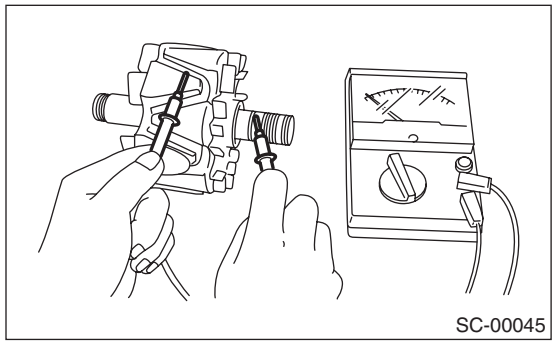
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check the resistance between slip rings using circuit tester.
If the resistance is not within the specified range, replace the rotor assembly.

Specified resistance:
Approx. 1.8 — 2.2 Ω



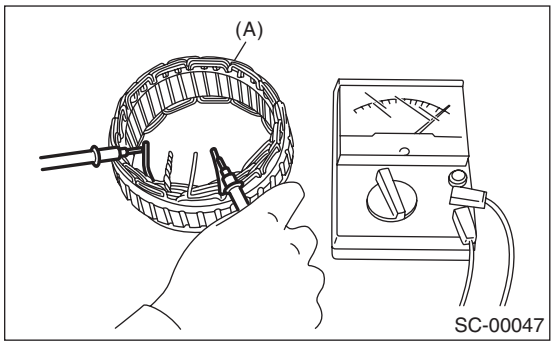
4) Insulation test
Check the continuity between slip ring and rotor core or shaft. If resistance is 1 Ω or less, the rotor coil is grounded, and so replace the rotor assembly.



5) Ball bearing (rear side)
Check the rear ball bearing. Replace if it is noisy or if the rotor does not turn smoothly.

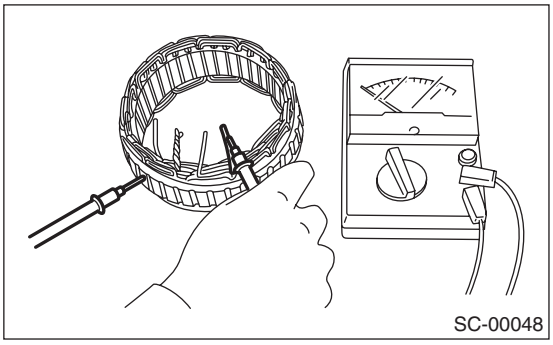
3. STATOR

1) Continuity test
Inspect the stator coil for continuity between each end of the lead wires. If resistance is 1 MΩ or more, the lead wire is broken, and so replace the stator assembly.



(A) Stator

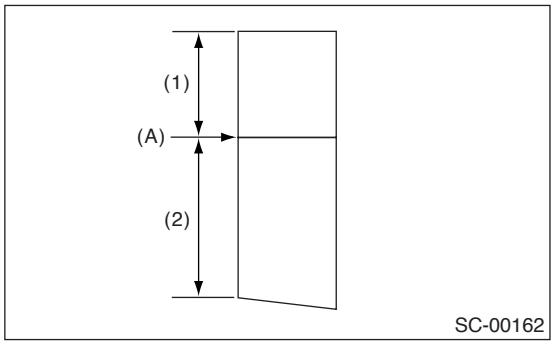
2) Insulation test
Inspect the stator coil for continuity between stator core and each end of lead wire. If resistance is 1 Ω or less, the stator coil is grounded, and so replace the stator assembly.



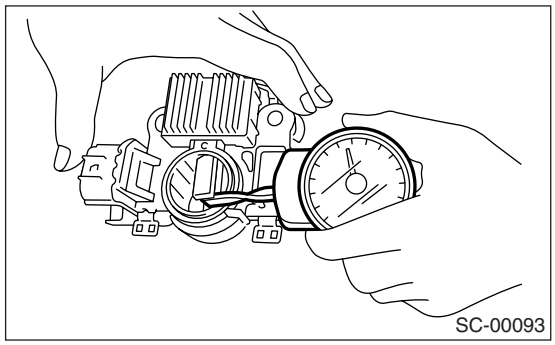
4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Service limit (1)
5.0 mm (0.197 in)
Standard (2)
18.5 mm (0.728 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of brush spring. If the pressure is less than 2.648 N (270 g, 9.52 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.609 to 5.786 N (470 to 590 g, 16.58 to 20.810 oz).



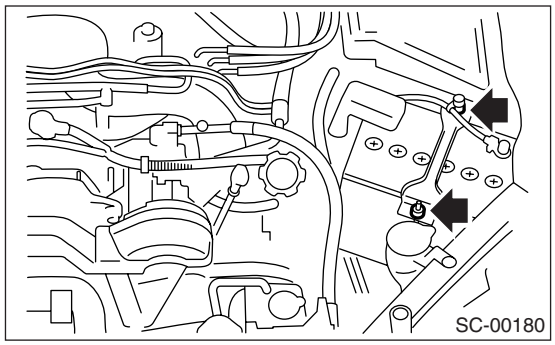
5. BEARING (FRONT SIDE)

Check the front ball bearing. If the resistance is felt while rotating, or if abnormal noise is heard, replace the ball bearing.

4. Battery

A: REMOVAL

1) Disconnect the positive (+) terminal after disconnecting the negative (–) terminal of battery.
2) Remove the flange nuts from battery rods and take off battery holder.



3) Remove the battery.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

NOTE:
• Clean the battery cable terminals and apply grease to retard the formation of corrosion.
• Connect the positive (+) terminal, and then connect the negative (–) terminal of battery.
• Initial diagnosis of electronic control throttle is performed after battery installation. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.

C: INSPECTION

WARNING:
• Electrolyte has toxicity; be careful handling the fluid.
• Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.
• Batteries produce explosive gases. Keep sparks, flame, cigarettes away.
• Ventilate when charging or using in enclosed space.
• For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
• Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
• To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle. This may cause short circuit.

1. EXTERNAL PARTS

Check the battery case, top cover, vent plugs, and terminal posts for dirt or cracks. If necessary, clean with water and wipe with a dry cloth.
Apply a thin coat of grease on the terminal posts to prevent corrosion.

2. ELECTROLYTE LEVEL

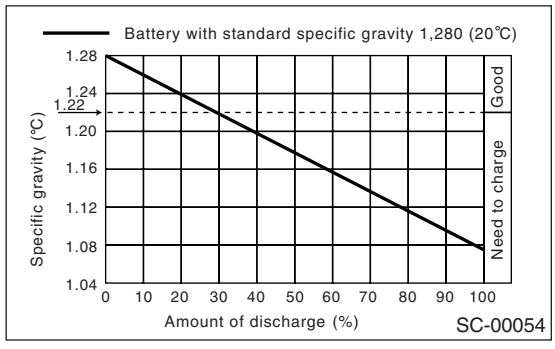
Check the electrolyte level in each cell. If the level is below MIN level, bring the level to MAX level by pouring distilled water into the battery cell. Do not fill beyond MAX level.

3. SPECIFIC GRAVITY OF ELECTROLYTE

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

S_{20} = St + 0.0007 × (t − 20)
S_{20}: Specific gravity corrected at electrolyte temperature of 20°C (68°F)
St: Measured specific gravity
t: Measured temperature (°C)
Determine whether or not battery must be charged, according to corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [20°C (68°F)]

2) Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between specific gravity and state of charge is as shown in the figure.



D: MEASUREMENT

WARNING:
Do not bring an open flame close to the battery at this time.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.
• Be careful since battery electrolyte overflows while charging the battery.
• Observe instructions when handling the battery charger.
• Before charging the battery on vehicle, disconnect the battery ground terminal to prevent damage of generator diodes or other electrical modules.

1. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte should be held within the specific range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell should be held at a specific value in a range from 2.5 to 2.8 V for more than one hour.

2. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	Charge battery	Corrective action
Green	Above 65%	Load test
Dark	Below 65%	Charge battery
Clear	Low electrolyte	Replace battery* (If cranking is difficult)
* Check electrical system before replacement.		

3. NORMAL CHARGING

Charge the battery at current value specified by manufacturer or at approx. 1/10 of battery's ampere-hour rating.

4. QUICK CHARGING

Quick charging is a method that the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
Also the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:
• Observe the items in 3. NORMAL CHARGING.
• Never use more than 10 A when charging the battery because it will shorten the battery life.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

ENGINE (DIAGNOSTICS)

EN(H4SO 2.0)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H4SO 2.0)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Starting Failure". <Ref. to EN(H4SO 2.0)(diag)-51, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does the malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostic Table". <Ref. to EN(H4SO 2.0)(diag)-224, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read DTC on Subaru Select Monitor.	Is DTC displayed on the Subaru Select Monitor?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the engine warning light illuminates, perform the diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4SO 2.0)(diag)-41, Malfunction Indicator Light.>
4	**PERFORM DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SO 2.0)(diag)-32, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor?	Check on "Diagnostic Chart with Diagnostic Trouble Code (DTC)" <Ref. to EN(H4SO 2.0)(diag)-71, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Audio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure indicator light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of other parts except genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

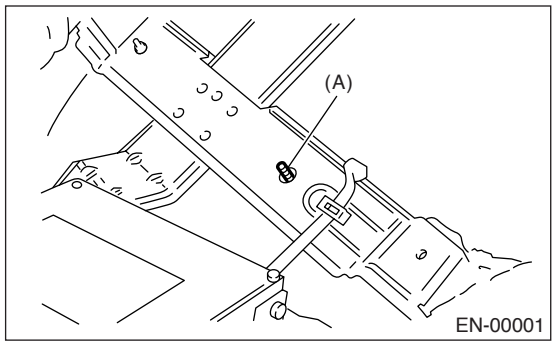
CAUTION:
• All airbag system wiring harnesses and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will be damaged.
3) Do not disconnect the battery terminals while the engine is running.
A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM, etc.
4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the inspection mode after connecting the connectors.
5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

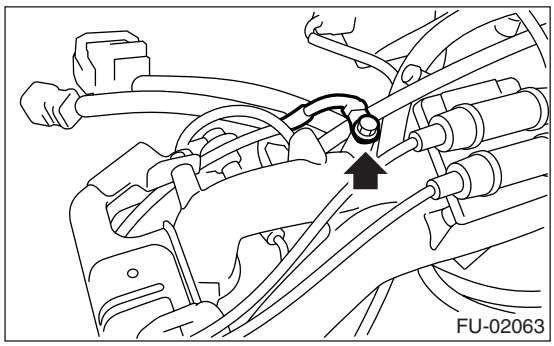
7) Connectors of each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts as the grounding point to body when measuring voltage and resistance inside the passenger compartment.

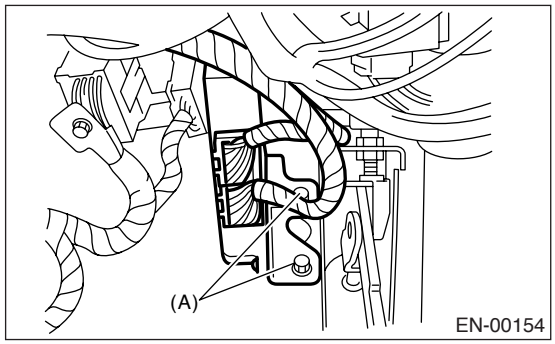


(A) Stud bolt

9) Use engine grounding terminal or engine as the grounding point to body when measuring voltage and resistance in the engine compartment.



10) Use TCM mounting stud bolts as the grounding point to body when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.
12) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control unit. (The ECM is located under the steering column, inside of instrument panel lower trim panel.)

• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items mentioned above.
• Incorrect installation of the radio may affect the operation of ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) For AT models, do not hold the stall for more than five seconds. (from closed throttle, fully open throttle to stall engine speed.)
17) On the model with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems.

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

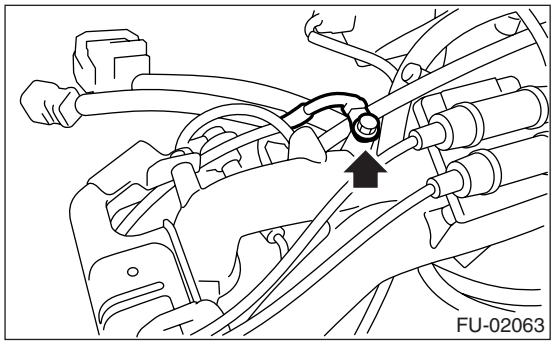
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

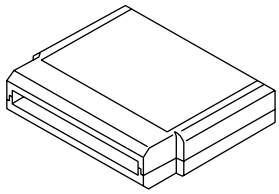
Make sure the engine grounding terminal is properly connected to engine.



3. SELF-DIAGNOSIS FUNCTION

When detecting a malfunction by self-diagnosis function on ECM, malfunction indicator light illuminates and malfunction occurrence is displayed.
Calling the self-diagnosis result is performed by the Subaru Select Monitor.

C: PREPARATION TOOL

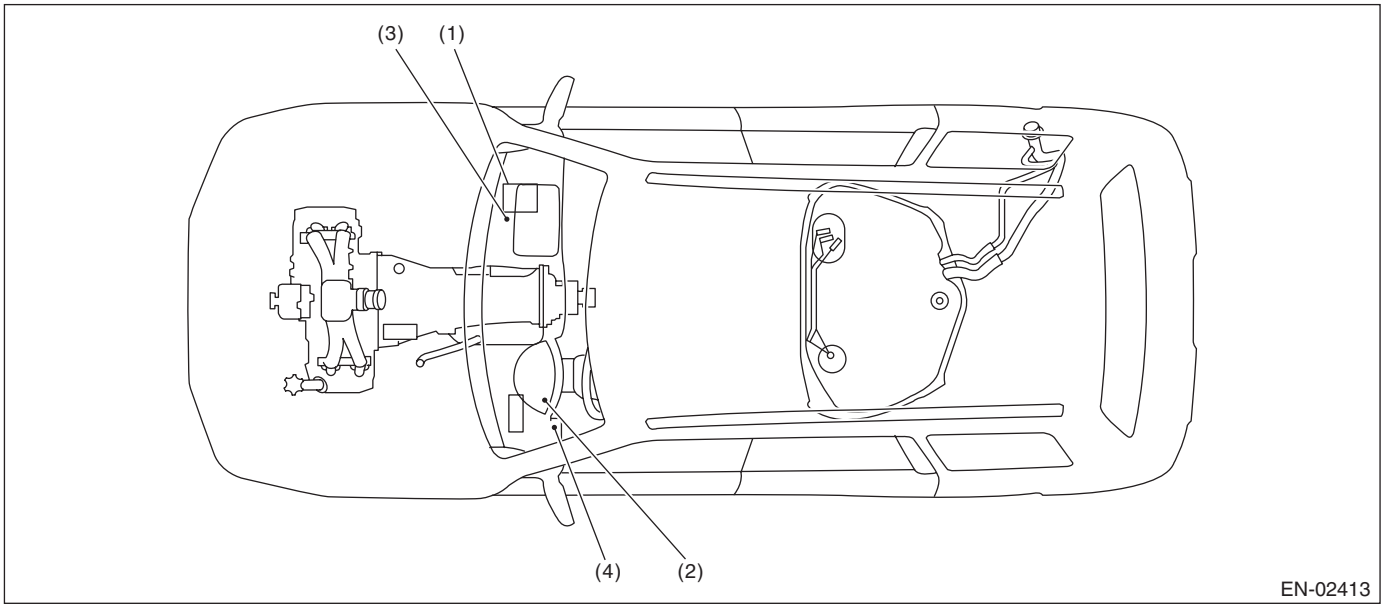
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

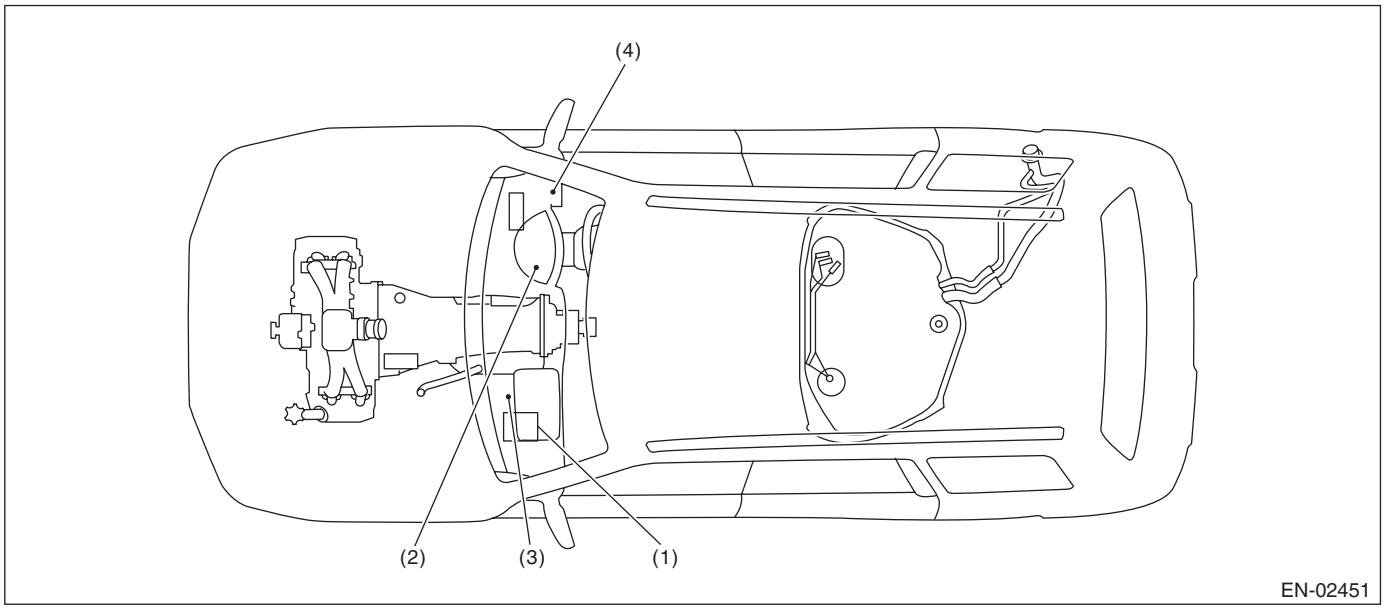
4. Electrical Component Location

A: LOCATION

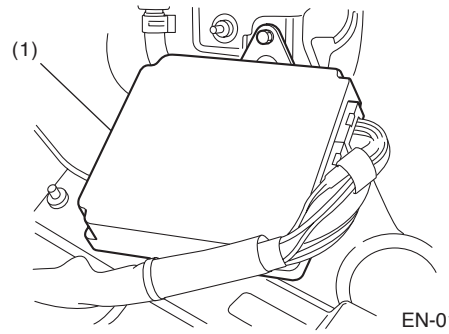
1. ENGINE

• Control module

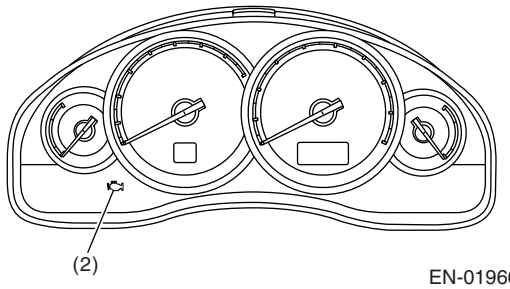




(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



EN-01147



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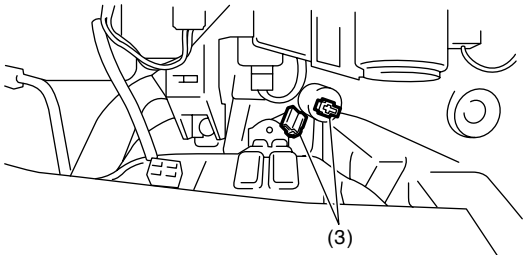

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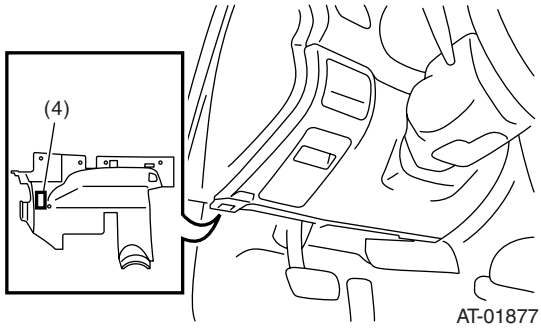
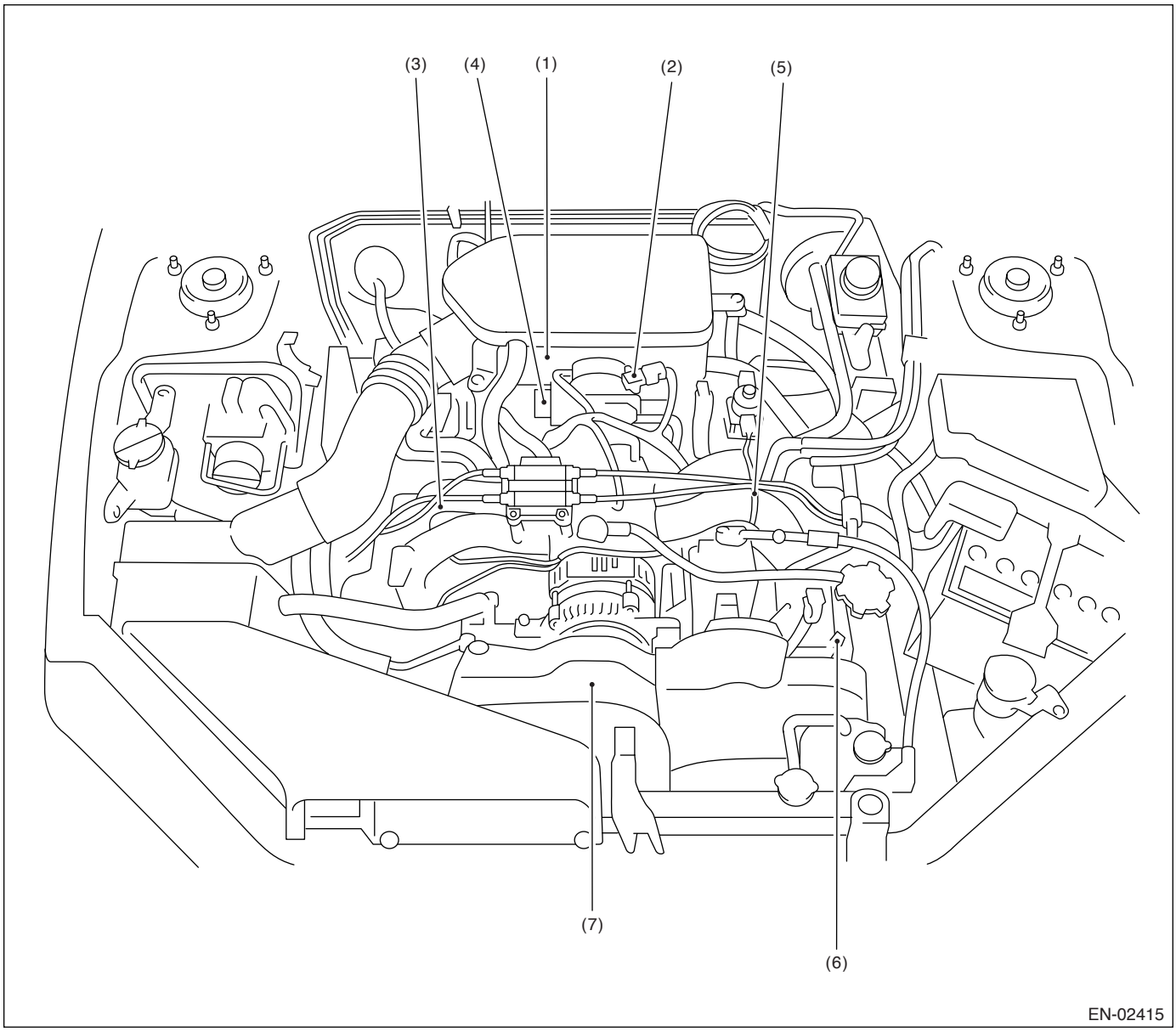
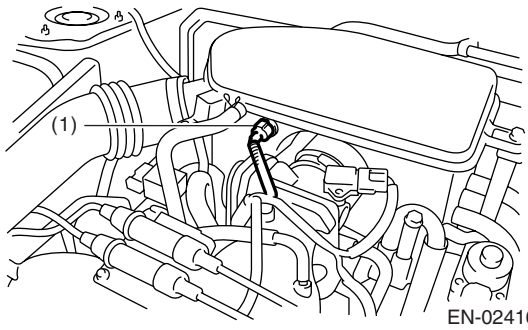


AT-01877

• Sensor



(1) Intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor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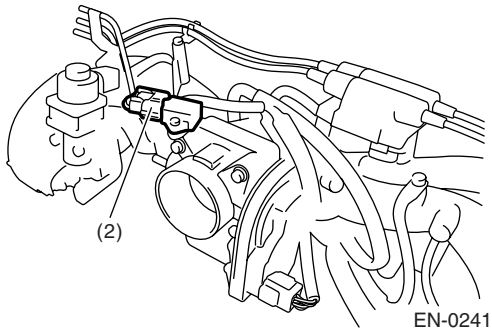
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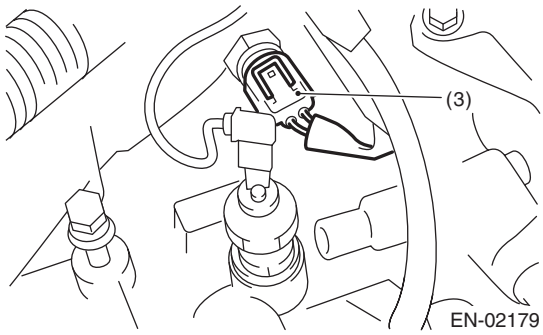
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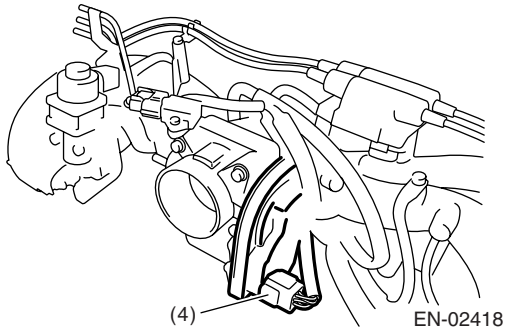
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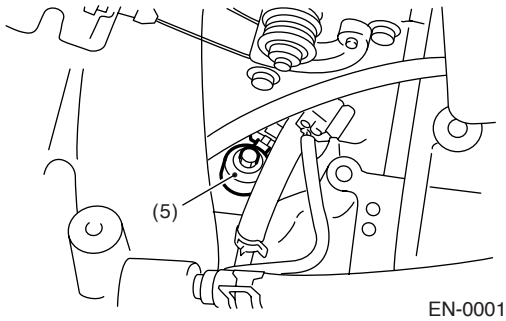
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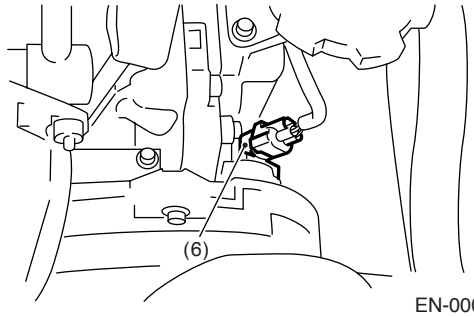
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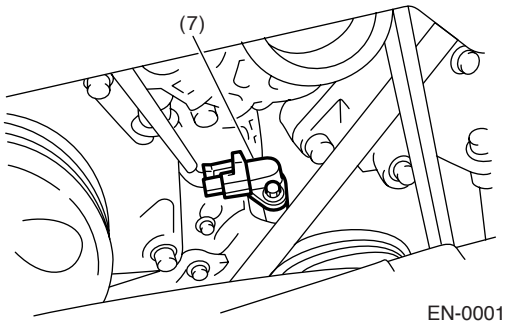
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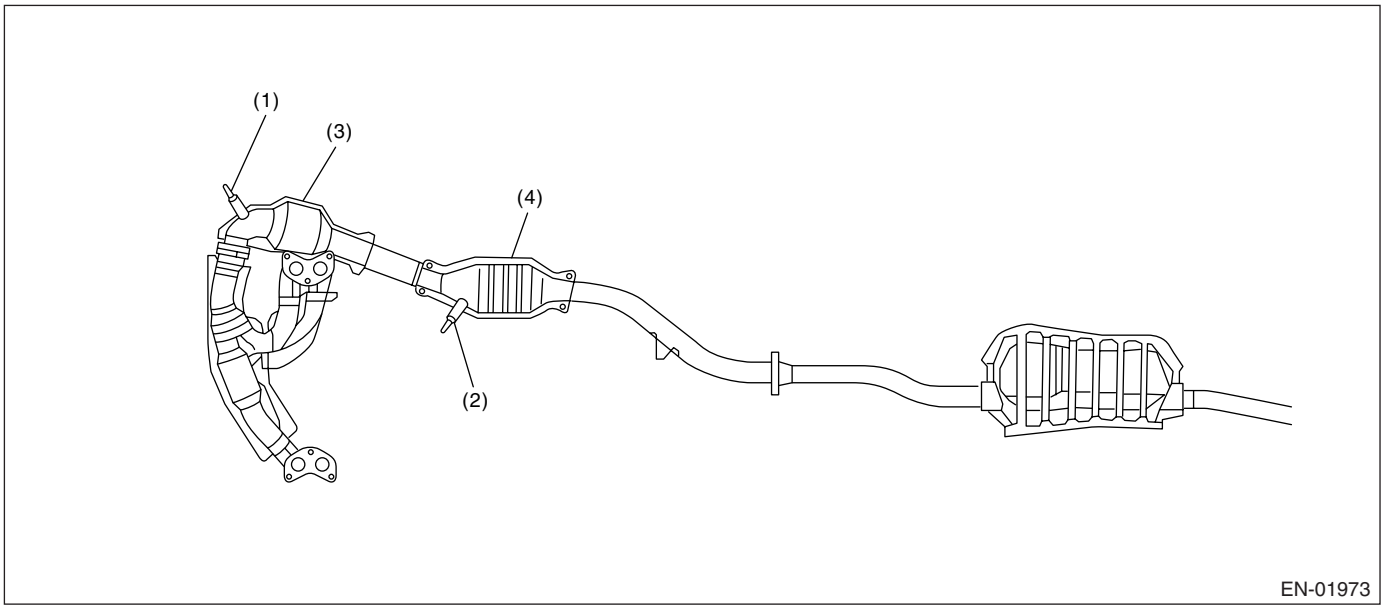
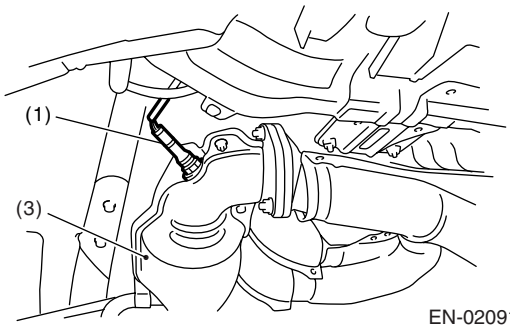
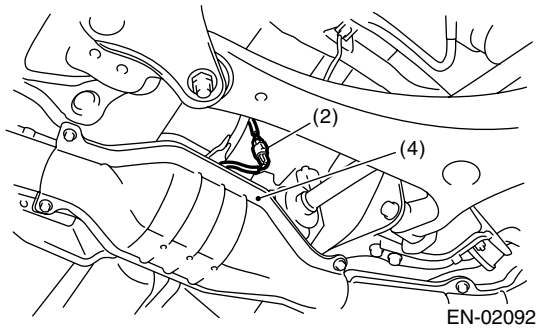
EN-00012

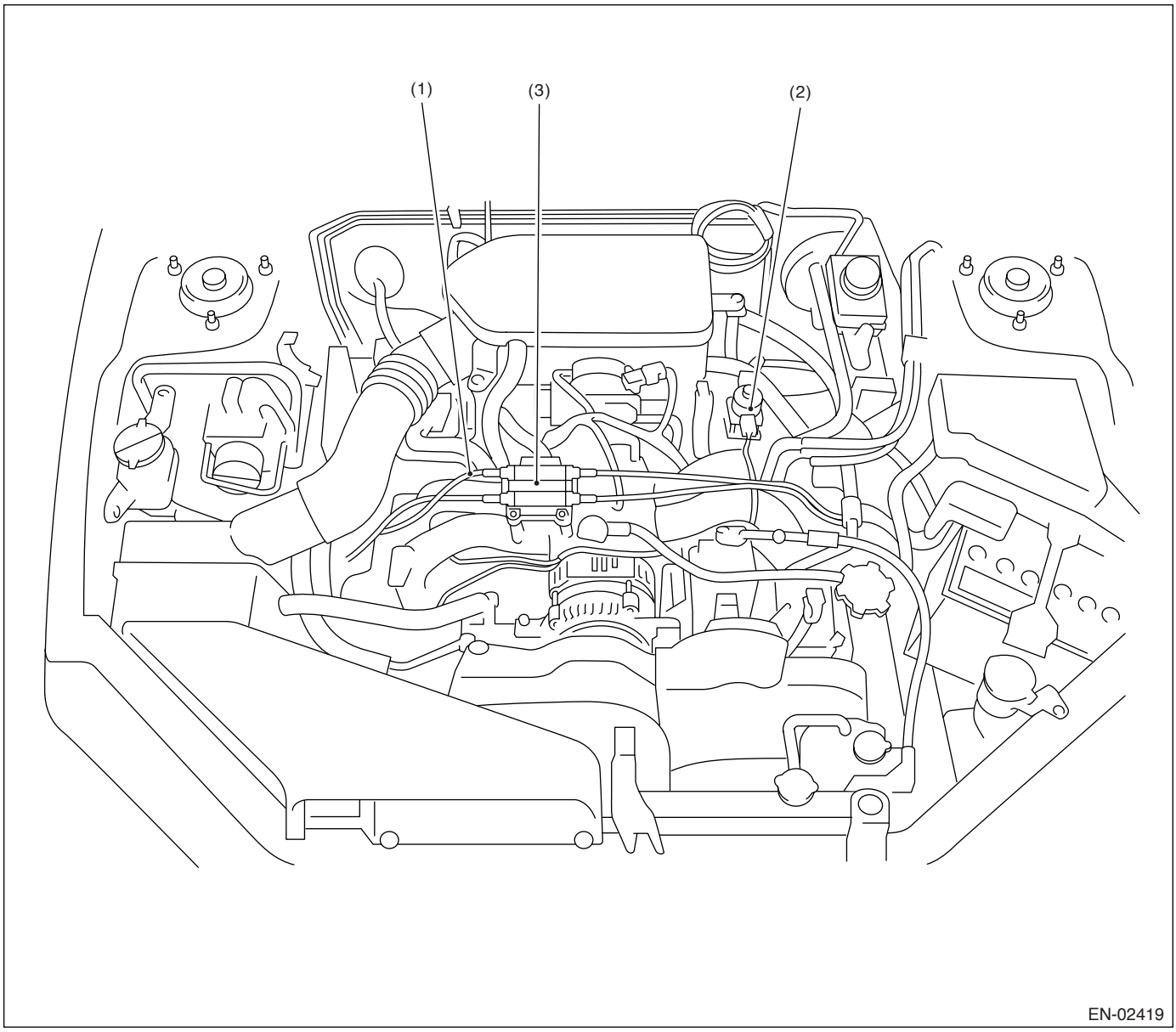


(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter

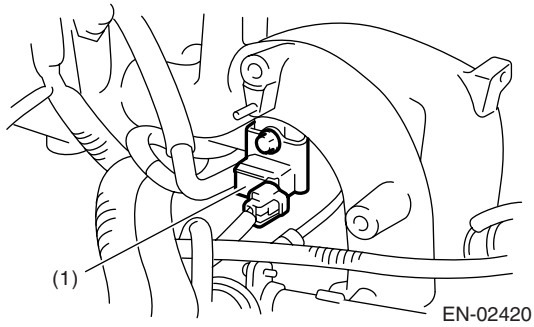




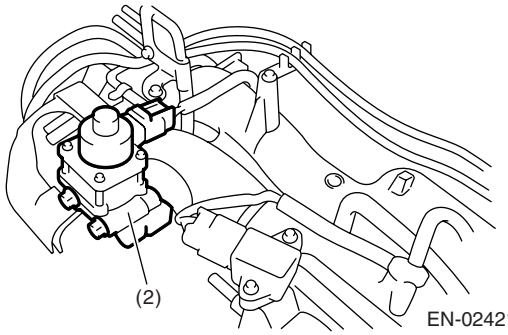
• Solenoid valve, actuator, emission control system parts and ignition system parts



(1) Purge control solenoid valve (2) EGR Valve (EC, EK, K4 model) (3) Ignition coil & ignitor ASSY



EN-02420



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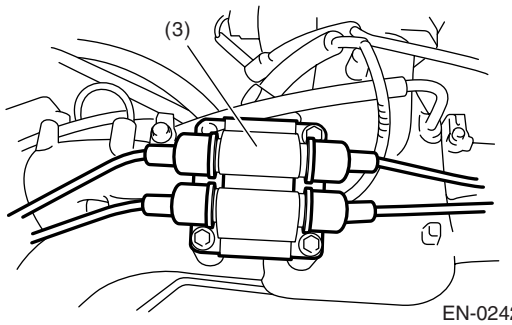

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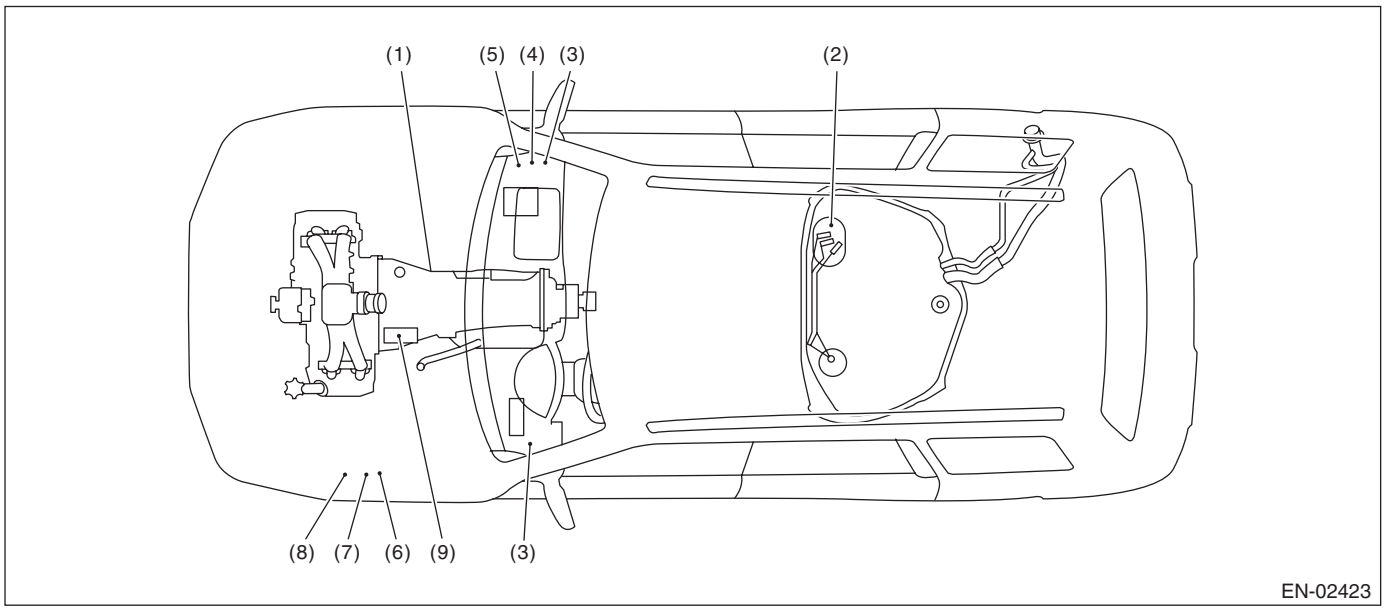
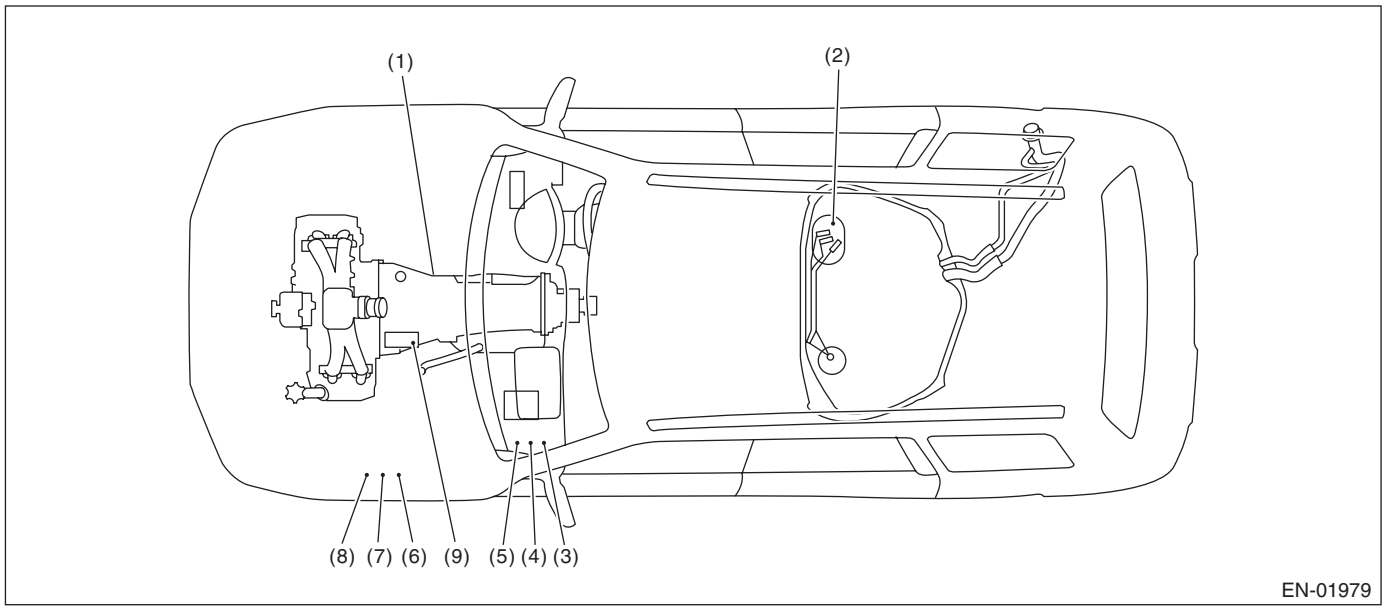
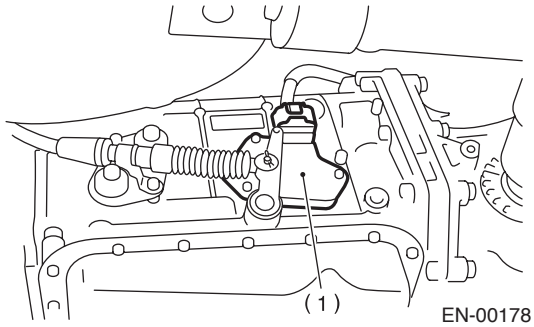
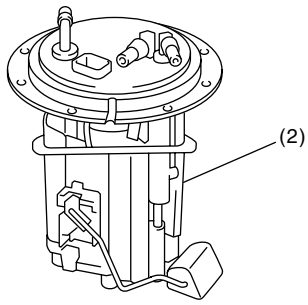




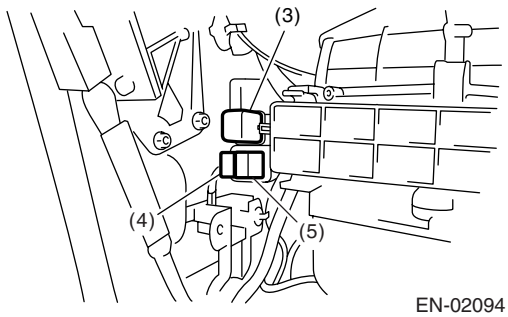
(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator main fan relay 1
(7) Radiator sub fan relay
(8) Radiator main fan relay 2
(9) Starter



EN-00178



EN-02093



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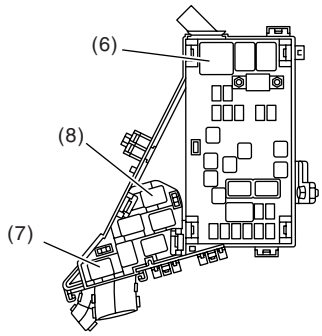

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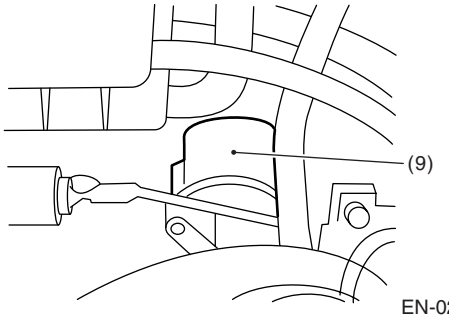
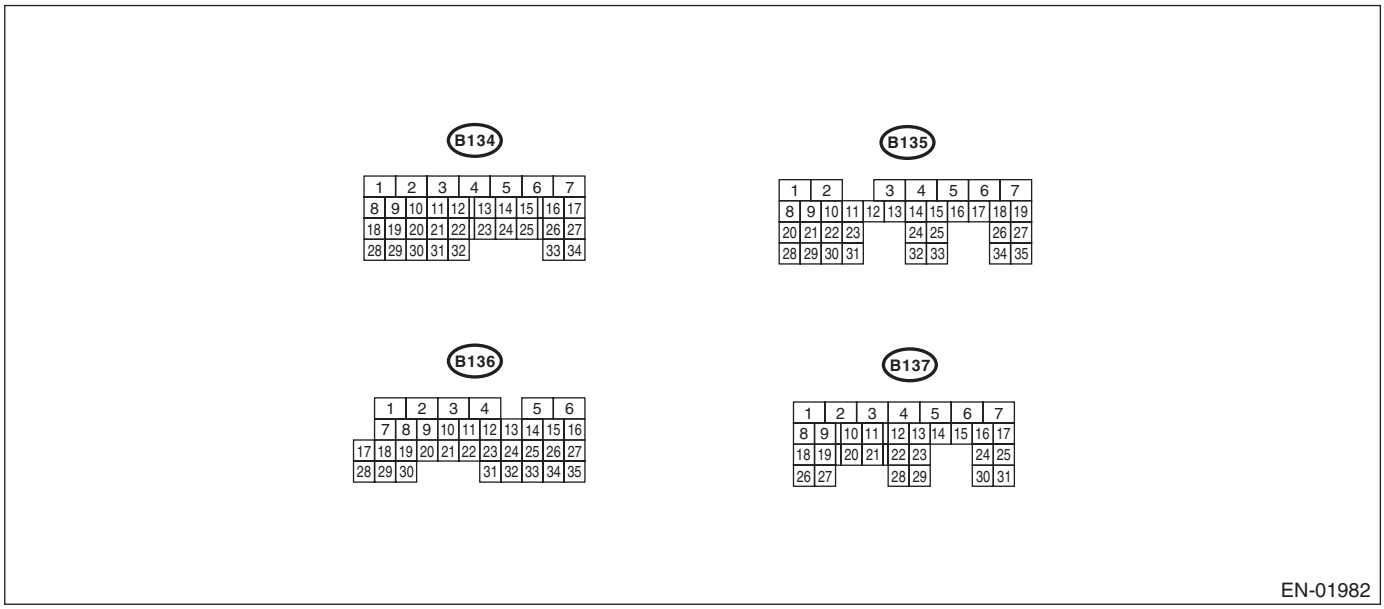


EN-02096

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor (Model with immobilizer)	Signal (+)	B136	27	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	24	0	0	—
	Shield	B136	32	0	0	—
Crankshaft position sensor (Model without immobilizer)	Signal (+)	B136	26	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	24	0	0	—
	Shield	B136	32	0	0	—
Camshaft position sensor (Model with immobilizer)	Signal (+)	B136	26	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	25	0	0	—
	Shield	B136	32	0	0	—
Camshaft position sensor (Model without immobilizer)	Signal (+)	B136	27	0	–7 — +7	Sensor output waveform
	Signal (–)	B136	25	0	0	—
	Shield	B136	32	0	0	—
Electronic throttle control	Main	B137	23	0.4 — 1.1 Fully opens: 3.7 — 4.3	0.3 — 0.9 (After engine is warmed-up.)	—
	Sub	B137	24	3.9 — 4.8 Fully opens: 0.65 — 1.5	4.05 — 4.95 (After engine is warmed-up.)	—
Electronic throttle control motor 1 (+)		B137	2	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 2 (+)		B137	3	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 1 (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 1 kHz

Engine Control Module (ECM) I/O Signal

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Electronic throttle control motor 2 (–)		B137	5	Duty waveform	Duty waveform	Drive frequency: 1 kHz
Electronic throttle control motor 1 power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor 2 power supply		B137	7	10 — 13	13 — 14	—
Electronic throttle control motor relay		B137	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator position sensor	Main	B137	29	Fully closed: 0.5 — 1.5 Fully opens: 3 — 5	Fully closed: 0.5 — 1.5 Fully opens: 3 — 5	—
	Power supply	B137	25	5	5	—
	Ground	B137	31	0	0	—
	Sub	B137	30	Fully closed: 0.5 — 1.5 Fully opens: 3 — 5	Fully closed: 0.5 — 1.5 Fully opens: 3 — 5	—
Rear oxygen sensor	Signal	B136	19	0	0 — 0.9	—
	Shield	B136	30	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B135	2	0 — 1.0	13 — 14	—
	Signal 2	B135	3	0 — 1.0	13 — 14	—
Rear oxygen sensor heater signal		B134	1	0 — 1.0	13 — 14	—
Engine coolant temperature sensor		B136	22	1.0 — 1.6	1.0 — 1.6	After engine is warmed-up.
Starter switch		B135	23	OFF: 0 ON: 10 — 13	OFF: 0 ON: 13 — 14	—
A/C switch		B135	20	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B135	13	10 — 13	13 — 14	—
Neutral position switch (AT model)		B135	12	ON: 0 OFF: 10 — 14		—
Neutral position switch (MT model)		B135	12	ON: 10 — 14 OFF: 0		—
Test mode connector		B135	24	5	5	When connected: 0
Knock sensor	Signal	B136	23	2.8	2.8	—
	Shield	B136	12	0	0	—
Back-up power supply		B136	7	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B136	3	10 — 13	13 — 14	—
		B136	4	10 — 13	13 — 14	—
Sensor power supply 1		B136	17	5	5	—
Sensor power supply 2		B137	25	5	5	—
Ignition control	1	B134	23	0	1 — 3.4	Waveform
	2	B134	24	0	1 — 3.4	Waveform
Fuel injector	#1	B134	17	10 — 13	1 — 14	Waveform
	#2	B134	27	10 — 13	1 — 14	Waveform
	#3	B134	34	10 — 13	1 — 14	Waveform
	#4	B134	33	10 — 13	1 — 14	Waveform
Fuel pump relay control (Model with immobilizer)		B135	44	0.5 or less	0.5 or less	—
Fuel pump relay control (Model without immobilizer)		B134	27	0.5 or less	0.5 or less	—

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
A/C relay control		B135	35	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	10	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B134	9	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Self-shutoff control		B135	14	10 — 13	13 — 14	—
Malfunction indicator light		B135	15	1 or less	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B135	27	—	0 — 13 or more	Waveform
Purge control solenoid valve		B134	8	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
EGR solenoid valve	Signal A+	B134	13	0 or 10 — 13	0 or 13 — 14	—
	Signal A–	B134	12	0 or 10 — 13	0 or 13 — 14	—
	Signal B+	B134	3	0 or 10 — 13	0 or 13 — 14	—
	Signal B–	B134	4	0 or 10 — 13	0 or 13 — 14	—
Power steering switch		B135	8	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Front oxygen (A/F) sensor signal 1		B136	35	—	2.05 — 2.25	—
Front oxygen (A/F) sensor signal 2		B136	33	—	2.05 — 2.25	—
Front oxygen (A/F) sensor shield		B136	34	0	0	—
Manifold absolute pressure sensor		B136	20	4.0 — 4.8	1.1 — 1.9	—
Intake air temperature sensor		B136	28	3.3 — 3.5	3.3 — 3.5	intake air temperature: 25°C (75°F)
Generator control		B135	16	0 — 6.5	0 — 6.5	—
SSM communication line		B135	32	Less than 1←→ More than 4	Less than 1←→ More than 4	—
Main switch		B137	14	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Clutch switch		B137	22	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
Brake switch 1		B137	12	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B137	13	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch		B136	21	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
GND (sensor 1)		B136	18	0	0	—

Engine Control Module (ECM) I/O Signal

DESCRIPTION	Connector No.	Terminal No.	Signal (V)		NOTE
			Ignition SW ON (engine OFF)	Engine ON (idling)	
GND (sensor 2)	B137	31	0	0	—
GND (injector)	B134	7	0	0	—
GND (power supply)	B134	2	0	0	—
	B137	1	0	0	—
GND (control system)	B136	5	0	0	—
	B136	6	0	0	—
GND (oxygen sensor heater 1)	B135	5	0	0	—
GND (oxygen sensor heater 2)	B135	6	0	0	—
GND (Electronic throttle control)	B136	1	0	0	—
	B136	2	0	0	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	SPECIFICATION
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm Racing

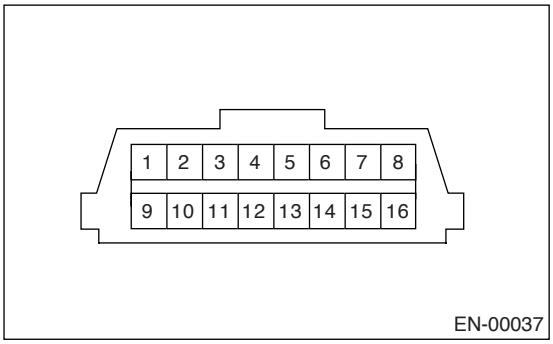
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- A/C is turned OFF.
- All accessory switches are turned OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools except for OBD-II general scan tool and Subaru Select Monitor, because the circuit for Subaru Select Monitor may be damaged.



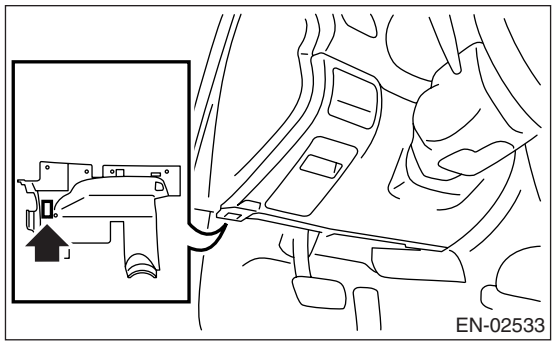
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. OBD-II General Scan Tool

A: OPERATION

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Connect the OBD-II general scan tool to data link connector located in the lower portion of instrument panel (on driver's side).



3) Using the OBD-II general scan tool, call up DTC and freeze frame data.
OBD-II general scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain DTC
(4) MODE $04: Clear/Reset emission-related diagnostic information
Read out the data according to repair procedures. (For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.)

NOTE:
For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". **<Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>**

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain DTC, malfunction indicator light status and diagnosis support information	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate from manifold absolute pressure sensor	g/sec
11	Throttle valve absolute opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor—bank 1 sensor 2	V and %
1C	Supporting OBD system	—
21	Driving distance after MIL illuminates	km
24	A/F value and A/F sensor output voltage	— and V

NOTE:
Refer to OBD-II general scan tool manufacturer's operation manual to access generic OBD-II PIDs (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refer to data denoting the operating condition when trouble is detected by on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB to require freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h

NOTE:
Refer to OBD-II general scan tool manufacturer's operation manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (DTC))

Refer to "Read Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. **<Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>**

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

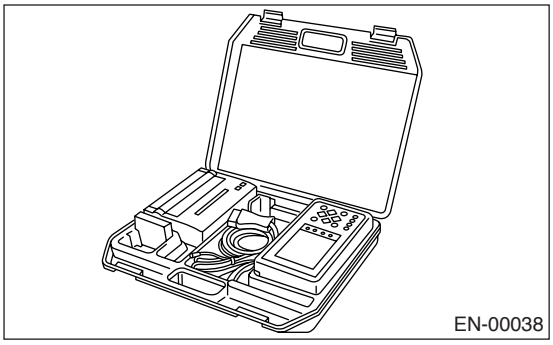
NOTE:
Refer to OBD-II general scan tool manufacturer's operation manual to clear or reset emission-related diagnostic information (MODE $04).

9. Subaru Select Monitor

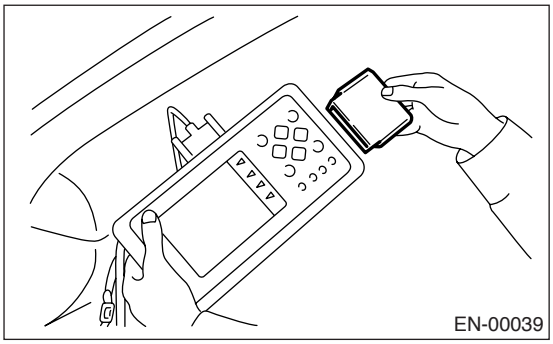
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>

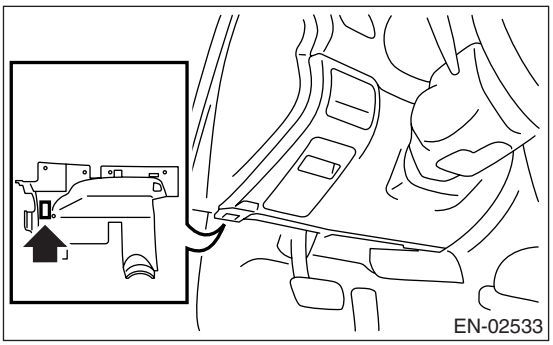


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

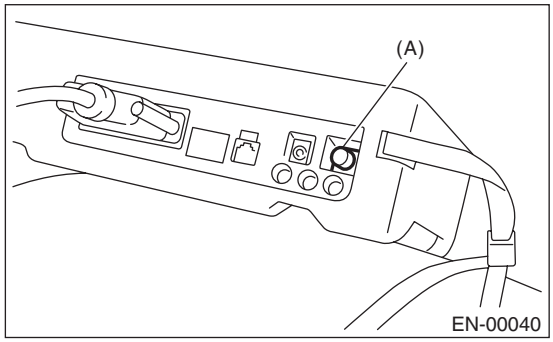
(1) Data link connectors is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for OBD-II general scan tool and Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTCs and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.0)(diag)-31, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine load	Engine Load	%	1 — 3%
Engine coolant temperature signal	Coolant Temp.	°C	≥ 75 °C
A/F correction 1	A/F Correction #1	%	−10 — +10%
A/F learning 1	A/F Learning #1	%	−15 — +15%
Intake manifold absolute pressure	Mani. Absolute Pressure	kpa	200 — 300 kpa
Engine speed signal	Engine Speed	rpm	600 — 800 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h	0 km/h (at parking)
Ignition timing signal	Ignition Timing	deg	10 — 15 deg
Intake air temperature signal	Intake Air Temp.	°C	(Ambient air temperature)
Throttle opening angle signal	Throttle Opening Angle	%	1 — 2%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0.01 — 0.85 V
Battery voltage	Battery Voltage	V	12 — 14 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2 — 4 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Atmospheric pressure signal	Atmosphere Pressure	kpa	(Atmosphere pressure)
Intake manifold relative pressure	Mani. Relative Pressure	kpa	(Mani. Absolute Pressure − Atmosphere pressure)
Learned ignition timing	Learned Ignition Timing	°	−2 — 2°
Acceleration opening angle signal	Accel. Opening Angle	%	0.0%
Rear O_2 heater current	Rear O2 Heater Current	A	0.9 — 1.1 A
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 3%
EGR steps	No. of EGR Steps	STEP	0
Generator duty ratio	ALT Duty	%	0 — 100%
A/F sensor resistance value 1	A/F Sensor #1 Resistance	ohm	25 — 27 mA
A/F sensor output lambda 1	A/F Sensor #1	—	0.85 — 1.15
A/F correction 3	A/F Correction #3	%	3.5 — 6.5%
Front oxygen (A/F) sensor current	A/F Heater Current	A	5 — 10 A
Main-throttle position sensor fully closed voltage	Main-Throttle Sensor Closed Position Voltage	V	0.3 — 0.7 V
AT/MT identification terminal	AT Vehicle ID Signal	—	ON/OFF
Test mode terminal	Test Mode Signal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch input signal	P/S Switch	—	OFF (At OFF)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Handle switch signal	Handle Switch	—	RHD/LHD
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	OFF

Remarks	Display	Unit of measure	Note (at idling)
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Wiper switch signal	Wiper Switch	—	OFF (At OFF)
A/C middle pressure switch signal	A/C Mid Pressure Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF (At OFF)
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF (At OFF)
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF (At OFF)
Fuel pump relay signal	Fuel Pump Relay	—	ON
AT coordinate retard angle demand signal	Retard Signal from AT	—	OFF
AT coordinate fuel cut demand signal	Fuel Cut Signal from AT	—	OFF
AT coordinate permission demand	Torque Permission Signal	—	ON
Throttle motor duty	Throttle Motor Duty	%	5 — 10%
Throttle power supply voltage	Throttle Motor Voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub-throttle Sensor	V	1.48 — 1.50 V
Main throttle sensor voltage	Main-throttle Sensor	V	0.62 V
Sub acceleration sensor voltage	Sub-accelerator Sensor	V	0.5 — 1.5 V
Main acceleration sensor voltage	Main-accelerator Sensor	V	0.5 — 1.5 V
Memory vehicle speed	Memorized Cruise Speed	km/h	0 km/h
Fuel level sensor resistance	Fuel Level Resistance	Ω	0 — 100 Ω
ETC motor relay signal	ETC Motor Relay	—	ON
Clutch switch signal	Clutch Switch	—	OFF (At OFF)
Stop light switch signal	Stop Light Switch	—	OFF (At OFF)
SET/COAST switch signal	SET/COAST Switch	—	OFF (At OFF)
RES/ACC switch signal	RESUME/ACCEL Switch	—	OFF (At OFF)
Brake switch signal	Brake Switch	—	OFF (At OFF)
Main switch signal	Main Switch	—	OFF (At OFF)
Integrated unit data reception	Body Int. Unit Data	—	ON
Integrated unit data update	Body Int. Unit Count	—	ON

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD system} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display & Save}, and press the [YES] key.
6) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	0
Condition of malfunction indicator light	MI (MIL)	OFF
Monitoring test of misfire	Misfire monitoring	—
Monitoring test of fuel system	Fuel system monitoring	complete
Monitoring test of comprehensive component	Component monitoring	complete
Test of catalyst	Catalyst Diagnosis	—
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete
Test of EGR system	EGR system	incomplete

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.
• A list of support data is shown in the following table.

Contents	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	—
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Message	LED "ON" requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Handle switch signal	Handle SW	RHD or LHD	When handle switch signal is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned ON.
Light switch signal	Light Switch	ON or OFF	When light switch is turned ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned ON.
Windshield wiper switch signal	Wiper Switch	ON or OFF	When windshield wiper switch is turned ON.
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When A/C middle pressure switch is turned ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON output
AT retard angle demand signal	Retard Signal	ON or OFF	When AT retard angle demand signal is input.
AT fuel cut signal	Fuel Cut	ON or OFF	When AT fuel cut signal is input.

Remarks	Display	Message	LED “ON” requirements
AT coordinate permission signal	Torque Control Permission	ON or OFF	When AT coordinate permission signal is input.
Clutch switch signal	Clutch Switch	ON or OFF	When clutch switch is turned to ON.
Stop light switch signal	Stop Light Switch	ON or OFF	When stop switch is turned to ON.
SET/COAST switch signal	SET/COAST Switch	ON or OFF	When SET/COAST switch is turned to ON.
RES/ACC switch signal	RESUME/ACCEL Switch	ON or OFF	When RES/ACC switch is turned to ON.
Brake switch signal	Brake Switch	ON or OFF	When brake switch is turned to ON.
Main switch signal	Main Switch	ON or OFF	When main switch is turned to ON.
Cancel switch signal	Cancel Switch	ON or OFF	When cancel switch is turned to ON.
Electronic throttle control motor relay signal	ETC Motor Relay	ON or OFF	When electronic throttle control motor relay is in function.
Data reception signal	Body Int. Unit Data	ON or OFF	When data reception signal is entered.
Counter update signal	Body Int. Unit Count	ON or OFF	When counter update signal is entered.

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

10. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>

11.Inspection Mode

A: OPERATION

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle.
<Ref. to EN(H4SO 2.0)(diag)-36, Drive Cycle.>

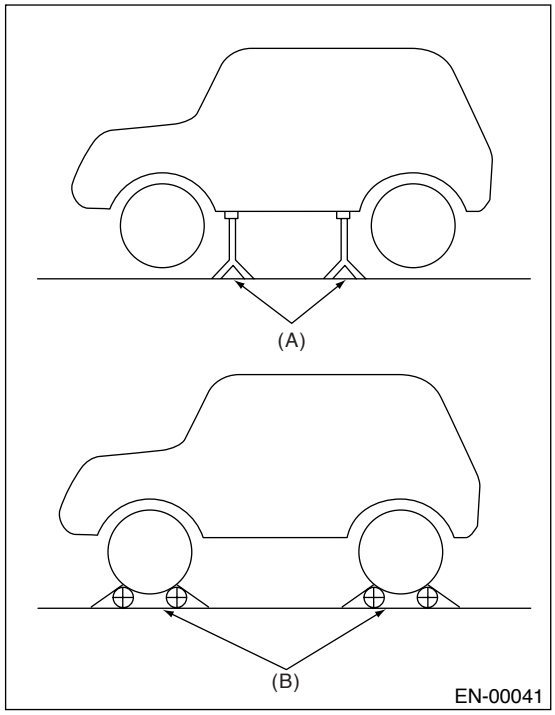
DTC	Item
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input
P0112	Intake Air Temperature Circuit Low Input
P0113	Intake Air Temperature Circuit High Input
P0117	Engine Coolant Temperature Circuit Low Input
P0118	Engine Coolant Temperature Circuit High Input
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input
P0131	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)
P0132	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 1)
P0134	O_2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low Input
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High Input
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)
P0335	Crankshaft Position Sensor “A” Circuit
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low
P0459	Canister Purge Solenoid Circuit (High)
P0462	Fuel Level Sensor Circuit Low Input
P0463	Fuel Level Sensor Circuit High Input
P0500	Vehicle Speed Sensor
P0512	Starter Request Circuit
P0513	Incorrect Immobilizer Key
P0519	Idle Control System Malfunction (Fail-Safe)
P0558	Generator Circuit Low Input
P0600	Serial Communication Link
P0604	Internal Control Module Random Access Memory (RAM) Error
P0605	Internal Control Module Read Only Memory (ROM) Error
P0607	Control Module Performance
P0638	Throttle Actuator Control Range/Performance (Bank 1)
P0691	Cooling Fan 1 Control Circuit Low
P0692	Cooling Fan 1 Control Circuit High
P0851	Neutral Switch Input Circuit Low
P0852	Neutral Switch Input Circuit High
P1160	Return Spring Failure
P1134	A/F Sensor Micro-Computer Problem
P1518	Starter Switch Circuit Low Input
P1560	Back-up Voltage Circuit Malfunction

DTC	Item
P1570	Antenna
P1571	Reference Code Incompatibility
P1572	IMM Circuit Failure (Except Antenna Circuit)
P1574	Key Communication Failure
P1576	EGI Control Module EEPROM
P1577	IMM Control Module EEPROM
P1578	Meter Failure
P2101	Throttle Actuator Control Motor Circuit Range/Performance
P2102	Throttle Actuator Control Motor Circuit Low
P2103	Throttle Actuator Control Motor Circuit High
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance
P2100	Throttle Control Motor Circuit Open
P2111	Throttle Actuator Control System - Stuck Open
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low Input
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High Input
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low Input
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High Input
P2135	Throttle/Pedal Position Sensor/Switch “A”/“B” Voltage Rationality
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Rationality

1. PREPARATION FOR THE INSPECTION MODE

1) Check that the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

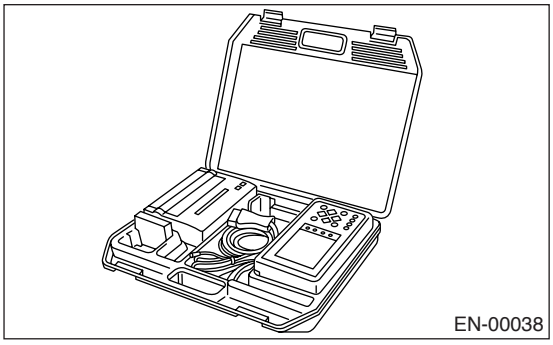
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



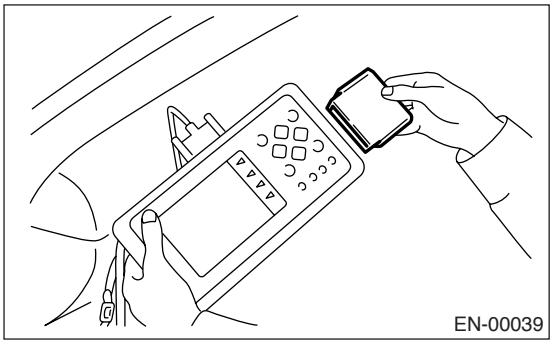
(A) Rigid rack
(B) Free rollers

2. SUBARU SELECT MONITOR

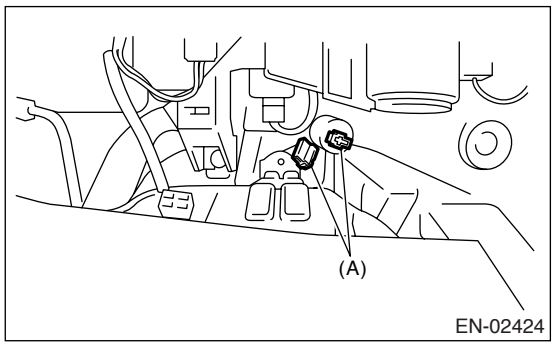
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



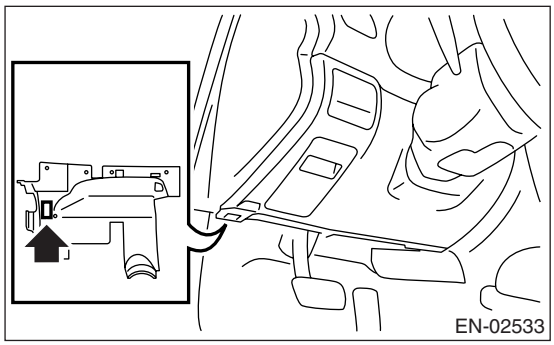
4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located at the lower portion of glove box.

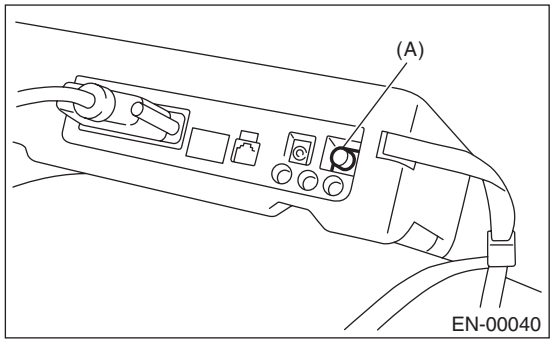


7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

8) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

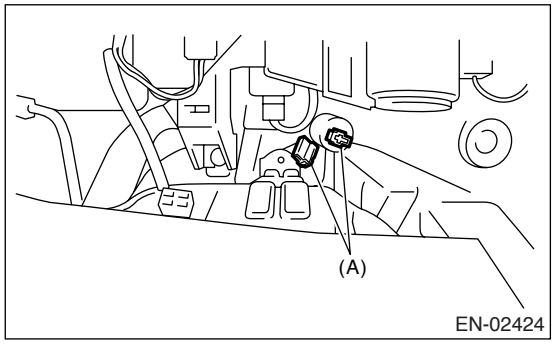
9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type has been displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the "Perform D Check?" is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.
• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to "SUBARU SELECT MONITOR OPERATION MANUAL".
• For the details concerning DTCs, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.

• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis function.

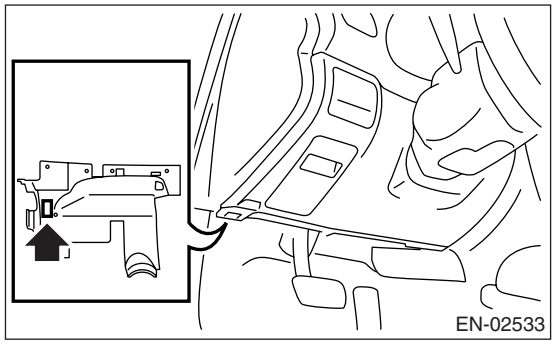
3. OBD-II GENERAL SCAN TOOL

1) After clearing memory, check for any remaining unresolved trouble data: **<Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>**
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower side of instrument panel (on the driver's side).



4) Connect the OBD-II general scan tool to its data link connector in the lower portion of instrument panel (on the driver's side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and OBD-II general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in "P" position before starting. (AT model)
• Depress the clutch pedal when starting engine. (MT model)

6) Using the select lever or shift lever, turn the "P" position switch and "N" position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT model)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
9) Place the select lever or shift lever in "D" position (AT model) or "1st" gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the OBD-II general scan tool, check for DTC and record the result(s).

NOTE:
• For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.
• For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>

12.Drive Cycle

A: PROCEDURE

There are three drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR DRIVE CYCLE

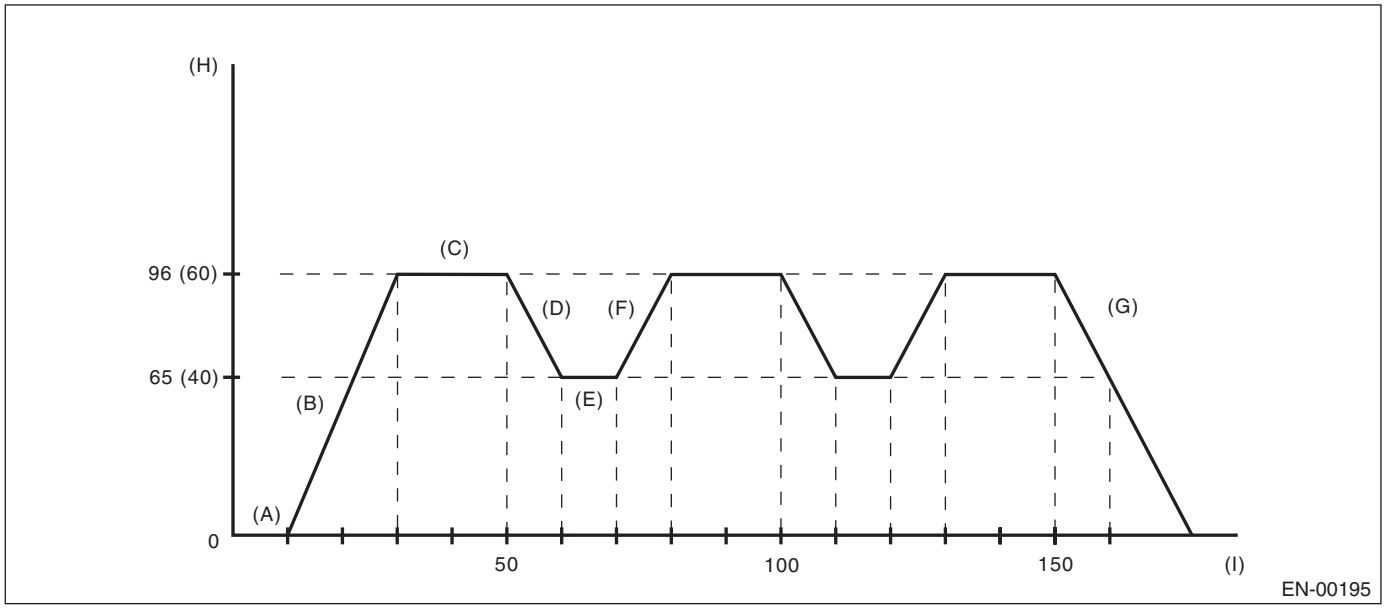
1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12V or more.
2) After performing the diagnostics and cleaning memory, check for any remaining unresolved trouble data. **<Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.>**
3) Separate the test mode connector.

NOTE:
• Except for the water temperature specified items at starting, the diagnosis is carried out after engine warm up.
• Carry out the diagnosis which is marked * on DTC twice, then, after finishing first diagnosis, stop the engine and do second time at the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Coolant temperature at start is less than 20°C (68°F).
*P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0171	System too Lean (Bank 1)	—
*P0172	System too Rich (Bank 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
*P0483	Cooling Fan Rationality Check	—
P1137	O_2 Sensor Circuit (Bank1 Sensor1)	—

3. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for 1 minute.
(B) Accelerate to 96 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 96 km/h (60 MPH) for 20 seconds.
(D) Decelerate with throttle fully closed to 65 km/h (40 MPH).
(E) Drive vehicle at 65 km/h (40 MPH) for 10 seconds.
(F) Accelerate to 96 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Seconds

DTC	Item	Condition
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
P0130	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
*P0139	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
P0301	Cylinder 1 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0302	Cylinder 2 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0303	Cylinder 3 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0304	Cylinder 4 Misfire Detected	Diagnosis frequency is different from misfire ratio.
P0400	Exhaust gas recirculation flow	—
P0559	Generator Circuit High Input	—
P0700	Transmission Control System (MIL Request)	—
P1134	A/F Sensor Micro-Computer Problem	—
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	—

13.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor switch to OFF.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

2. SUBARU SELECT MONITOR (OBD MODE)

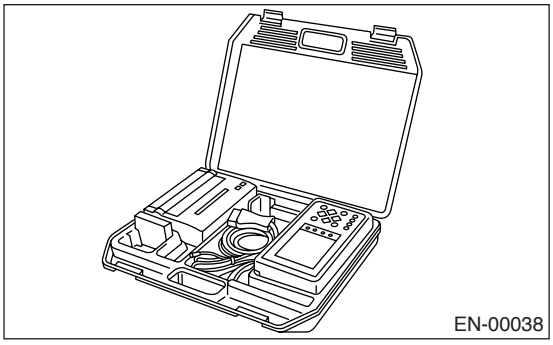
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF and then turn the Subaru Select Monitor switch to OFF.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

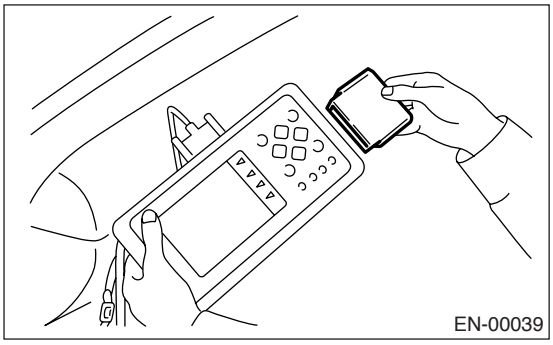
14. Compulsory Valve Operation Check Mode

A: PROCEDURE

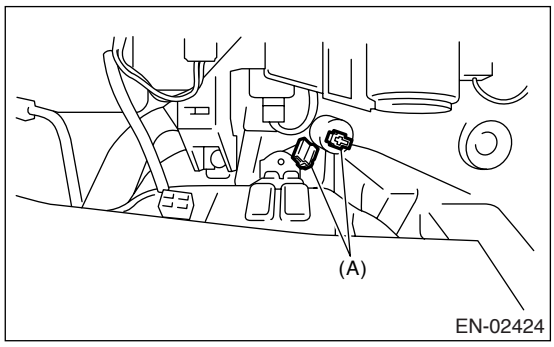
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



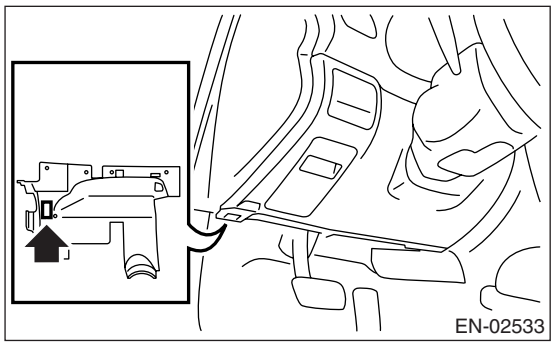
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) located at the lower portion of glove box.

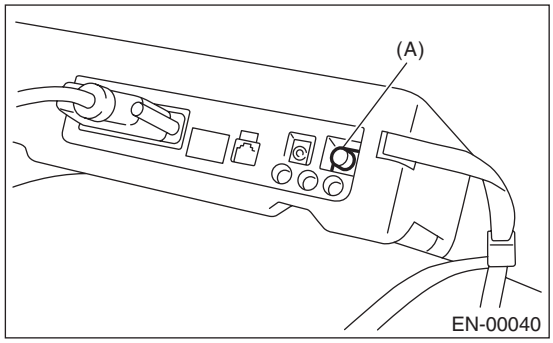


5) Connect the Subaru Select Monitor to data link connector located in the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

6) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type has been displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.
13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

DESCRIPTION	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid

NOTE:
• The following parts will be displayed but not functional.

Display
EGR Solenoid
ASV Solenoid
FICD Solenoid
Pressure switching solenoid 1
Pressure switching solenoid 2
Wastegate control solenoid
PCV Solenoid
Vent Control Solenoid
AAI Solenoid
Fuel Tank Sensor Control Valve

• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

15.Malfunction Indicator Light

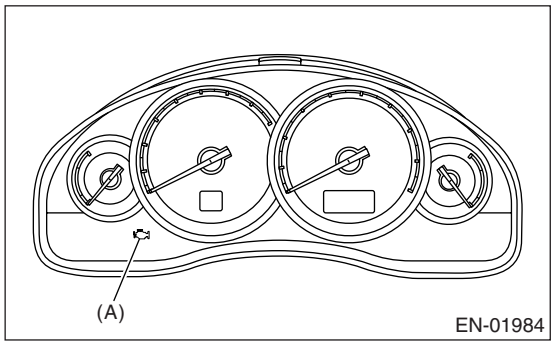
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SO 2.0)(diag)-42, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4SO 2.0)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink. <Ref. to EN(H4SO 2.0)(diag)-46, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking. <Ref. to EN(H4SO 2.0)(diag)-49, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

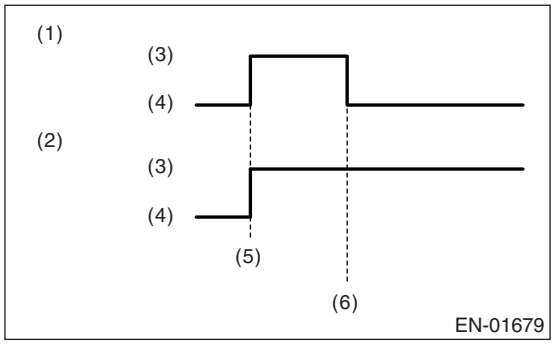
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or emission control system is malfunctioning.



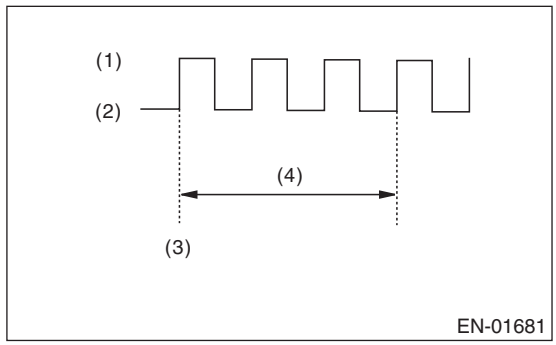
(1) No faulty
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) Turn the ignition switch to OFF and connect the test mode connector.

(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.

(2) Malfunction indicator light blinks at a cycle of 0.5 Hz after starting the engine. (During diagnosis)

(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

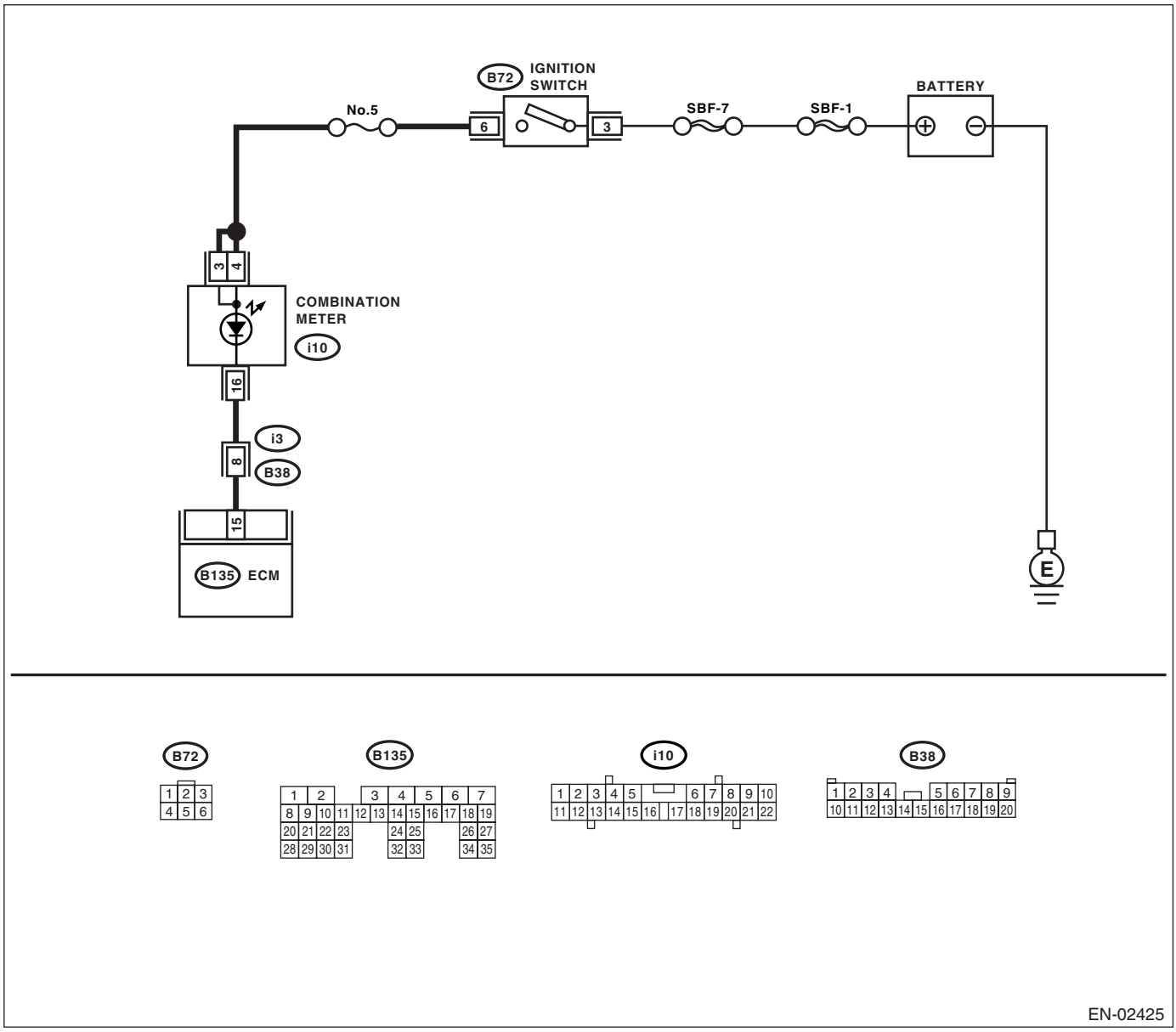
DIAGNOSIS:

The malfunction indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.

WIRING DIAGRAM:



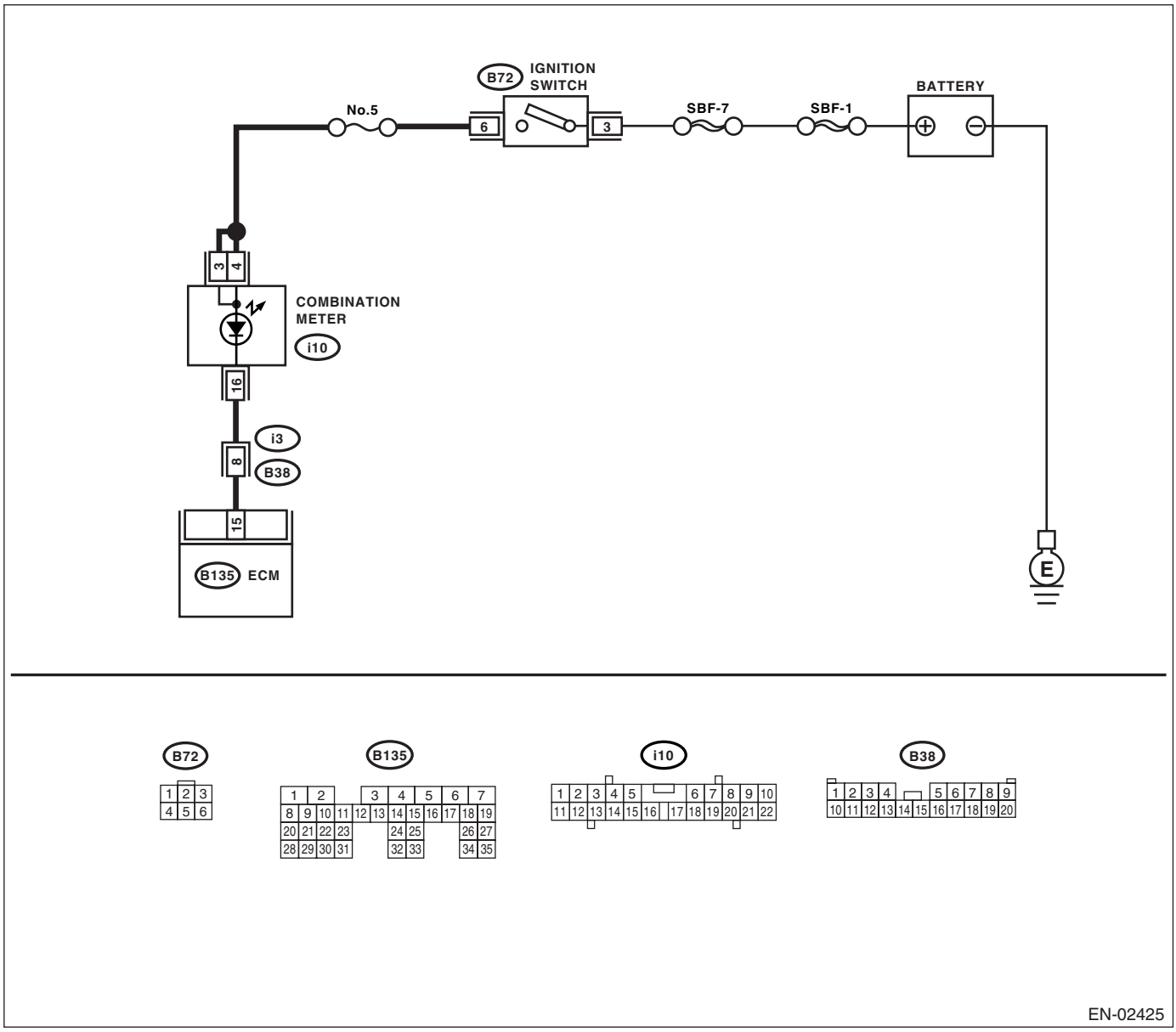
	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check for poor connection by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-16, Combination Meter Assembly.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B135) No. 15 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the board of combination meter. <Ref. to IDI-16, Combination Meter Assembly.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 5) • Open or short circuit in harness between fuse (No. 5) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

DIAGNOSIS:
The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

DIAGNOSIS:

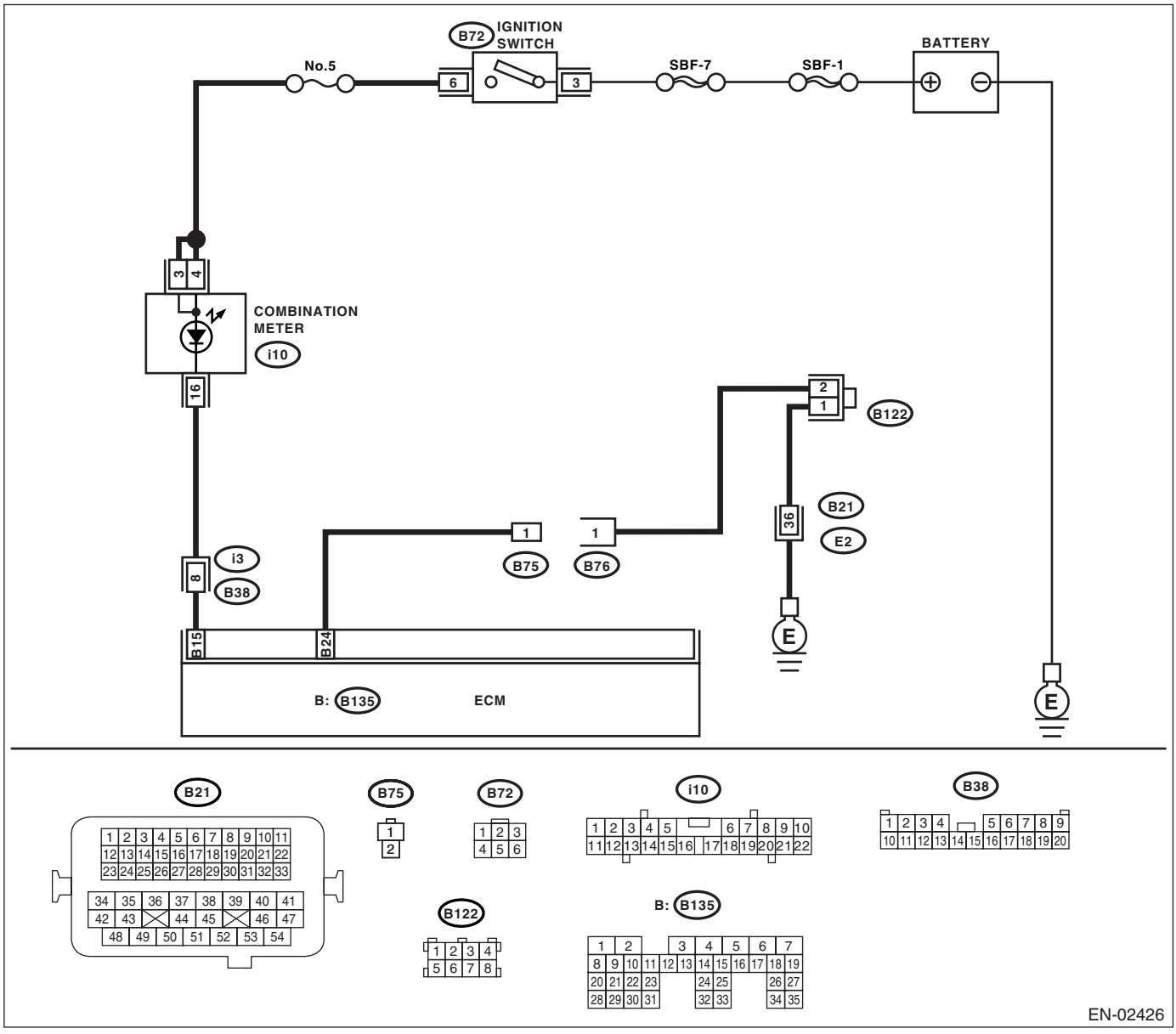
- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

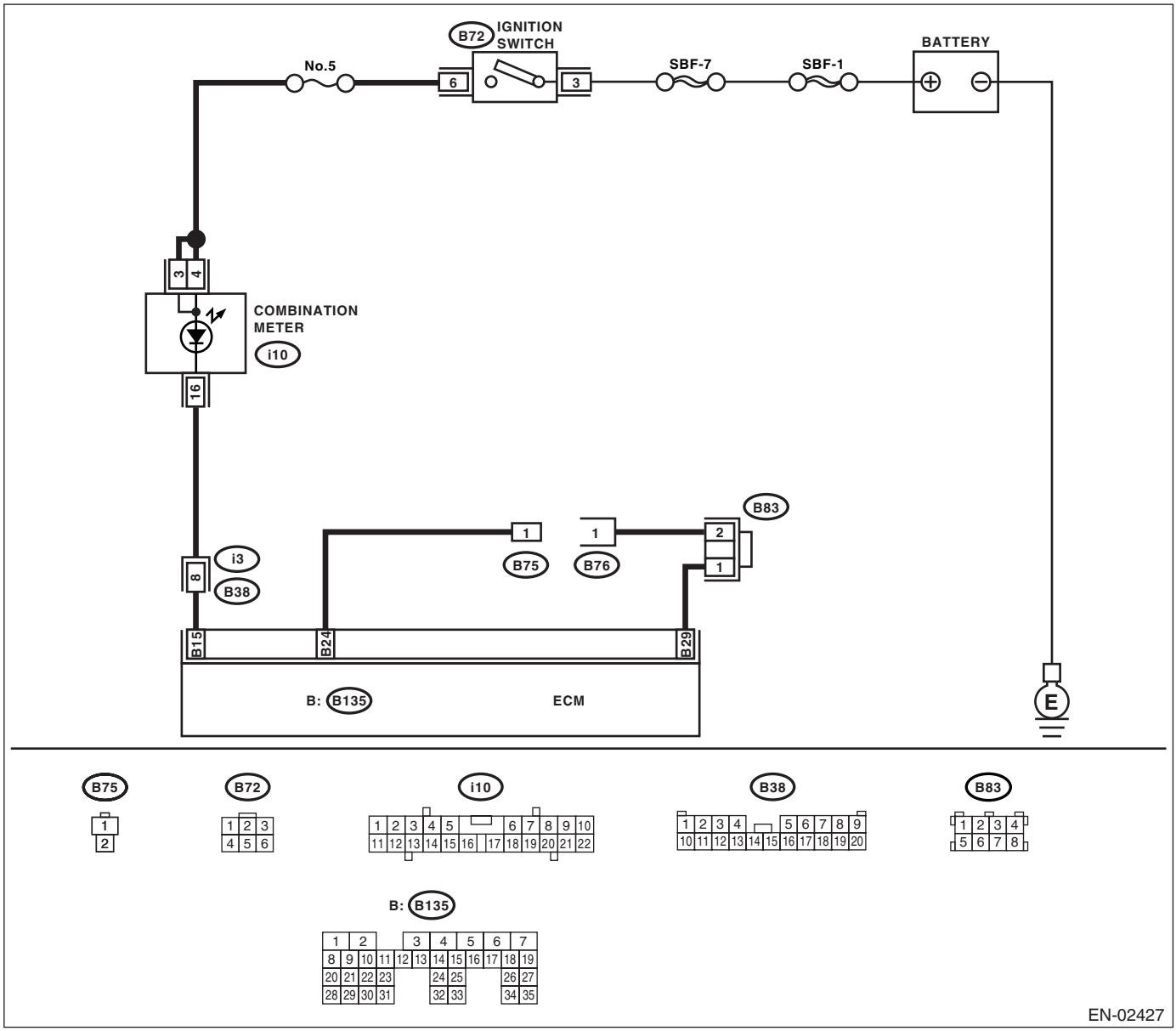
Malfunction indicator light does not blink during inspection mode.

WIRING DIAGRAM:

- LHD model



• RHD model


B72
IGNITION SWITCH
No.5
6
3
SBF-7
SBF-1
BATTERY
3
4
COMBINATION METER
i10
16
B83
1
1
2
1
i3
8
B38
B75
B76
B15
B24
B29
B: B135
ECM
E
B75
1
2
B72
1 2 3
4 5 6
i10
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22
B38
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20
B83
1 2 3 4
5 6 7 8
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
EN-02427

	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step **2.**	Repair the malfunction indictor light circuit. <Ref. to EN(H4SO 2.0)(diag)-43, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 24 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:

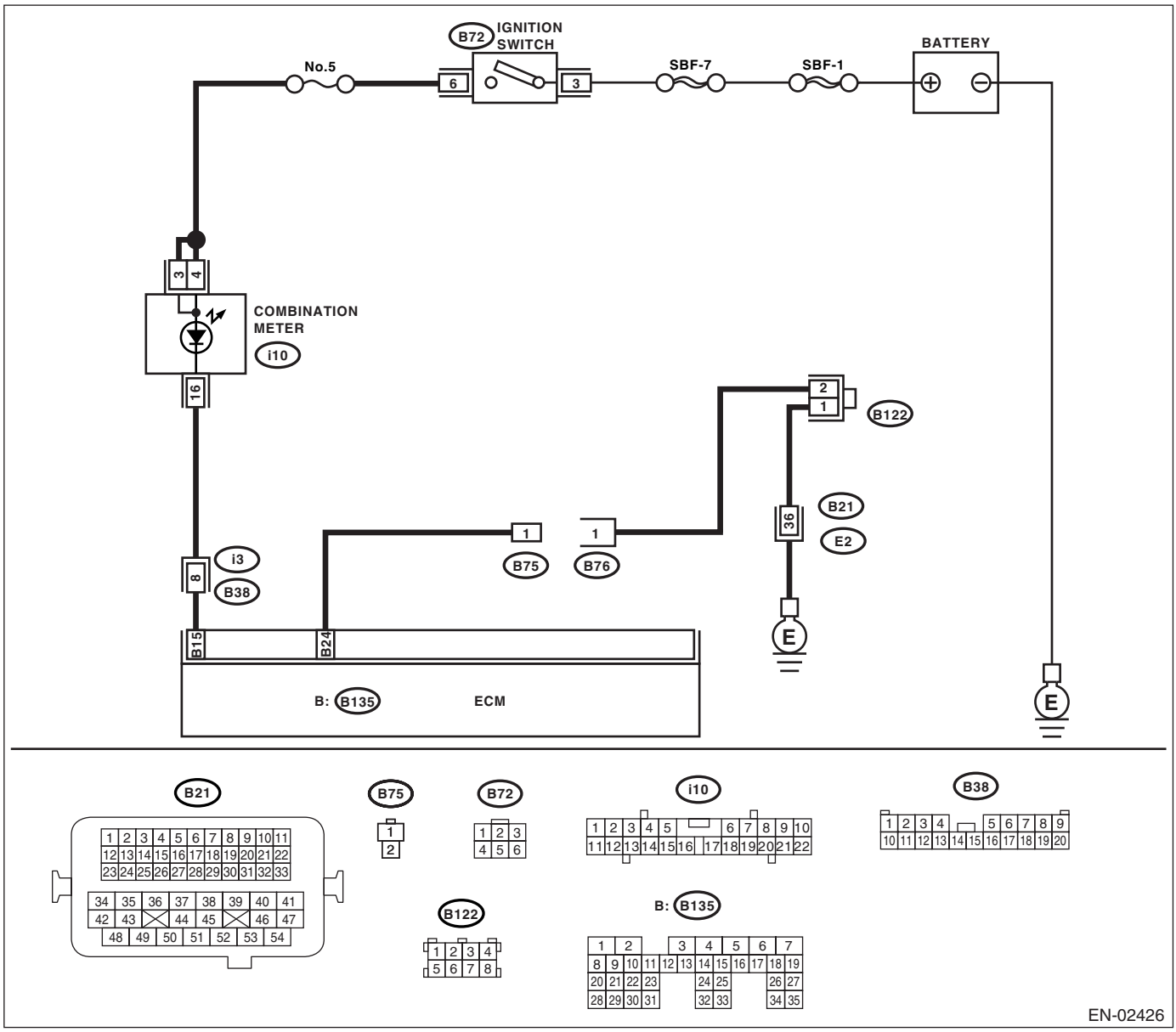
Test mode connector circuit is shorted.

TROUBLE SYMPTOM:

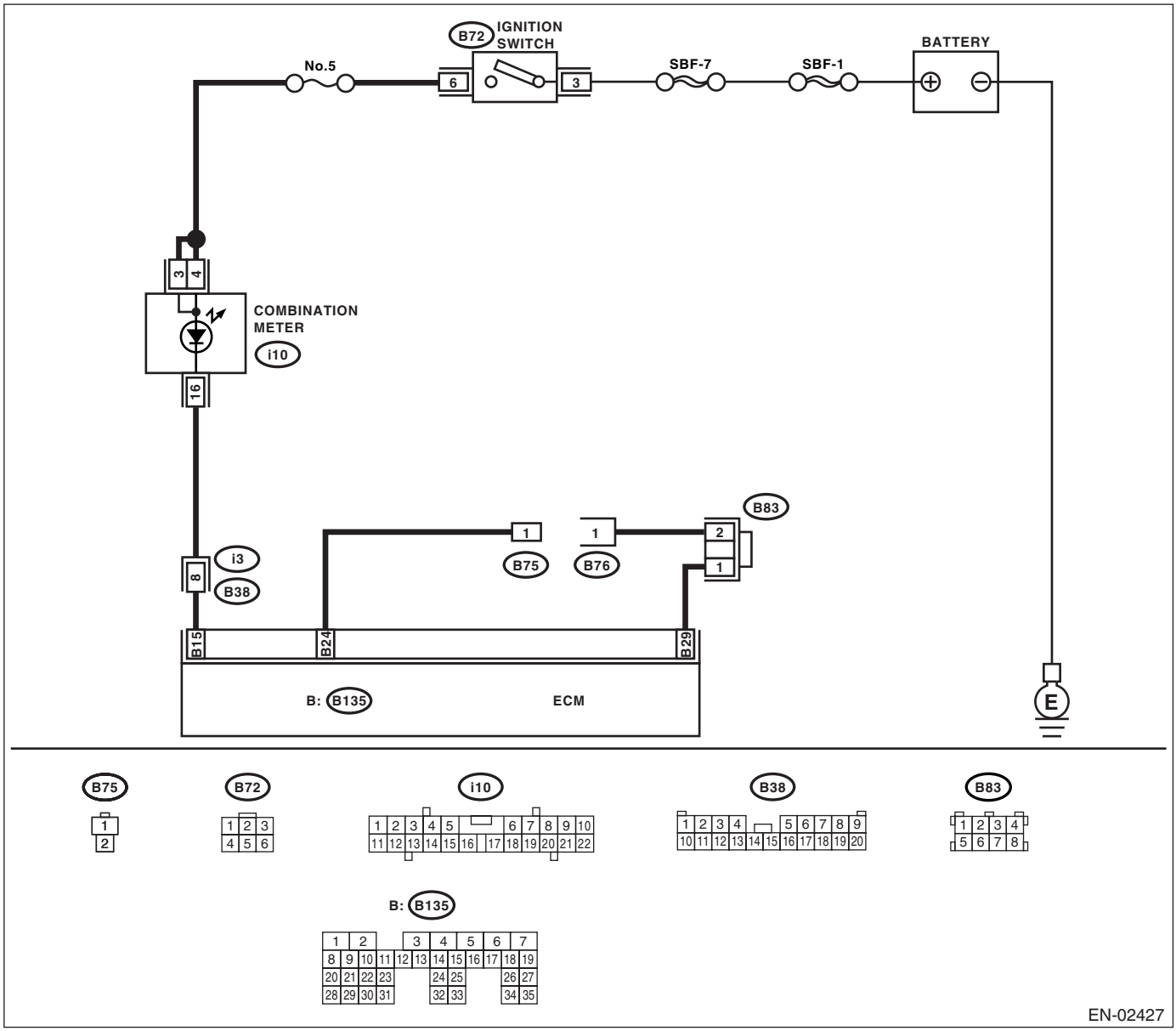
Malfunction indicator light blinks when test mode connector is not connected.

WIRING DIAGRAM:

• LHD model



• RHD model



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **2.**	System is in good order. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 24 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

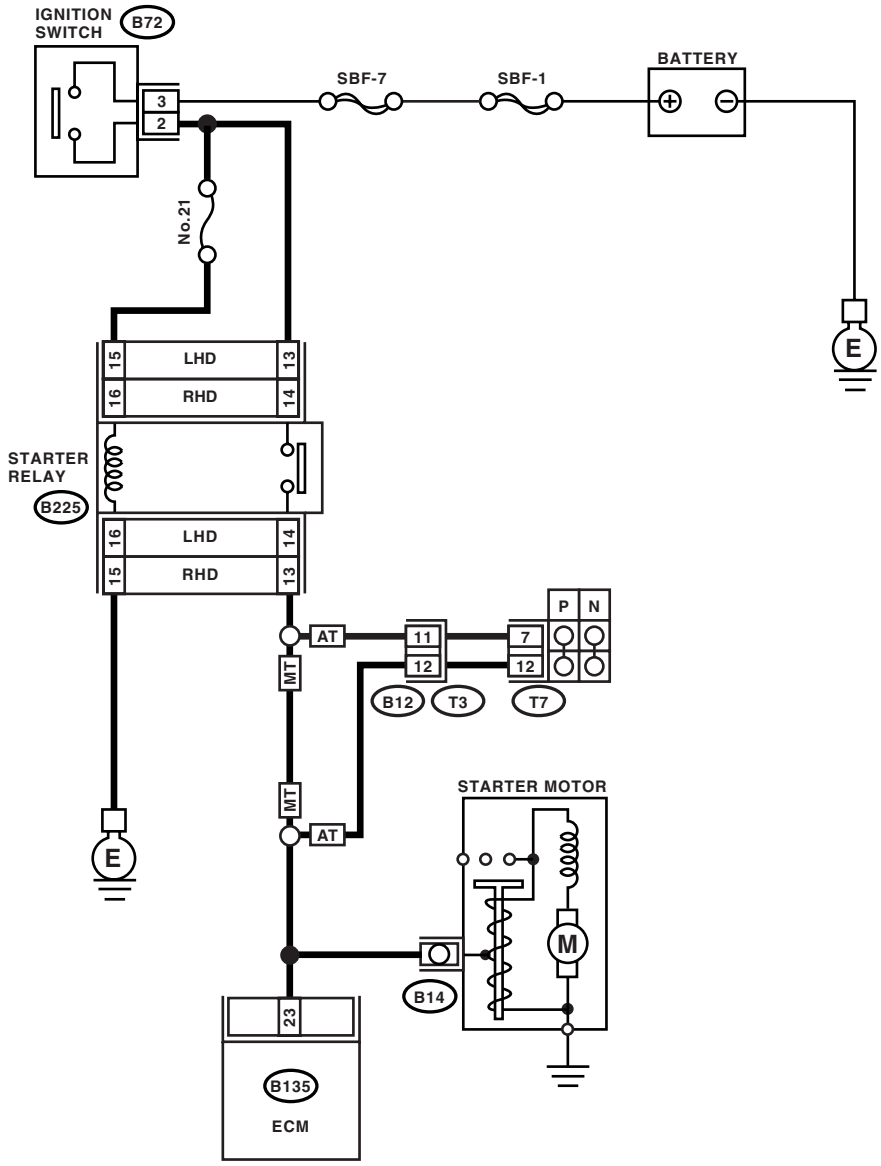
A: PROCEDURE

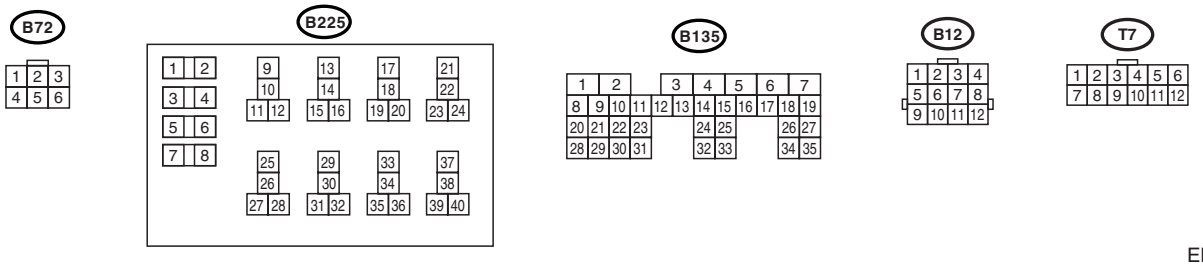
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO 2.0)(diag)-52, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO 2.0)(diag)-55, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO 2.0)(diag)-58, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO 2.0)(diag)-61, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-64, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02428

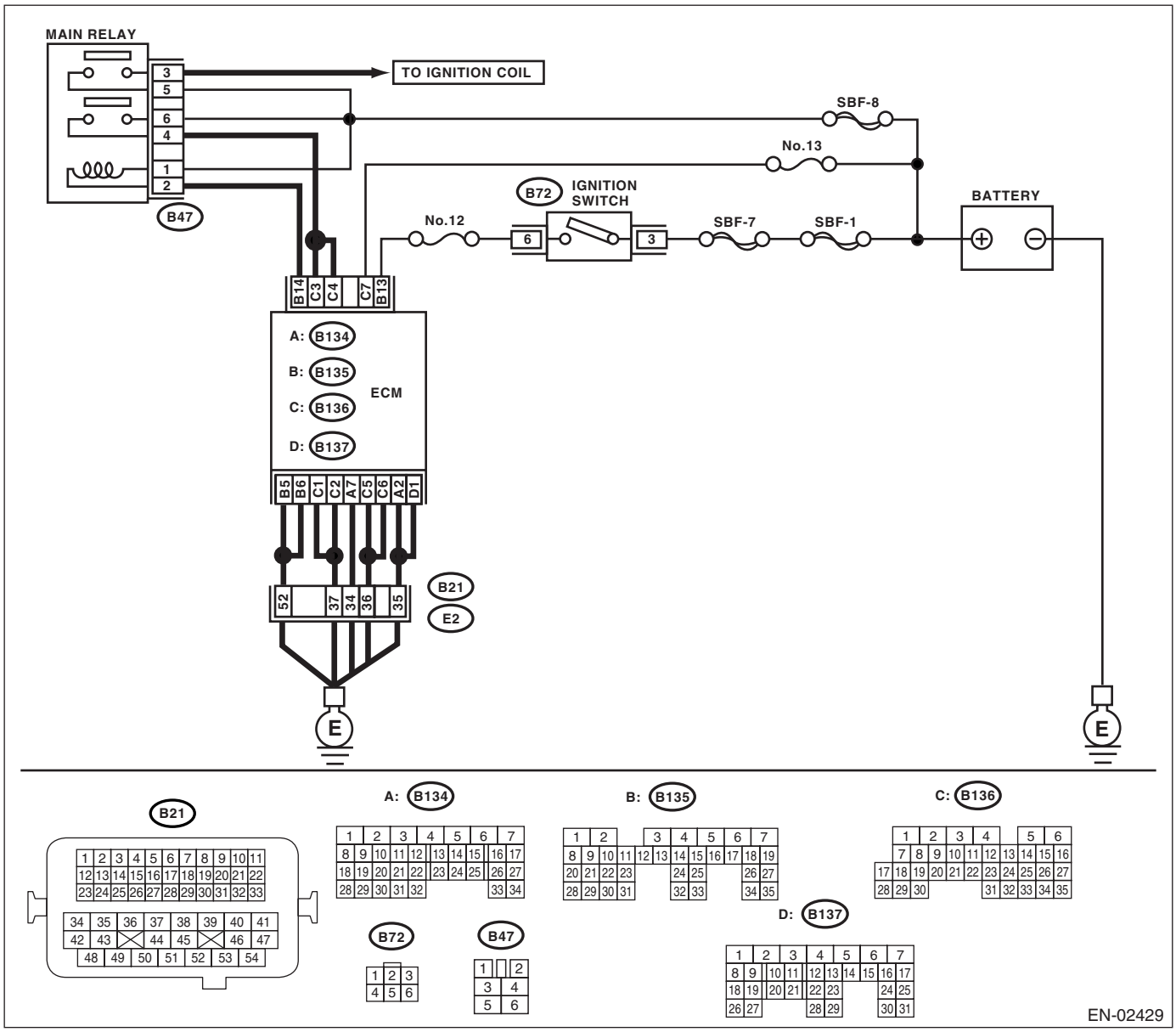
	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2.**	Charge or replace the battery.
2	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **3.**	Go to step **4.**
3	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4SO 2.0)(diag)-31, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
4	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: Place the select lever in the “P” or “N” range.	Is the voltage more than 10 V?	Go to step **5.**	Go to step **6.**
5	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ground cable terminal from starter motor. 3) Measure the resistance of ground cable between ground cable terminal and engine ground.	Is the resistance less than 5 Ω?	Check the starter motor. <Ref. to SC(H4SO 2.0)-6, Starter.>	Repair the open circuit of ground cable.
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between ignition switch and battery, and check fuse SBF No. 7 and SBF No. 1.
7	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **8.**	Replace the ignition switch.

	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***LHD MODEL*** ***(B225) No. 13 (+) — Chassis ground (–):*** ***(B225) No. 15 (+) — Chassis ground (–):*** ***RHD MODEL*** ***(B225) No. 14 (+) — Chassis ground (–):*** ***(B225) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open circuit in harness between starter fan relay and ignition switch.
9	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the starter relay.
10	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connectors from ECM. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the open or ground short circuit in harness between ECM and starter relay.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

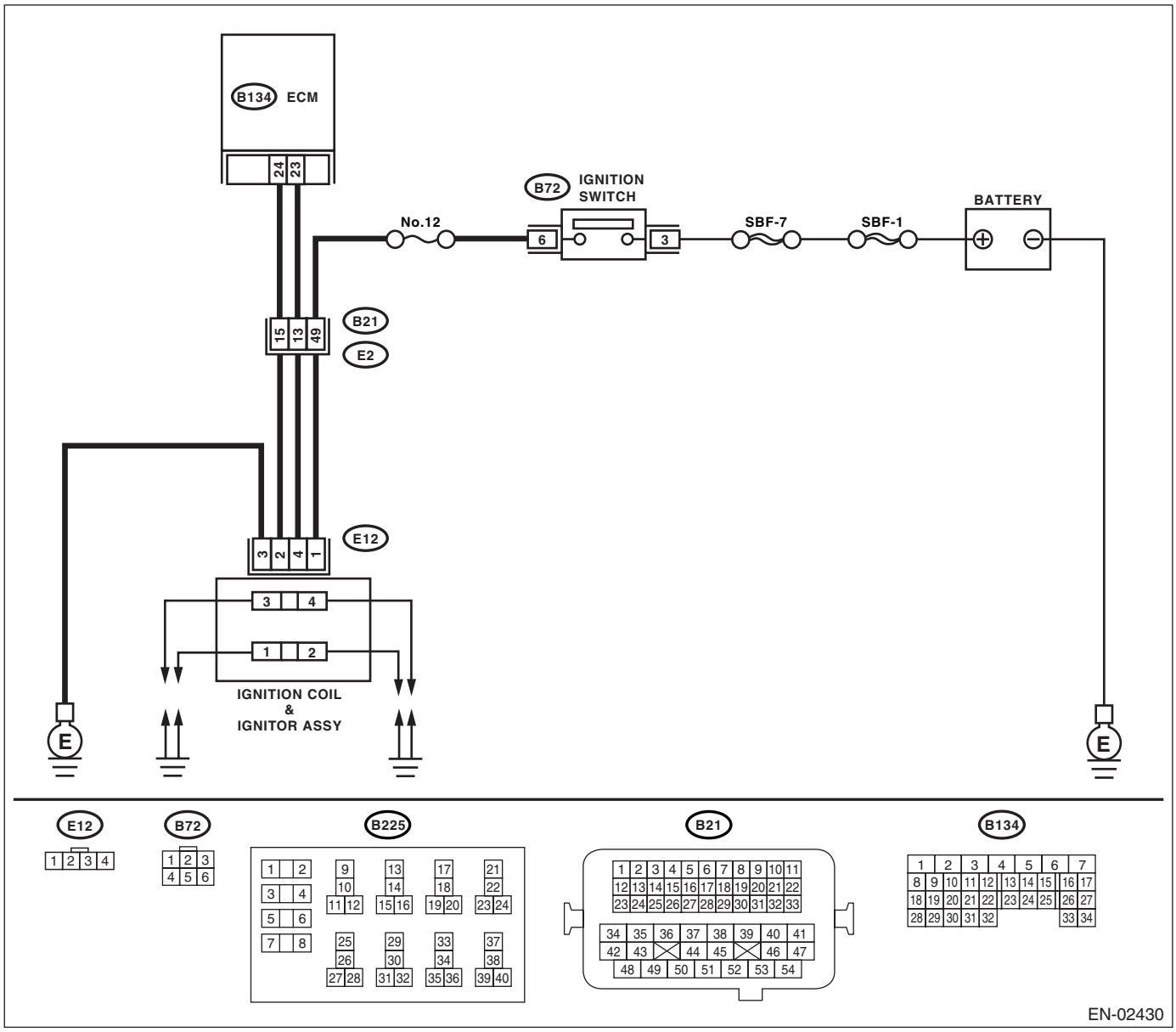
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — Chassis ground:*** ***(B136) No. 1 — Chassis ground:*** ***(B136) No. 2 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 7 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between ECM connector and main relay connector.
6	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open or ground short circuit in harness between ECM connector and main relay connector.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit in harness of power supply circuit.

	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO 2.0)(diag)-58, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



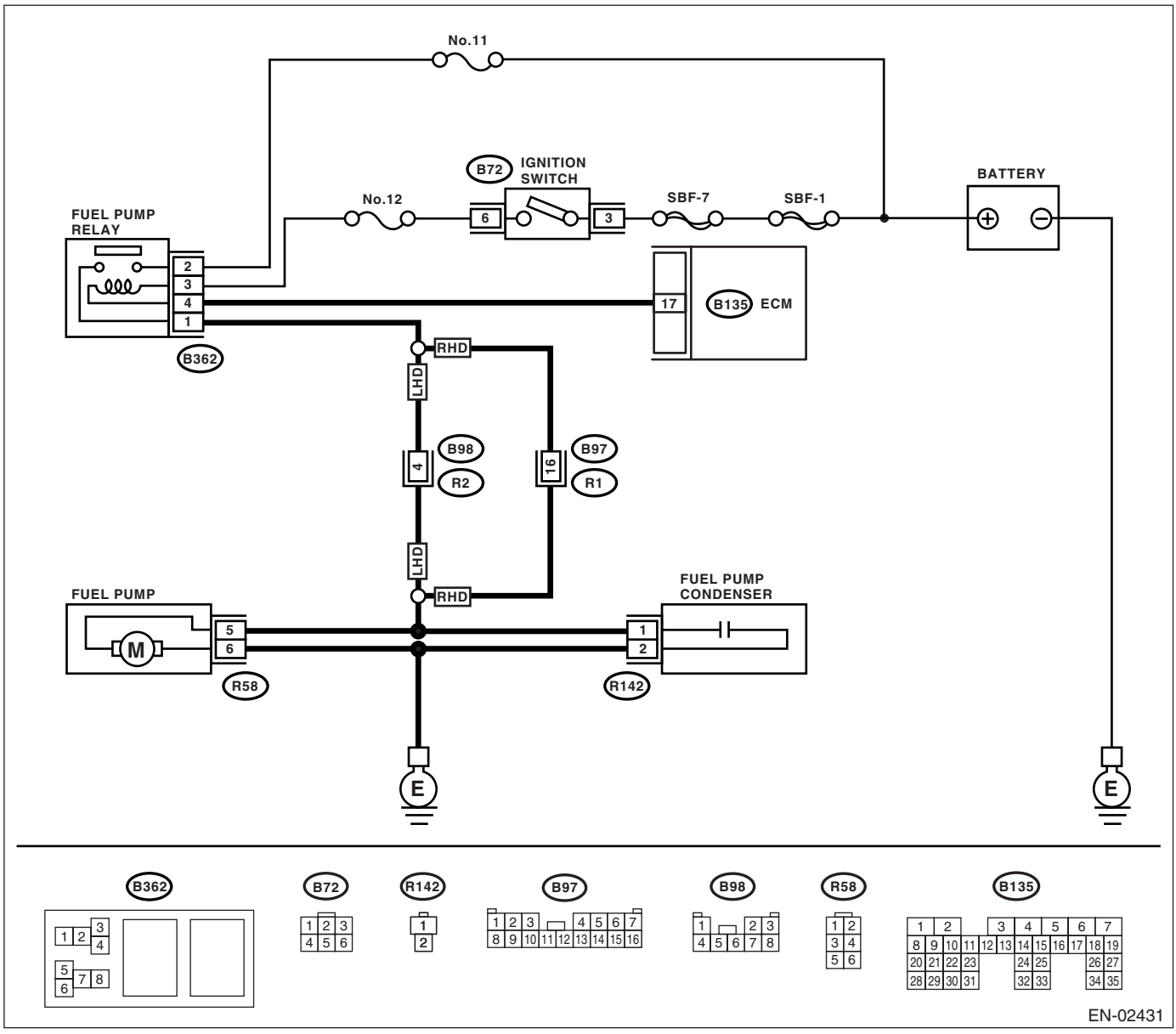
	Step	Check	Yes	No
1	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4SO 2.0)(diag)-61, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY, and main relay connector • Poor contact in coupling connector • Blown out fuse
3	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
4	**CHECK IGNITION COIL & IGNITOR ASSY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 10 — 15 kΩ?	Go to step **5.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, Ignition Coil & Ignitor ASSY.>
5	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSY.** 1) Connect the connector to ignition coil & ignitor ASSY. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 2 (+) — Engine ground (–):*** ***(E12) No. 4 (+) — Engine ground (–):***	Does the voltage vary more than 10 V?	Go to step **6.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, Ignition Coil & Ignitor ASSY.>

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil & ignitor ASSY. 4) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***(B134) No. 23 — (E12) No. 4:*** ***(B134) No. 24 — (E12) No. 2:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in coupling connector
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B134) No. 23 — Engine ground:*** ***(B134) No. 24 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel pump circuit. <Ref. to EN(H4SO 2.0)(diag)-61, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



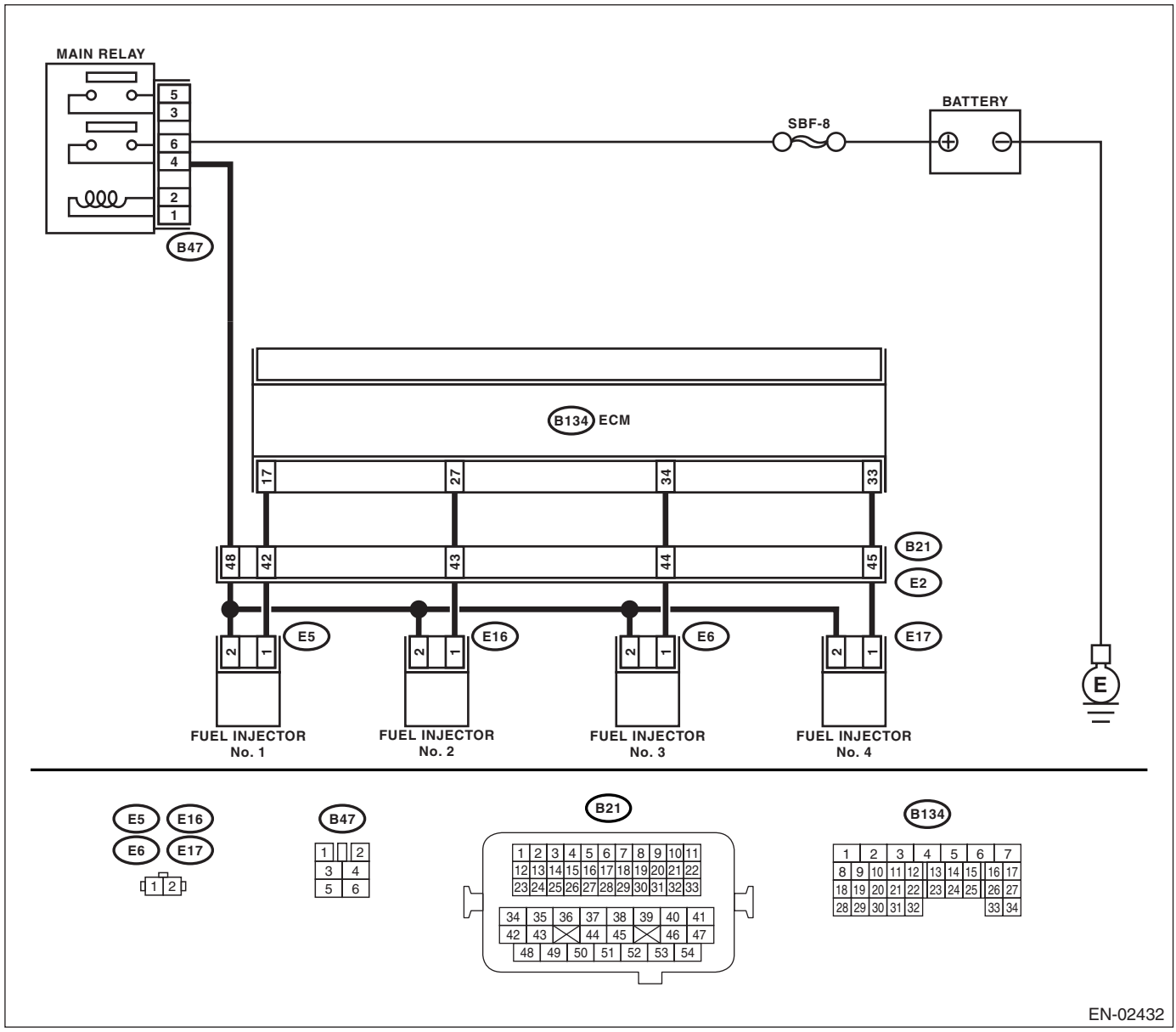
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Check if the fuel pump is in operation for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-64, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **2.**
2	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the fuel pump access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the resistance of harness connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal
3	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO 2.0)-47, Fuel Pump.>	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 5 — (B362) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between fuel pump and fuel pump relay connector.
6	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 3 and No. 4. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Go to step **7.**	Replace the fuel pump relay. <Ref. to FU(H4SO 2.0)-47, Fuel Pump.>

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal (B135) No. 17 — (B362) No. 4:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between ECM and fuel pump relay connector.
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SO 2.0)(diag)-64, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.**

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or apply a screwdriver to the injector for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO 2.0)-27, INSPECTION, Fuel Pressure.>	Go to step **2.**
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 17 — (E5) No. 1:*** ***#2 (B134) No. 27 — (E16) No. 1:*** ***#3 (B134) No. 34 — (E6) No. 1:*** ***#4 (B134) No. 33 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B134) No. 17 — Chassis ground:*** ***#2 (B134) No. 27 — Chassis ground:*** ***#3 (B134) No. 34 — Chassis ground:*** ***#4 (B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4SO 2.0)(diag)-224, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	NOTE
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-71, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-73, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-76, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-78, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-81, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-83, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-86, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-89, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-91, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-94, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-96, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-99, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-102, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4SO 2.0)(diag)-105, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O2 Sensor Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-107, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-110, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-112, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-114, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-116, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-118, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-121, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-124, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-126, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-128, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-135, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-142, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-144, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4SO 2.0)(diag)-146, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-148, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO 2.0)(diag)-150, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-153, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-155, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H4SO 2.0)(diag)-157, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	NOTE
P0463	Fuel Level Sensor Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.0)(diag)-160, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0558	Generator Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0558 GENERATOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0559	Generator Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0559 GENERATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.0)(diag)-165, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Read Access Memory (RAM) Error	<Ref. to EN(H4SO 2.0)(diag)-166, DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H4SO 2.0)(diag)-167, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.0)(diag)-168, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-169, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Neutral Switch Input Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-171, DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Neutral Switch Input Circuit High	<Ref. to EN(H4SO 2.0)(diag)-173, DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-Computer Problem	<Ref. to EN(H4SO 2.0)(diag)-176, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	O2 Sensor Circuit (Bank1 Sensor1)	<Ref. to EN(H4SO 2.0)(diag)-178, DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-182, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-184, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-186, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	<Ref. to EN(H4SO 2.0)(diag)-189, DTC P1521 BRAKE SWITCH CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.0)(diag)-191, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-21, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except antenna circuit)	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2100	Throttle Control Motor Circuit Open	<Ref. to EN(H4SO 2.0)(diag)-192, DTC P2100 THROTTLE CONTROL MOTOR CIRCUIT OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-200, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H4SO 2.0)(diag)-203, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	<Ref. to EN(H4SO 2.0)(diag)-205, DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P2111	Throttle Actuator Control System - Stuck Open	<Ref. to EN(H4SO 2.0)(diag)-205, DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-206, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-209, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-211, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-214, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H4SO 2.0)(diag)-216, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H4SO 2.0)(diag)-220, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

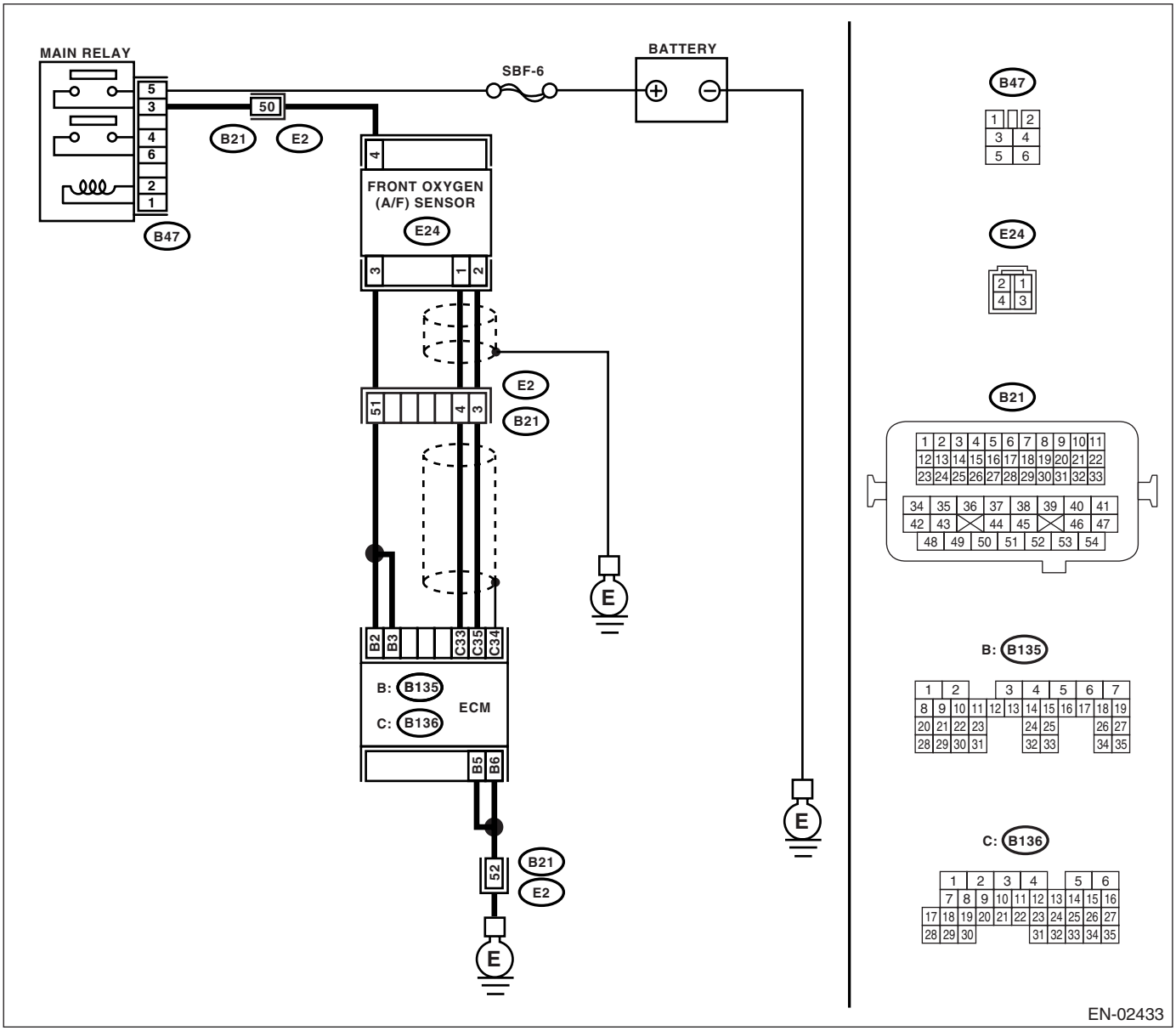
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B135) No. 2 — (E24) No. 3:*** ***(B135) No. 3 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 3 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check the poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

B: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

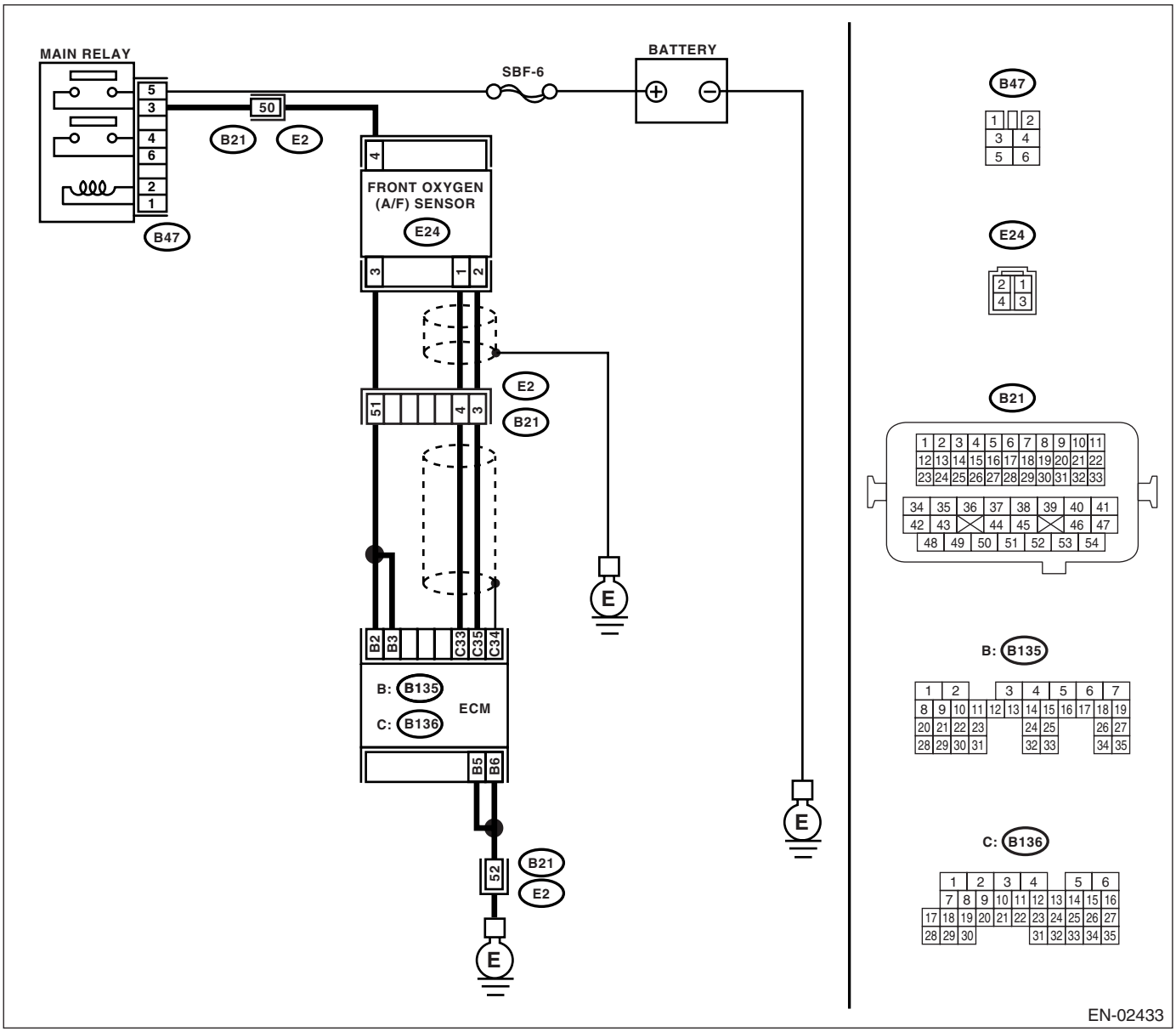
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Do DTC P0031 and P0037 appear at the same time on the Subaru Select Monitor?	Go to step **2.**	Go to step **5.**
2	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
3	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the current more than 0.2 A?	Repair the poor contact connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Go to step **5.**
5	**CHECK INPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **6.**
6	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

C: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

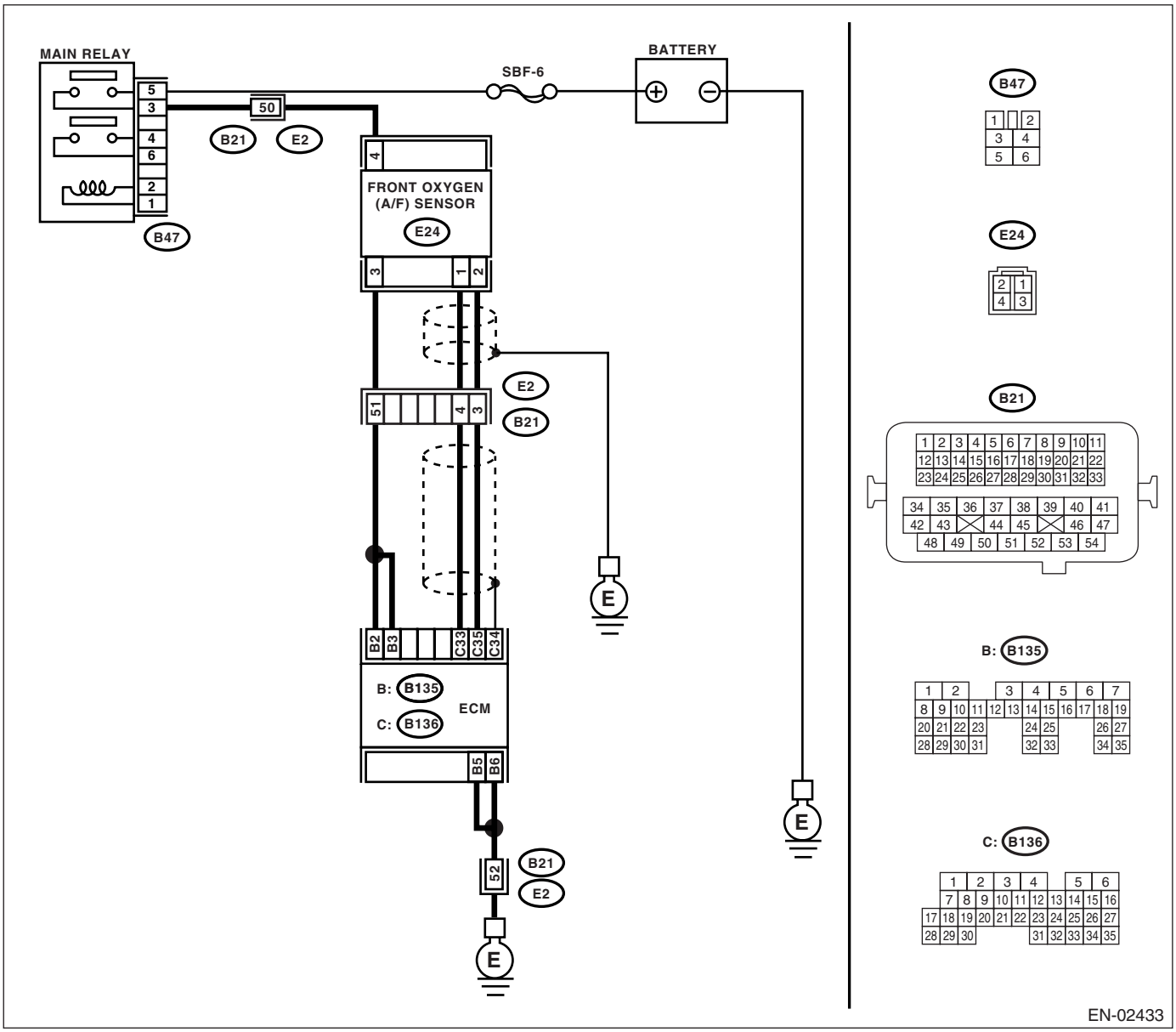
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	END.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END.

D: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

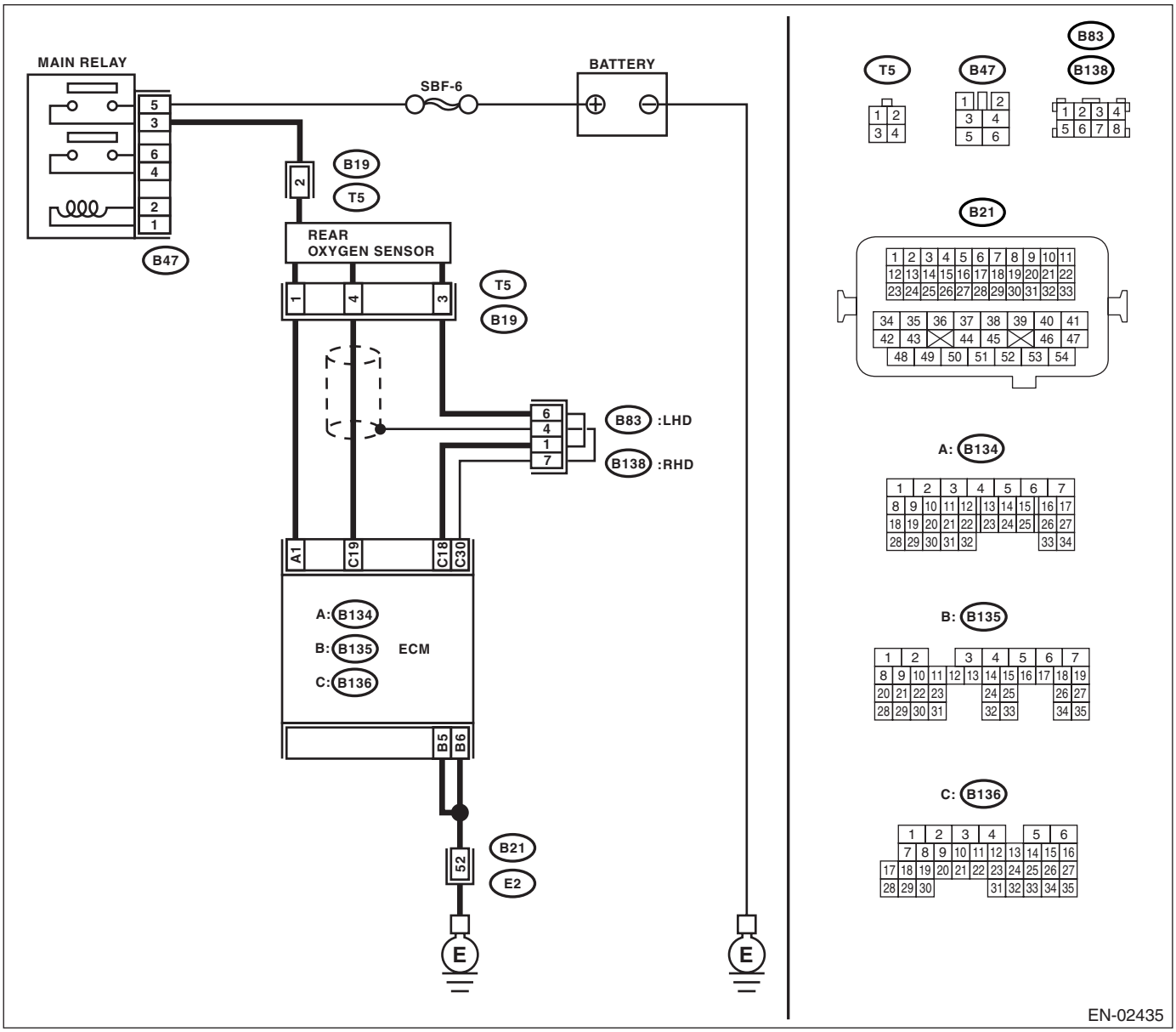
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 — Chassis ground:*** ***(B135) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>

E: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

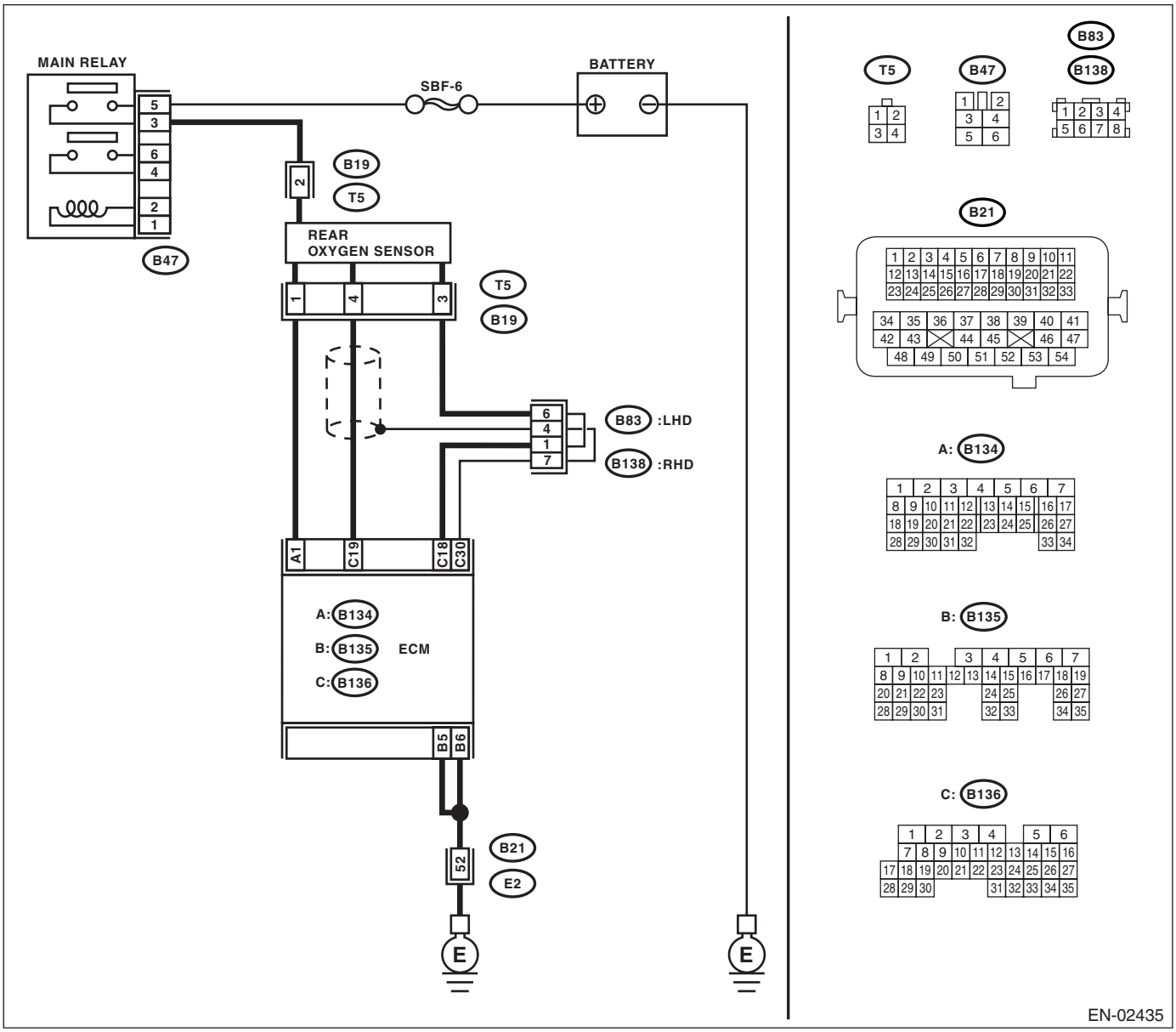
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	END.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	END.

F: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

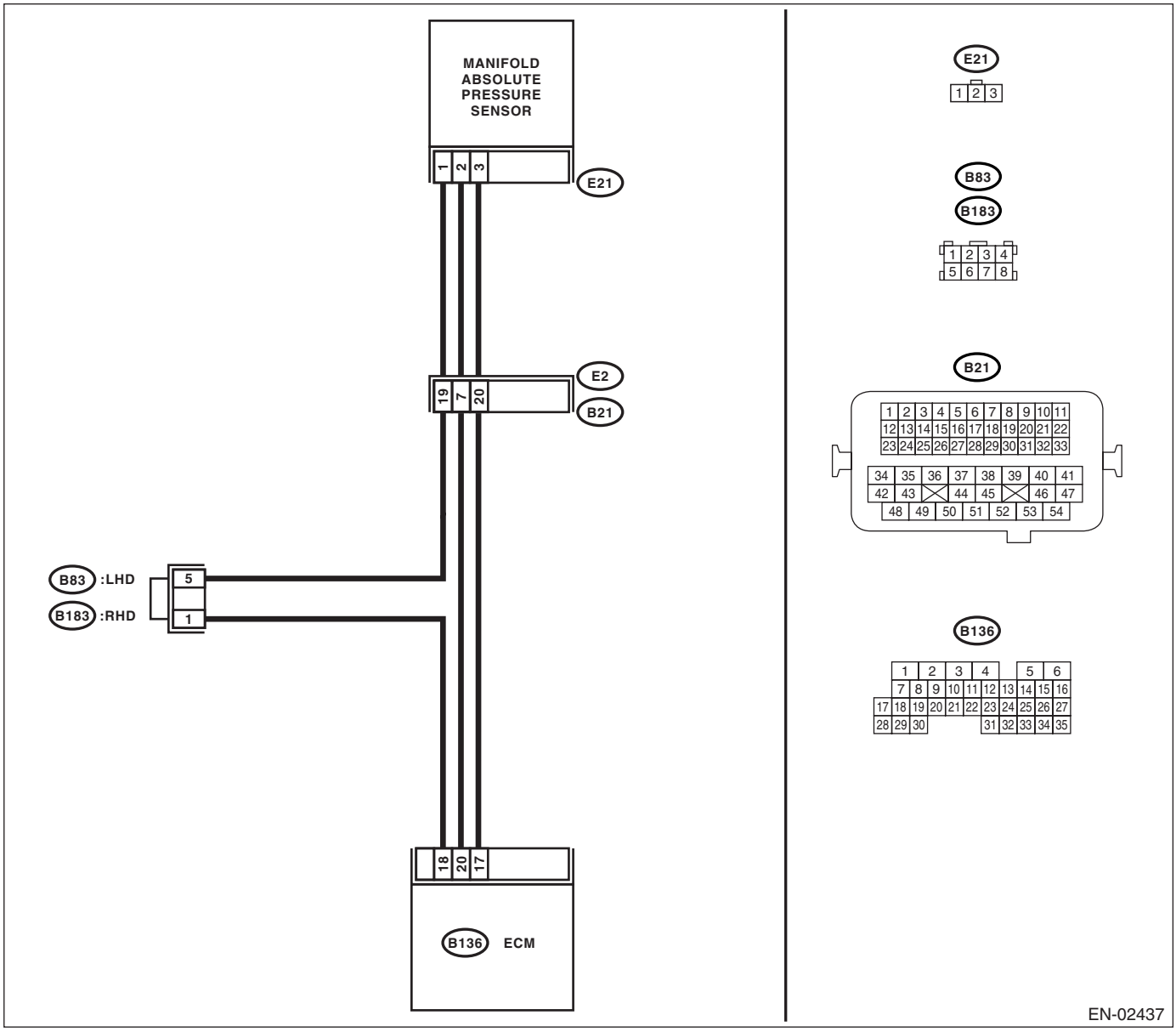
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check the poor contact in ECM and manifold pressure sensor connector.	Is there poor contact in ECM or manifold pressure sensor connector?	Repair the poor contact in ECM or manifold pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 20 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **7.**	Go to step **6.**
6	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **8.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 18 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

G: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

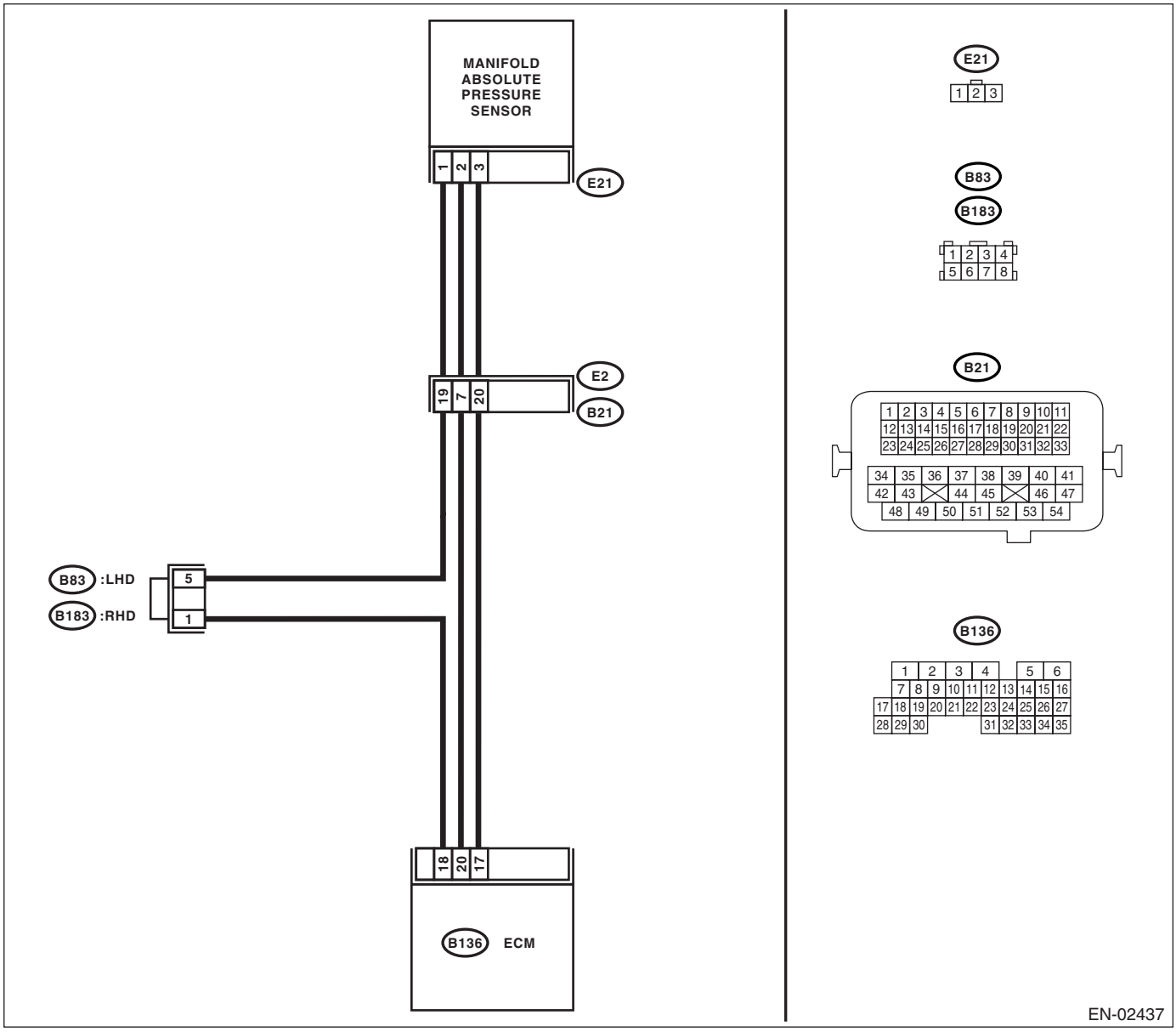
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Go to step **10.**	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
4	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 20 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 20 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 18 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF, and the Subaru Select Monitor switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Repair the battery short in harness between ECM and manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

H: DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

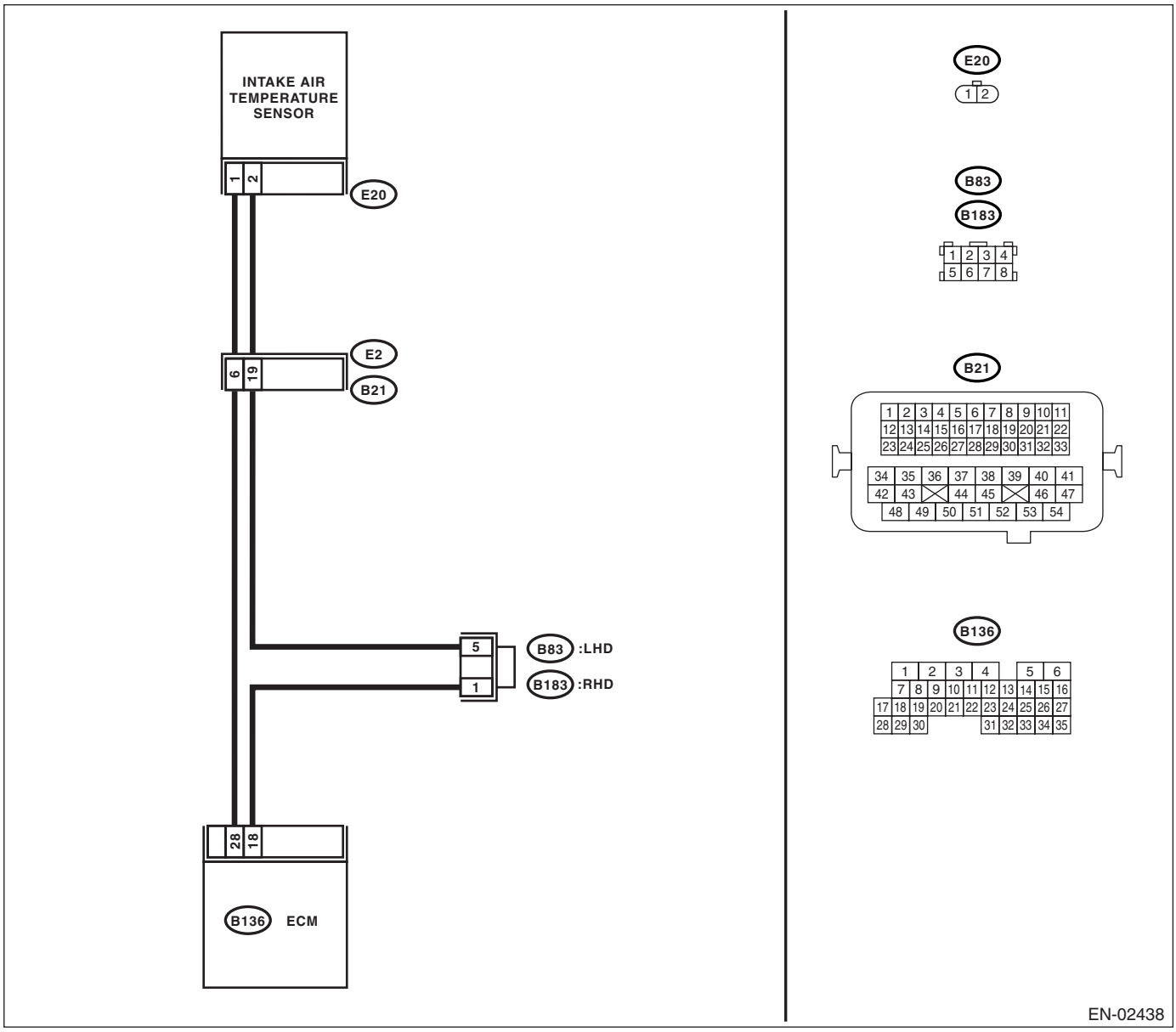
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the intake air temperature more than 120°C (248°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the intake air temperature less than −40°C (−40°F)?	Replace the intake air temperature sensor. <Ref. to FU(H4SO 2.0)-27, Intake Air Temperature Sensor.>	Repair the ground short circuit in harness between intake air temperature sensor and ECM connector.

I: DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

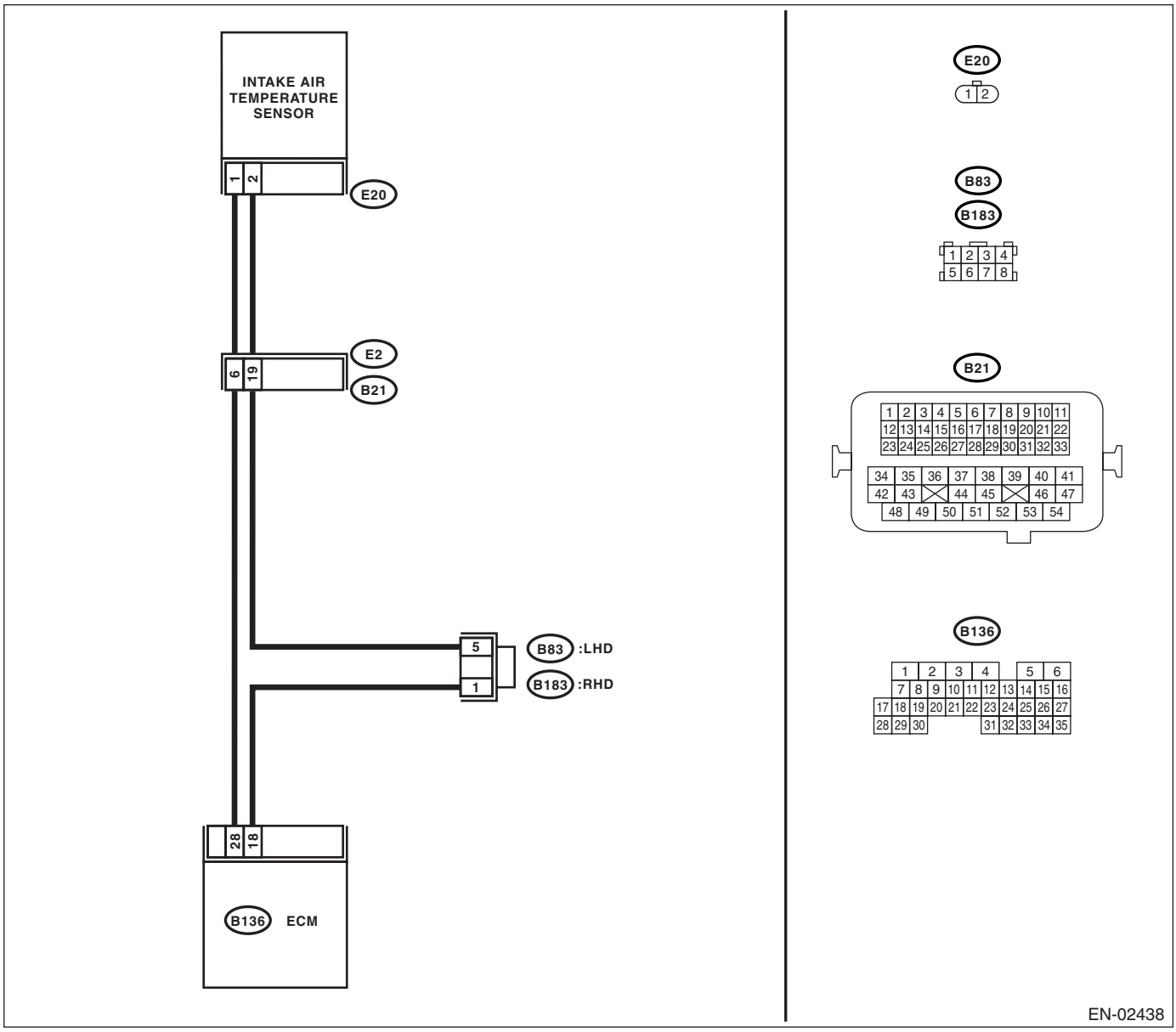
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the intake air temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from intake air temperature sensor. 3) Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 28 (+) — Engine ground (−):***	Is the voltage more than 3 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 18 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the intake air temperature sensor. <Ref. to FU(H4SO 2.0)-27, Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between intake air temperature sensor and ECM connector • Poor contact in intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

J: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

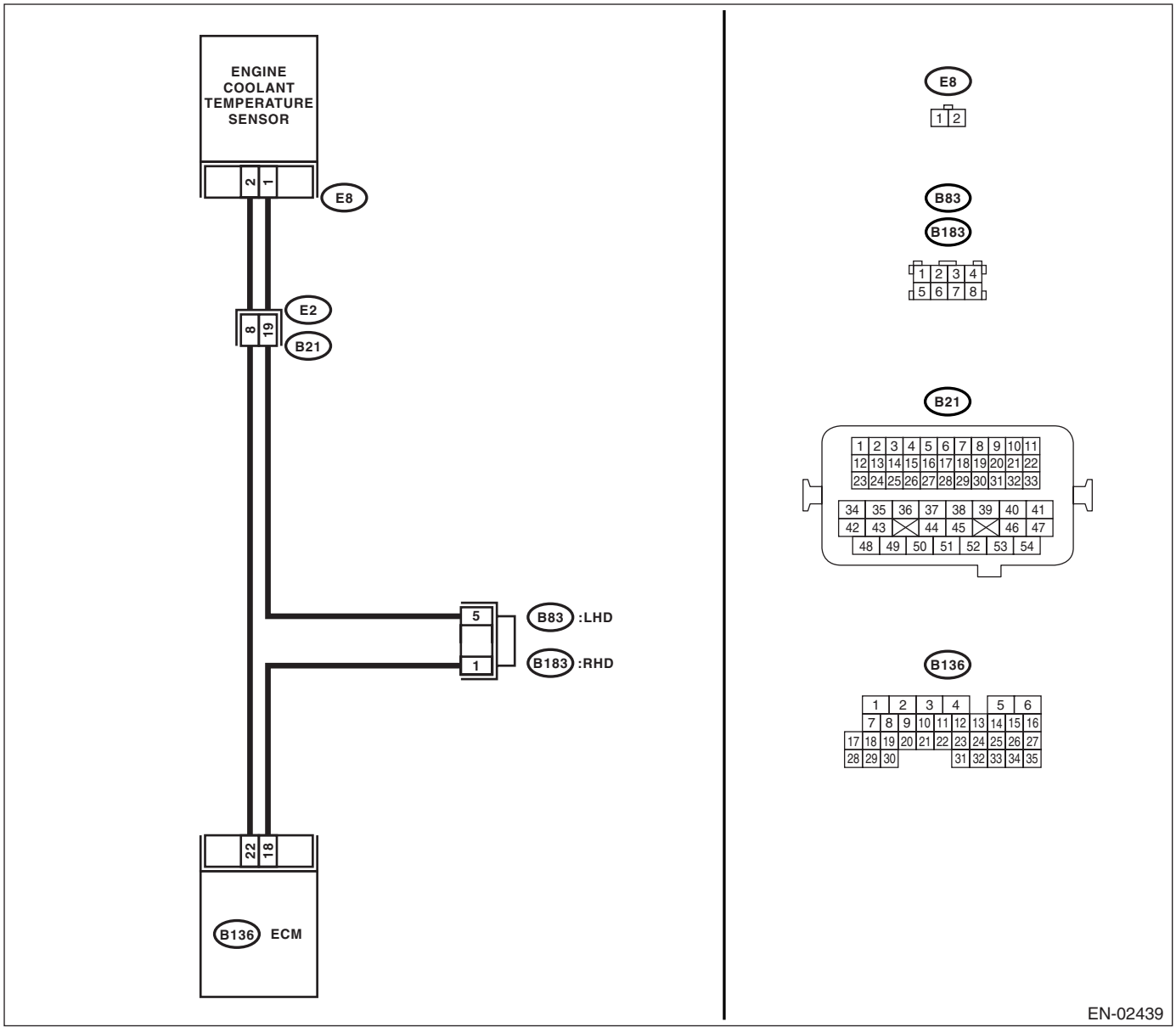
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the engine coolant temperature more than 150°C (302°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>	Repair the ground short circuit in harness between engine coolant temperature sensor and ECM connector.

K: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

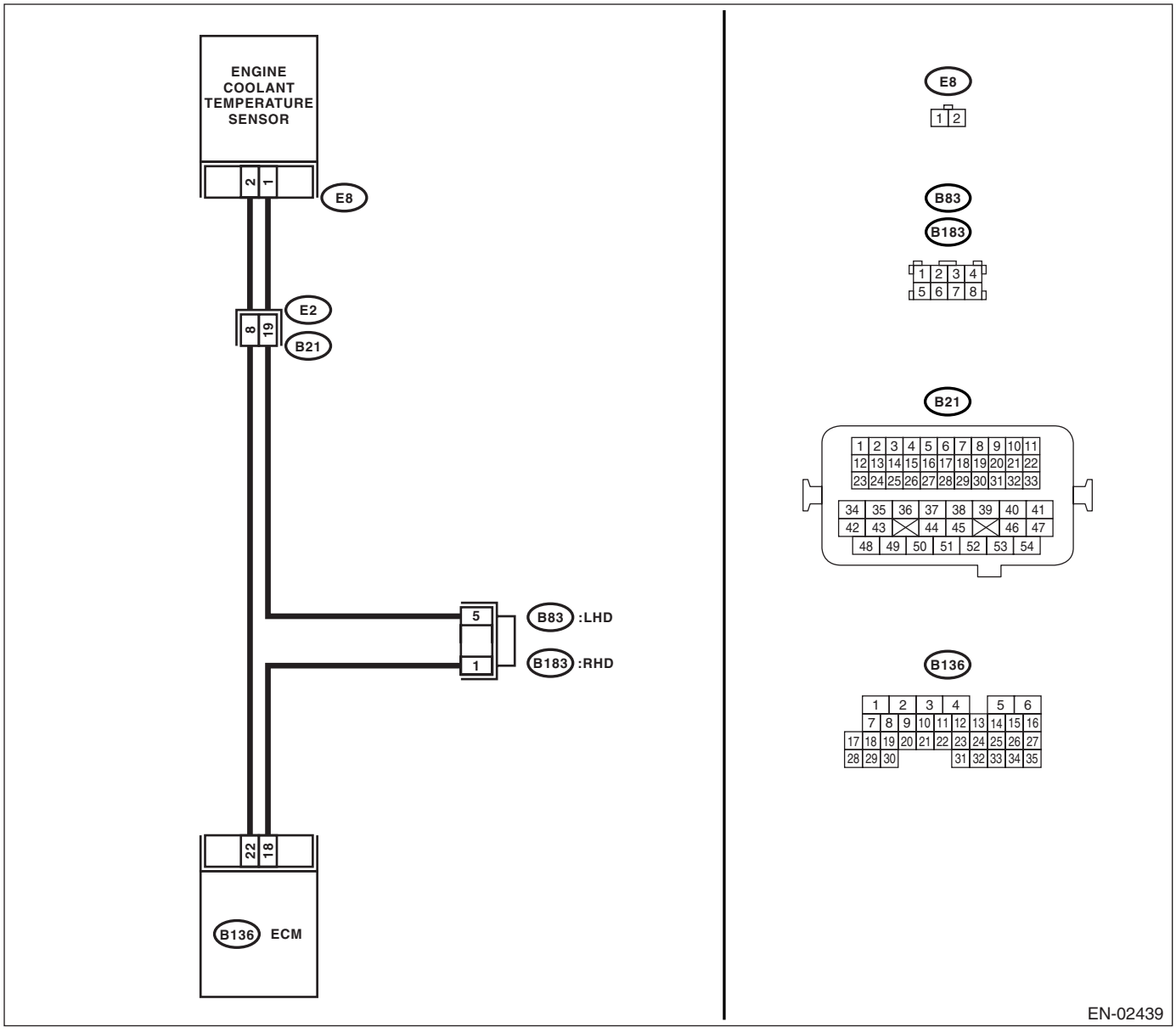
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the engine coolant temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

L: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

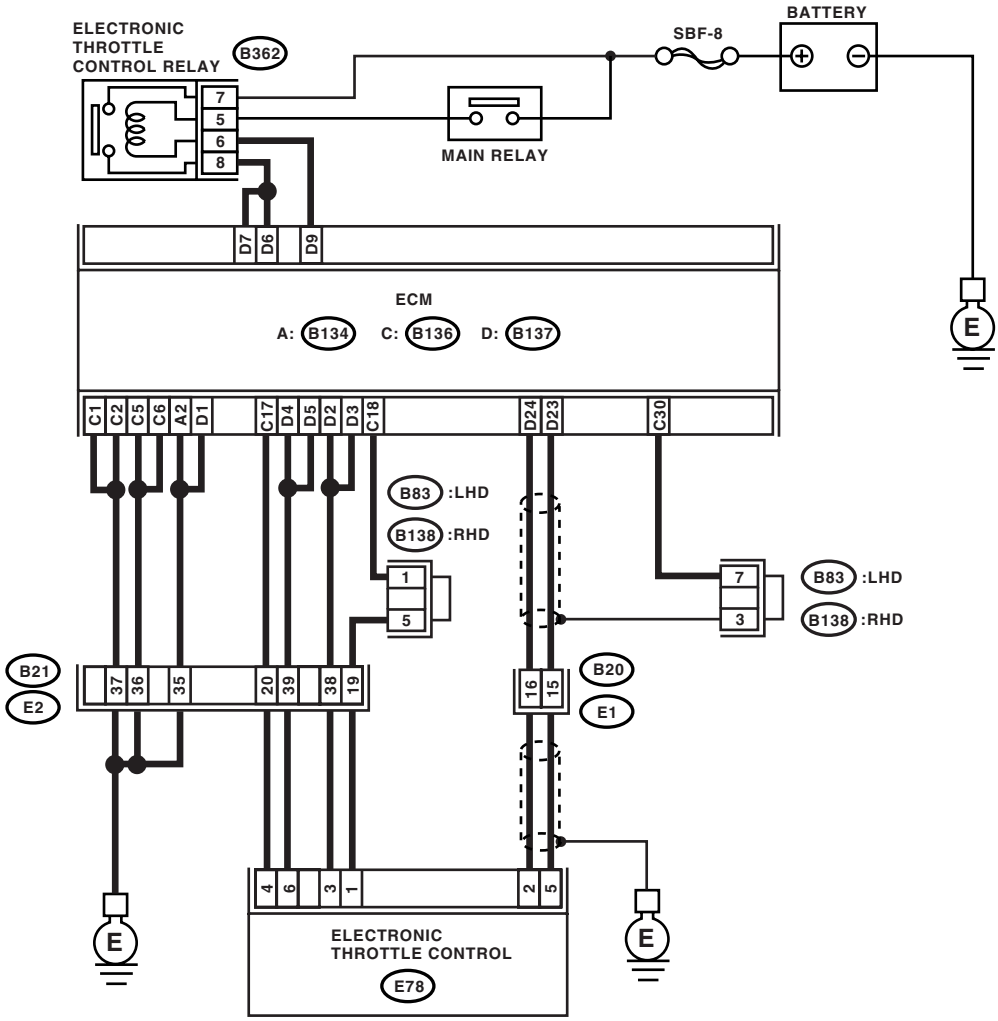
TROUBLE SYMPTOM:

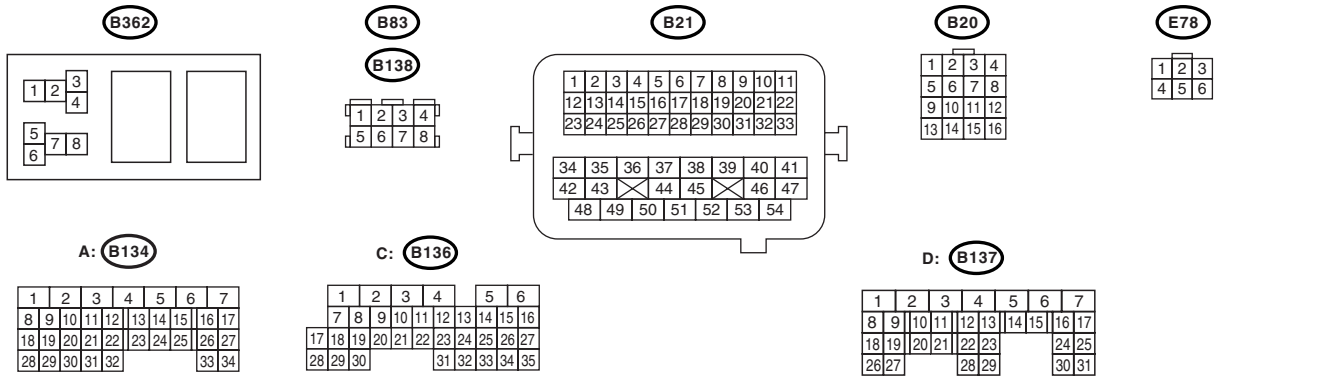
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B136) No. 17 — (E78) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 23 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the accelerator position sensor if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

M: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

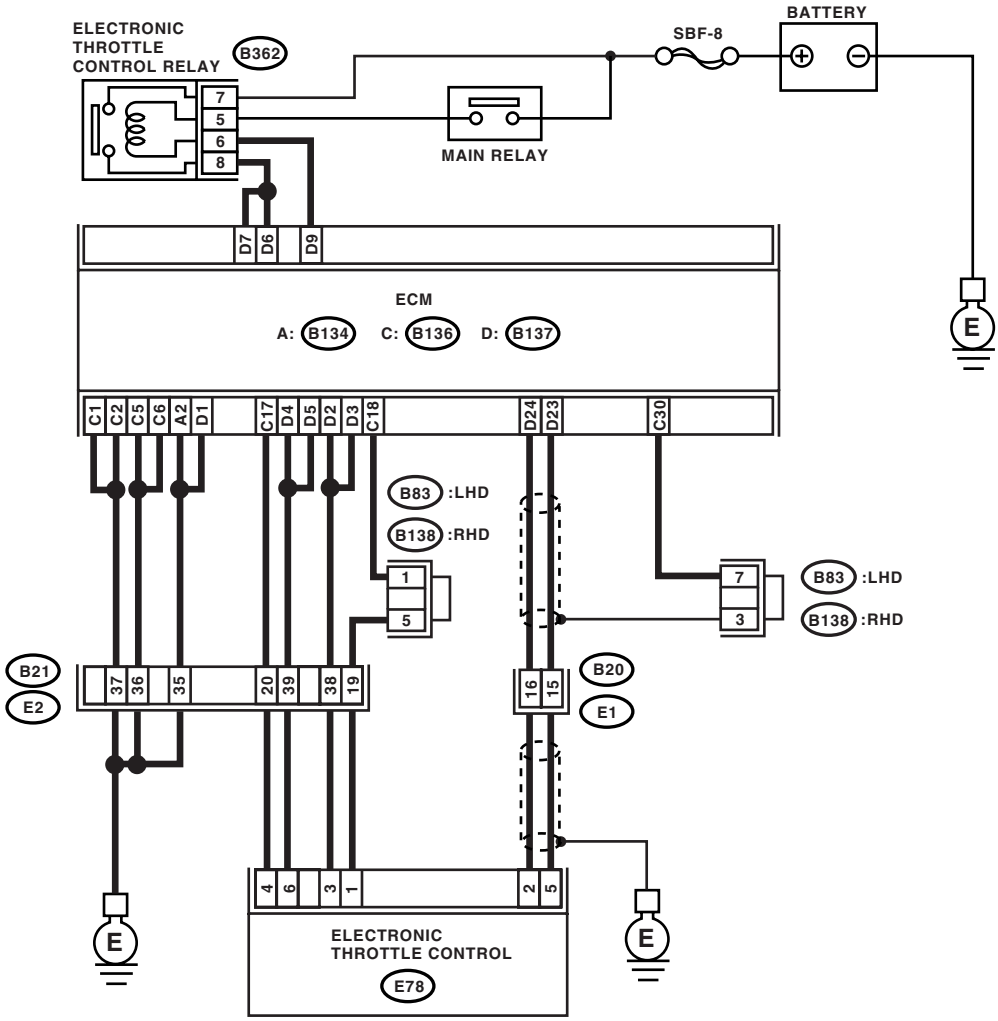
TROUBLE SYMPTOM:

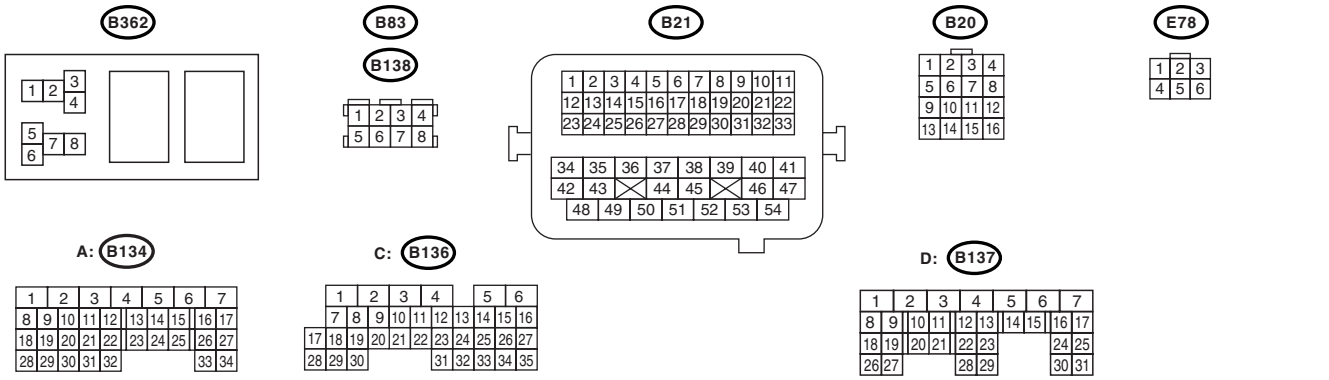
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 23 — (E78) No. 5:*** ***(B136) No. 18 — (E78) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 1 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Repair the electronic throttle control.	Repair the short circuit to sensor power supply.

N: DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

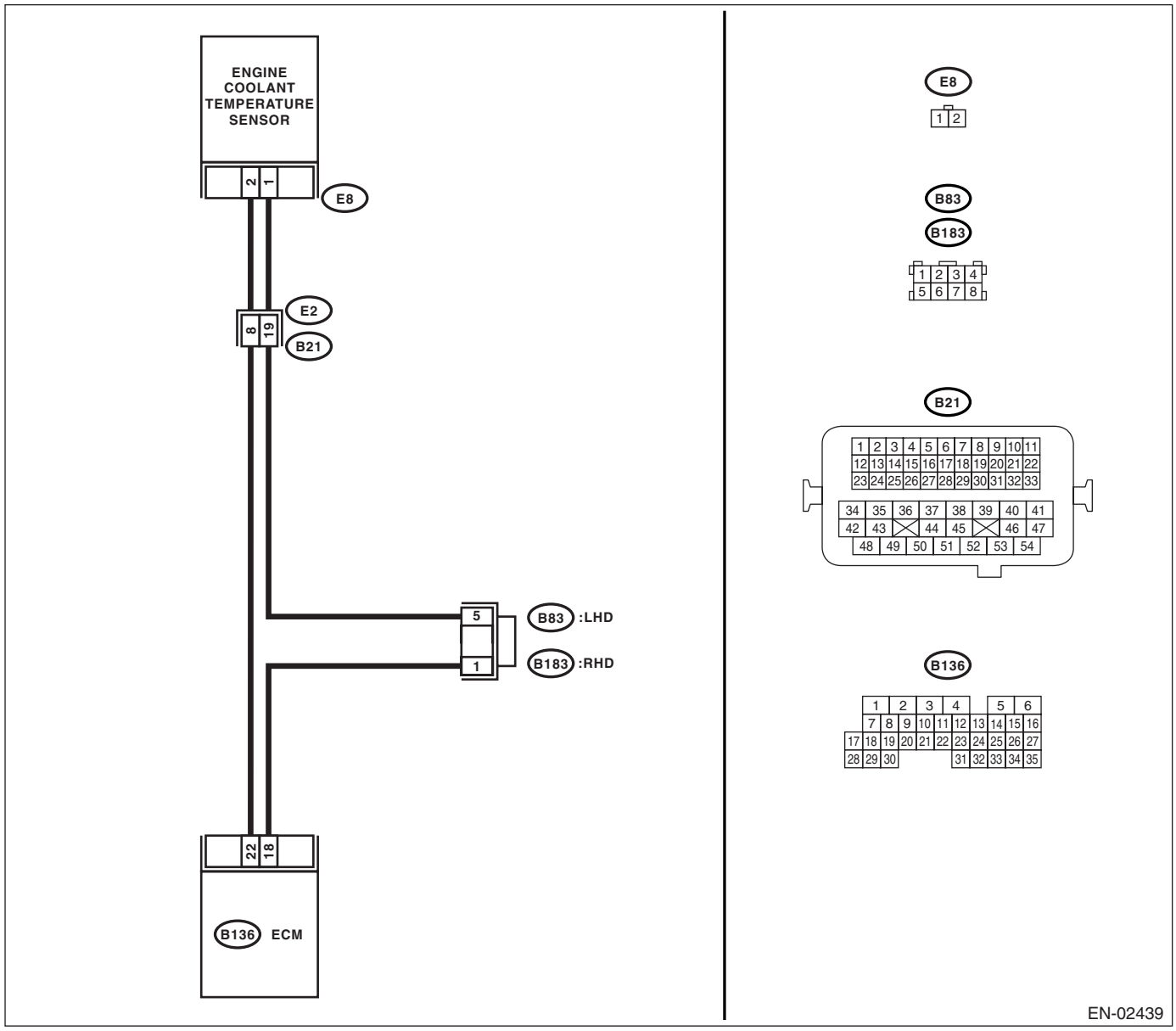
TROUBLE SYMPTOM:

Engine would not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H4SO 2.0)-18, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>

O: DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1)

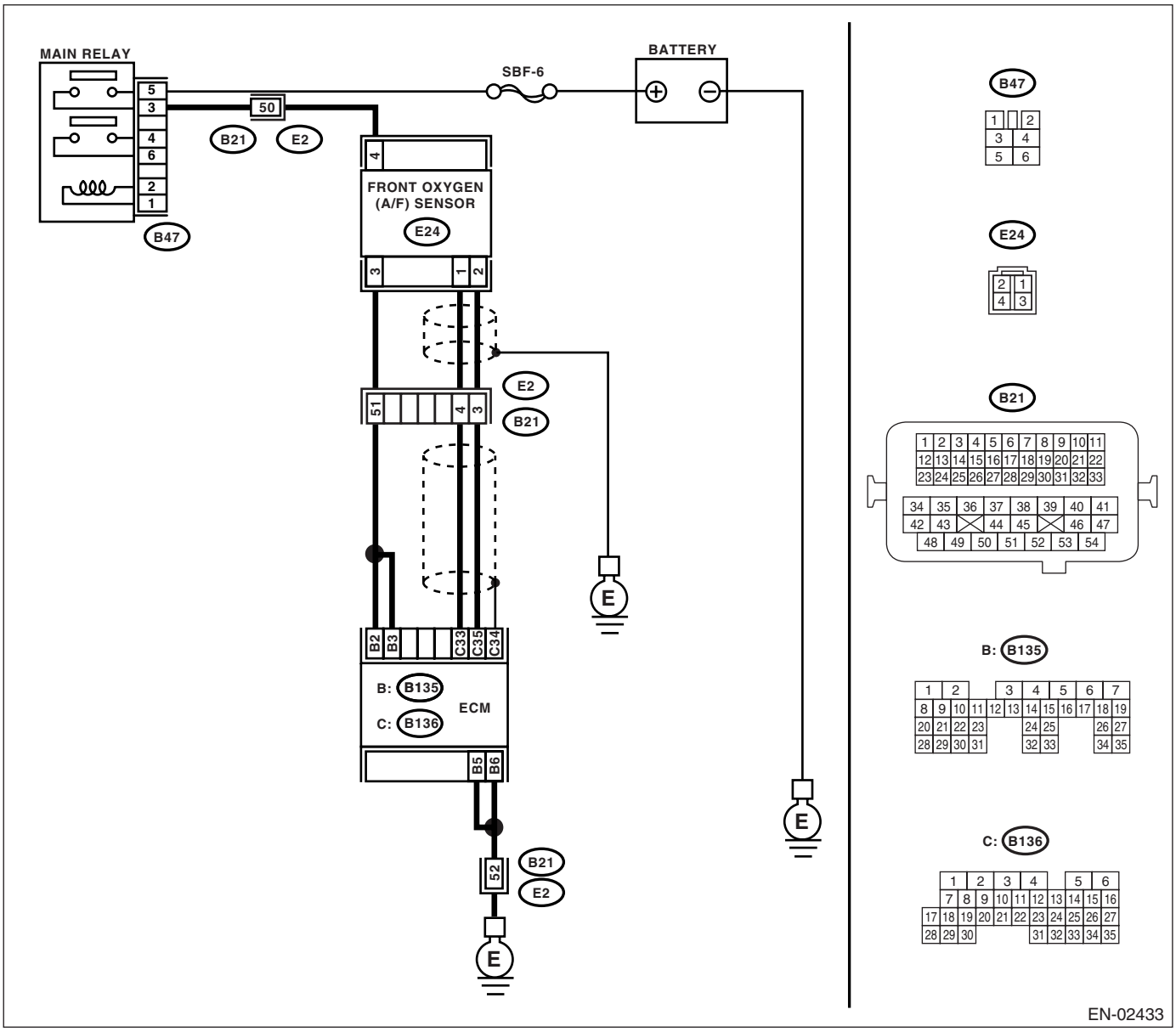
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to OBD-II General Scan Tool Instruction Manual.	Is the voltage 0.85 — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. 2) Read the data of front oxygen (A/F) sensor signal during racing using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between ECM and front oxygen (A/F) sensor.

Step		Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

P: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

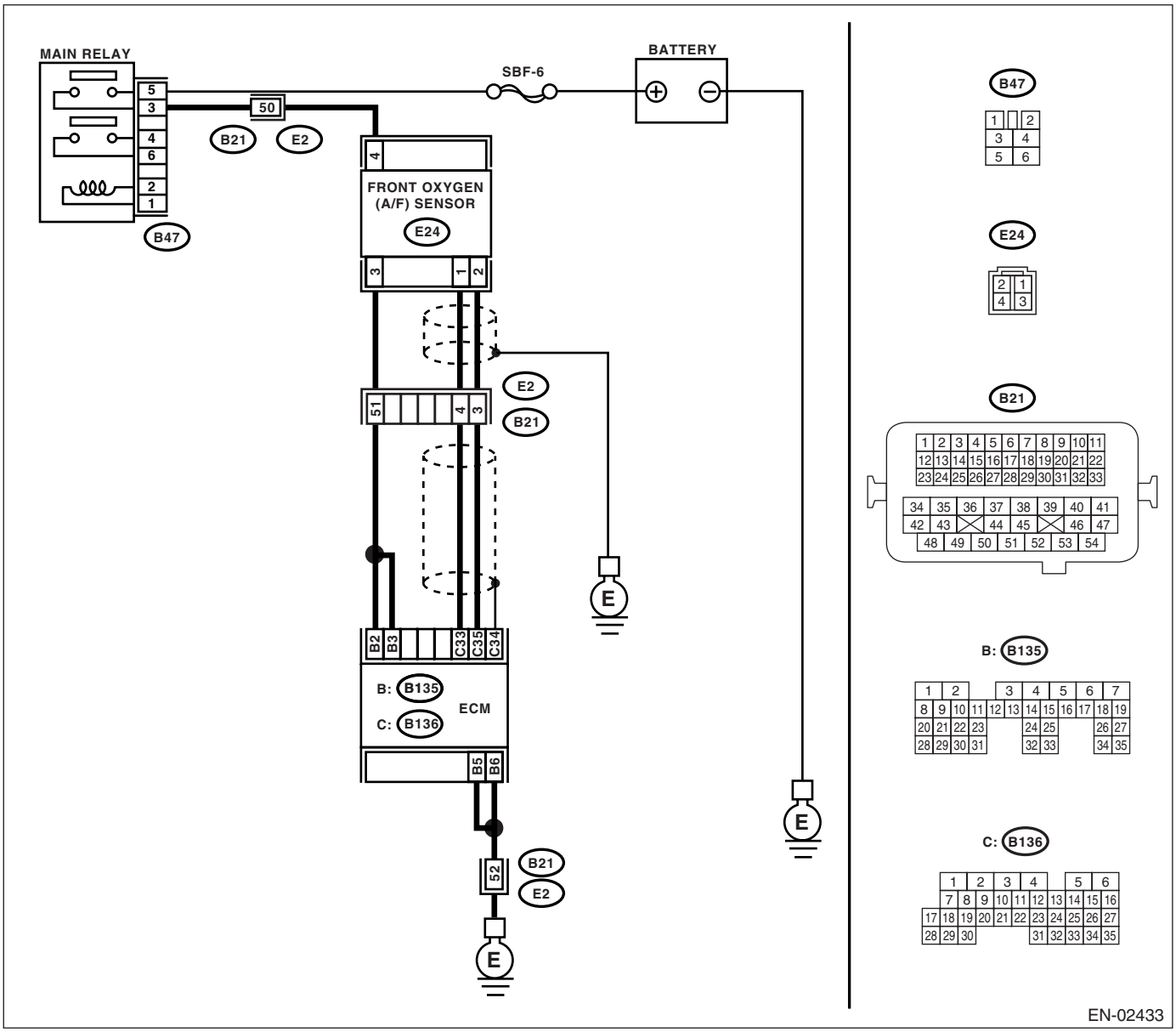
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

Q: DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

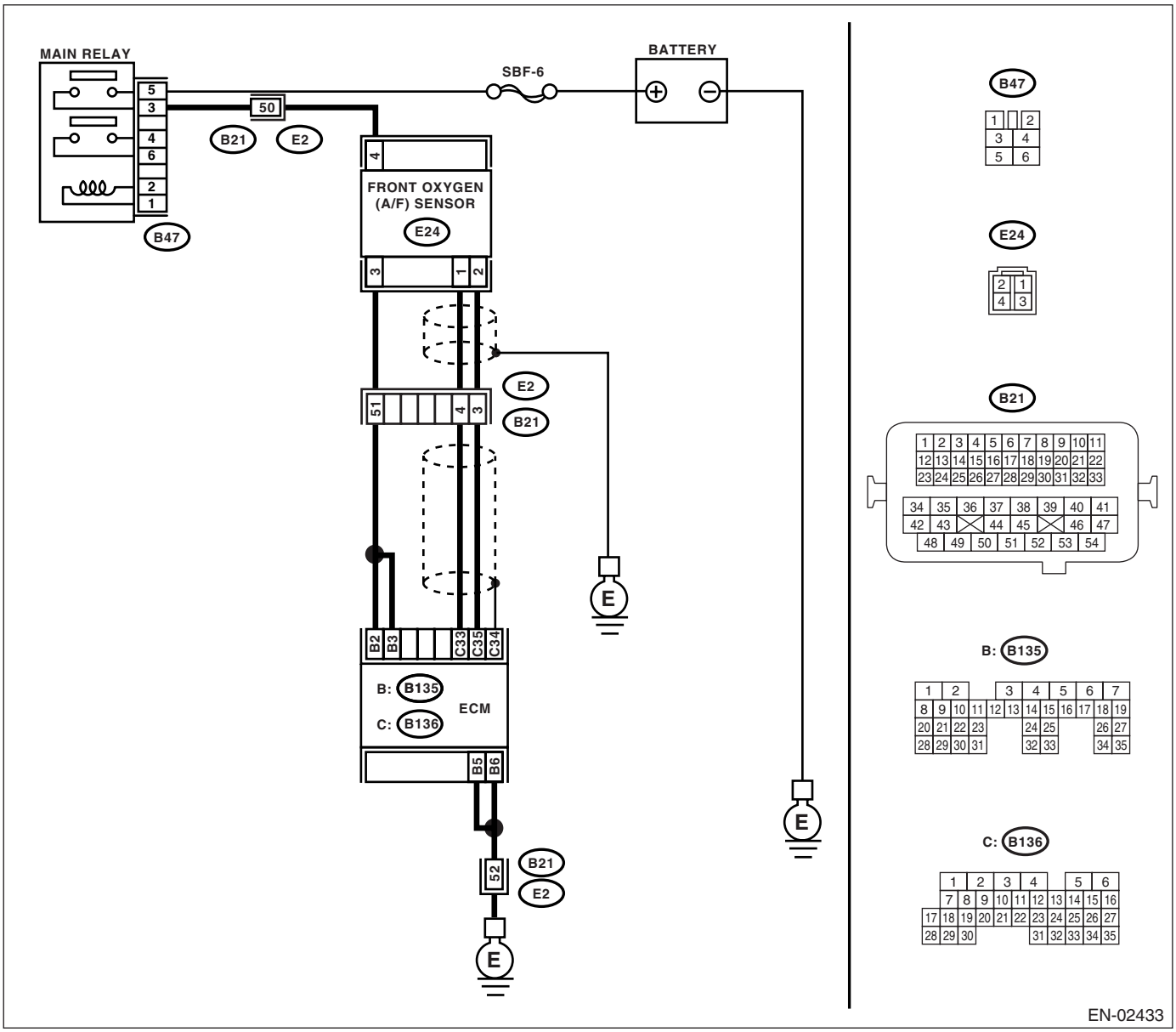
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 33 (+) — Chassis ground (−):*** ***(B136) No. 35 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

R: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

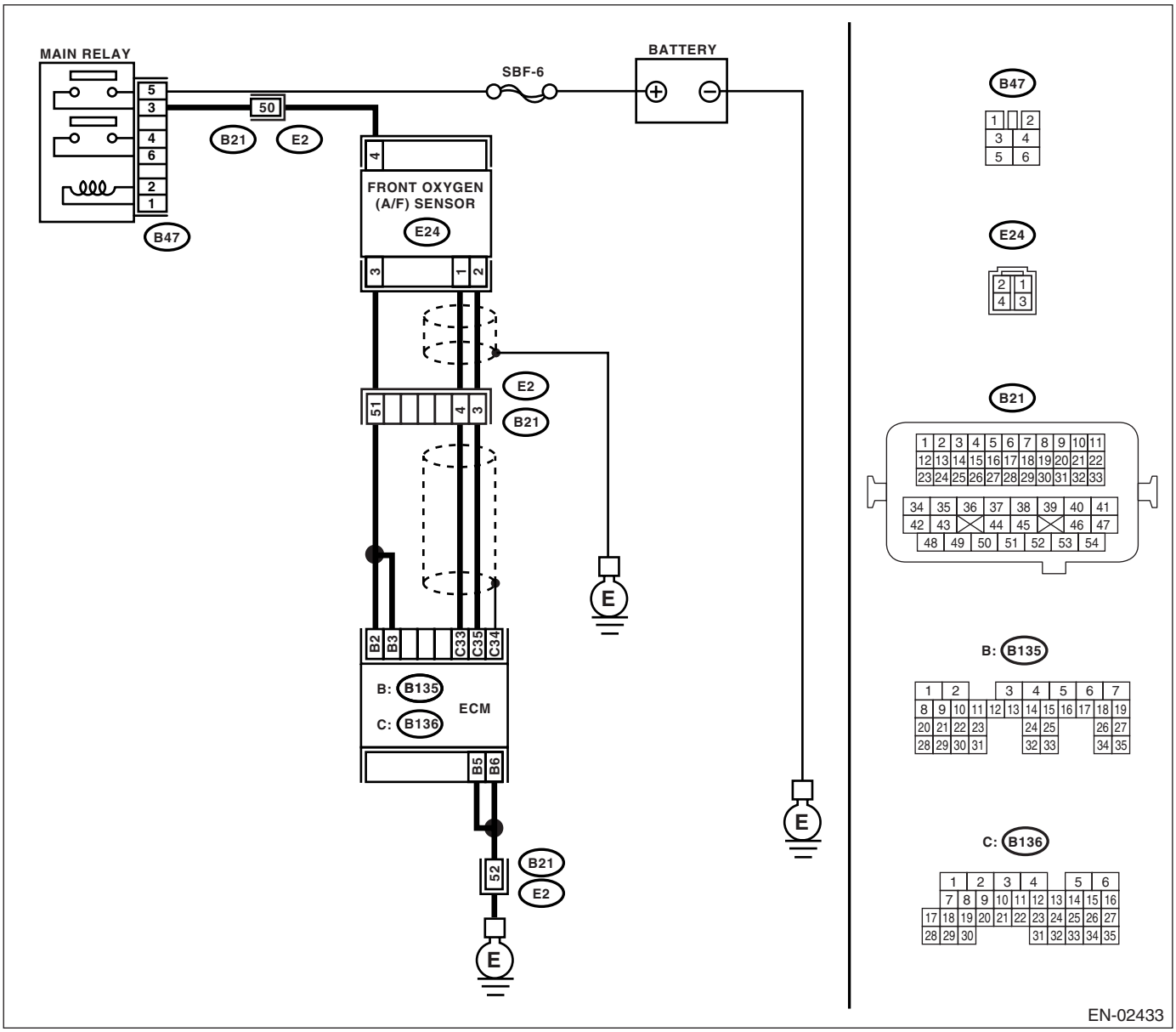
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



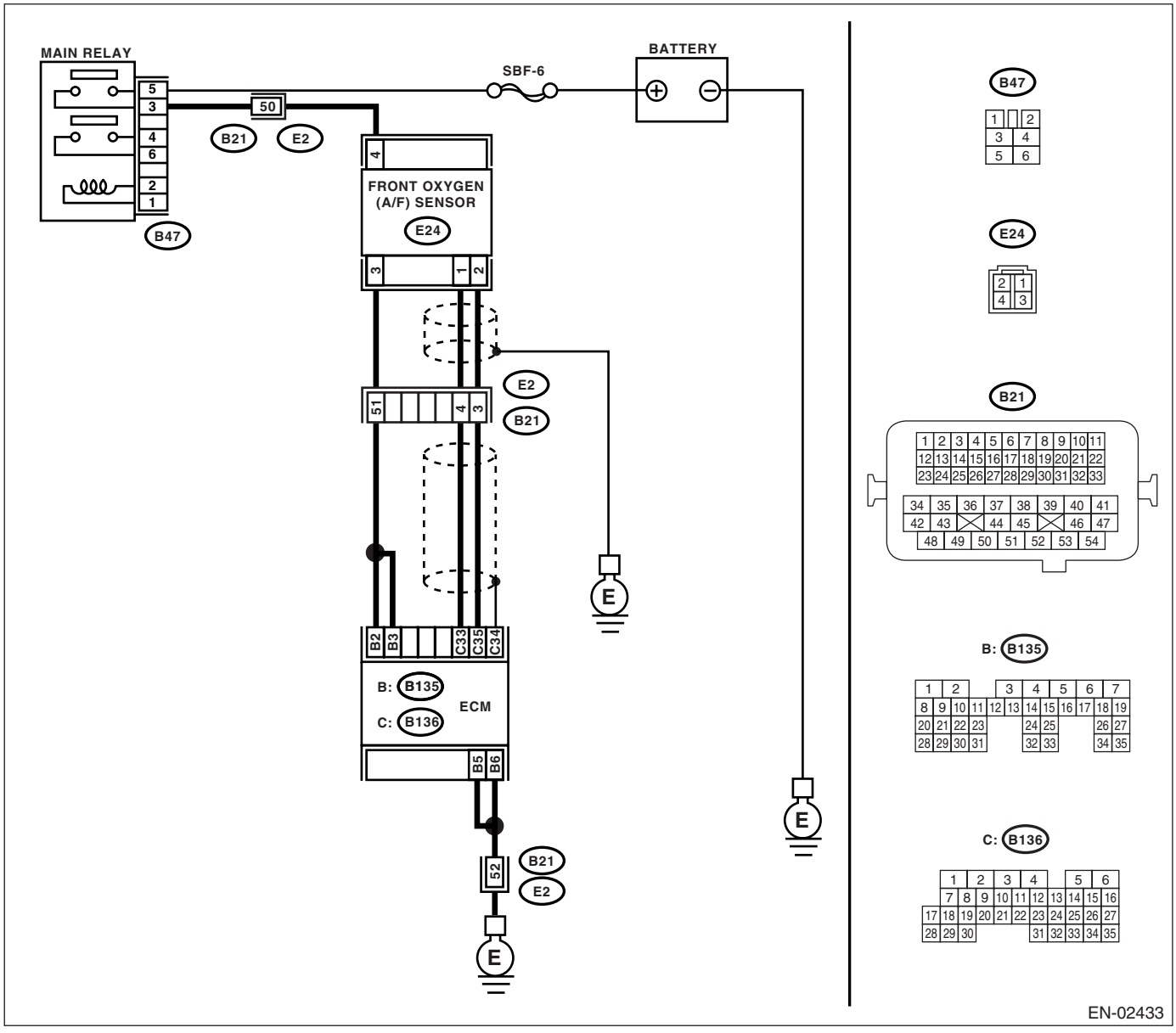
	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

S: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminals*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor.>

T: DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

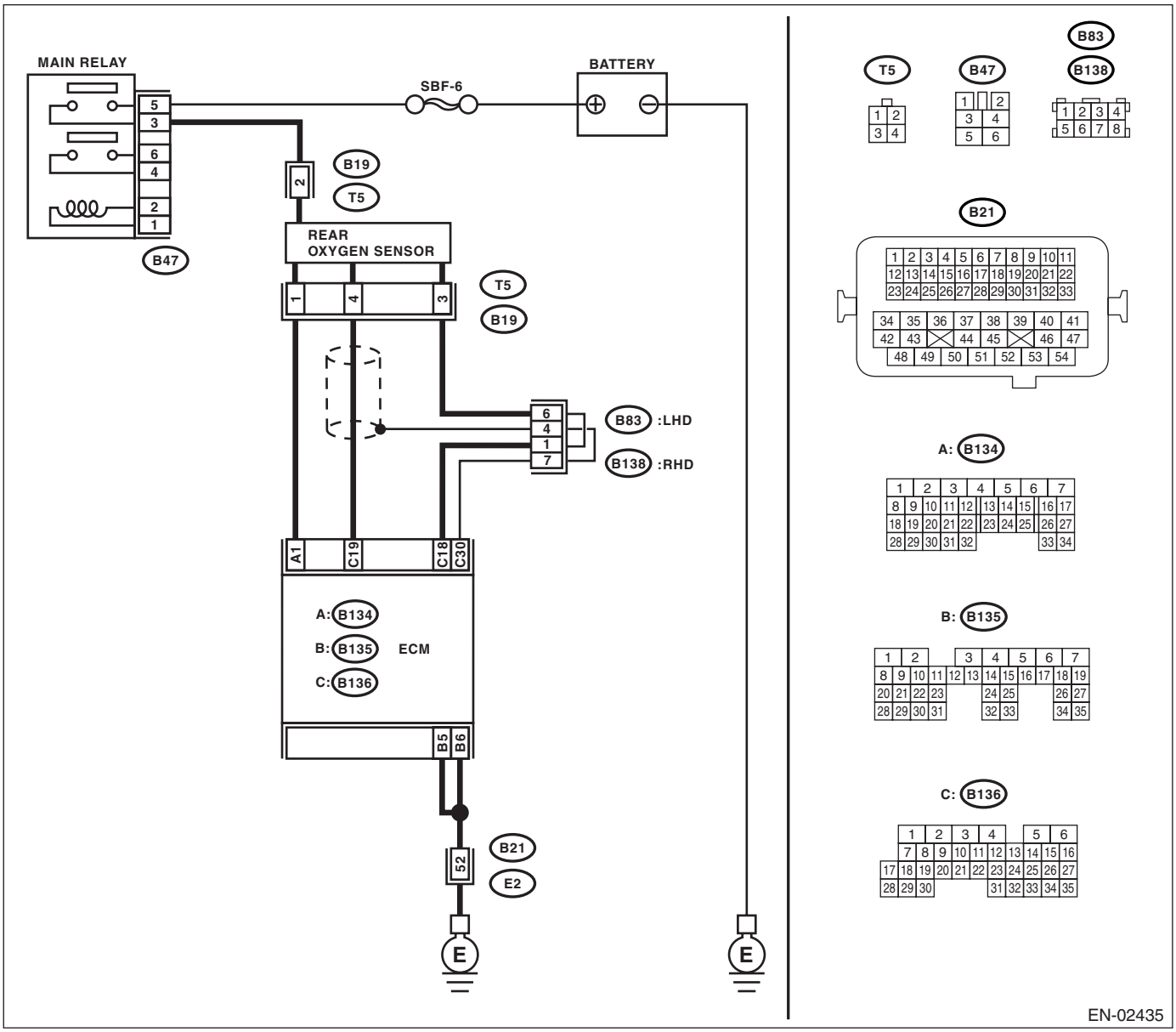
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 490 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminals*** ***(B136) No. 19 — (B19) No. 4:*** ***(B136) No. 18 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

Step		Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>

U: DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

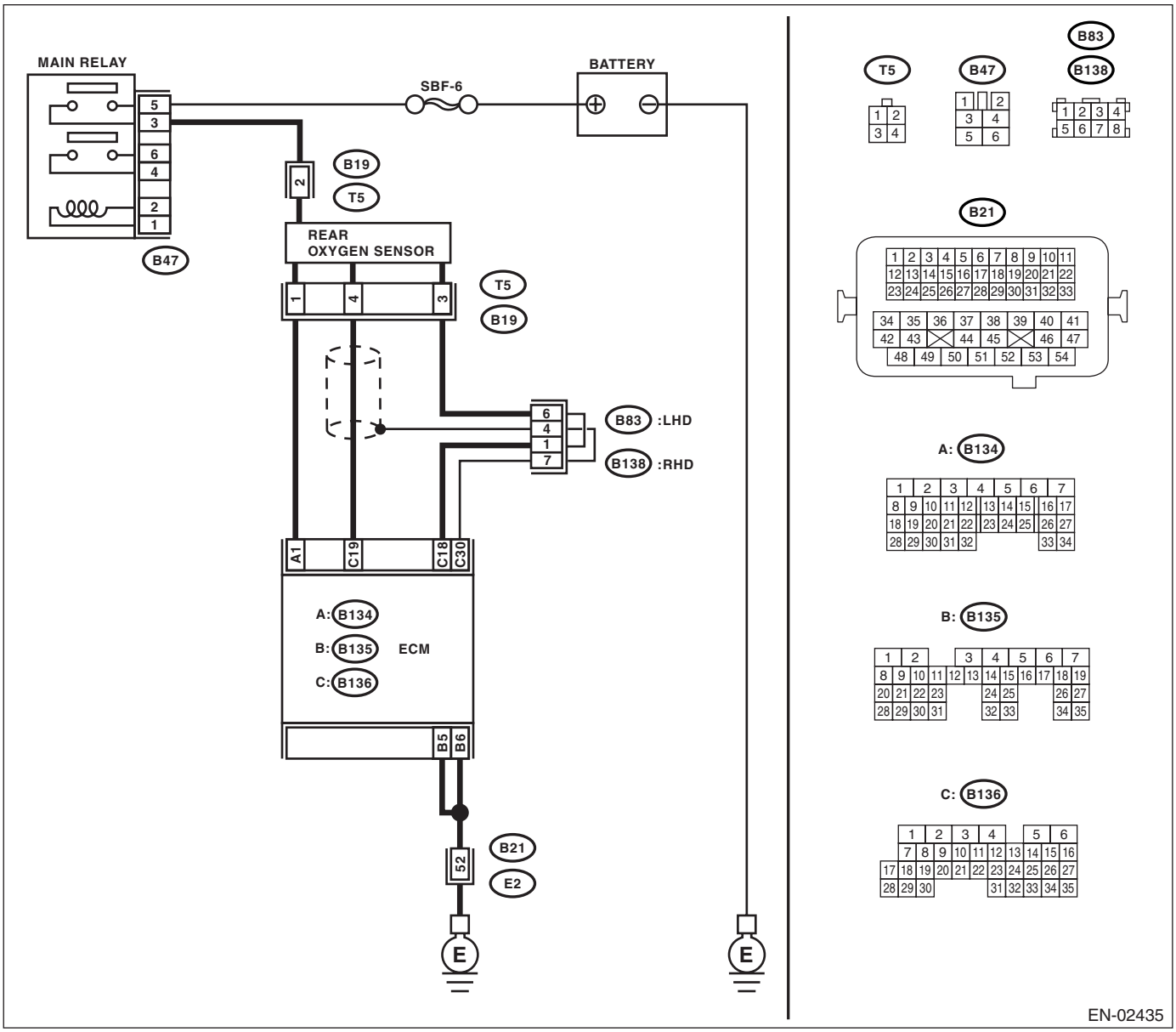
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 250 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminals*** ***(B136) No. 19 — (B19) No. 4:*** ***(B136) No. 18 — (B19) No. 3:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 4 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>

V: DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

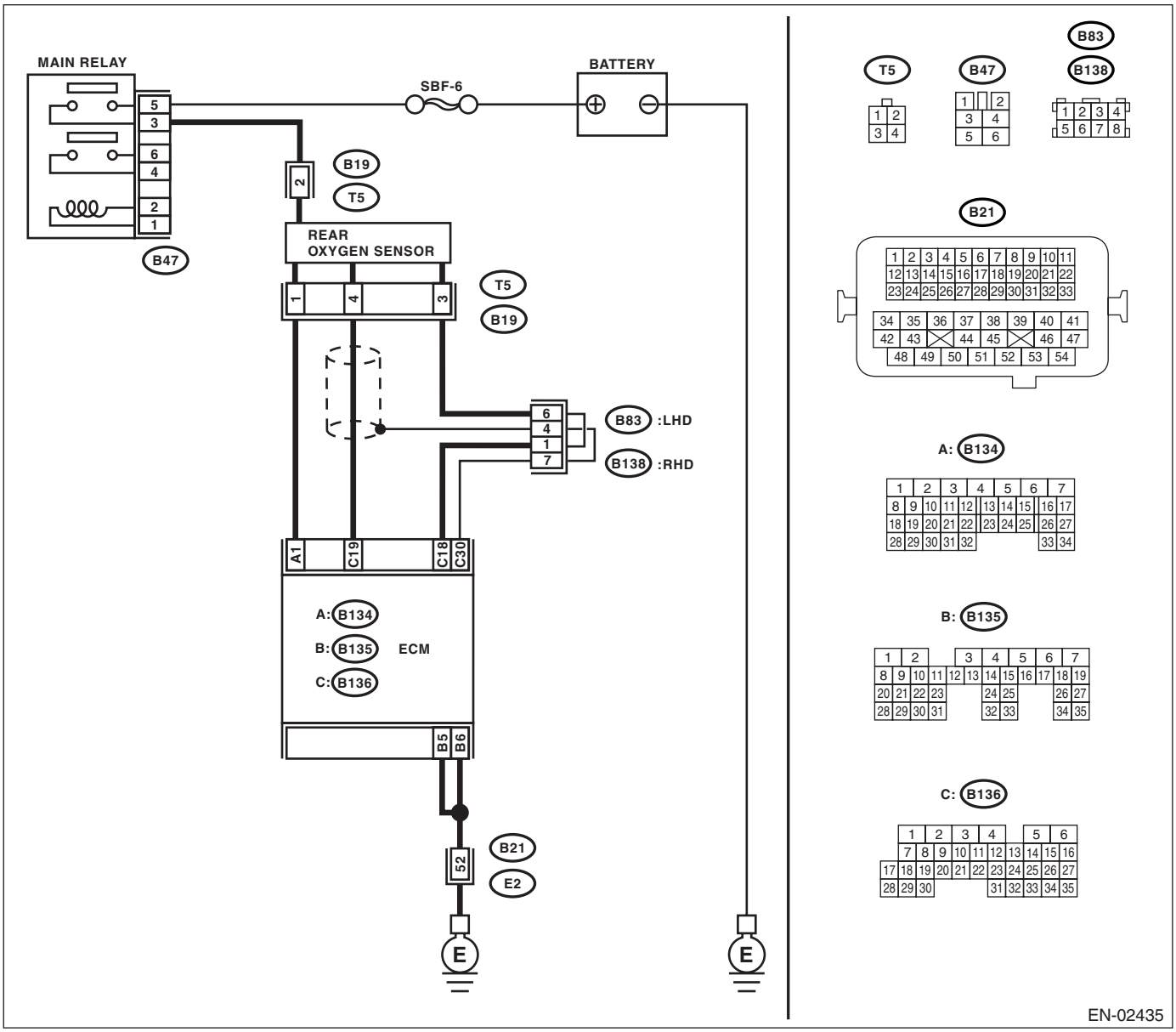
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.0)-33, Rear Oxygen Sensor.>

W: DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

X: DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair the exhaust system.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair the air intake system.	Go to step **3.**
3	**CHECK EGR VALVE.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **4.**
4	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **5.**
5	**CHECK PCV VALVE.**	Is the PCV valve stuck?	Replace the PCV valve.	Go to step **6.**
6	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge,.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)?	Go to step **7.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line

	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge,.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.	Is measured value 206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)?	Go to step **8.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the engine coolant temperature 70 — 100°C (158 — 212°F)?	Go to step **9.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.0)-20, Engine Coolant Temperature Sensor.>
9	**CHECK MANIFOLD PRESSURE SENSOR SIGNAL.** 1) Start and warm-up the engine until engine coolant temperature is above 60°C (140°F). 2) Place the select lever in "N" or "P" position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of manifold pressure sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the measurement value 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg) when idling and 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when the ignition turns to ON?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the manifold pressure sensor. <Ref. to FU(H4SO 2.0)-26, Manifold Absolute Pressure Sensor.>

Y: DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

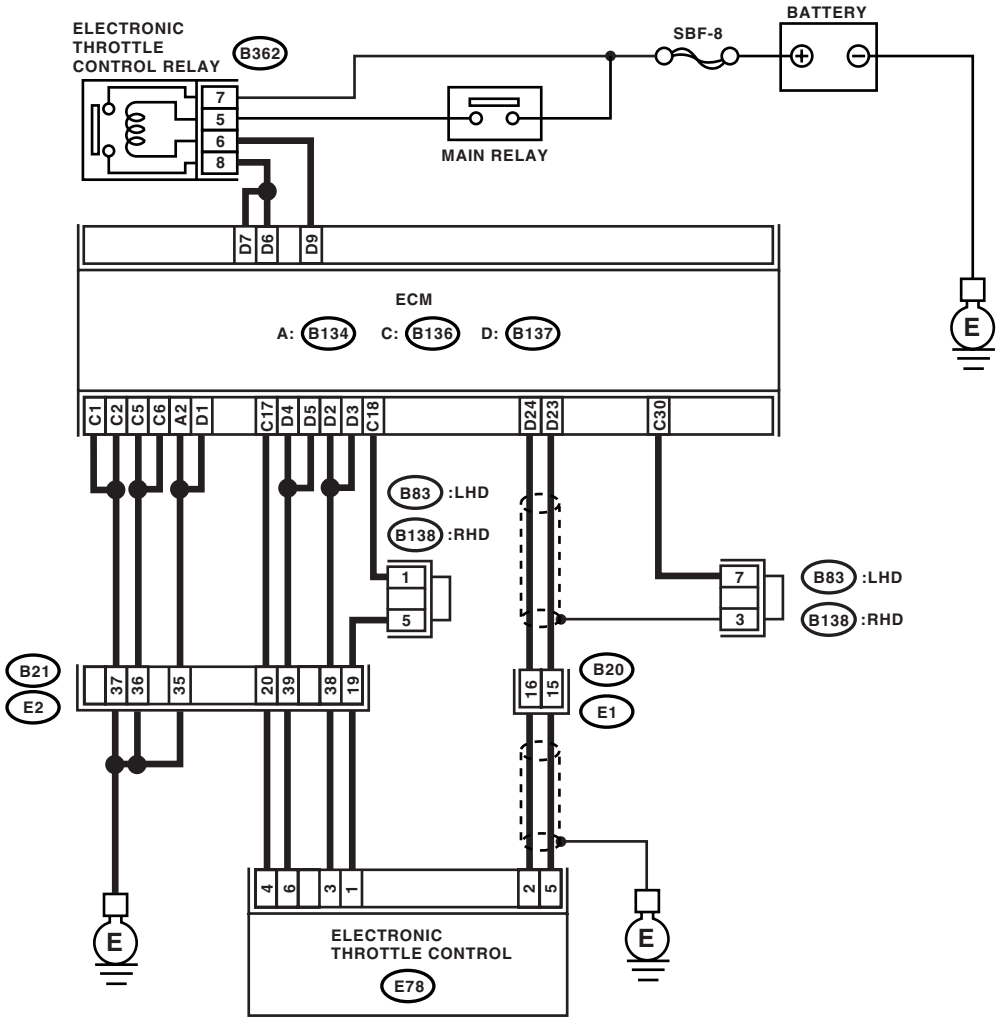
TROUBLE SYMPTOM:

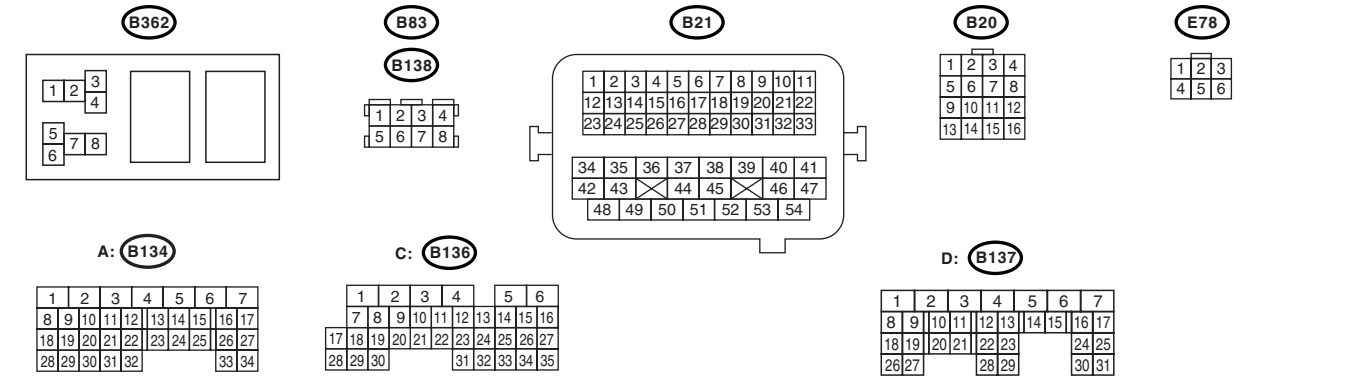
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B137) No. 24 — (E78) No. 2:*** ***(B136) No. 17 — (E78) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 24 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

Z: DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

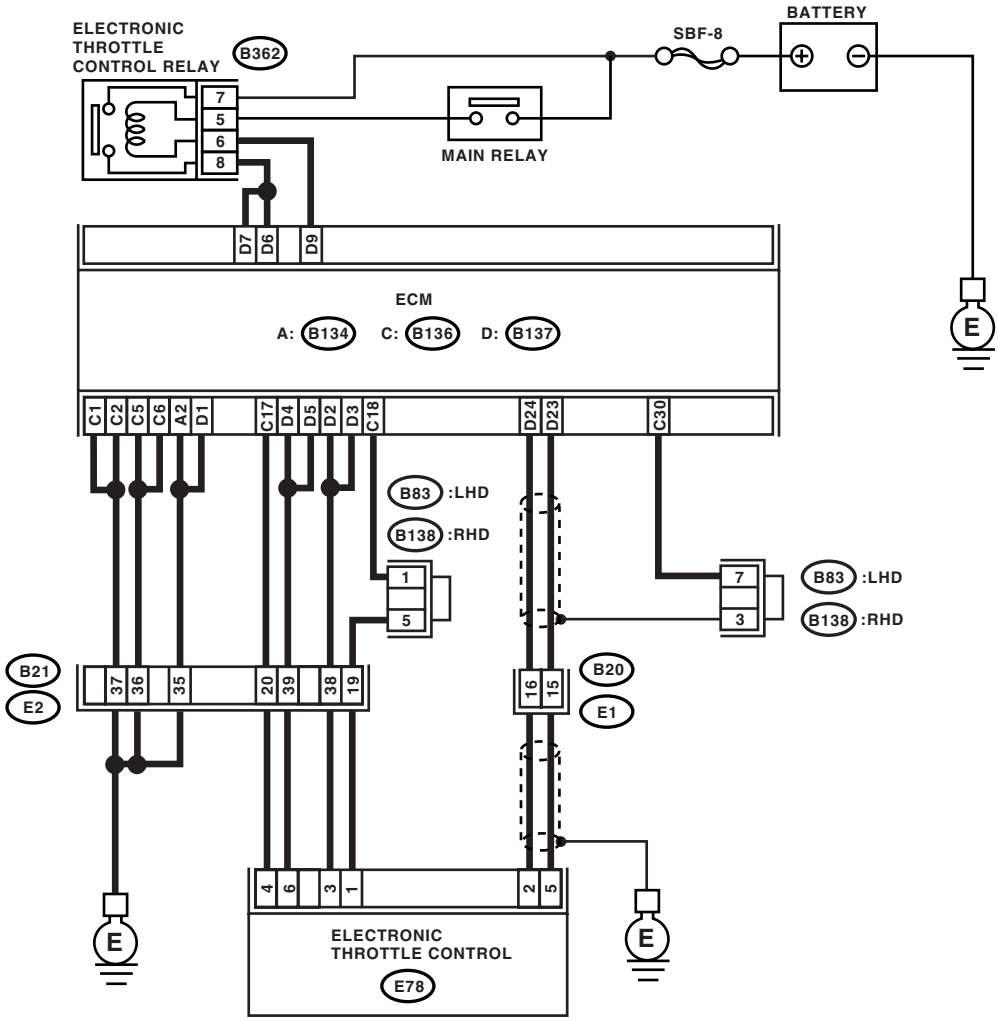
TROUBLE SYMPTOM:

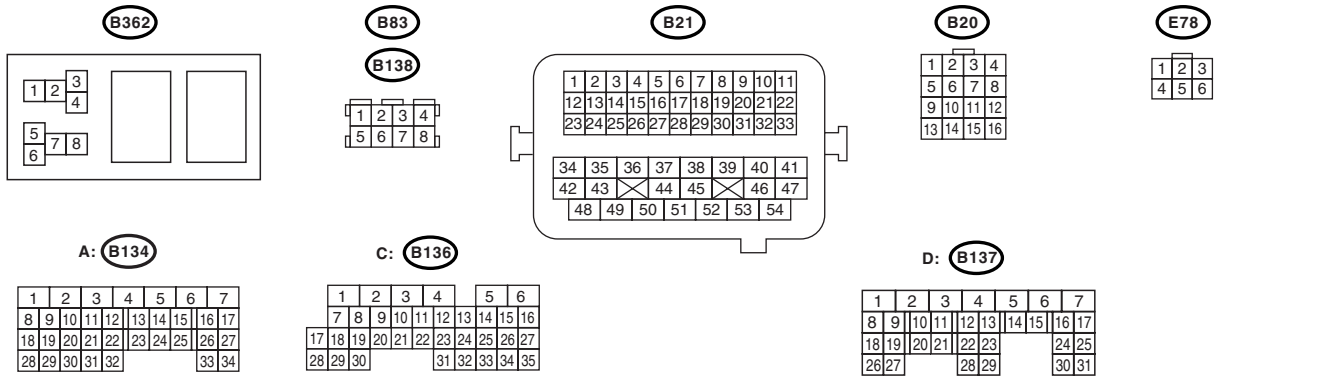
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B136) No. 18 — (E78) No. 1:*** ***(B137) No. 24 — (E78) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Replace the electronic throttle control.	Sensor power supply circuit may be shorted.

AA:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. **<Ref. to EN(H4SO 2.0)(diag)-135,** DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. **<Ref. to EN(H4SO 2.0)(diag)-135,** DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. **<Ref. to EN(H4SO 2.0)(diag)-135,** DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

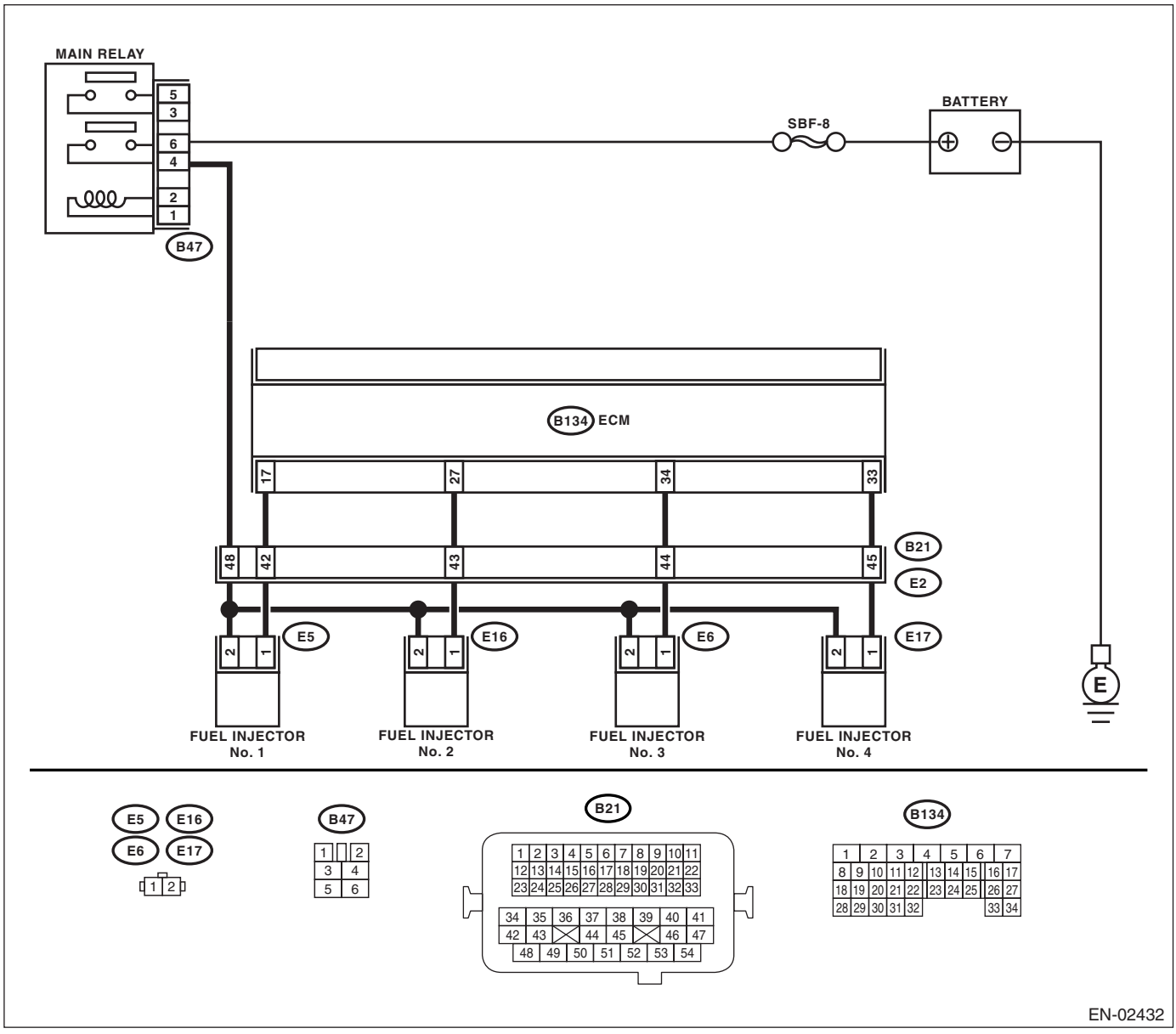
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0303 and P0304.	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 (+) — Chassis ground (–):*** ***#2 (B134) No. 27 (+) — Chassis ground (–):*** ***#3 (B134) No. 34 (+) — Chassis ground (–):*** ***#4 (B134) No. 33 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 — (E5) No. 1:*** ***#2 (B134) No. 27 — (E16) No. 1:*** ***#3 (B134) No. 34 — (E6) No. 1:*** ***#4 (B134) No. 33 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector. <Ref. to FU(H4SO 2.0)-29, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B134) No. 17 (+) — Chassis ground (–):*** ***#2 (B134) No. 27 (+) — Chassis ground (–):*** ***#3 (B134) No. 34 (+) — Chassis ground (–):*** ***#4 (B134) No. 33 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **8.**
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU(H4SO 2.0)-29, Fuel Injector.> and ECM <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **9.**
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step **10.**
10	**CHECK CRANKSHAFT SPROCKET.** Remove the timing belt cover.	Is the crankshaft sprocket rusted or does it have broken teeth?	Replace the crankshaft sprocket. <Ref. to ME(H4SO 2.0)-50, Crank Sprocket.>	Go to step **11.**
11	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft using ST, and align alignment mark on crankshaft sprocket with alignment mark on cylinder block. ST 499987500 CRANKSHAFT SOCKET	Is the timing belt dislocated from its proper position?	Repair the installation condition of timing belt. <Ref. to ME(H4SO 2.0)-43, Timing Belt.>	Go to step **12.**

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **13.**	Replenish fuel so fuel meter indication is higher than the “Lower” level. After replenishing fuel, Go to step **13.**
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-38, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire identified when the engine is running. Ex. Disconnection of spark plug cord.	Finish diagnostics operation, if the engine has no abnormality.	1. Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in ignitor connector • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector 2. If there is no poor contact, check the followings and contact with your Subaru distributor service. • Fuel condition • Whether addition agent is used or not • Plug condition • Plug cord condition • Engine oil condition

	Step	Check	Yes	No
15	**CHECK AIR INTAKE SYSTEM.**	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16.**
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) Read the DTC. • Subaru Select Monitor <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to OBD-II General Scan Tool Operation Manual. NOTE: Perform diagnosis according to the items listed below.	Does the Subaru Select Monitor or OBD-II general scan tool display only one DTC?	Go to step **21.**	Go to step **17.**
17	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0302?	Go to step **22.**	Go to step **18.**
18	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0303 and P0304?	Go to step **23.**	Go to step **19.**
19	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0301 and P0303?	Go to step **24.**	Go to step **20.**
20	**CHECK DIAGNOSTIC TROUBLE CODE (DTC) ON DISPLAY.** Is any other DTC displayed?	Does the Subaru Select Monitor or OBD-II general scan tool indicate DTC P0302 and P0304?	Go to step **25.**	Go to step **26.**
21	**ONLY ONE CYLINDER**	Is there any fault in that cylinder?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plug • Spark plug cord • Fuel injector • Compression ratio	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
22	GROUP OF #1 AND #2 CYLINDERS	Are there any faults in #1 and #2 cylinders?	Repair or replace faulty parts. NOTE: • Check the following items. • Spark plugs • Fuel injectors • Ignition coil • Compression ratio • If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H4SO 2.0)(diag)-58, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	GROUP OF #3 AND #4 CYLINDERS	Are there any faults in #3 and #4 cylinders?	Repair or replace faulty parts. NOTE: • Check the following items. • Spark plugs • Fuel injectors • Ignition coil • If no abnormal is discovered, check for “16. D: IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN(H4SO 2.0)(diag)-58, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
24	GROUP OF #1 AND #3 CYLINDERS	Are there any faults in #1 and #3 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
25	GROUP OF #2 AND #4 CYLINDERS	Are there any faults in #2 and #4 cylinders?	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Compression ratio • Skipping timing belt teeth	Go to DTC P0171. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	CYLINDER AT RANDOM	Is the engine idle rough?	Go to DTC P0170. <Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Repair or replace faulty parts. NOTE: Check the following items. • Spark plugs • Fuel injectors • Compression ratio

AE:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

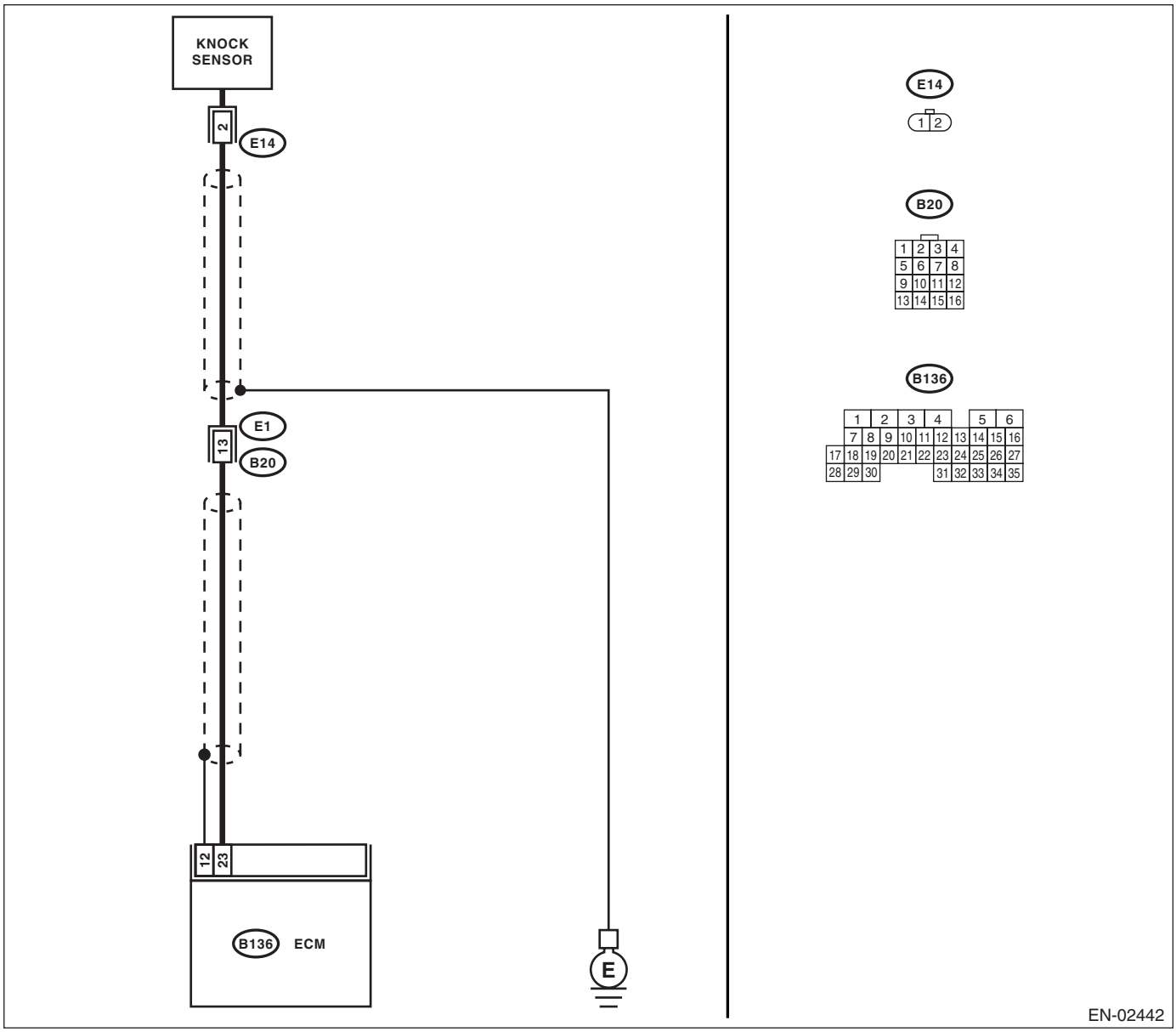
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Poor contact in knock sensor connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4SO 2.0)-23, Knock Sensor.>	Tighten the knock sensor installation bolt securely.

AF:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

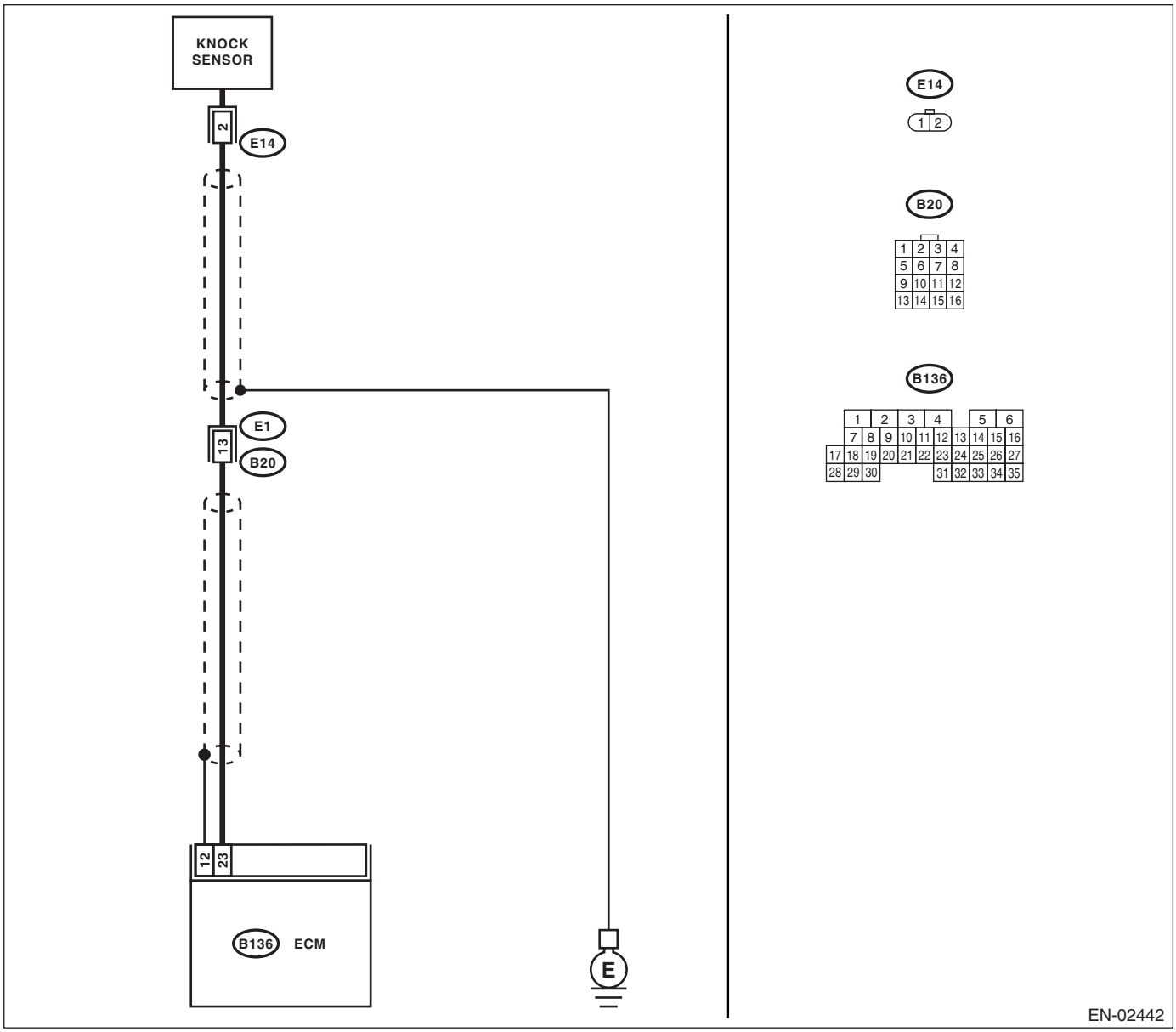
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4SO 2.0)-23, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit in harness covered with shield.
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AG:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

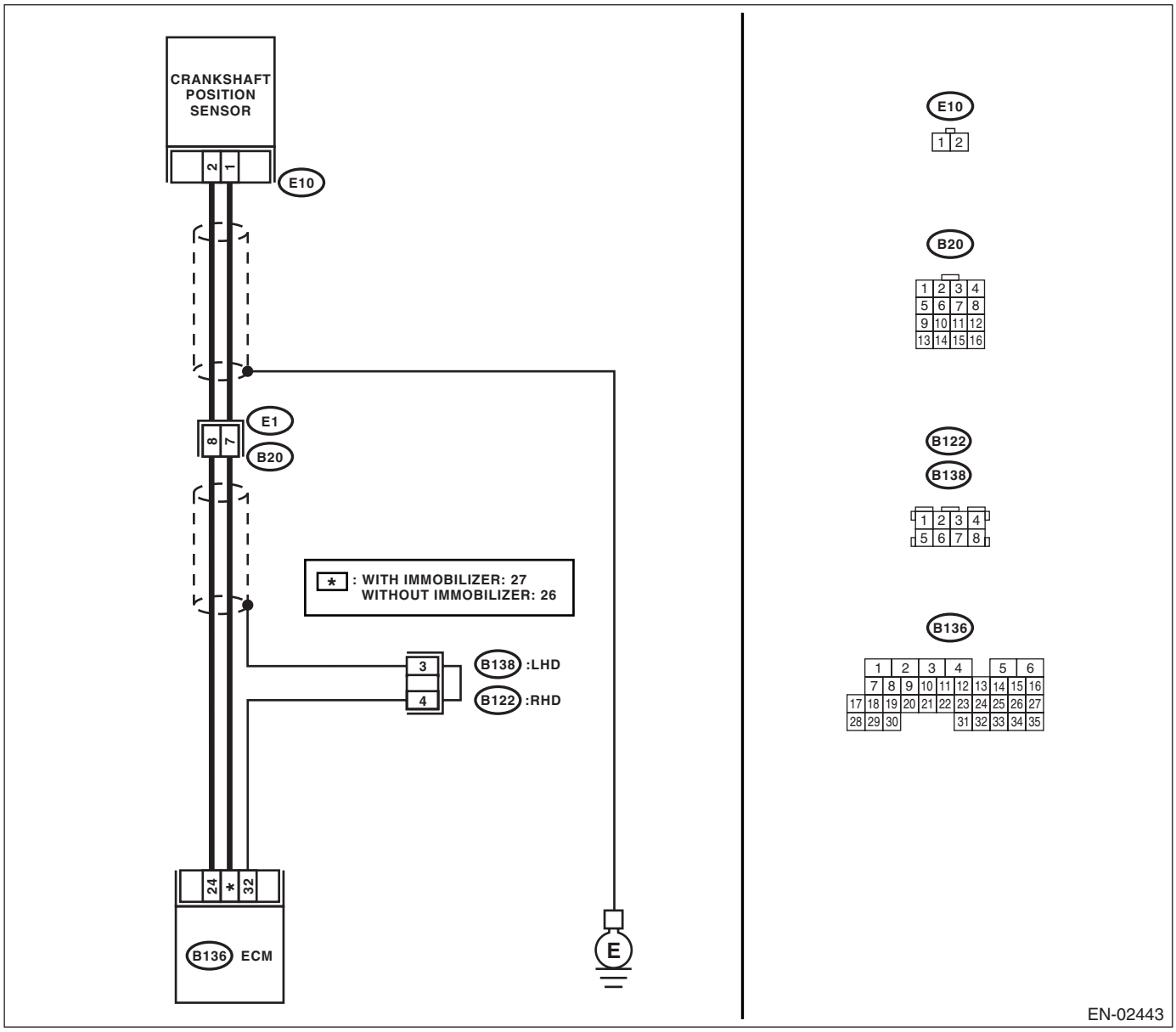
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4SO 2.0)-21, Crankshaft Position Sensor.>

AH:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

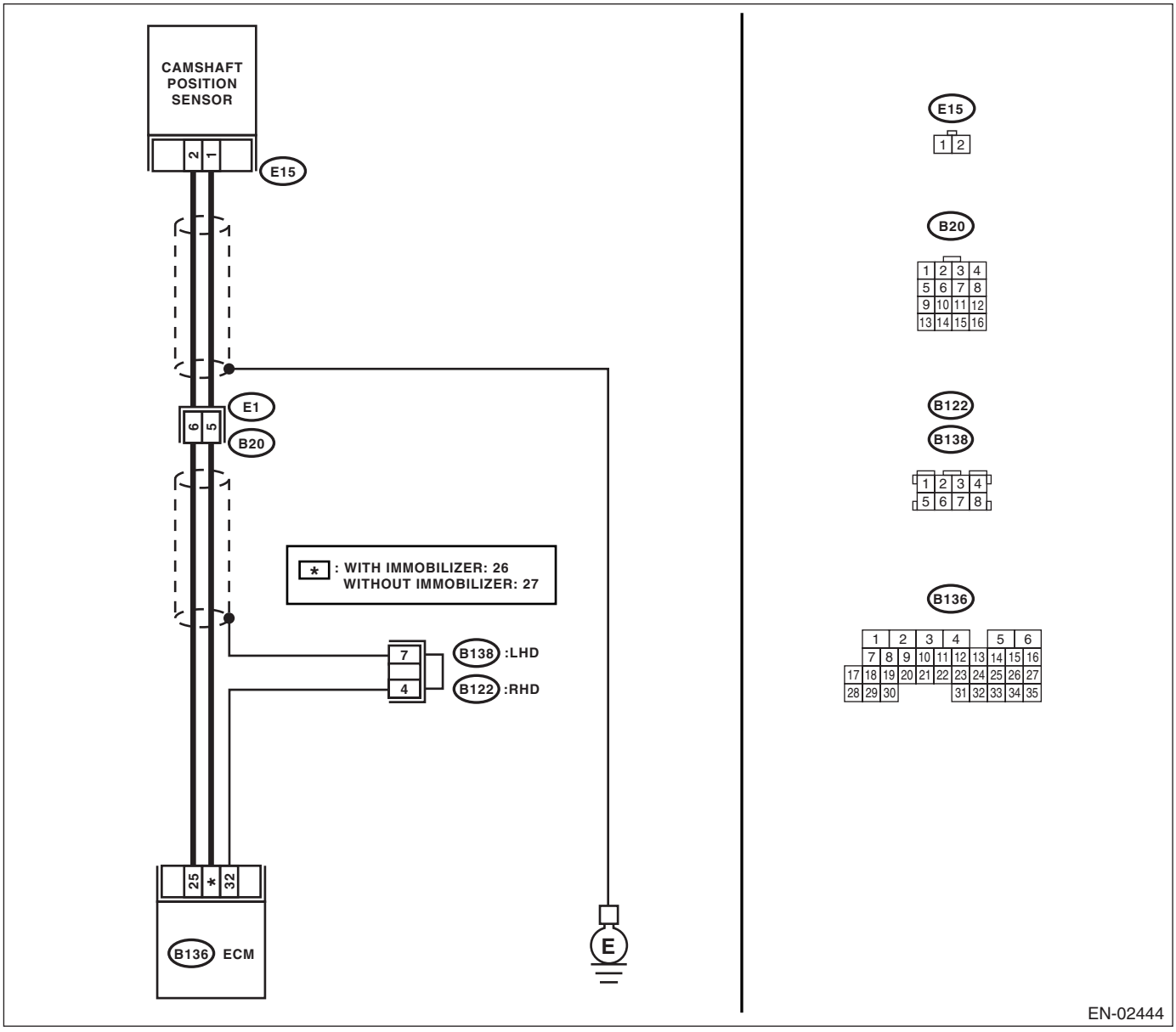
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the camshaft position sensor installation bolt securely.
5	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4SO 2.0)-22, Camshaft Position Sensor.>

AI: DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

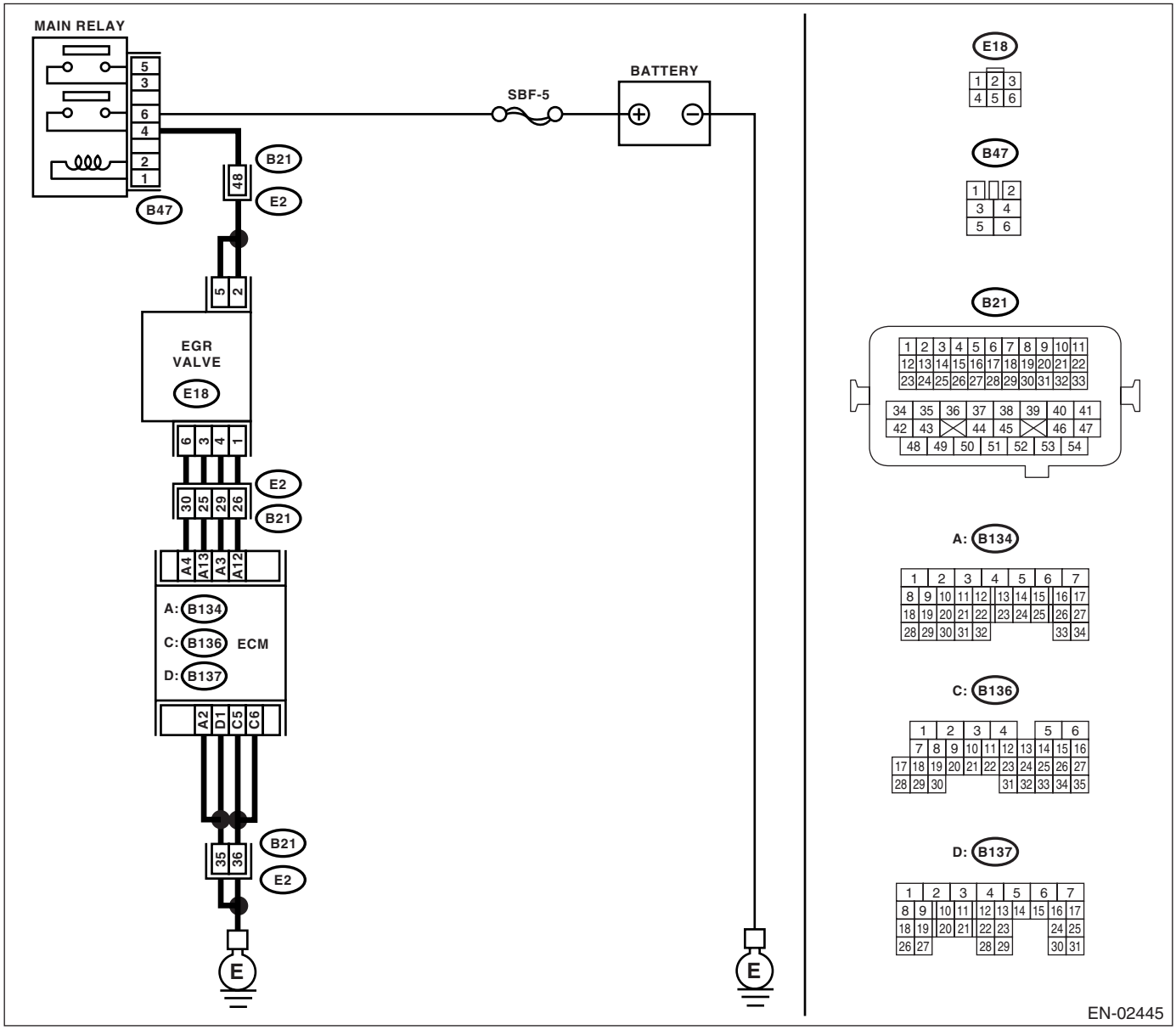
TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed.
- Erroneous idling
- Movement performance problem

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.>	Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Make sure that the EGR valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step **3.**
3	**CHECK THE POWER SUPPLY OF EGR SOLENOID VALVE.** 1) Detach the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there is no foreign material between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	Is the resistance 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.0)-28, EGR Valve.>
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 4 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):*** ***(B134) No. 12 (+) — Chassis ground (−):*** ***(B134) No. 13 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact portion in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Detach the connector from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 4 — (E18) No. 6:*** ***(B134) No. 12 — (E18) No. 1:*** ***(B134) No. 3 — (E18) No. 4:*** ***(B134) No. 13 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 3 — Chassis ground:*** ***(B134) No. 12 — Chassis ground:*** ***(B134) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check poor contact for ECM and EGR solenoid valve connector.	Is there poor contact for ECM and EGR solenoid valve connector?	Repair the poor contact of ECM and EGR solenoid valve connector.	Even if the malfunction indicator light illuminates, the circuit has returned to the specified condition at this time.

AJ:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

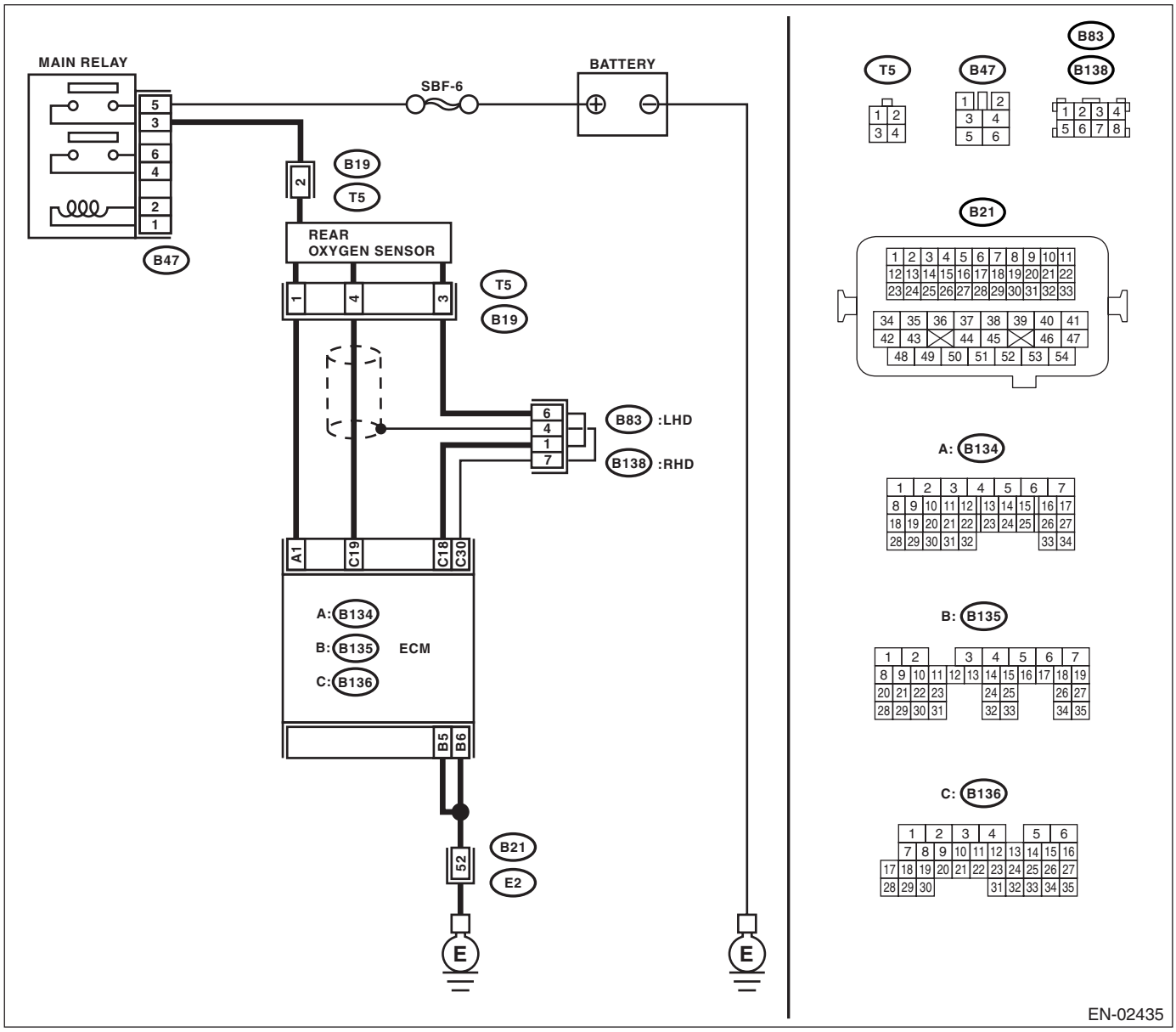
TROUBLE SYMPTOM:

- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there any fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4SO 2.0)-2, General Description.>	Go to step **3.**
3	**CHECK CATALYTIC CONVERTER.**	Is there damage at rear face or front face of front catalyst?	Replace the catalytic converter. <Ref. to EC(H4SO 2.0)-3, Front Catalytic Converter.>	Go to step **5.**
4	**CHECK REAR OXYGEN SENSOR GROUND HARNESS.** 1) Disconnect the rear oxygen sensor and ECM connectors. 2) Measure the resistance between rear oxygen sensor connector and ECM connector. ***Connector & terminals*** ***(B19) No. 3 — (B136) No. 18:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and rear oxygen sensor.
5	**CHECK SHIELD HARNESS.**	Is the shield harness opened?	Repair the shield harness.	Contact with your Subaru distributor service.

AK:DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

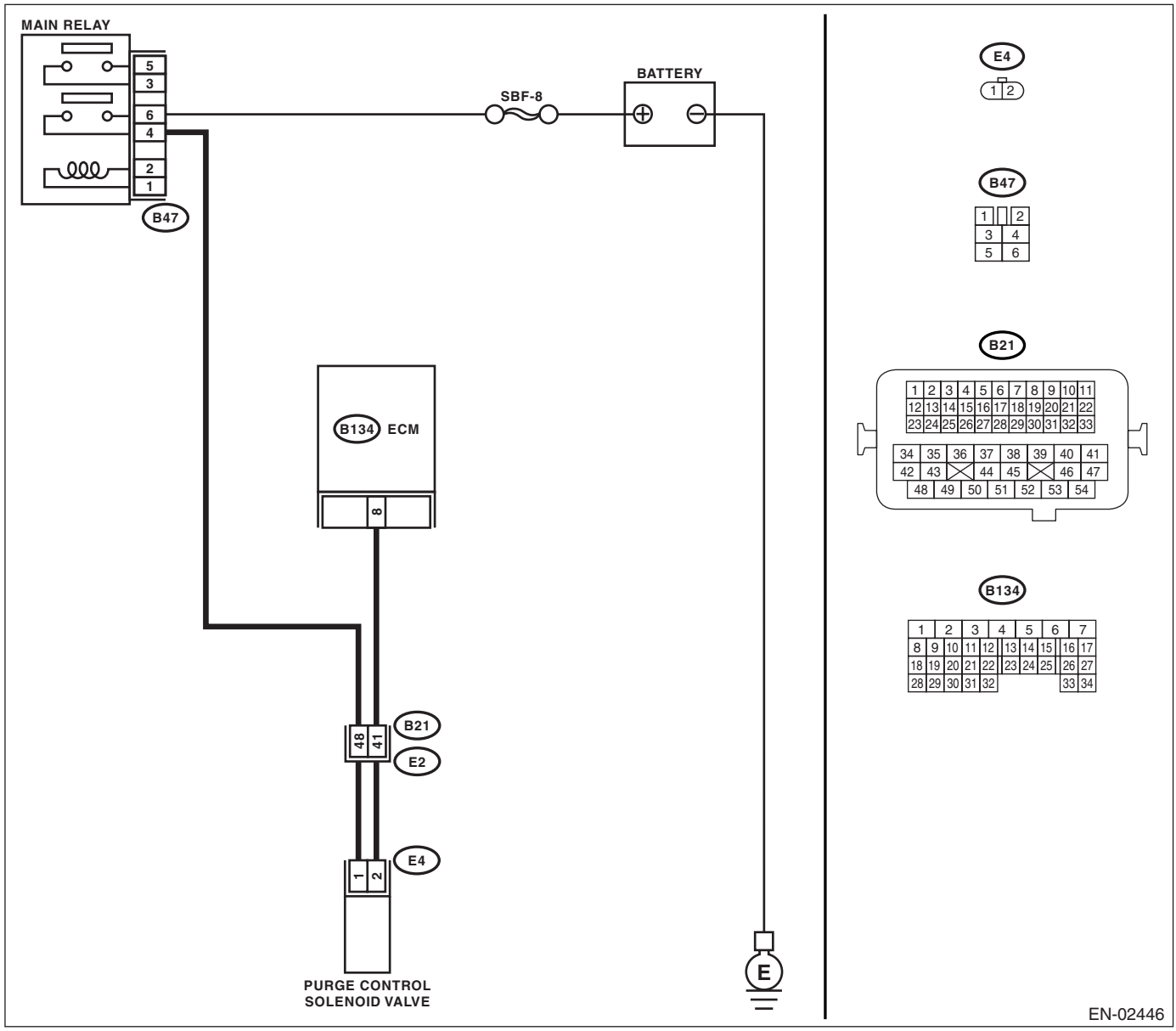
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B134) No. 8 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

AL:DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

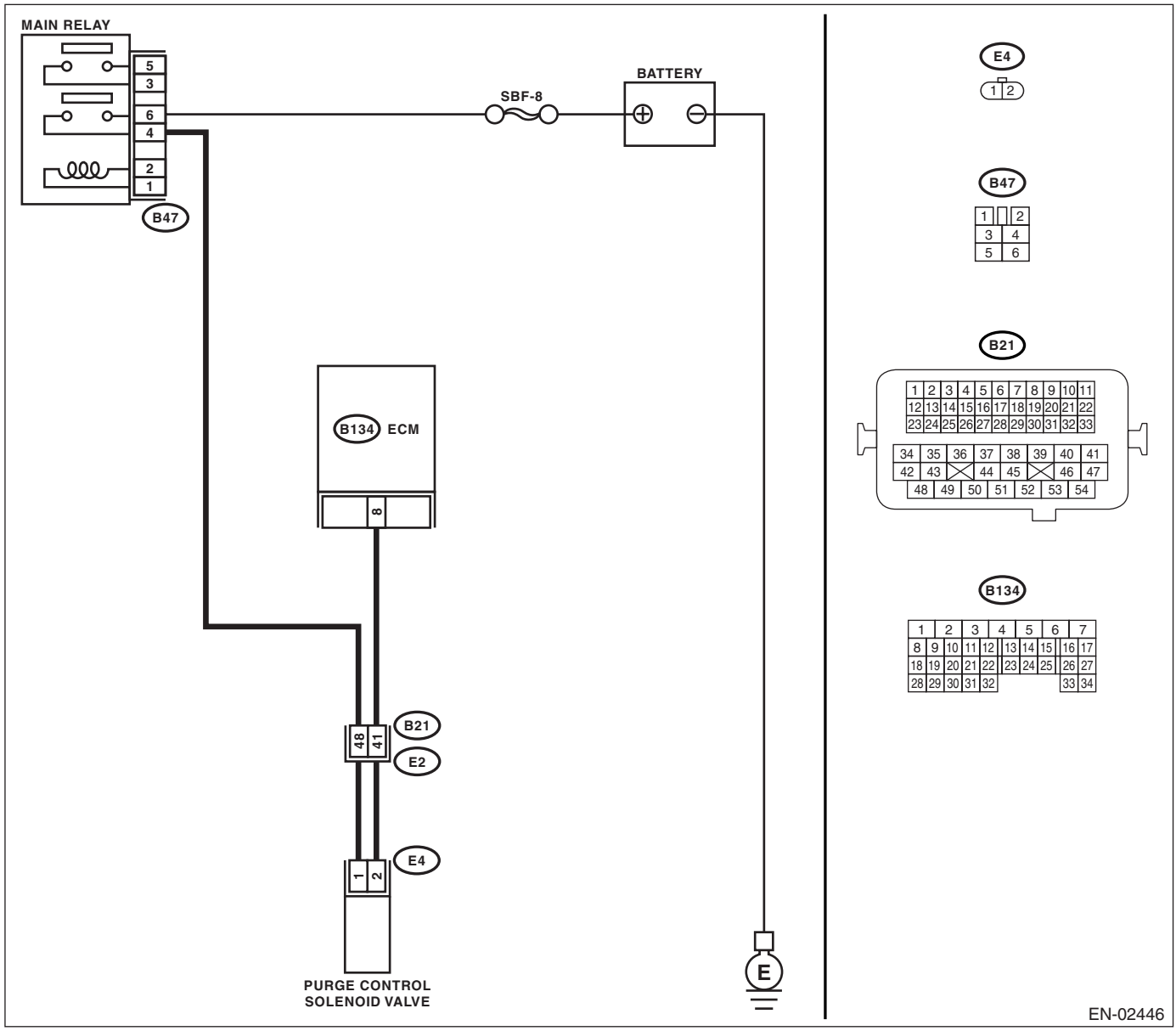
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.0)(diag)-39, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.> and ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

AM:DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does DTC P0462 appear on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AN:DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does DTC P0463 appear on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AO:DTC P0500 VEHICLE SPEED SENSOR

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to DTC. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

AP:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

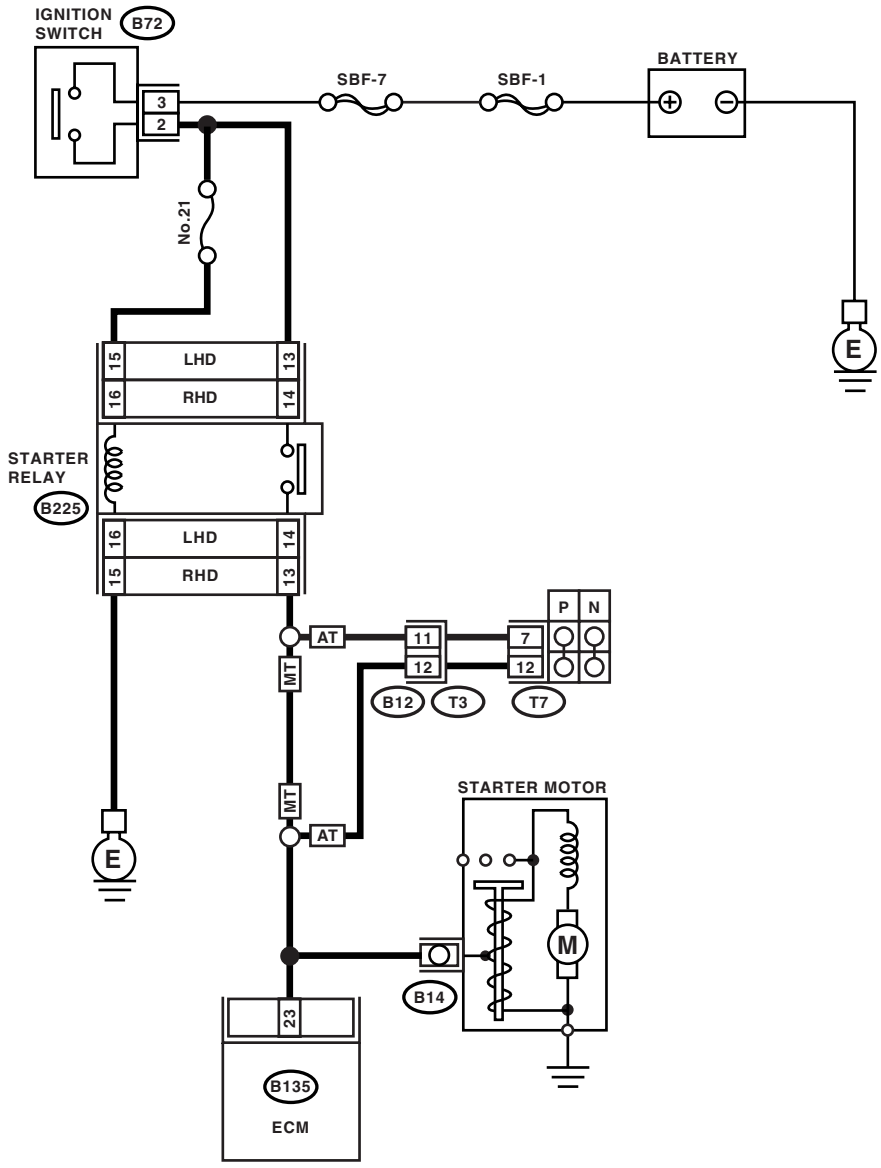
TROUBLE SYMPTOM:

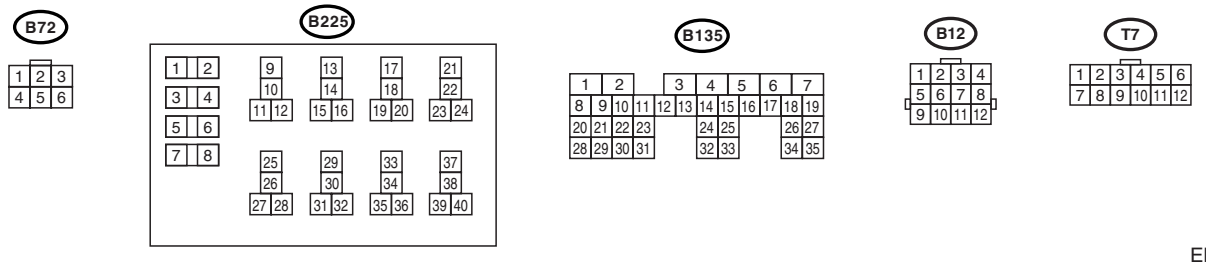
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02428

	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to ON. NOTE: Place the inhibitor switch in each position.	Does the starter motor operate?	Repair the battery short circuit in starter motor circuit.	Check starter motor circuit. <Ref. to EN(H4SO 2.0)(diag)-52, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

AQ:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

Engine keeps running at higher revolution than specified idling revolution.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items: • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3.**
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Replace the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

AR:DTC P0558 GENERATOR CIRCUIT LOW INPUT

CAUTION:

For diagnostic procedure, refer to DTC P0559. <Ref. to EN(H4SO 2.0)(diag)-164, DTC P0559 GENERATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>.

AS:DTC P0559 GENERATOR CIRCUIT HIGH

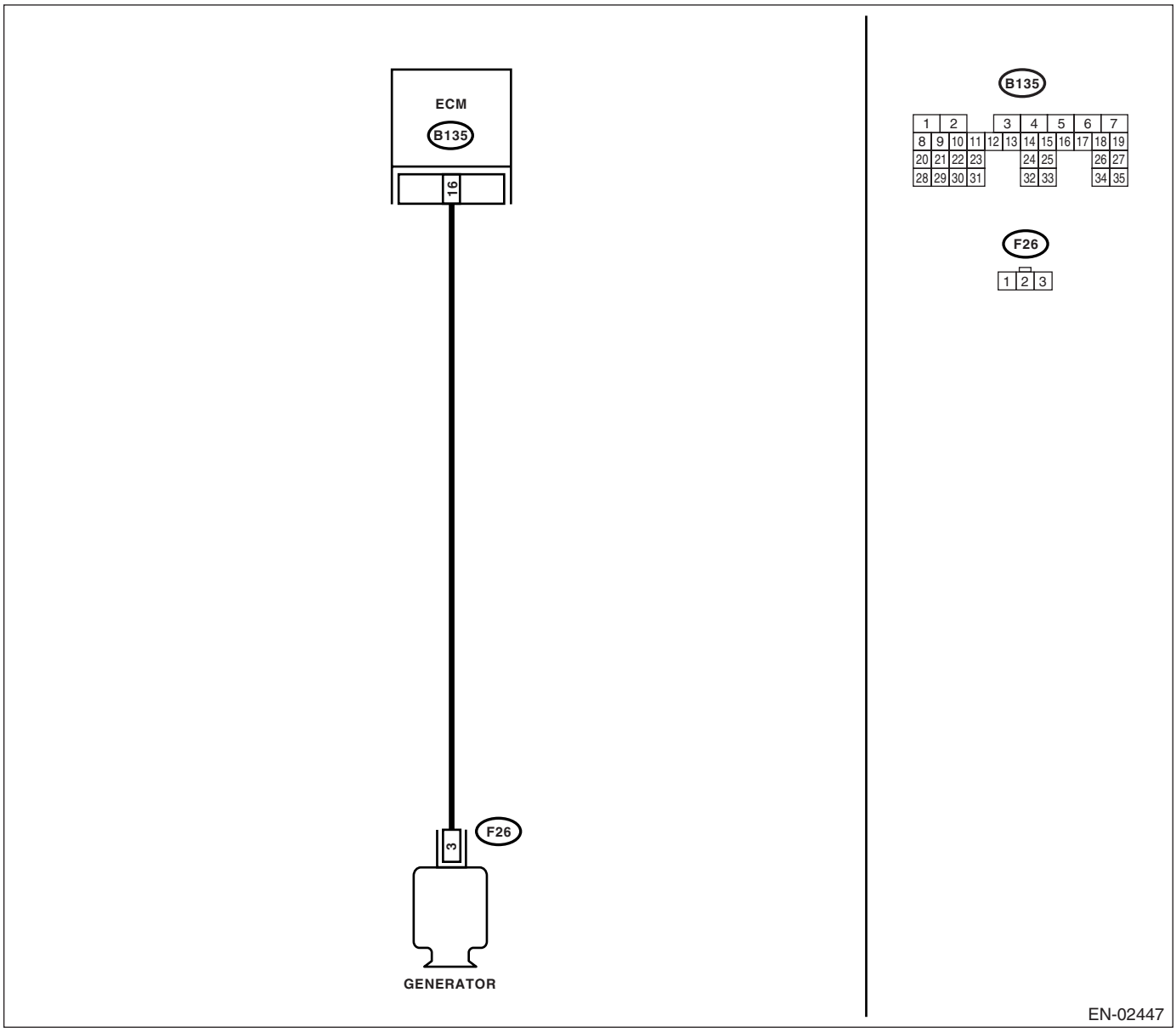
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator of harness connector. ***Connector & terminal*** ***(B136) No. 16 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair the poor contact in connector.	Repair the open circuit in harness between ECM and generator connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and generator connector • Poor contact in coupling connector

AT:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AU:DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

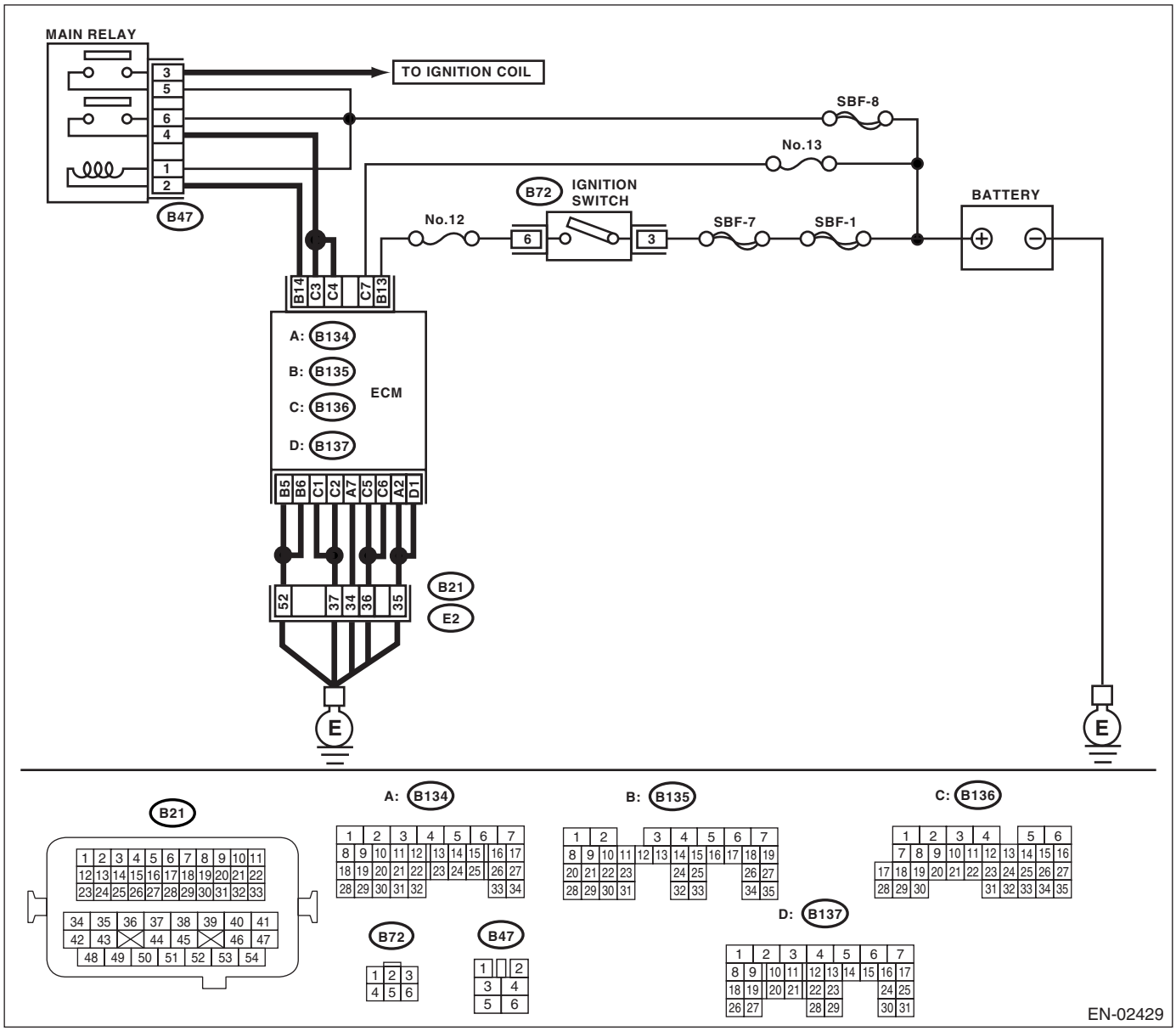
TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AV:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4SO 2.0)(diag)-168, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

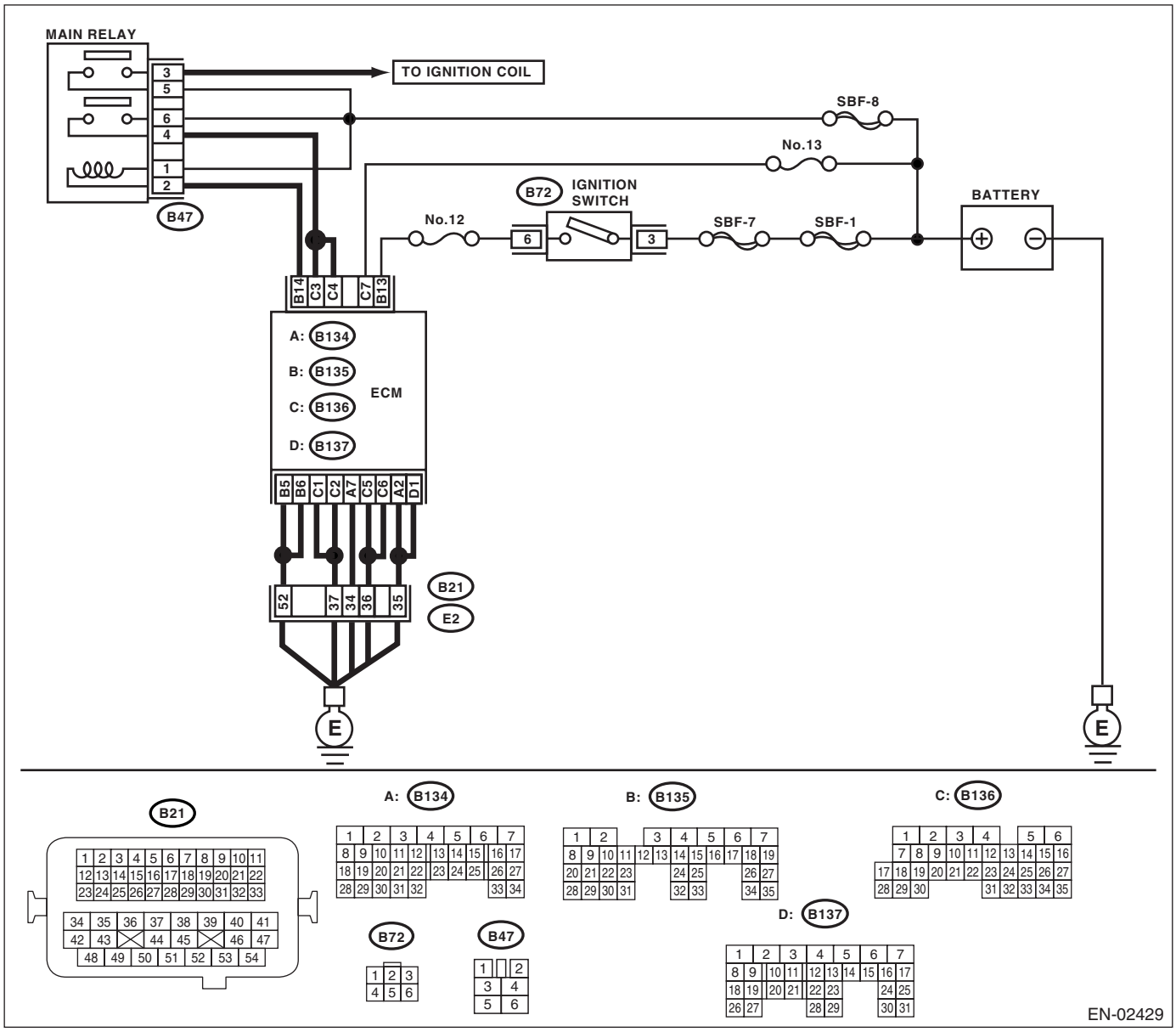
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **2.**	Repair the open or ground short circuit of power supply circuit.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 3 (+) — Chassis ground (−):*** ***(B136) No. 4 (+) — Chassis ground (−):***	Is the voltage 13 — 15 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 2 (+) — Chassis ground (−):*** ***(B136) No. 5 (+) — Chassis ground (−):*** ***(B136) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

AX:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AY:DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does DTC P0691 appear on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

AZ:DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Does DTC P0692 appear on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

BA:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:

For the diagnostic procedure, refer to AT section. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

BB:DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

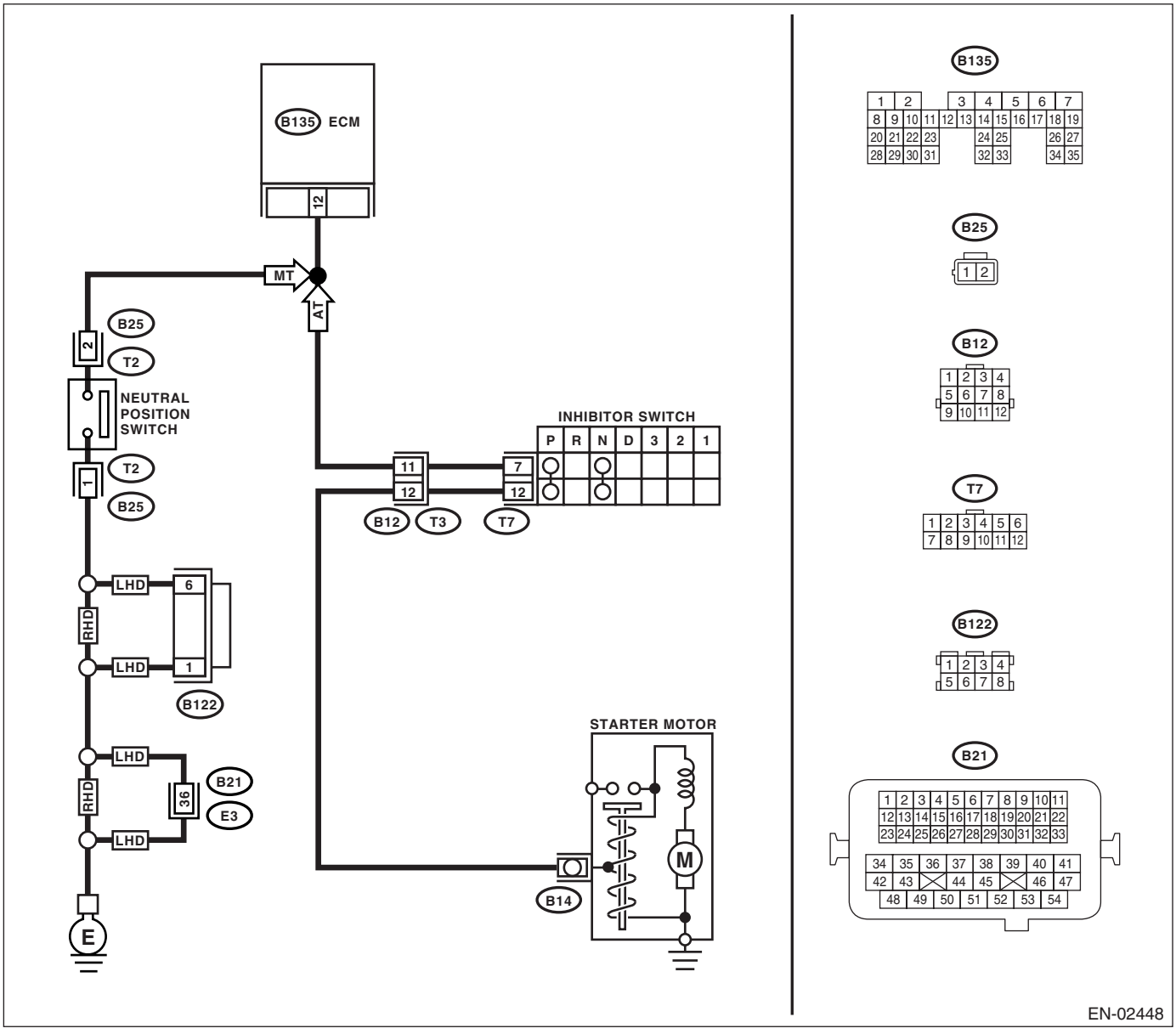
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Place the select lever other than "N" and "P" range. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and transmission harness connector.
4	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 11 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between transmission harness connector and inhibitor switch connector.
5	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at other than "N" and "P" range. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>
6	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-14, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BC:DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

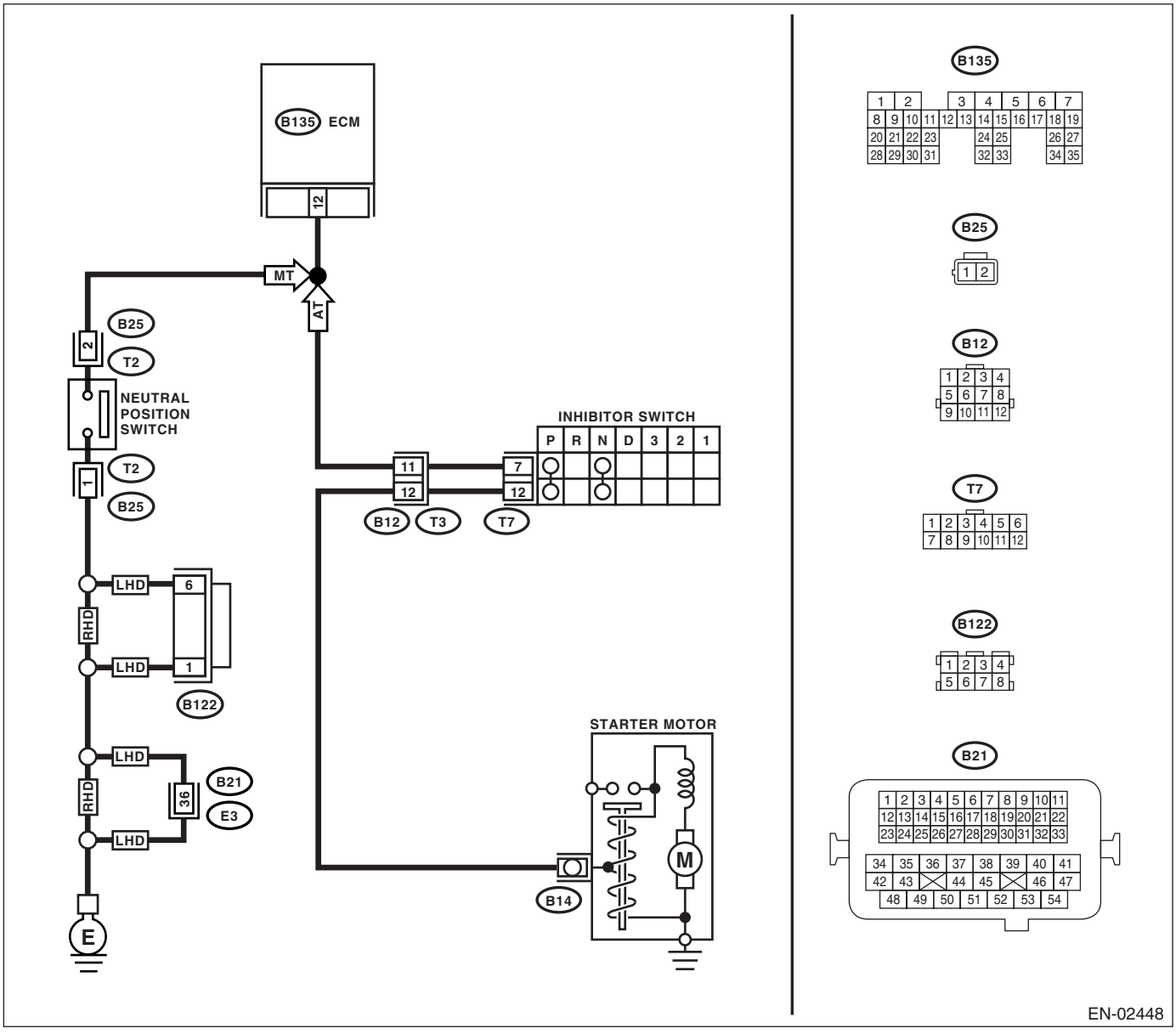
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground with select lever at "N" and "P" range. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **3.**	Go to step **5.**
3	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground with select lever at other than "N" and "P" range. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and inhibitor switch connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B135) No. 12 — (T7) No. 11:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

	Step	Check	Yes	No
7	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 11 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **8.**	Repair the open circuit in harness between inhibitor switch connector and ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and ground line
8	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at "N" and "P" range. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>
9	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-14, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BD:DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM

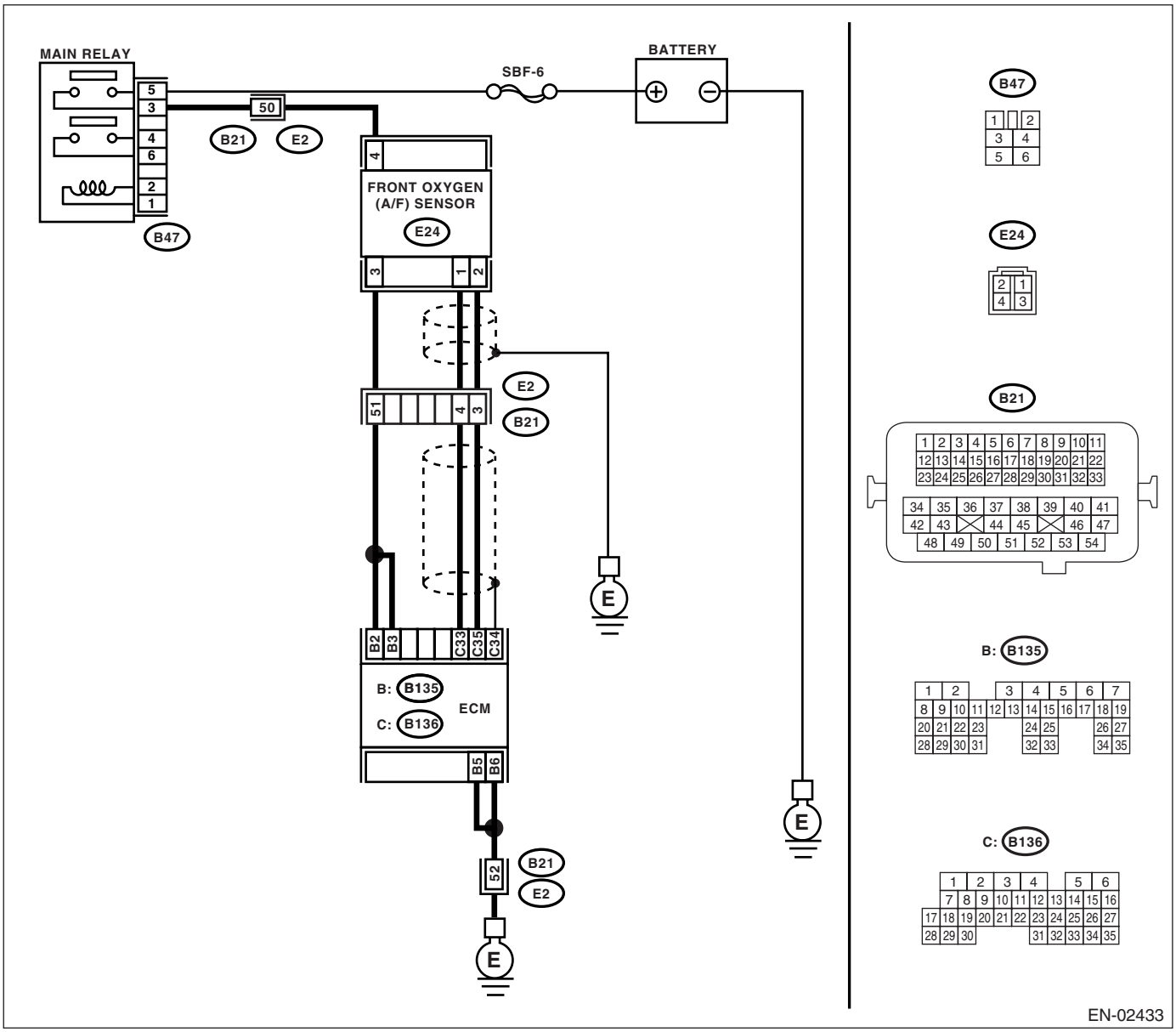
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Check DTC using the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P1134.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BE: DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1)

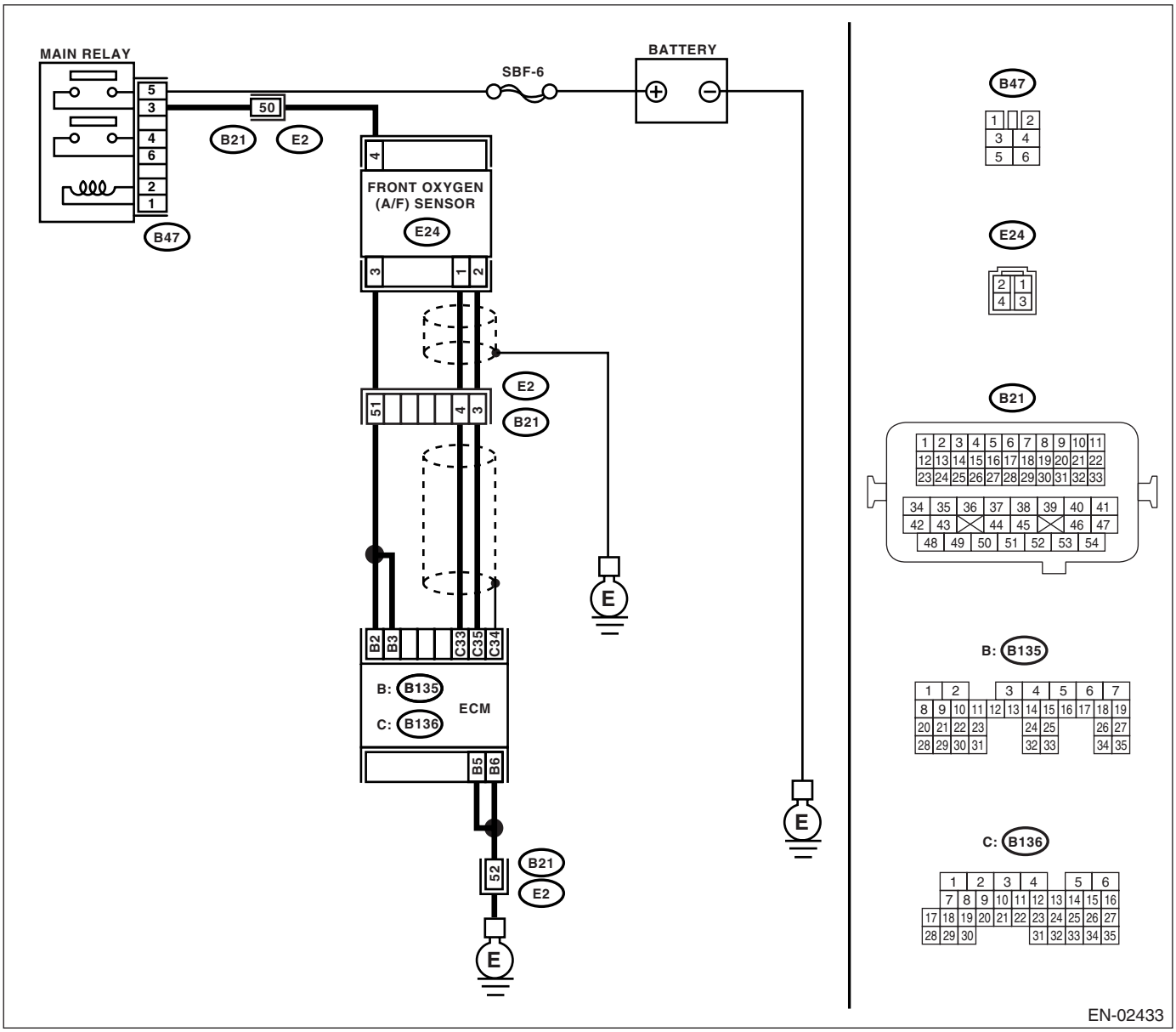
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** 1) Start the engine. 2) While observing the Subaru Select Monitor or OBD-II general scan tool screen, warm-up the engine until coolant temperature is above 70°C (160°F). If the engine is already warmed-up, operate at idle speed for at least 1 minute. 3) Read the data of front oxygen (A/F) sensor signal during idling using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.0)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to OBD-II General Scan Tool Instruction Manual.	Is the voltage 0.85 — 1.15 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR DATA.** Race the engine at speeds from idling to 5,000 rpm for a total of 5 cycles. NOTE: • Air fuel ratio is rich at normal condition or during racing. • To increase engine speed to 5,000 rpm, slowly depress accelerator pedal, taking approximately 5 seconds, and quickly release accelerator pedal to decrease engine speed.	Is the voltage more than 1.1 V?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance between ECM and front oxygen (A/F) sensor. ***Connector & terminals*** ***(B136) No. 33 — (E24) No. 1:*** ***(B136) No. 35 — (E24) No. 2:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the open circuit between ECM and front oxygen (A/F) sensor.
5	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between ECM and chassis ground. ***Connector & terminals*** ***(B136) No. 33 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between ECM and front oxygen (A/F) sensor.

Step		Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items. • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness of front oxygen (A/F) sensor • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace faulty parts.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.0)-32, Front Oxygen (A/F) Sensor, .>

BF:DTC P1160 RETURN SPRING FAILURE

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BG:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-182, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BH:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-184, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-182, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BJ:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-184, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BK:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.0)(diag)-182, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BL:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.0)(diag)-184, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BM:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

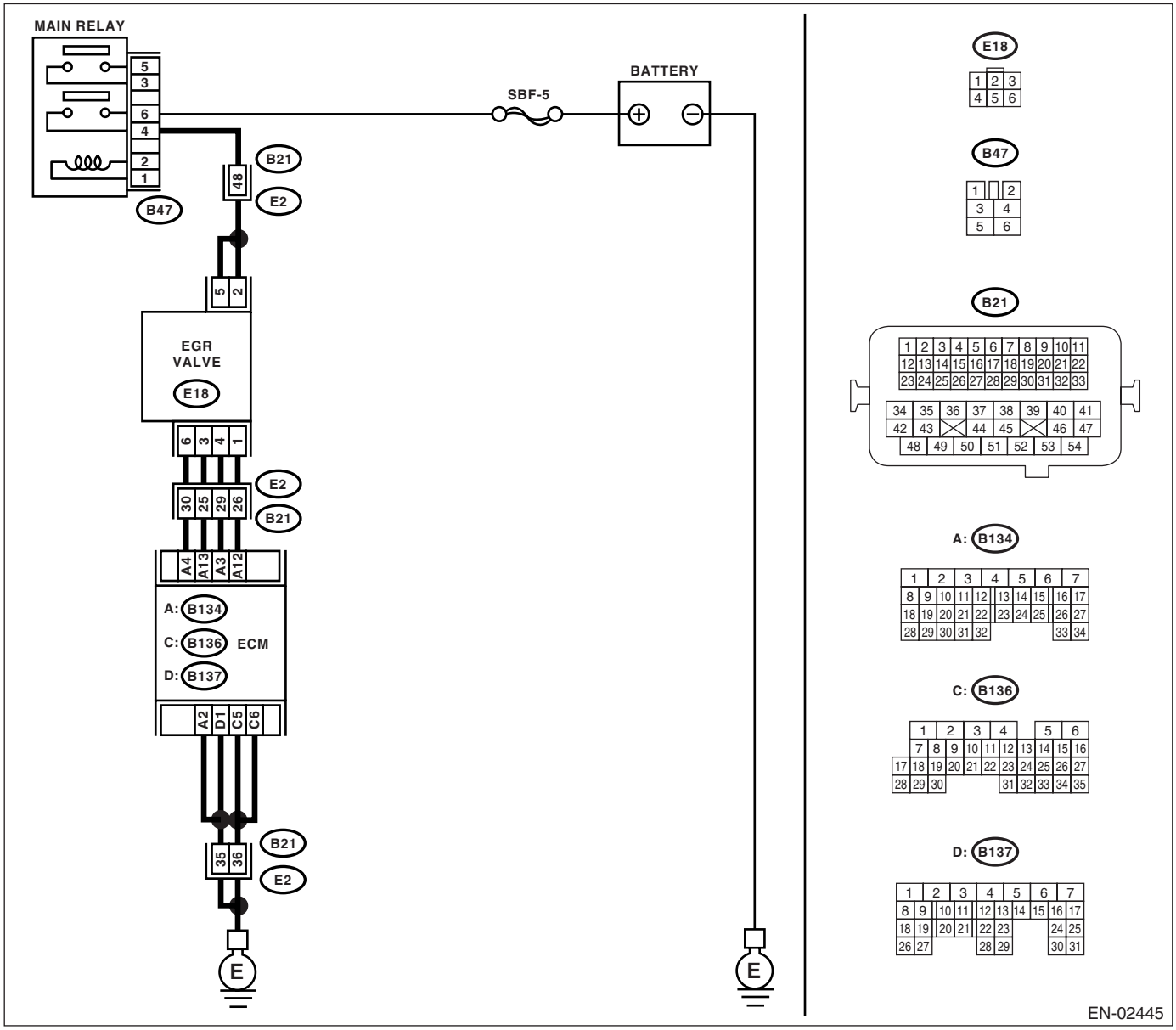
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (–):*** ***(E18) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 13 — (E18) No. 3:*** ***DTC P1494; (B134) No. 12 — (E18) No. 1:*** ***DTC P1496; (B134) No. 3 — (E18) No. 4:*** ***DTC P1498; (B134) No. 4 — (E18) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and EGR solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 13 — Chassis ground:*** ***DTC P1494; (B134) No. 12 — Chassis ground:*** ***DTC P1496; (B134) No. 3 — Chassis ground:*** ***DTC P1498; (B134) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair the poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.0)-28, EGR Valve.>

BN:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

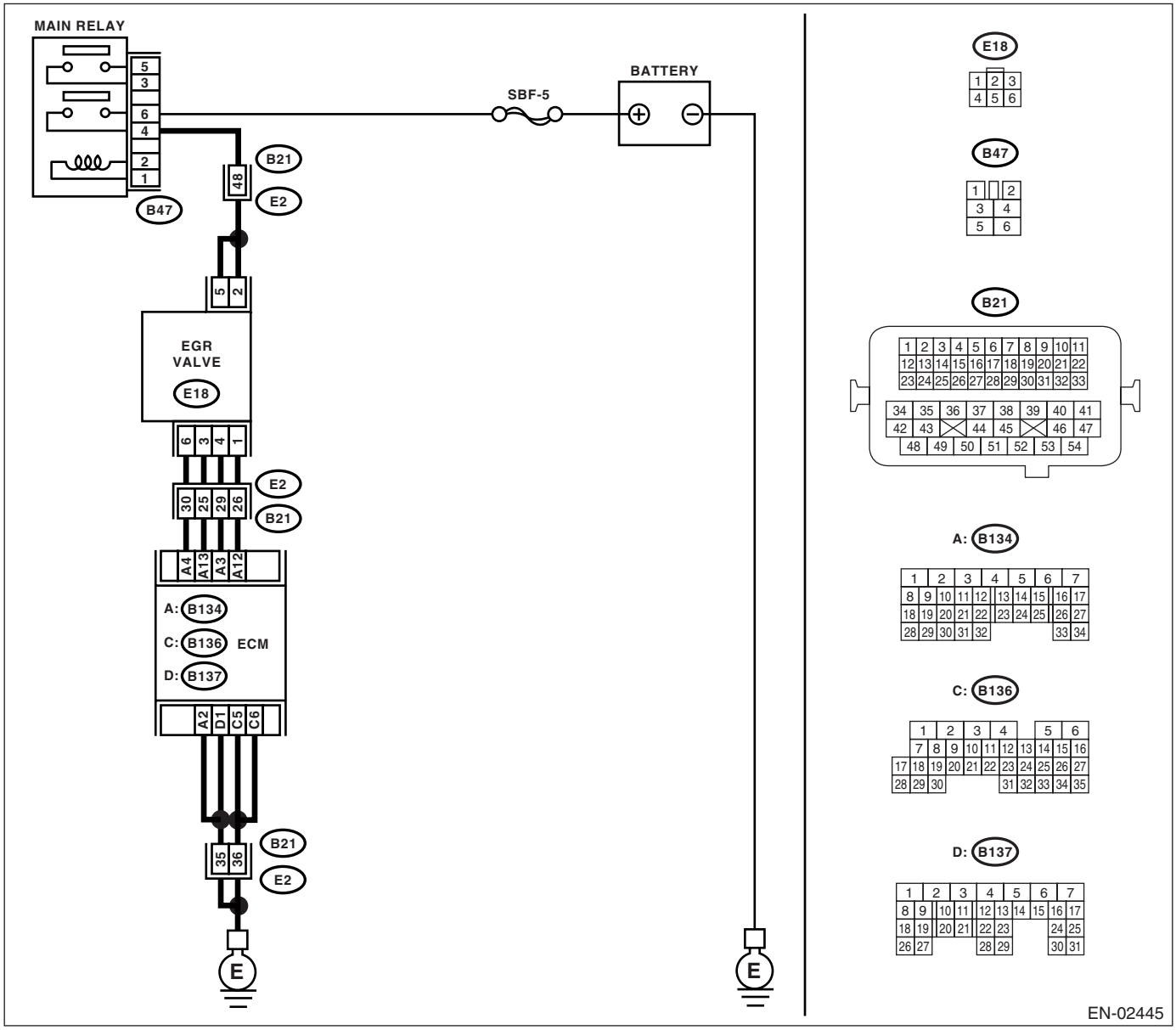
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 6 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM connector and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 13 (+) — Chassis ground (–):*** ***DTC P1495; (B134) No. 12 (+) — Chassis ground (–):*** ***DTC P1497; (B134) No. 3 (+) — Chassis ground (–):*** ***DTC P1499; (B134) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short in harness between ECM and EGR solenoid valve connector. After repairing, replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>

BO:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

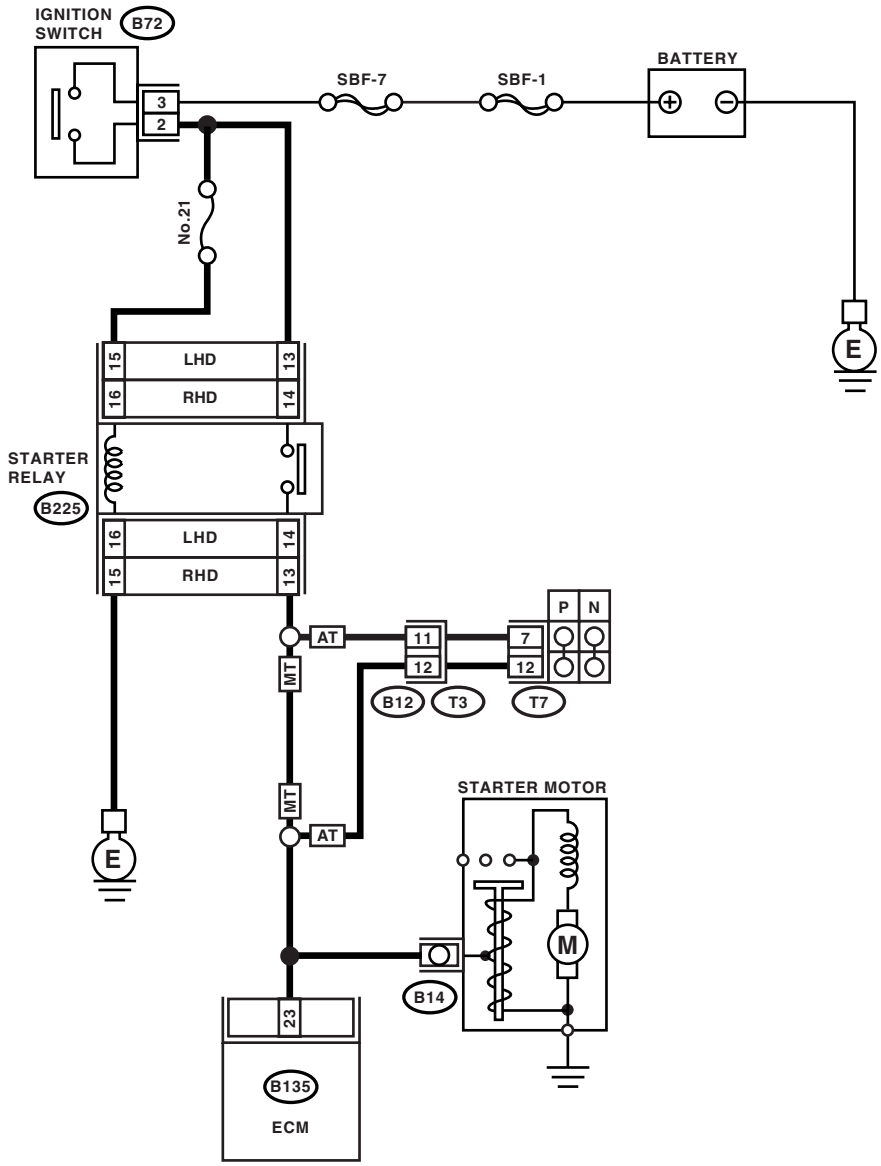
TROUBLE SYMPTOM:

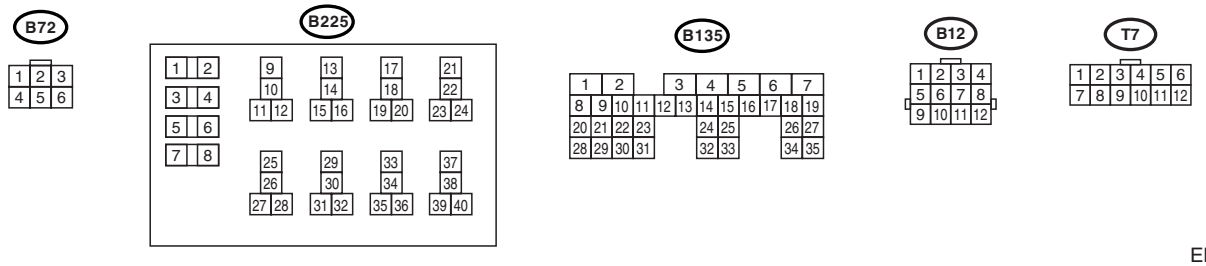
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





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Step		Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Place the inhibitor switch in the “P” or “N” range.	Does the starter motor operate when ignition switch to START?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between ECM and starter motor connector • Poor contact in ECM connector	Check starter motor circuit. <Ref. to EN(H4SO 2.0)(diag)-52, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BP:DTC P1521 BRAKE SWITCH CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT)

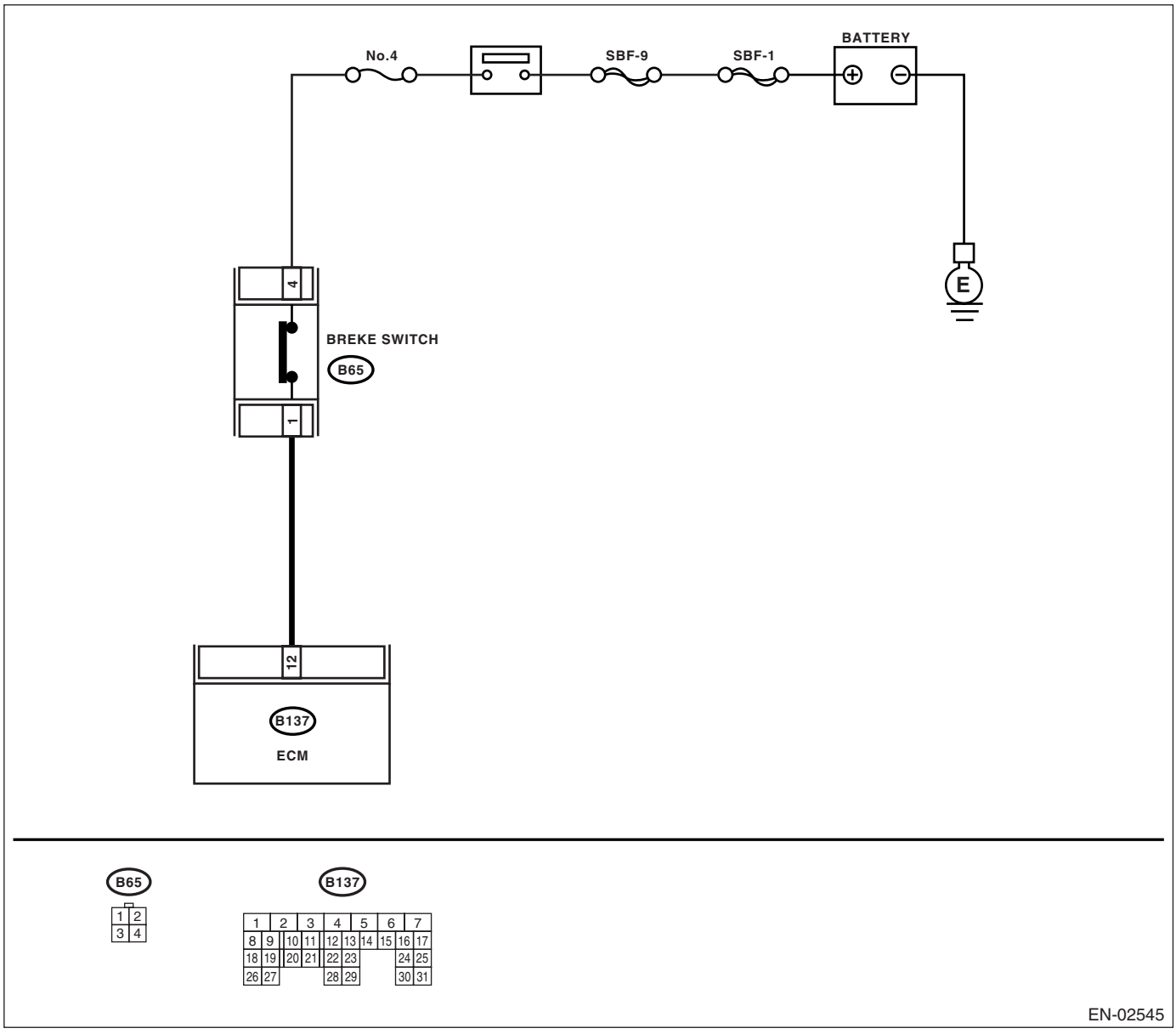
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Go to step **3.**
2	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between brake switch connectors. ***Connector & terminal*** ***(B137) No. 12 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit between ECM and brake switch.	Go to step **3.**
3	**CHECK BRAKE SWITCH.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM and chassis ground with brake pedal depressed. ***Terminal*** ***(B65) No. 1 — (B65) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the brake switch. <Ref. to CC-6, Stop Light and Brake Switch.>
4	**CHECK BRAKE SWITCH.** Measure the resistance between brake switch connectors with brake pedal depressed. ***Terminal*** ***(B65) No. 1 — (B65) No. 4:***	Is the resistance more than 1 MΩ?	Check the poor contact in ECM connector.	Replace the brake switch. <Ref. to CC-6, Stop Light and Brake Switch.>

BQ:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

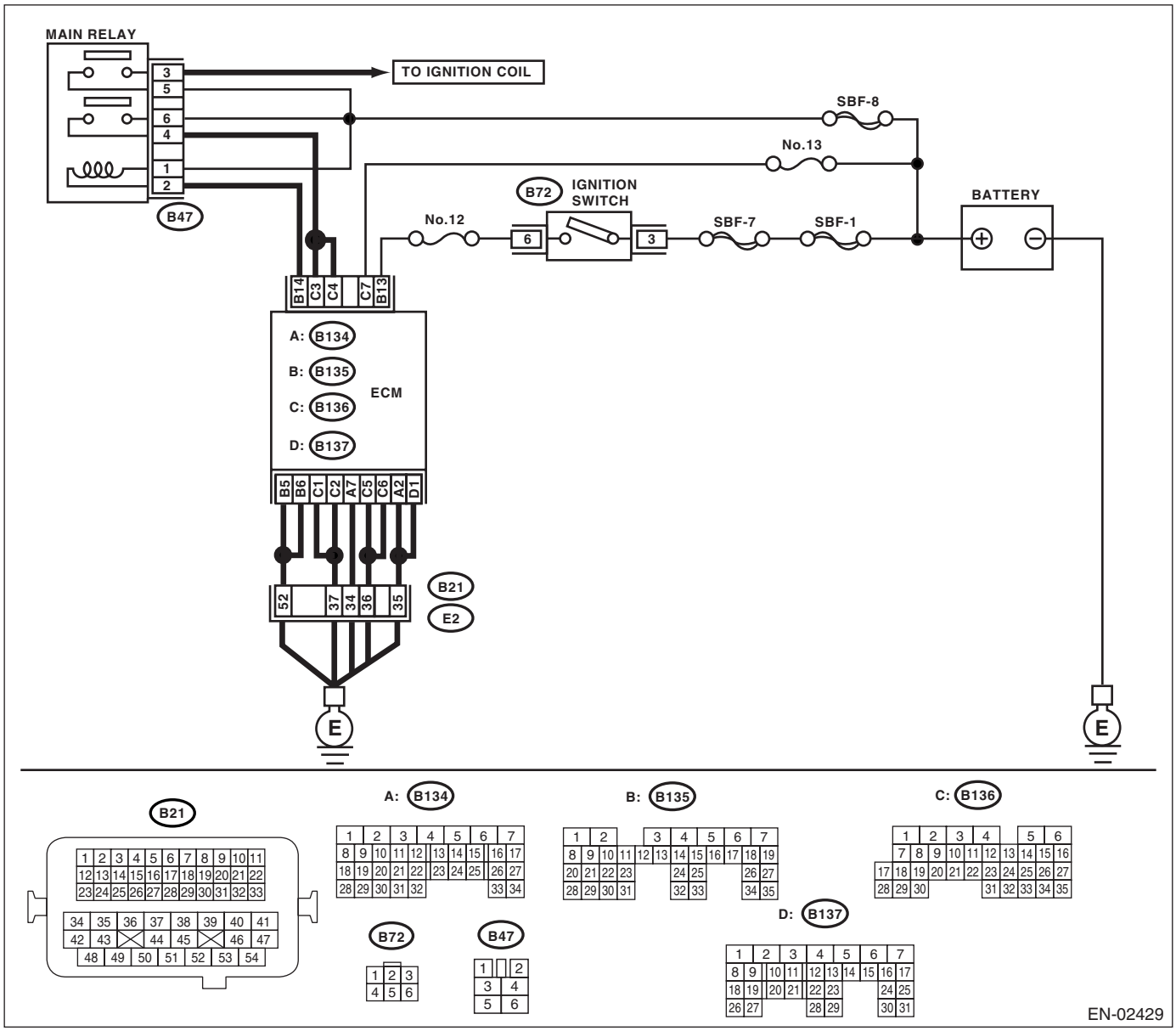
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

BR:DTC P2100 THROTTLE CONTROL MOTOR CIRCUIT OPEN

NOTE:
Refer to DTC P2101 for diagnostic procedure. <Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

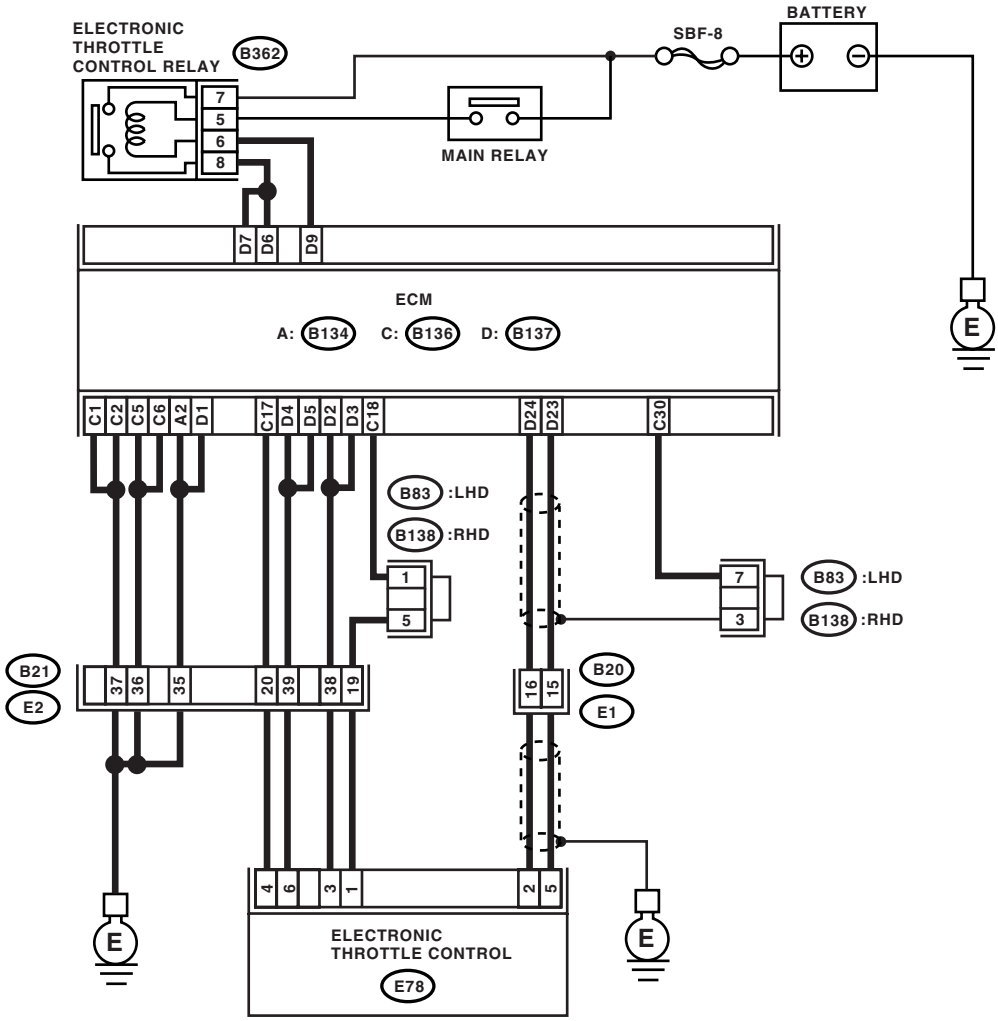
TROUBLE SYMPTOM:

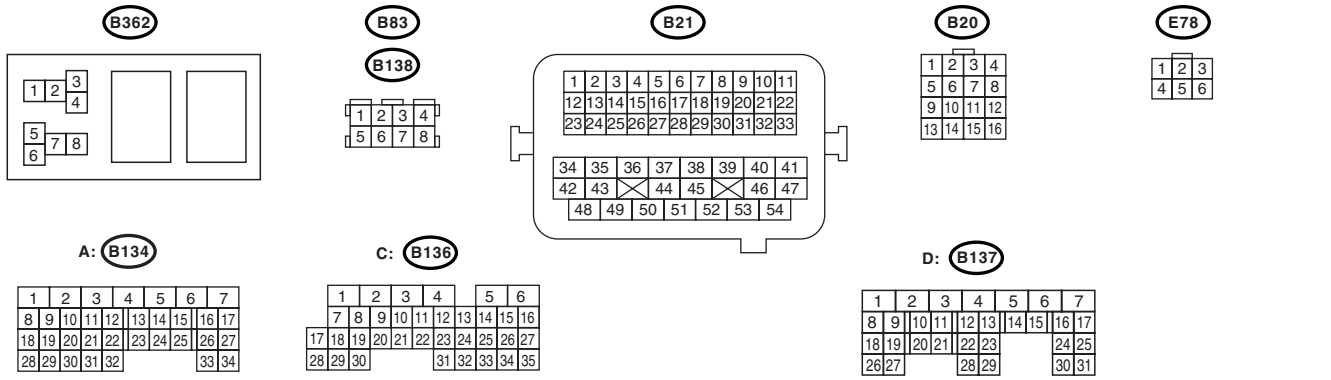
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 10 V?	Go to step **4.**	Repair the power supply short circuit in harness between ECM and electronic throttle control.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B137) No. 9 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:*** ***(B137) No. 7 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and electronic throttle control relay.
6	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B137) No. 24 (+) — (B136) No. 8 (−):***	Is the voltage more than 0.3 V?	Go to step **7.**	Go to step **9.**
7	**CHECK SENSOR OUTPUT.** Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B137) No. 23 (+) — (B136) No. 18 (−):***	Is the voltage less than 4.8 V?	Go to step **8.**	Go to step **9.**

	Step	Check	Yes	No
8	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **13.**
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B136) No. 17 — (E78) No. 4:*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness connector.
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B137) No. 23 — Chassis ground:*** ***(B137) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the ground short circuit of harness.
11	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **12.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
12	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 2 — Engine ground:*** ***(E78) No. 5 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
13	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.5 — 1.0 V?	Go to step **14.**	Go to step **16.**
14	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.5 — 1.0 V?	Go to step **15.**	Go to step **16.**
15	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **21.**

	Step	Check	Yes	No
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B136) No. 18 — (E78) No. 1:*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:***	Is the resistance less than 1 Ω?	Go to step **17.**	Repair the open circuit of harness connector.
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **18.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **19.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (−):*** ***(E78) No. 2 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **20.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **21.**	Repair the short circuit to sensor power supply.
21	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except for the electric control throttle relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.5 — 1.0 V?	Go to step **22.**	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
22	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.5 — 1.0 V?	Go to step **23.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.

	Step	Check	Yes	No
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B137) No. 2 — (E78) No. 3:*** ***(B137) No. 3 — (E78) No. 3:*** ***(B137) No. 4 — (E78) No. 6:*** ***(B137) No. 5 — (E78) No. 6:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness connector.
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 3 (+) — Engine ground (−):*** ***(E78) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **25.**	Repair the power supply short circuit in harness between ECM and electronic throttle control.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 3 — Engine ground:*** ***(E78) No. 6 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Repair the short circuit of harness.
26	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E78) No. 3 — (E78) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **27.**	Repair the short circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 1 — Chassis ground:*** ***(B134) No. 2 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **28.**	Repair the open circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **29.**	Replace the electronic throttle control.

	Step	Check	Yes	No
29	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the electronic throttle control.

BT:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

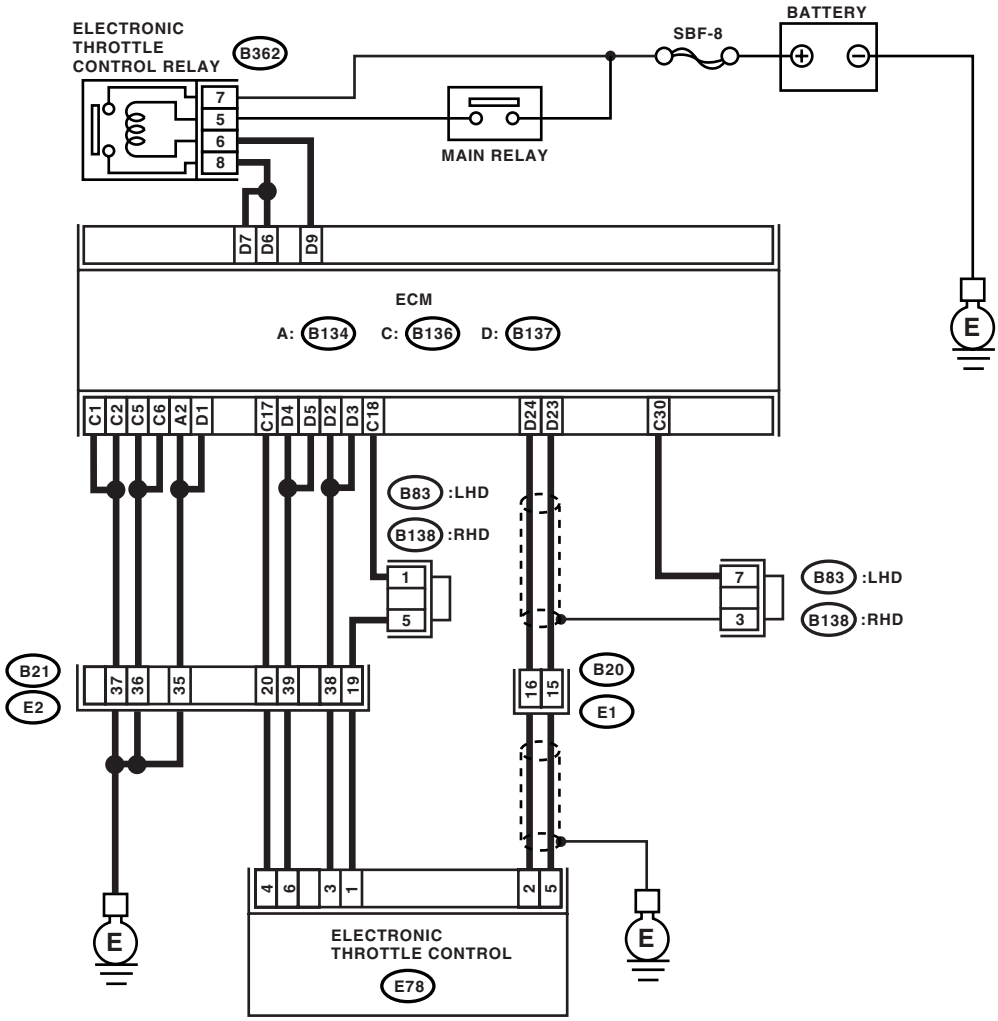
TROUBLE SYMPTOM:

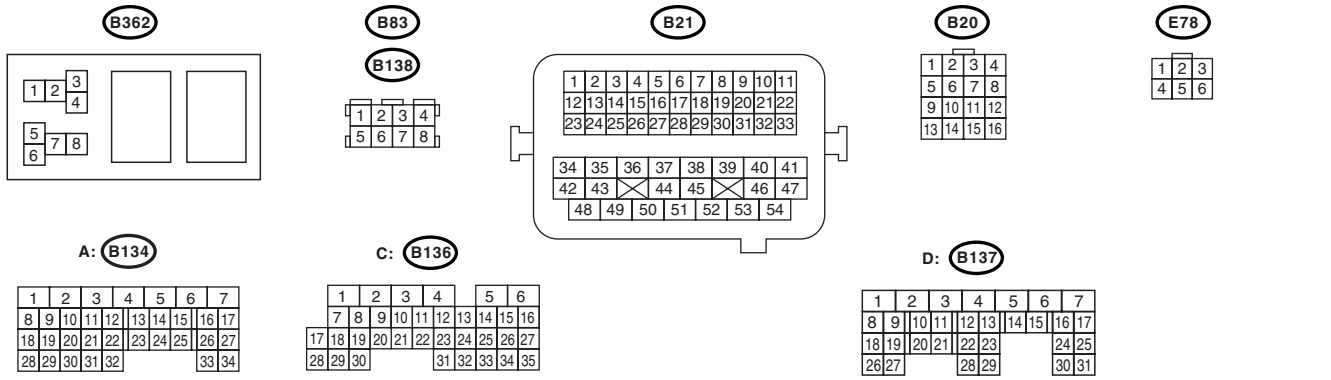
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **4.**	Repair the power supply short circuit in harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B137) No. 9 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:*** ***(B137) No. 7 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the open circuit in harness between ECM and electronic throttle control relay.

BU:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

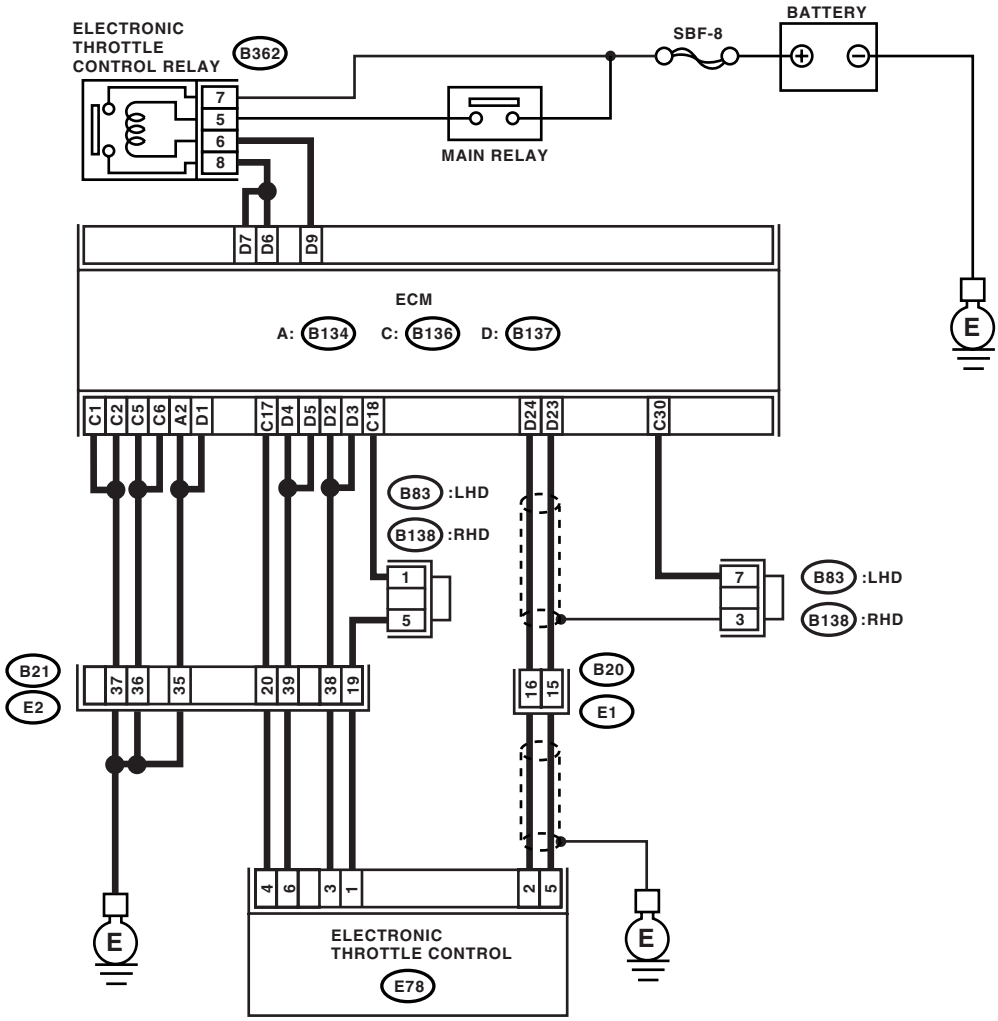
TROUBLE SYMPTOM:

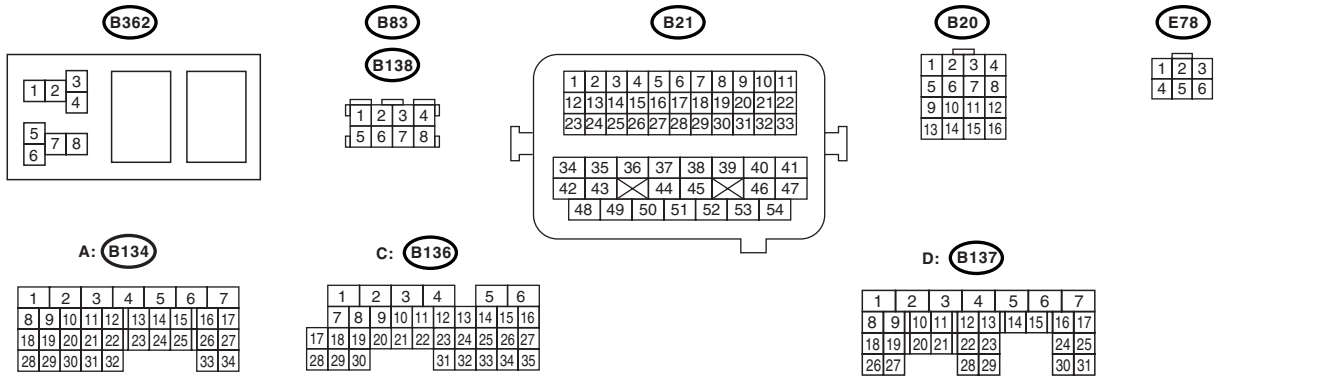
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the power supply short circuit in harness between ECM and electronic throttle control relay.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the ground short circuit in harness between ECM and electronic throttle control relay.

BV:DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BW:DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BX:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

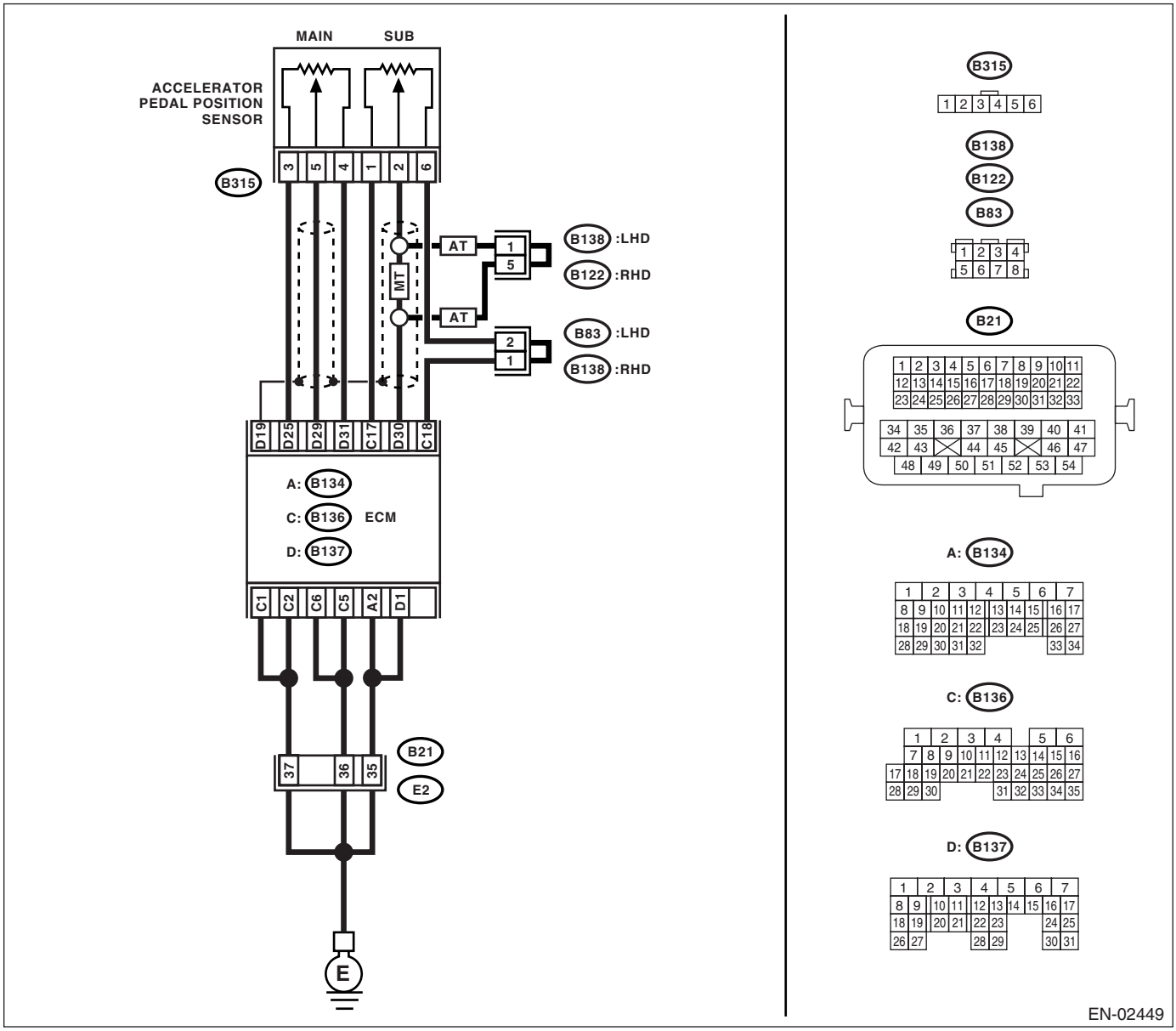
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B315) No. 5:*** ***(B137) No. 25 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:*** ***(B137) No. 25 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the accelerator position sensor.

BY:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

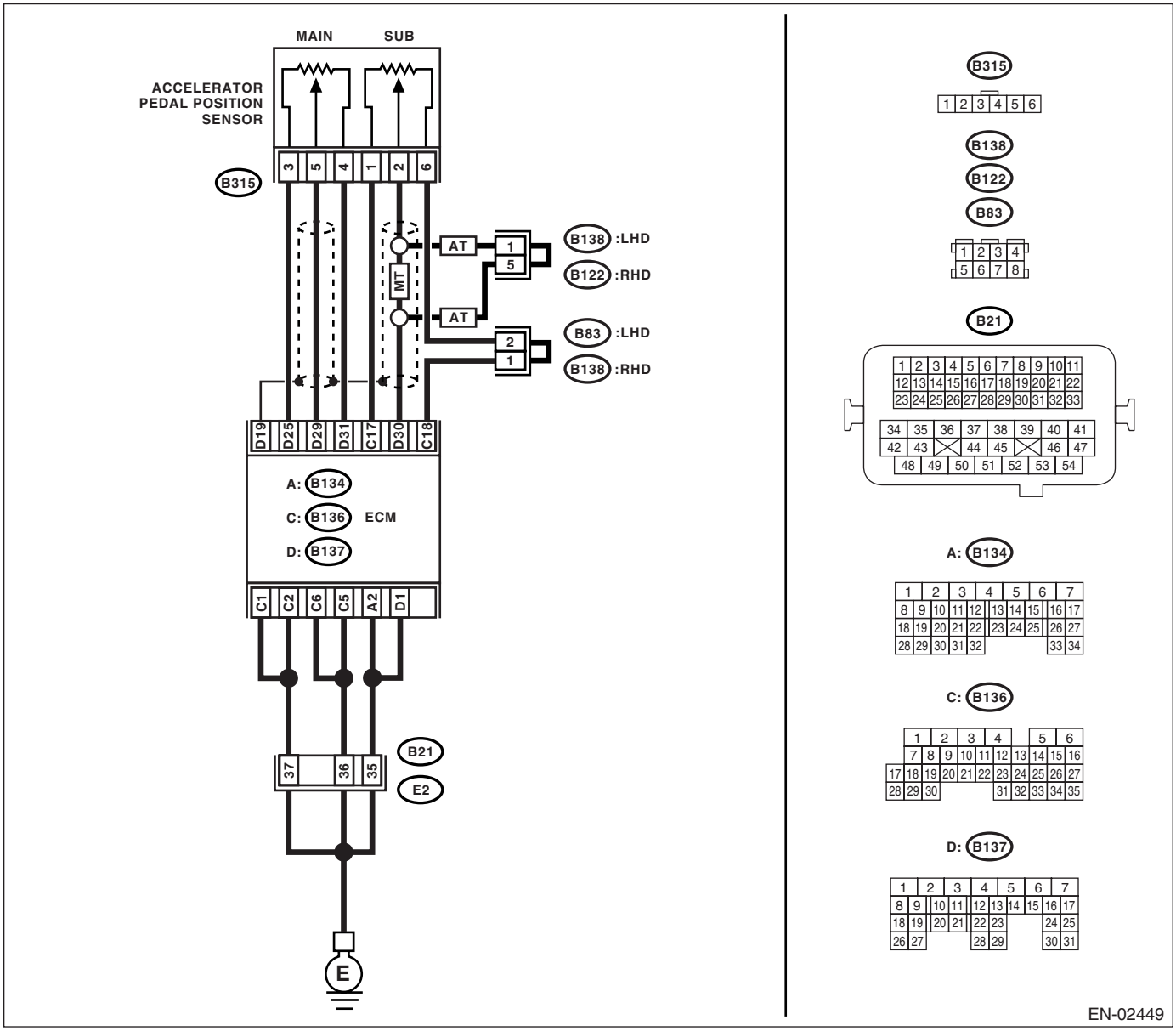
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B137) No. 31 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 29 — (B137) No. 25:*** ***(B137) No. 29 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

BZ:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

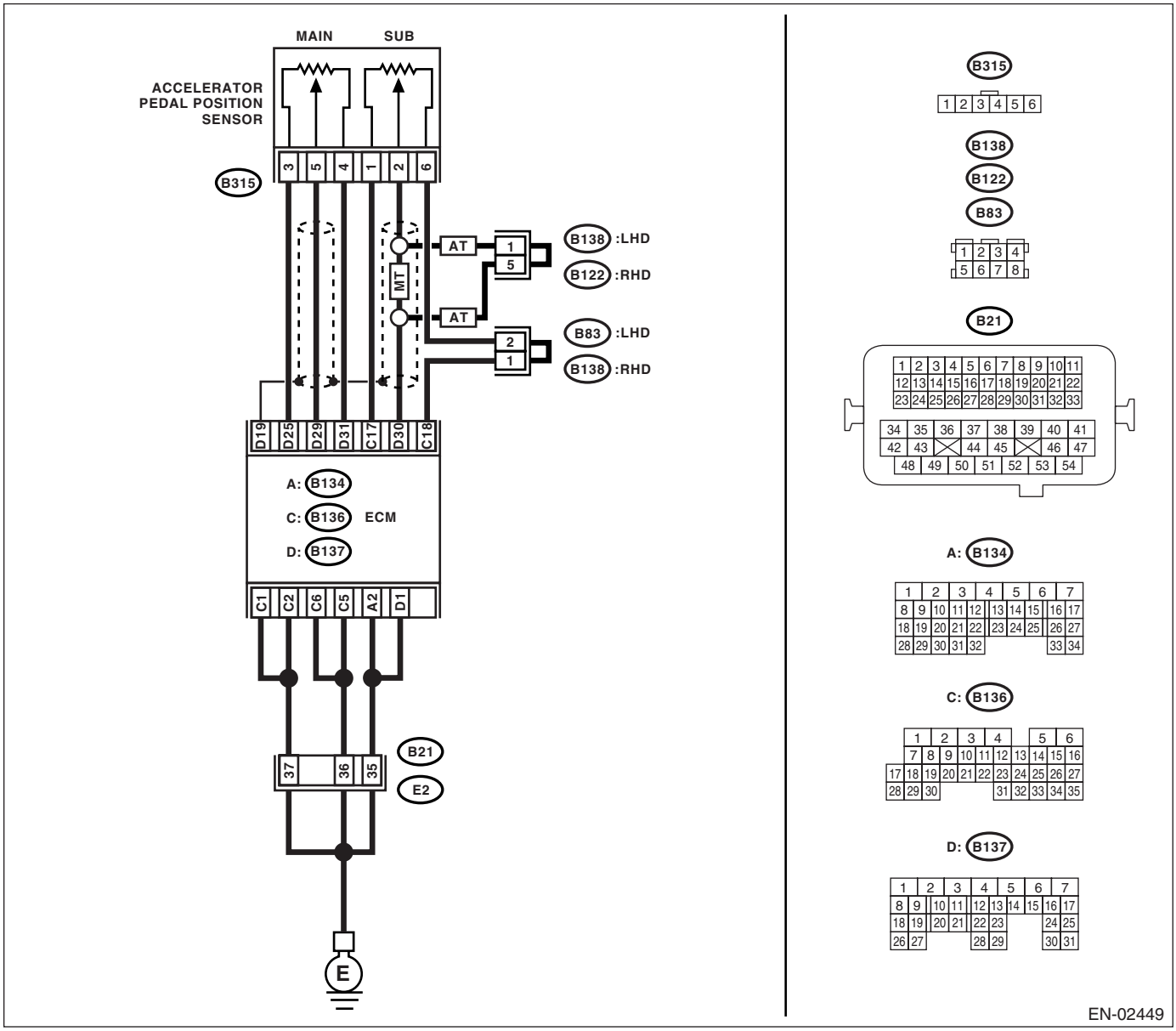
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B137) No. 30 — (B315) No. 2:*** ***(B136) No. 17 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 30 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Replace the accelerator position sensor.

CA:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

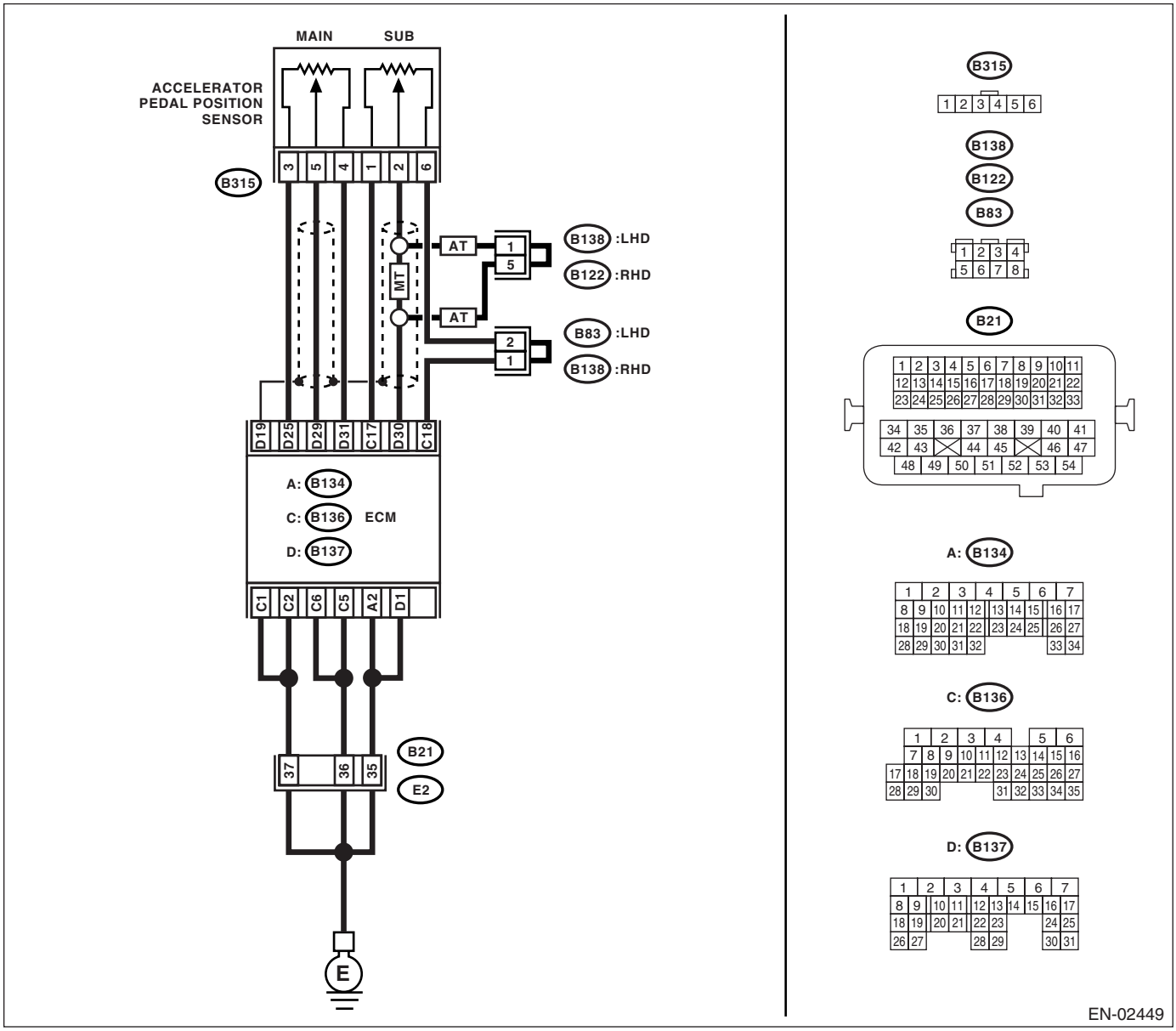
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 18 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 30 — (B137) No. 25:*** ***(B137) No. 30 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

CB:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY

DTC DETECTING CONDITION:

Immediately at fault recognition

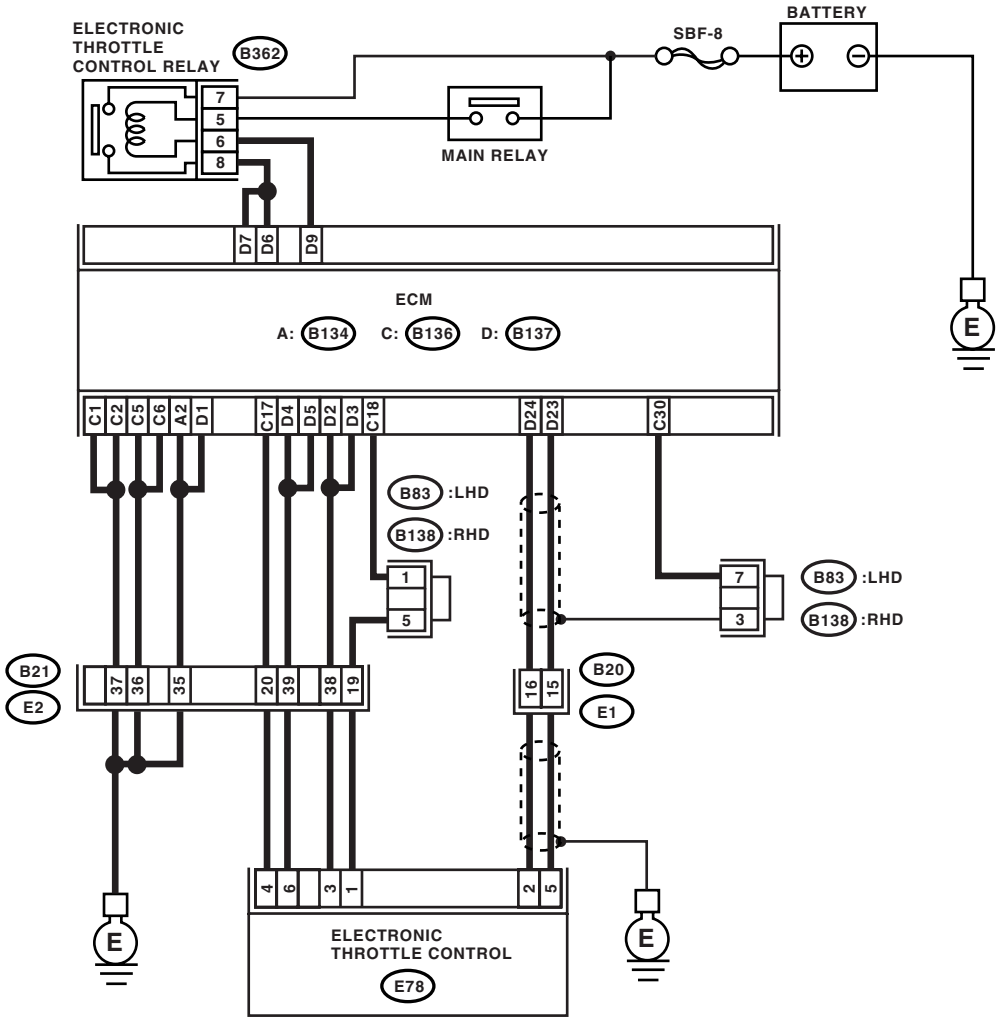
TROUBLE SYMPTOM:

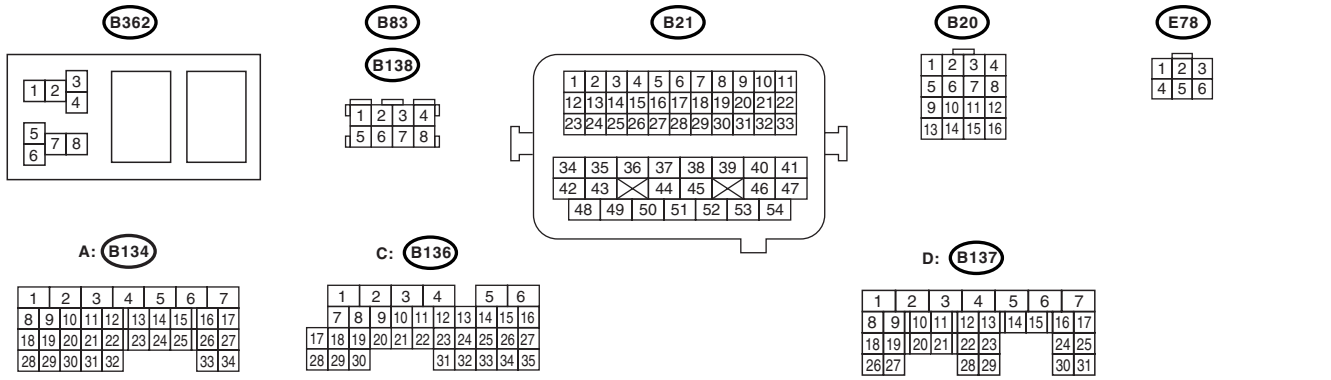
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:





EN-02440

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **4.**
2	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***(B136) No. 17 — (E78) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 23 — Chassis ground:*** ***(B137) No. 24 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 — Engine ground:*** ***(E78) No. 2 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
8	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **9.**	Go to step **11.**
9	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **10.**	Go to step **11.**

	Step	Check	Yes	No
10	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminals*** ***(B137) No. 23 — (E78) No. 5:*** ***(B137) No. 24 — (E78) No. 2:*** ***(B136) No. 17 — (E78) No. 4:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit of harness connector.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **14.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E78) No. 5 (+) — Engine ground (–):*** ***(E78) No. 2 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 23 — (B136) No. 17:*** ***(B137) No. 24 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Repair the short circuit to sensor power supply.
16	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connectors from electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E78) No. 5 — (E78) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the short circuit of harness.

CC:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" / "E" VOLTAGE RATIONALITY

DTC DETECTING CONDITION:

Immediately at fault recognition

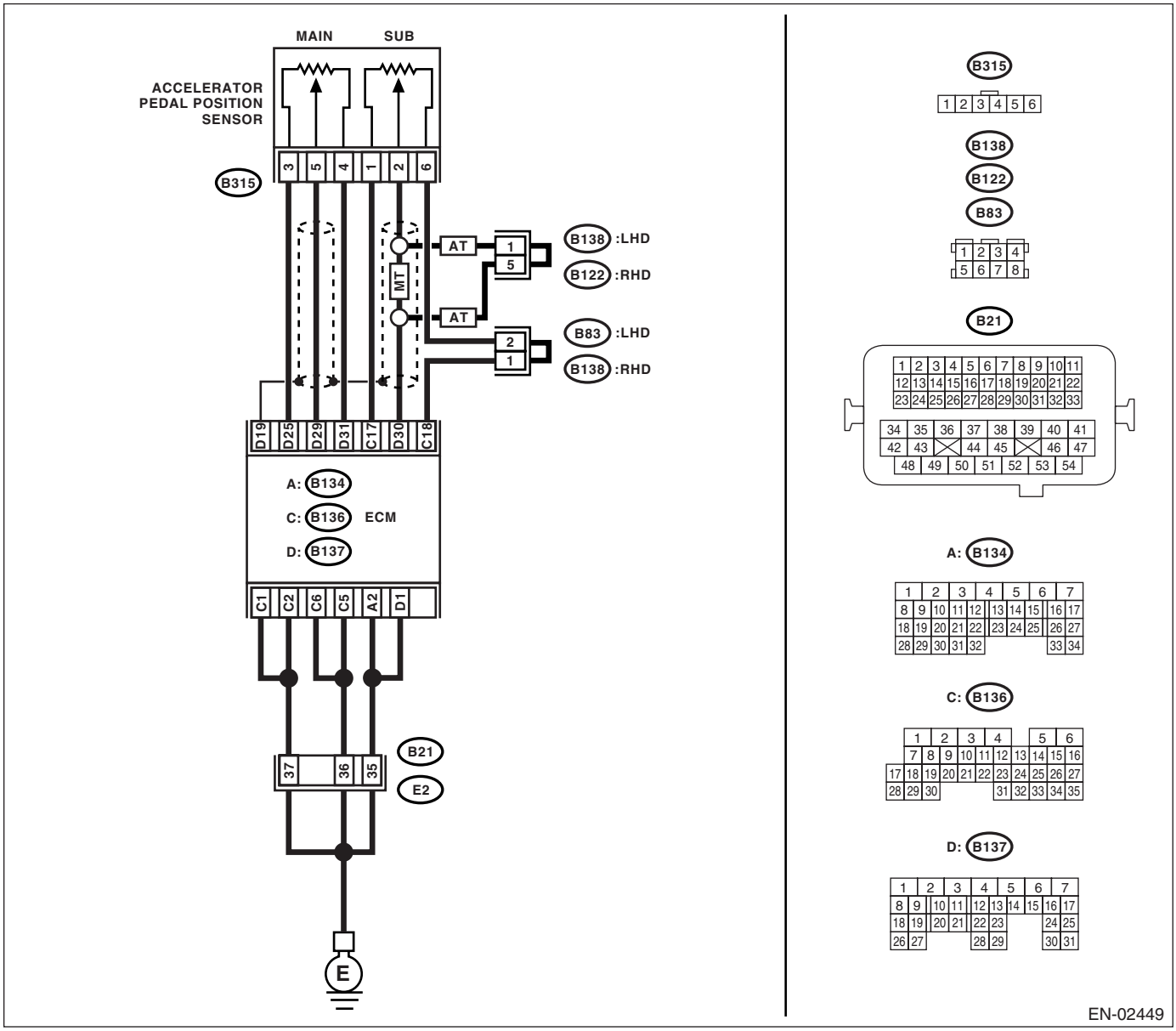
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.0)(diag)-38, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.0)(diag)-32, OPERATION, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **12.**
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B137) No. 29 — (B315) No. 5:*** ***(B137) No. 25 — (B315) No. 3:*** ***(B137) No. 30 — (B315) No. 2:*** ***(B136) No. 17 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 29 — Chassis ground:*** ***(B137) No. 25 — Chassis ground:*** ***(B137) No. 30 — Chassis ground:*** ***(B136) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator position sensor.
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **9.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
9	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **10.**	Replace the accelerator position sensor.
10	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **11.**	Replace the accelerator position sensor.
11	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **12.**	Replace the accelerator position sensor.
12	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **13.**	Go to step **14.**
13	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **18.**
14	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B137) No. 31 — (B315) No. 4:*** ***(B136) No. 18 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness connector.
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **17.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.

	Step	Check	Yes	No
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B137) No. 29 — (B137) No. 25:*** ***(B137) No. 29 — (B136) No. 17:*** ***(B137) No. 30 — (B137) No. 25:*** ***(B137) No. 30 — (B136) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the short circuit to sensor power supply.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between connector terminals of accelerator position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).>	Repair the short circuit in harness between ECM connector and accelerator position sensor connector.

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO 2.0)-83, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4)
2. Rough idling	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay 12) EGR valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Intake air temperature sensor 5) EGR valve
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) EGR valve
5. Engine stalls, engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Electronic throttle control 9) Fuel pump and fuel pump relay 10) EGR valve

Symptom	Problem parts
6. Surge	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay 9) EGR valve
7. Spark knock	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) EGR valve
8. After burning in exhaust system	1) Intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

FUEL INJECTION (FUEL SYSTEMS)

FU(H4SO 2.5)

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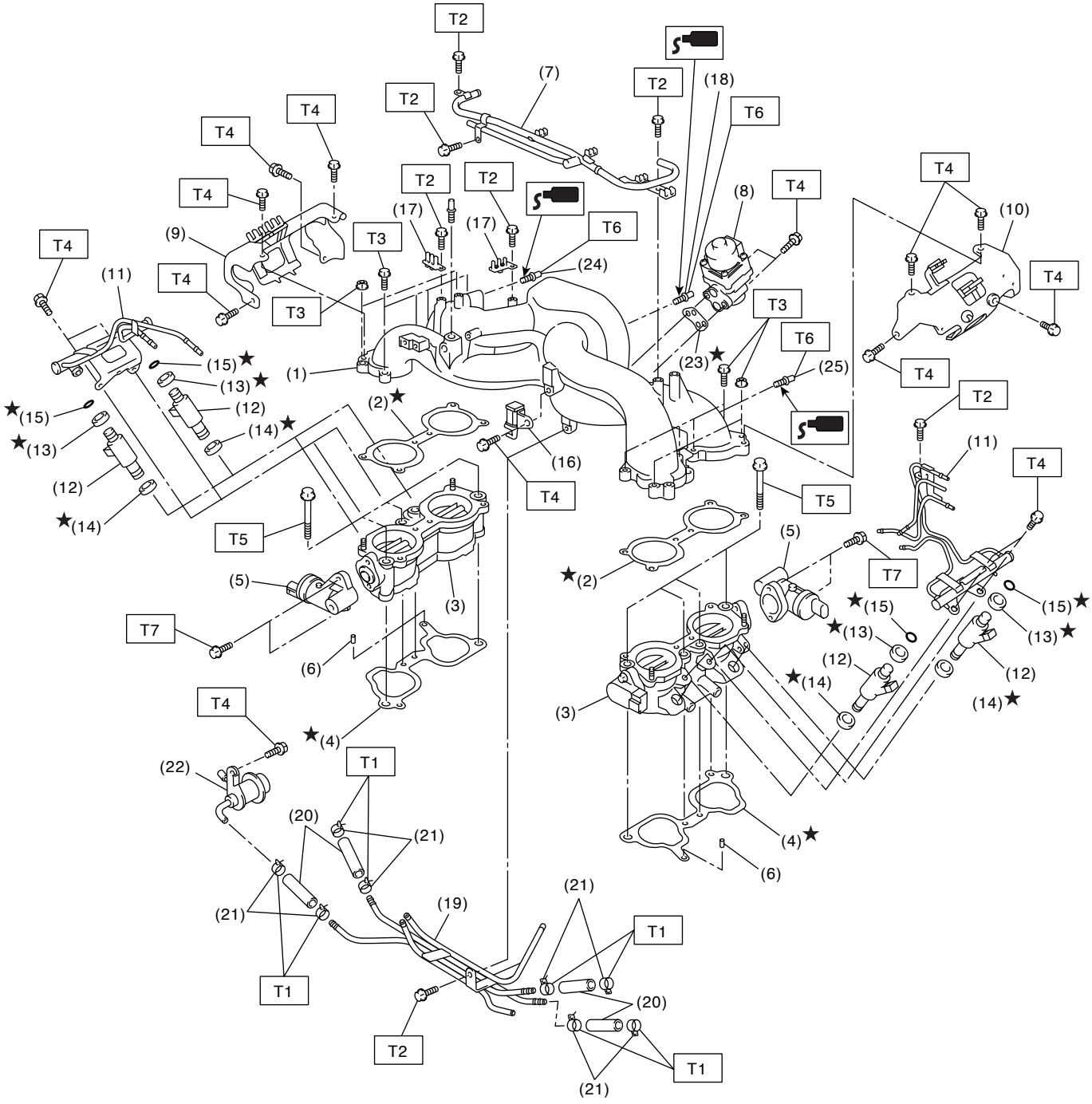
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	441 — 686 kPa (4.50 — 7.00 kg/cm^2, 64.0 — 99.5 psi)
	Discharge	75 ℓ (19.8 US gal, 16.5 Imp gal)/h or more [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

1. INTAKE MANIFOLD



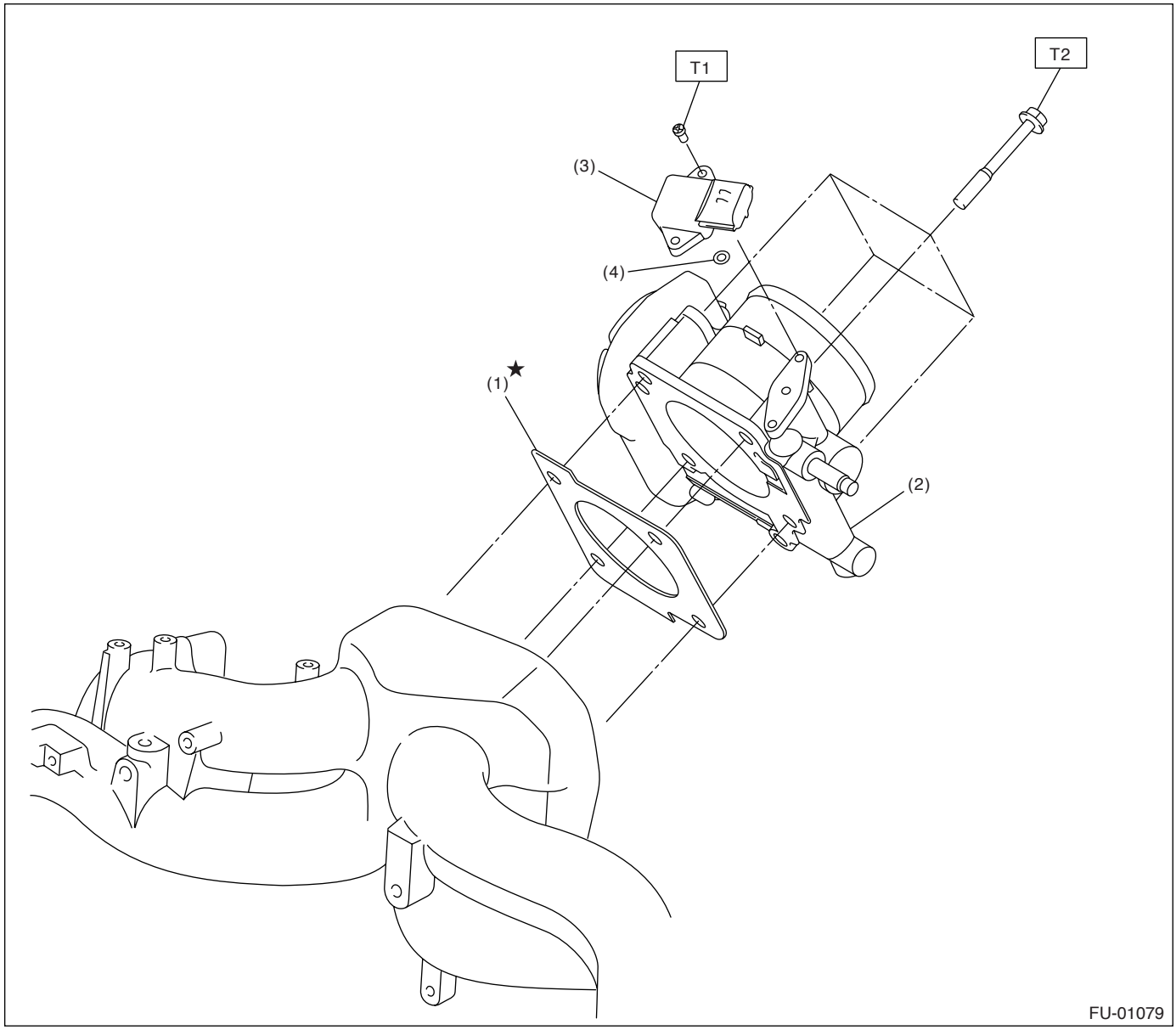
FU-02096

(1) Intake manifold
(2) Gasket (EC, EK and K4 model)
(3) Tumble generator valve ASSY (EC, EK and K4 model)
(4) Gasket
(5) Tumble generator valve actuator (EC, EK and K4 model)
(6) Guide pin
(7) PCV pipe (EC, EK and K4 model)
(8) EGR valve (EC, EK and K4 model)
(9) Fuel pipe protector RH
(10) Fuel pipe protector LH
(11) Fuel injector pipe
(12) Fuel injector
(13) O-ring
(14) O-ring
(15) O-ring
(16) Purge control solenoid valve
(17) Plug cord holder
(18) Nipple
(19) Fuel pipe ASSY
(20) Fuel hose
(21) Clip
(22) Pressure regulator
(23) Gasket (EC, EK and K4 model)
(24) Nipple (RHD model)
(25) Nipple (LHD model)

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***1.5 (0.15, 1.1)***
T2:	***6.4 (0.65, 4.7)***
T3:	***8.75 (0.89, 6.5)***
T4:	***19 (1.9, 13.7)***
T5:	***25 (2.5, 18.1)***
T6:	***17 (1.7, 12.5)***
T7:	***6 (0.61, 4.4)***

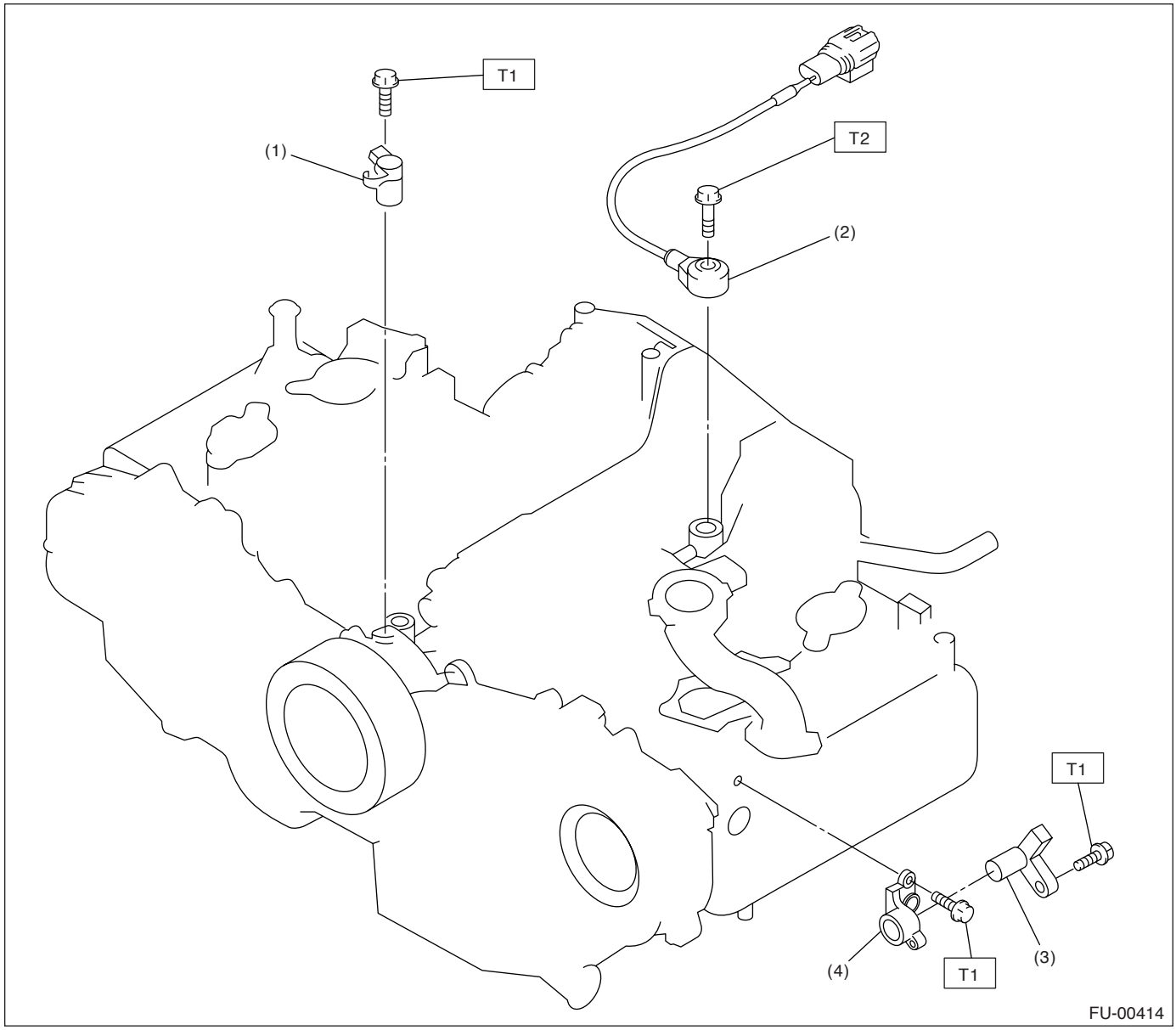
2. AIR INTAKE SYSTEM



(1) Gasket
(2) Throttle body
(3) Manifold absolute pressure sensor
(4) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2.0 (0.2, 1.5)
T2: 8 (0.8, 5.8)

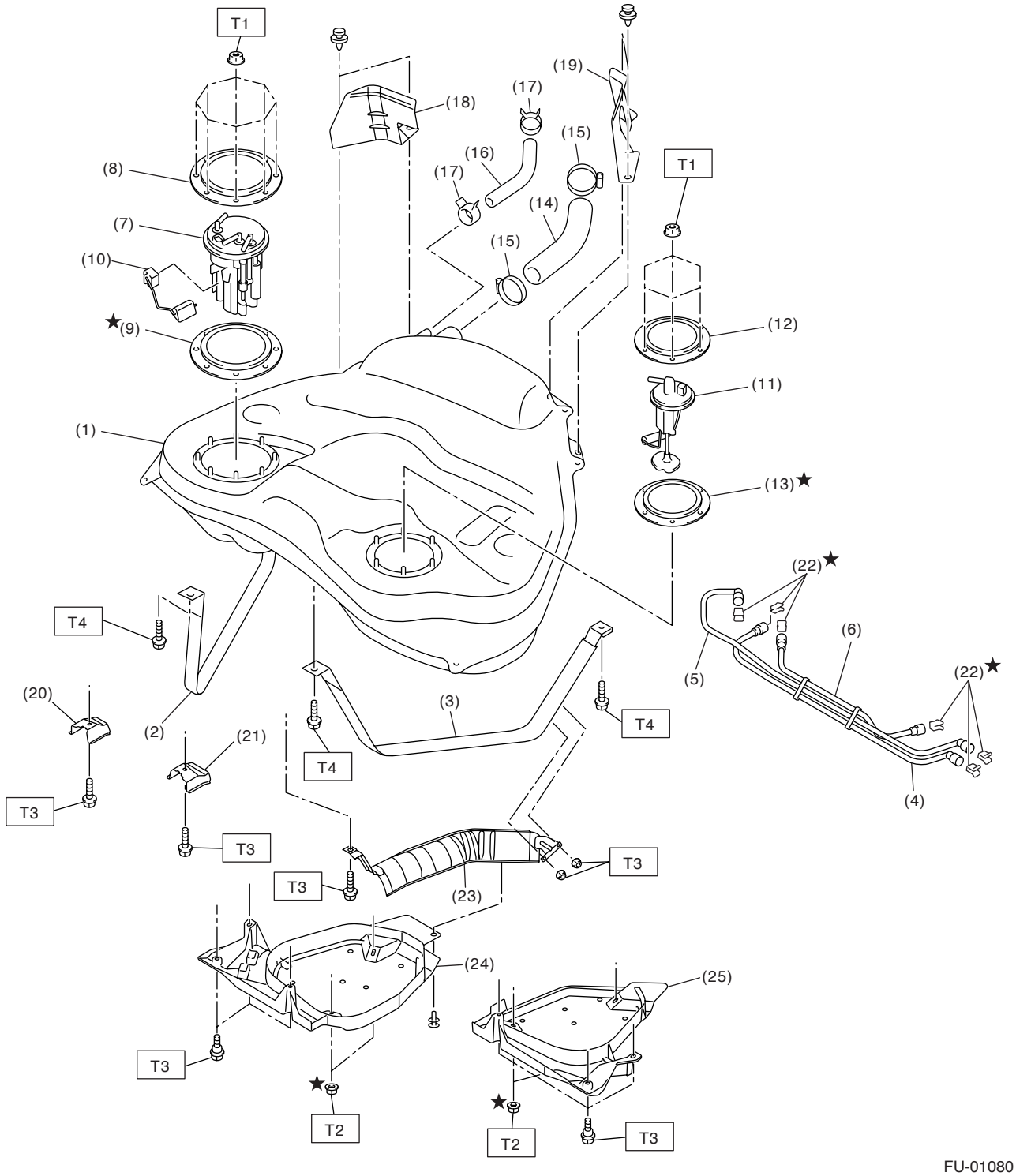
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Camshaft position sensor
(4) Camshaft position sensor support

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

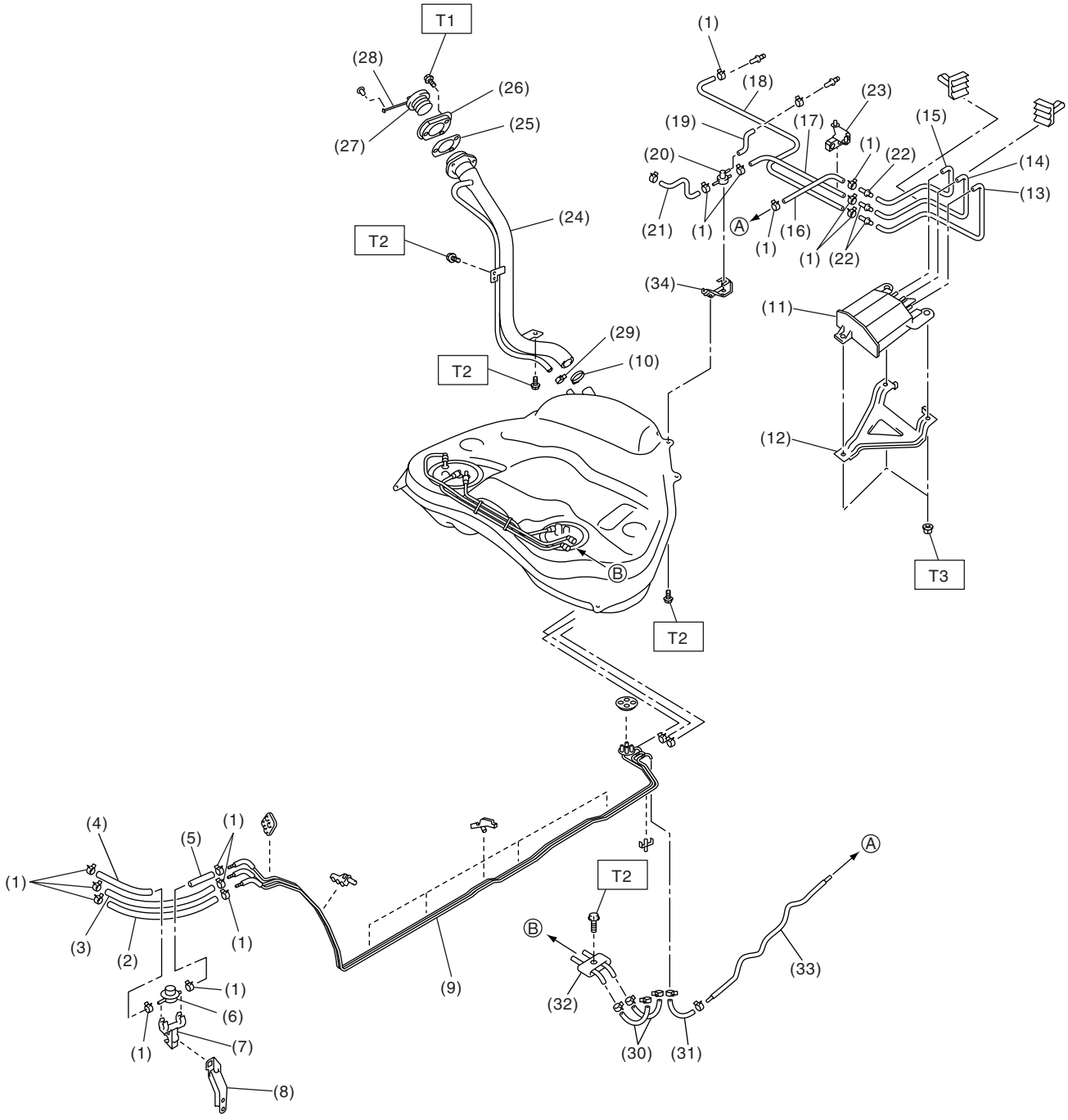


FU-01080

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump assembly
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Fuel tank protector RH (Rear)
(19) Fuel tank protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 9.0 (0.92, 6.6)
T3: 17.5 (1.78, 12.9)
T4: 33 (3.4, 25)

5. FUEL LINE



FU-01081

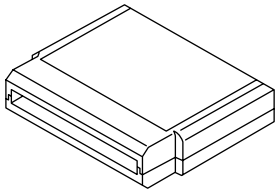
(1) Clip
(2) Fuel return hose
(3) Evaporation hose A
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel damper
(7) Fuel damper holder
(8) Fuel damper bracket
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Connector
(33) Purge pipe
(34) Two-way valve bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.2)
T2: 7.5 (0.76, 5.53)
T3: 8.3 (0.85, 6.1)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

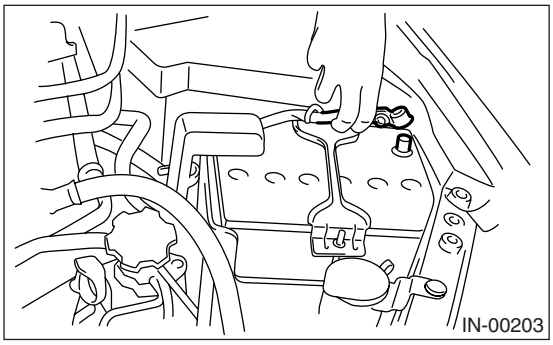
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

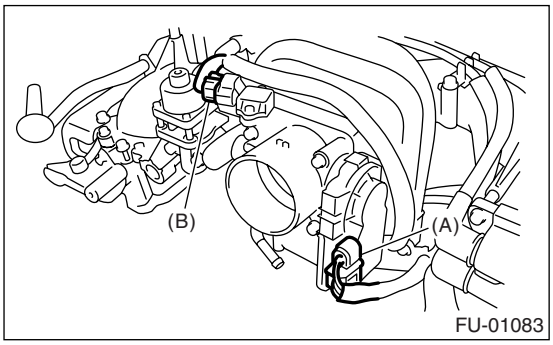
2. Throttle Body

A: REMOVAL

1) Disconnect the ground cable from battery.

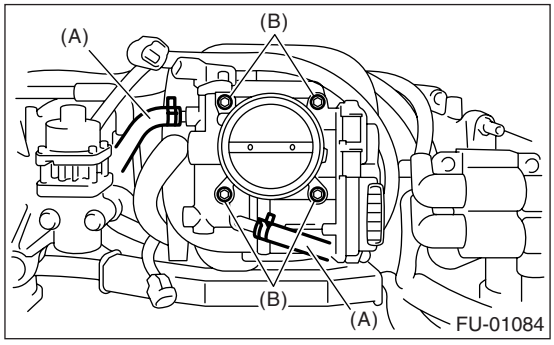


2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the connectors from the throttle position sensor and manifold absolute pressure sensor.



(A) Throttle position sensor
(B) Manifold absolute pressure sensor

4) Disconnect the engine coolant hoses (A) from throttle body.
5) Remove the bolts (B) which secure throttle body to intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

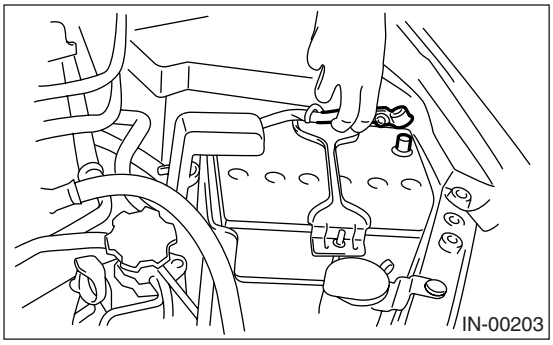
NOTE:
Use a new gasket.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

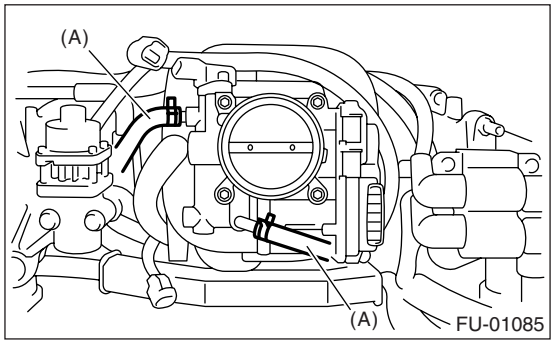
3. Intake Manifold

A: REMOVAL

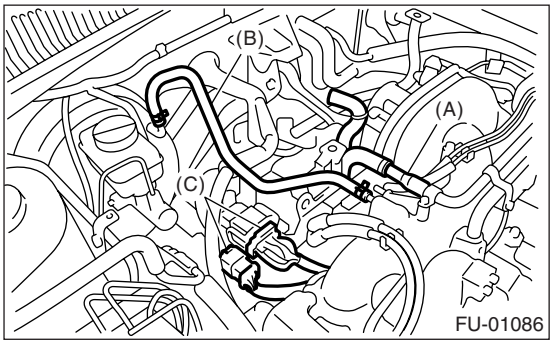
1) Release the fuel pressure. **<Ref. to FU(H4SO 2.5)-40,** RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



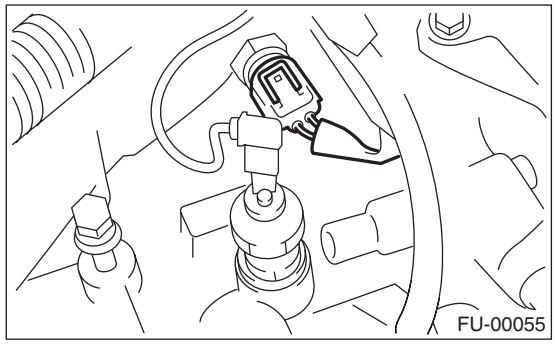
4) Remove the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
5) Disconnect the spark plug cords from spark plugs.
6) Disconnect the engine coolant hoses (A) from throttle body.



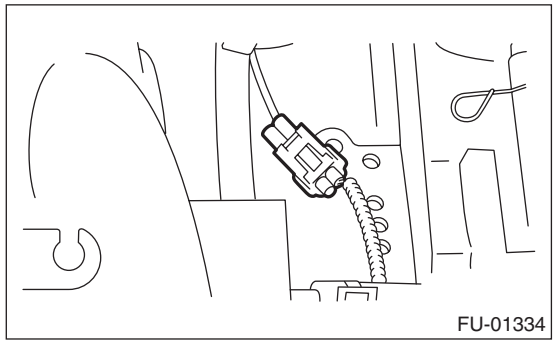
7) Disconnect the PCV hose (A) from intake manifold.
8) Disconnect the brake booster hose (B).
9) Disconnect the engine harness connectors (C) from bulkhead harness connectors.



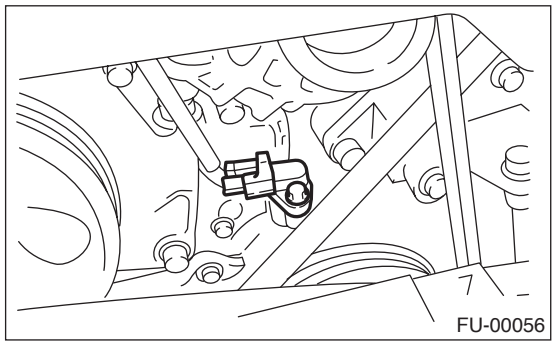
10) Disconnect the connectors from engine coolant temperature sensor.



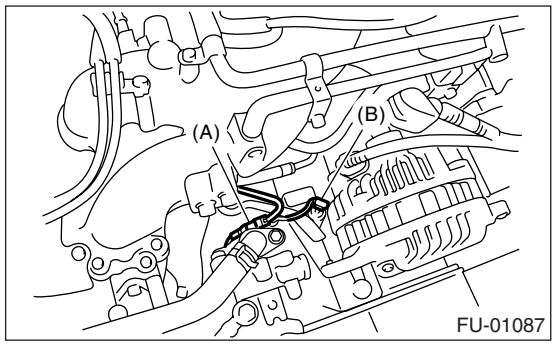
11) Disconnect the knock sensor connector.



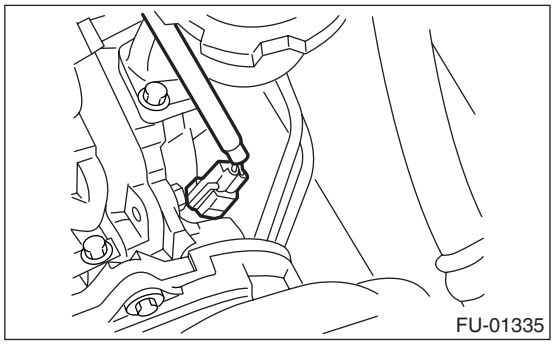
12) Disconnect the connector from crankshaft position sensor.



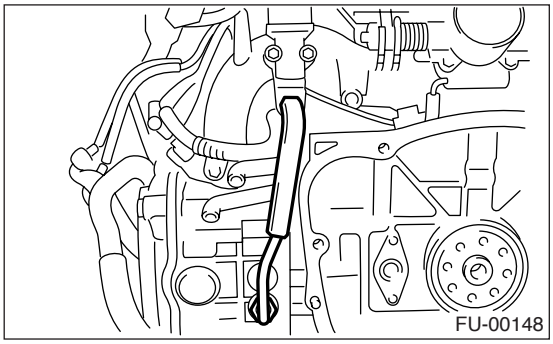
13) Disconnect the connector from power steering pump switch (A).
14) Disconnect the connector from oil pressure switch (B).



15) Disconnect the connector from camshaft position sensor.

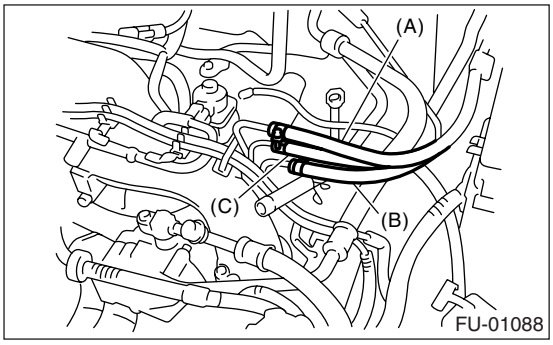


16) Remove the EGR pipe from intake manifold. (EC, EK and K4 model)



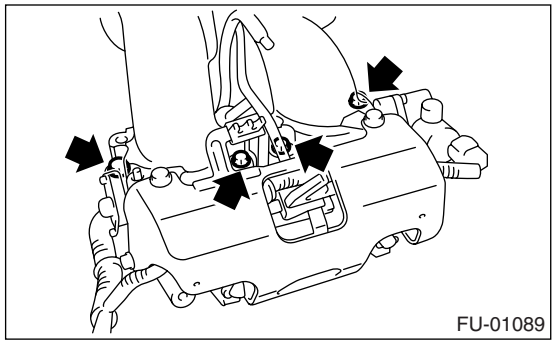
17) Disconnect the fuel hoses from fuel pipes.

WARNING:
• Be careful not to spill fuel.
• Catch the fuel from hoses using a container or cloth.



(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

18) Remove the bolts which secure intake manifold to cylinder head.



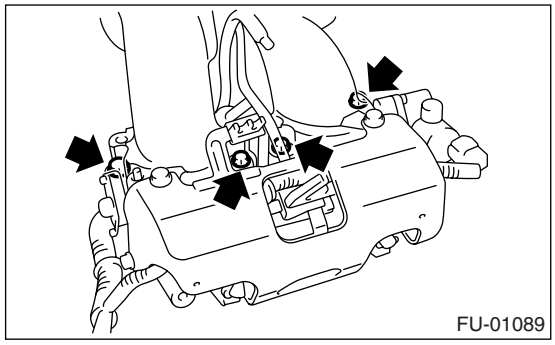
19) Remove the intake manifold.

B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

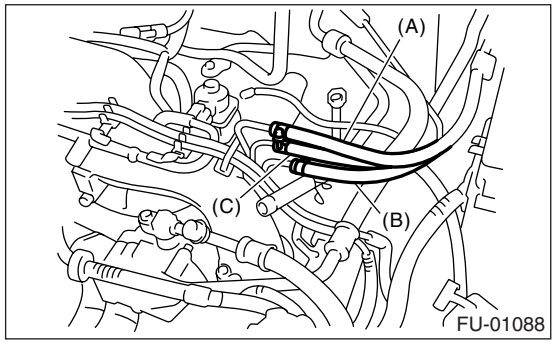
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Connect the fuel hoses.

NOTE:
If fuel hoses or clamps are damaged, replace them with new ones.

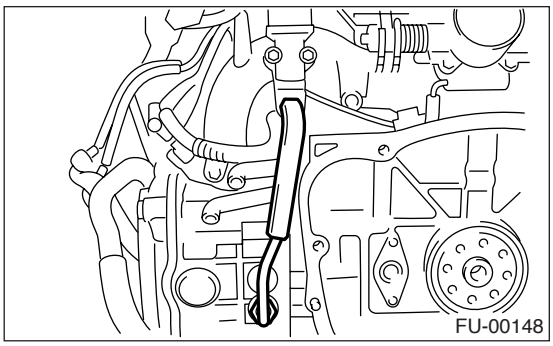


(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

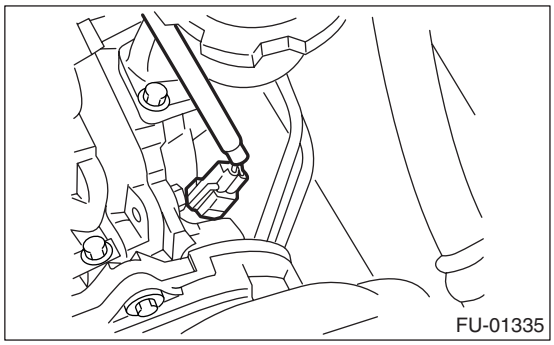
Tightening torque (Hose clamp screw):
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

3) Install the EGR pipe to intake manifold. (EC, EK and K4 model)

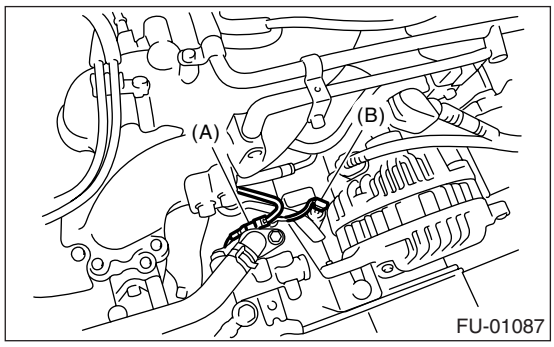
Tightening torque:
34 N·m (3.4 kgf-m, 24.6 ft-lb)



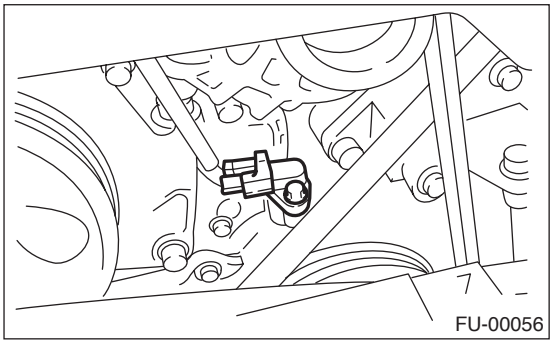
4) Connect the connector to camshaft position sensor.



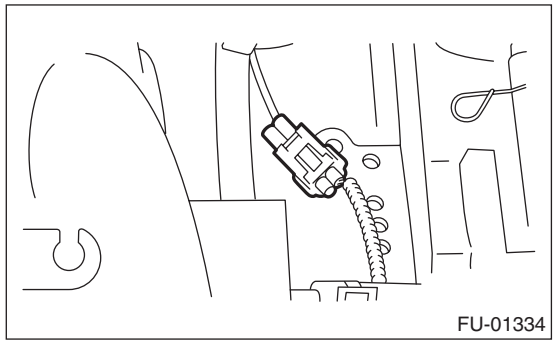
5) Connect the connector to power steering pump switch (A).
6) Connect the connector to oil pressure switch (B).



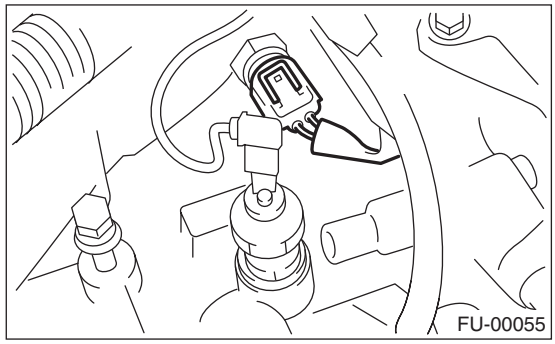
7) Connect the connector to crankshaft position sensor.



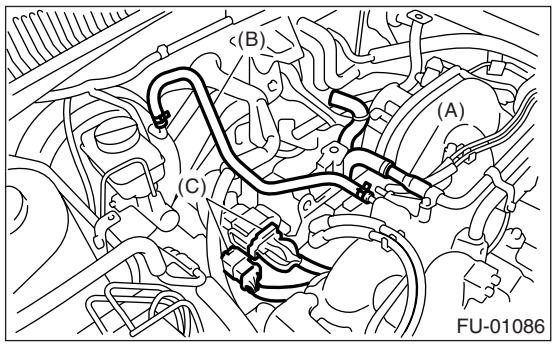
8) Connect the knock sensor connector.



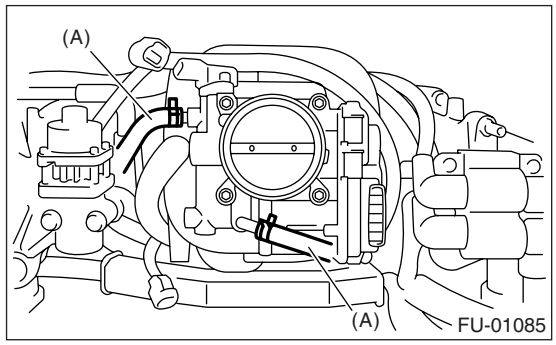
9) Connect the connectors to engine coolant temperature sensor.



10) Connect the PCV hose (A) to intake manifold.
11) Connect the brake booster hose (B).
12) Connect the engine harness connectors (C) to bulkhead harness connectors.

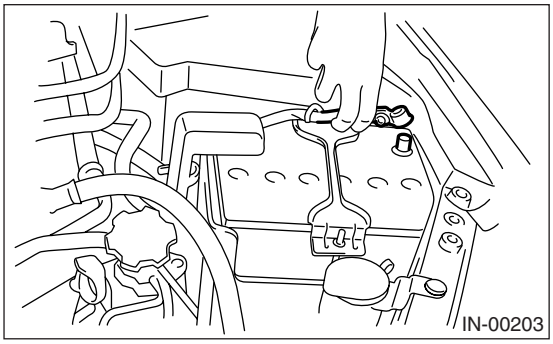


13) Connect the engine coolant hoses (A) to throttle body.



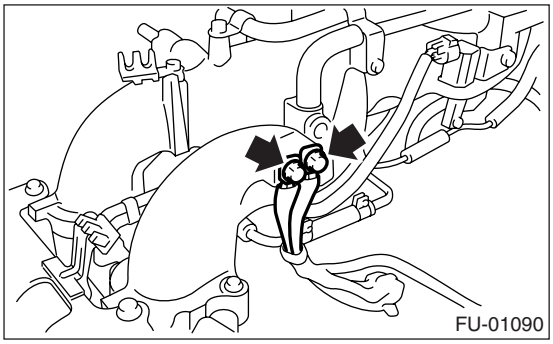
14) Connect the spark plug cords to spark plugs.

15) Install the air cleaner case and air intake chamber. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
16) Install the fuse of fuel pump to main fuse box.
17) Connect the battery ground cable to battery.

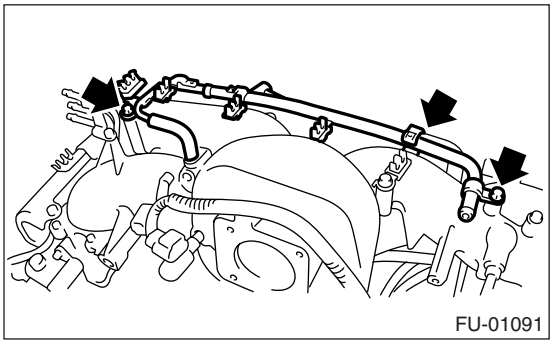


C: DISASSEMBLY

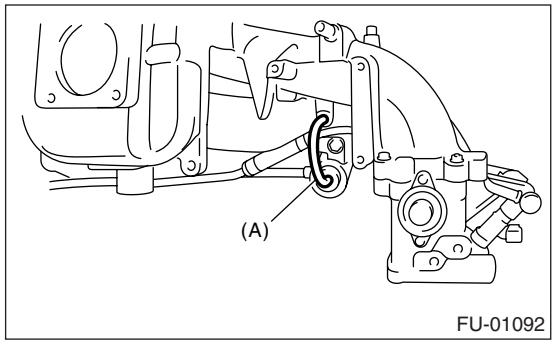
1) Disconnect the engine ground terminal from intake manifold.



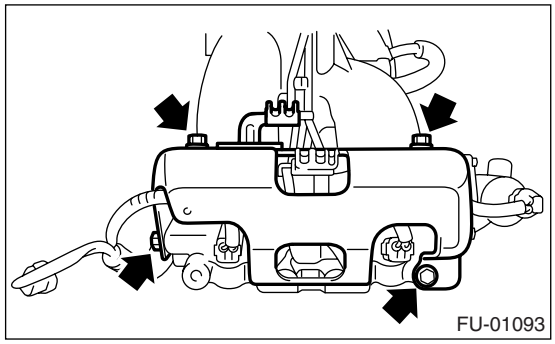
2) Remove the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, REMOVAL, Ignition Coil & Ignitor ASSY.>
3) Remove the throttle body. **<Ref. to FU(H4SO 2.5)-11,** REMOVAL**, Throttle Body.>**
4) Remove the EGR valve. (EC, EK and K4 model) **<Ref. to FU(H4SO 2.5)-30,** REMOVAL**, EGR Valve.>**
5) Remove the PCV pipe. (EC, EK and K4 model)



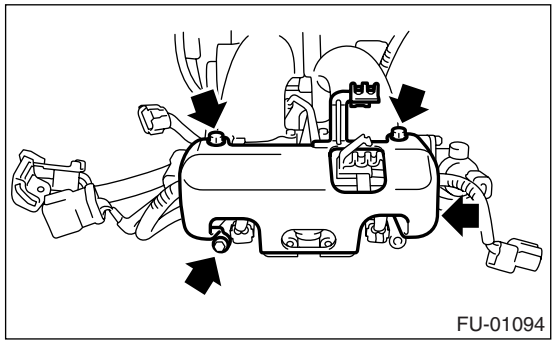
6) Disconnect the pressure regulator vacuum hose (A) from intake manifold.



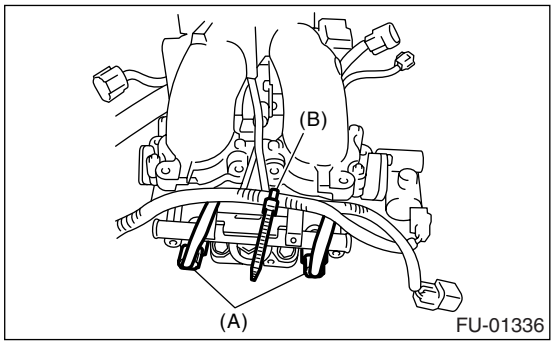
7) Remove the fuel pipe protector LH.



8) Remove the fuel pipe protector RH.

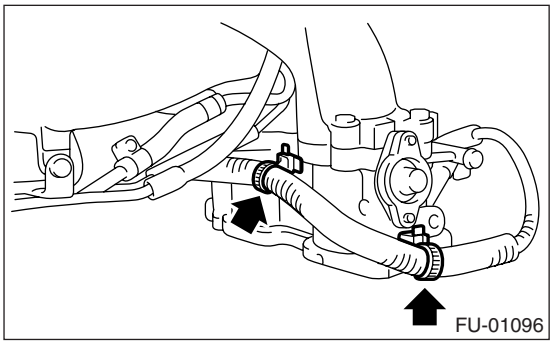


9) Disconnect the connectors (A) from fuel injector.
10) Remove the harness band (B) which holds engine harness to injector pipe.

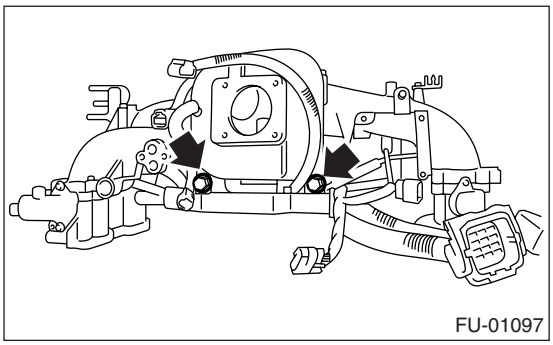


11) Remove the tumble generator valve actuator. (EC, EK and K4 model) **<Ref. to FU(H4SO 2.5)-29,** REMOVAL**, Tumble Generator Valve Actuator.>**

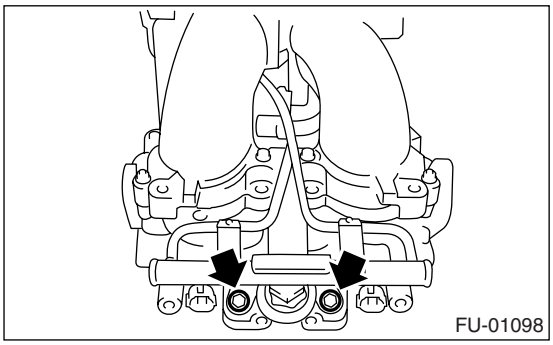
12) Remove the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, REMOVAL, Purge Control Solenoid Valve.>
13) Remove the harness band clips which install the engine harness.


FU-01096

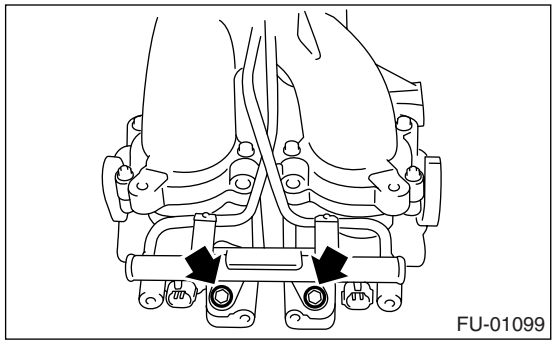
14) Remove the bolts which hold the engine harness to intake manifold.

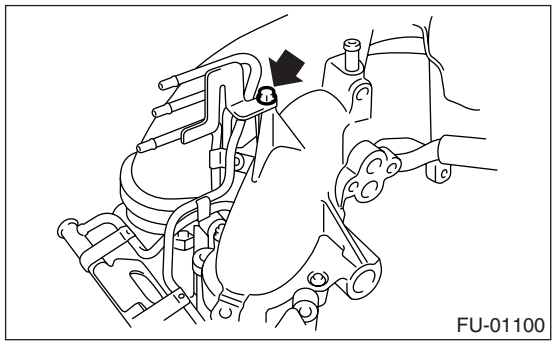

FU-01097

15) Remove the engine harness from intake manifold.
16) Remove the bolts which install injector pipe on the intake manifold as shown in the figure.
• RH side

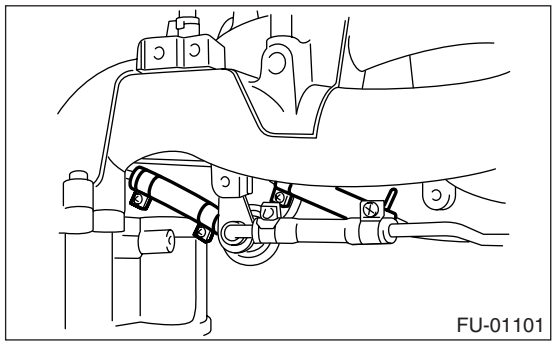

FU-01098

• LH side

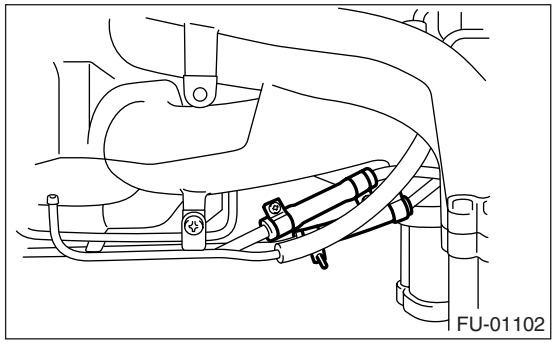

FU-01099


FU-01100

17) Remove the fuel injectors from injector pipe.
18) Loosen the clamp which holds fuel injector pipe RH to fuel hose, and then disconnect the pipe from fuel hose.

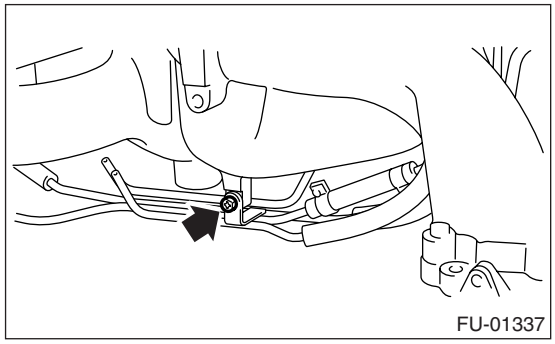

FU-01101

19) Loosen the clamp which holds fuel injector pipe LH to fuel hose, and then disconnect the pipe from fuel hose.

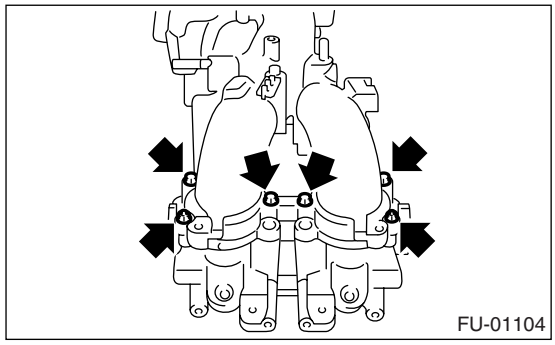

FU-01102

20) Remove the fuel injector pipe.
21) Remove the bolt which installs pressure regulator on intake manifold.

22) Remove the bolt which installs the fuel pipes on intake manifold.



23) Remove the fuel pipe assembly and pressure regulator, from intake manifold.
24) Remove the intake manifold. (EC, EK and K4 model)



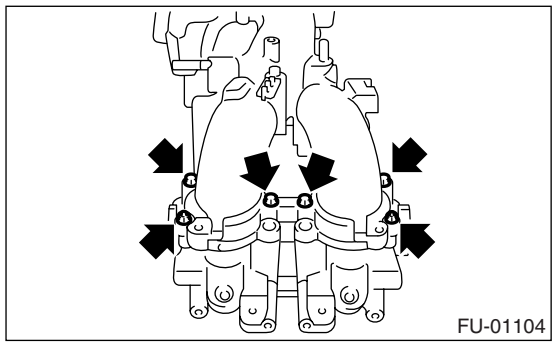
D: ASSEMBLY

1) Install the intake manifold. (EC, EK and K4 model)

NOTE:
- Use a new gasket.
- When assembling the nipple, apply liquid gasket.

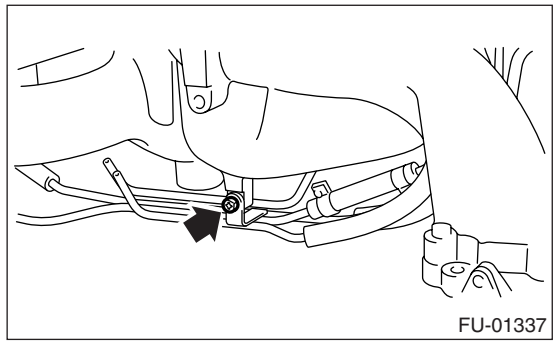
Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
8.75 N·m (0.89 kgf-m, 6.5 ft-lb)



2) Tighten the bolt which installs the fuel pipes on intake manifold.

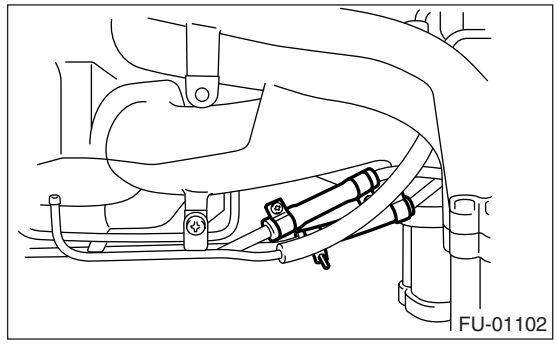
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



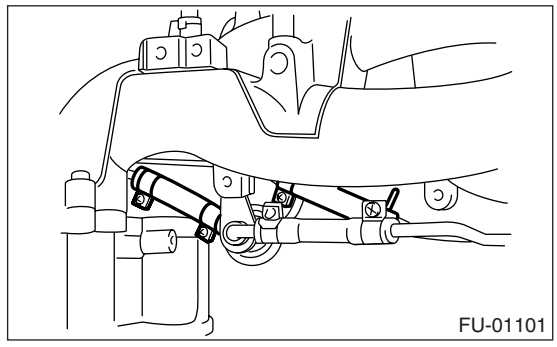
3) Tighten the bolt which installs pressure regulator on intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

4) Connect the fuel injector pipe.
5) Connect the fuel injector pipe LH to fuel hose, and tighten the clamp screw.



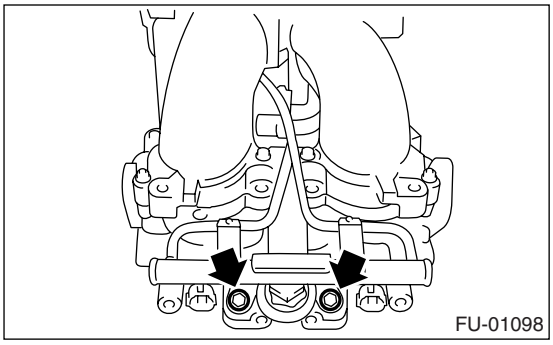
6) Connect the fuel injector pipe RH to fuel hose, and tighten the clamp screw.



7) Install the fuel injectors.

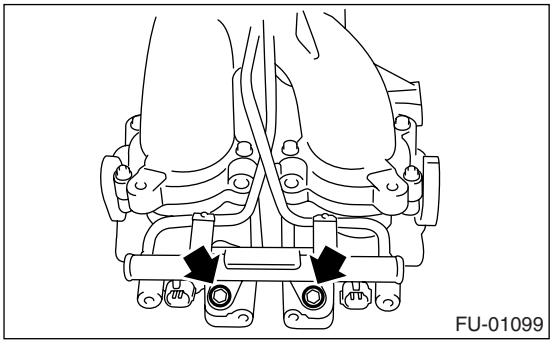
8) Tighten the bolts which install injector pipe on intake manifold.
• RH side

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



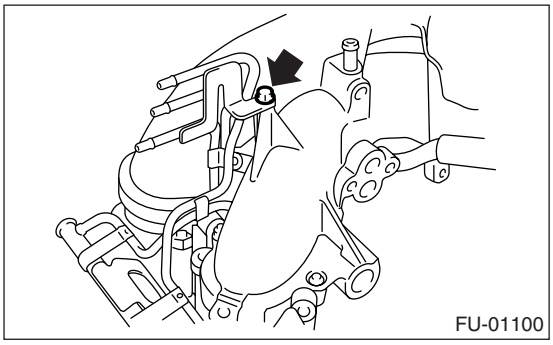
• LH side

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



9) Tighten the two bolts which install fuel pipes on intake manifold.

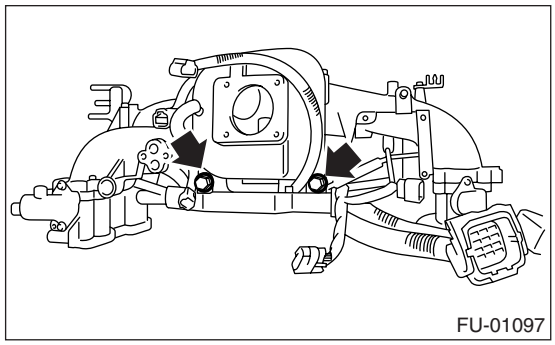
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



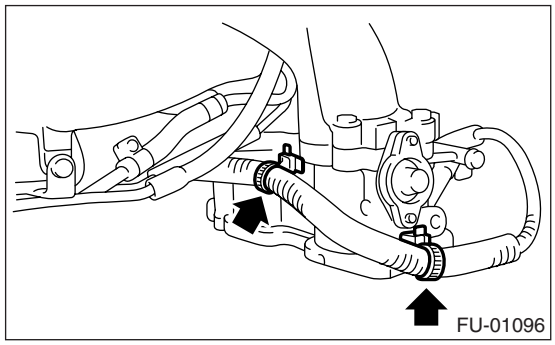
10) Install the engine harness onto intake manifold.

11) Tighten the bolts which install engine harness on intake manifold.

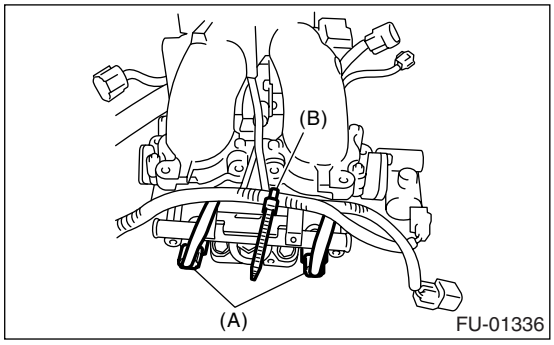
Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



12) Hold the engine harness by harness band clips.

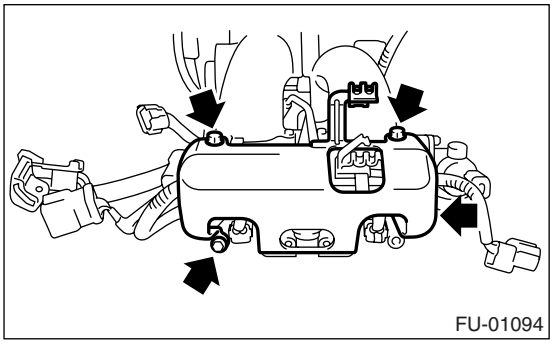


13) Install the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, INSTALLATION, Purge Control Solenoid Valve.>
14) Install the tumble generator valve actuator. (EC, EK and K4 model) **<Ref. to FU(H4SO 2.5)-29,** INSTALLATION**, Tumble Generator Valve Actuator.>**
15) Connect the connectors (A) to fuel injector.
16) Hold the engine harness to injector pipe by harness band (B).



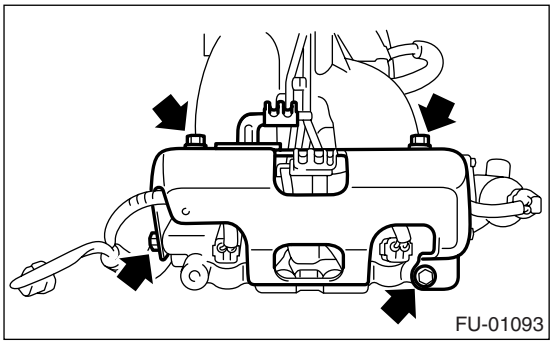
17) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

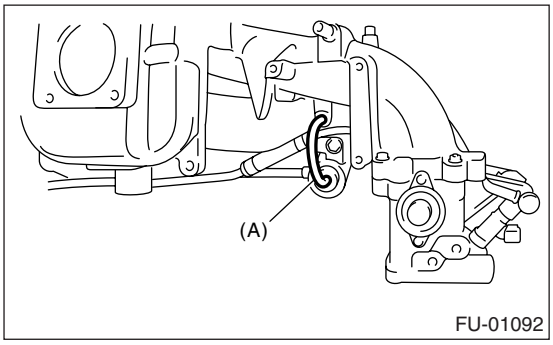

FU-01094

18) Install the fuel pipe protector LH.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

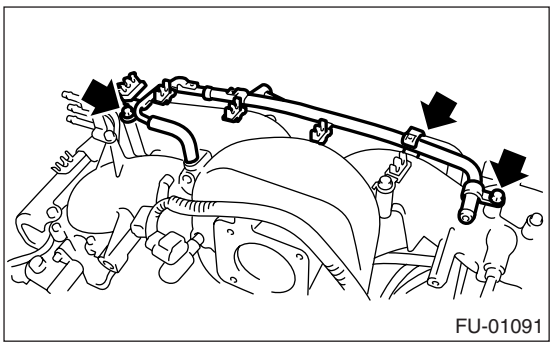

FU-01093

19) Connect the pressure regulator vacuum hose (A) to intake manifold.



FU-01092

20) Install the PCV pipe. (EC, EK and K4 model)


FU-01091

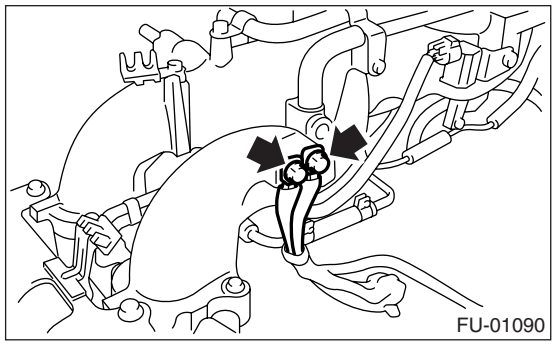
21) Install the EGR valve. (EC, EK and K4 model) **<Ref. to FU(H4SO 2.5)-30,** INSTALLATION**, EGR Valve.>**

22) Install the throttle body to intake manifold. **<Ref. to FU(H4SO 2.5)-11,** INSTALLATION**, Throttle Body.>**

23) Install the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, INSTALLATION, Ignition Coil & Ignitor ASSY.>

24) Install the engine ground terminal to intake manifold.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)


FU-01090

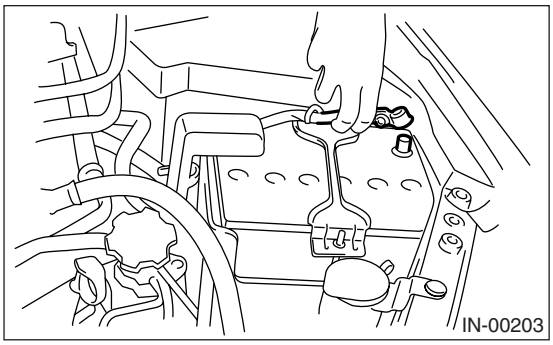
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not damaged and the connections are tightened firmly.

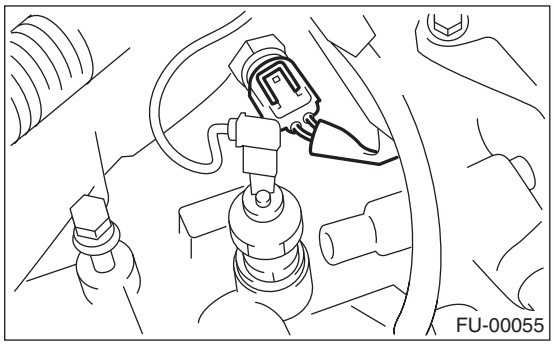
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
3) Disconnect the connectors from engine coolant temperature sensor.



4) Remove the engine coolant temperature sensor.

B: INSTALLATION

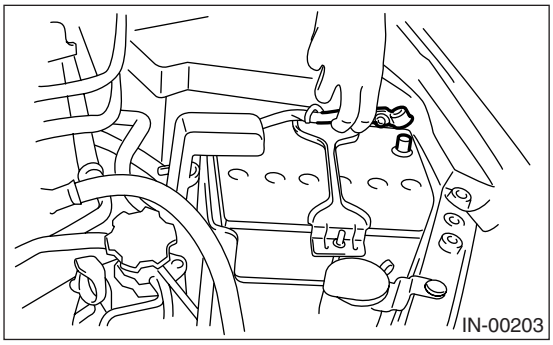
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

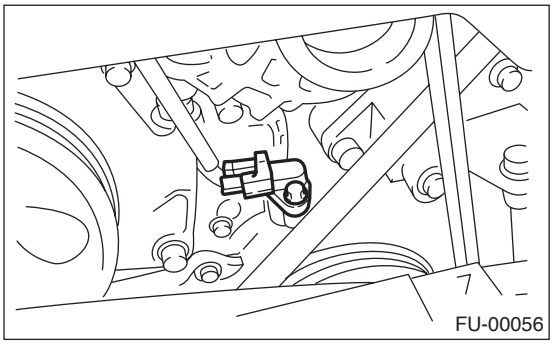
5. Crankshaft Position Sensor

A: REMOVAL

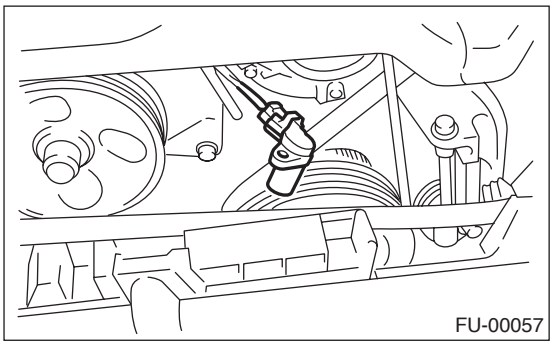
1) Disconnect the ground cable from battery.



2) Remove the bolt which installs crankshaft position sensor to cylinder block.



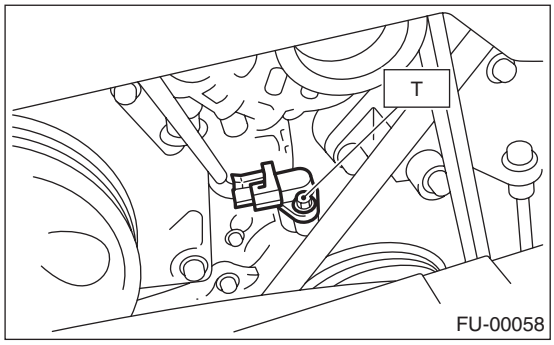
3) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

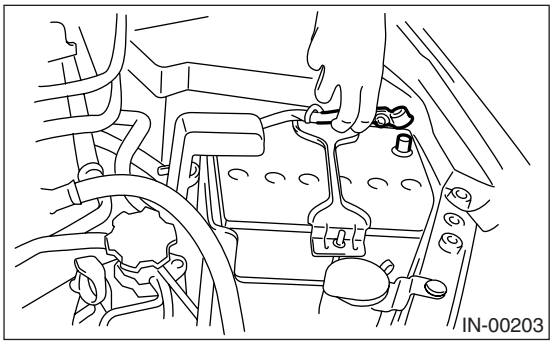
Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



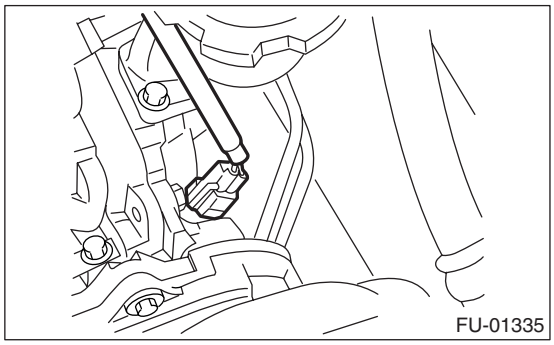
6. Camshaft Position Sensor

A: REMOVAL

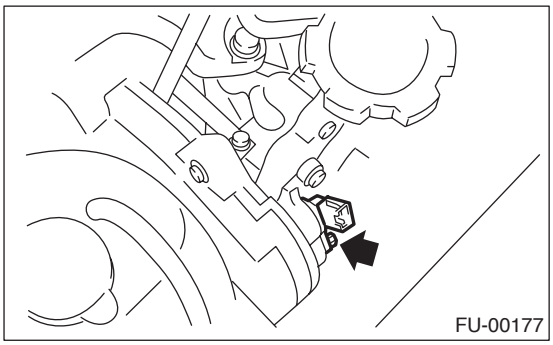
1) Disconnect the ground cable from battery.



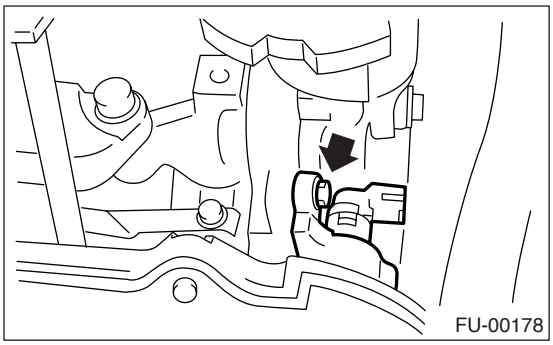
2) Disconnect the connector from camshaft position sensor.



3) Remove the bolt which installs camshaft position sensor to the support.

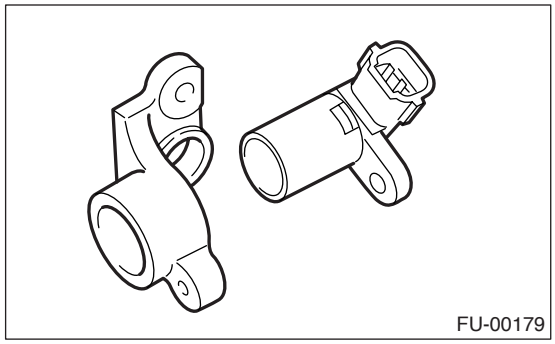


4) Remove the bolt which installs the camshaft position sensor support to camshaft cap LH.



5) Remove the camshaft position sensor and the support as a unit.

6) Remove the camshaft position sensor itself.



B: INSTALLATION

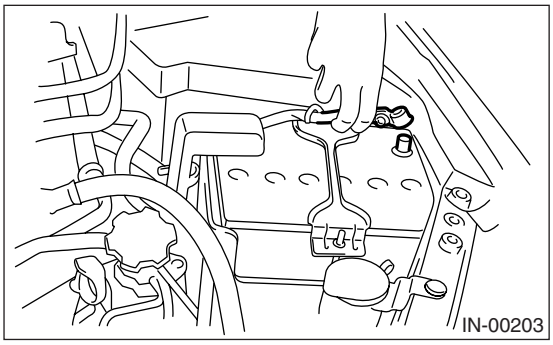
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor support
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

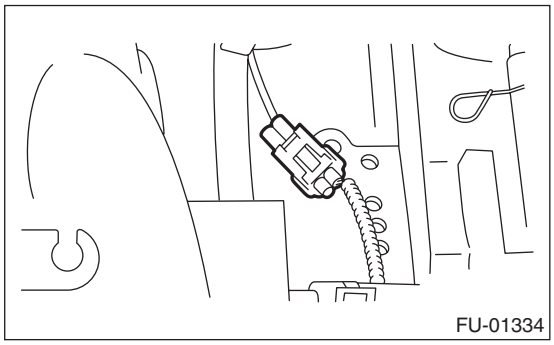
7. Knock Sensor

A: REMOVAL

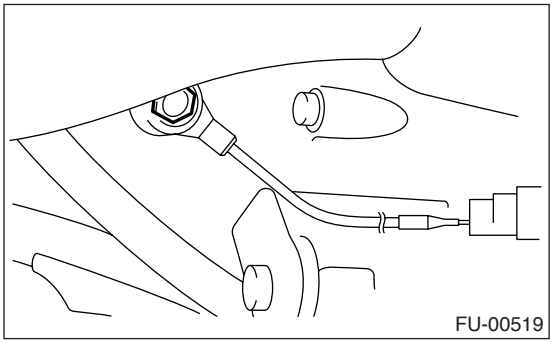
1) Disconnect the ground cable from battery.



2) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
3) Disconnect the knock sensor connector.



4) Remove the knock sensor from cylinder block.

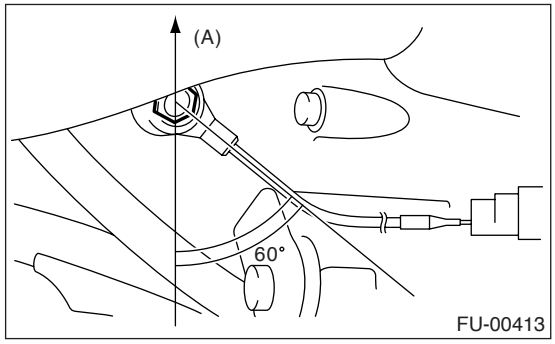


B: INSTALLATION

1) Install the knock sensor to cylinder block.

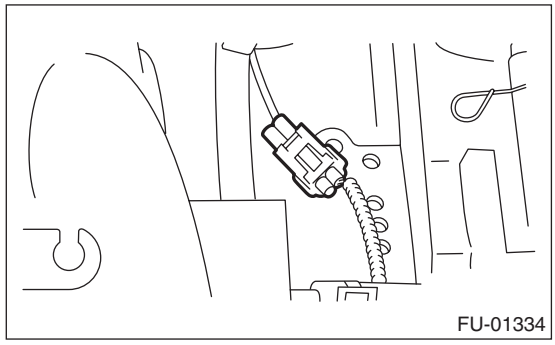
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to the engine rear.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

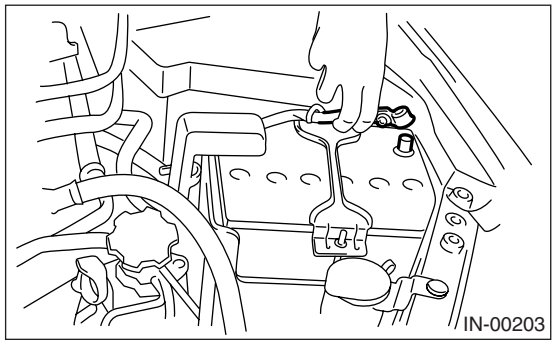


(A) Front side

2) Connect the knock sensor connector.



3) Install the air cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.>
4) Connect the battery ground cable to battery.



8. Throttle Position Sensor

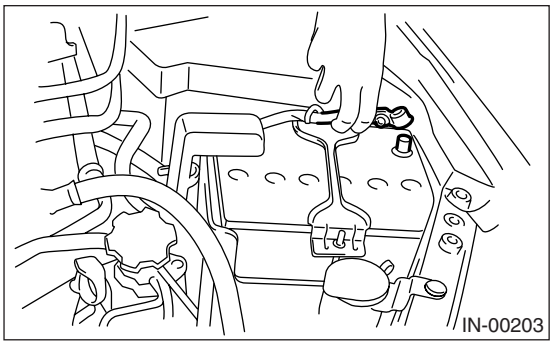
A: SPECIFICATION

Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body.
Refer to “Throttle Body” for removal and installation procedure. **<Ref. to FU(H4SO 2.5)-11,** REMOVAL**, Throttle Body.> <Ref. to FU(H4SO 2.5)-11,** INSTALLATION**, Throttle Body.>**

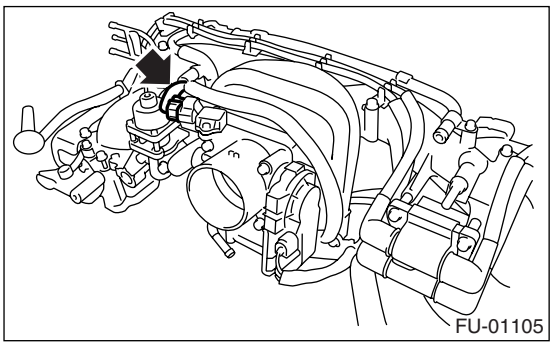
9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from manifold absolute pressure sensor.



3) Remove the manifold absolute pressure sensor from throttle body.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use new O-rings.

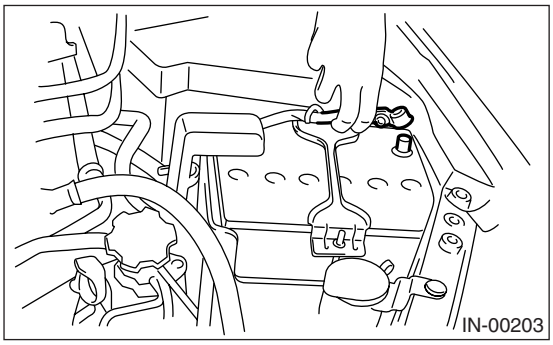
Tightening torque:
2.0 N·m (0.2 kgf-m, 1.5 ft-lb)

10. Mass Air Flow and Intake Air Temperature Sensor

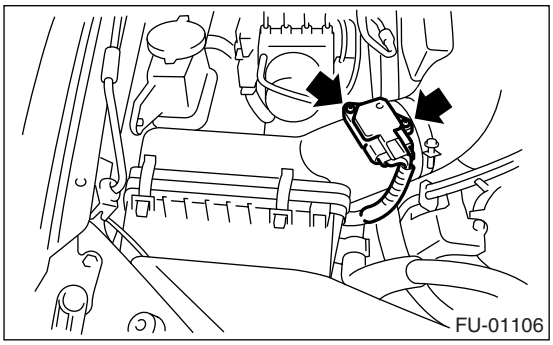
A: REMOVAL

NOTE:
Mass air flow and intake air temperature sensor is installed to EC, EK and K4 model.

1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.
3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

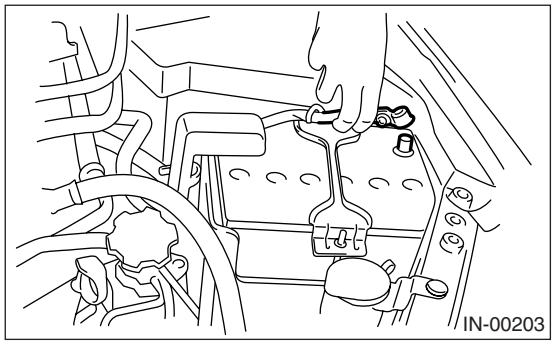
Tightening torque:
1.0 N·m (0.10 kgf-m, 0.74 ft-lb)

11.Intake Air Temperature Sensor

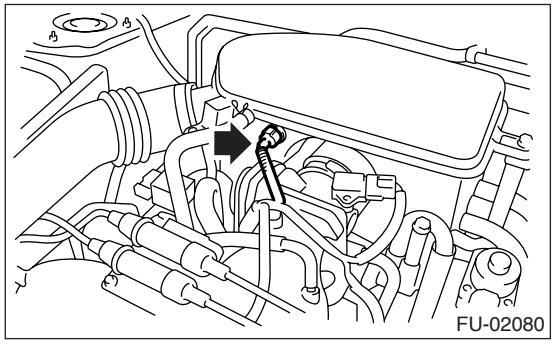
A: REMOVAL

NOTE:
Intake air temperature sensor is installed to models except for EC, EK and K4.

1) Disconnect the ground cable from battery.



2) Disconnect the connector from intake air temperature sensor.
3) Remove the intake air temperature sensor.



B: INSTALLATION

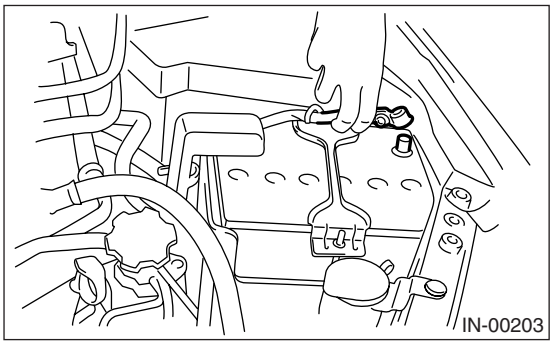
Install in the reverse order of removal.

12. Tumble Generator Valve Assembly

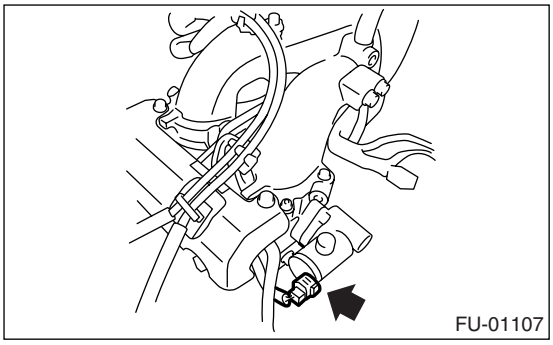
A: REMOVAL

NOTE:
This component is installed to EC, EK and K4 model.

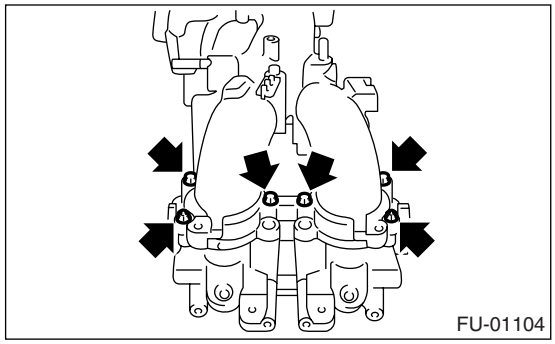
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Remove the intake manifold.
<Ref. to FU(H4SO 2.5)-12, REMOVAL**, Intake Manifold.>**
5) Disconnect the connector from tumble generator valve actuator.



6) Remove the fuel injectors.
<Ref. to FU(H4SO 2.5)-31, REMOVAL**, Fuel Injector.>**
7) Remove the tumble generator valve body from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

Tightening torque:
8.75 N·m (0.89 kgf-m, 6.5 ft-lb)

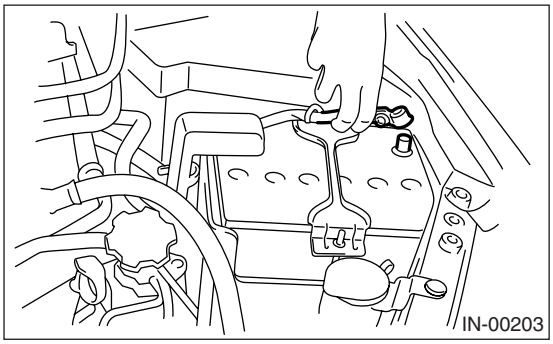
13. Tumble Generator Valve Actuator

A: REMOVAL

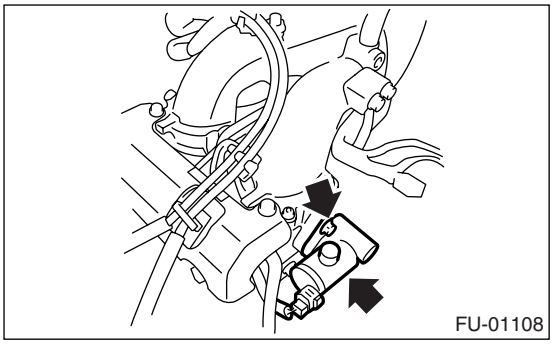
1. RH SIDE

NOTE:
This component is installed to EC, EK and K4 model.

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.

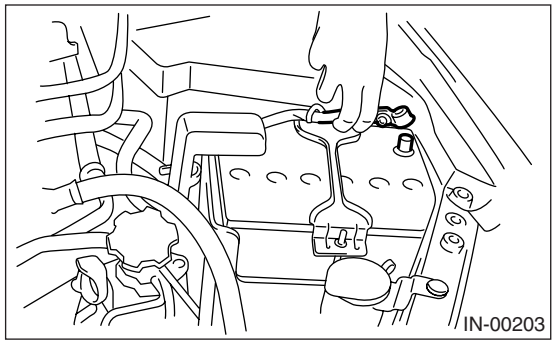


4) Remove the intake manifold.
<Ref. to FU(H4SO 2.5)-12, REMOVAL**, Intake Manifold.>**
5) Disconnect the connector from tumble generator valve RH.
6) Remove the tumble generator valve RH.

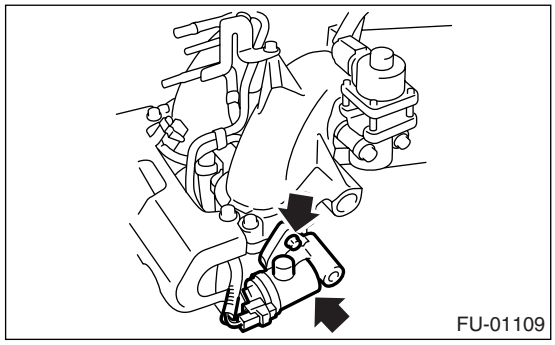


2. LH SIDE

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Disconnect the connector from tumble generator valve LH.
5) Remove the tumble generator valve LH.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

2. LH SIDE

Install in the reverse order of removal.

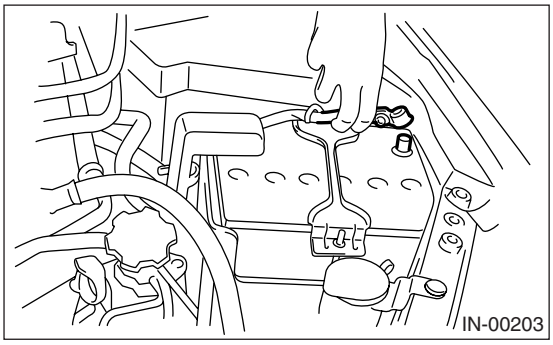
Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

14.EGR Valve

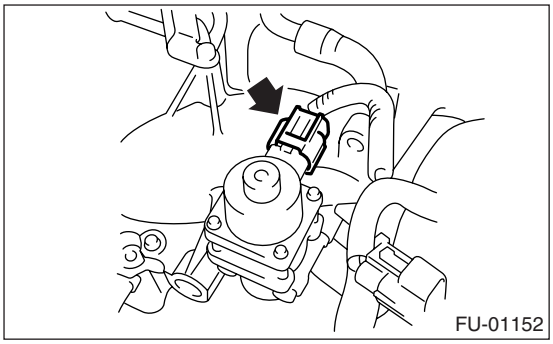
A: REMOVAL

NOTE:
EGR valve is installed to EC, EK and K4 model.

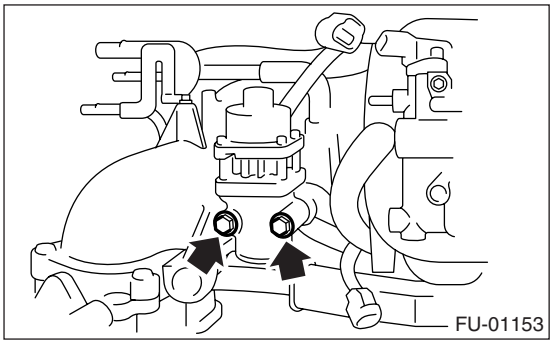
1) Disconnect the ground cable from battery.



2) Disconnect the connector from EGR valve.



3) Remove the EGR valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.

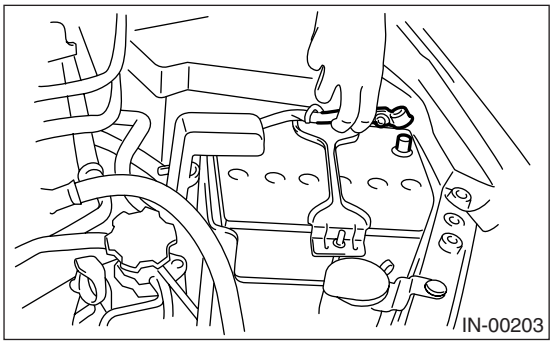
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

15.Fuel Injector

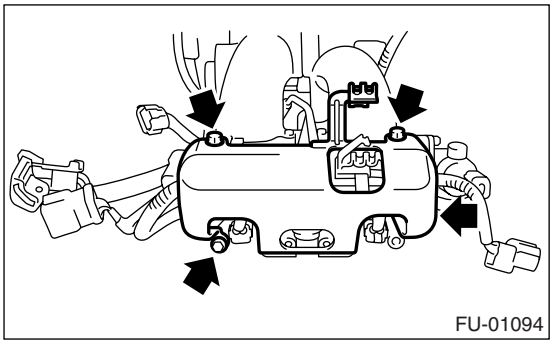
A: REMOVAL

1. RH SIDE

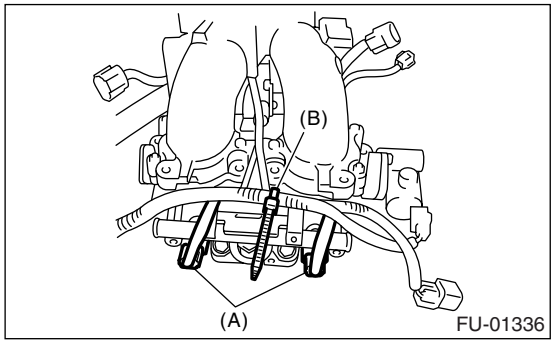
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



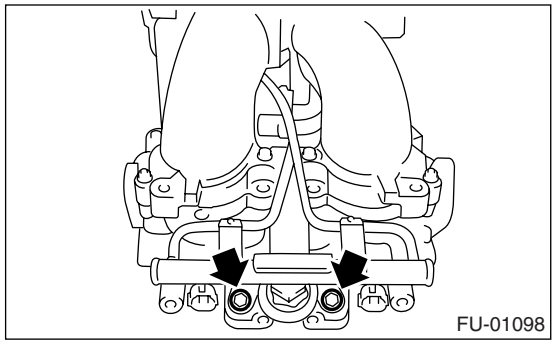
4) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
5) Remove the spark plug cords from spark plugs (#1 and #3 cylinders).
6) Remove the fuel pipe protector RH.



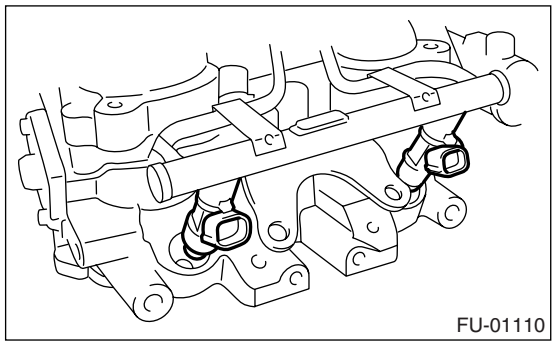
7) Disconnect the connector (A) from fuel injector.
8) Remove the harness band (B) which holds engine harness to injector pipe.



9) Remove the bolts which hold fuel injector pipe onto intake manifold.

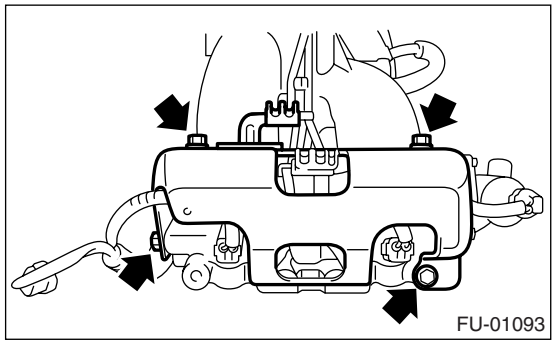


10) Remove the fuel injector while lifting up the fuel injector pipe.



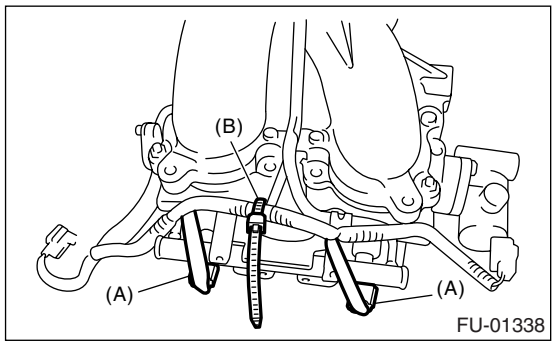
2. LH SIDE

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the battery.
4) Remove the spark plug cords from spark plugs (#2 and #4 cylinders).
5) Remove the fuel pipe protector LH.

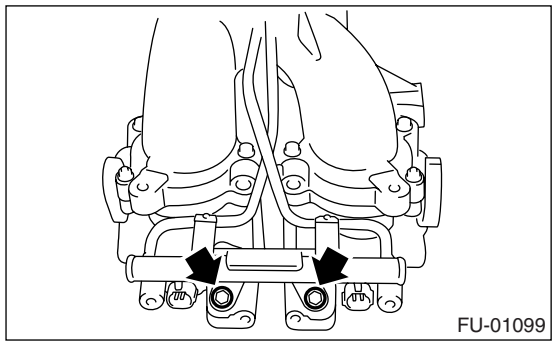


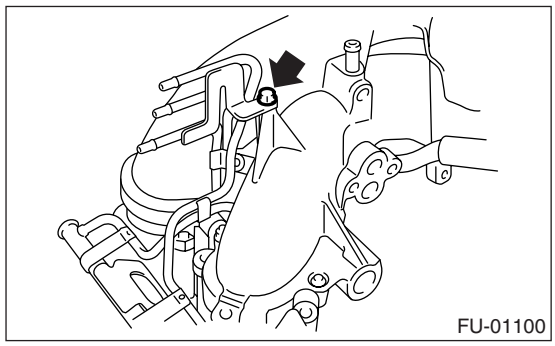
6) Disconnect the connector (A) from fuel injector.

7) Remove the harness band (B) which holds engine harness to injector pipe.

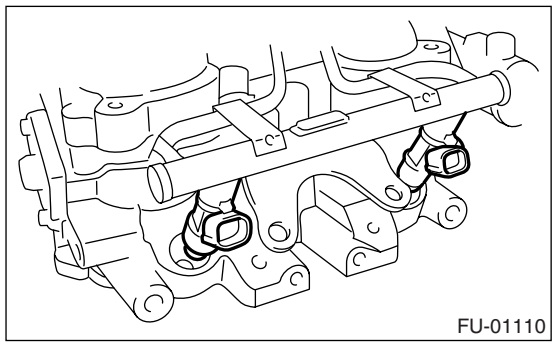


8) Remove the bolts which hold fuel injector pipe onto intake manifold.





9) Remove the fuel injector while lifting up the fuel injector pipe.

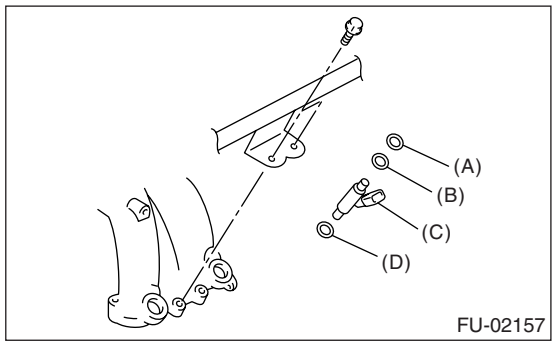


B: INSTALLATION

1. RH SIDE

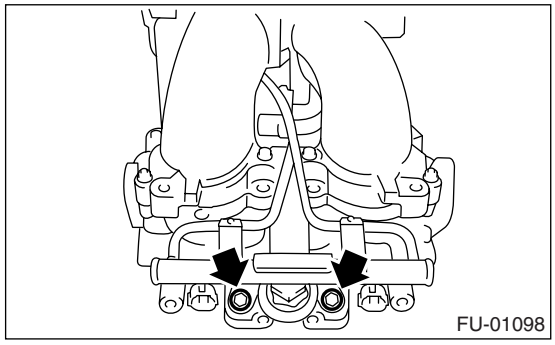
Install in the reverse order of removal.

NOTE:
- Use new O-rings.
- O-ring (B) is used for EC, EK and K4 model.

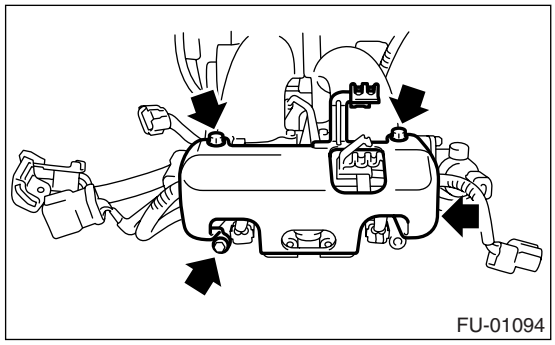


(A) O-ring
(B) O-ring
(C) Fuel injector
(D) O-ring

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



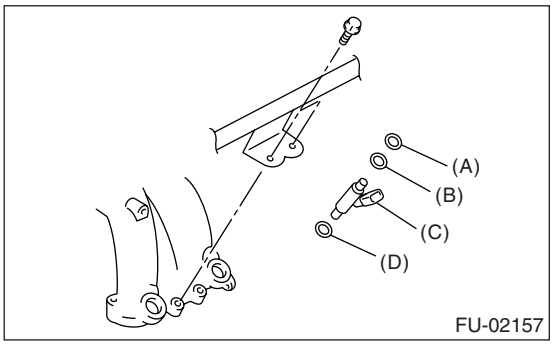
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



2. LH SIDE

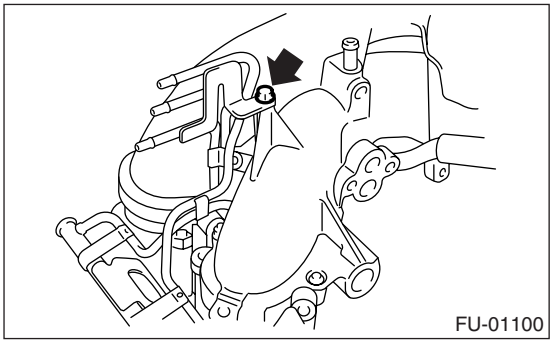
Install in the reverse order of removal.

NOTE:
- Use new O-rings.
- O-ring (B) is used for EC, EK and K4 model.

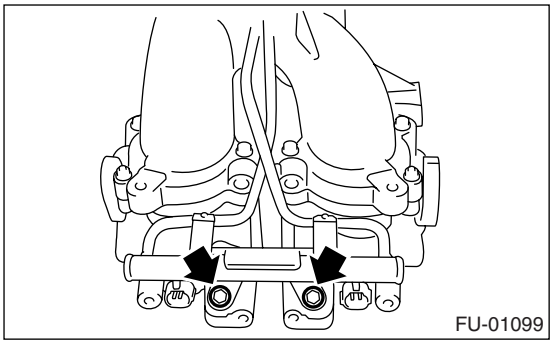


(A) O-ring
(B) O-ring
(C) Fuel injector
(D) O-ring

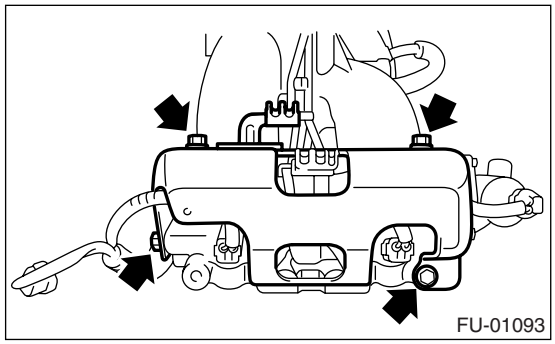
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



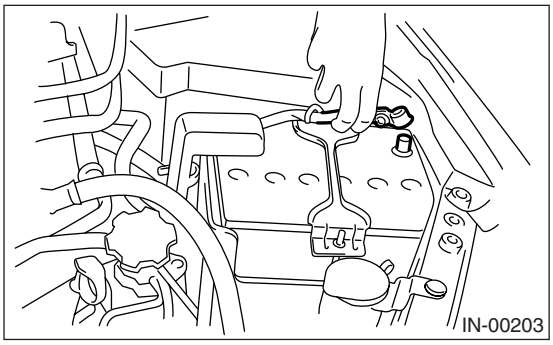
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



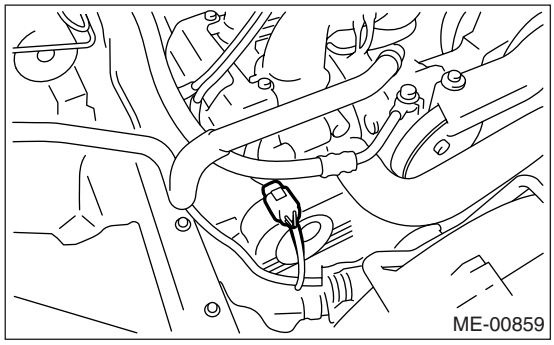
16.Front Oxygen (A/F) Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

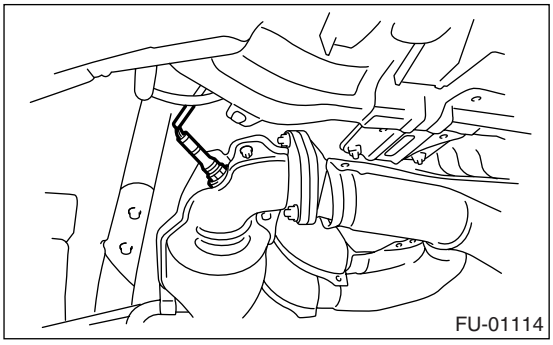


2) Remove the air intake duct. <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
3) Remove the connector of front oxygen (A/F) sensor.



4) Remove the clip holding harness.
5) Lift-up the vehicle.
6) Remove the under cover.
7) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
8) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the front oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

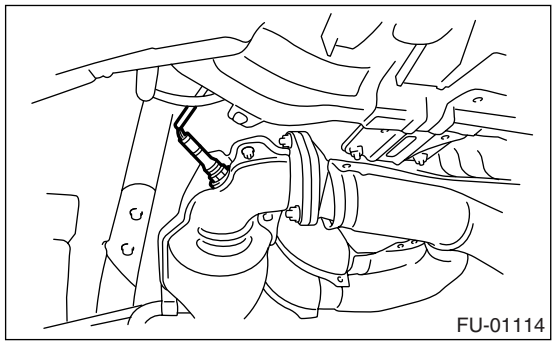
1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

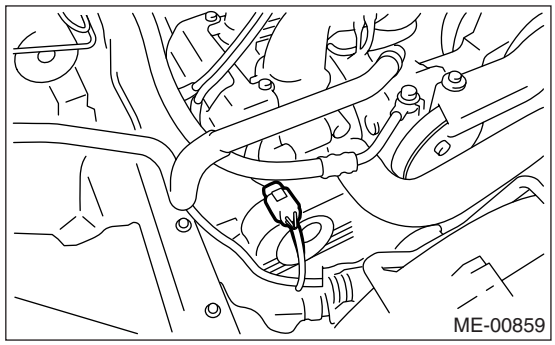
CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

2) Install the front oxygen (A/F) sensor.

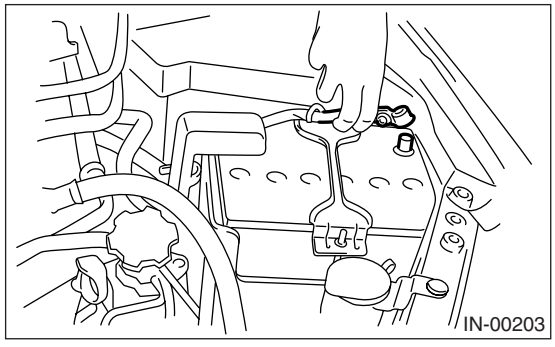
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Install the under cover.
4) Lower the vehicle.
5) Hold the harness with clip.
6) Connect the connector of front oxygen (A/F) sensor.



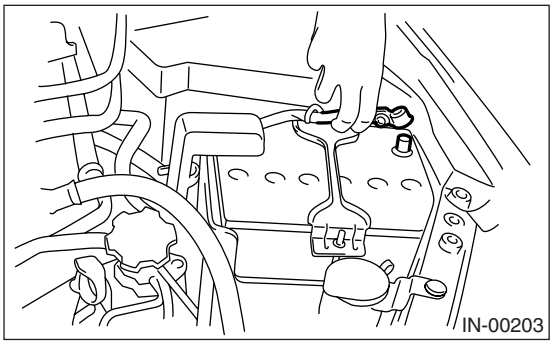
7) Install the air intake duct. <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
8) Connect the battery ground cable to battery.



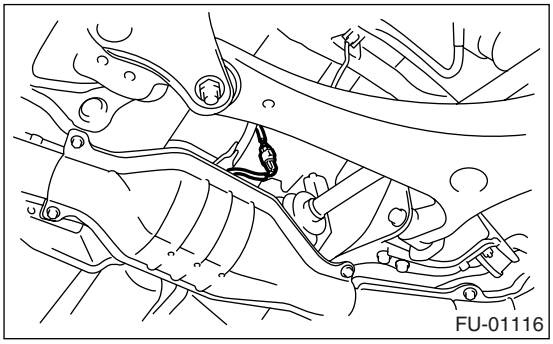
17.Rear Oxygen Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.

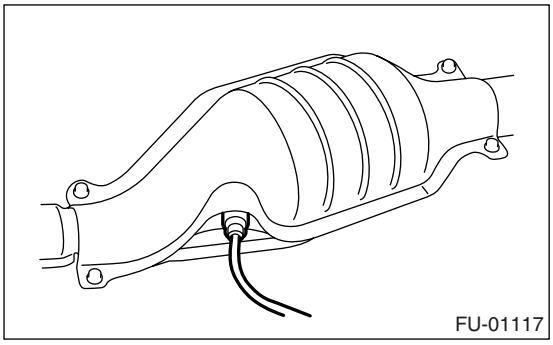


2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.



4) Remove the clip holding harness.
5) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
6) Remove the rear oxygen sensor.

CAUTION:
When removing the rear oxygen sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.



B: INSTALLATION

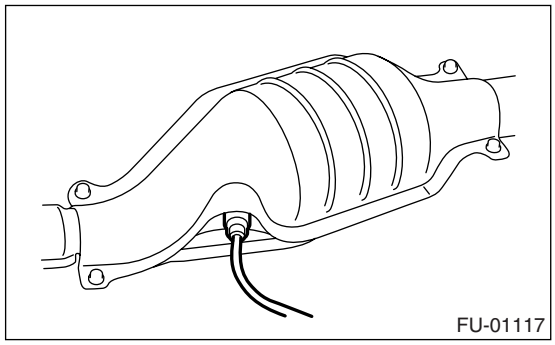
1) Before installing rear oxygen sensor, apply anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

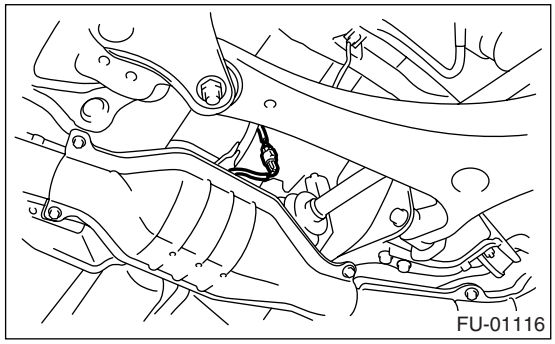
CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

2) Install the rear oxygen sensor.

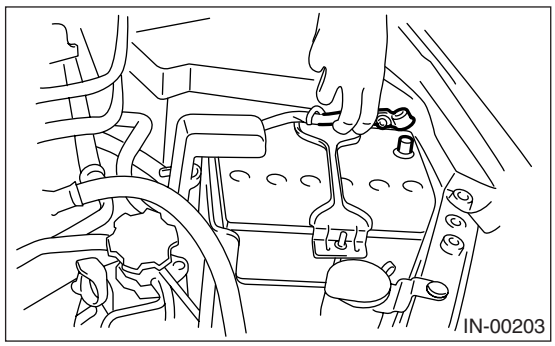
Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



3) Hold the harness with clip.
4) Connect the connector to rear oxygen sensor.



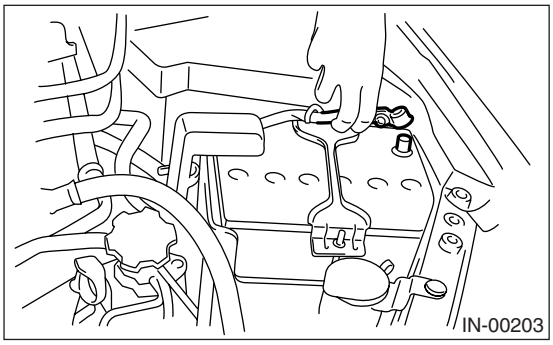
5) Lower the vehicle.
6) Connect the battery ground cable to battery.



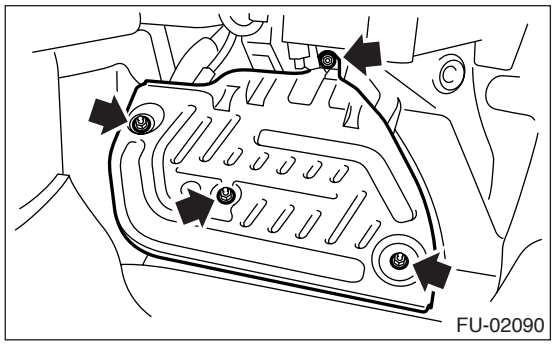
18.Engine Control Module (ECM)

A: REMOVAL

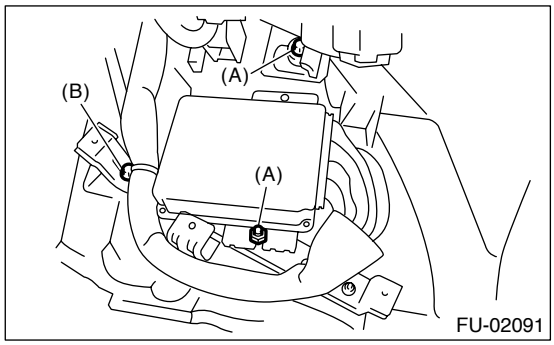
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger's side. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold the ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

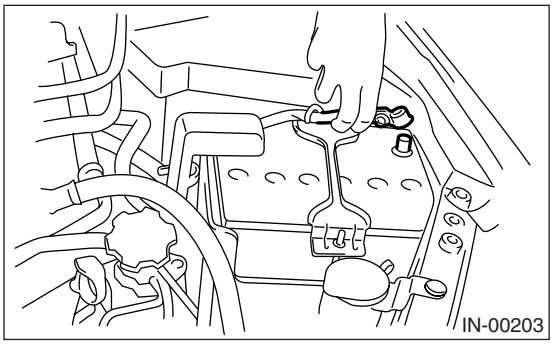
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

19.Main Relay

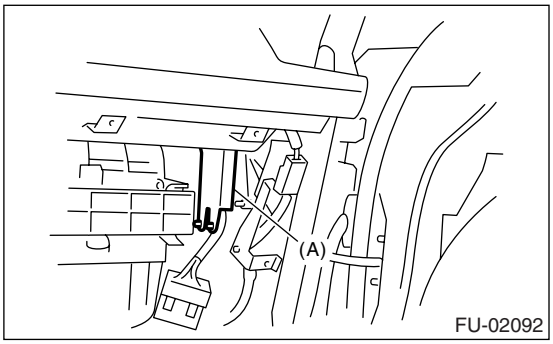
A: REMOVAL

1) Disconnect the ground cable from battery.

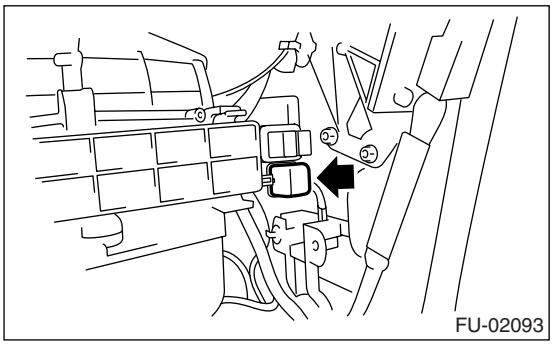


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



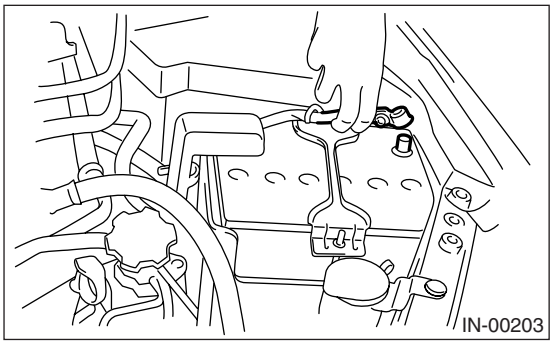
B: INSTALLATION

Install in the reverse order of removal.

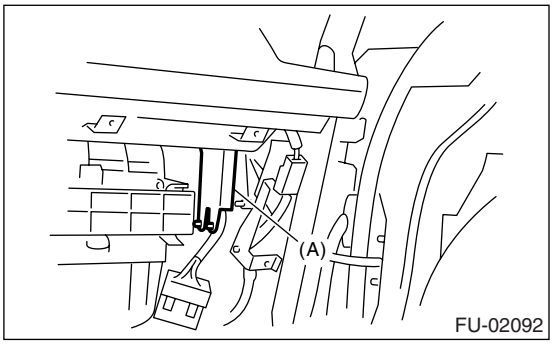
20.Fuel Pump Relay

A: REMOVAL

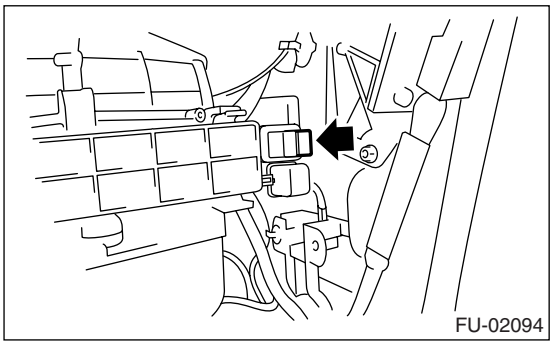
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



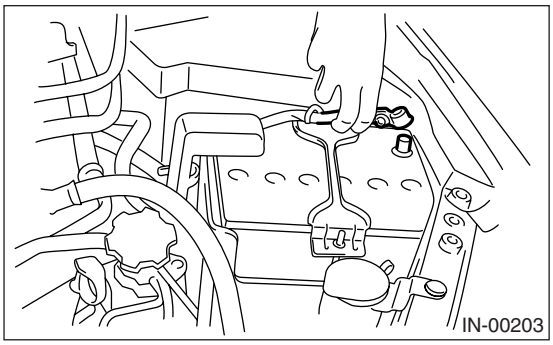
B: INSTALLATION

Install in the reverse order of removal.

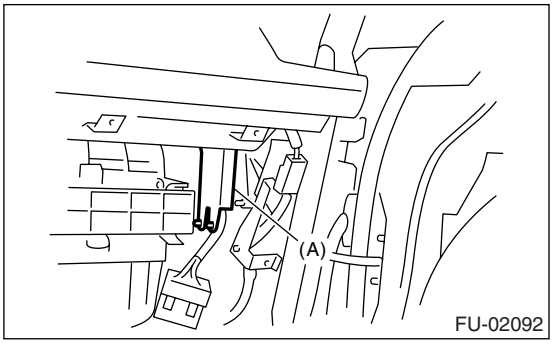
21. Electronic Throttle Control Relay

A: REMOVAL

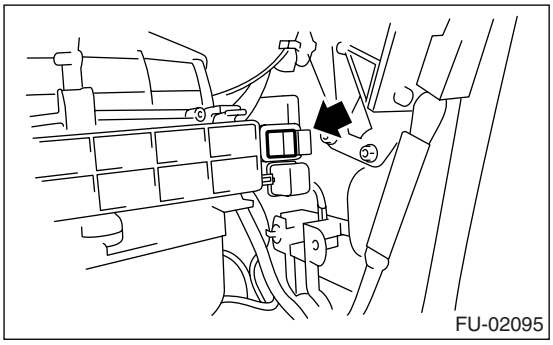
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from electric throttle control relay.



B: INSTALLATION

Install in the reverse order of removal.

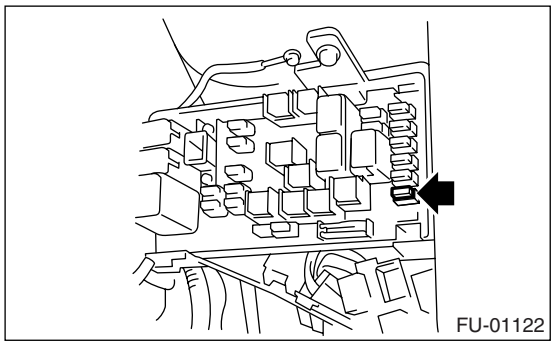
22.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuse of fuel pump from main fuse box.

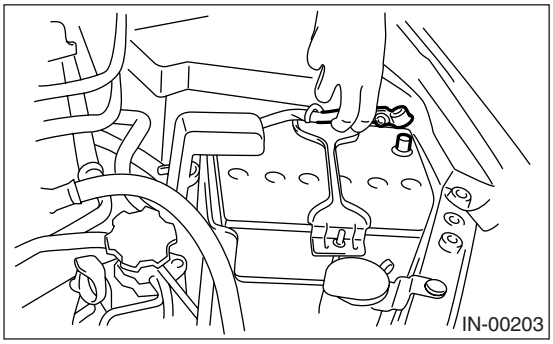


2) Start the engine and run it until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

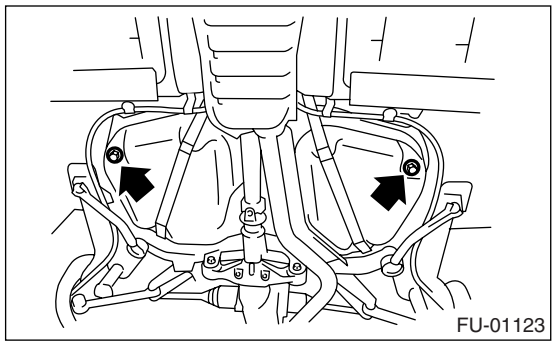
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

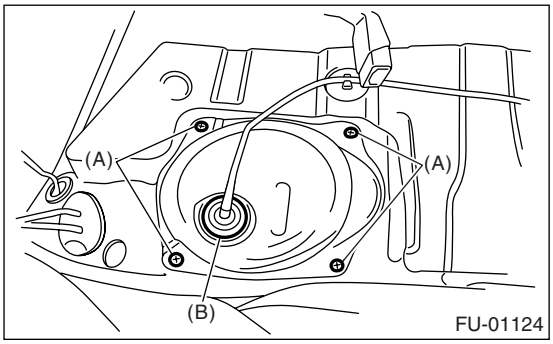
Tightening torque:
Nut
9.0 N·m (0.92 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

23.Fuel Tank

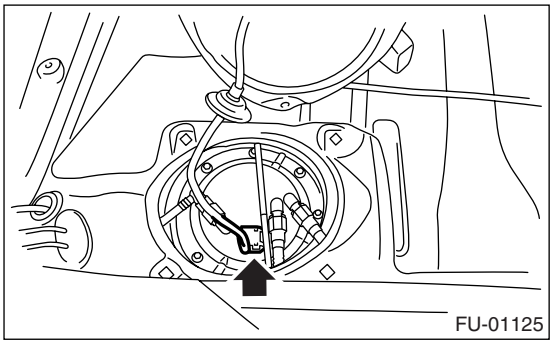
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

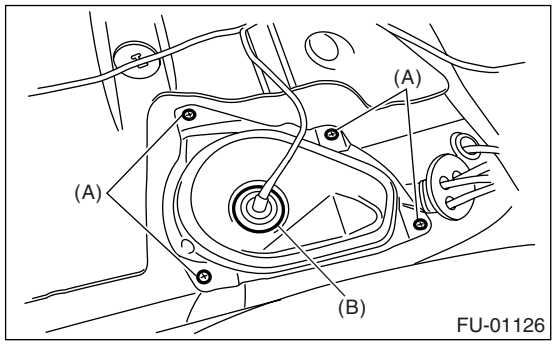
1) Set the vehicle on a lift.
2) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from the fuel tank.
<Ref. to FU(H4SO 2.5)-40, DRAINING FUEL, PROCEDURE**, Fuel.>**
4) Remove the rear seat.
5) Remove the service hole cover from fuel pump.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove service hole cover.



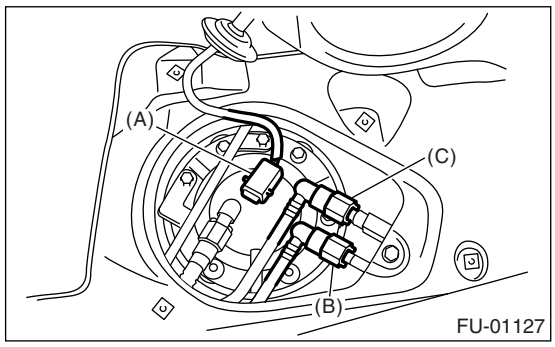
6) Disconnect the connector from fuel pump.



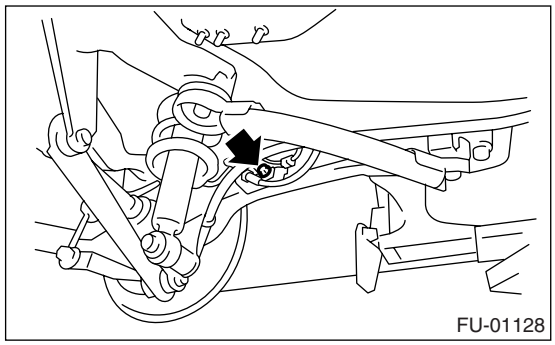
7) Remove the service hole cover from fuel sub level sensor.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove service hole cover.



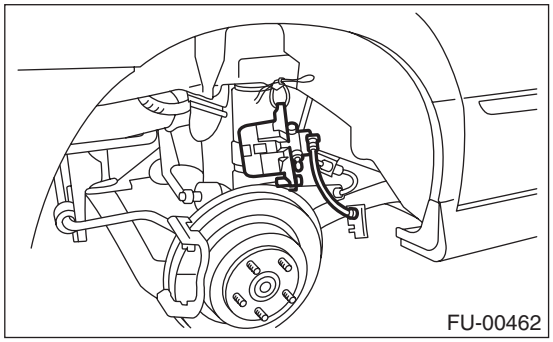
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector from the fuel delivery (B) and return hose (C). **<Ref. to FU(H4SO 2.5)-55,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**



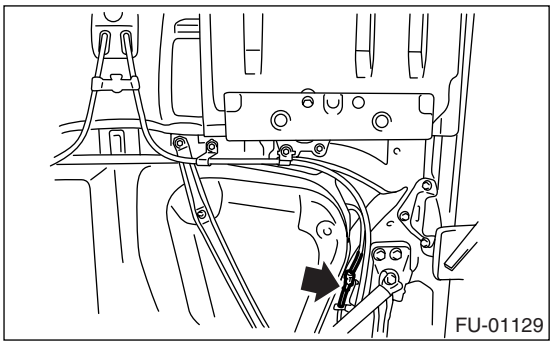
10) Remove the rear wheels.
11) Remove the bolts which secure the rear brake hose installation bracket.



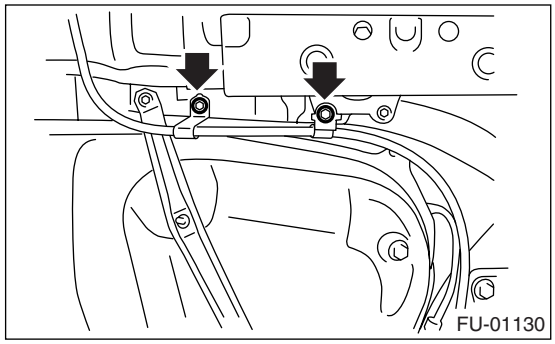
12) Remove the rear brake caliper and tie it to the vehicle body side.

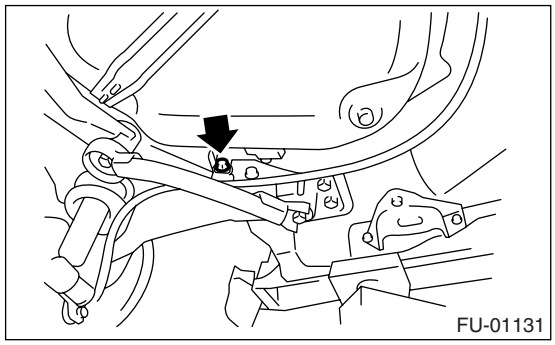


13) Remove the parking brake cable from parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
14) Lift-up the vehicle.
15) Remove the rear exhaust pipe.
<Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install the parking brake cable clamp.

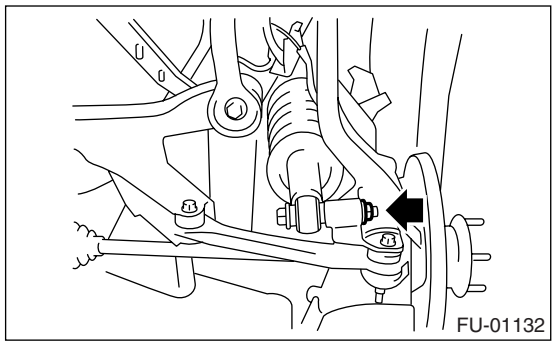




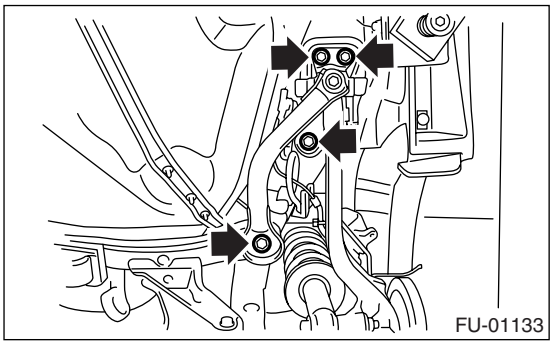
20) Remove the rear suspension assembly.

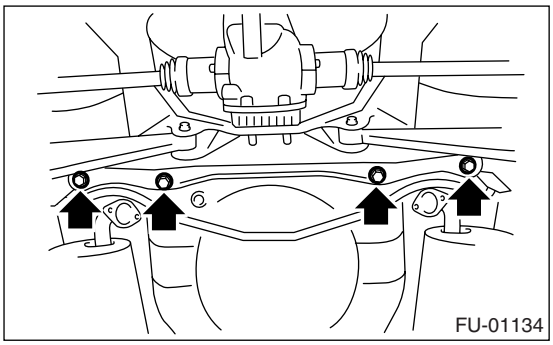
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs the rear shock absorber to rear suspension arm.



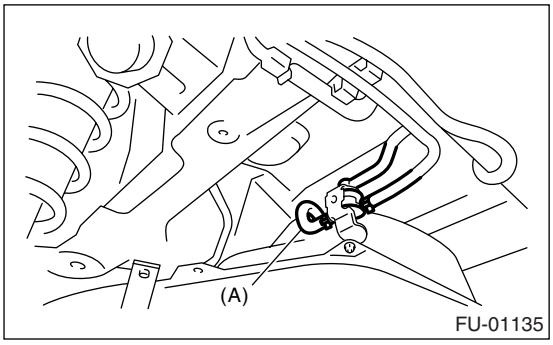
(3) Remove the bolts which secure the rear suspension assembly to body.



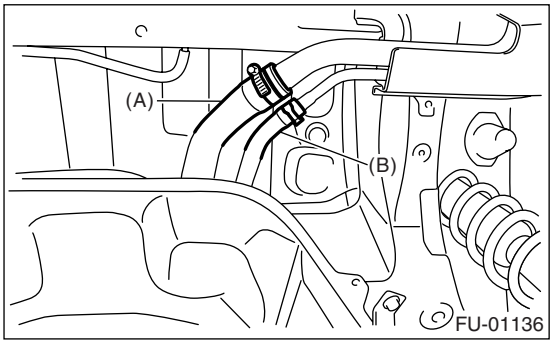


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

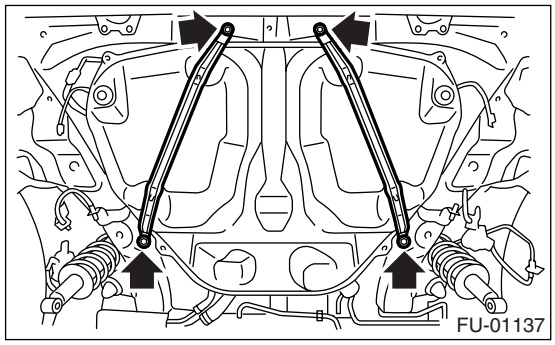


22) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands, and dismount the fuel tank from vehicle.

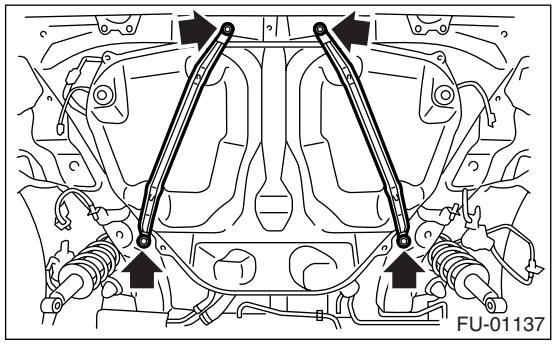
WARNING:
A helper is required to perform this work.



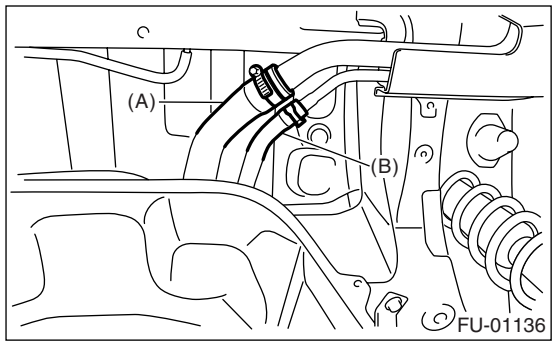
B: INSTALLATION

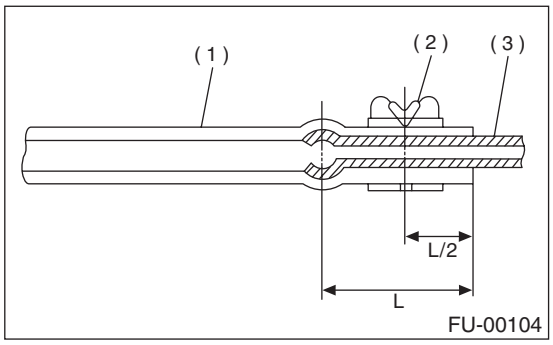
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

WARNING:
A helper is required to perform this work.



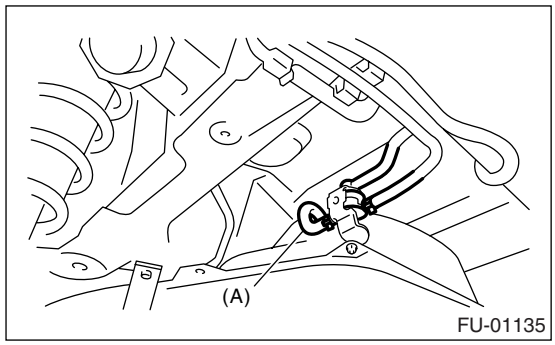
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipe

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolts of fuel tank band.

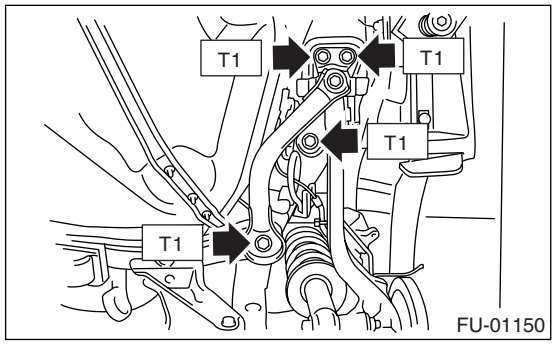
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

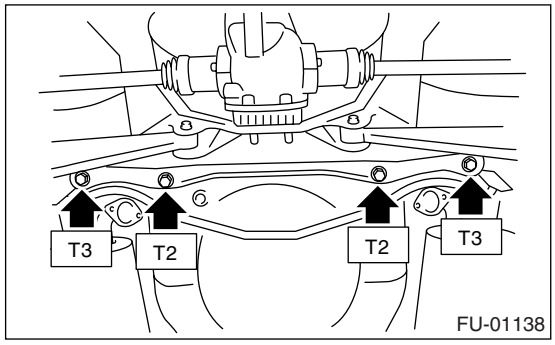
5) Install the rear suspension assembly.

CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Support the rear suspension assembly, and then tighten the bolts which secure the rear suspension assembly to body.

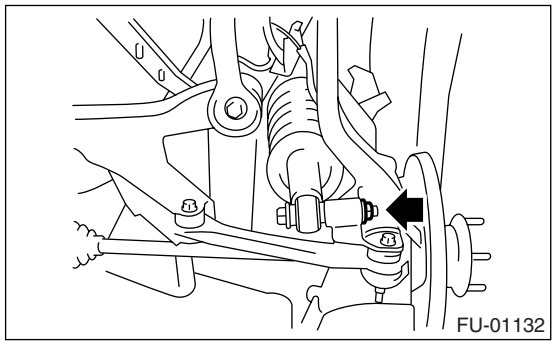
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.2 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





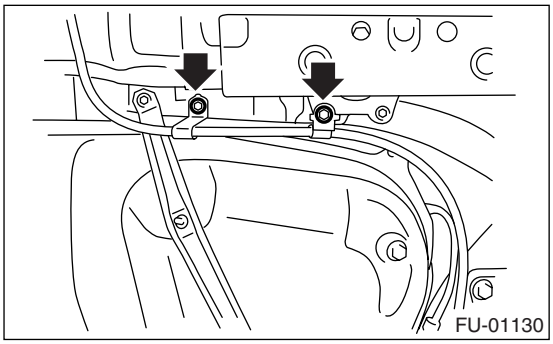
(3) Tighten the bolts which install the rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

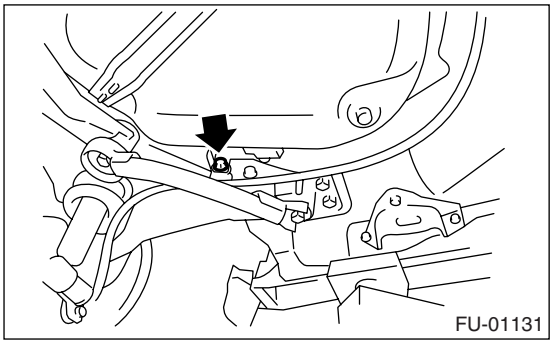


6) Tighten the bolts which install the parking brake cable clamp.

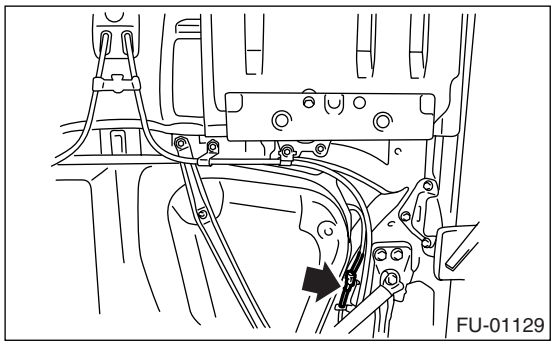
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

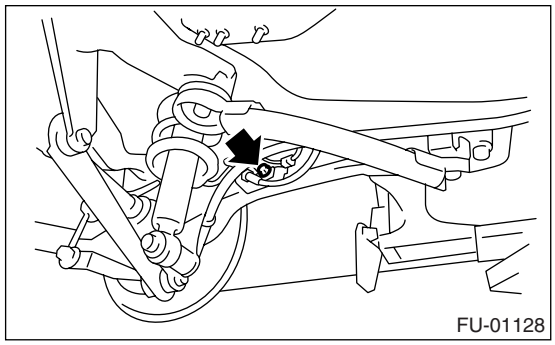


7) Connect the connector to rear ABS wheel speed sensor.



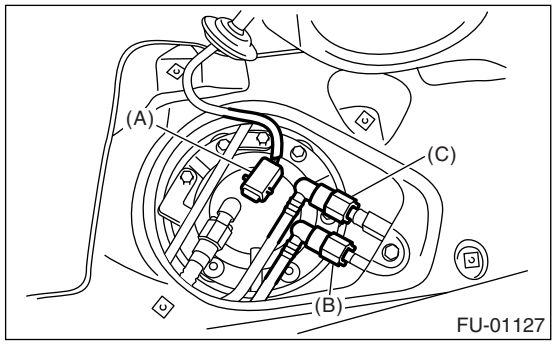
8) Install the heat shield cover.
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe. <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-8, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolt which secures rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

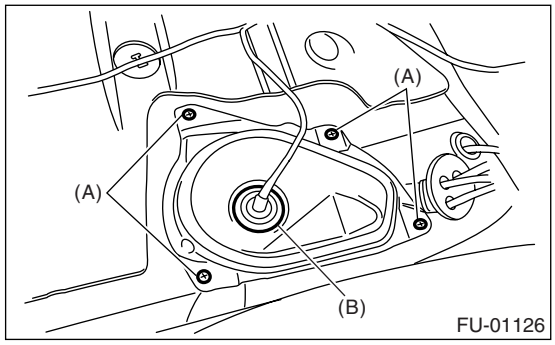


15) Install the rear wheels.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector to the fuel delivery (B) and return hose (C). **<Ref. to FU(H4SO 2.5)-56,** INSTALLATION**, Fuel Delivery, Return and Evaporation Lines.>**

NOTE:
Be careful not to misconnect the delivery side and return side.

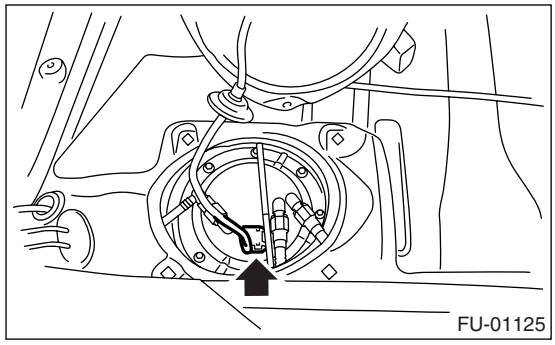


19) Install the service hole cover of fuel sub level sensor.

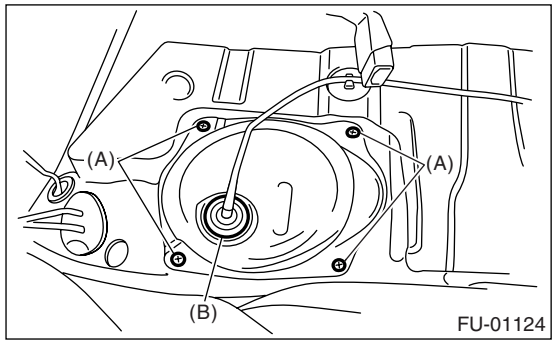


(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

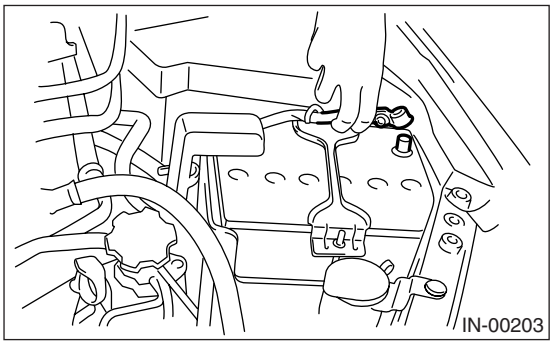
1) Check that the fuel tank is not holed, cracked or otherwise damaged.
2) Make sure that the fuel hoses and fuel pipes are not cracked and those connections are tight.

24.Fuel Filler Pipe

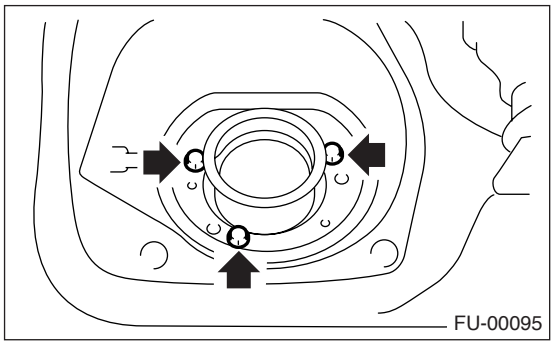
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

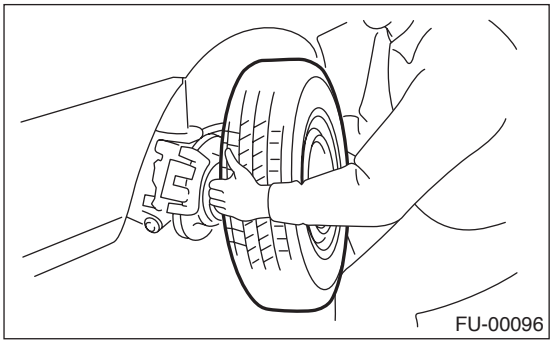
1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the filler cap.
3) Disconnect the ground cable from battery.



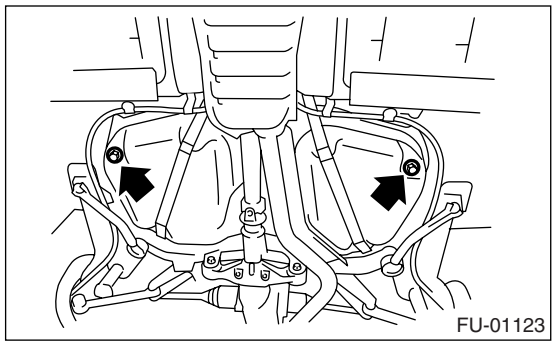
4) Remove the screws which secure the packing.



5) Lift-up the vehicle.
6) Remove the rear wheel RH.



7) Set a container under the vehicle, and remove the drain plug from the fuel tank to drain fuel from fuel tank.

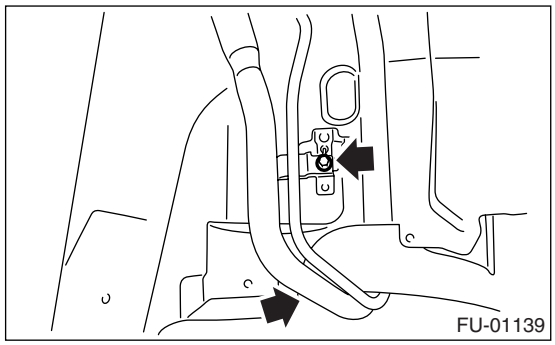


8) Tighten the fuel drain plug.

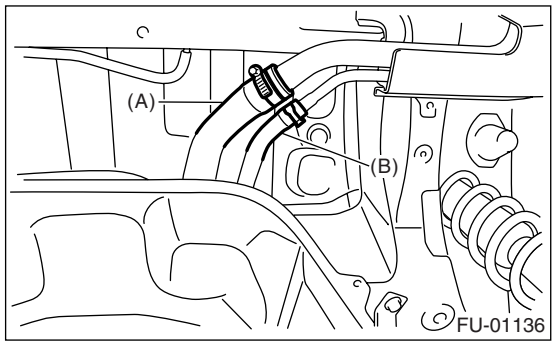
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

9) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
10) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
11) Remove the bolts which hold the fuel filler pipe bracket on the body.



12) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

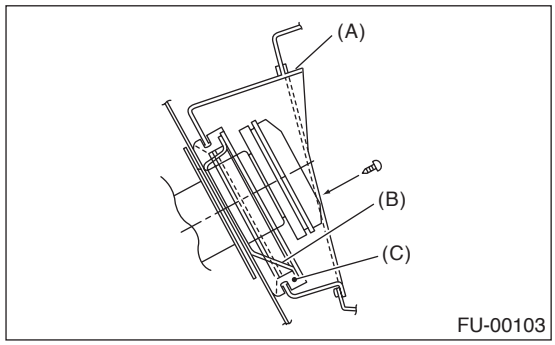


13) Remove the fuel filler pipe to under side of the vehicle.

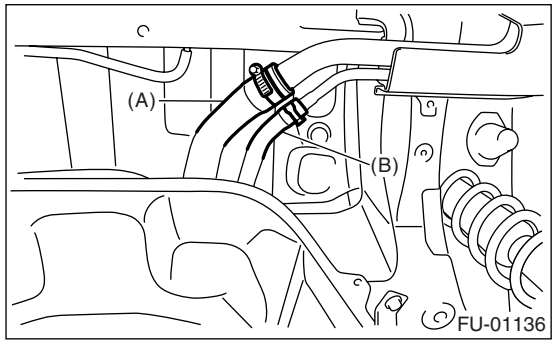
B: INSTALLATION

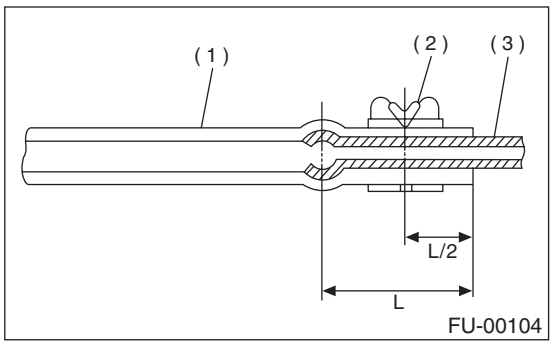
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward the inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.

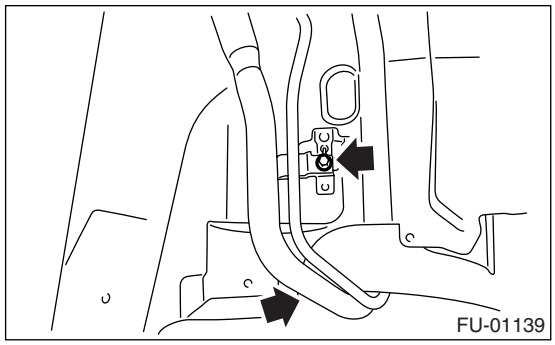




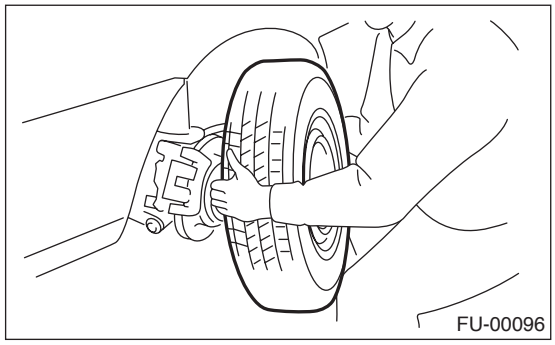
(1) Hose
(2) Clip or clamp
(3) Pipe

5) Tighten the bolts which hold the fuel filler pipe bracket on the body.

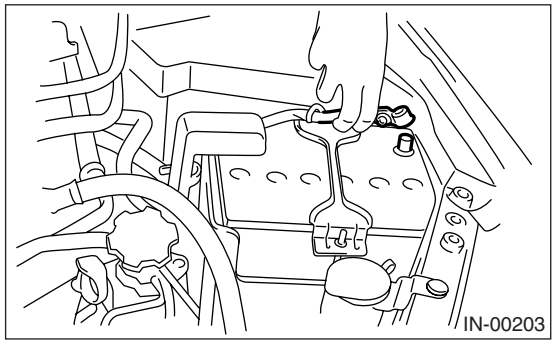
Tightening torque:
7.5 N·m (0.75 kgf-m, 5.4 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Install the fuse of fuel pump to main fuse box.
11) Connect the battery ground cable to battery.



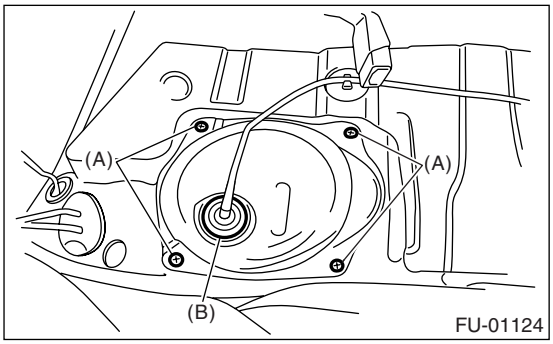
25.Fuel Pump

A: REMOVAL

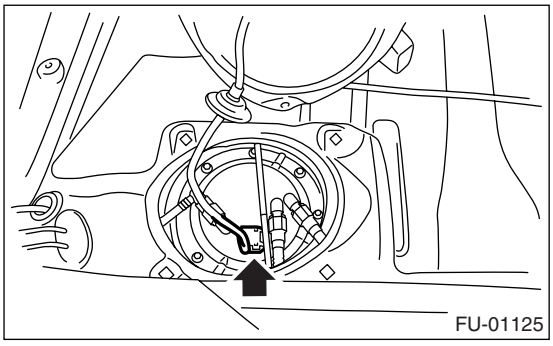
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Drain the fuel. **<Ref. to FU(H4SO 2.5)-40,** DRAINING FUEL, PROCEDURE**, Fuel.>**
3) Remove the rear seat.
4) Remove the service hole cover.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.

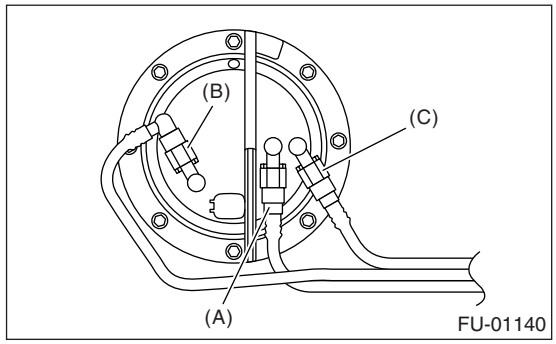


5) Disconnect the connector from fuel pump.



6) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. **<Ref. to FU(H4SO 2.5)-55,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**

7) Remove the nuts which install the fuel pump assembly onto fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

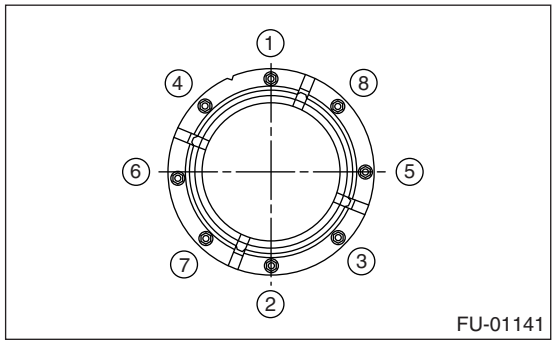
8) Take off the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

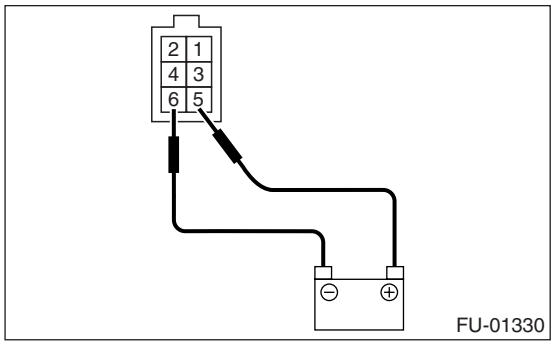


C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump and apply the battery power supply to check whether the pump operates.

WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply to ON and OFF on the battery side.**

• Do not run fuel pump for a long time under non-load condition.



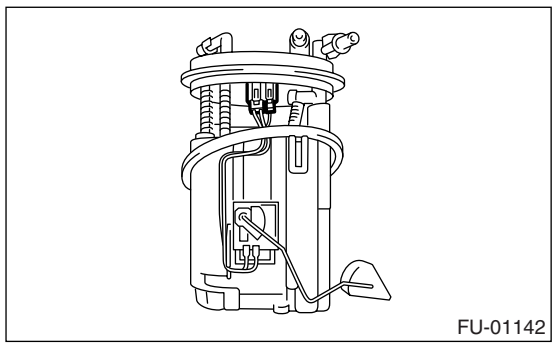
26.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. **<Ref. to FU(H4SO 2.5)-49,** REMOVAL**, Fuel Pump.>**
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

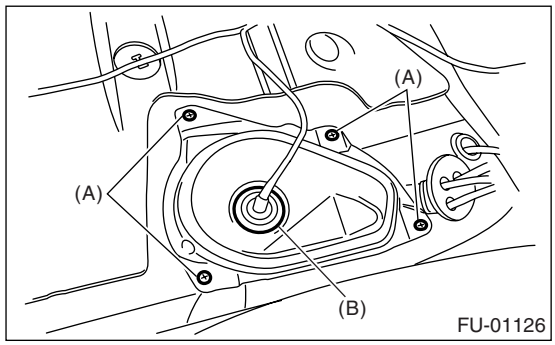
Install in the reverse order of removal.

27.Fuel Sub Level Sensor

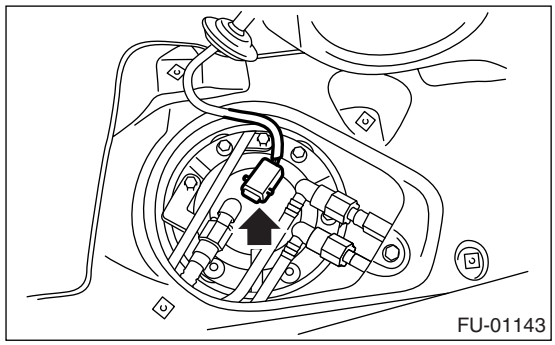
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

1) Drain fuel. **<Ref. to FU(H4SO 2.5)-40,** DRAINING FUEL, PROCEDURE**, Fuel.>**
2) Remove the rear seat.
3) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down under the body and remove the service hole cover.

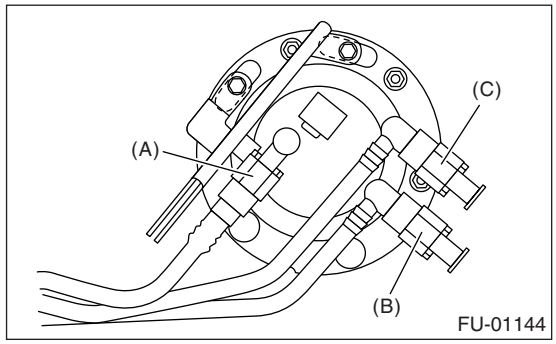


4) Disconnect the connector from fuel sub level sensor.



5) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. **<Ref. to FU(H4SO 2.5)-55,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**

6) Remove the nuts and bolts which install the fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

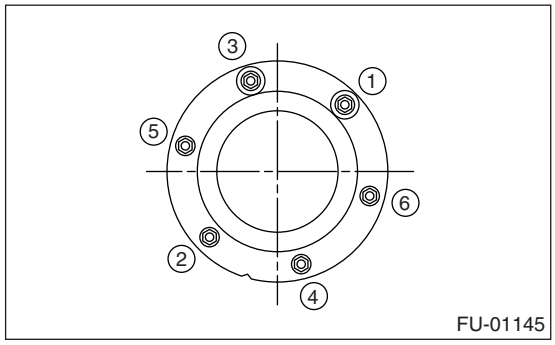
7) Remove the fuel sub level sensor.

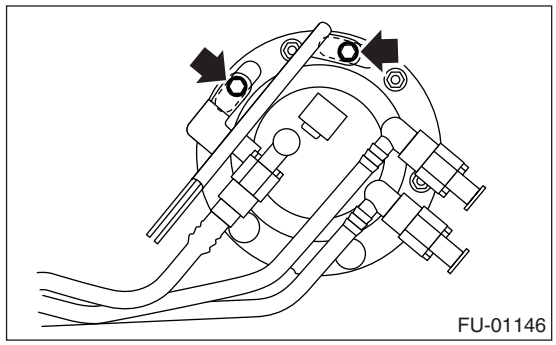
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)





28.Fuel Filter

A: SPECIFICATION

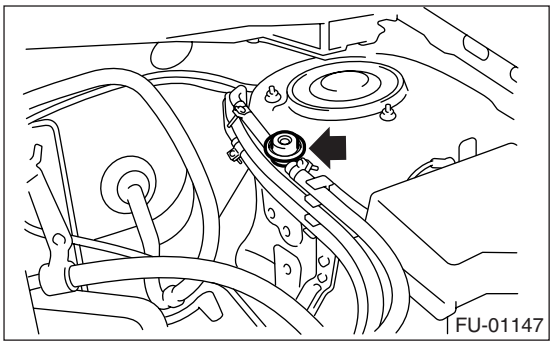
Fuel filter forms a unit with fuel pump.
Refer to Fuel Pump for removal and installation.
<Ref. to FU(H4SO 2.5)-49, REMOVAL**, Fuel Pump.>**
<Ref. to FU(H4SO 2.5)-49, INSTALLATION**, Fuel Pump.>**

29.Fuel Damper Valve

A: REMOVAL

1. DELIVERY SIDE

1) Release the fuel pressure.
<Ref. to FU(H4SO 2.5)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Remove the fuel damper valve from fuel delivery line.



2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for removal. **<Ref. to FU(H4SO 2.5)-15,** DISASSEMBLY**, Intake Manifold.>**

B: INSTALLATION

1. DELIVERY SIDE

Install in the reverse order of removal.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

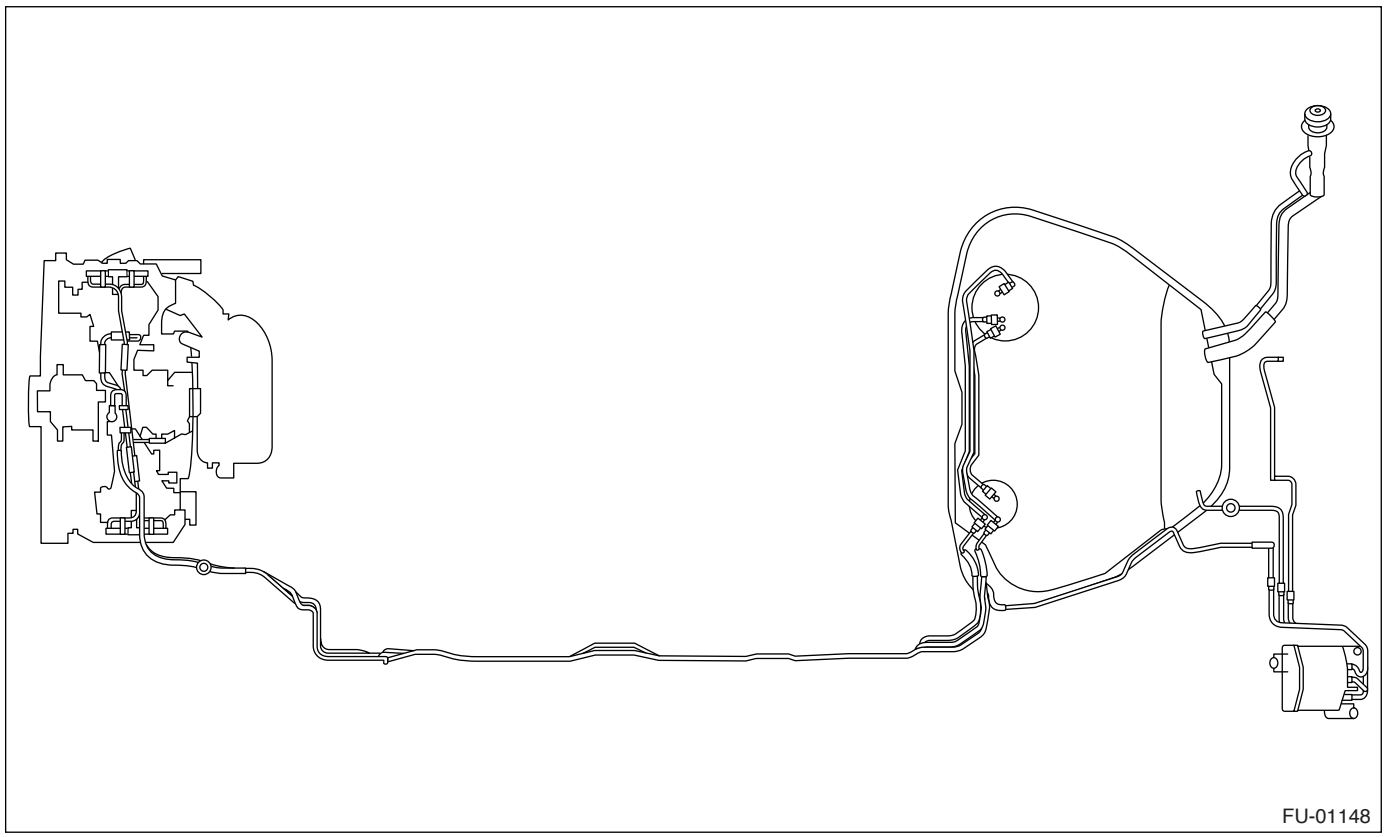
2. RETURN SIDE

Fuel damper valve forms a unit with fuel injector pipe RH.
Refer to “Intake Manifold” for installation. **<Ref. to FU(H4SO 2.5)-17,** ASSEMBLY**, Intake Manifold.>**

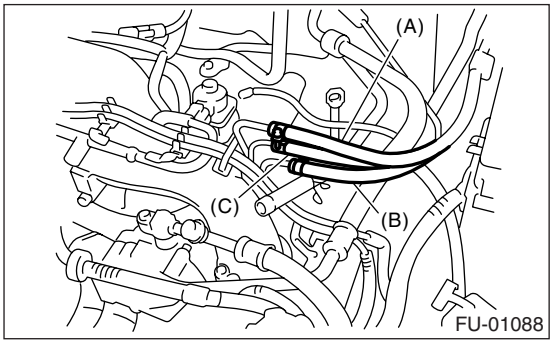
30.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. **<Ref. to FU(H4SO 2.5)-40,** RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.

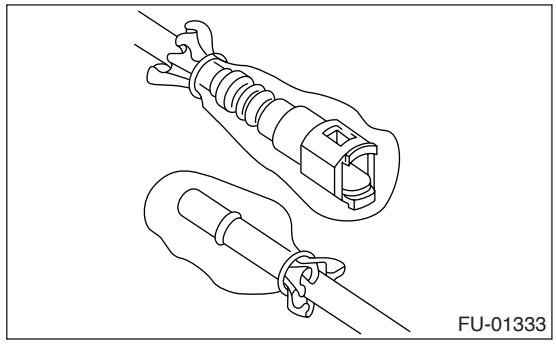


6) In the engine compartment, disconnect the fuel delivery hoses, return hoses, and evaporation hose.



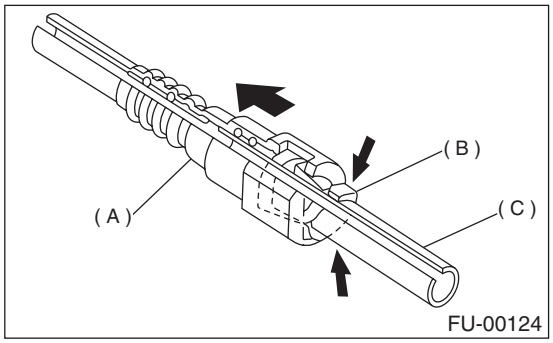
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

7) Lift-up the vehicle.
8) Remove the fuel tank. **<Ref. to FU(H4SO 2.5)-41,** REMOVAL**, Fuel Tank.>**
9) Separate the quick connector on fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector (A) and push retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

CAUTION:
Always use a new retainer.

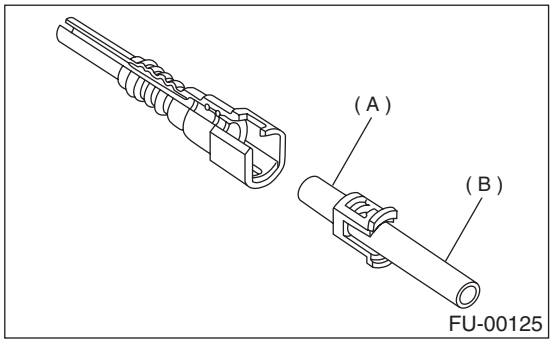


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

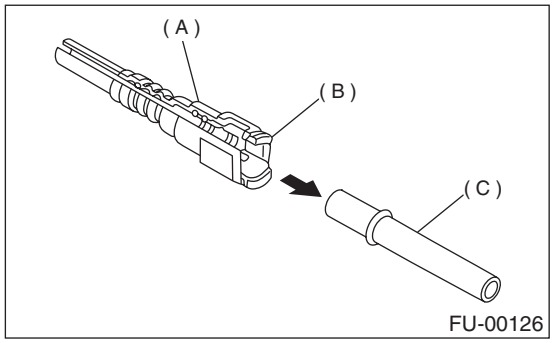
1) Connect the quick connector on fuel line.

CAUTION:
• Always use a new retainer.
• Make sure that the connected portion is not damaged or dust-covered. If necessary, clean the seal surface of pipe.



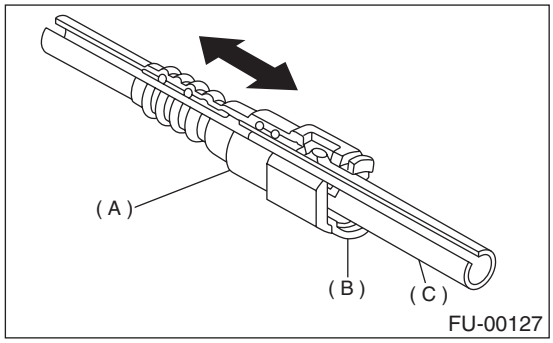
(A) Seal surface
(B) Pipe

(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.

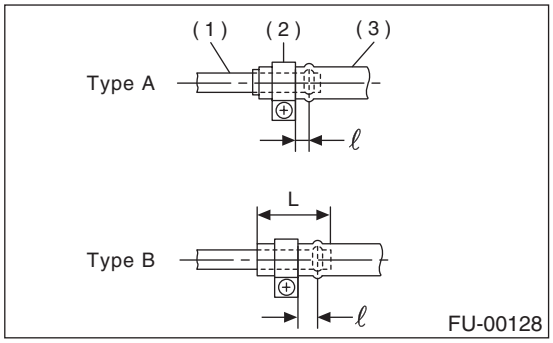


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount to be inserted is specified.
Type B: When the amount to be inserted is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

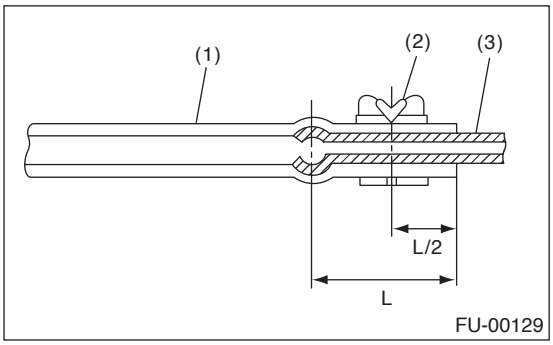


(1) Pipe
(2) Clamp
(3) Hose

3) Connect the return hose and evaporation hose to the pipe by approx. 15 mm (0.59 in) from hose end.

Fuel return hose:
L = 22.5±2.5 mm (0.885±0.098 in)
Fuel evaporation hose:
L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure the fuel pipe and fuel hose connections are tightened firmly.

31.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump does not operate.	
	❍ Defective terminal contact	Inspect contact, especially ground, and tighten it securely.
	❍ Trouble in electromagnetic or electronic circuit parts	Replace the faulty parts.
2)	Decline of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air mixed in the fuel system	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator	Replace.
2. Leakage or blow out of fuel		
1)	Loosened joints of the fuel pipe	Retighten.
2)	Cracked fuel pipe, hose, and fuel tank	Replace.
3)	Defective welding part on the fuel tank	Replace.
4)	Defective drain packing of the fuel tank	Replace.
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube, and fuel filler pipe	Retighten.
2)	Defective packing air tightness on the fuel saucer	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unused for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent each time the fuel is reduced to half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using water removing agent, follow the cautions noted on the bottle.

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INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are included in EC(H4SO 2.0) section. <Ref. to EC(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

INTAKE (INDUCTION)

IN(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are included in IN(H4SO 2.0) section. <Ref. to IN(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

MECHANICAL

ME(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are included in ME(H4SO 2.0) section. <Ref. to ME(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

EXHAUST

EX(H4SO 2.5)

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are included in EX(H4SO 2.0) section. <Ref. to EX(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

COOLING

CO(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are the same as 2.0 L model. <Ref. to CO(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

LUBRICATION

LU(H4SO 2.5)

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1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are the same as 2.0 L model. <Ref. to LU(H4SO 2.0)-2, General Description.>

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EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

SPEED CONTROL SYSTEMS

SP(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are the same as 2.0 L model. <Ref. to SP(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

IGNITION

IG(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are included in IG(H4SO 2.0) section. <Ref. to IG(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

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MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

STARTING/CHARGING SYSTEMS

SC(H4SO 2.5)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 2.5 L model are the same as 2.0 L model. <Ref. to SC(H4SO 2.0)-2, General Description.>

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

ENGINE (DIAGNOSTICS)

EN(H4SO 2.5)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H4SO 2.5)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Starting Failure". <Ref. to EN(H4SO 2.5)(diag)-54, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does the malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostic Table". <Ref. to EN(H4SO 2.5)(diag)-261, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read DTC on Subaru Select Monitor.	Is DTC displayed on the Subaru Select Monitor?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the engine warning light illuminates, perform the diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H4SO 2.5)(diag)-44, Malfunction Indicator Light.>
4	**PERFORM DIAGNOSIS.** 1) Perform the clear memory mode. <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor?	Check on "Diagnostic Chart with Diagnostic Trouble Code (DTC)" <Ref. to EN(H4SO 2.5)(diag)-80, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Audio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure indicator light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of other parts except for genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

CAUTION:
• All airbag system wiring harnesses and connectors are colored yellow. Do not use electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other parts will be damaged.

3) Do not disconnect the battery terminals while the engine is running.
A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM, etc.

4) Before disconnecting the connectors of each sensor and ECM, be sure to turn the ignition switch to OFF. Perform the inspection mode after connecting the connectors.

5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.

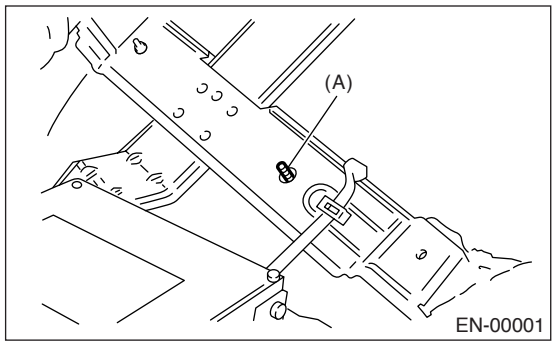
6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

NOTE:
Immobilizer system must be registered when installing the ECM of the model with immobilizer. For doing so, all ignition keys and ID cards should be prepared. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

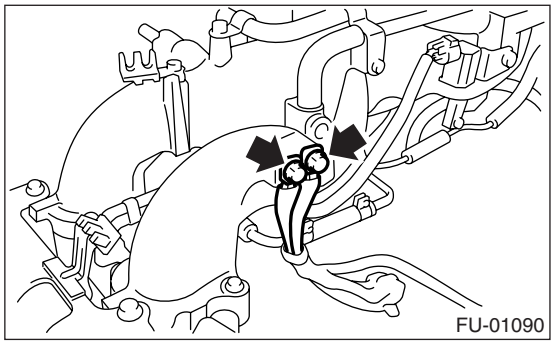
7) Connectors of each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts as the grounding point to chassis when measuring voltage and resistance inside the passenger compartment.

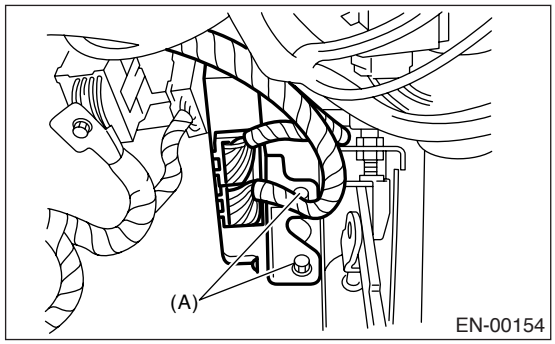


(A) Stud bolt

9) Use engine grounding terminal or engine as the grounding point to the chassis when measuring voltage and resistance in the engine compartment.



10) Use TCM mounting stud bolts as the grounding point to chassis when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.

12) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control unit. (The ECM is located under the steering column, inside of instrument panel lower trim panel.)

• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items mentioned above.
• Incorrect installation of the radio may affect the operation of ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
16) For AT models, do not hold the stall for more than five seconds. (from closed throttle, fully open throttle to stall engine speed.)
17) On the model with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clear procedure of self-diagnosis function.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems.

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

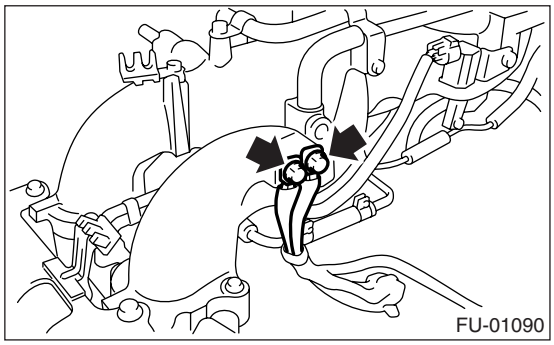
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

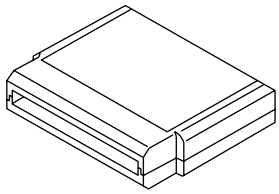
Make sure the engine grounding terminal is properly connected to engine.



3. SELF-DIAGNOSIS FUNCTION

When detecting a malfunction by self-diagnosis function on ECM, malfunction indicator light illuminates and malfunction occurrence is displayed.
Calling the self-diagnosis result is performed by the Subaru Select Monitor.

C: PREPARATION TOOL

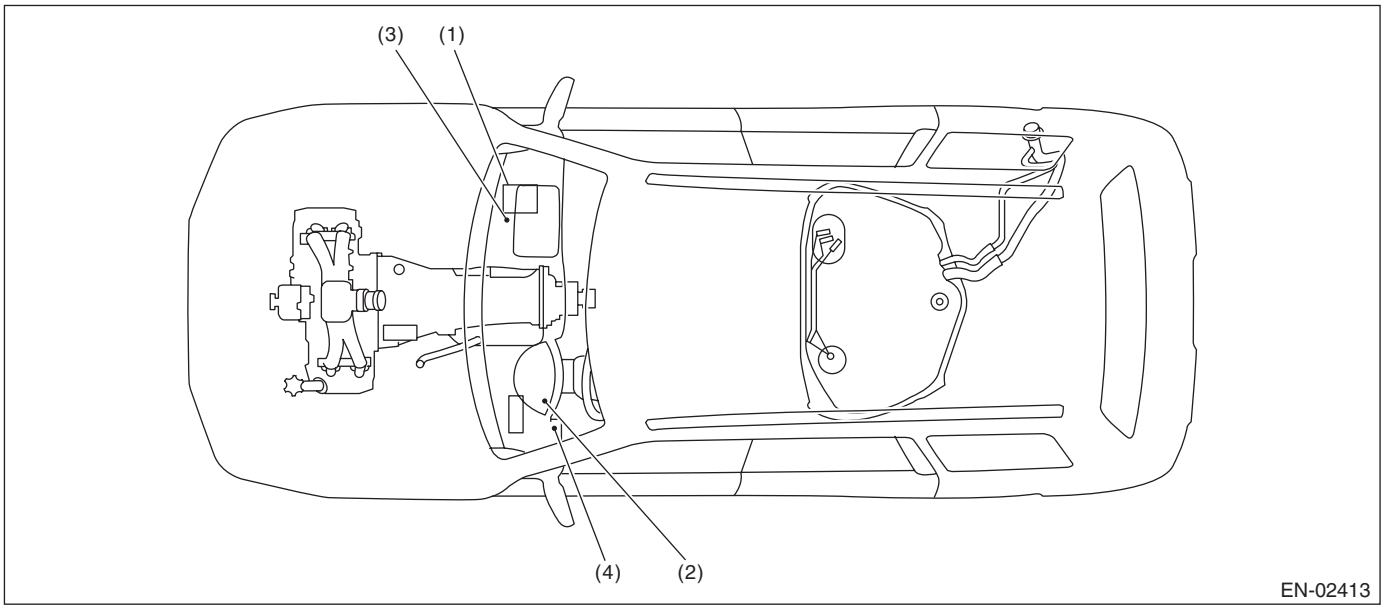
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

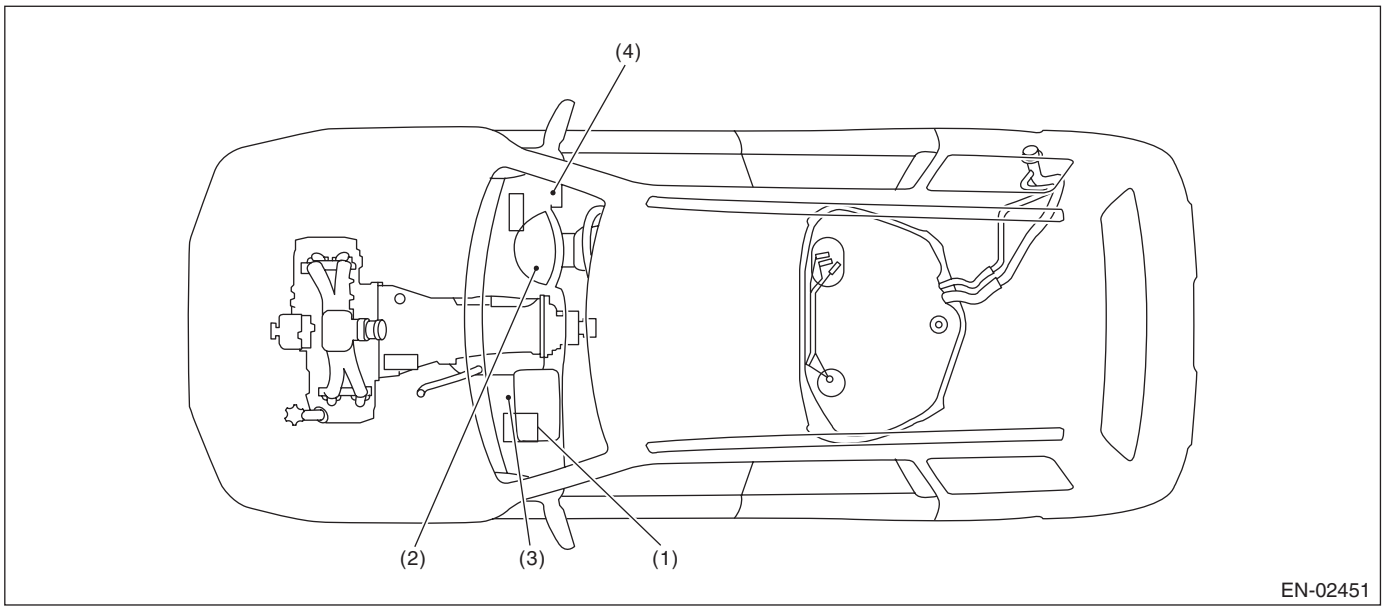
A: LOCATION

1. ENGINE

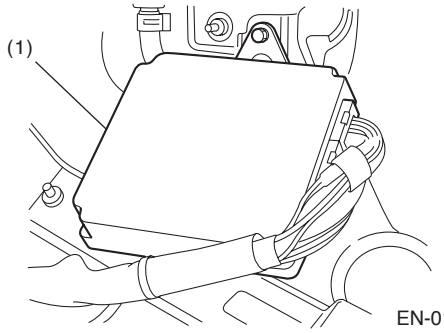
- Control module
  - LHD model



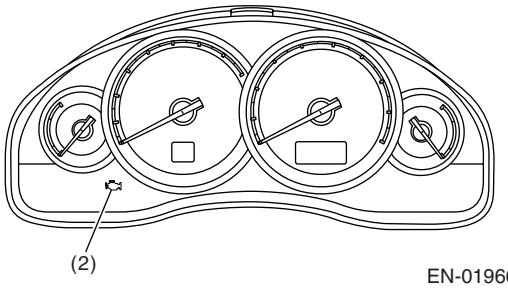
  - RHD model



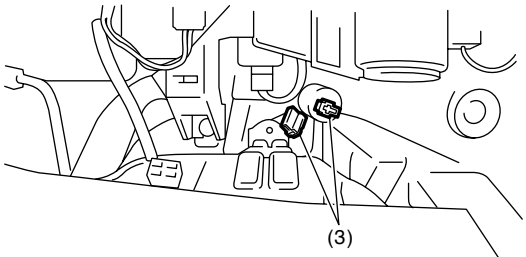
(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



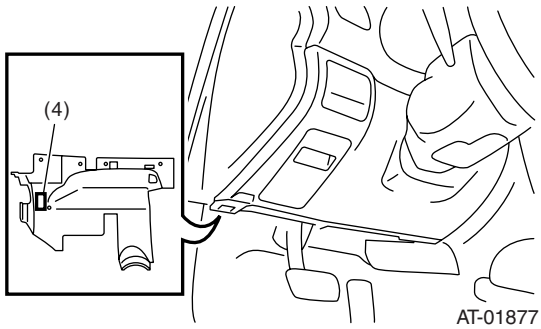
EN-01147



EN-01966

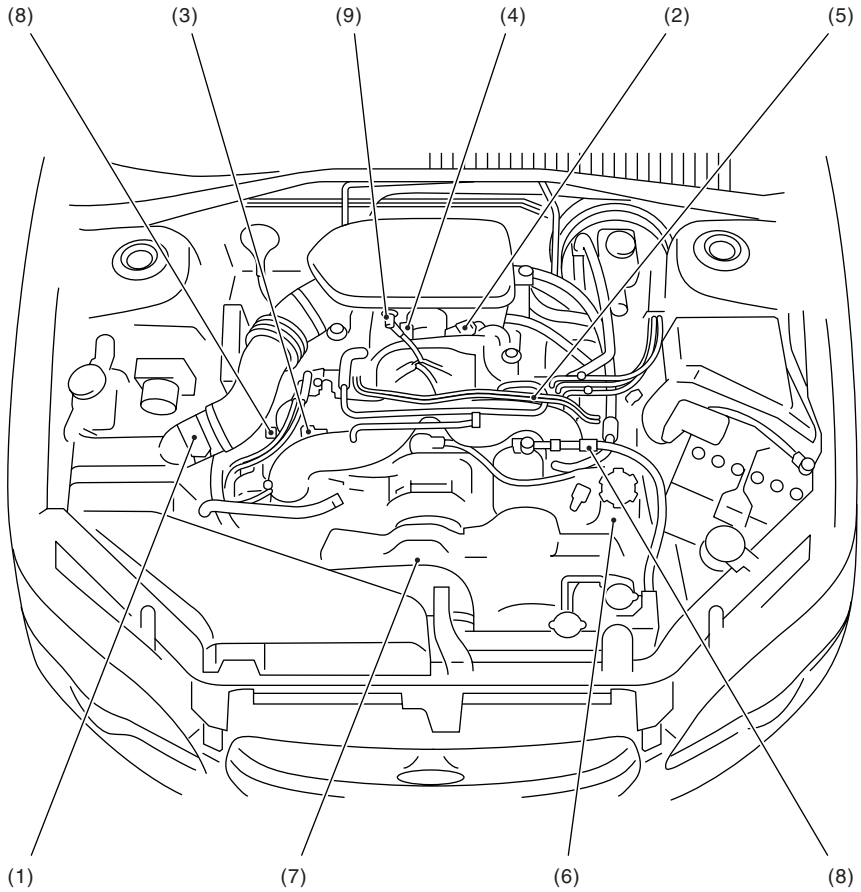


EN-02414



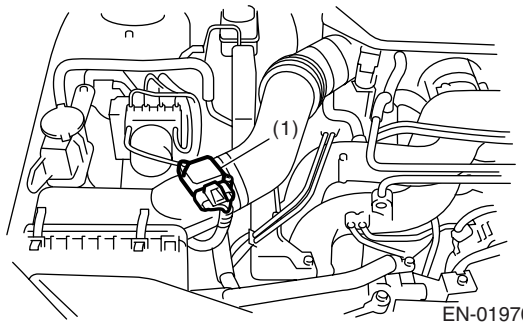
AT-01877

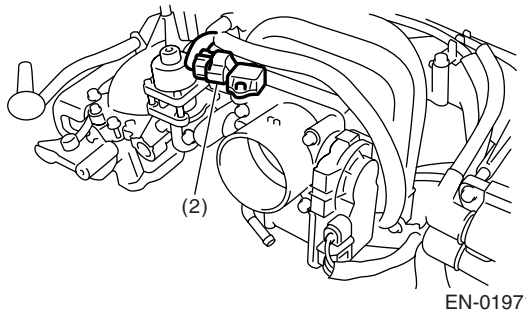
• Sensor



EN-02530

(1) Mass air flow and intake air temperature sensor (EC, EK and K4 model)
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor
(8) Tumble generator valve position sensor
(9) Intake air temperature sensor (KA and KS model)


(1)
EN-01970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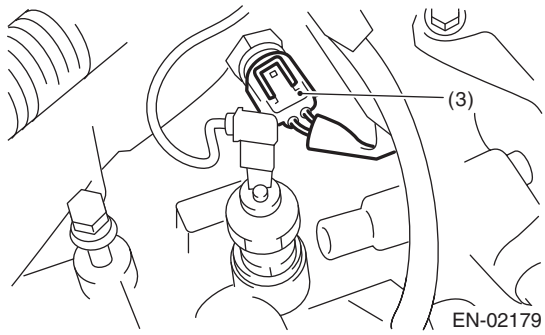
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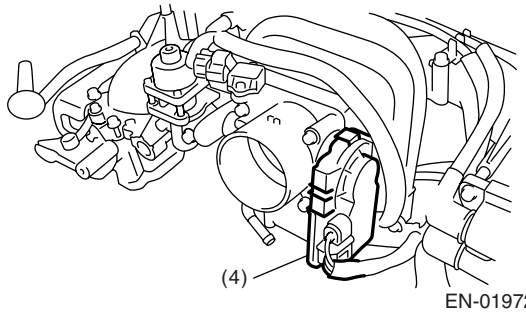
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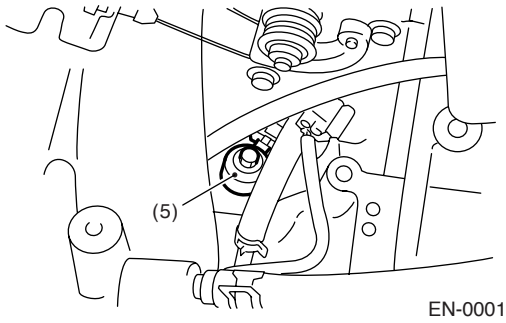
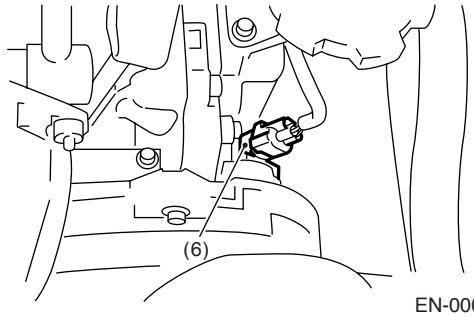
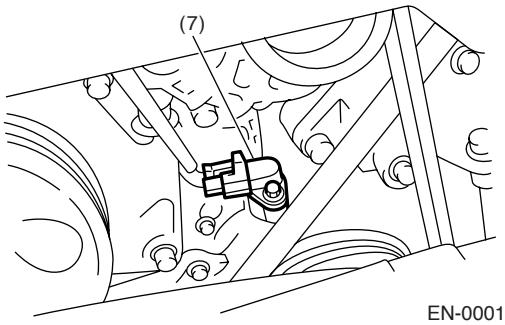
EN-01972


(5)
EN-00010


(6)
EN-00011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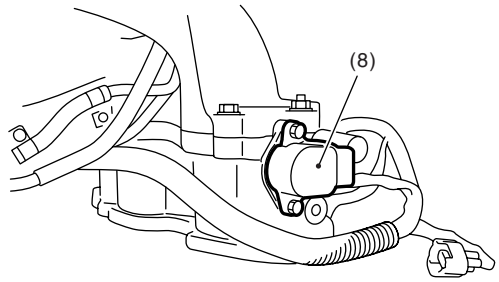
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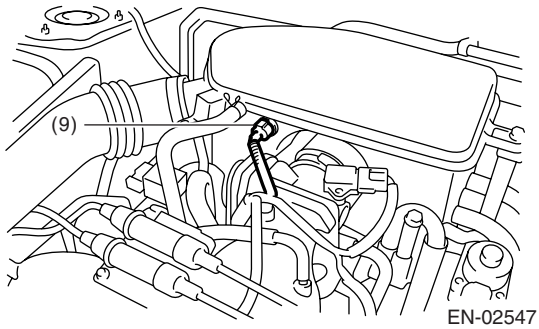
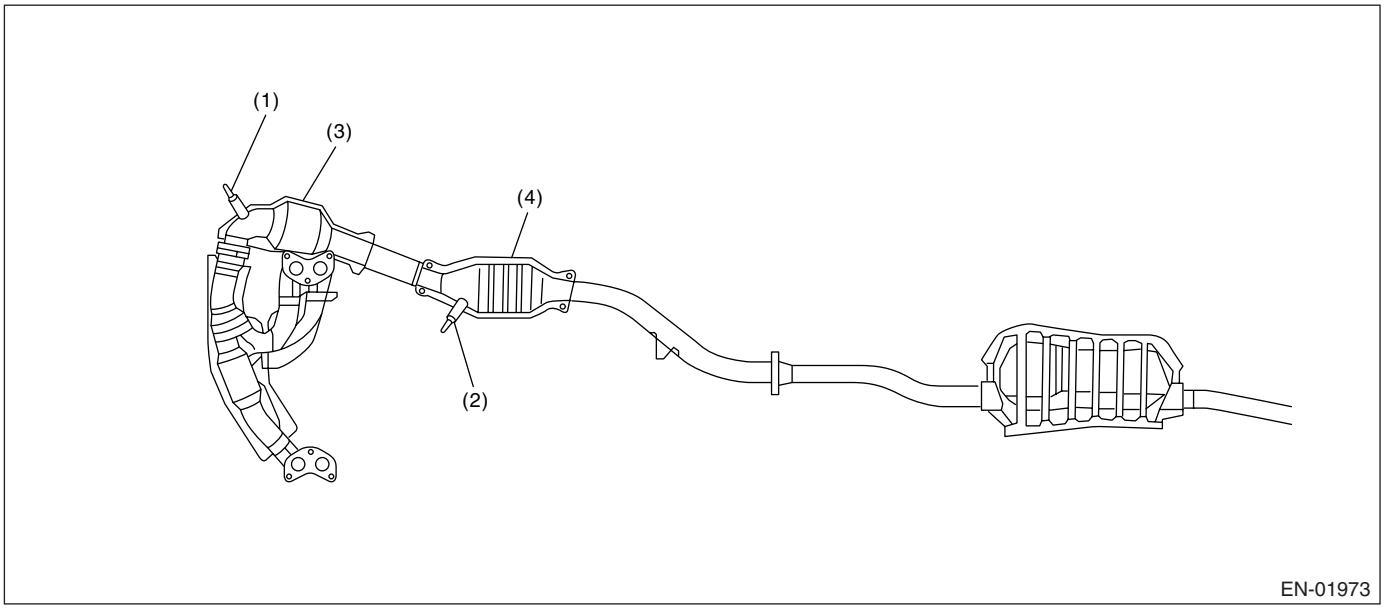
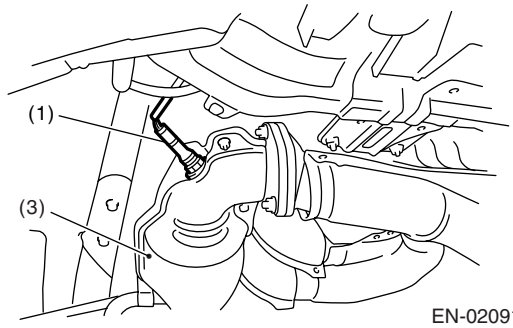
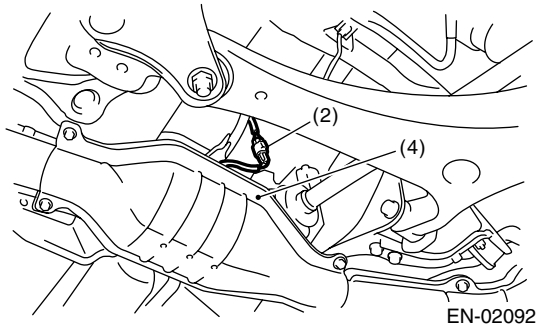


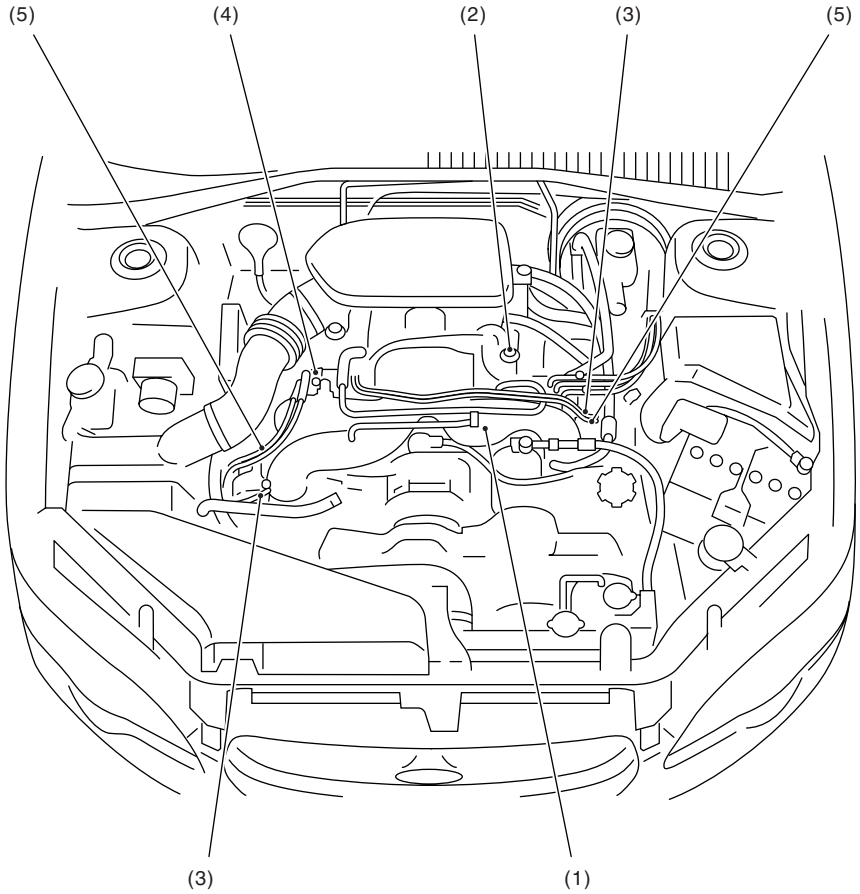


(1) Front oxygen (A/F) sensor
(2) Rear oxygen sensor
(3) Front catalytic converter
(4) Rear catalytic converter





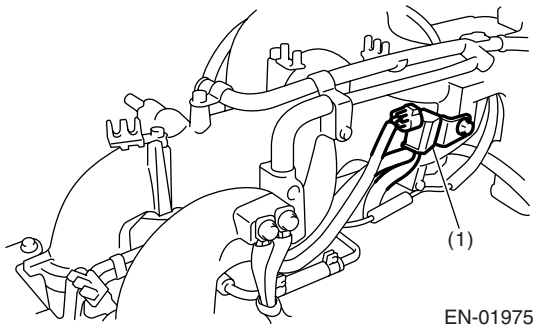
• Solenoid valve, actuator, emission control system parts and ignition system parts

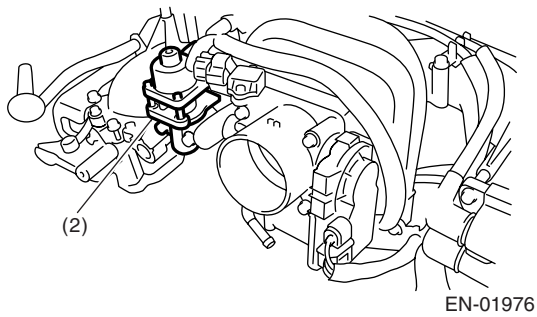


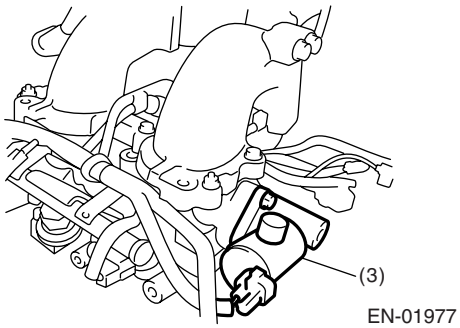
EN-02452

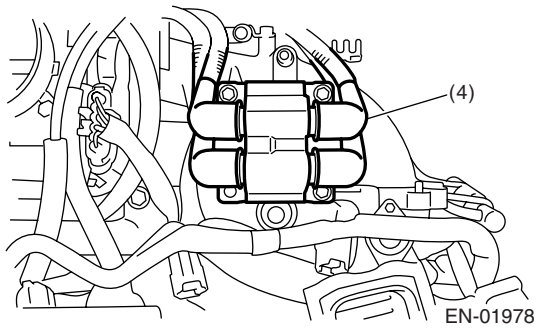
(1) Purge control solenoid valve
(2) EGR Valve (EC, EK and K4 model)
(3) Tumble generator valve actuator
(4) Ignition coil & ignitor ASSY
(5) Fuel injector

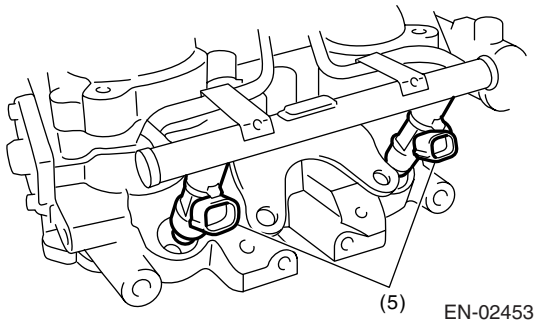
Electrical Component Location



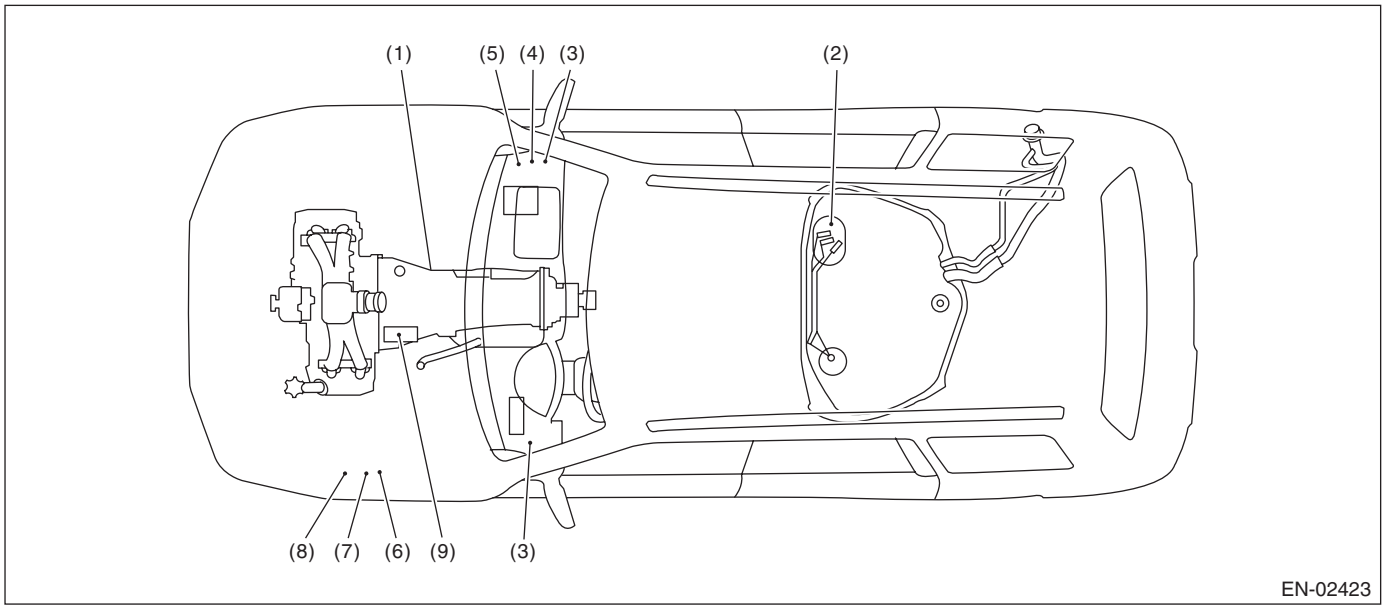




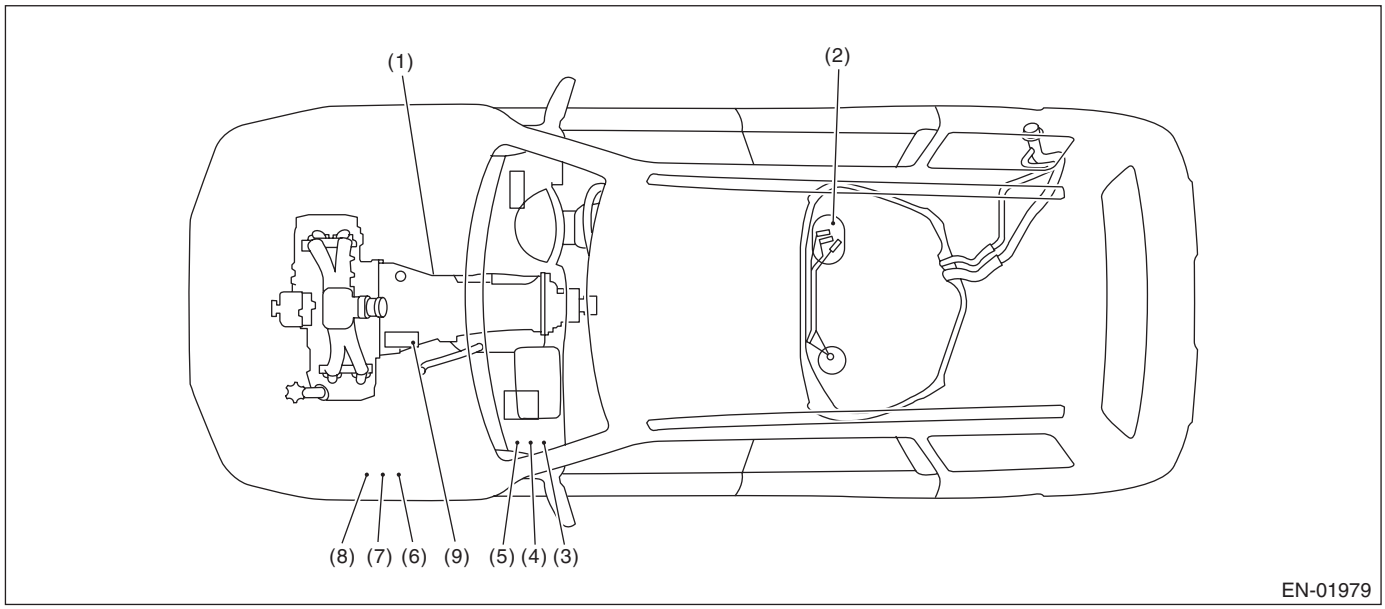




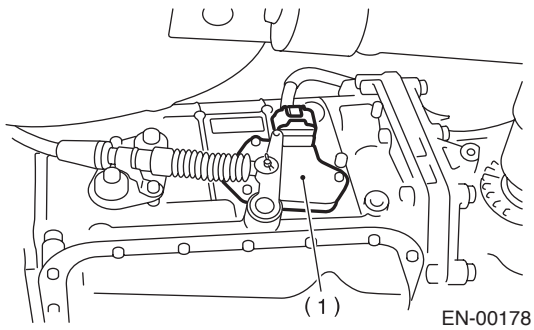
• LHD model



• RHD model



(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator main fan relay 1
(7) Radiator sub fan relay
(8) Radiator main fan relay 2
(9) Starter



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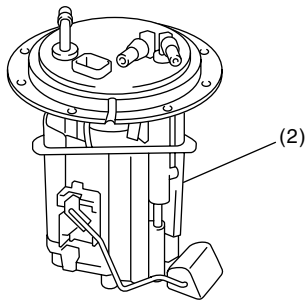

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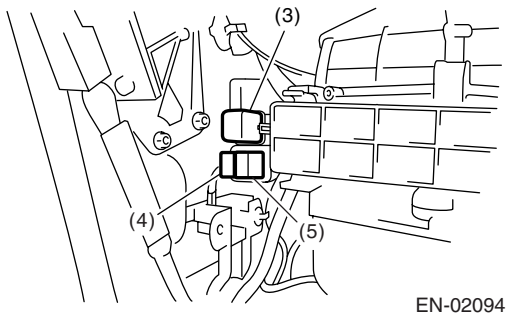
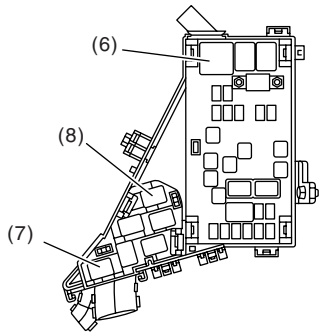
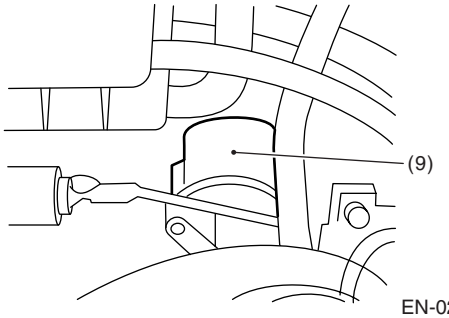


EN-02094



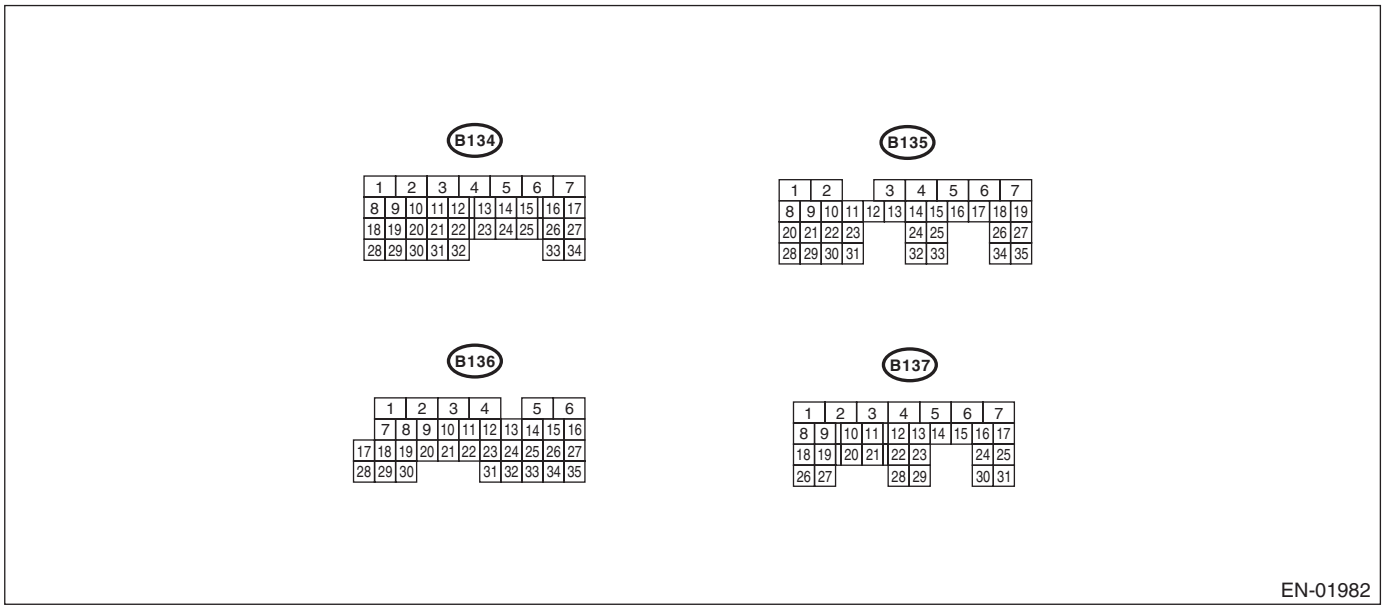
EN-02095



EN-02096

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B135	10	0	−7 — +7	Sensor output waveform
	Signal (−)	B135	22	0	0	—
	Shield	B135	31	0	0	—
Camshaft position sensor	Signal (+)	B135	11	0	−7 — +7	Sensor output waveform
	Signal (−)	B135	23	0	0	—
	Shield	B135	31	0	0	—
Electronic throttle control	Main	B136	18	0.64 — 0.72 Fully opens: 3.96	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully open: 3.96
	Sub	B136	29	1.51 — 1.58 Fully opens: 4.17	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully open: 4.17
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (−)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor relay		B135	35	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator position sensor	Main	B136	17	Fully closed: 1 Fully opens: 3.3	Fully closed: 1 Fully opens: 3.3	—
	Power supply	B136	15	5	5	—
	Ground	B136	34	0	0	—
	Sub	B136	28	Fully closed: 1 Fully opens: 3.3	Fully closed: 1 Fully opens: 3.3	—
Rear oxygen sensor	Signal	B137	24	0	0 — 0.9	—
	Shield	B137	31	0	0	—

Engine Control Module (ECM) I/O Signal

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Front oxygen (A/F) sensor heater	Signal 1	B134	3	0 — 1.0	0 — 1.0	—
	Signal 2	B134	2	0 — 1.0	0 — 1.0	—
Rear oxygen sensor heater signal		B135	2	0 — 1.0	0 — 1.0	—
Engine coolant temperature sensor		B136	14	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
Tumble generator valve RH (open)		B134	19	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve RH (close)		B134	18	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (open)		B134	29	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve LH (close)		B134	28	0 or 10 — 13	0 or 13 — 14	Sensor output waveform
Tumble generator valve position sensor RH		B136	27	Fully open: 0.2 — 1.0 Fully closed: 4.2 — 4.7		—
Tumble generator valve position sensor LH		B136	26	Fully open: 0.2 — 1.0 Fully closed: 4.2 — 4.7		—
Starter switch		B137	8	0	0	Cranking: 8 — 14
Starter relay		B135	32	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C switch (Model with immobilizer)		B137	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
A/C switch (Model without immobilizer)		B137	16	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch (Model with immobilizer)		B137	14	10 — 13	13 — 14	—
Ignition switch (Model without immobilizer)		B137	15	10 — 13	13 — 14	—
Neutral position switch		B137	9	ON: 0 OFF: 12±0.5		Switch is ON when select or shift lever is shifted into “P” or “N” range.
Test mode connector (Model with immobilizer)		B137	15	5	5	When connected: 0
Test mode connector (Model without immobilizer)		B137	14	5	5	When connected: 0
Knock sensor	Signal	B136	25	2.8	2.8	—
	Shield	B136	33	0	0	—
Back-up power supply		B135	19	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B135	6	10 — 13	13 — 14	—
		B135	5	10 — 13	13 — 14	—
Sensor power supply	1	B136	16	5	5	—
	2	B136	15	5	5	—
Ignition control	1	B135	18	0	1 — 3.4	Waveform
	2	B135	17	0	1 — 3.4	Waveform
Fuel injector	#1	B136	6	10 — 13	1 — 14	Waveform
	#2	B136	5	10 — 13	1 — 14	Waveform
	#3	B136	4	10 — 13	1 — 14	Waveform
	#4	B136	3	10 — 13	1 — 14	Waveform
Fuel pump relay control (Model with immobilizer)		B135	27	ON: 0.5 or less OFF: 10 — 13	0.5 or less	—

DESCRIPTION		Connector No.	Terminal No.	Signal (V)		NOTE
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Fuel pump relay control (Model without immobilizer)		B135	26	ON: 0.5 or less OFF: 10 — 13	0.5 or less	—
A/C relay control		B135	33	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B134	31	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B135	34	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Self-shutoff control (Model with immobilizer)		B137	16	10 — 13	13 — 14	—
Self-shutoff control (Model without immobilizer)		B137	17	10 — 13	13 — 14	—
Malfunction indicator light		B134	17	—	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B134	23	—	0 — 13 or more	Waveform
Purge control solenoid valve		B134	14	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
EGR solenoid valve	Signal A+	B134	11	0 or 10 — 13	0 or 10 — 13	—
	Signal A–	B134	10	0 or 10 — 13	0 or 10 — 13	—
	Signal B+	B134	9	0 or 10 — 13	0 or 10 — 13	—
	Signal B–	B134	8	0 or 10 — 13	0 or 10 — 13	—
Power steering switch		B137	10	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	—
Blower fan switch		B137	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal 1		B134	33	—	2.05 — 2.25	—
Front oxygen (A/F) sensor signal 2		B134	26	—	1.75 — 1.95	—
Front oxygen (A/F) sensor shield		B134	25	0	0	—
Manifold absolute pressure sensor		B136	22	4.0 — 4.8	1.1 — 1.9	—
Air flow sensor	Signal	B136	23	—	0.3 — 4.5	—
	Shield	B136	32	0	0	—
	Ground	B136	31	0	0	—
Intake air temperature sensor		B136	13	3.15 — 3.33	3.15 — 3.33	intake air temperature: 25°C (75°F)
Generator control		B134	22	0 — 6.5	0 — 6.5	—
SSM communication line		B137	20	Less than 1←→ More than 4	Less than 1←→ More than 4	—
GND (sensor)	1	B136	35	0	0	—
	2	B136	34	0	0	—
GND (injector)		B137	7	0	0	—
GND (ignition system)		B135	12	0	0	—
GND (power supply)		B135	4	0	0	—
		B135	1	0	0	—
GND (control system)		B137	2	0	0	—
		B137	1	0	0	—
GND (oxygen sensor heater 1)		B134	7	0	0	—

Engine Control Module (ECM) I/O Signal

DESCRIPTION	Connector No.	Terminal No.	Signal (V)		NOTE
			Ignition SW ON (engine OFF)	Engine ON (idling)	
GND (oxygen sensor heater 2)	B134	6	0	0	—
GND (Electronic throttle control)	B137	3	0	0	—
Main switch	B137	14	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Clutch switch	B137	22	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
Brake switch 1	B137	12	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2	B137	13	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch	B136	21	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	SPECIFICATION
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm Racing

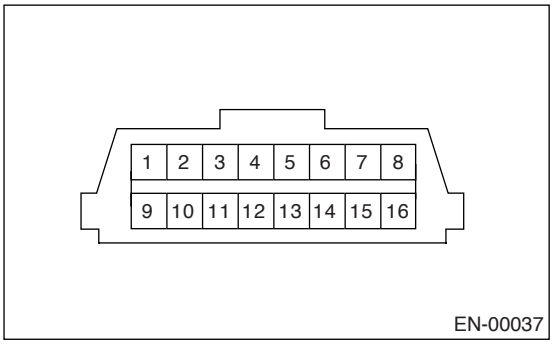
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- A/C is turned OFF.
- All accessory switches are turned OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools except for Subaru Select Monitor or OBD-II general scan tool, because the circuit for Subaru Select Monitor may be damaged.



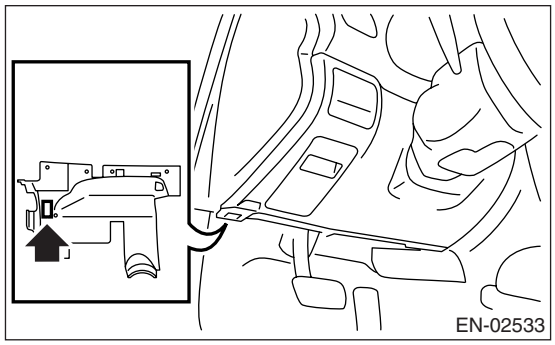
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. OBD-II General Scan Tool

A: OPERATION

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Open the cover and connect the OBD-II general scan tool to data link connector located in the lower portion of instrument panel (on the driver's side).



3) Using the OBD-II general scan tool, call up DTC and freeze frame data.

OBD-II general scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain DTC
(4) MODE $04: Clear/Reset emission-related diagnostic information
(5) MODE $06: Request on-board monitoring test results for non-continuously monitored systems
(6) MODE $07: Request on-board monitoring test results for continuously monitored systems
(7) MODE $09: Request vehicle information

Read out the data according to repair procedures. (For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.)

NOTE:
For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". **<Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>**

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain DTC and malfunction indicator light status and diagnosis support information	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate from mass air flow sensor	g/sec
11	Throttle valve absolute opening angle	%
13	Check whether oxygen sensor is installed.	—
15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor	V and %
1C	Supporting OBD system	—
21	Driving distance after MIL illuminates	km
24	A/F value and A/F sensor output voltage	— and V

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refer to data denoting the operating condition when trouble is detected by the on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim	%
07	Long term fuel trim	%
0B	Intake manifold absolute pressure	kPa
0C	Engine speed	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
0F	Intake air temperature	°C
10	Air flow rate from mass air flow sensor	g/sec
11	Throttle valve opening angle	%

NOTE:
Refer to OBD-II general scan tool manufacturer's operation manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DIAGNOSTIC TROUBLE CODE (DTC))

Refer to "Read Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. **<Ref. to EN(H4SO 2.5)(diag)-33, Read Diagnostic Trouble Code (DTC).>**

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

NOTE:
Refer to OBD-II general scan tool manufacturer's operation manual to clear or reset emission-related diagnostic information (MODE $04).

6. MODE $06

Refer to test value of troubleshooting and data of test limit on support data bit sequence table. List of support data is shown in the following table.

TID	CID	Test value & Test limit	Unit
$01	$01	Catalyst system efficiency below threshold	—
$02	$81	Exhaust gas recirculation control circuit range/performance	mmHg
	$02		
$03	$81	Evaporative emission control system (CPC open malfunction)	—
	$02	Evaporative emission control system small leak	pa
	$03	Evaporative emission control system small leak (Immediate normality judgment)	pa
	$04	Evaporative emission control system large leak	pa
	$05	Evaporative emission control system very small leak (Immediate normality judgment)	pa
	$06	Evaporative emission control system very small leak	pa
$05	$01	O_2 sensor circuit slow response (Bank 1 Sensor 1) Lean → Rich	millisecond
	$02	O_2 sensor circuit slow response (Bank 1 Sensor 1) Rich → Lean	
$06	$81	O_2 sensor circuit (Bank 1 Sensor 2) <$81 or $02>	V
	$02		
$07	$01	O_2 sensor circuit slow response (Bank 1 Sensor 2)	second

TID	CID	Test value & Test limit	Unit
$0B	$81	O_2 sensor heater circuit (Bank 1 Sensor 2) <$81 or $02>	W
	$02		
$0C	$01	Coolant thermostat (Coolant temperature below thermostat regulating temperature)	°C
$0D	$01	Evaporative emission control system vent control circuit range/performance	Pa
	$82		

7. MODE $07

Refer to the data of DTC (pending code) for troubleshooting result about emission in first time.

8. MODE $09

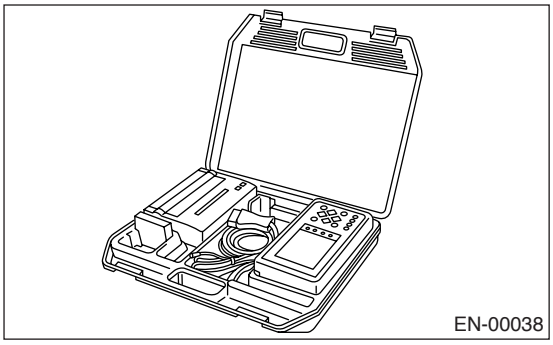
Refer to the data of vehicle specification (VIN, calibration ID, etc.).

9. Subaru Select Monitor

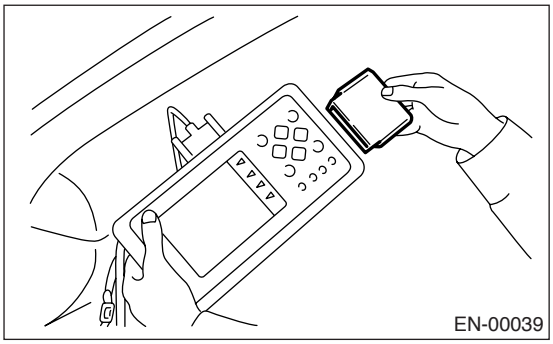
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>

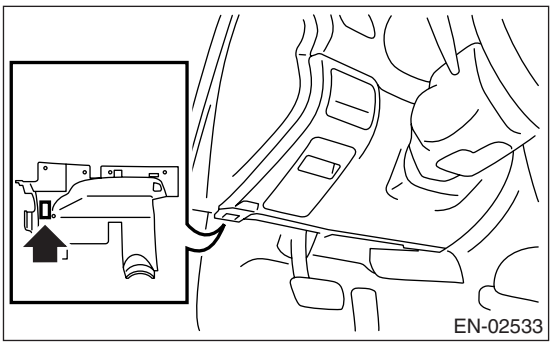


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

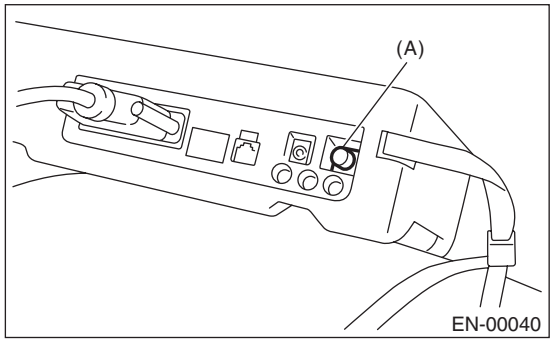
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.

5) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.5)(diag)-33, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTCs. <Ref. to EN(H4SO 2.5)(diag)-33, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine load	Engine Load	%	3.5%
Engine coolant temperature signal	Coolant Temp.	°C	≥ 75 °C
A/F correction 1	A/F Correction #1	%	–10 — +10%
A/F learning 1	A/F Learning #1	%	–15 — +15%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg	200 — 300 mmHg
Engine speed signal	Engine Speed	rpm	600 — 800 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h	0 km/h (at parking)
Ignition timing signal	Ignition Timing	deg	12.5 — 13.5 deg
Intake air temperature signal	Intake Air Temp.	°C	(Ambient air temperature)
Amount of intake air	Mass Air Flow	g/s	2.8 — 3.2 g/s
Throttle opening angle signal	Throttle Opening Angle	%	1.2 — 1.6%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0.6 — 0.85 V
Battery voltage	Battery Voltage	V	12 — 14 V
Mass air flow voltage	Air Flow Sensor Voltage	V	1.1 — 1.2 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	2.56 — 3.3 ms
Knock sensor correction	Knocking Correction	deg	0.0 deg
Atmospheric pressure signal	Atmosphere Pressure	mmHg	(Atmosphere pressure)
Intake manifold relative pressure	Mani. Relative Pressure	mmHg	(Mani. Absolute Pressure – Atmosphere pressure)
Acceleration opening angle signal	Accel. Opening Angle	%	0.0%
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 3%
EGR steps	No. of EGR Steps	STEP	0
Generator duty ratio	ALT Duty	%	0%
A/F sensor current value 1	A/F Sensor #1 Current	mA	–0.2 — 0.2 mA
A/F sensor resistance value 1	A/F Sensor #1 Resistance	ohm	28 — 31 mA
A/F sensor output lambda 1	A/F Sensor #1	—	0.85 — 1.05
A/F correction 3	A/F Correction #3	%	5.08%
A/F learning 3	A/F Learning #3	%	0%
Throttle motor duty	Throttle Motor Duty	%	–12 — –20%
Throttle power supply voltage	Throttle Motor Voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub-throttle Sensor	V	1.48 — 1.50 V
Main throttle sensor voltage	Main-throttle Sensor	V	0.62 V
Sub acceleration sensor voltage	Sub-accelerator Sensor	V	1.12 V
Main acceleration sensor voltage	Main-accelerator Sensor	V	0.98 — 1.0 V
Memory vehicle speed	Memorized Cruise Speed	km/h	0 km/h
AT/MT identification terminal	AT Vehicle ID Signal	—	ON/OFF
TGV position sensor voltage RH	TGV Position Sensor R	V	0 — 12
TGV position sensor voltage LH	TGV Position Sensor L	V	0 — 12

Remarks	Display	Unit of measure	Note (at idling)
Fuel level sensor resistance	Fuel Level Resistance	Ω	4 — 100 Ω
Test mode terminal	Test Mode Signal	—	OFF
Neutral position switch signal	Neutral Position Switch	—	ON
Soft idle switch signal	Idle Switch Signal	—	ON
Ignition switch signal	Ignition Switch	—	ON
Power steering switch input signal	P/S Switch	—	OFF (At OFF)
Air conditioning switch signal	A/C Switch	—	OFF (At OFF)
Handle switch signal	Handle Switch	—	RHD/LHD
Starter switch signal	Starter Switch	—	OFF
Rear O_2 monitor	Rear O2 Rich Signal	—	OFF
Knocking signal	Knocking Signal	—	OFF
Crankshaft position sensor signal	Crankshaft Position Sig.	—	OFF
Camshaft position sensor signal	Camshaft Position Sig.	—	OFF
Rear defogger switch signal	Rear Defogger SW	—	OFF (At OFF)
Blower fan switch signal	Blower Fan SW	—	OFF (At OFF)
Light switch signal	Light Switch	—	OFF (At OFF)
Wiper switch signal	Wiper Switch	—	OFF (At OFF)
A/C middle pressure switch signal	A/C Mid Pressure Switch	—	OFF (At OFF)
Air conditioner compressor relay output signal	A/C Compressor Signal	—	OFF (At OFF)
Radiator fan relay 1 signal	Radiator Fan Relay #1	—	OFF (At OFF)
Radiator fan relay 2 signal	Radiator Fan Relay #2	—	OFF (At OFF)
Fuel pump relay signal	Fuel Pump Relay	—	ON
Tumble generator valve output signal	TGV Output	—	OFF
Tumble generated valve drive signal	TGV Drive	—	Open
AT coordinate retard angle demand signal	Retard Signal from AT	—	OFF
AT coordinate fuel cut demand signal	Fuel Cut Signal from AT	—	OFF
AT coordinate permission demand	Torque Permission Signal	—	ON
ETC motor relay signal	ETC Motor Relay	—	ON
Ban of torque down signal	Ban of Torque Down	—	ON/OFF
Request torque down signal	Request Torque Down	—	ON/OFF
Clutch switch signal	Clutch Switch	—	OFF (At OFF)
Stop light switch signal	Stop Light Switch	—	OFF (At OFF)
SET/COAST switch signal	SET/COAST Switch	—	OFF (At OFF)
RES/ACC switch signal	RESUME/ACCEL Switch	—	OFF (At OFF)
Brake switch signal	Brake Switch	—	OFF (At OFF)
Main switch signal	Main Switch	—	OFF (At OFF)
Cancel switch signal	Cancel Switch	—	OFF (At OFF)
Integrated unit data reception	Body Int. Unit Data	—	ON
Integrated unit data update	Body Int. Unit Count	—	ON

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD system} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display/Save}, and press the [YES] key.
6) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, scroll the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	0
Condition of malfunction indicator light	MI (MIL)	OFF
Monitoring test of misfire	Misfire monitoring	no support
Monitoring test of fuel system	Fuel system monitoring	complete
Monitoring test of comprehensive component	Component monitoring	complete
Test of catalyst	Catalyst Diagnosis	no support
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete
Test of EGR system	EGR system	incomplete

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.
• A list of support data is shown in the following table.

Contents	Display	Unit of measure
DTC for freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	ON or OFF
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor	Long term fuel trim B1	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH
Ignition timing signal	Ignition Timing	°
Intake air volume	Mass Air Flow	g/sec
Intake air temperature signal	Intake Air Temp	°C
Throttle position signal	Throttle Opening Angle	%

NOTE:
For detailed operation procedure, refer to SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Message	LED “ON” requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	D check
Clear memory signal	Clear Memory Terminal	ON or OFF	When clear memory connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned to ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Handle switch signal	Handle SW	RHD or LHD	When handle switch signal is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is entered.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned to ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned to ON.
Light switch signal	Light Switch	ON or OFF	When light switch is turned to ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned to ON.
Windshield wiper switch signal	Wiper SW	ON or OFF	When windshield wiper switch is turned to ON.
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When A/C middle pressure switch is turned to ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
Fuel pump relay signal	Fuel Pump Relay	ON or OFF	ON output
Tumble generator valve output signal	TGV Output	ON or OFF	Yes

Remarks	Display	Message	LED “ON” requirements
Tumble generated valve drive signal	TGV Drive	Open or Close	Opening direction
AT retard angle demand signal	Retard Signal	ON or OFF	When AT retard angle demand signal is input.
AT fuel cut signal	Fuel Cut	ON or OFF	When AT fuel cut signal is input.
AT coordinate permission signal	Torque Control Permission	ON or OFF	When AT coordinate permission signal is input.
Clutch switch signal	Clutch Switch	ON or OFF	When clutch switch is turned to ON.
Stop light switch signal	Stop Light Switch	ON or OFF	When stop switch is turned to ON.
SET/COAST switch signal	SET/COAST Switch	ON or OFF	When SET/COAST switch is turned to ON.
RES/ACC switch signal	RESUME/ACCEL Switch	ON or OFF	When RES/ACC switch is turned to ON.
Brake switch signal	Brake Switch	ON or OFF	When brake switch is turned to ON.
Main switch signal	Main Switch	ON or OFF	When main switch is turned to ON.
Cancel switch signal	Cancel Switch	ON or OFF	When cancel switch is turned to ON.
Electronic throttle control motor relay signal	ETC Motor Relay	ON or OFF	When electronic throttle control motor relay is in function.
Data reception signal	Body Int. Unit Data	ON or OFF	When data reception signal is entered.
Counter update signal	Body Int. Unit Count	ON or OFF	When counter update signal is entered.

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

10. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>

11.Inspection Mode

A: PROCEDURE

Carry out trouble diagnosis shown in the following DTC table.
When performing trouble diagnosis which is not shown in the DTC table, refer to the next item Drive cycle.
<Ref. to EN(H4SO 2.5)(diag)-39, Drive Cycle.>

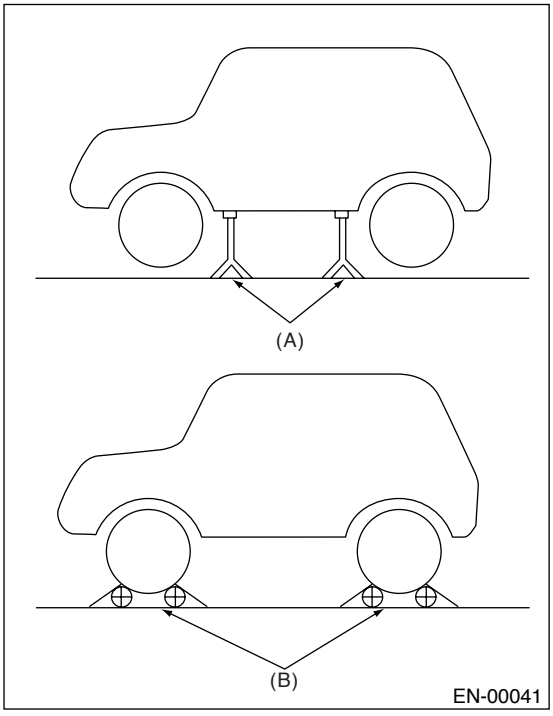
DTC	Item	Condition
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Circuit Low Input	—
P0113	Intake Air Temperature Circuit High Input	—
P0117	Engine Coolant Temperature Circuit Low Input	—
P0118	Engine Coolant Temperature Circuit High Input	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input	—
P0131	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
P0132	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	—
P0134	O_2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0171	System too Lean (Bank 1)	—
P0172	System too Rich (Bank 1)	—
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low Input	—
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High Input	—
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—
P0400	Exhaust Gas Recirculation Flow	—
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor Circuit Low Input	—
P0463	Fuel Level Sensor Circuit High Input	—
P0500	Vehicle Speed Sensor	—
P0512	Starter Request Circuit	—
P0513	Incorrect Immobilizer Key	—
P0519	Idle Control System Malfunction (Fail-Safe)	—
P0558	Generator Circuit Low Input	—
P0600	Serial Communication Link	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0607	Control Module Performance	—
P0638	Throttle Actuator Control Range/Performance (Bank 1)	—
P0691	Cooling Fan 1 Control Circuit Low	—
P0692	Cooling Fan 1 Control Circuit High	—
P0851	Neutral Switch Input Circuit Low	—

DTC	Item	Condition
P0852	Neutral Switch Input Circuit High	—
P1086	Tumble Generated Valve Position Sensor 2 Circuit Low	—
P1087	Tumble Generated Valve Position Sensor 2 Circuit High	—
P1088	Tumble Generated Valve Position Sensor 1 Circuit Low	—
P1089	Tumble Generated Valve Position Sensor 1 Circuit High	—
P1090	Tumble Generated Valve System 1 (Valve Open)	Engine coolant temperature is –5 — 5°C (–41 — 41°F) at engine start.
P1091	Tumble Generated Valve System 1 (Valve Close)	—
P1092	Tumble Generated Valve System 2 (Valve Open)	Engine coolant temperature is –5 — 5°C (–41 — 41°F) at engine start.
P1093	Tumble Generated Valve System 2 (Valve Close)	—
P1094	Tumble Generated Valve Signal 1 Circuit Malfunction (Open)	—
P1095	Tumble Generated Valve Signal 1 Circuit Malfunction (Short)	—
P1096	Tumble Generated Valve Signal 2 Circuit Malfunction (Open)	—
P1097	Tumble Generated Valve Signal 2 Circuit Malfunction (Short)	—
P1110	Atmospheric Pressure sensor circuit malfunction (Low input)	—
P1111	Atmospheric Pressure sensor circuit malfunction (High input)	—
P1152	O_2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	—
P1153	O_2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	—
P1160	Return Spring Failure	—
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—
P1518	Starter Switch Circuit Low Input	—
P1560	Back-up Voltage Circuit Malfunction	—
P1570	Antenna	—
P1571	Reference Code Incompatibility	—
P1572	IMM Circuit Failure (Except Antenna Circuit)	—
P1574	Key Communication Failure	—
P1576	EGI Control Module EEPROM	—
P1577	IMM Control Module EEPROM	—
P1578	Meter Failure	—
P2101	Throttle Actuator Control Motor Circuit Range/Performance	—
P2102	Throttle Actuator Control Motor Circuit Low	—
P2103	Throttle Actuator Control Motor Circuit High	—
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	—
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low Input	—
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High Input	—
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low Input	—
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High Input	—
P2135	Throttle/Pedal Position Sensor/Switch “A”/“B” Voltage Rationality	—
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Rationality	—

1. PREPARATION FOR THE INSPECTION MODE

1) Check if the battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

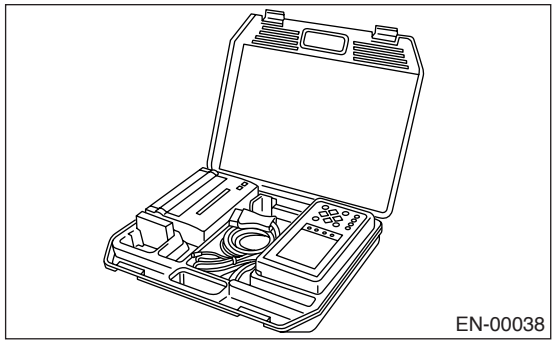
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



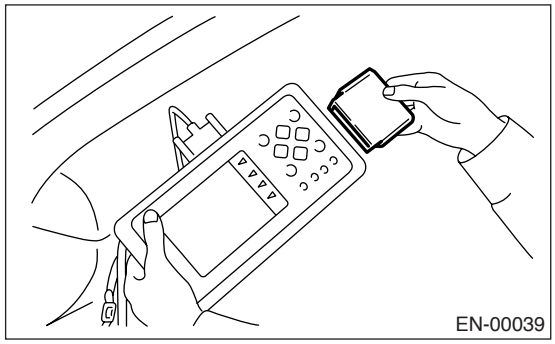
(A) Rigid rack
(B) Free rollers

2. SUBARU SELECT MONITOR

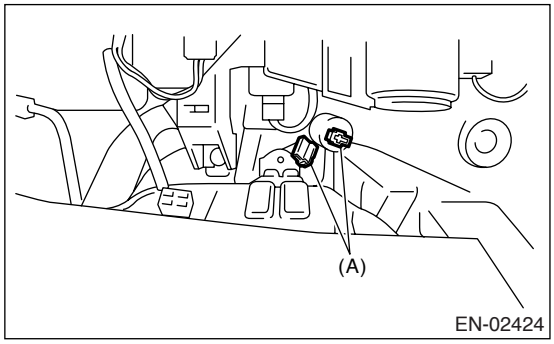
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



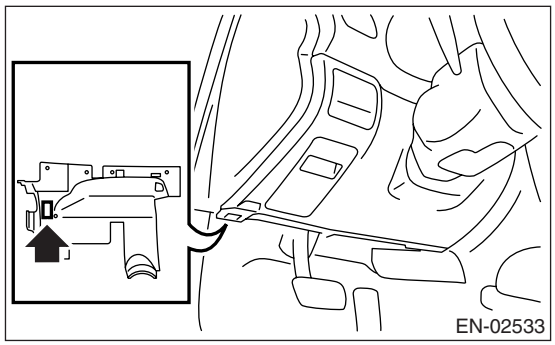
4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located at the lower portion of glove box.

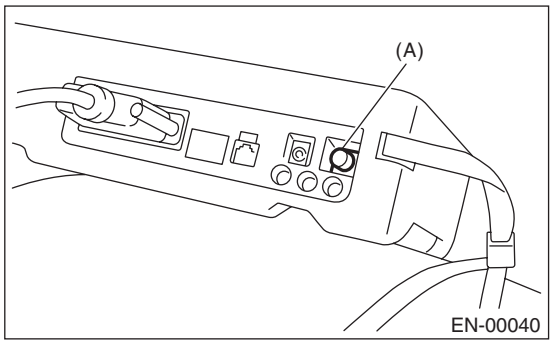


7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.

8) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

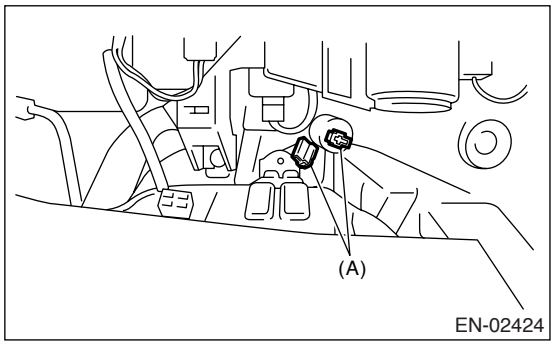
9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type has been displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the "Perform D Check?" is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.

• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to "SUBARU SELECT MONITOR OPERATION MANUAL".
• For the details concerning DTCs, refer to "List of Diagnostic Trouble Code (DTC)".
<Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clear procedure of self-diagnosis function.

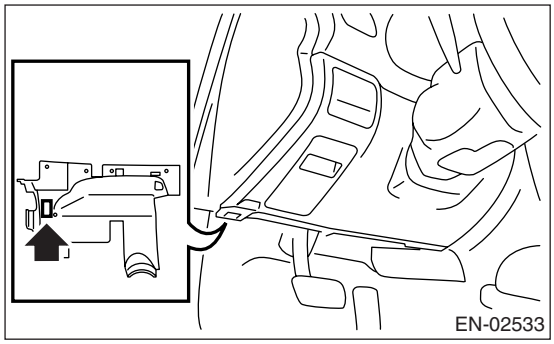
3. OBD-II GENERAL SCAN TOOL

1) After performing the diagnostics and clearing memory, check for any remaining unresolved trouble data: **<Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.>**
2) Warm up the engine.
3) Connect the test mode connector (A) at the lower side of globe box.



4) Connect the OBD-II general scan tool to its data link connector in the lower portion of instrument panel (on the driver's side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in "P" range before starting. (AT model)
• Depress the clutch pedal when starting engine. (MT model)

6) Using the select lever or shift lever, turn the "P" position switch and "N" position switch to ON.
7) Depress the brake pedal to turn brake switch ON. (AT model)
8) Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.

9) Place the select lever or shift lever in “D” range (AT model) or “1st” gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD model, release the parking brake.
• The speed difference between front and rear wheels may light ABS warning light, but this indicates no malfunctions. When the engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the OBD-II general scan tool, check for DTC and record the result(s).

NOTE:
• For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.
• For detailed concerning DTC, refer to “List of Diagnostic Trouble Code (DTC)”.
<Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>

12.Drive Cycle

A: PROCEDURE

There are three drive patterns for the trouble diagnosis. Driving in the specified pattern allows to diagnose malfunctioning items listed below. After the malfunctioning items listed below are repaired, always check whether they correctly resume their functions by driving in the required drive pattern.

1. PREPARATION FOR THE DRIVE CYCLE

1) Make sure that the fuel remains approx. half amount [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)], and battery voltage is 12 V or more.
2) After performing the diagnostics and cleaning memory, check for any remaining unresolved trouble data. <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Except for the engine coolant temperature specified items at starting, the diagnosis is carried out after engine warm up.
• Carry out the diagnosis which is marked * on DTC twice, then, after finishing first diagnosis, stop the engine and do second time at the same condition.

2. AFTER RUNNING 20 MINUTES AT 80 KM/H (50 MPH), IDLE ENGINE FOR 1 MINUTE.

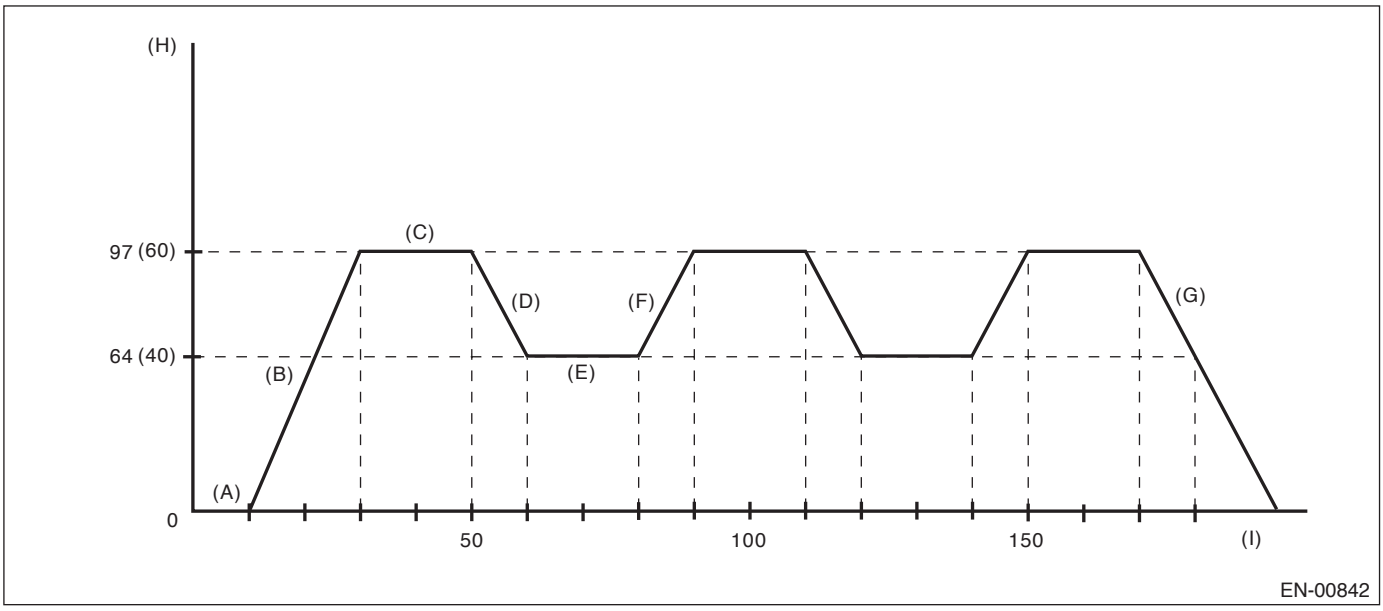
DTC	Item	Condition
*P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	Engine coolant temperature is less than 20°C (68°F) at engine start.
*P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	—

3. IDLE FOR 10 MINUTES

NOTE:
Before the diagnosis, drive the vehicle at 10 km/h (6 MPH) or more.

DTC	Item	Condition
P0030	O_2 Sensor Heater Circuit Range/Performance (Bank 1 Sensor 1)	—

4. DRIVE ACCORDING TO THE FOLLOWING DRIVE PATTERN



(A) Idle engine for 10 seconds or more.
(B) Accelerate to 97 km/h (60 MPH) within 20 seconds.
(C) Drive vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate with throttle fully closed to 64 km/h (40 MPH).
(E) Drive vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate to 97 km/h (60 MPH) within 10 seconds.
(G) Stop vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Seconds

DTC	Item	Condition
*P0139	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	—
*P0301	Cylinder 1 Misfire Detected	In some cases, diagnosis may complete at once.
*P0302	Cylinder 2 Misfire Detected	In some cases, diagnosis may complete at once.
*P0303	Cylinder 3 Misfire Detected	In some cases, diagnosis may complete at once.
*P0304	Cylinder 4 Misfire Detected	In some cases, diagnosis may complete at once.
P0559	Generator circuit high input	—
P0700	Transmission Control System (MIL request)	—

13.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor switch to OFF.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

2. SUBARU SELECT MONITOR (OBD MODE)

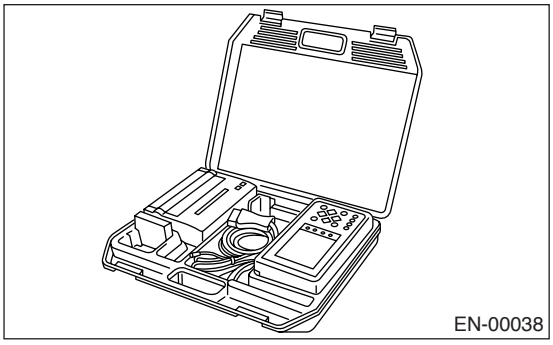
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF and then turn the Subaru Select Monitor switch to OFF.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

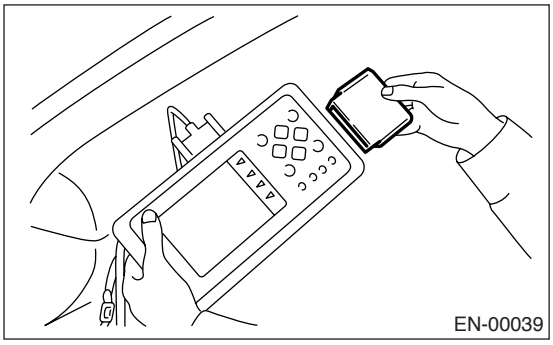
14. Compulsory Valve Operation Check Mode

A: OPERATION

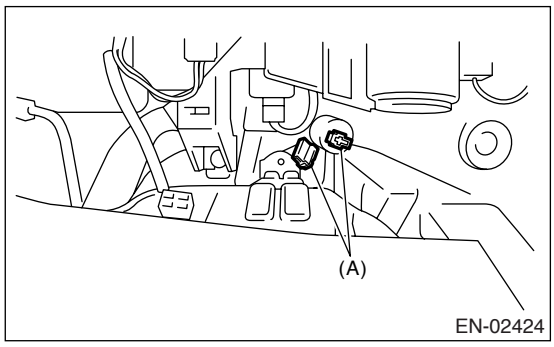
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



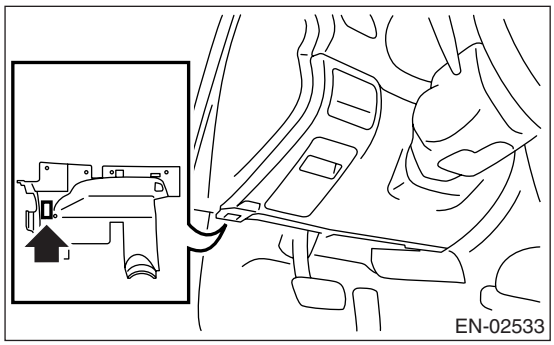
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) located at the lower portion of glove box.

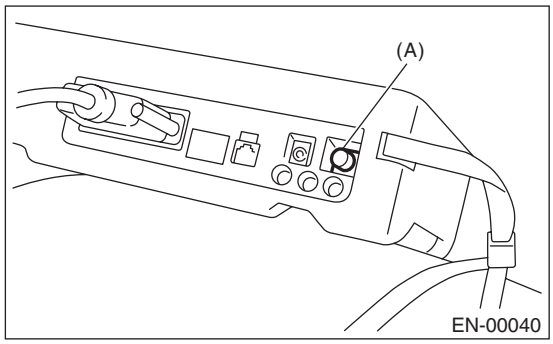


5) Connect the Subaru Select Monitor to data link connector located in the lower portion of instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.

6) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type has been displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired compulsory actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.
13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

DESCRIPTION	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid

NOTE:
• The following parts will be displayed but not functional.

Display
EGR Solenoid
ASV Solenoid
FICD Solenoid
Pressure switching solenoid 1
Pressure switching solenoid 2
Wastegate control solenoid
PCV Solenoid
Vent Control Solenoid
AAI Solenoid
Fuel Tank Sensor Control Valve

• For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

15.Malfunction Indicator Light

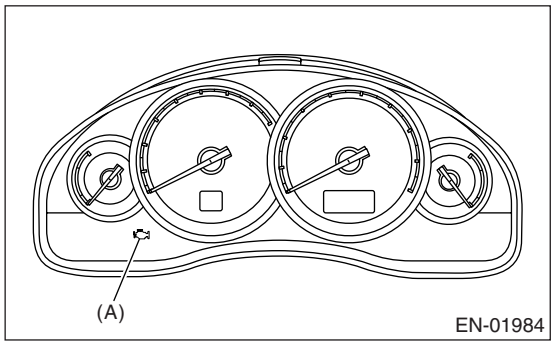
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4SO 2.5)(diag)-45, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4SO 2.5)(diag)-46, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4SO 2.5)(diag)-48, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink. <Ref. to EN(H4SO 2.5)(diag)-50, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking. <Ref. to EN(H4SO 2.5)(diag)-52, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

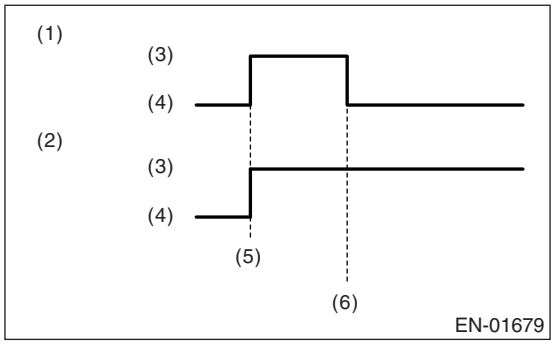
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4SO 2.5)(diag)-46, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or emission control system is malfunctioning.



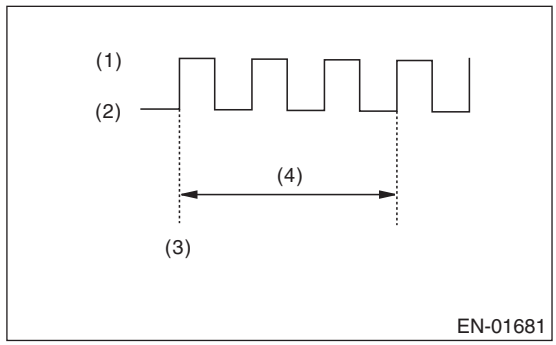
(1) No faulty
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) Turn the ignition switch to OFF and connect the test mode connector.

(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.

(2) Malfunction indicator light blinks at a cycle of 0.5 Hz after starting the engine. (During diagnosis)

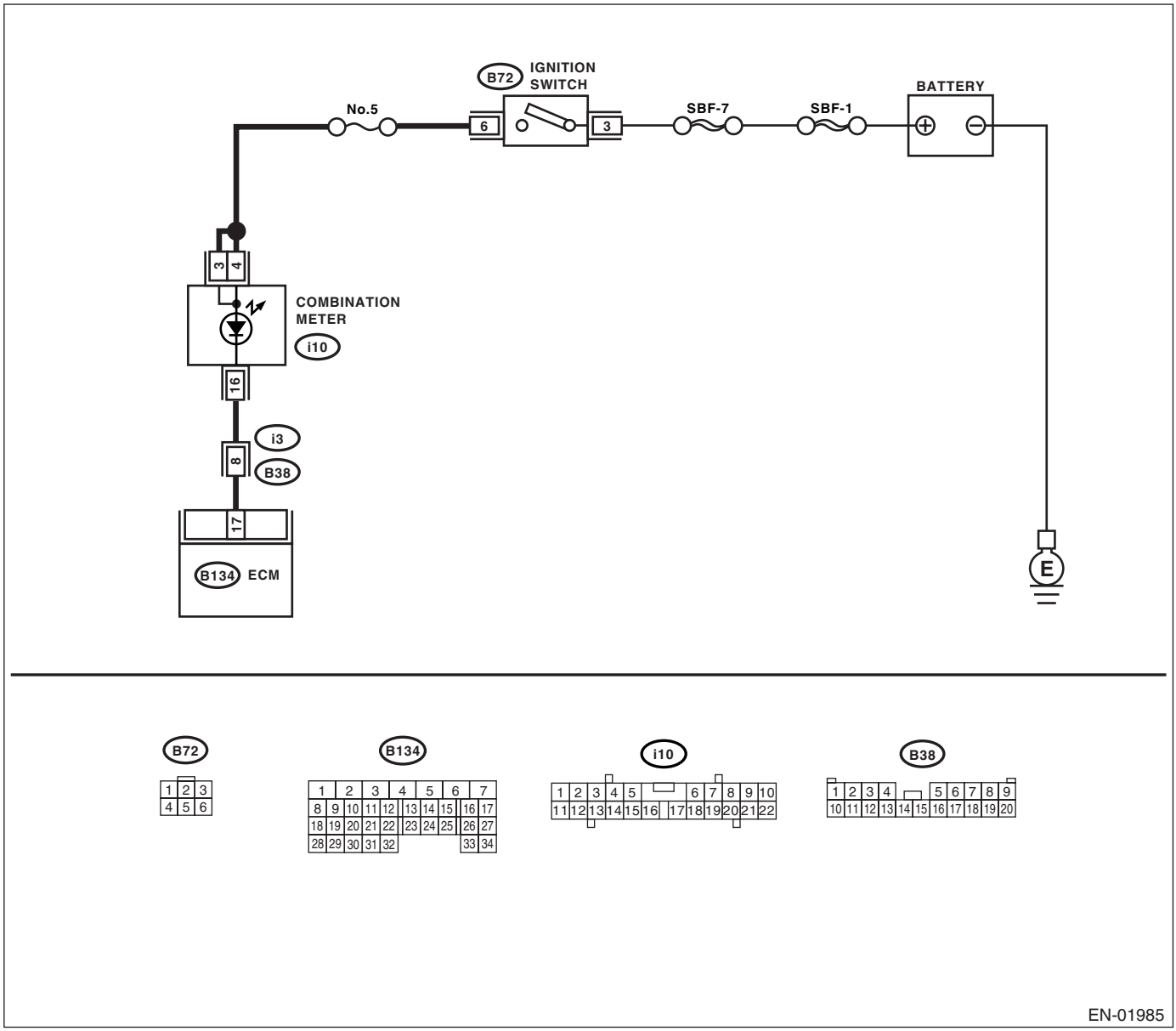
(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

DIAGNOSIS:
The malfunction indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.
WIRING DIAGRAM:
• EC, EK and K4 model



• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 17 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **5.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check for poor connection by shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **4.**
4	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the connection of ECM connector.
5	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-16, Combination Meter Assembly.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 17 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
6	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the board of combination meter. <Ref. to IDI-16, Combination Meter Assembly.>	Check the following and repair if necessary. NOTE: • Blown out fuse (No. 5) • Open or short circuit in harness between fuse (No. 5) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

DIAGNOSIS:

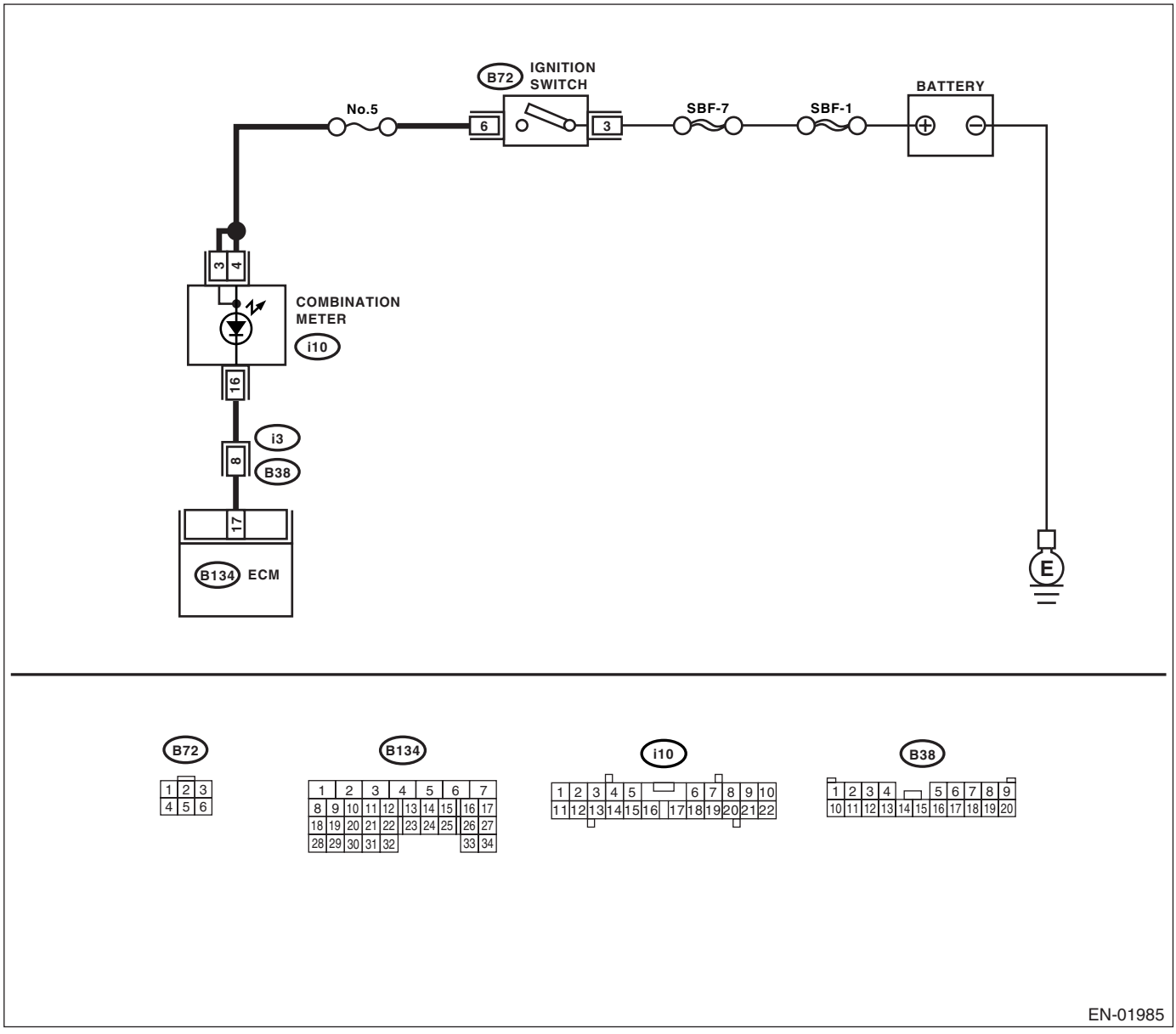
The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

WIRING DIAGRAM:

• EC, EK and K4 model



• KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

DIAGNOSIS:

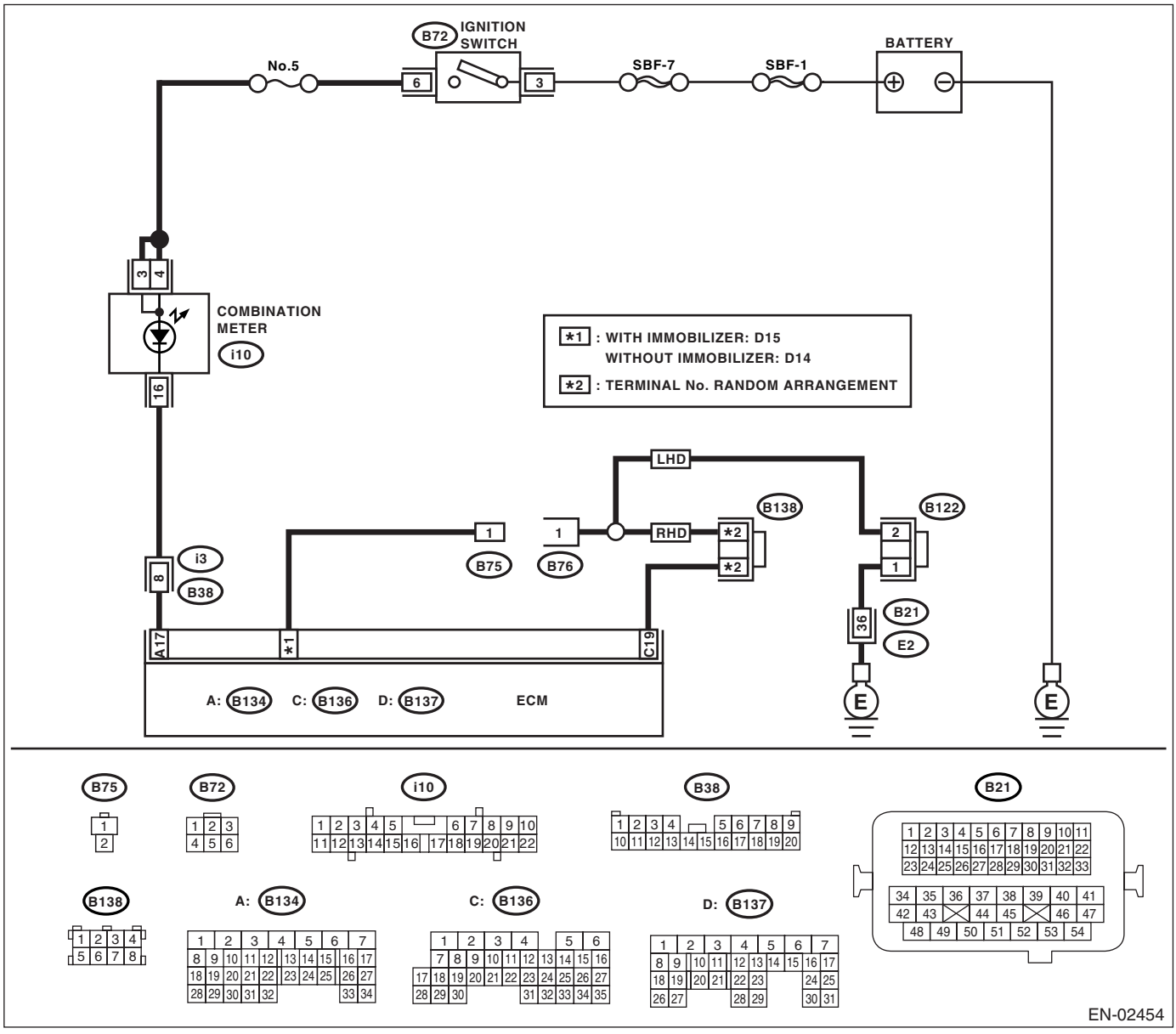
- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

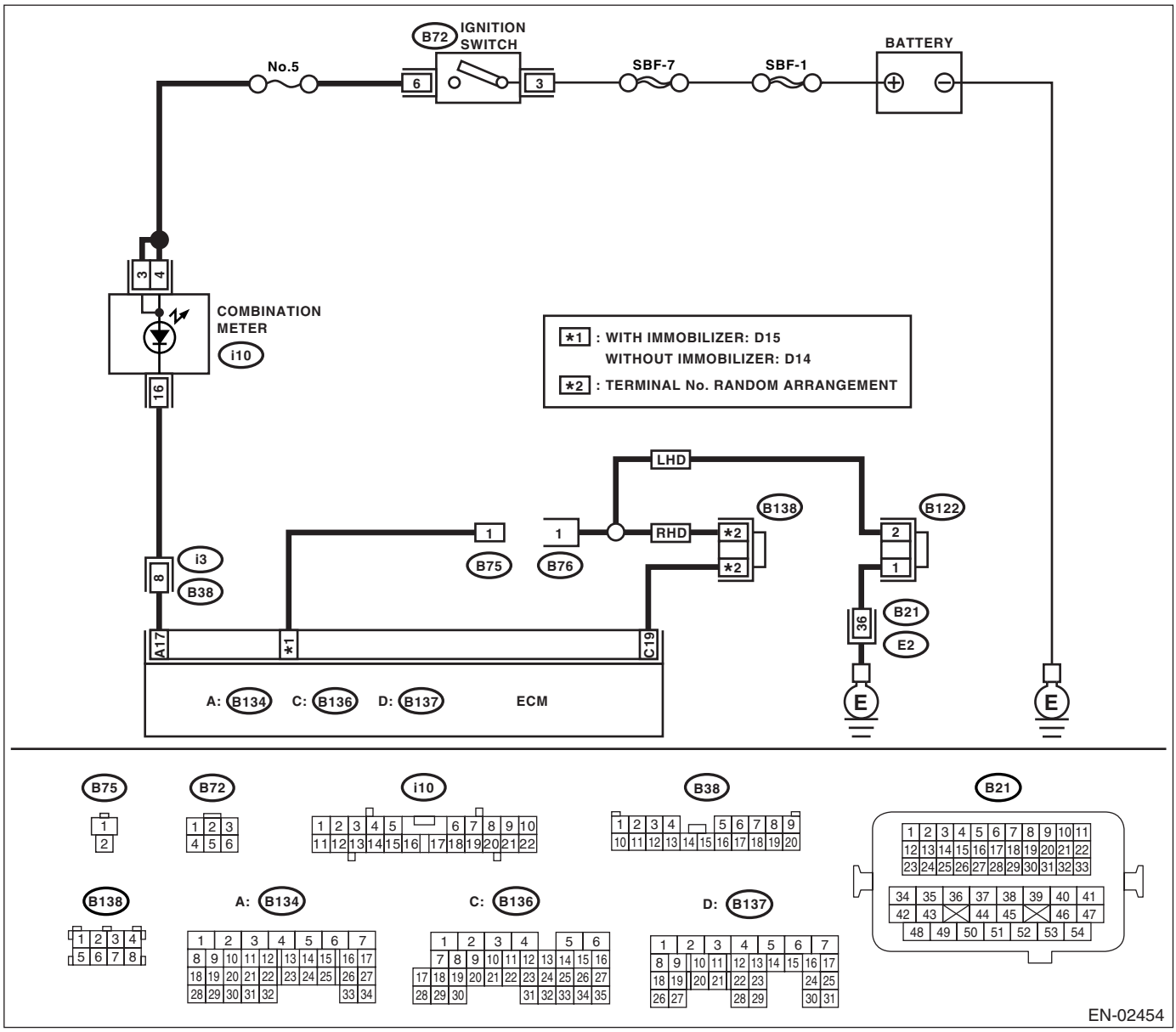
NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step **3.**	Repair the malfunction indictor light circuit. <Ref. to EN(H4SO 2.5)(diag)-46, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
3	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and chassis ground
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***Model with immobilizer*** ***(B137) No. 15 — Chassis ground:*** ***Model without immobilizer*** ***(B137) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and test mode connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.
TROUBLE SYMPTOM:
Malfunction indicator light blinks when test mode connector is not connected.
WIRING DIAGRAM:
• EC, EK and K4 model



• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **3.**	System is in good order. NOTE: Malfunction indicator light blinks when test mode connector is connected.
3	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***Model with immobilizer*** ***(B137) No. 15 — Chassis ground:*** ***Model without immobilizer*** ***(B137) No. 14 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

A: PROCEDURE

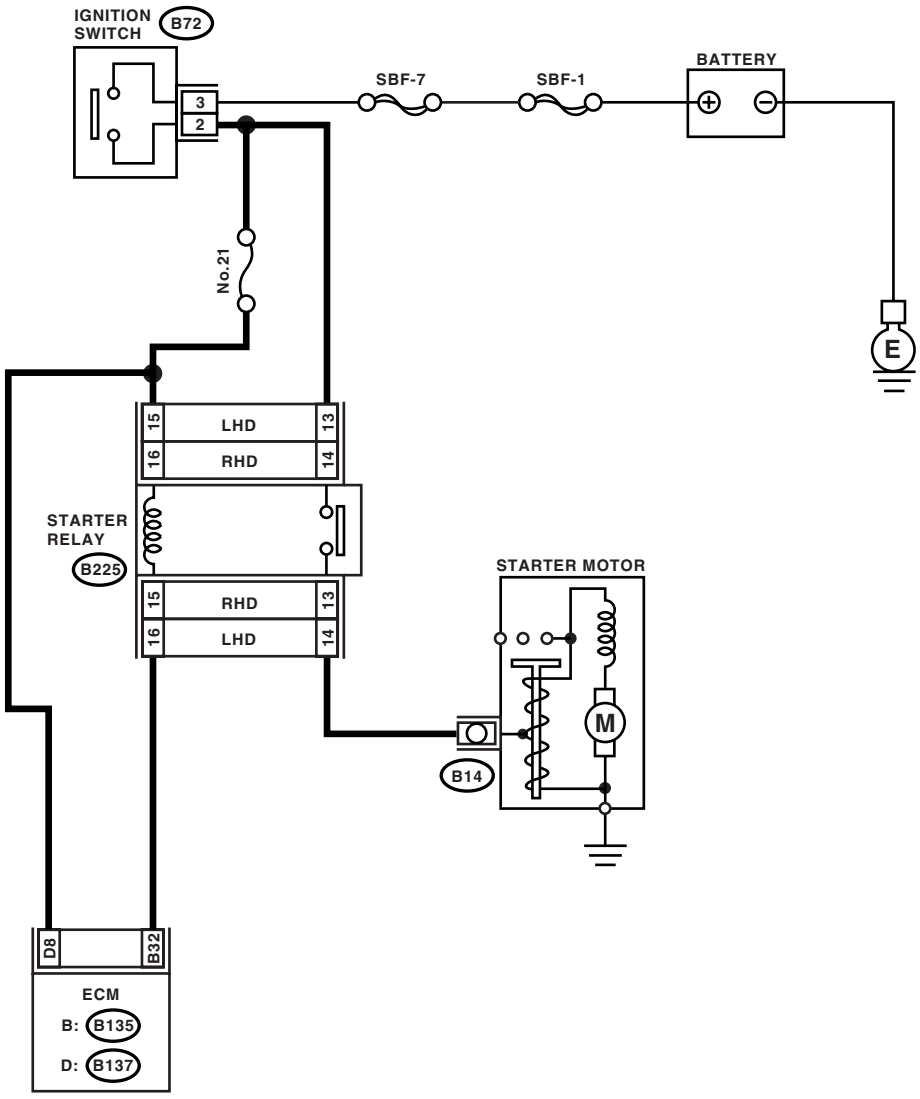
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4SO 2.5)(diag)-55, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4SO 2.5)(diag)-58, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4SO 2.5)(diag)-61, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4SO 2.5)(diag)-64, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-67, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

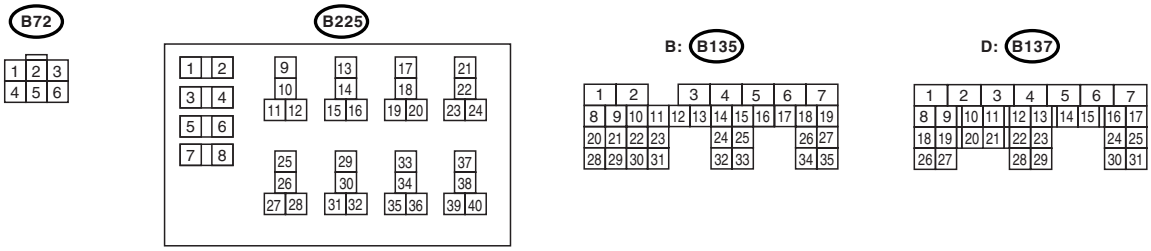
B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model





EN-02455

• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **4.**	Go to step **5.**
4	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4SO 2.5)(diag)-33, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
5	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):*** NOTE: Place the select lever in the “P” or “N” range.	Is the voltage more than 10 V?	Go to step **6.**	Go to step **7.**
6	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ground cable terminal from starter motor. 3) Measure the resistance of ground cable between ground cable terminal and engine ground.	Is the resistance less than 5 Ω?	Check the starter motor. <Ref. to SC(H4SO 2.0)-6, Starter.>	Repair the open circuit of ground cable.
7	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open circuit in harness between ignition switch and battery, and check fuse SBF No. 7 and SBF No. 1.

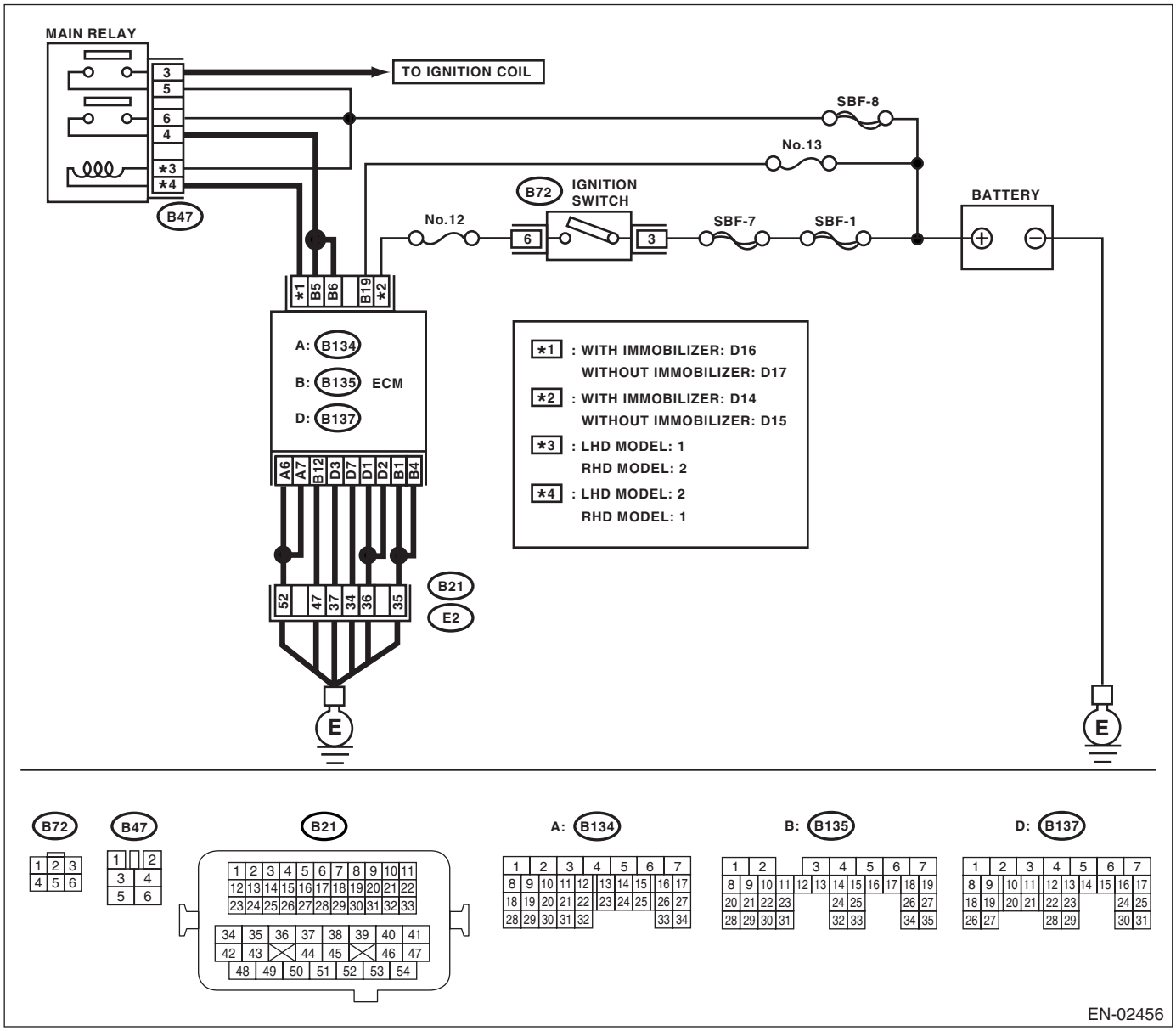
	Step	Check	Yes	No
8	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals after turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **9.**	Replace the ignition switch.
9	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground after turning the ignition switch to START position. ***Connector & terminal*** ***LHD model*** ***(B225) No. 13 (+) — Chassis ground (–):*** ***(B225) No. 15 (+) — Chassis ground (–):*** ***RHD model*** ***(B225) No. 14 (+) — Chassis ground (–):*** ***(B225) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10.**	Repair the open circuit in harness between starter fan relay and ignition switch.
10	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **11.**	Replace the starter relay.
11	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connectors from ECM. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (–):*** ***(B137) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the open or ground short circuit in harness between ECM and starter relay.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the main relay.
3	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B135) No. 12 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
4	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***Model with immobilizer*** ***(B137) No. 14 (+) — Chassis ground (–):*** ***Model without immobilizer*** ***(B137) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open or ground short circuit of power supply circuit.
6	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***LHD model*** ***(B47) No. 1 (+) — Chassis ground (–):*** ***RHD model*** ***(B47) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between ECM connector and main relay connector.

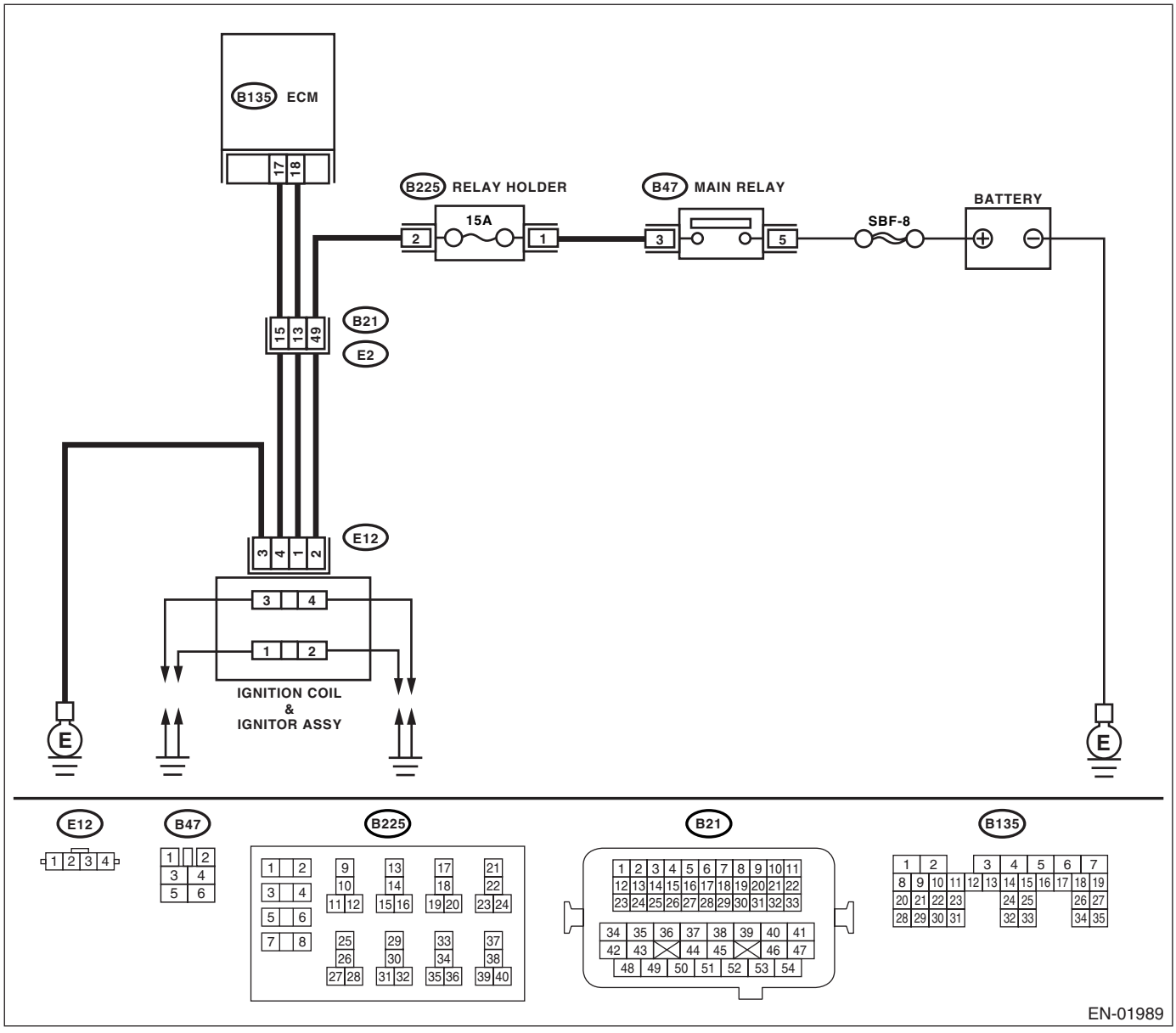
	Step	Check	Yes	No
7	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***Model with immobilizer*** ***(B137) No. 16 (+) — Chassis ground (–):*** ***Model without immobilizer*** ***(B137) No. 17 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit in harness between ECM connector and main relay connector.
8	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open or ground short circuit in harness of power supply circuit.
9	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (–):*** ***(B135) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4SO 2.5)(diag)-61, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Remove the plug cord cap from each spark plug. 2) Install a new spark plug on plug cord cap. **CAUTION:** **Do not remove the spark plug from engine.** 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4SO 2.5)(diag)-64, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY and main relay connector • Poor contact in coupling connector • Blown out fuse
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
5	**CHECK IGNITION COIL & IGNITOR ASSY.** 1) Remove the spark plug cords. 2) Measure the resistance between spark plug cord contact portions to check secondary coil. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 10 — 15 kΩ?	Go to step **6.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, Ignition Coil & Ignitor ASSY.>

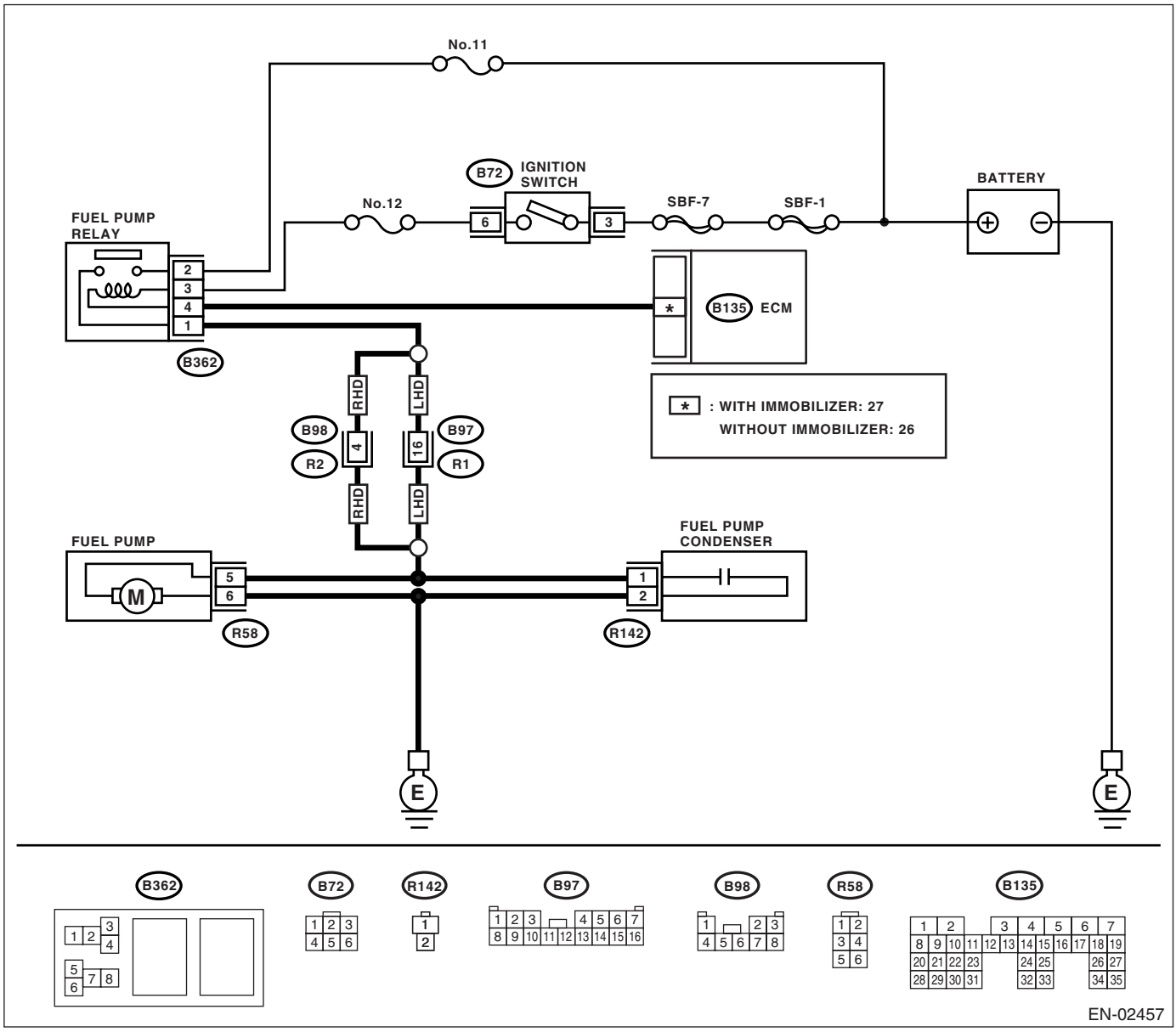
	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR IGNITION COIL & IGNITOR ASSY.** 1) Connect the connector to ignition coil & ignitor ASSY. 2) Check if voltage varies synchronously with engine speed when cranking, while monitoring voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E12) No. 1 (+) — Engine ground (–):*** ***(E12) No. 4 (+) — Engine ground (–):***	Does the voltage vary more than 10 V?	Go to step **7.**	Replace the ignition coil & ignitor ASSY. <Ref. to IG(H4SO 2.0)-8, Ignition Coil & Ignitor ASSY.>
7	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil & ignitor ASSY. 4) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***(B135) No. 18 — (E12) No. 1:*** ***(B135) No. 17 — (E12) No. 4:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B135) No. 18 — Engine ground:*** ***(B135) No. 17 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
9	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN(H4SO 2.5)(diag)-64, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

• EC, EK and K4 model



• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

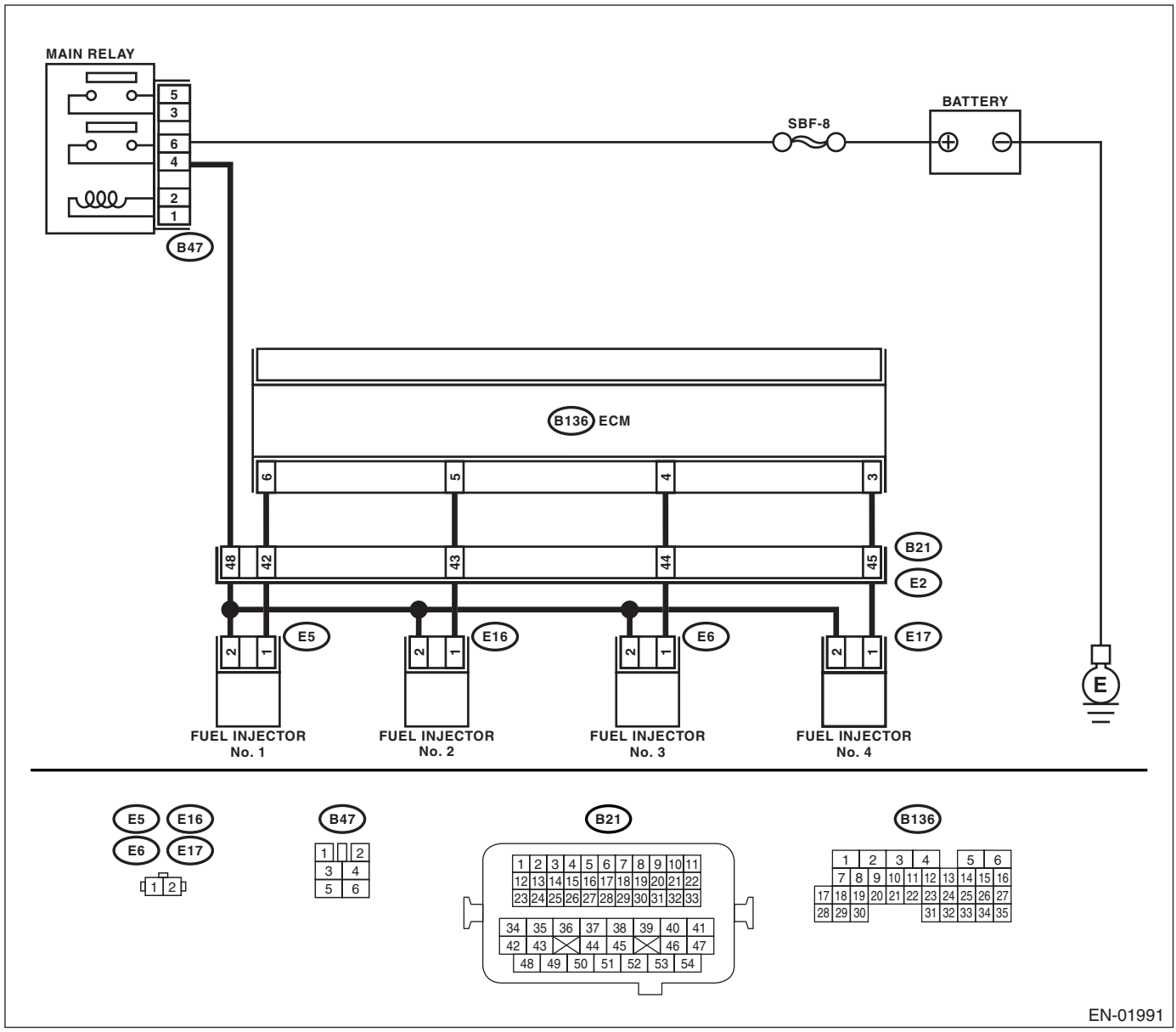
	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATING SOUND OF FUEL PUMP.** Check the fuel pump is in operation for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.5)(diag)-42, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check the fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-67, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK GROUND CIRCUIT OF FUEL PUMP.** 1) Turn the ignition switch to OFF. 2) Remove the fuel pump access hole lid. 3) Disconnect the connector from fuel pump. 4) Measure the resistance of harness connector between fuel pump and chassis ground. ***Connector & terminal*** ***(R58) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal
4	**CHECK POWER SUPPLY TO FUEL PUMP.** 1) Turn the ignition switch to ON. 2) Measure the voltage of power supply circuit between fuel pump connector and chassis ground. ***Connector & terminal*** ***(R58) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the fuel pump. <Ref. to FU(H4SO 2.5)-49, Fuel Pump.>	Go to step **5.**
5	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness connector between fuel pump and fuel pump relay. ***Connector & terminal*** ***(R58) No. 5 — (B362) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between fuel pump connector and chassis grounding terminal • Poor contact in coupling connector
6	**CHECK HARNESS BETWEEN FUEL PUMP AND FUEL PUMP RELAY CONNECTOR.** Measure the resistance of harness between fuel pump and fuel pump relay connector. ***Connector & terminal*** ***(R58) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between fuel pump and fuel pump relay connector.

	Step	Check	Yes	No
7	**CHECK FUEL PUMP RELAY.** 1) Disconnect the connectors from fuel pump relay and main relay. 2) Remove the fuel pump relay and main relay with bracket. 3) Connect the battery to fuel pump relay connector terminals No. 3 and No. 4. 4) Measure the resistance between connector terminals of fuel pump relay. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Go to step **8.**	Replace the fuel pump relay. <Ref. to FU(H4SO 2.5)-49, Fuel Pump.>
8	**CHECK HARNESS BETWEEN ECM AND FUEL PUMP RELAY CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel pump relay connector. ***Connector & terminal*** ***Model with immobilizer*** ***(B135) No. 27 — (B362) No. 4:*** ***Model without immobilizer*** ***(B135) No. 26 — (B362) No. 4:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and fuel pump relay connector.
9	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the fuel injector circuit. <Ref. to EN(H4SO 2.5)(diag)-67, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.**

WIRING DIAGRAM:
- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or apply a screwdriver to the injector for this check.	Does the fuel pump emit operating sound?	Check the fuel pressure. <Ref. to ME(H4SO 2.0)-27, INSPECTION, Fuel Pressure.>	Go to step **3.**
3	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (−):*** ***#2 (E16) No. 2 (+) — Engine ground (−):*** ***#3 (E6) No. 2 (+) — Engine ground (−):*** ***#4 (E17) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — Chassis ground:*** ***#2 (B136) No. 5 — Chassis ground:*** ***#3 (B136) No. 4 — Chassis ground:*** ***#4 (B136) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and fuel injector connector.

	Step	Check	Yes	No
6	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **7.**	Replace the faulty fuel injector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4SO 2.5)(diag)-261, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

1. EC, EK AND K4 MODEL

DTC	Item	NOTE
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-80, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-82, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-85, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-87, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-90, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-92, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-95, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-97, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-100, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-103, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-105, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-108, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-110, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-113, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-116, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4SO 2.5)(diag)-119, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-121, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-123, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-125, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.5)(diag)-127, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-129, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-132, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.5)(diag)-135, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-136, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-137, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-140, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-143, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 misfire detected	<Ref. to EN(H4SO 2.5)(diag)-146, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 misfire detected	<Ref. to EN(H4SO 2.5)(diag)-146, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 misfire detected	<Ref. to EN(H4SO 2.5)(diag)-146, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 misfire detected	<Ref. to EN(H4SO 2.5)(diag)-147, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.5)(diag)-151, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.5)(diag)-153, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4SO 2.5)(diag)-155, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.5)(diag)-158, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO 2.5)(diag)-161, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-164, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-166, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H4SO 2.5)(diag)-169, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-172, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-173, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H4SO 2.5)(diag)-174, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.5)(diag)-175, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H4SO 2.5)(diag)-178, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0558	Generator Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-178, DTC P0558 GENERATOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0559	Generator Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-179, DTC P0559 GENERATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.5)(diag)-180, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Read Access Memory (RAM) Error	<Ref. to EN(H4SO 2.5)(diag)-181, DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H4SO 2.5)(diag)-182, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.5)(diag)-183, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.5)(diag)-184, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-185, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.5)(diag)-186, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.5)(diag)-186, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Neutral Switch Input Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-187, DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Neutral Switch Input Circuit High	<Ref. to EN(H4SO 2.5)(diag)-189, DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1086	Tumble Generated Valve Position Sensor 2 Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-192, DTC P1086 TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1087	Tumble Generated Valve Position Sensor 2 Circuit High	<Ref. to EN(H4SO 2.5)(diag)-195, DTC P1087 TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1088	Tumble Generated Valve Position Sensor 1 Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-197, DTC P1088 TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P1089	Tumble Generated Valve Position Sensor 1 Circuit High	<Ref. to EN(H4SO 2.5)(diag)-200, DTC P1089 TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1090	Tumble Generated Valve System 1 (Valve Open)	<Ref. to EN(H4SO 2.5)(diag)-202, DTC P1090 TUMBLE GENERATED VALVE SYSTEM 1 (VALVE OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1091	Tumble Generated Valve System 1 (Valve Close)	<Ref. to EN(H4SO 2.5)(diag)-203, DTC P1091 TUMBLE GENERATED VALVE SYSTEM 1 (VALVE CLOSE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1092	Tumble Generated Valve System 2 (Valve Open)	<Ref. to EN(H4SO 2.5)(diag)-204, DTC P1092 TUMBLE GENERATED VALVE SYSTEM 2 (VALVE OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1093	Tumble Generated Valve System 2 (Valve Close)	<Ref. to EN(H4SO 2.5)(diag)-205, DTC P1093 TUMBLE GENERATED VALVE SYSTEM 2 (VALVE CLOSE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1094	Tumble Generated Valve Signal 1 Circuit Malfunction (Open)	<Ref. to EN(H4SO 2.5)(diag)-206, DTC P1094 TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1095	Tumble Generated Valve Signal 1 Circuit Malfunction (Short)	<Ref. to EN(H4SO 2.5)(diag)-208, DTC P1095 TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1096	Tumble Generated Valve Signal 2 Circuit Malfunction (Open)	<Ref. to EN(H4SO 2.5)(diag)-210, DTC P1096 TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1097	Tumble Generated Valve Signal 2 Circuit Malfunction (Short)	<Ref. to EN(H4SO 2.5)(diag)-212, DTC P1097 TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric Pressure Sensor Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-214, DTC P1110 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric Pressure Sensor Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.5)(diag)-215, DTC P1111 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1152	O2 Sensor Circuit Range/Performance (Low) (Bank1 Sensor1)	<Ref. to EN(H4SO 2.5)(diag)-216, DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1153	O2 Sensor Circuit Range/Performance (High) (Bank1 Sensor1)	<Ref. to EN(H4SO 2.5)(diag)-218, DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.5)(diag)-221, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.5)(diag)-222, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.5)(diag)-224, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-226, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.5)(diag)-229, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-21, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.5)(diag)-231, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H4SO 2.5)(diag)-237, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H4SO 2.5)(diag)-240, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	<Ref. to EN(H4SO 2.5)(diag)-241, DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-242, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-245, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H4SO 2.5)(diag)-247, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H4SO 2.5)(diag)-250, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H4SO 2.5)(diag)-252, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H4SO 2.5)(diag)-257, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

2. KA AND KS MODEL

DTC	Item	NOTE
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-71, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-73, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-76, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-78, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-81, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-83, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-86, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-89, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-91, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-94, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-96, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-99, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-102, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature for Closed Loop Fuel Control	<Ref. to EN(H4SO 2.0)(diag)-105, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0130	O2 Sensor Circuit (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-107, DTC P0130 O2 SENSOR CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-110, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-112, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	NOTE
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-114, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4SO 2.0)(diag)-116, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-118, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-121, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0139	O2 Sensor Circuit Slow Response (Bank 1 Sensor 2)	<Ref. to EN(H4SO 2.0)(diag)-124, DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-126, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-126, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-128, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-131, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-134, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H4SO 2.0)(diag)-135, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-142, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-144, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4SO 2.0)(diag)-146, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H4SO 2.0)(diag)-148, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H4SO 2.0)(diag)-150, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-153, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-155, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H4SO 2.0)(diag)-157, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H4SO 2.0)(diag)-159, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4SO 2.0)(diag)-160, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0558	Generator Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-163, DTC P0558 GENERATOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0559	Generator Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-164, DTC P0559 GENERATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4SO 2.0)(diag)-165, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Read Access Memory (RAM) Error	<Ref. to EN(H4SO 2.0)(diag)-166, DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H4SO 2.0)(diag)-167, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4SO 2.0)(diag)-168, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H4SO 2.0)(diag)-169, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4SO 2.0)(diag)-170, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Neutral Switch Input Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-171, DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Neutral Switch Input Circuit High	<Ref. to EN(H4SO 2.0)(diag)-173, DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1134	A/F Sensor Micro-Computer Problem	<Ref. to EN(H4SO 2.0)(diag)-176, DTC P1134 A/F SENSOR MICRO-COMPUTER PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1137	O2 Sensor Circuit (Lamda=1) (Bank1 Sensor1)	<Ref. to EN(H4SO 2.0)(diag)-178, DTC P1137 O2 SENSOR CIRCUIT (BANK1 SENSOR1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-181, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H4SO 2.0)(diag)-182, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H4SO 2.0)(diag)-184, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-186, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1521	Brake Switch Circuit Range/Performance Problem (High Input)	<Ref. to EN(H4SO 2.0)(diag)-189, DTC P1521 BRAKE SWITCH CIRCUIT RANGE/PERFORMANCE PROBLEM (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H4SO 2.0)(diag)-191, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-21, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except antenna circuit)	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key Communication Failure	<Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2100	Throttle Control Motor Circuit Open	<Ref. to EN(H4SO 2.0)(diag)-192, DTC P2100 THROTTLE CONTROL MOTOR CIRCUIT OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4SO 2.0)(diag)-193, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H4SO 2.0)(diag)-200, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H4SO 2.0)(diag)-203, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	NOTE
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	<Ref. to EN(H4SO 2.0)(diag)-205, DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2111	Throttle Actuator Control System - Stuck Open	<Ref. to EN(H4SO 2.0)(diag)-205, DTC P2111 THROTTLE ACTUATOR CONTROL SYSTEM - STUCK OPEN, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-206, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-209, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H4SO 2.0)(diag)-211, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H4SO 2.0)(diag)-214, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H4SO 2.0)(diag)-216, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H4SO 2.0)(diag)-220, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

ENGINE SECTION 1

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.0)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.0)
INTAKE (INDUCTION)	IN(H4SO 2.0)
MECHANICAL	ME(H4SO 2.0)
EXHAUST	EX(H4SO 2.0)
COOLING	CO(H4SO 2.0)
LUBRICATION	LU(H4SO 2.0)
SPEED CONTROL SYSTEMS	SP(H4SO 2.0)
IGNITION	IG(H4SO 2.0)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.0)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.0) (diag)
FUEL INJECTION (FUEL SYSTEMS)	FU(H4SO 2.5)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4SO 2.5)
INTAKE (INDUCTION)	IN(H4SO 2.5)
MECHANICAL	ME(H4SO 2.5)
EXHAUST	EX(H4SO 2.5)
COOLING	CO(H4SO 2.5)

ENGINE SECTION 1

LUBRICATION	LU(H4SO 2.5)
SPEED CONTROL SYSTEMS	SP(H4SO 2.5)
IGNITION	IG(H4SO 2.5)
STARTING/CHARGING SYSTEMS	SC(H4SO 2.5)
ENGINE (DIAGNOSTICS)	EN(H4SO 2.5) (diag)

ENGINE (DIAGNOSTICS)

EN(H4SO 2.5)(diag)

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18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

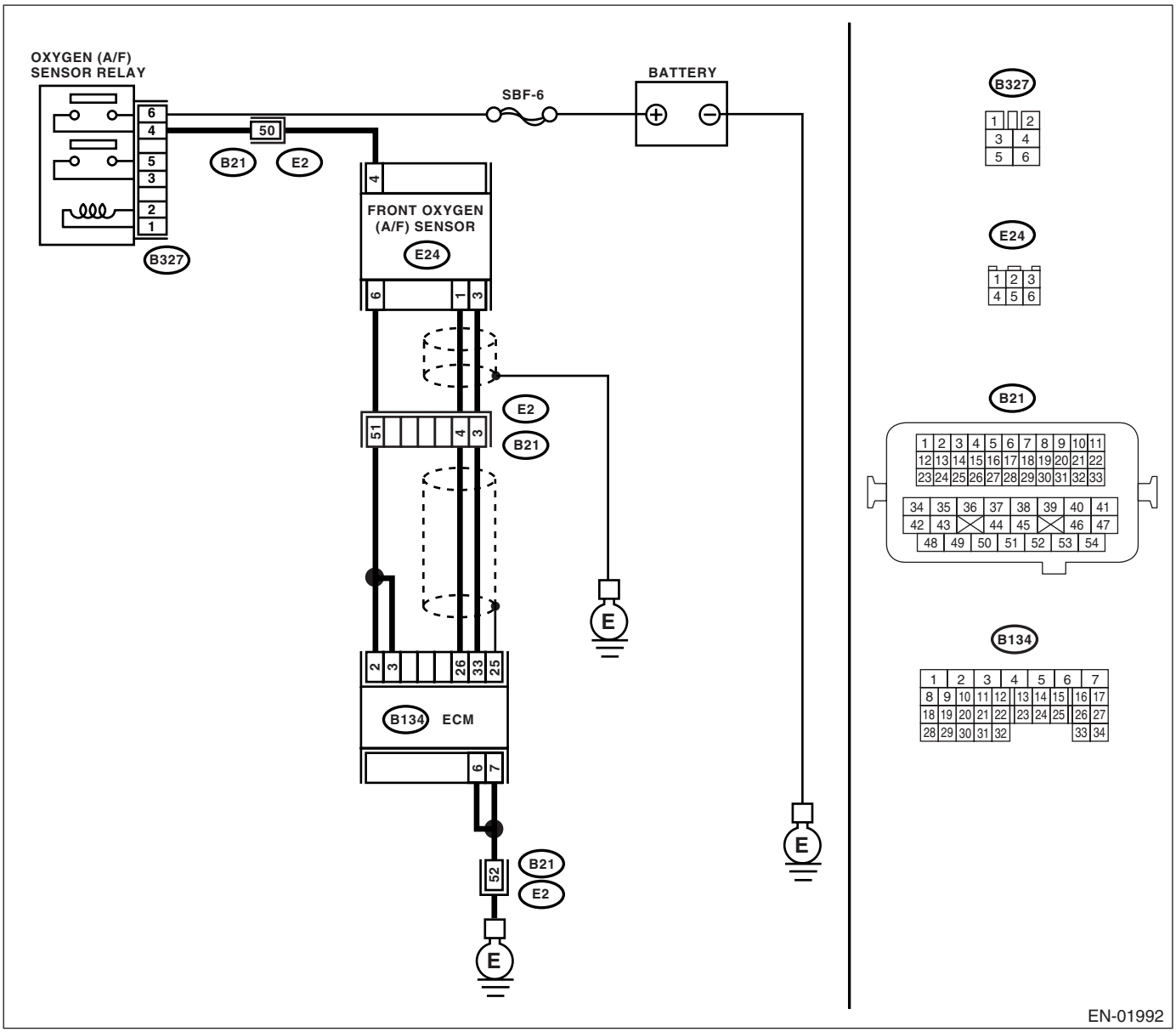
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 2 — (E24) No. 6:*** ***(B134) No. 3 — (E24) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B327) No. 4 — (E24) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
5	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 4 — No. 6:***	Is the resistance less than 5 Ω?	Go to step **6.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>
6	**CHECK POOR CONTACT.** Check the poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

B: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

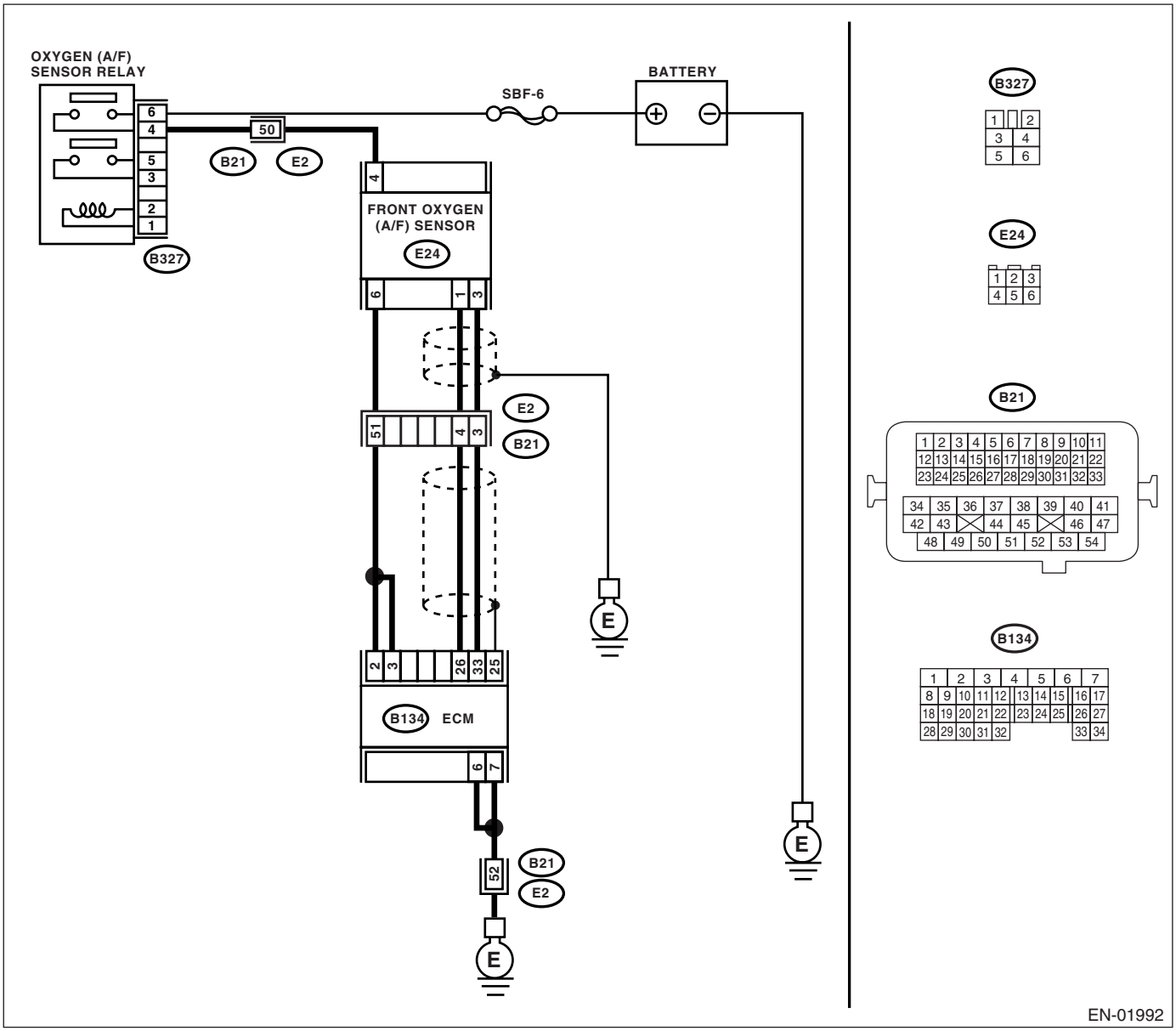
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Do DTC P0031 and P0037 appear at the same time on the Subaru Select Monitor?	Go to step **3.**	Go to step **6.**
3	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
4	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector. • Poor contact in coupling connector
5	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the current more than 0.2 A?	Repair the poor contact connector. NOTE: In this case, repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Go to step **7.**
7	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **8.**
8	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

C: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

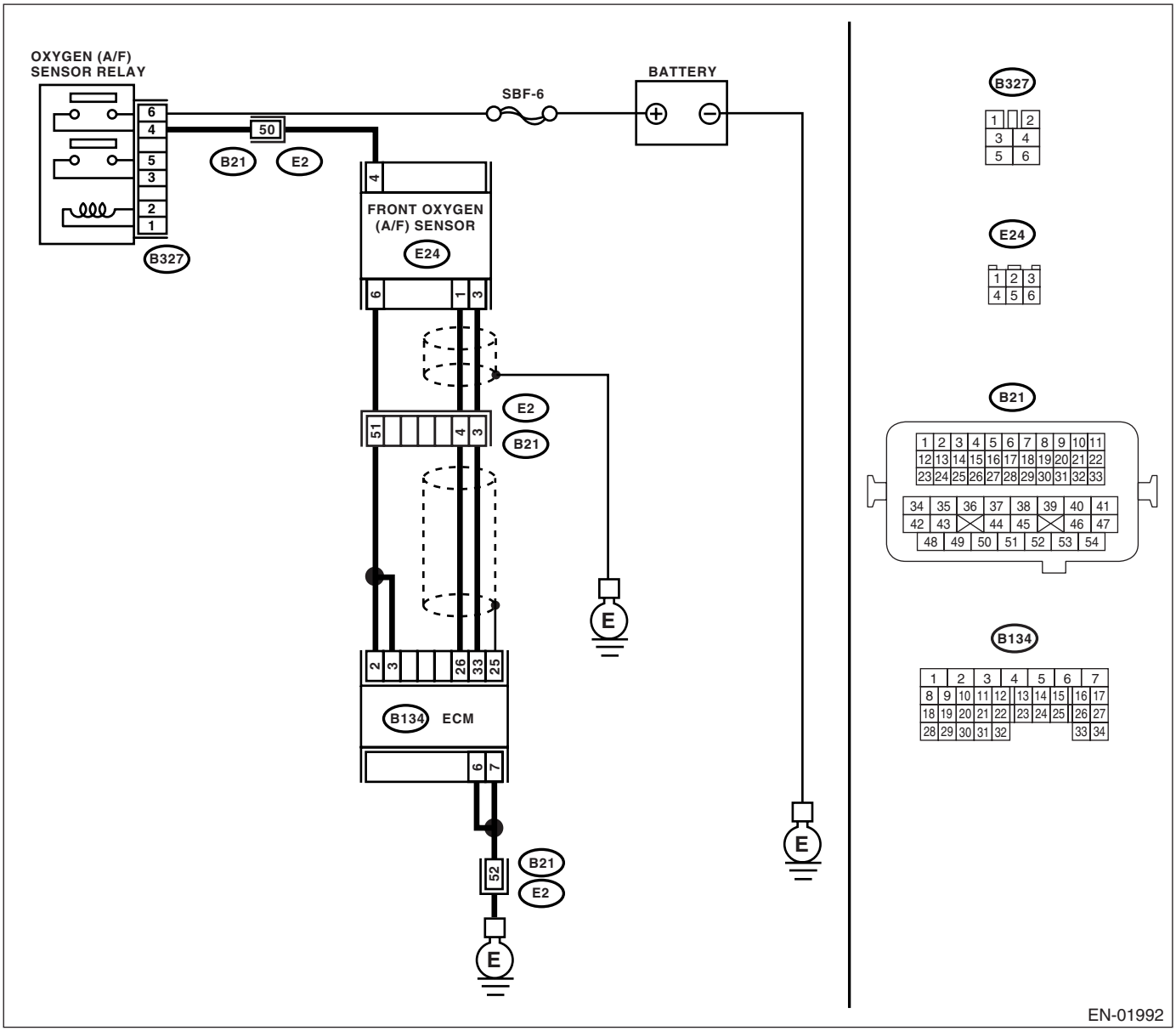
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

• EC, EK and K4 model



• KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	END.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (−):*** ***(B134) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END.

D: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

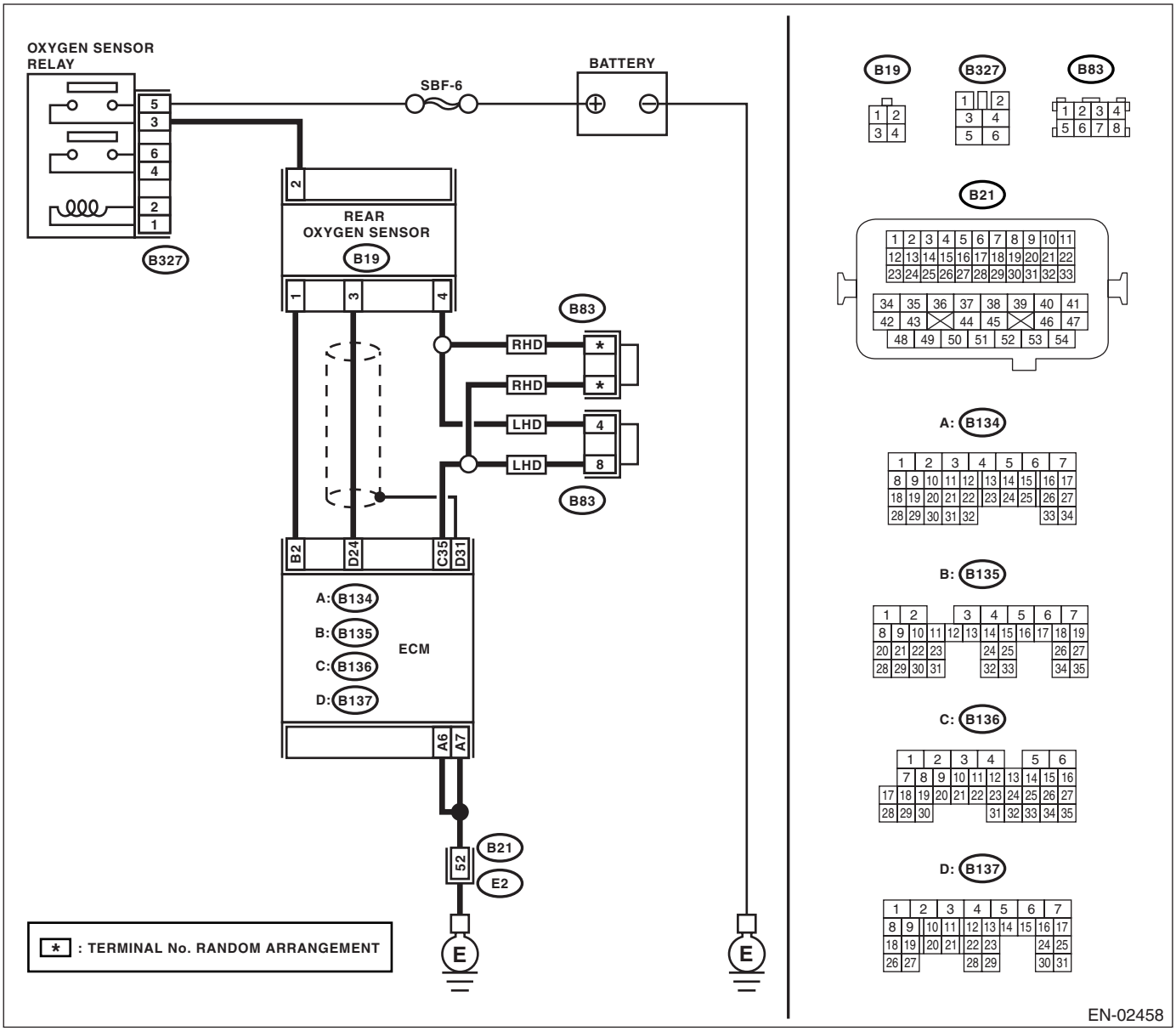
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK GROUND CIRCUIT OF ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case, repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in rear oxygen sensor connecting harness connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(B19) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
8	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>

E: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

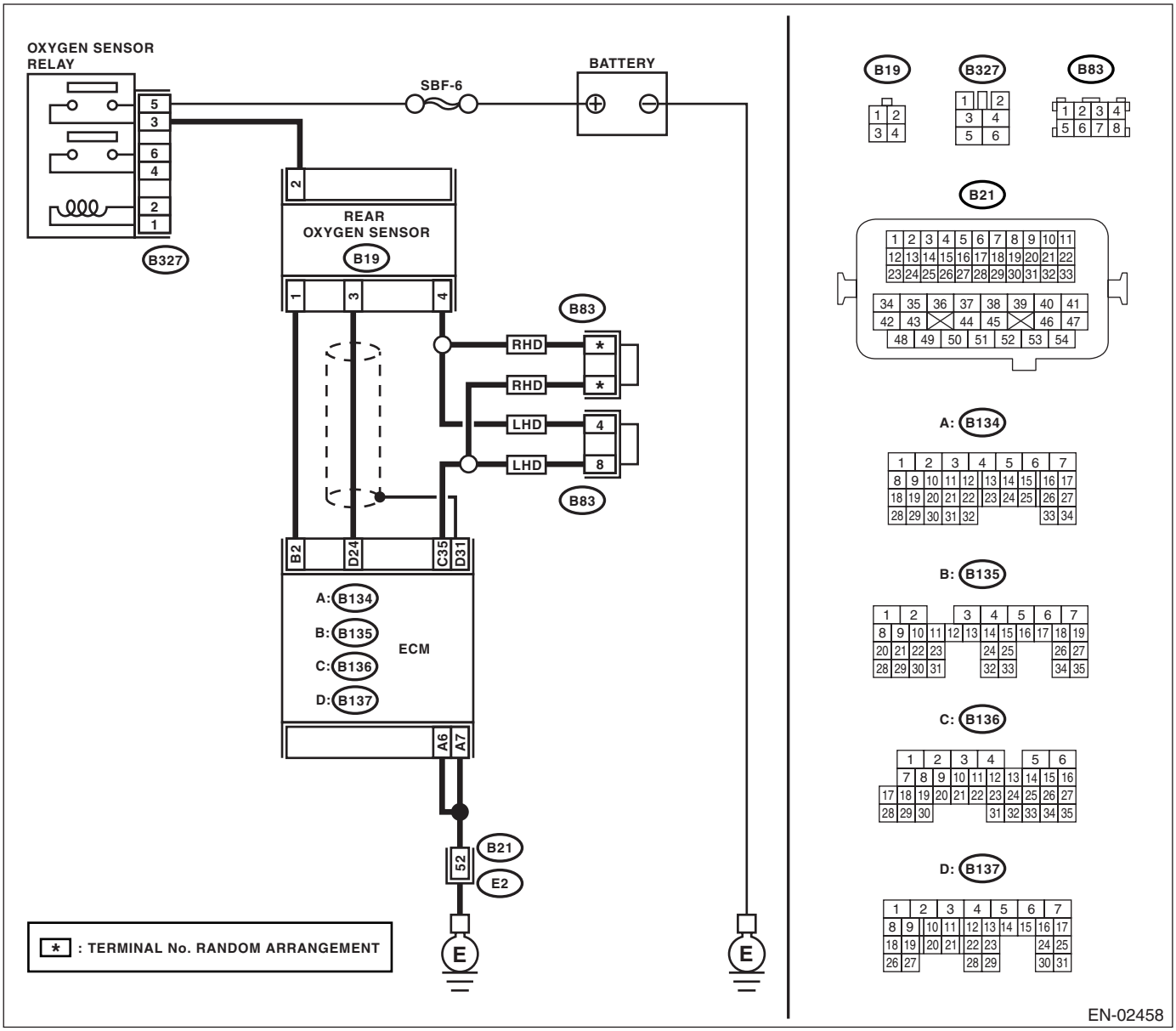
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	END.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	END.

F: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

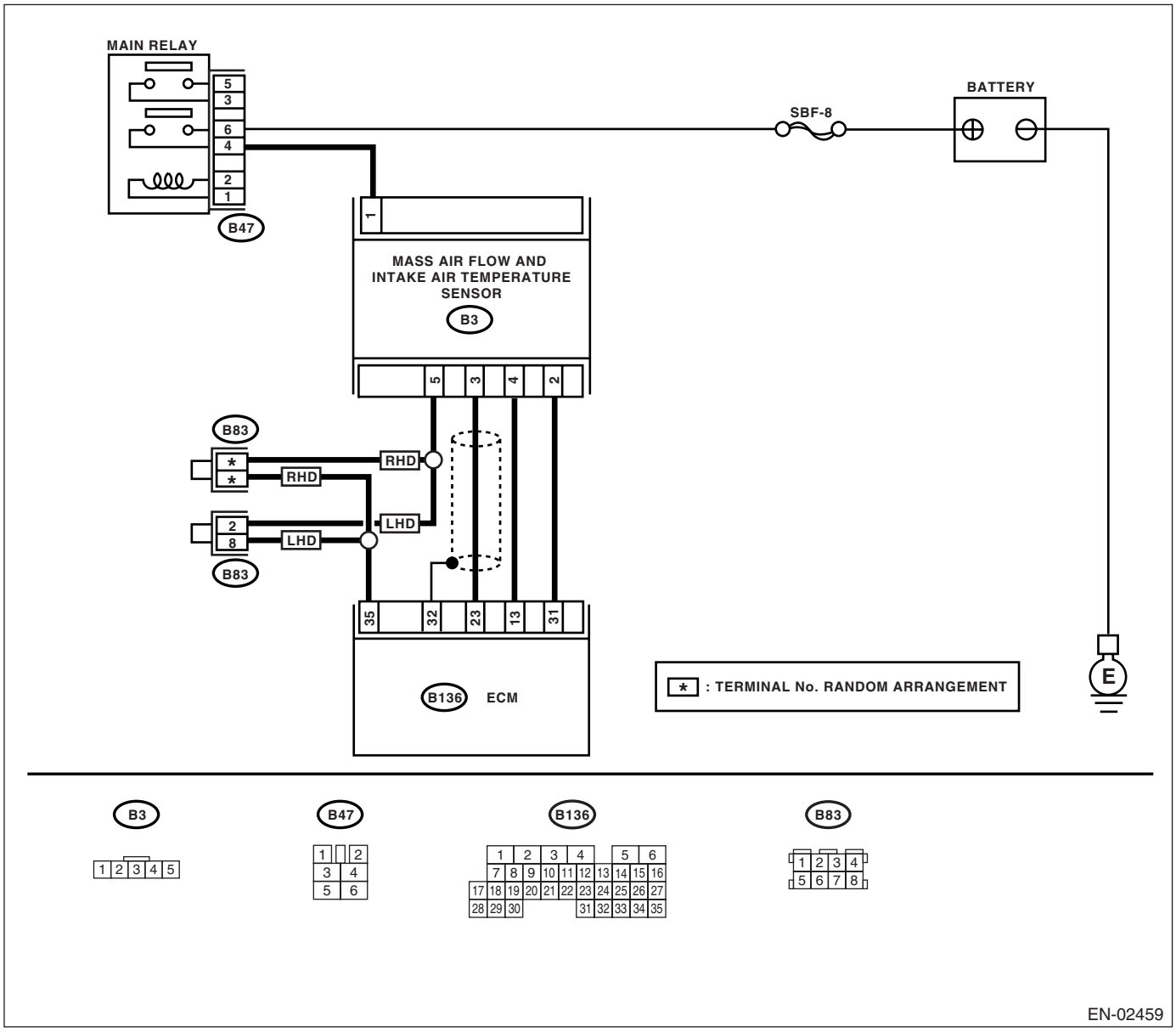
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



EN-02459

- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor. NOTE: In this case, repair the following: • Open or ground short circuit in harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **3.**
3	**CHECK INPUT SIGNAL OF ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Go to step **5.**	Go to step **4.**
4	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
5	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **6.**	Repair the open circuit between mass air flow sensor and main relay

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B136) No. 23 — (B3) No. 3:*** ***(B136) No. 31 — (B3) No. 2:*** ***(B136) No. 35 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit between ECM and mass air flow sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:*** ***(B136) No. 31 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the ground short circuit between ECM and mass air flow sensor connector.
8	**CHECK POOR CONTACT.** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact in mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>

G: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

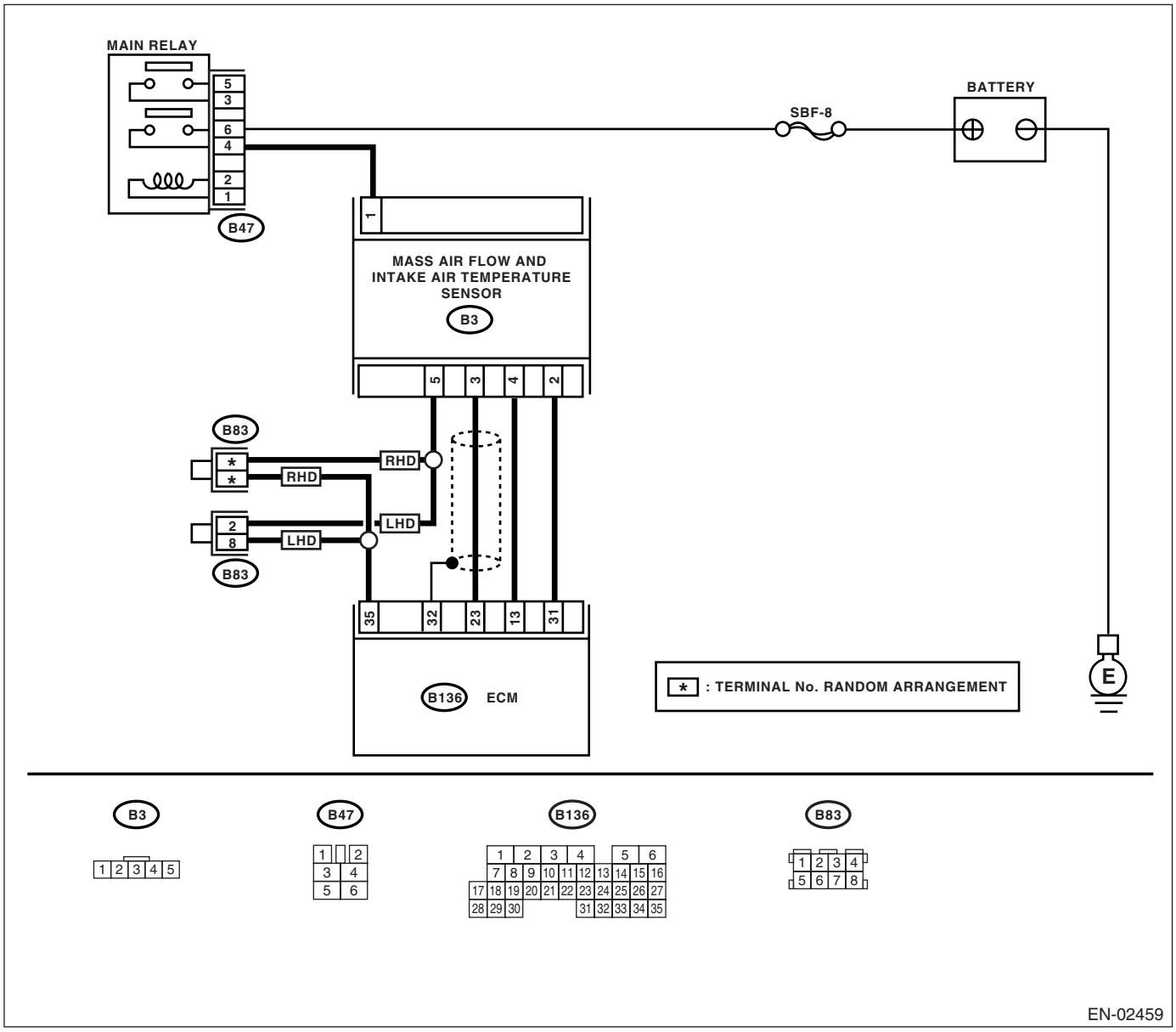
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



EN-02459

- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass airflow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Repair the battery short circuit in harness between mass air flow sensor connector and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B136) No. 31:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open circuit in harness between mass air flow sensor connector and ECM connector.

H: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

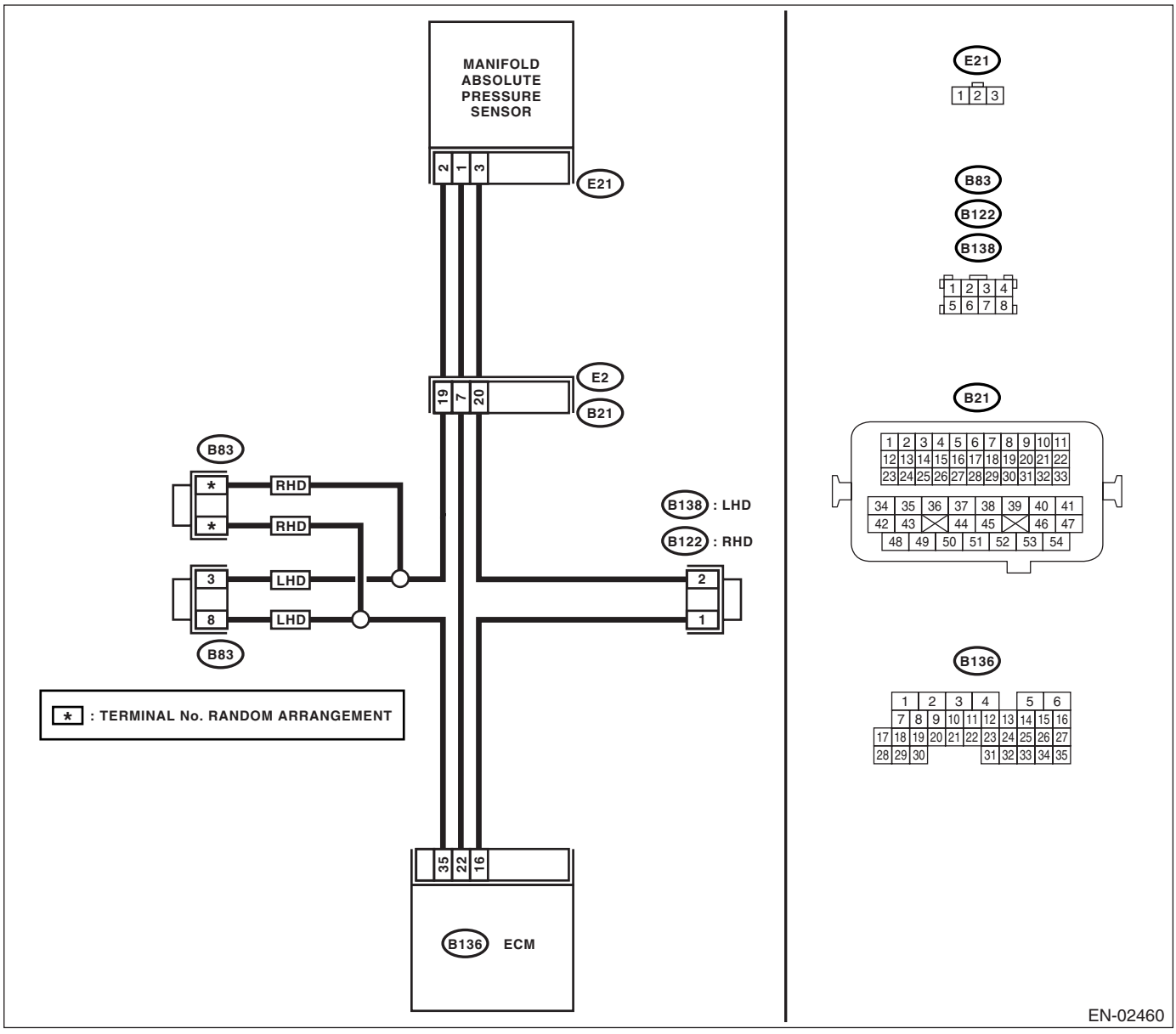
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check the poor contact in ECM and manifold pressure sensor connector.	Is there poor contact in ECM or manifold pressure sensor connector?	Repair the poor contact in ECM or manifold pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **6.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK INPUT SIGNAL TO ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 0.2 V?	Go to step **8.**	Go to step **7.**
7	**CHECK INPUT SIGNAL TO ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **8.**

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
10	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

I: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

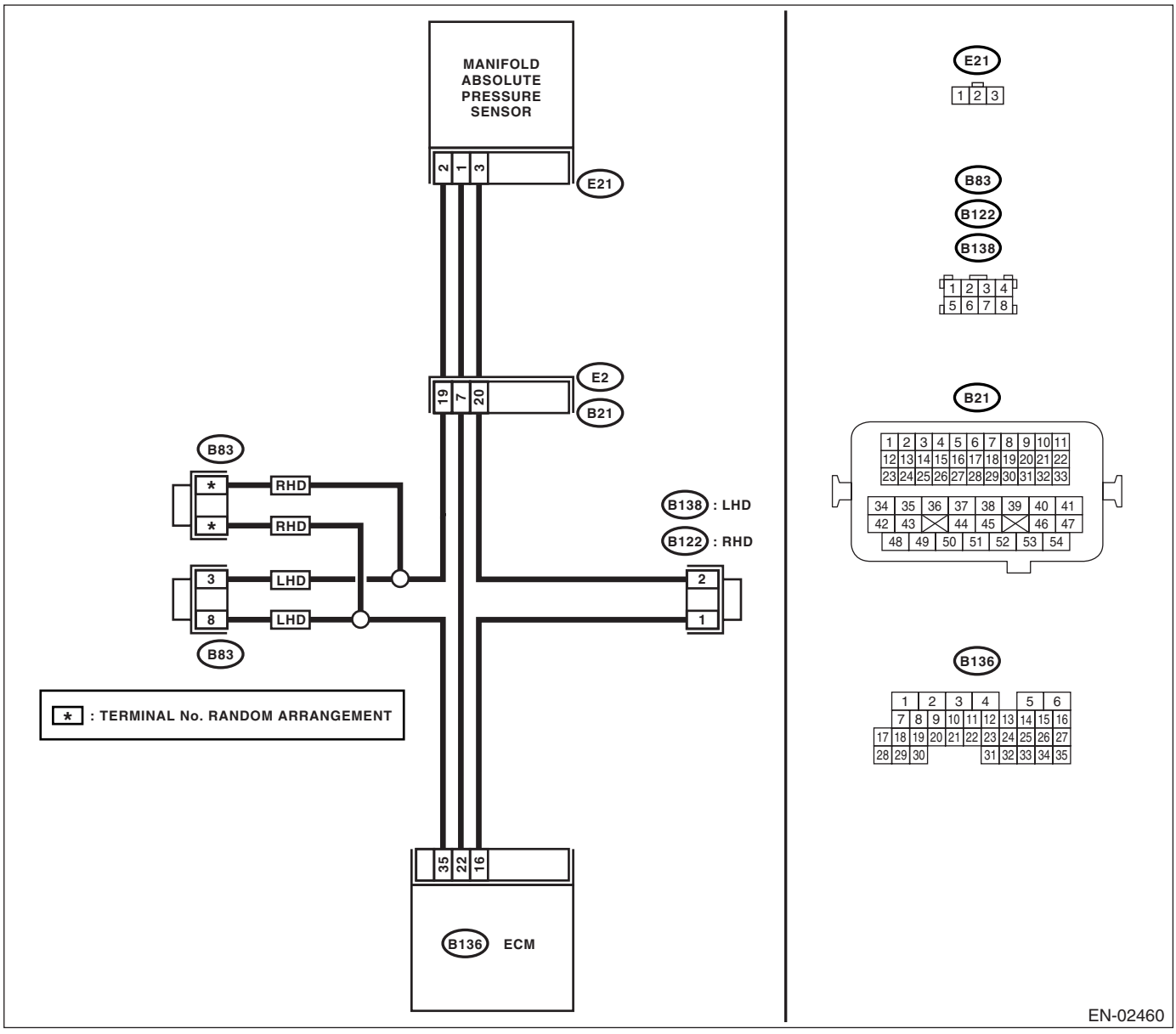
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Go to step **11.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Does the voltage change when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL TO ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **7.**	Go to step **6.**
6	**CHECK INPUT SIGNAL TO ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **8.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 22 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
10	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>
11	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF, and the Subaru Select Monitor switch to OFF. 2) Disconnect the connector from manifold absolute pressure sensor. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Repair battery short in harness between ECM and manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

J: DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

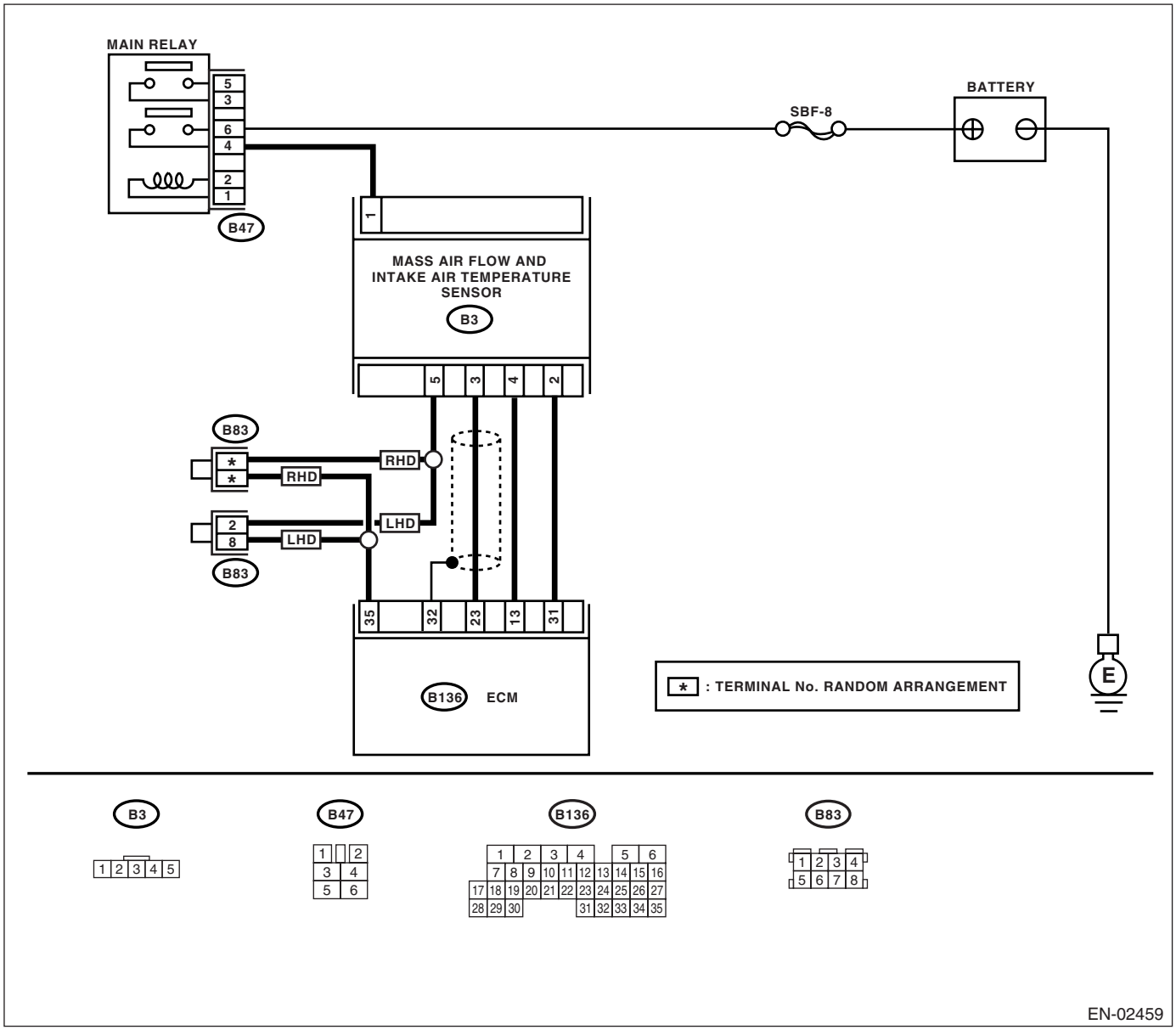
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the intake air temperature more than 120°C (248°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the intake air temperature less than −40°C (−40°F)?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.

K: DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

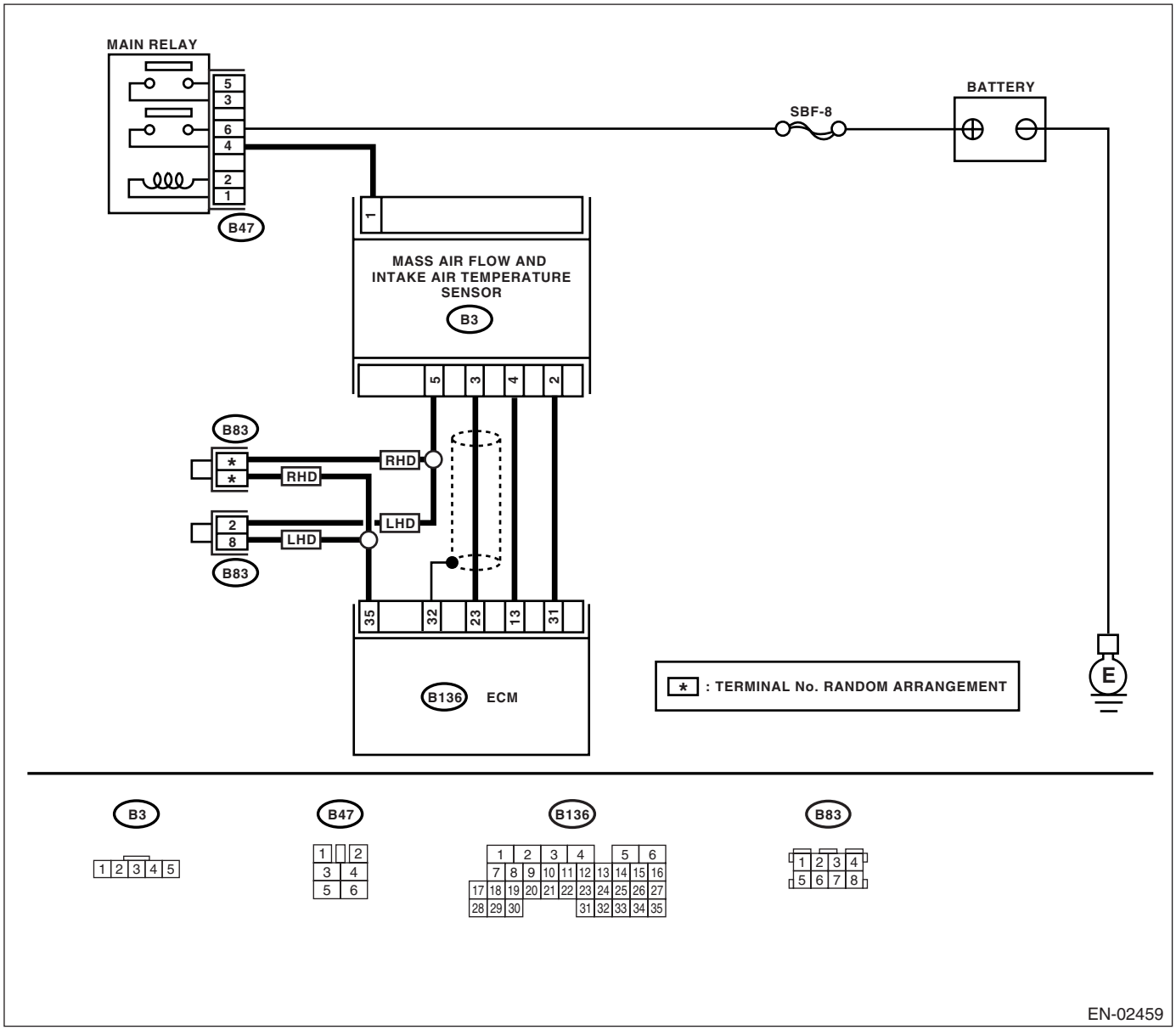
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the intake air temperature less than −40°C (−40°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (–):***	Is the voltage more than 3 V?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
6	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4SO 2.5)-26, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

L: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

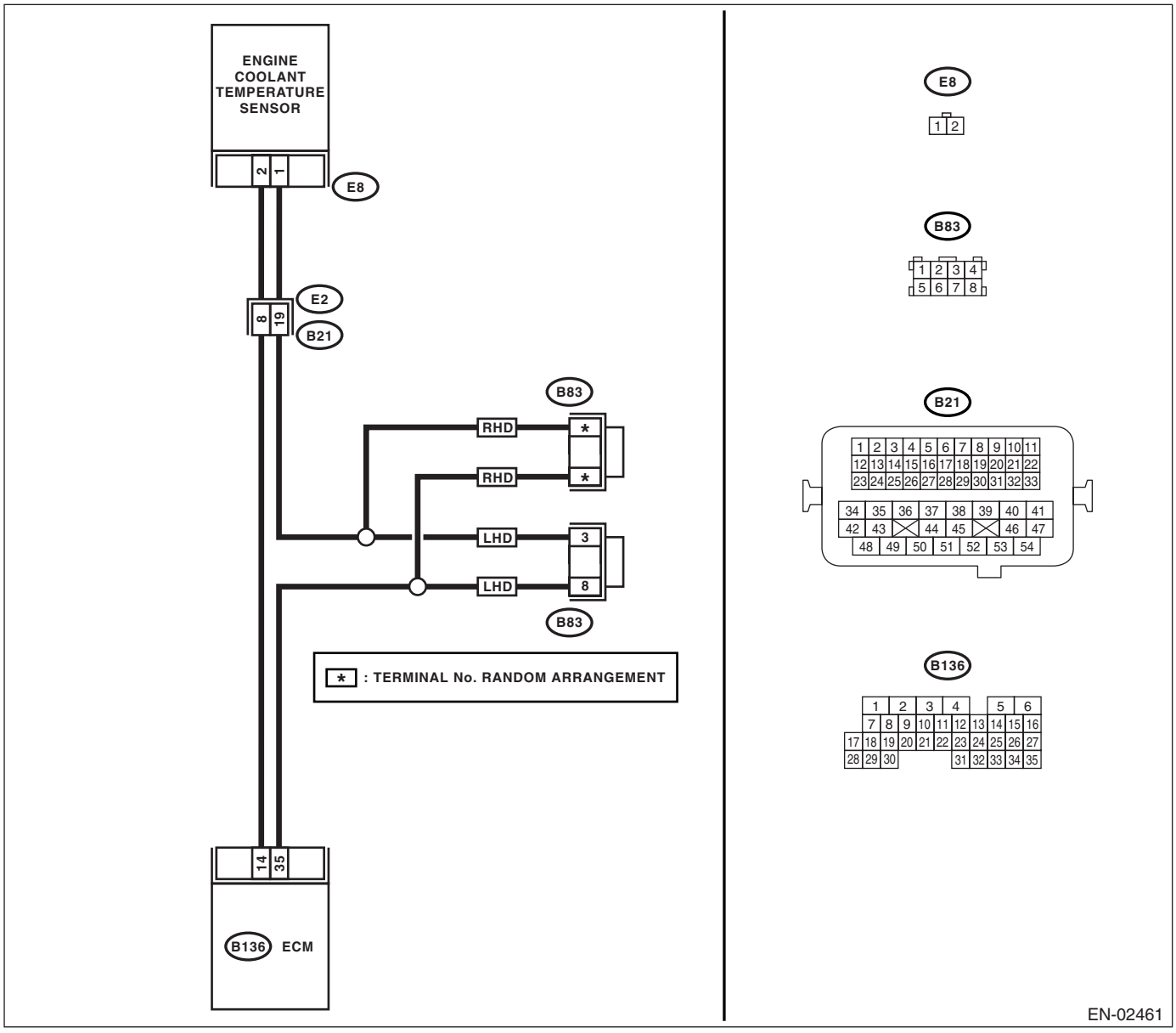
- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the engine coolant temperature more than 150°C (302°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>	Repair the ground short circuit in harness between engine coolant temperature sensor and ECM connector.

M: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

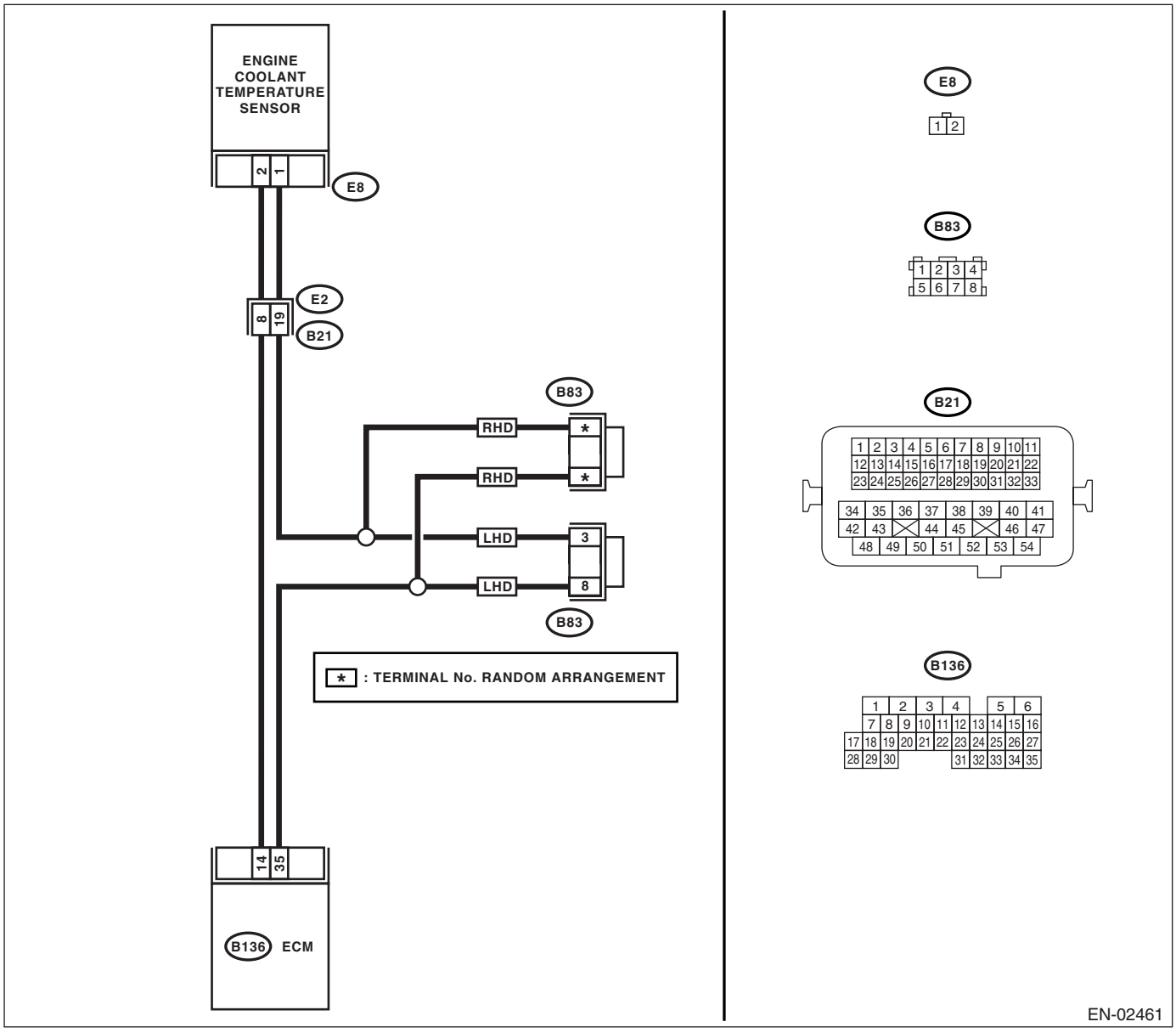
- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the engine coolant temperature less than −40°C (−40°F)?	Go to step **3.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (–):***	Is the voltage more than 4 V?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
6	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

N: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

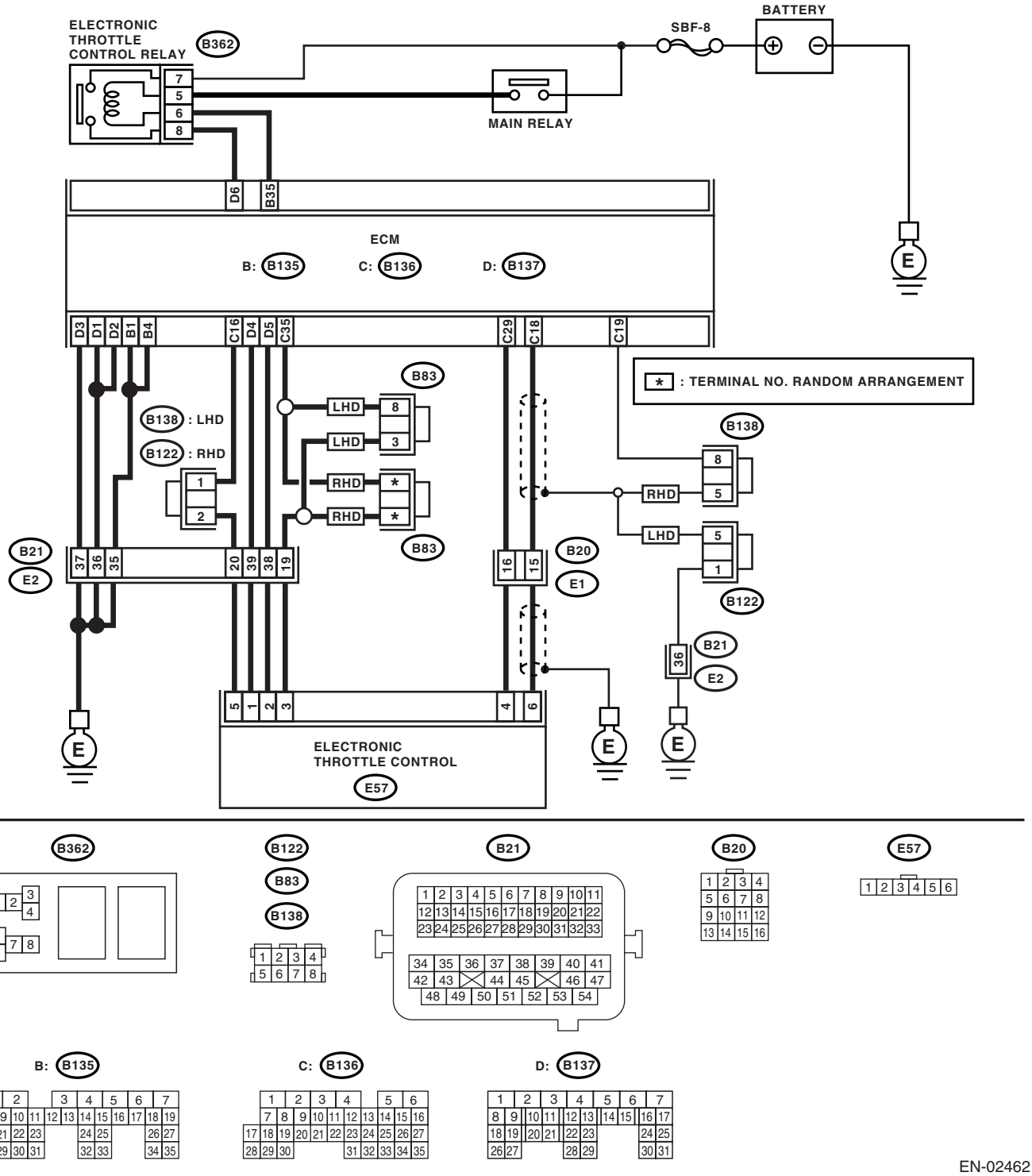
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the accelerator position sensor if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

O: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

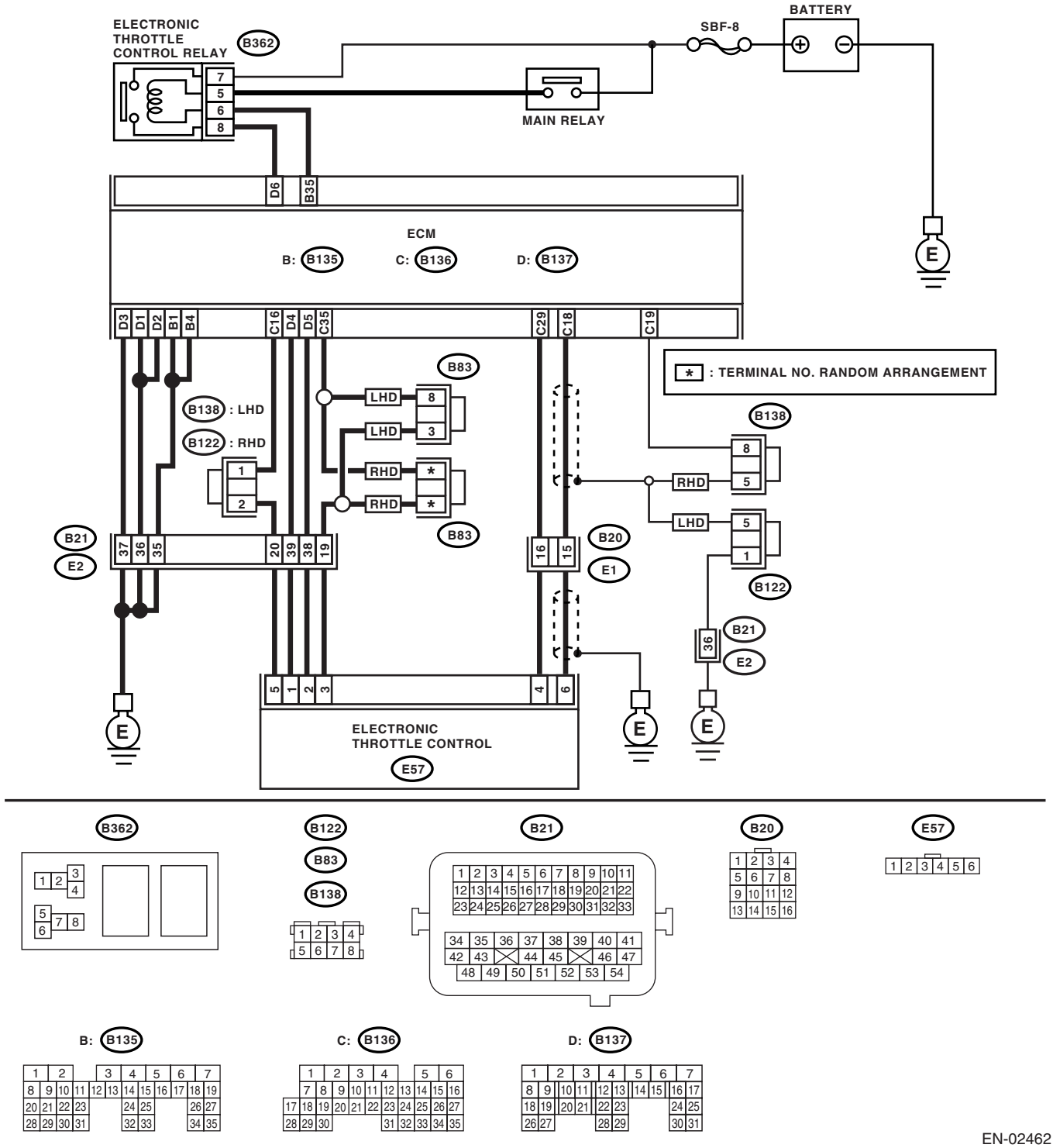
- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



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- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1)Turn the ignition switch to ON. 2)Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 35 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **7.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
7	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Replace the electronic throttle control.	Repair the short circuit to sensor power supply.

P: DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

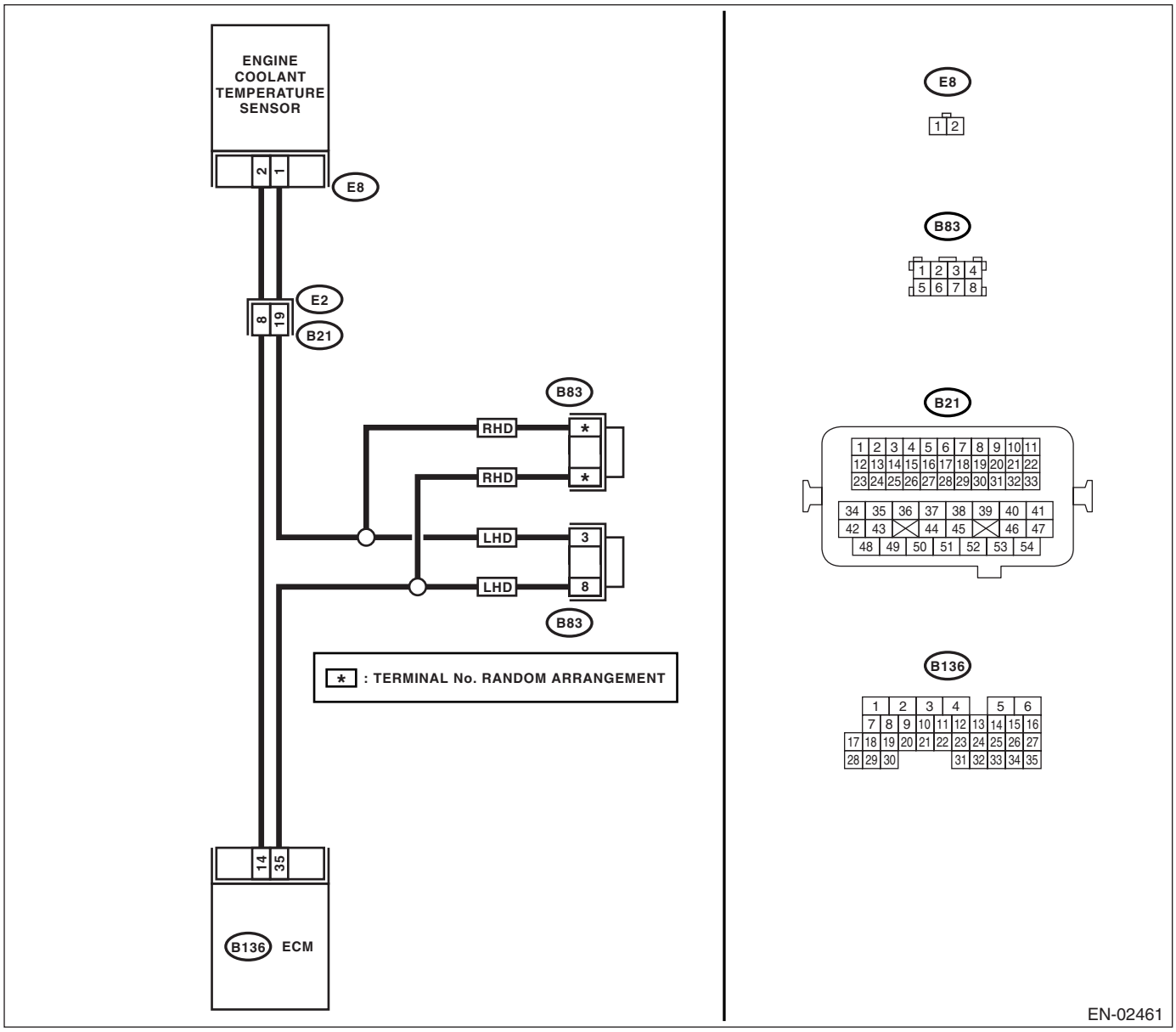
Engine will not return to idling.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **3.**
3	**CHECK ENGINE COOLING SYSTEM.** NOTE: Check the following items. • Thermostat open stuck • Coolant level • Coolant freeze • Tire diameter	Is there any fault in engine cooling system?	Replace the thermostat. <Ref. to CO(H4SO 2.0)-18, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>

Q: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

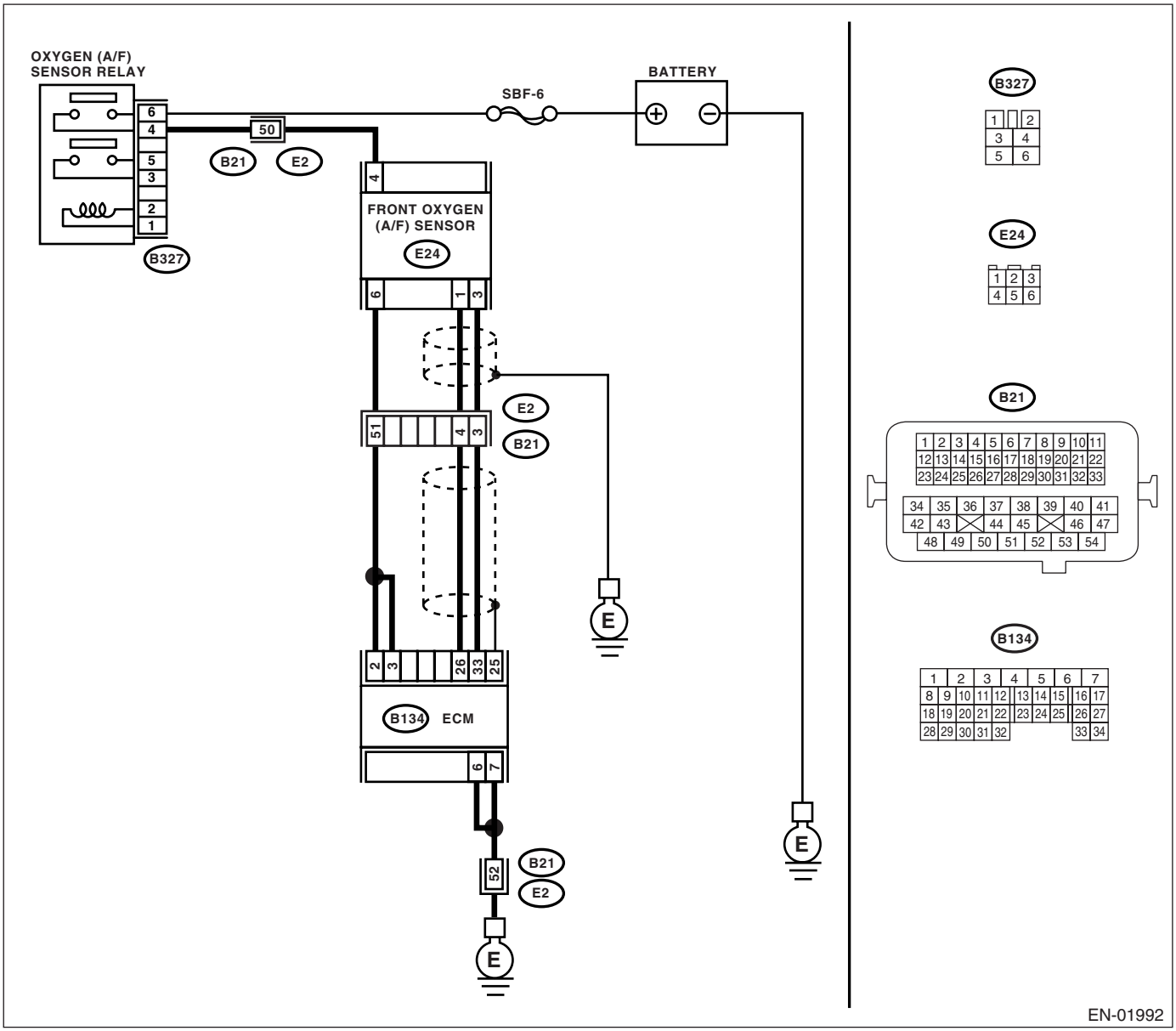
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

R: DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

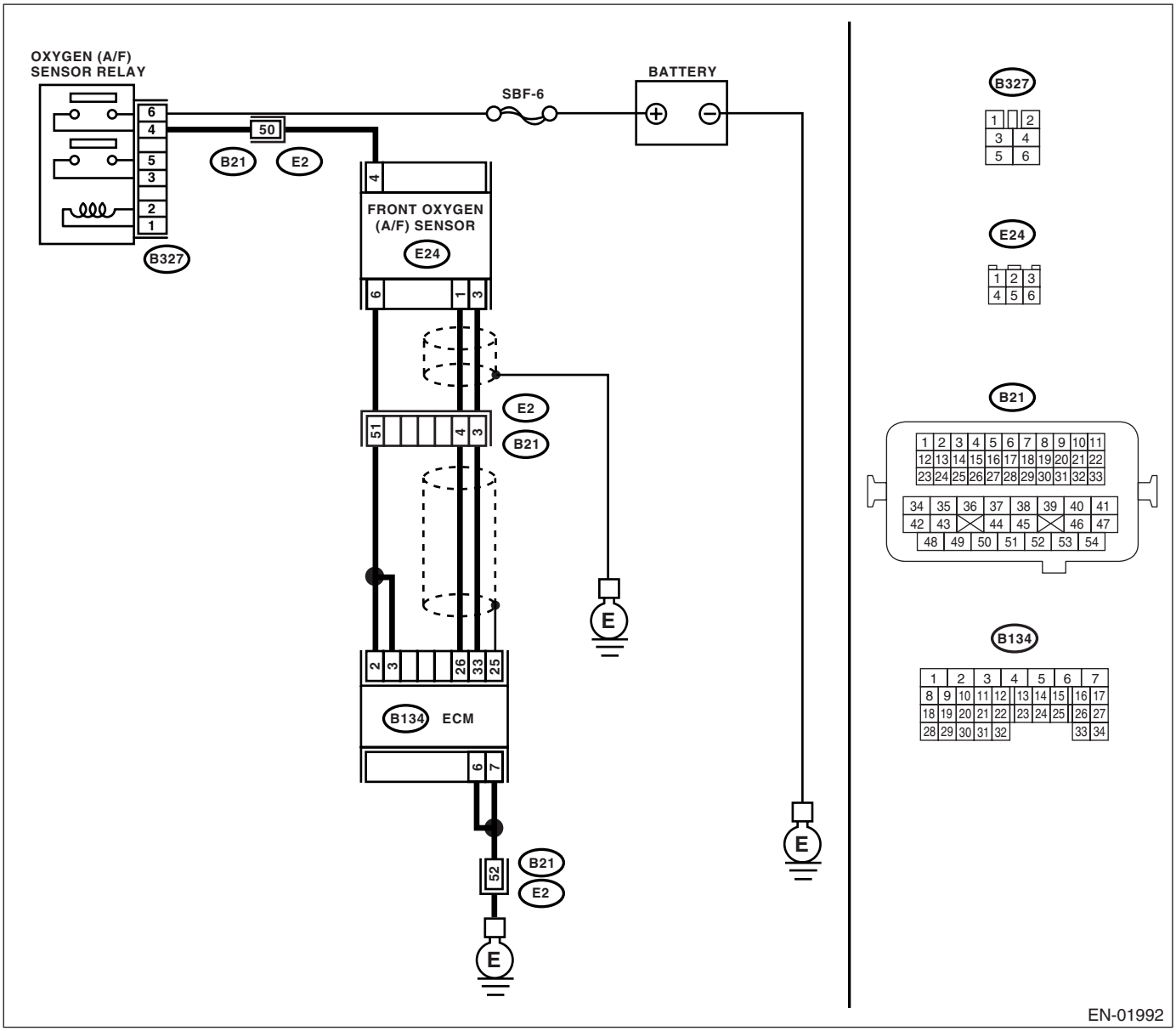
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

S: DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

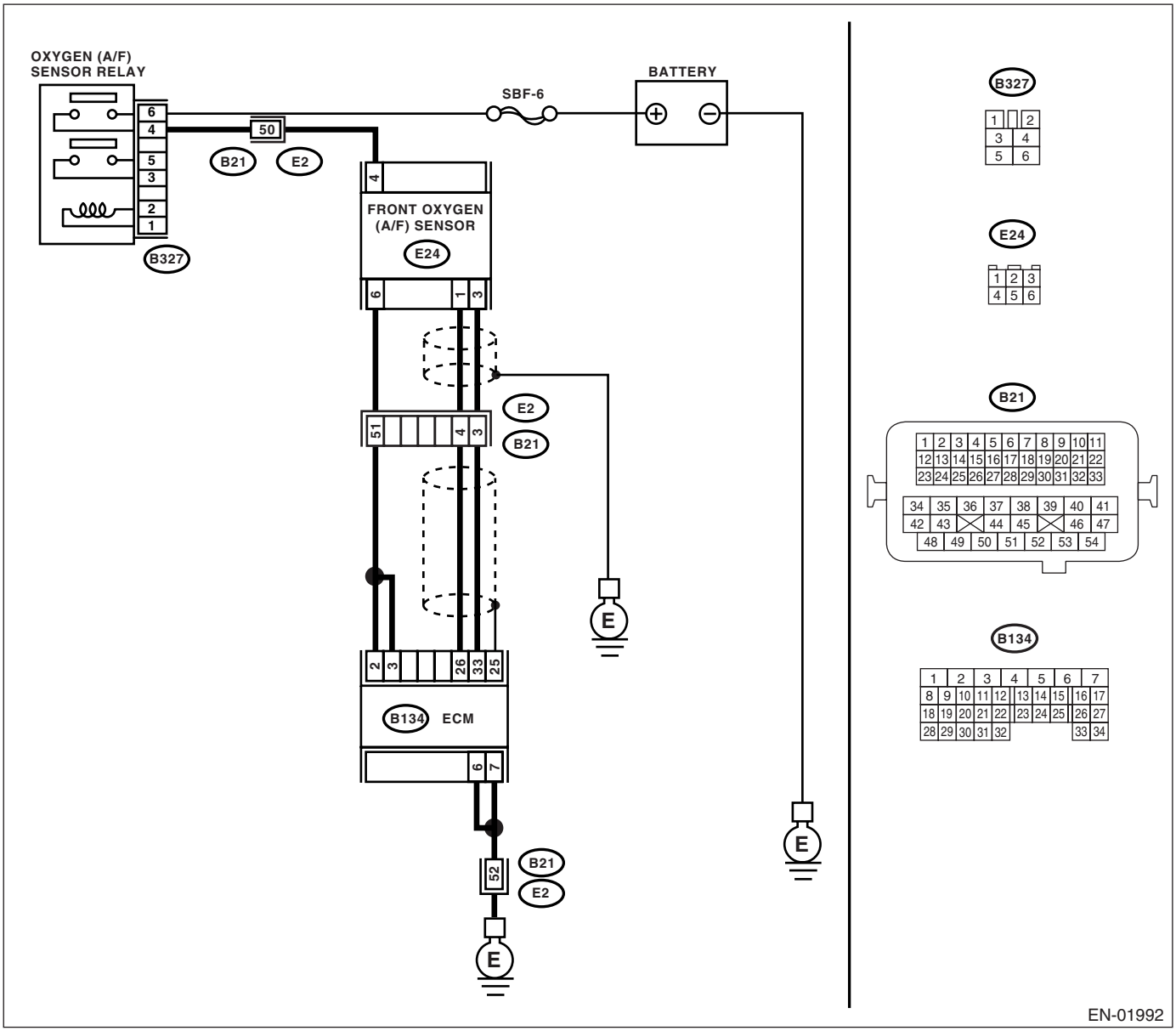
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **3.**
3	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items. • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair the exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

T: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:

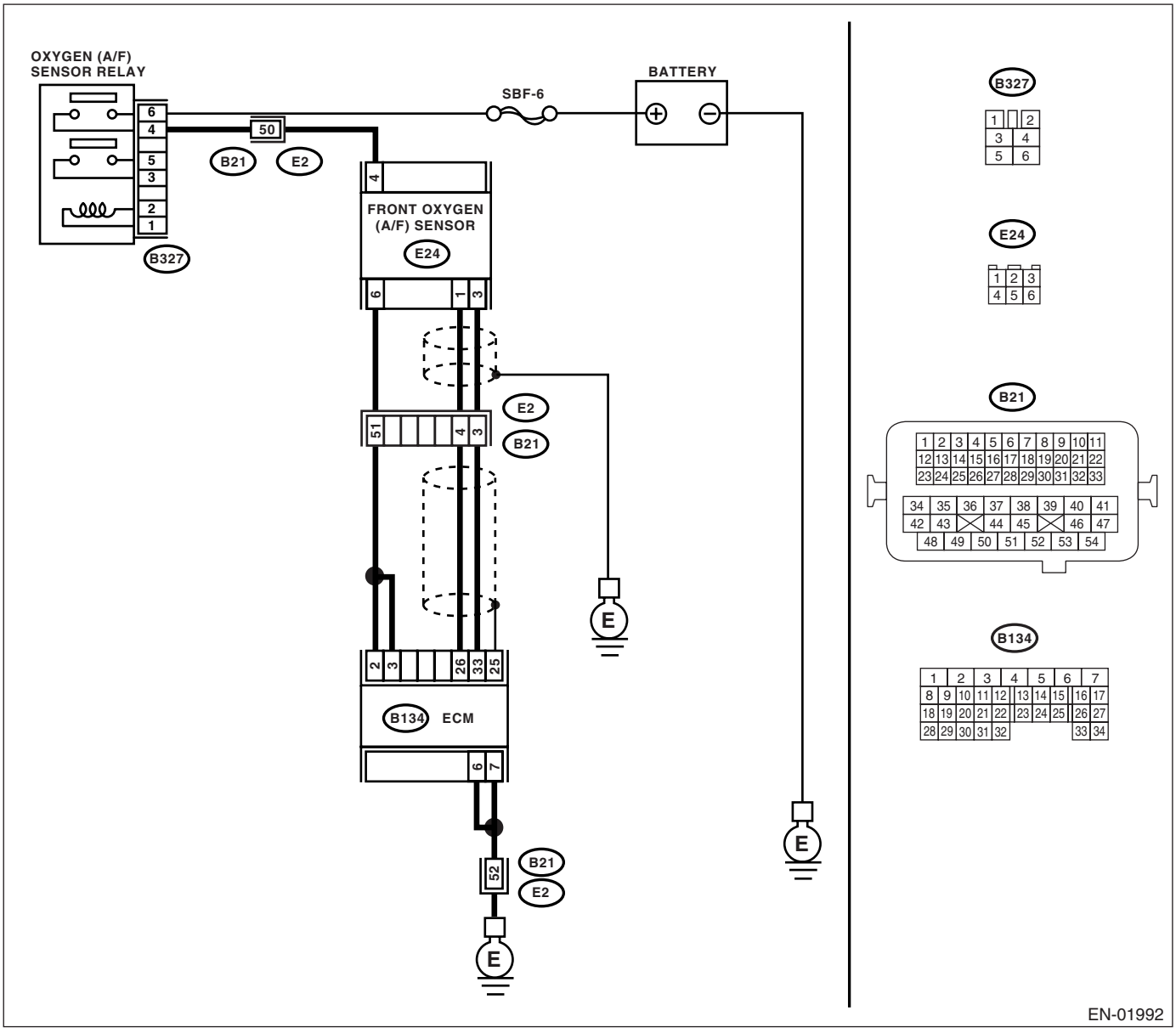
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
3	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

U: DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

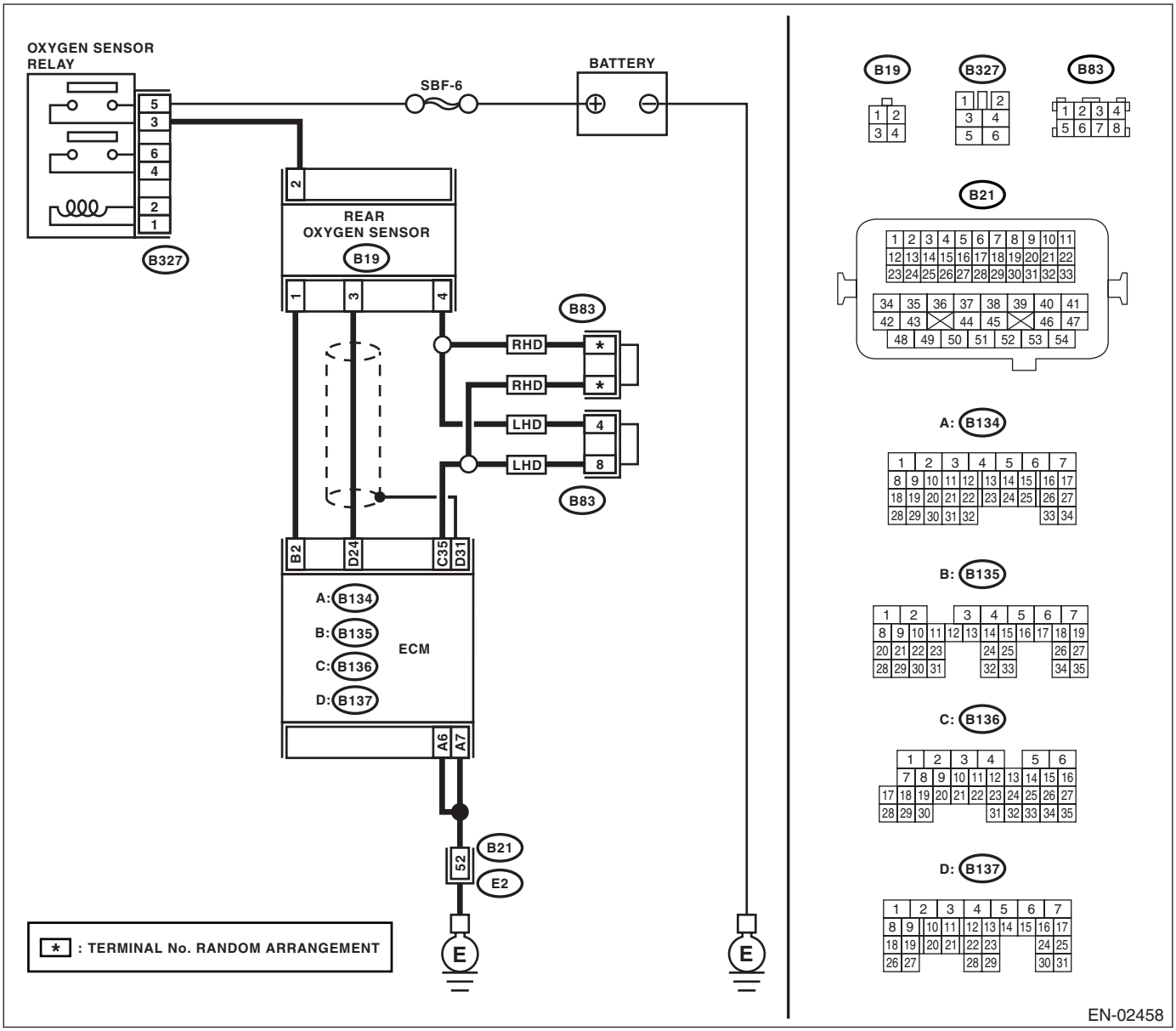
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 490 mV?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:*** ***(B136) No. 35 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>

V: DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

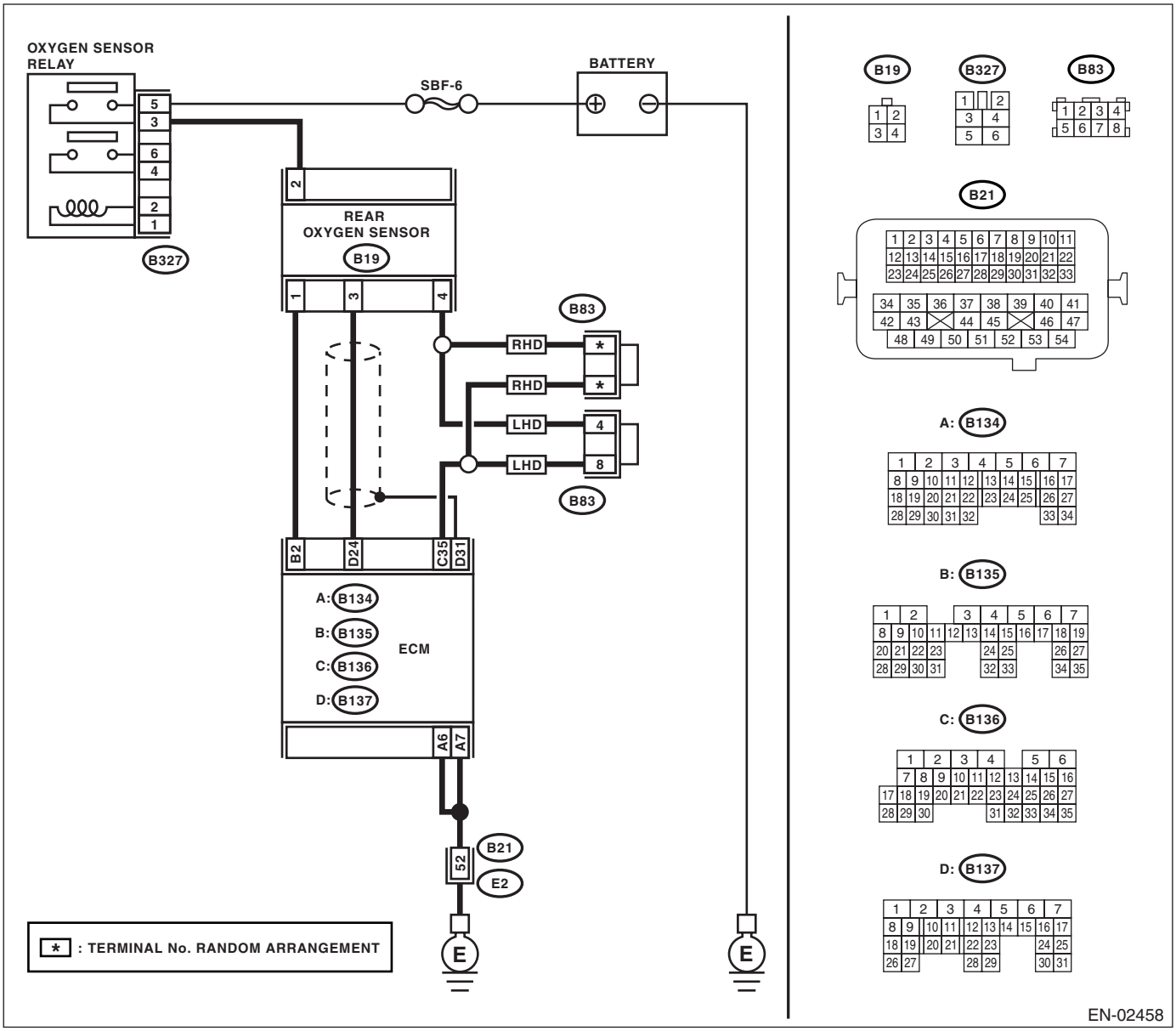
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the voltage more than 250 mV?	Go to step **6.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (B19) No. 3:*** ***(B136) No. 35 — (B19) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(B19) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>

W: DTC P0139 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 2)

DTC DETECTING CONDITION:

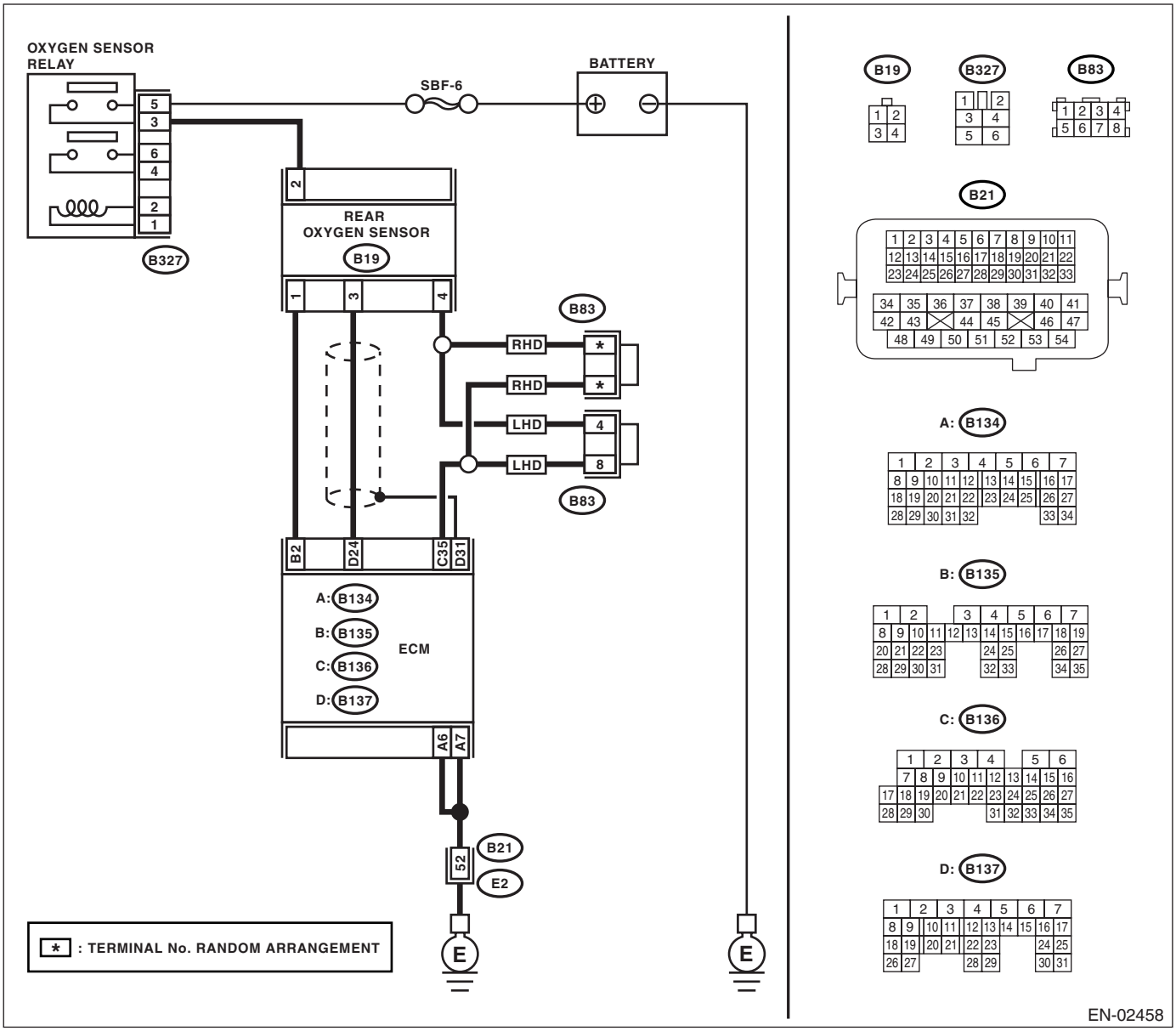
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0139.	Replace the rear oxygen sensor. <Ref. to FU(H4SO 2.5)-35, Rear Oxygen Sensor.>

X: DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0172 for diagnostic procedure. <Ref. to EN(H4SO 2.5)(diag)-137, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Y: DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **3.**
3	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **4.**
4	**CHECK EGR VALVE.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **6.**
6	**CHECK PCV VALVE.**	Is the PCV valve stuck?	Replace the PCV valve.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)?	Go to step **8.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.	Is measured value 206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)?	Go to step **9.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
9	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the engine coolant temperature between 70°C (158°F) and 100°C (212°F)?	Go to step **10.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4SO 2.5)-20, Engine Coolant Temperature Sensor.>

	Step	Check	Yes	No
10	**CHECK MANIFOLD PRESSURE SENSOR SIGNAL.** 1) Start and warm-up the engine until engine coolant temperature is above 60°C (140°F). 2) Place the select lever in “N” or “P” position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of manifold pressure sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the “READ CURRENT DATA FOR ENGINE”. <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the measurement value 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg) when idling and 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) when the ignition turns to ON?	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the manifold pressure sensor. <Ref. to FU(H4SO 2.5)-25, Manifold Absolute Pressure Sensor.>

Z: DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

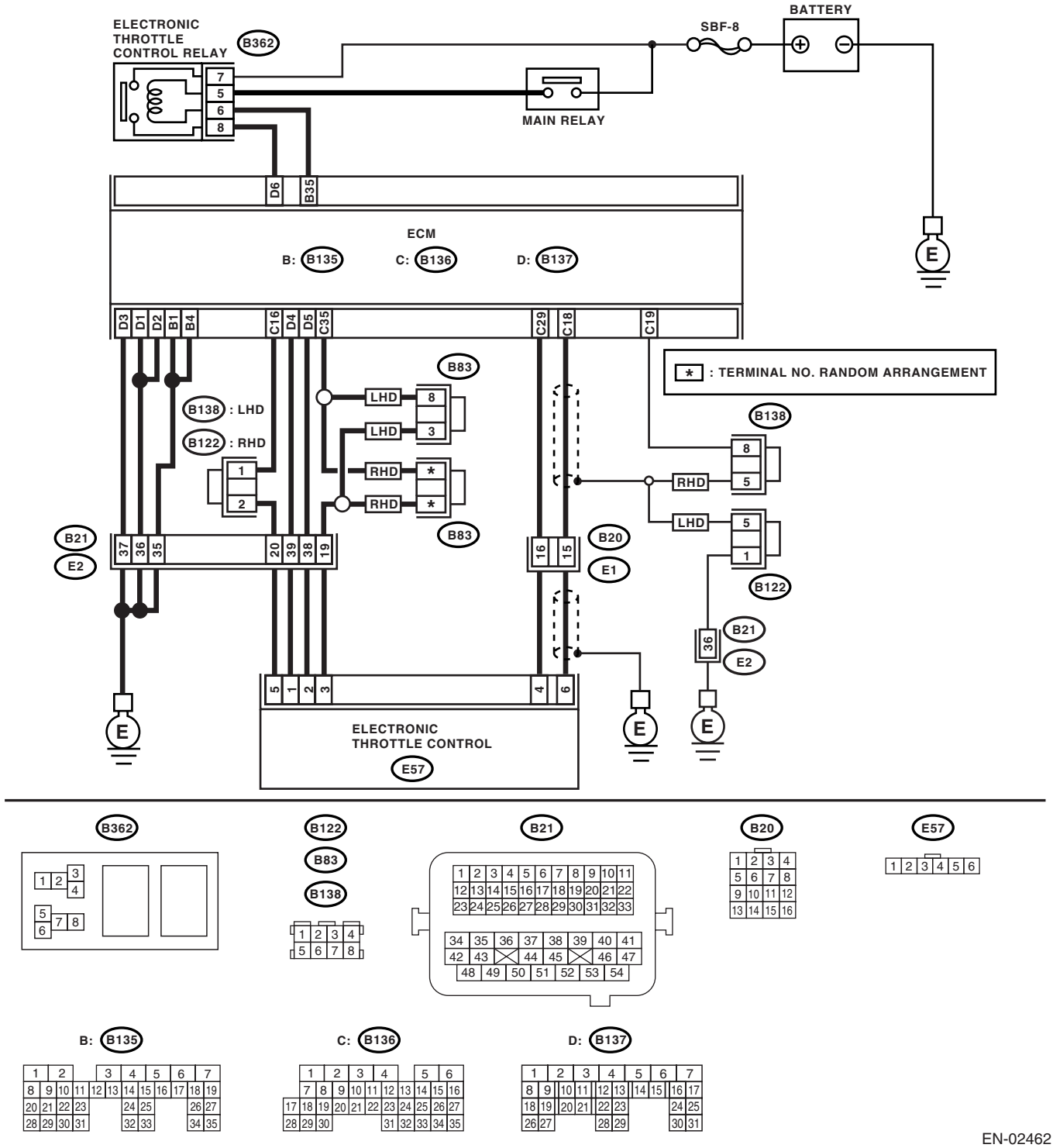
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

AA:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

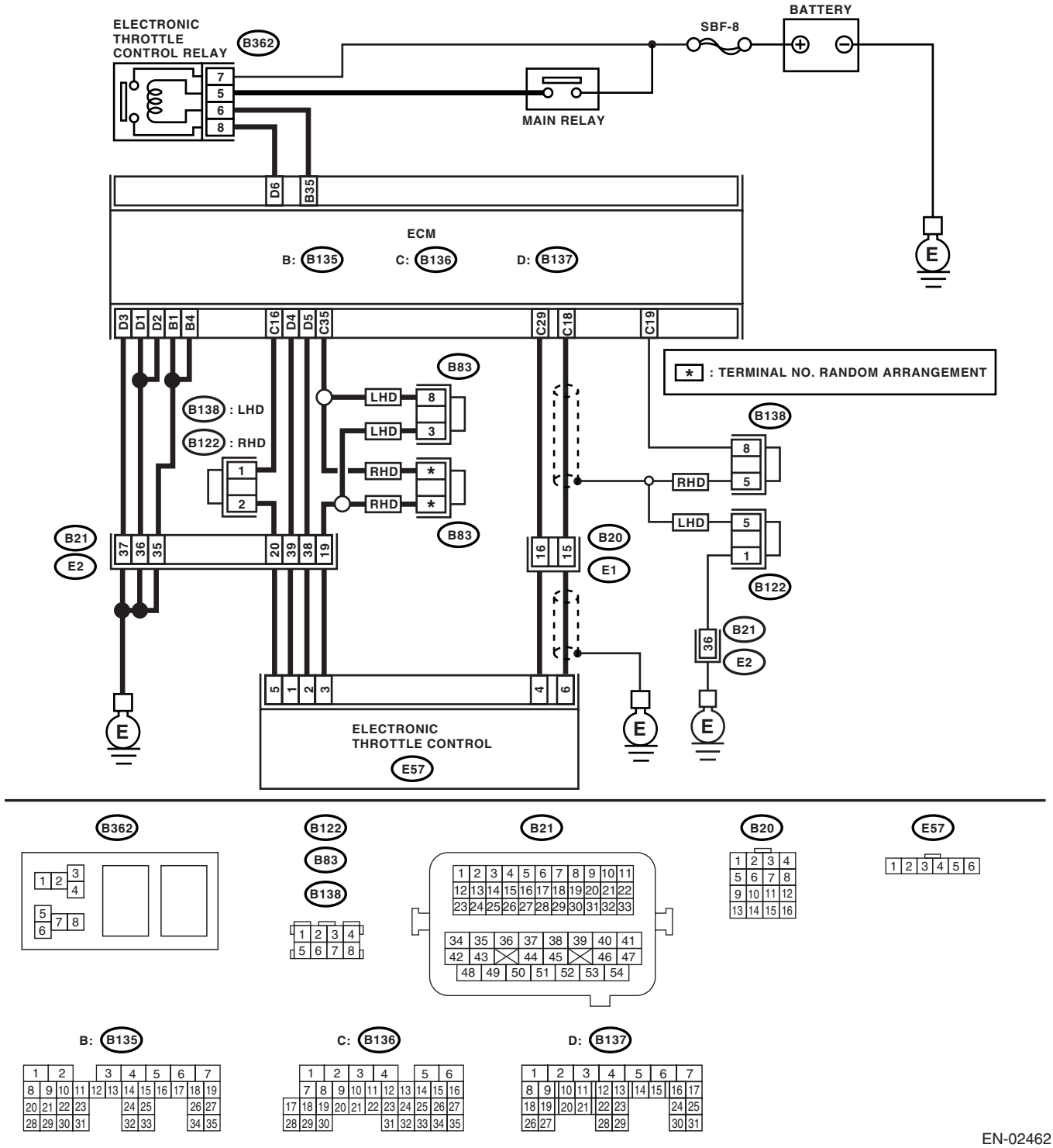
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **7.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
7	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Replace the electronic throttle control.	Sensor power supply circuit may be shorted.

AB:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-147, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-147, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0304. <Ref. to EN(H4SO 2.5)(diag)-147, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AE:DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

TROUBLE SYMPTOM:

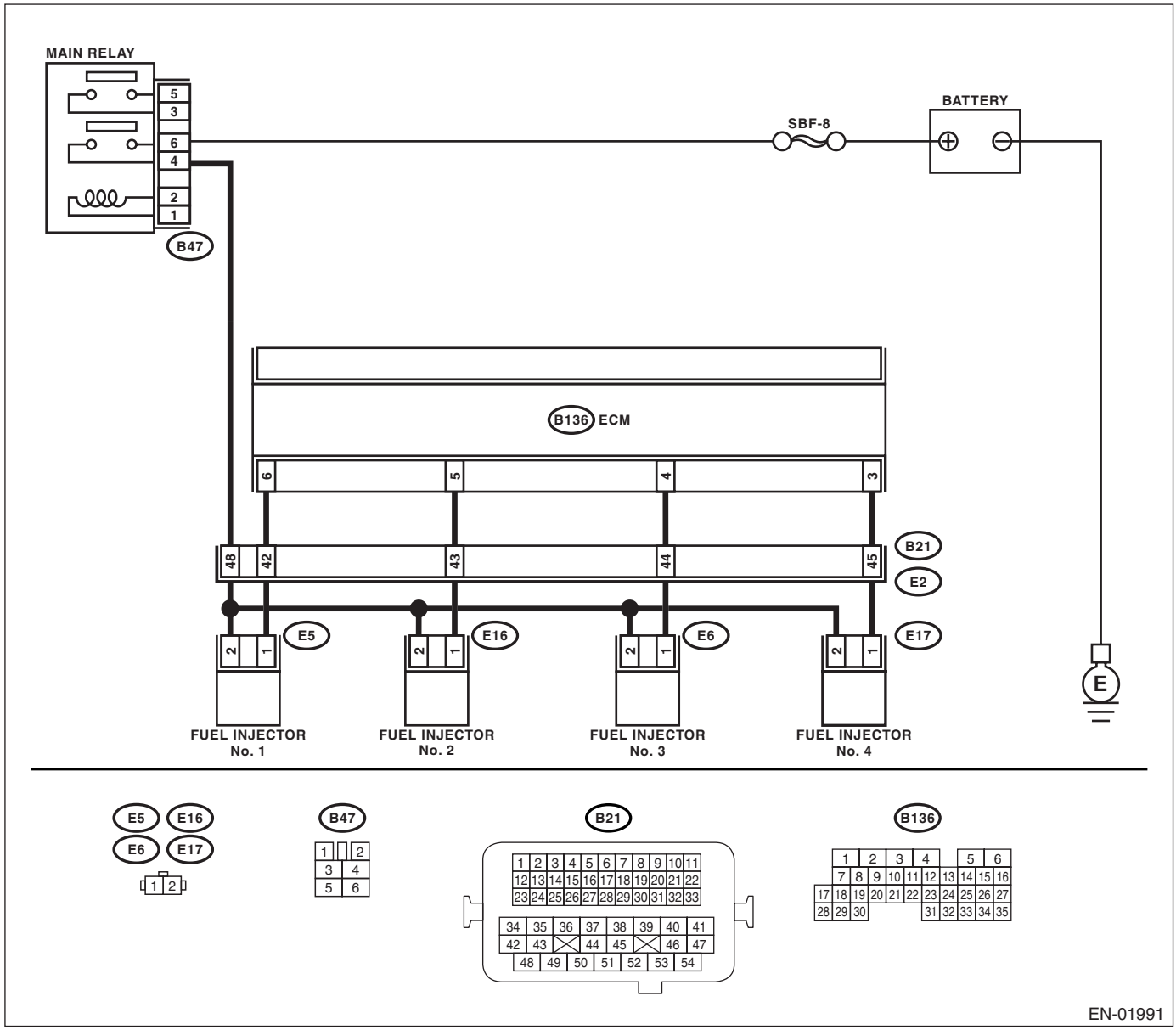
- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Go to step **4.**
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinders. 3) Disconnect the connector from ECM. 4) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between fuel injector and ECM connector.
5	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
6	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **7.**	Replace the faulty fuel injector. <Ref. to FU(H4SO 2.5)-31, Fuel Injector.>

	Step	Check	Yes	No
7	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
8	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Go to step **9.**
9	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector <Ref. to FU(H4SO 2.5)-31, Fuel Injector.> and ECM <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Go to step **10.**
10	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten the camshaft position sensor or crankshaft position sensor.	Go to step **11.**
11	**CHECK CRANK SPROCKET.** Remove the timing belt cover.	Is the crank sprocket rusted or does it have broken teeth?	Replace the crank sprocket. <Ref. to ME(H4SO 2.0)-50, Crank Sprocket.>	Go to step **12.**
12	**CHECK INSTALLATION CONDITION OF TIMING BELT.** Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.	Is the timing belt dislocated from its proper position?	Repair the installation condition of timing belt. <Ref. to ME(H4SO 2.0)-43, Timing Belt.>	Go to step **13.**

	Step	Check	Yes	No
13	**CHECK FUEL LEVEL.**	Is the fuel meter indication higher than the “Lower” level?	Go to step **14.**	Replenish the fuel so fuel meter indication is higher than the “Lower” level. After replenishing fuel, go to step **14.**
14	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using Subaru Select Monitor. <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light come on or blink?	Go to step **16.**	Go to step **15.**
15	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire diagnosed when the engine is running?	Finish the diagnostics operation, if the engine has no abnormality.	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
16	**CHECK AIR INTAKE SYSTEM.**	Is there any fault in air intake system?	Repair the air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **17.**
17	**CHECK CYLINDER.**	Is there any fault in that cylinder?	Repair or replace the faulty parts. NOTE: Check the following items. • Spark plug • Fuel injector • Compression pressure	Go to DTC P0171 and P0172. <Ref. to EN(H4SO 2.5)(diag)-136, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AF:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

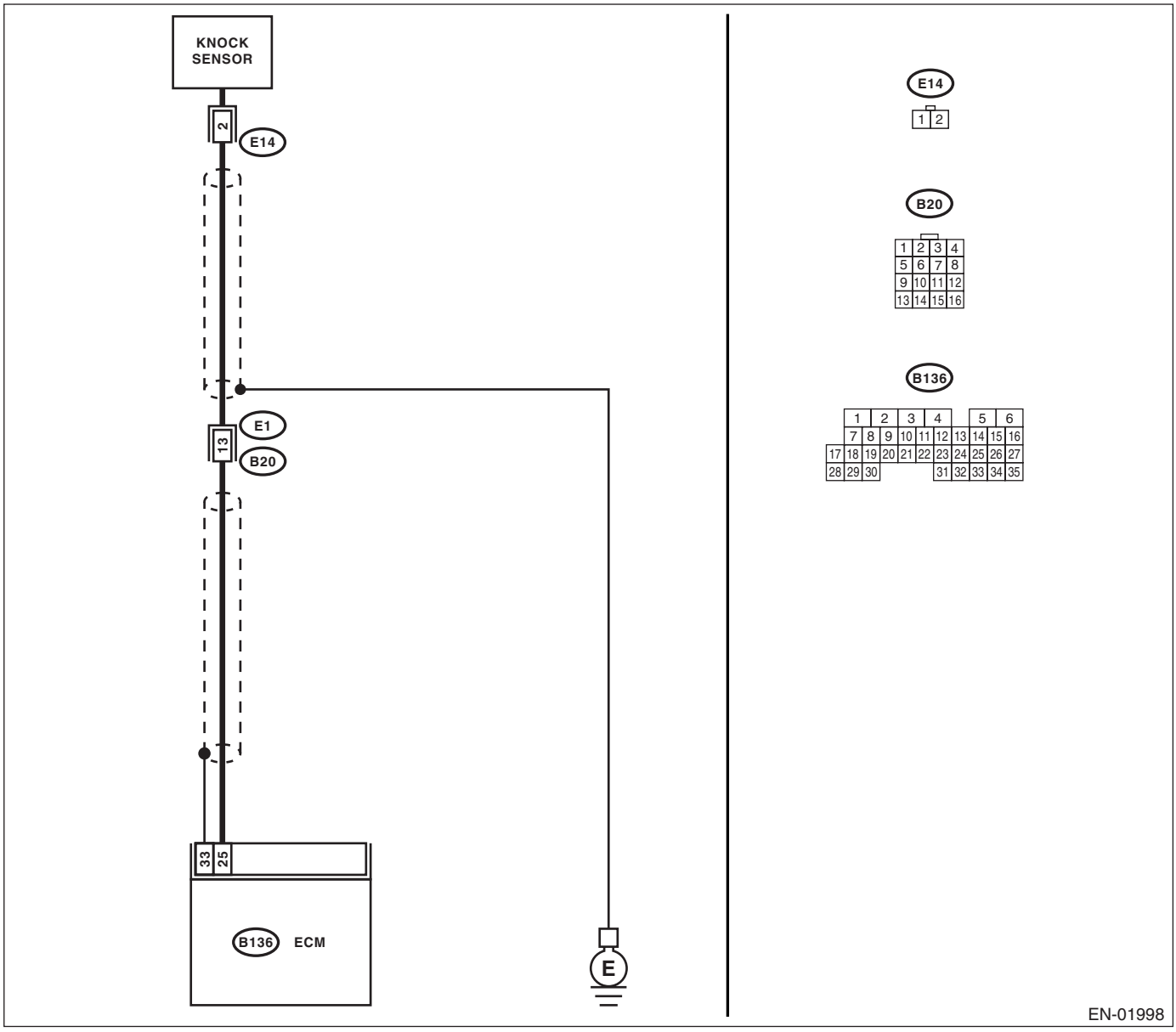
- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Poor contact in knock sensor connector
4	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4SO 2.5)-23, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AG:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

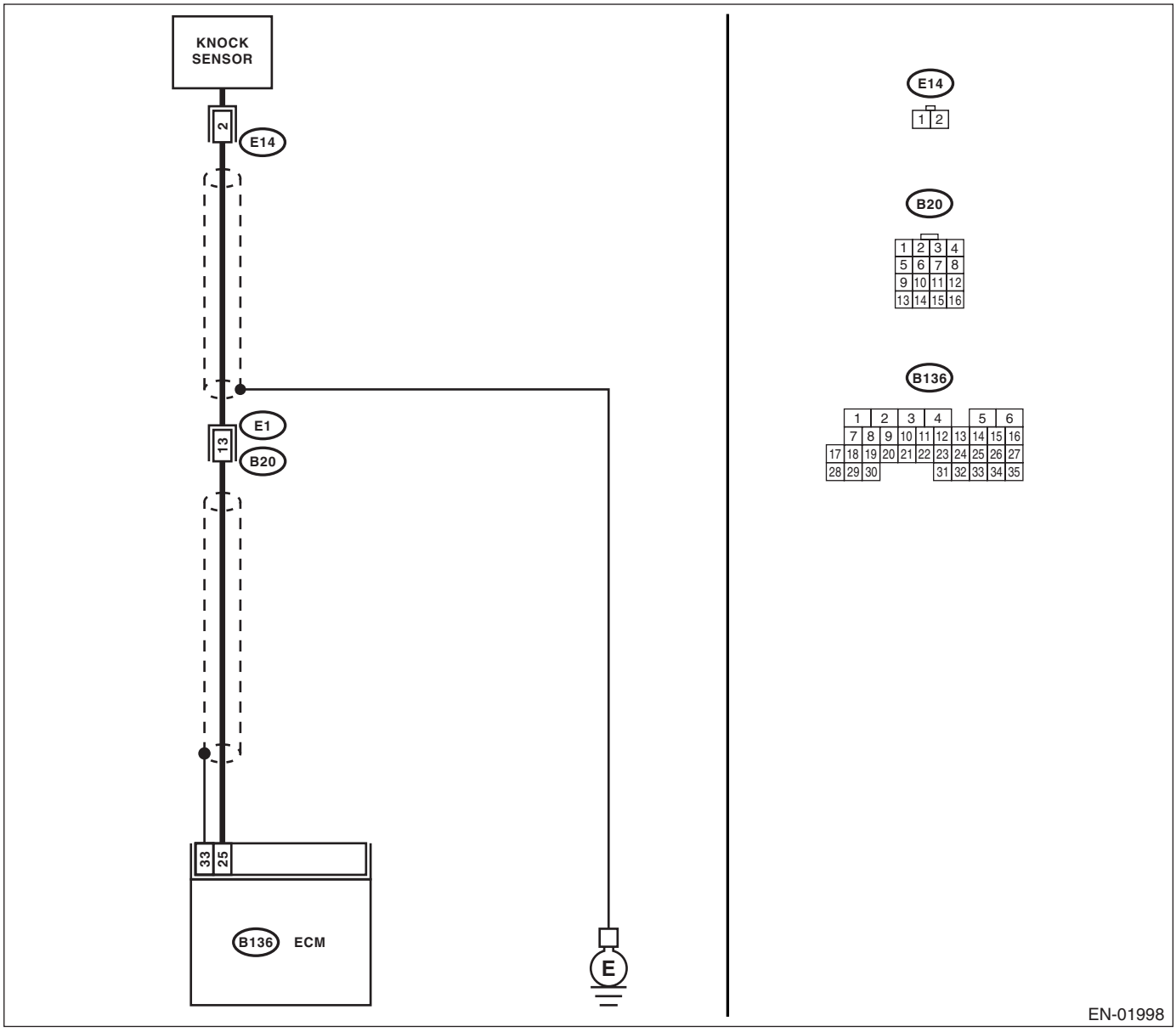
- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **3.**	Go to step **4.**
3	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4SO 2.5)-23, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit in harness covered with shield.
4	**CHECK INPUT SIGNAL FROM ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AH:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

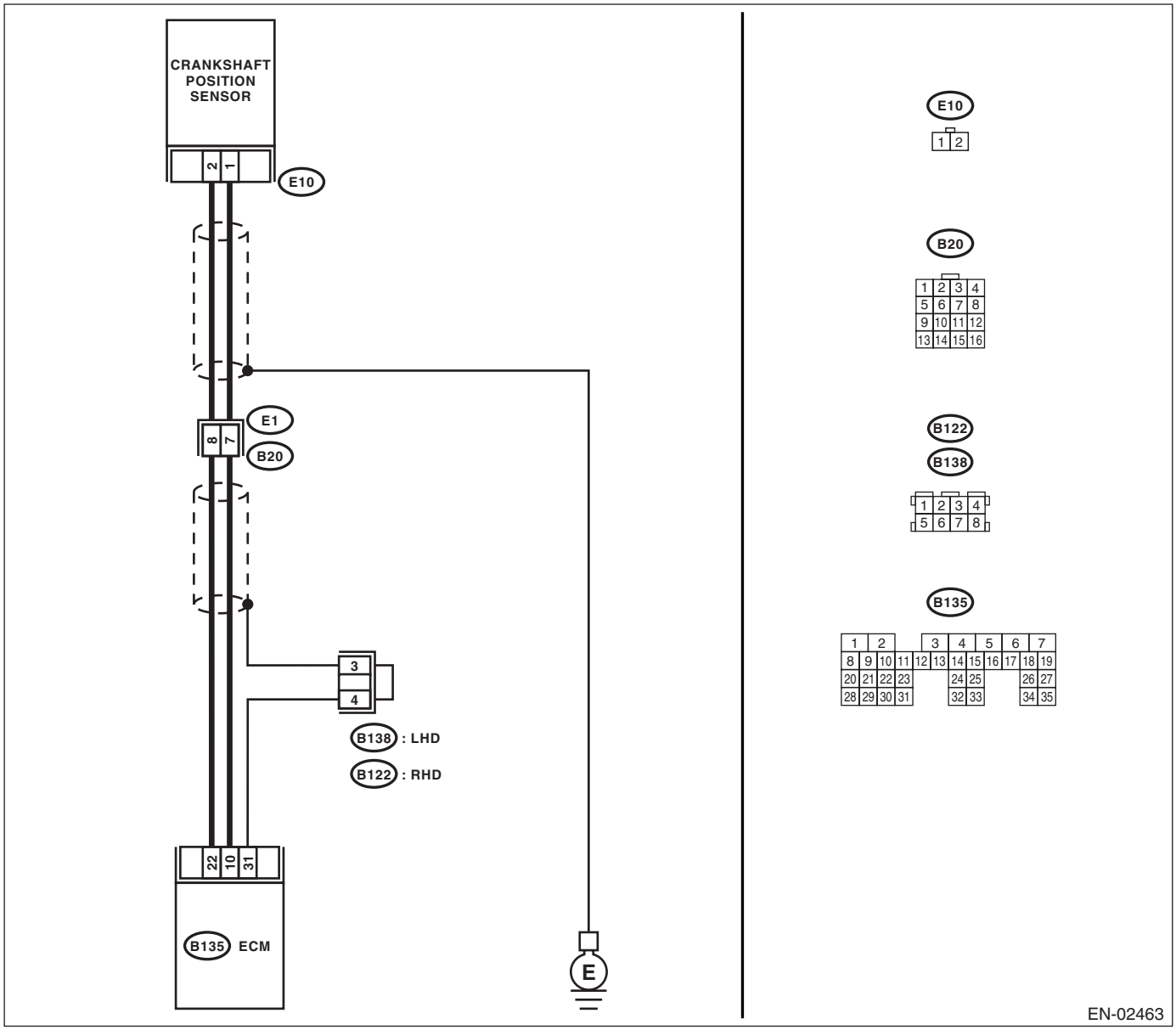
- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuitrepair the ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector

	Step	Check	Yes	No
5	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **6.**	Tighten the crankshaft position sensor installation bolt securely.
6	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4SO 2.5)-21, Crankshaft Position Sensor.>

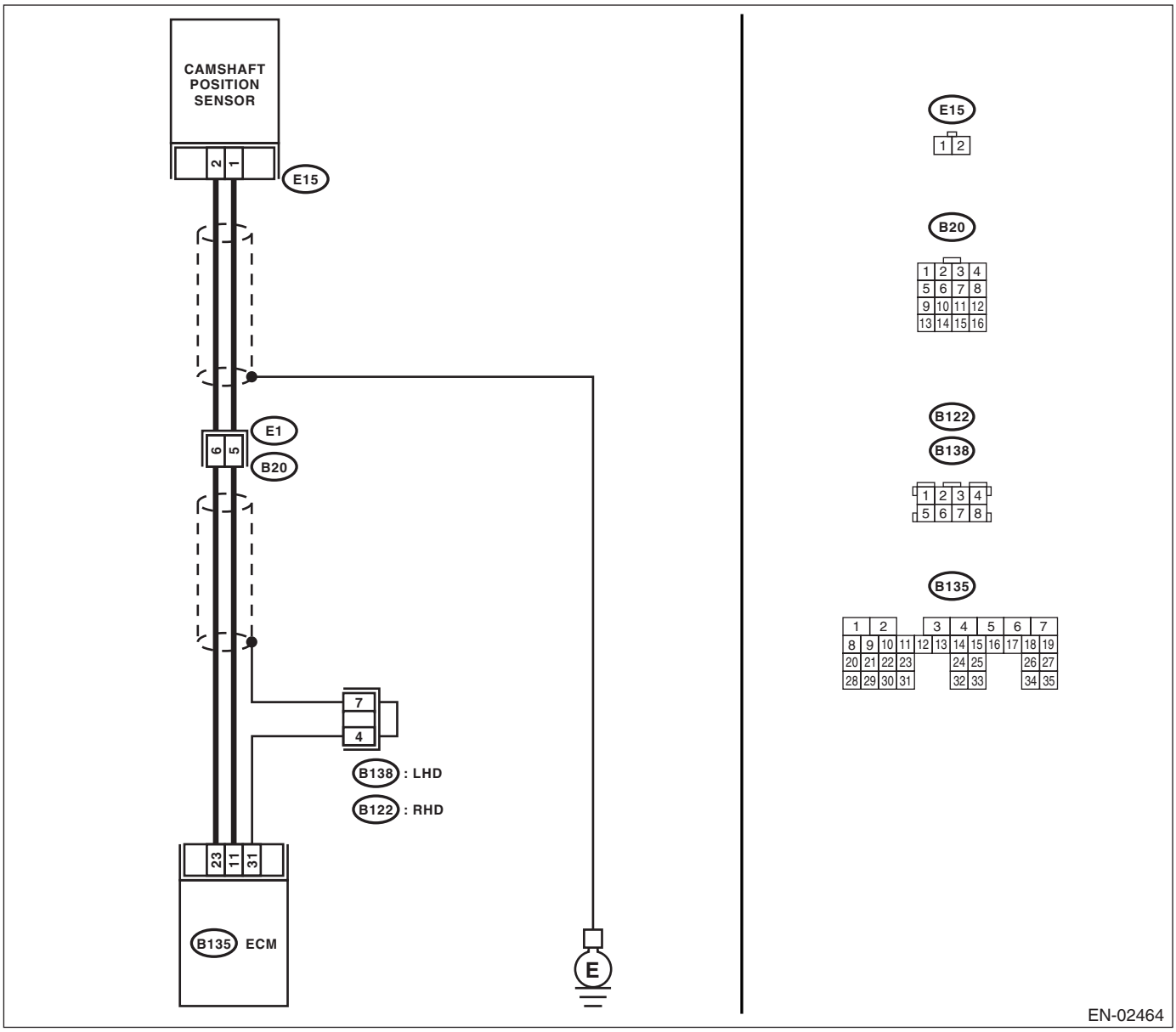
AI: DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:
Immediately at fault recognition.

TROUBLE SYMPTOM:
- Engine stalls.
- Failure of engine to start

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:
- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness with shield.	Go to step **4.**
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E15) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
5	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **6.**	Tighten the camshaft position sensor installation bolt securely.

	Step	Check	Yes	No
6	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4SO 2.5)-22, Camshaft Position Sensor.>

AJ:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

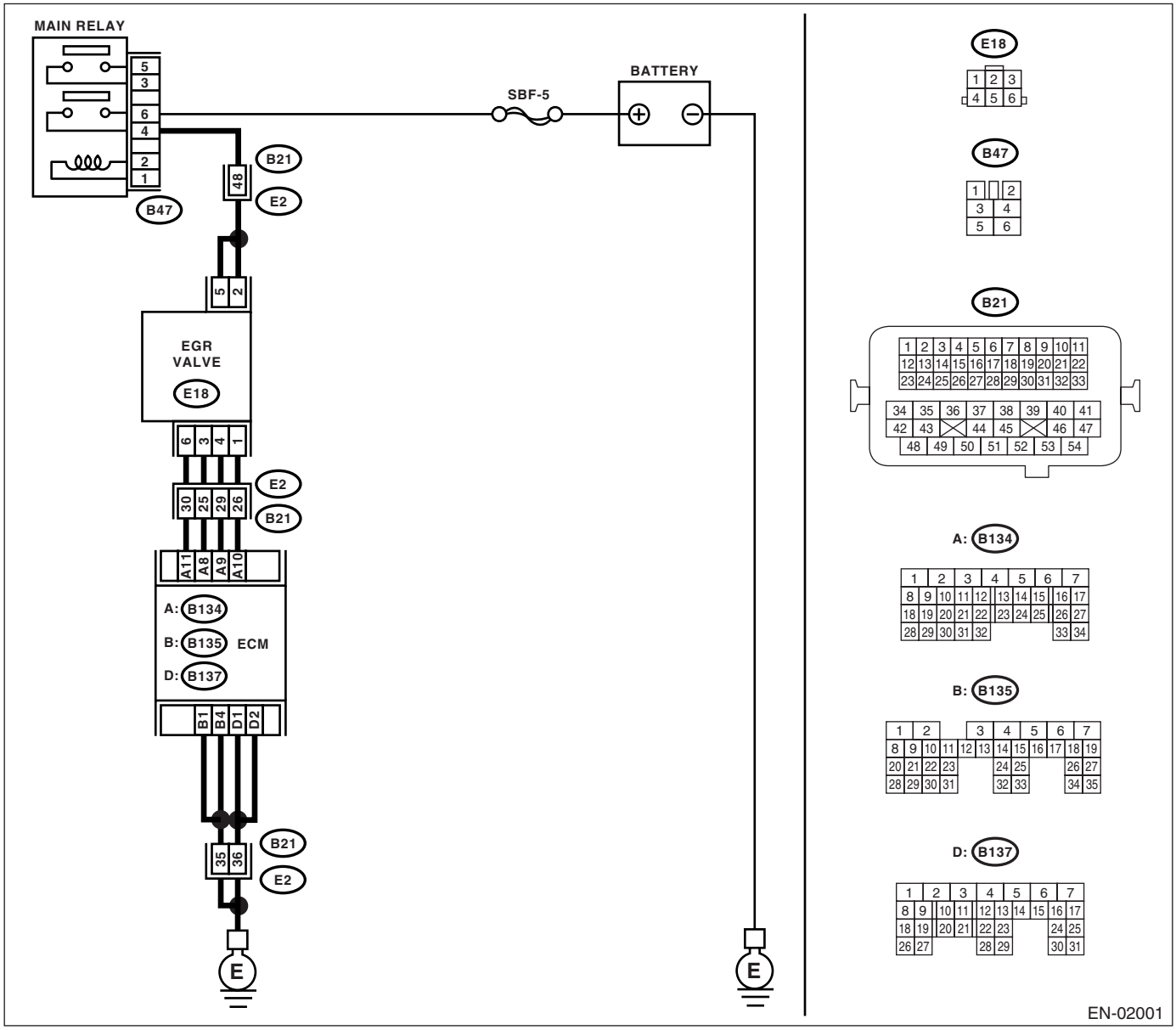
TROUBLE SYMPTOM:

- Movement performance problem when engine is low speed.
- Erroneous idling
- Movement performance problem

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.>	Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Make sure that the EGR valve, manifold absolute pressure sensor and throttle body are installed securely.	Go to step **3.**
3	**CHECK THE POWER SUPPLY OF EGR SOLENOID VALVE.** 1) Detach the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (−):*** ***(E18) No. 5 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there is no foreign material between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	Is the resistance 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.5)-30, EGR Valve.>
5	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** ***(B134) No. 9 (+) — Chassis ground (−):*** ***(B134) No. 10 (+) — Chassis ground (−):*** ***(B134) No. 11 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact portion in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Detach the connector from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 8 — (E18) No. 6:*** ***(B134) No. 10 — (E18) No. 1:*** ***(B134) No. 9 — (E18) No. 4:*** ***(B134) No. 11 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:*** ***(B134) No. 9 — Chassis ground:*** ***(B134) No. 10 — Chassis ground:*** ***(B134) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check poor contact for ECM and EGR solenoid valve connector.	Is there poor contact for ECM and EGR solenoid valve connector?	Repair the poor contact of ECM and EGR solenoid valve connector.	Even if the malfunction indicator light illuminates, the circuit has returned to the specified condition at this time.

AK:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

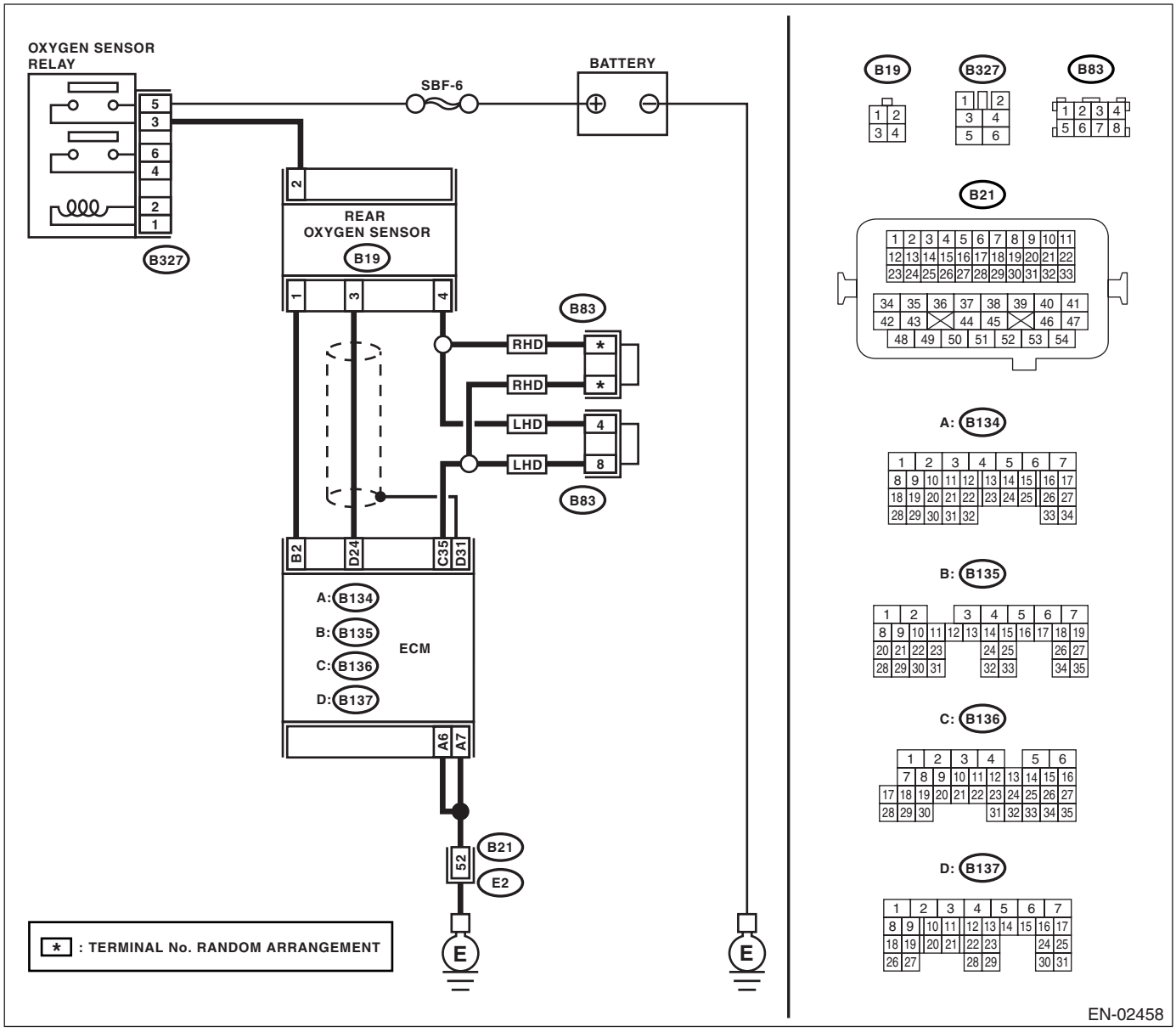
- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **3.**
3	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there any fault in exhaust system?	Repair or replace the exhaust system. <Ref. to EX(H4SO 2.0)-2, General Description.>	Go to step **4.**
4	**CHECK REAR CATALYTIC CONVERTER.** Separate the rear catalytic converter from rear exhaust pipe.	Is there damage at rear face of rear catalyst?	Replace the front catalytic converter. <Ref. to EC(H4SO 2.0)-3, Front Catalytic Converter.> and rear catalytic converter <Ref. to EC(H4SO 2.0)-4, Rear Catalytic Converter.>	Go to step **5.**
5	**CHECK FRONT CATALYTIC CONVERTER.** Remove the front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Replace the front catalytic converter. <Ref. to EC(H4SO 2.0)-3, Front Catalytic Converter.>	Contact Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.

AL:DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

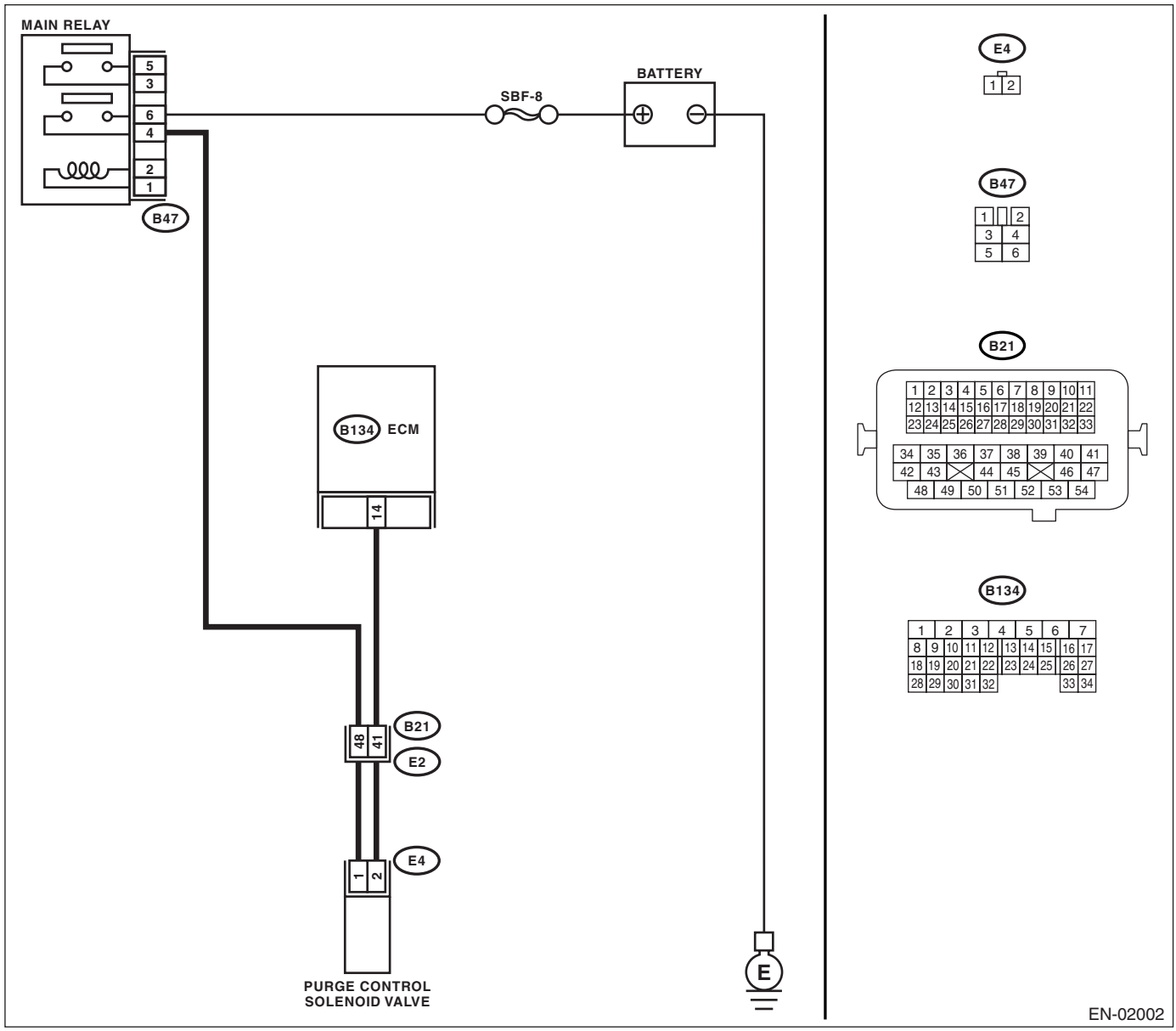
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **3.**
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve. ***Connector & terminal*** ***(B134) No. 14 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Go to step **6.**	Replace the purge control solenoid valve. <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.>
6	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between main relay and purge control solenoid valve connector.

	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

AM:DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

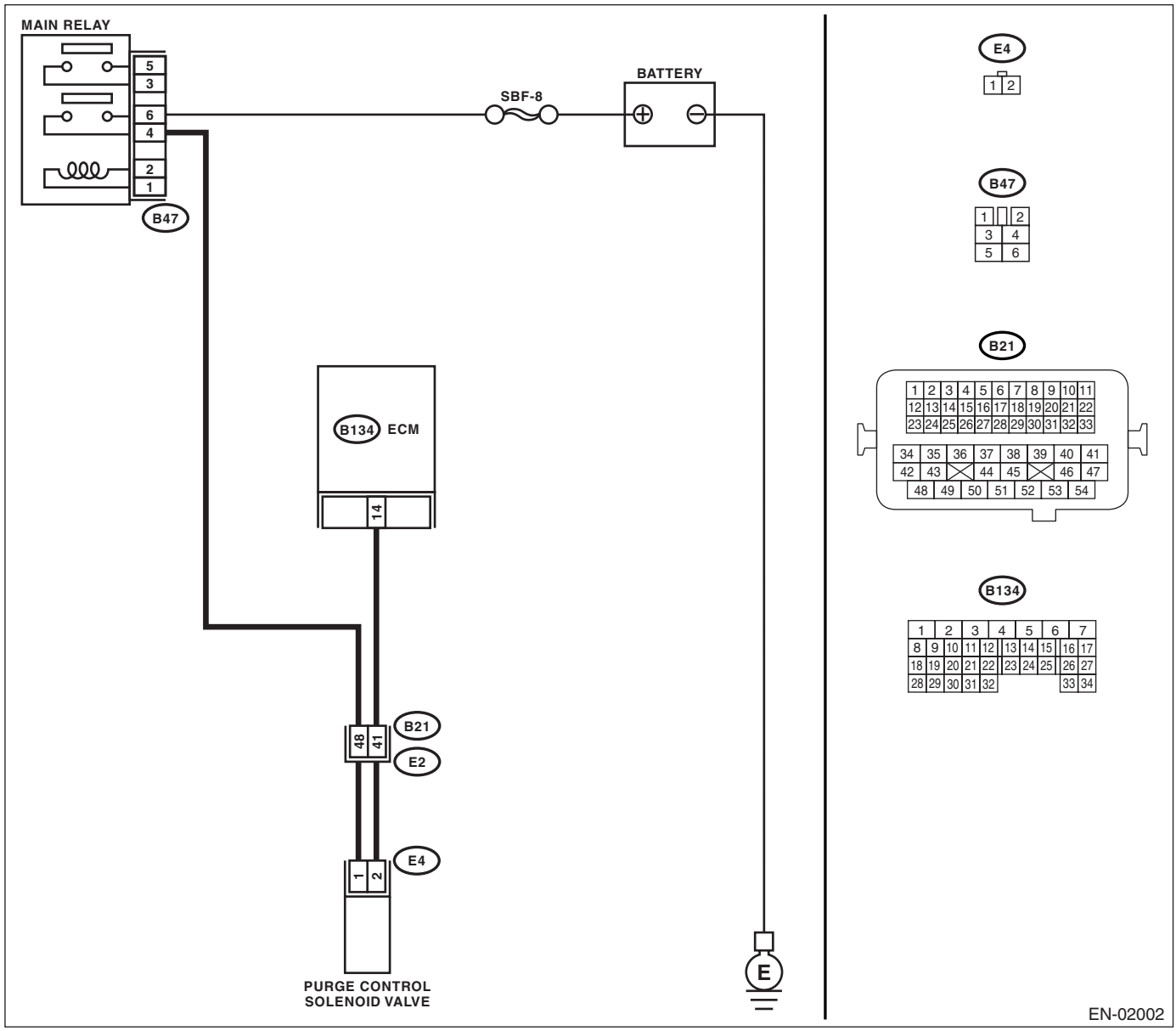
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of glove box. 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H4SO 2.5)(diag)-42, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Go to step **3.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **4.**
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Go to step **6.**
6	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve <Ref. to EC(H4SO 2.0)-7, Purge Control Solenoid Valve.> and ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

AN:DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0462 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AO:DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0463 displayed on the Subaru Select Monitor?	Check the combination meter system. <Ref. to IDI-3, Combination Meter System.>	Temporary poor contact occurs.

AP:DTC P0500 VEHICLE SPEED SENSOR

DTC DETECTING CONDITION:

Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to DTC. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

AQ:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

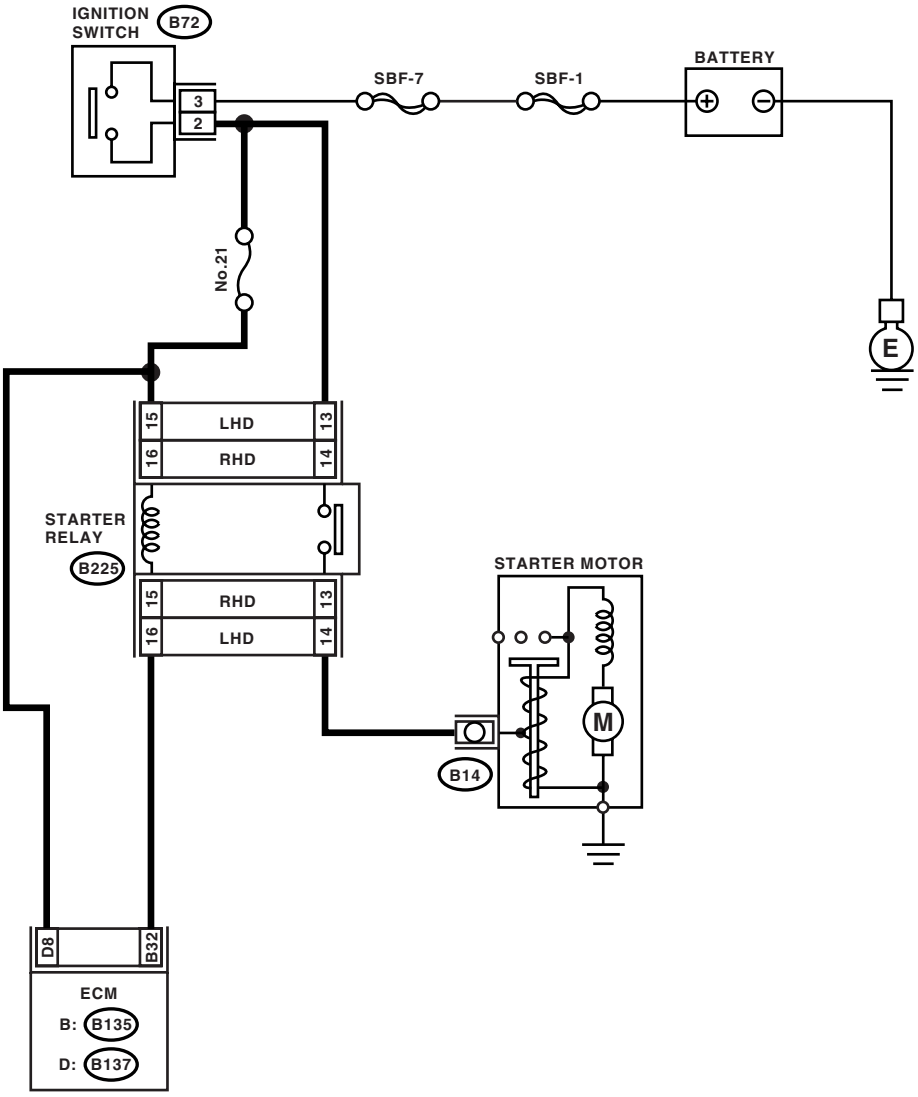
Failure of engine to start

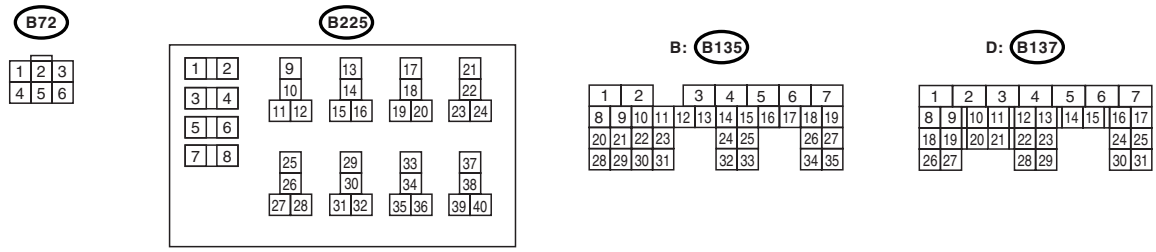
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model





EN-02455

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to ON. NOTE: Place the inhibitor switch in each position.	Does the starter motor operate?	Repair the battery short circuit in starter motor circuit.	Check starter motor circuit. <Ref. to EN(H4SO 2.5)(diag)-55, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

AR:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

DTC DETECTING CONDITION:
Immediately at fault recognition.
TROUBLE SYMPTOM:
Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **3.**
3	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items: • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **4.**
4	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

AS:DTC P0558 GENERATOR CIRCUIT LOW INPUT

CAUTION:
For diagnostic procedure, refer to DTC P0559. <Ref. to EN(H4SO 2.5)(diag)-179, DTC P0559 GENERATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>.

AT:DTC P0559 GENERATOR CIRCUIT HIGH

DTC DETECTING CONDITION:

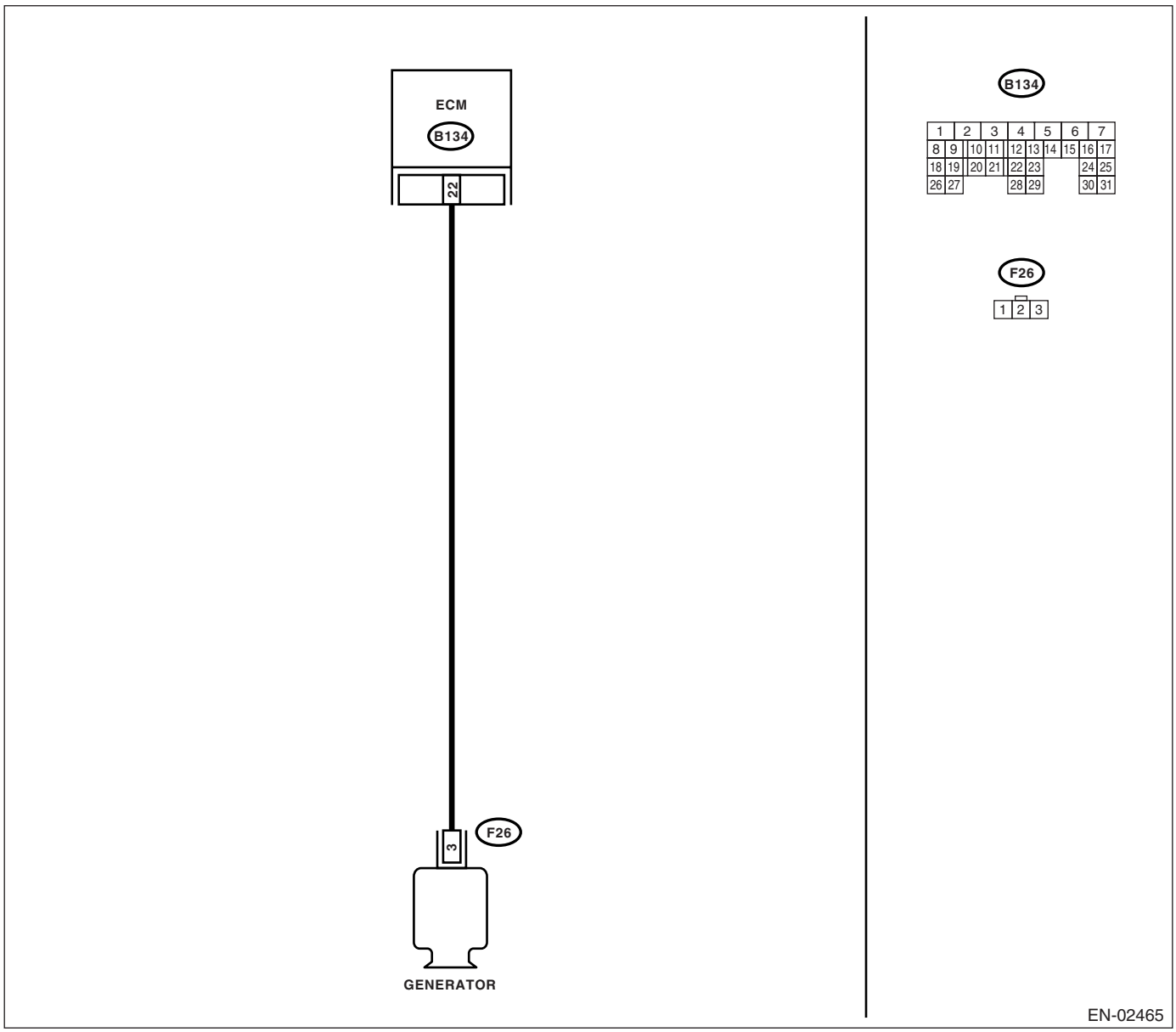
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator of harness connector. ***Connector & terminal*** ***(B134) No. 22 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair the poor contact in connector.	Repair the open circuit in harness between ECM and generator connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and generator connector • Poor contact in coupling connector

AU:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AV:DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

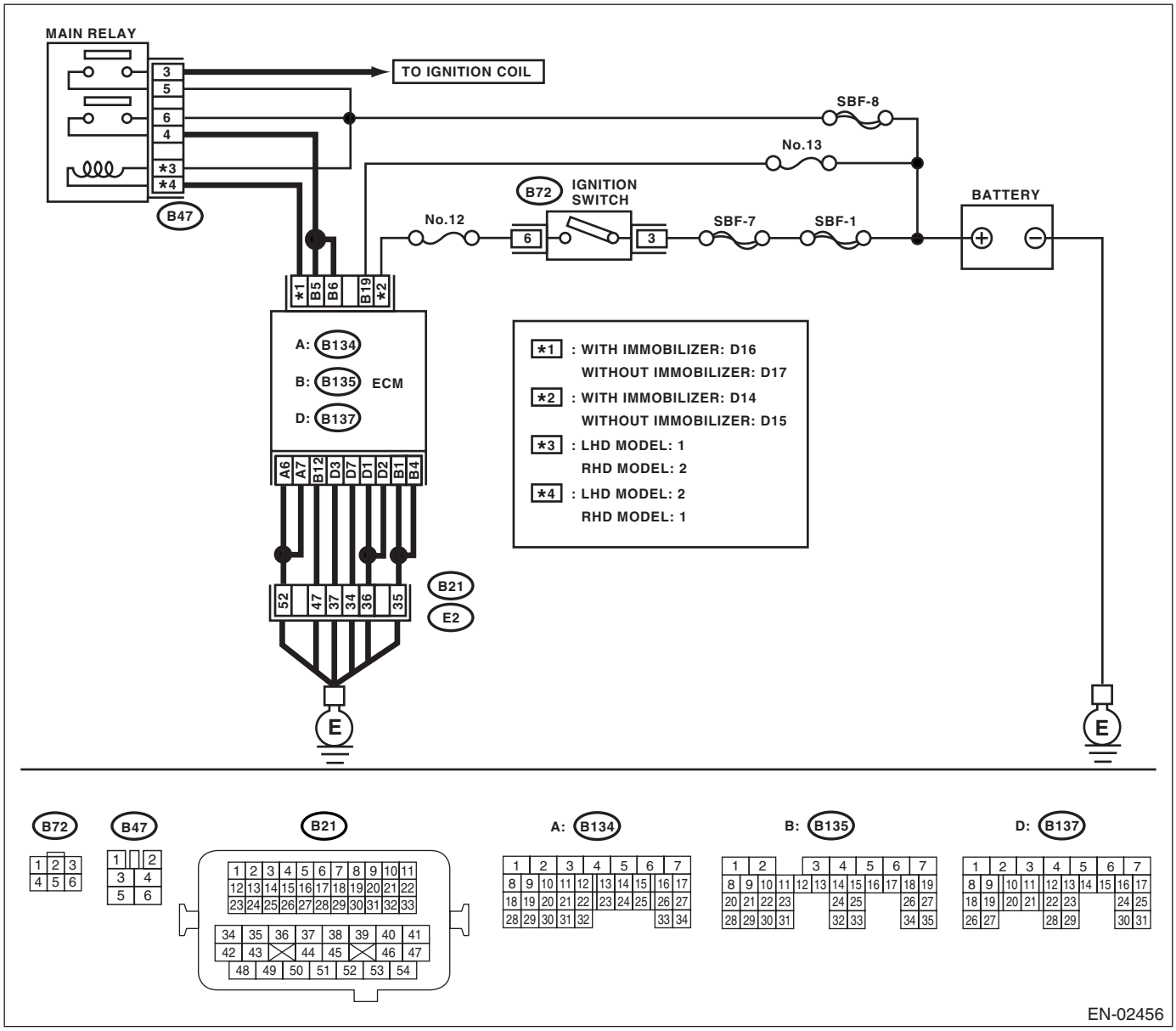
- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AW:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4SO 2.5)(diag)-183, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AX:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

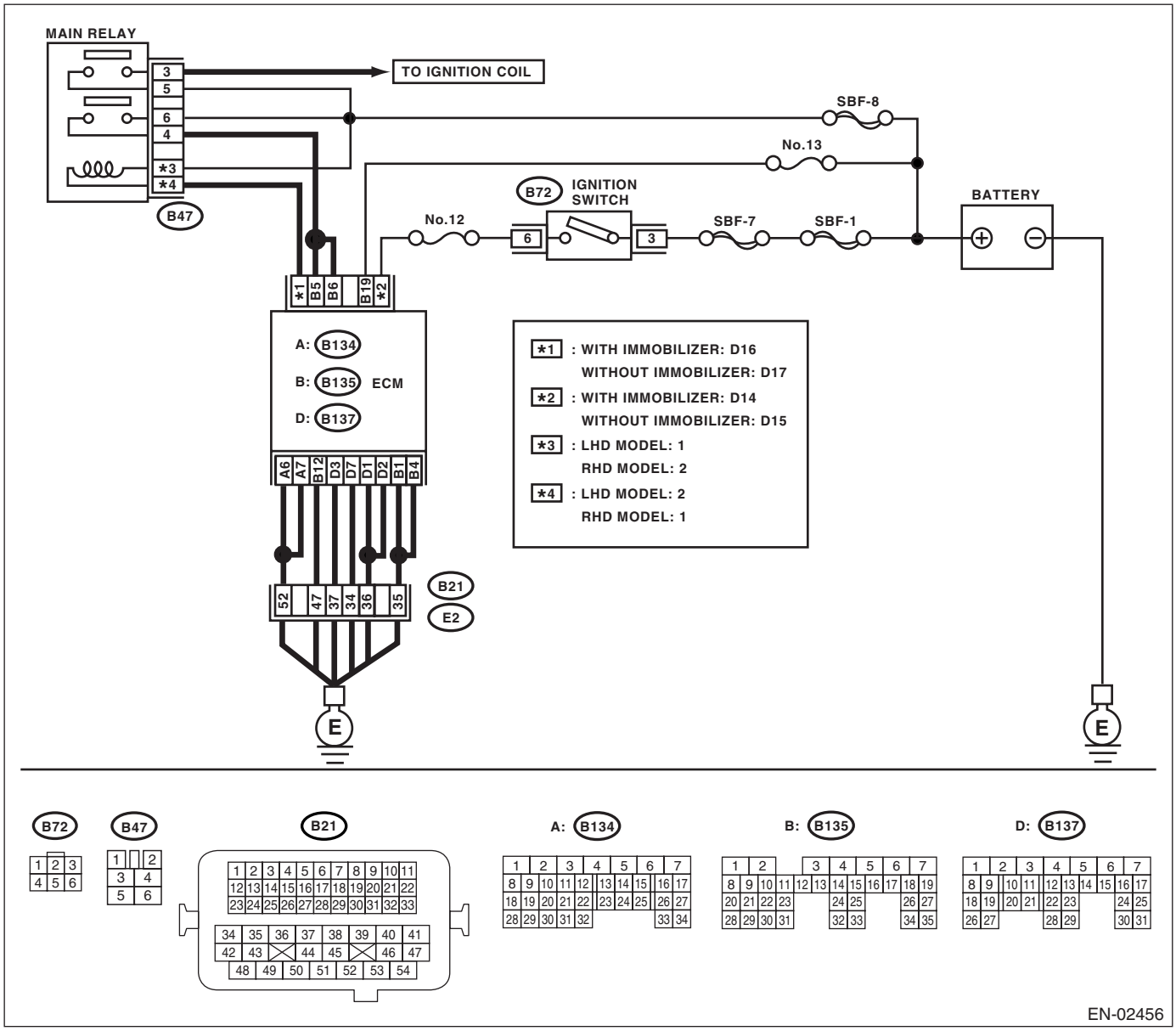
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 13 — 15 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 1 (+) — Chassis ground (−):*** ***(B137) No. 2 (+) — Chassis ground (−):*** ***(B137) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

AY:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-231, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AZ:DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0691 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

BA:DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Overheating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0692 displayed on the Subaru Select Monitor?	Check the radiator fan system. <Ref. to CO(H4SO 2.0)-7, Radiator Fan System.>	Temporary poor contact occurs.

BB:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

BC:DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

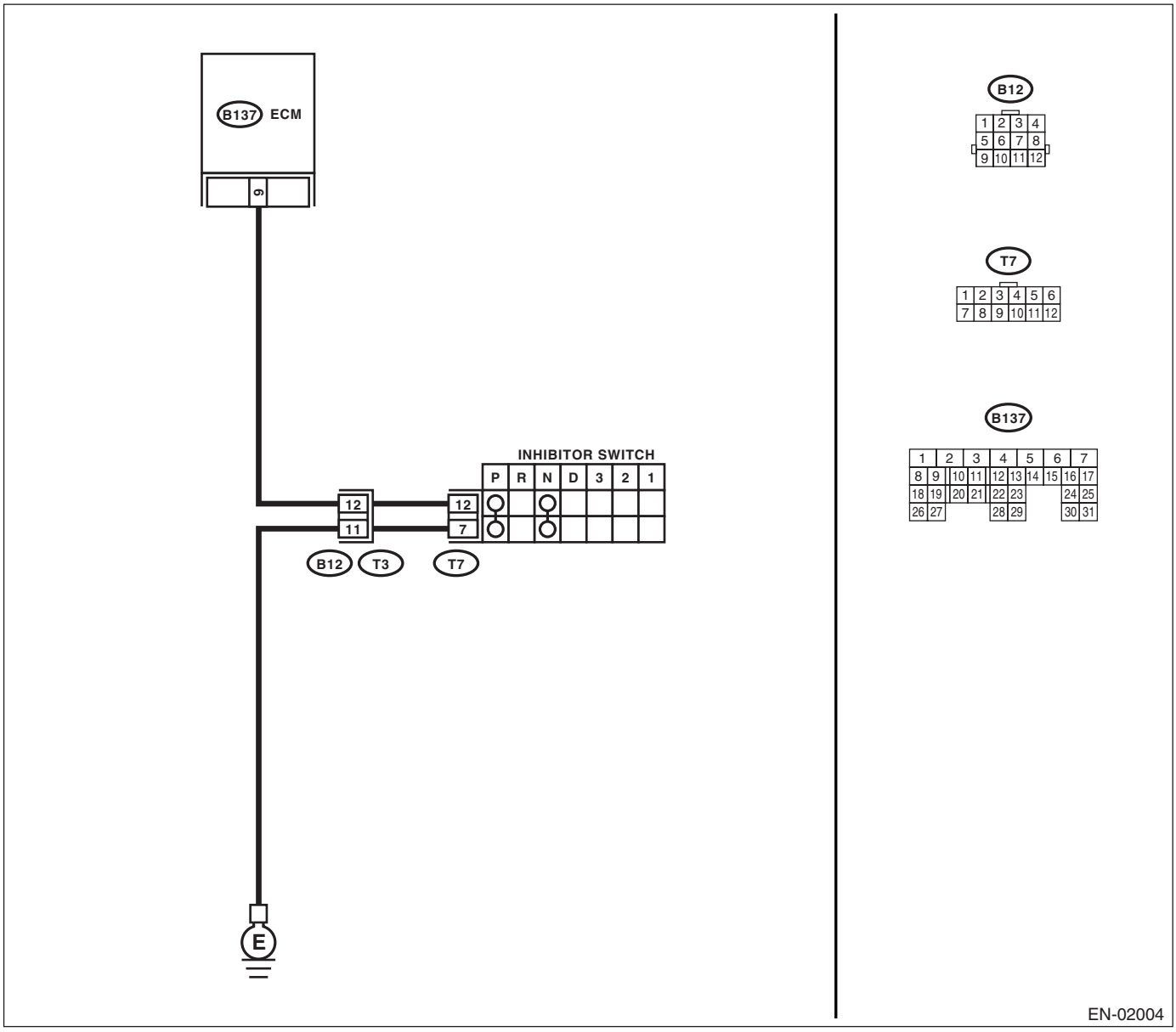
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Shift the select lever except for "N" and "P" range. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ECM AND TRANSMISSION HARNESS CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and transmission harness connector (T3). 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and transmission harness connector.
5	**CHECK TRANSMISSION HARNESS CONNECTOR.** 1) Disconnect the connector from inhibitor switch. 2) Measure the resistance of harness between transmission harness connector and engine ground. ***Connector & terminal*** ***(T3) No. 12 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between transmission harness connector and inhibitor switch connector.
6	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at other than "N" and "P" range. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>
7	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-14, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

BD:DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

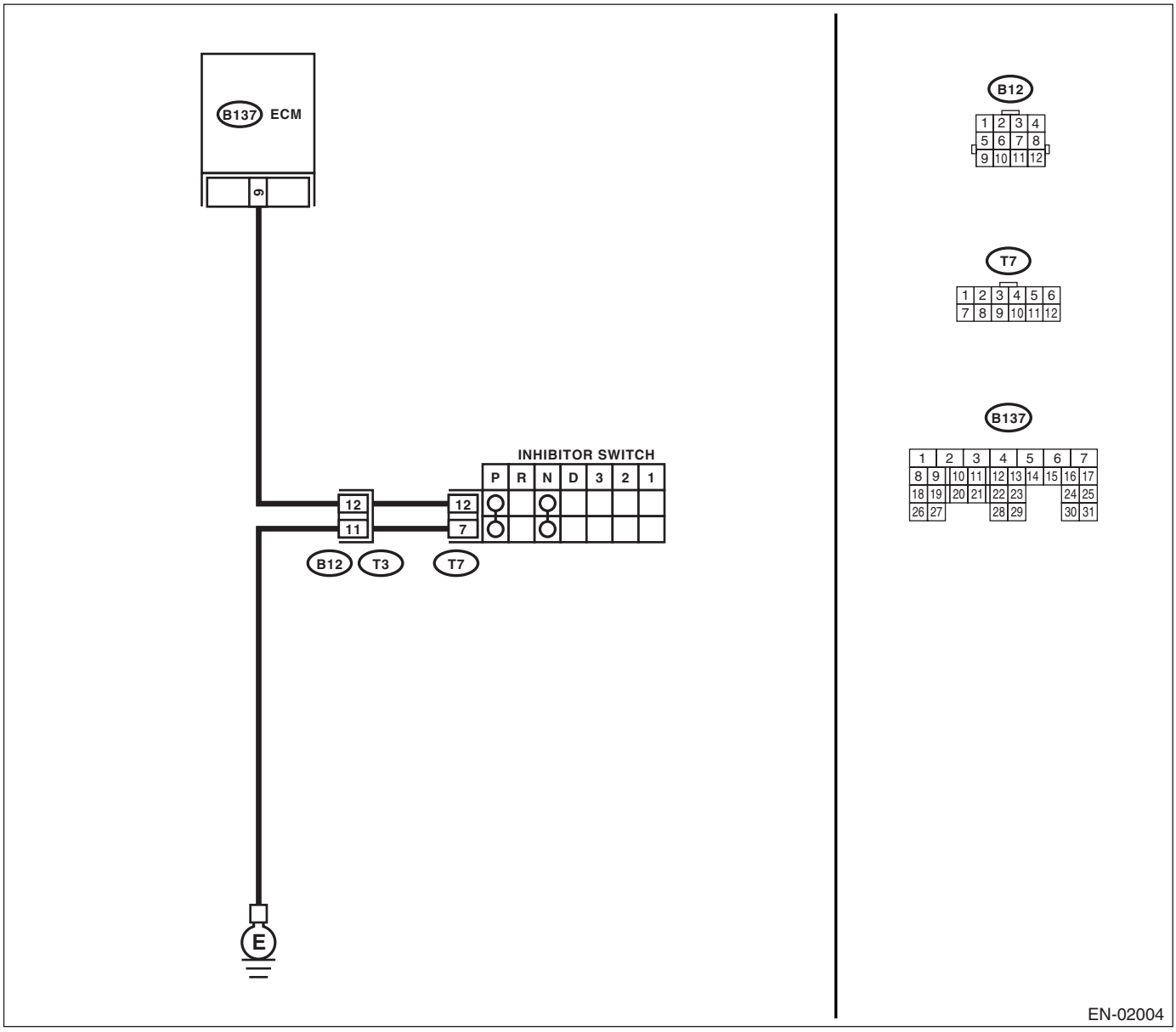
Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **3.**
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground with select lever at "N" and "P" range. ***Connector & terminal*** ***(B136) No. 21 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **6.**
4	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground with select lever at other than "N" and "P" range. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **6.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and inhibitor switch connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN ECM AND INHIBITOR SWITCH CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and inhibitor switch. 3) Measure the resistance of harness between ECM and inhibitor switch connector. ***Connector & terminal*** ***(B137) No. 9 — (T7) No. 12:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and inhibitor switch connector • Poor contact in coupling connector • Poor contact in inhibitor switch connector • Poor contact in ECM connector

	Step	Check	Yes	No
8	**CHECK INHIBITOR SWITCH GROUND LINE.** Measure the resistance of harness between inhibitor switch connector and engine ground. ***Connector & terminal*** ***(T7) No. 12 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **9.**	Repair the open circuit in harness between inhibitor switch connector and ground line. NOTE: In this case, repair the following: • Open circuit in harness between inhibitor switch connector and ground line
9	**CHECK INHIBITOR SWITCH.** Measure the resistance between inhibitor switch connector receptacle's terminals with select lever at "N" and "P" range. ***Terminals*** ***No. 7 — No. 12:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>
10	**CHECK SELECT CABLE CONNECTION.**	Is there any fault in select cable connection to inhibitor switch?	Repair the select cable connection. <Ref. to CS-14, INSPECTION, Select Cable.>	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

BE:DTC P1086 TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

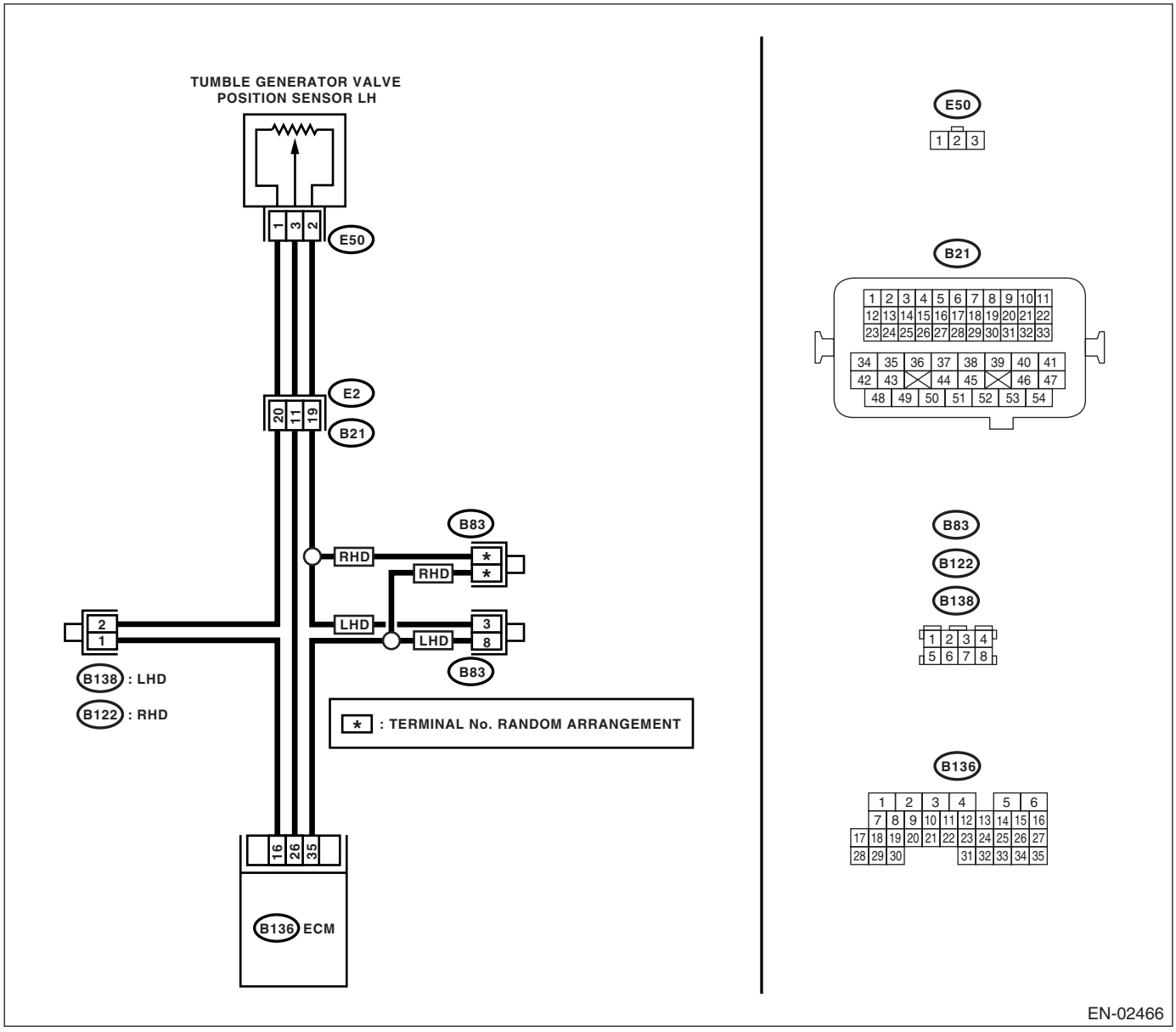
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while tumble generator valve is fully closed. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 26 (+) — Chassis ground (–):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Measure the voltage between ECM connector and chassis ground.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from tumble generator valve position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and tumble generator valve position sensor connector. ***Connector & terminal*** ***(B136) No. 26 — (E50) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BF:DTC P1087 TUMBLE GENERATED VALVE POSITION SENSOR 2 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

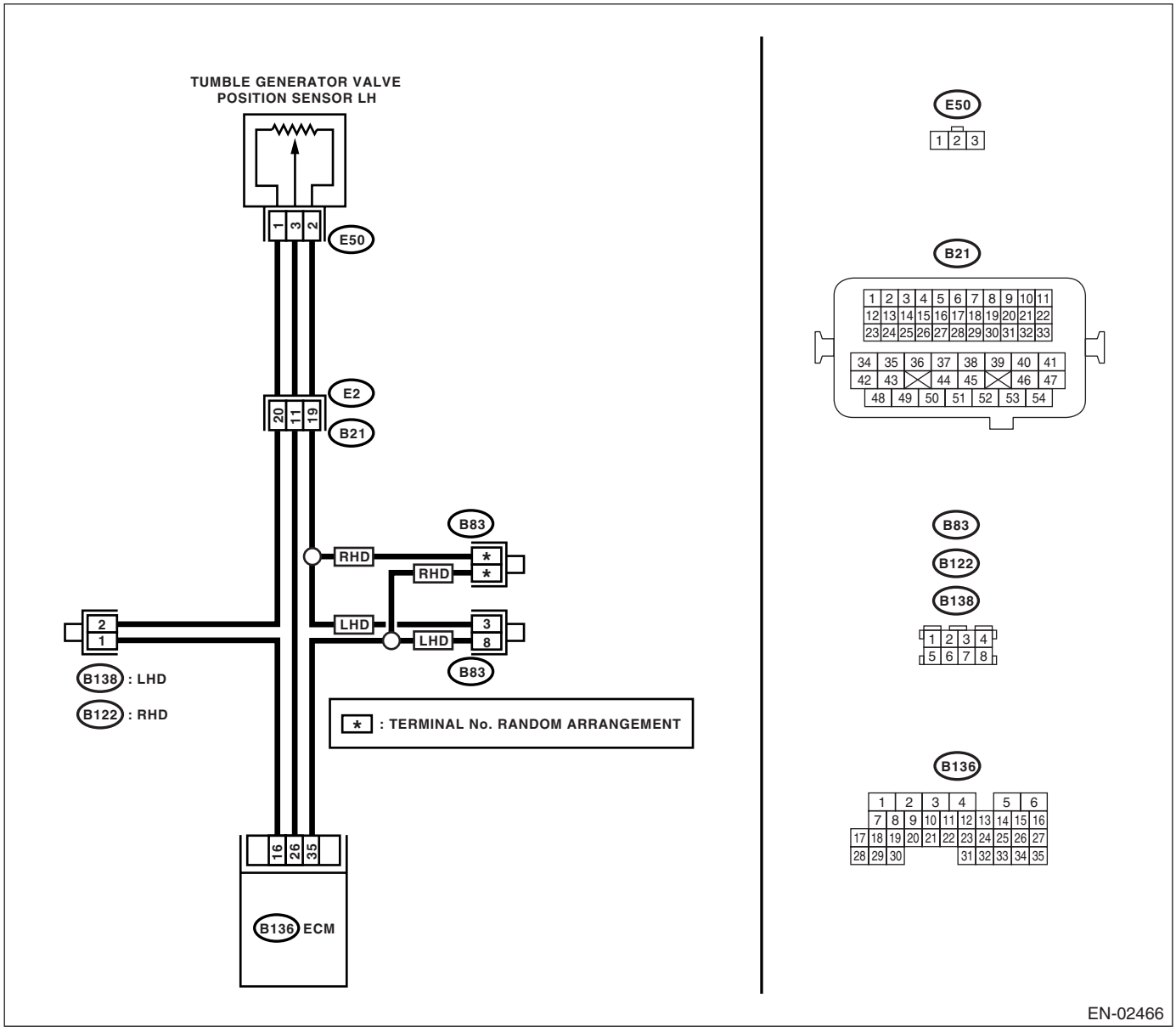
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of throttle position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from throttle position sensor. 3) Measure the resistance of harness between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN THROTTLE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E50) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BG:DTC P1088 TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition

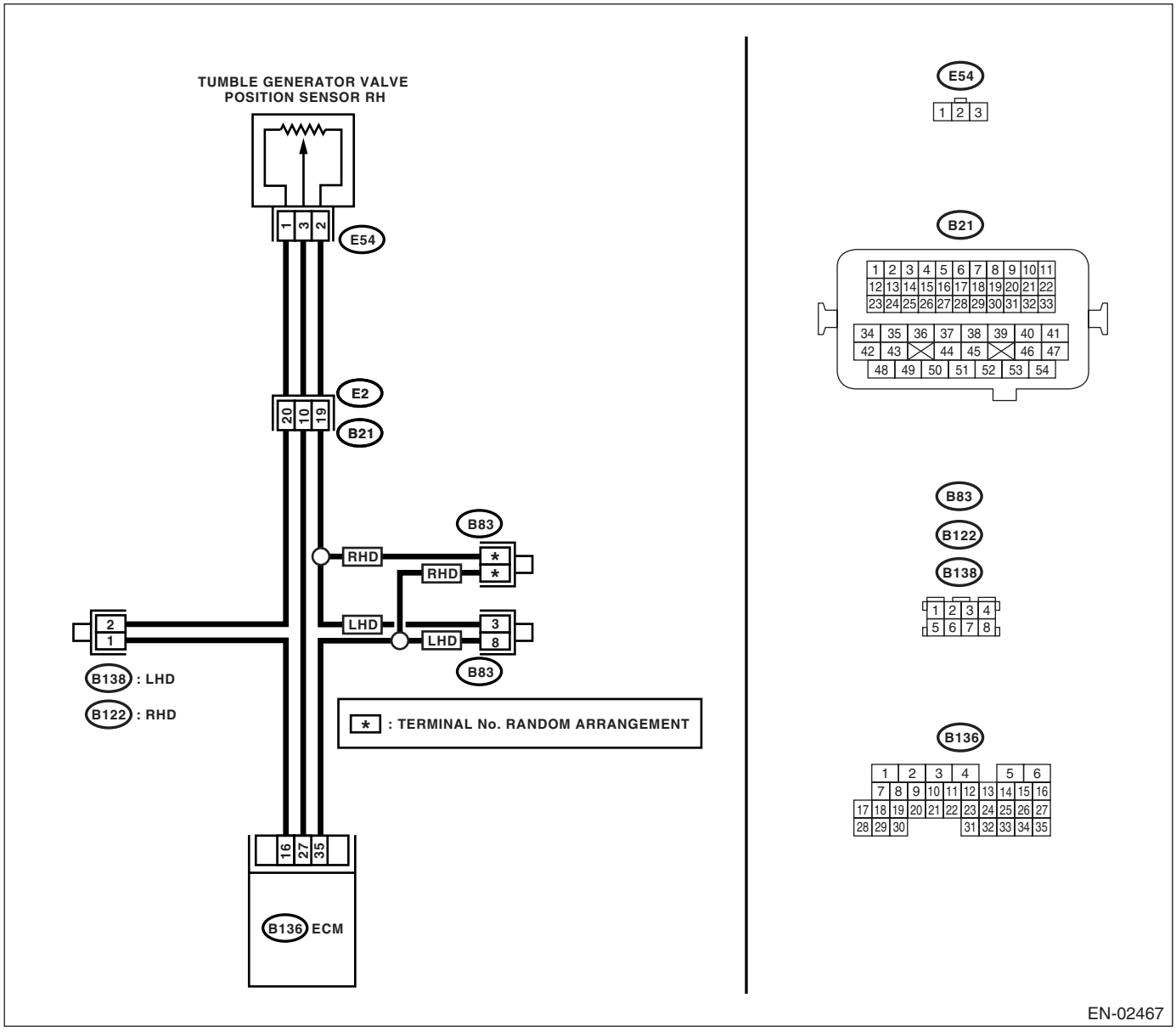
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.	Is the voltage less than 0.1 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground while throttle valve is fully closed. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Shake the ECM harness and connector, while monitoring value of voltage meter. Does the voltage change?	Repair the poor contact in ECM connector.	Contact your Subaru distributor service. NOTE: Inspection by DTM is required, because probable cause is deterioration of multiple parts.
4	**CHECK INPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 27 (+) — Chassis ground (–):***	Is the voltage less than 0.1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM. (USING SUBARU SELECT MONITOR)** Measure the voltage between ECM connector and chassis ground.	Shake the ECM harness and connector, while monitoring value of Subaru Select Monitor. Does the voltage change?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from throttle position sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 1 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in throttle position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector
7	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE POSITION SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between ECM connector and throttle position sensor connector. ***Connector & terminal*** ***(B136) No. 27 — (E54) No. 3:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in ECM connector • Poor contact in tumble generator valve position sensor connector • Poor contact in coupling connector
8	**CHECK HARNESS BETWEEN ECM AND THROTTLE POSITION SENSOR CONNECTOR.** Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the ground short circuit in harness between tumble generator valve position sensor and ECM connector.
9	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve position sensor connector.	Is there poor contact in tumble generator valve position sensor connector?	Repair the poor contact in tumble generator valve position sensor connector.	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BH:DTC P1089 TUMBLE GENERATED VALVE POSITION SENSOR 1 CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

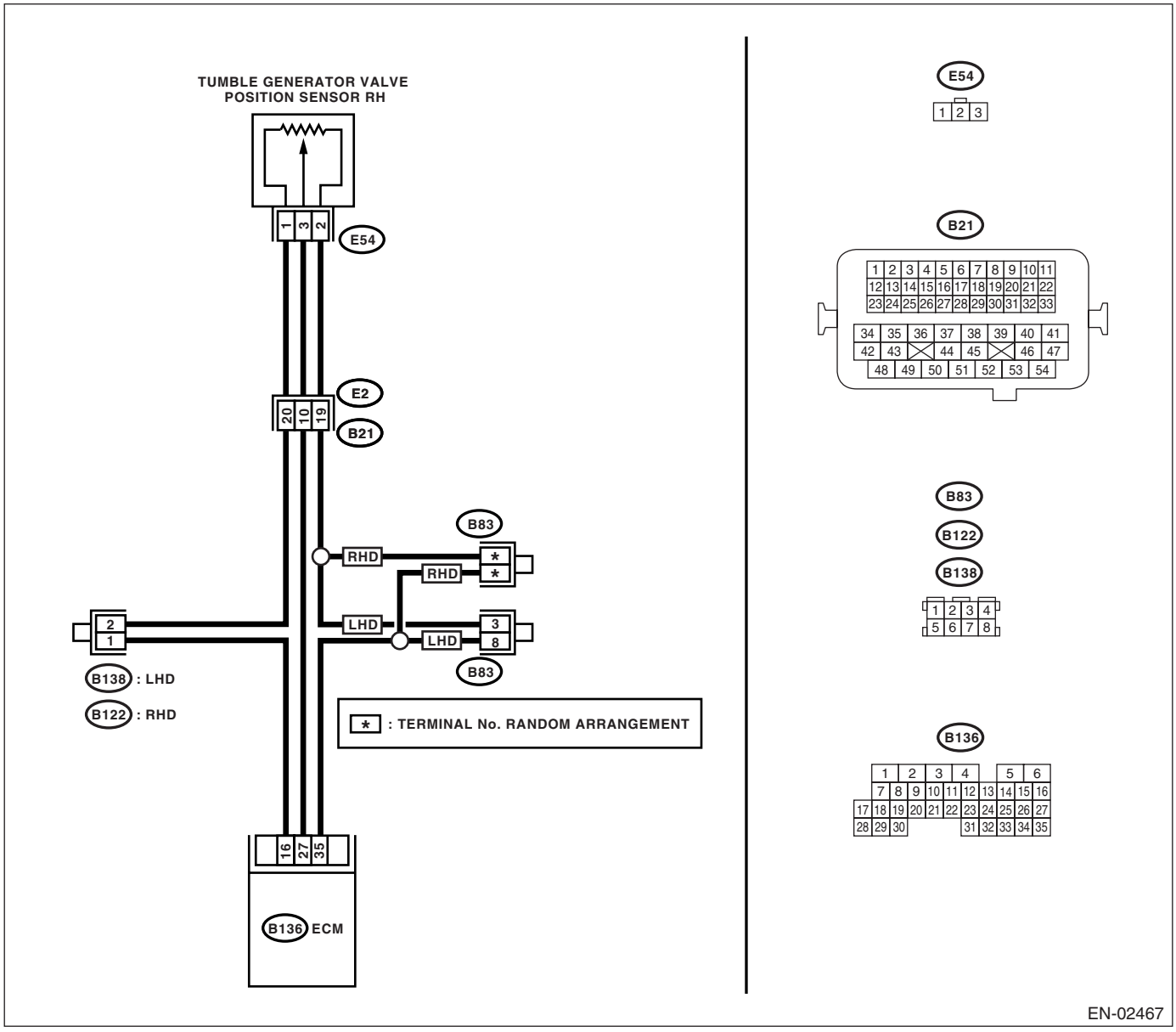
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of tumble generator valve position sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedure, refer to the "READ CURRENT DATA FOR ENGINE". <Ref. to EN(H4SO 2.5)(diag)-26, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the operation manual of OBD-II general scan tool.	Is the voltage more than 4.9 V?	Go to step **2.**	Even if malfunction indicator light lights up, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector may be the cause. NOTE: In this case, repair the following: • Poor contact in tumble generator valve position sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from throttle position sensor. 3) Measure the resistance of harness between tumble generator valve position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between tumble generator valve position sensor and ECM connector • Poor contact in coupling connector • Poor contact in joint connector
3	**CHECK HARNESS BETWEEN TUMBLE GENERATOR VALVE POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between throttle position sensor connector and engine ground. ***Connector & terminal*** ***(E54) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.9 V?	Repair the battery short circuit in harness between tumble generator valve position sensor and ECM connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BI: DTC P1090 TUMBLE GENERATED VALVE SYSTEM 1 (VALVE OPEN)

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BJ:DTC P1091 TUMBLE GENERATED VALVE SYSTEM 1 (VALVE CLOSE)

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)" <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BK:DTC P1092 TUMBLE GENERATED VALVE SYSTEM 2 (VALVE OPEN)

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BL:DTC P1093 TUMBLE GENERATED VALVE SYSTEM 2 (VALVE CLOSE)

DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK TUMBLE GENERATOR VALVE RH.** 1) Remove the tumble generator valve assembly. 2) Check the tumble generator valve body.	Does the tumble generator valve move smoothly? (No dirt or foreign materials clogged)	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Clean the tumble generator valve.

BM:DTC P1094 TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (OPEN)

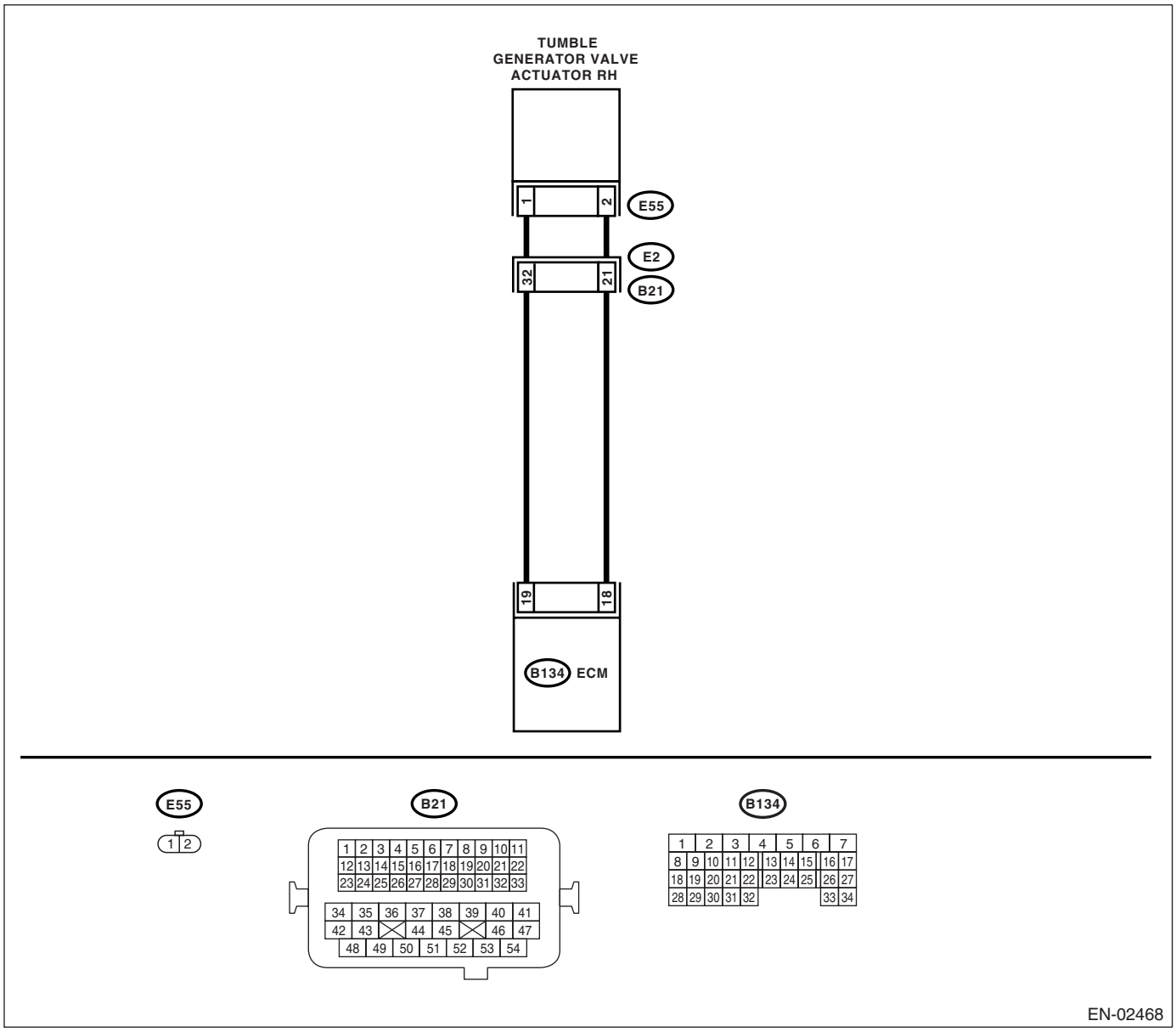
DTC DETECTING CONDITION:

Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E55) No. 1 — (B134) No. 19:*** ***(E55) No. 2 — (B134) No. 18:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BN:DTC P1095 TUMBLE GENERATED VALVE SIGNAL 1 CIRCUIT MALFUNCTION (SHORT)

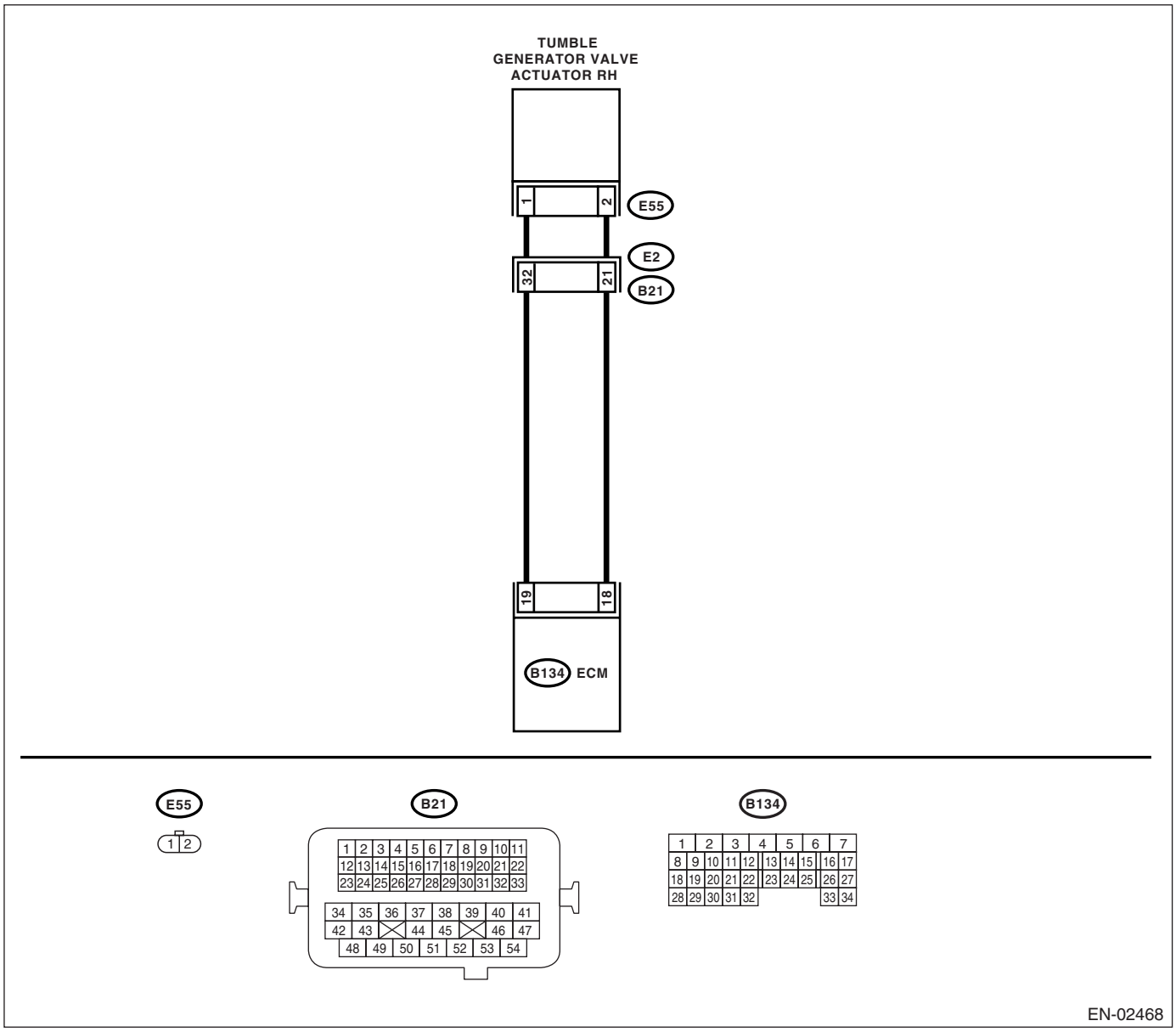
DTC DETECTING CONDITION:

Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E55) No. 1 (+) — Chassis ground (−):*** ***(E55) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

BO:DTC P1096 TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (OPEN)

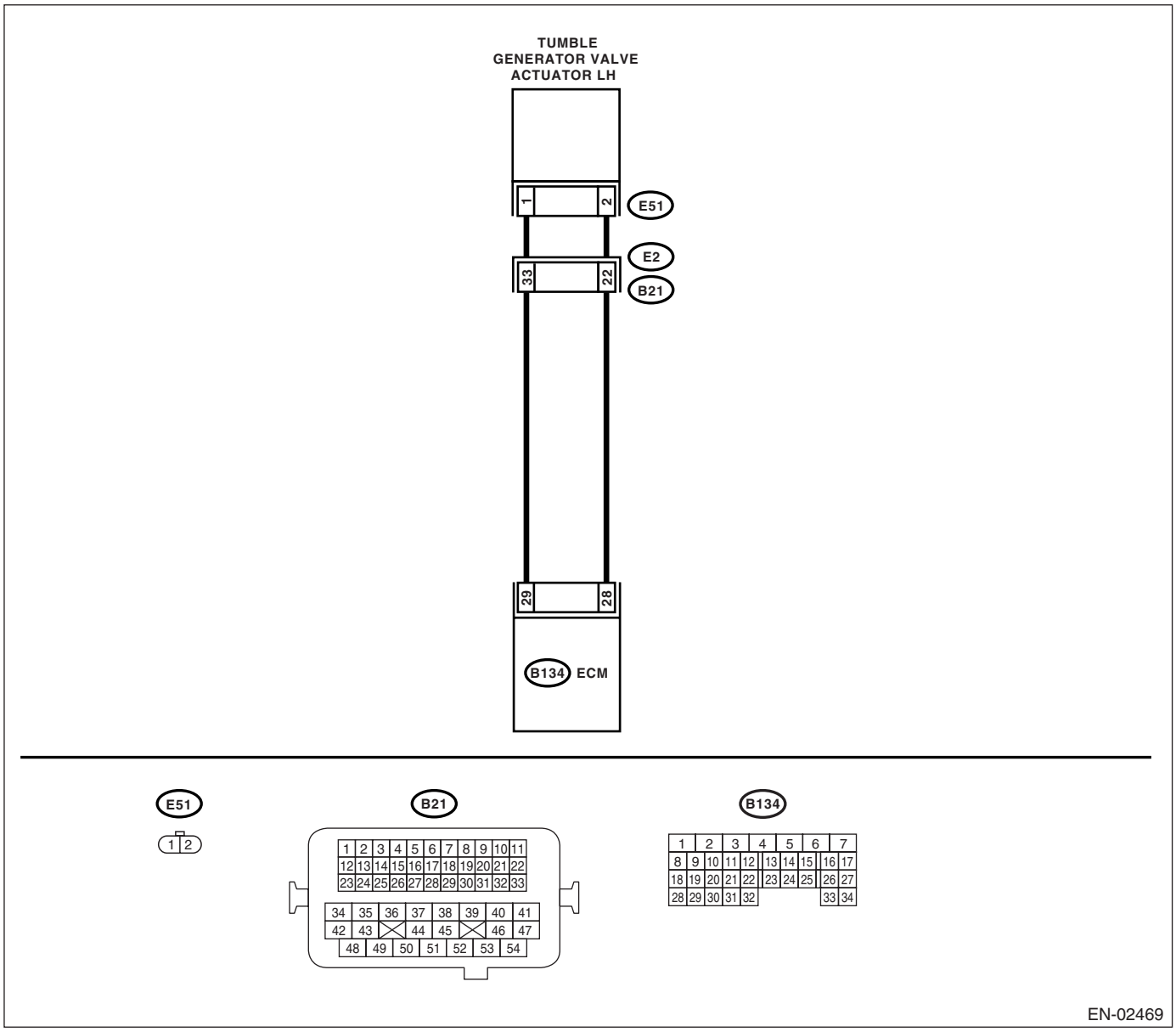
DTC DETECTING CONDITION:

Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve and ECM connector. 3) Measure the resistance between tumble generator valve actuator and ECM connector. ***Connector & terminal*** ***(E51) No. 1 — (B134) No. 29:*** ***(E51) No. 2 — (B134) No. 28:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit between ECM and tumble generator valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and tumble generator valve actuator connector • Poor contact in coupling connector
2	**CHECK POOR CONTACT.** Check poor contact in tumble generator valve actuator connector.	Is there poor contact in tumble generator valve actuator connector?	Repair the poor contact in tumble generator valve actuator connector.	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>

BP:DTC P1097 TUMBLE GENERATED VALVE SIGNAL 2 CIRCUIT MALFUNCTION (SHORT)

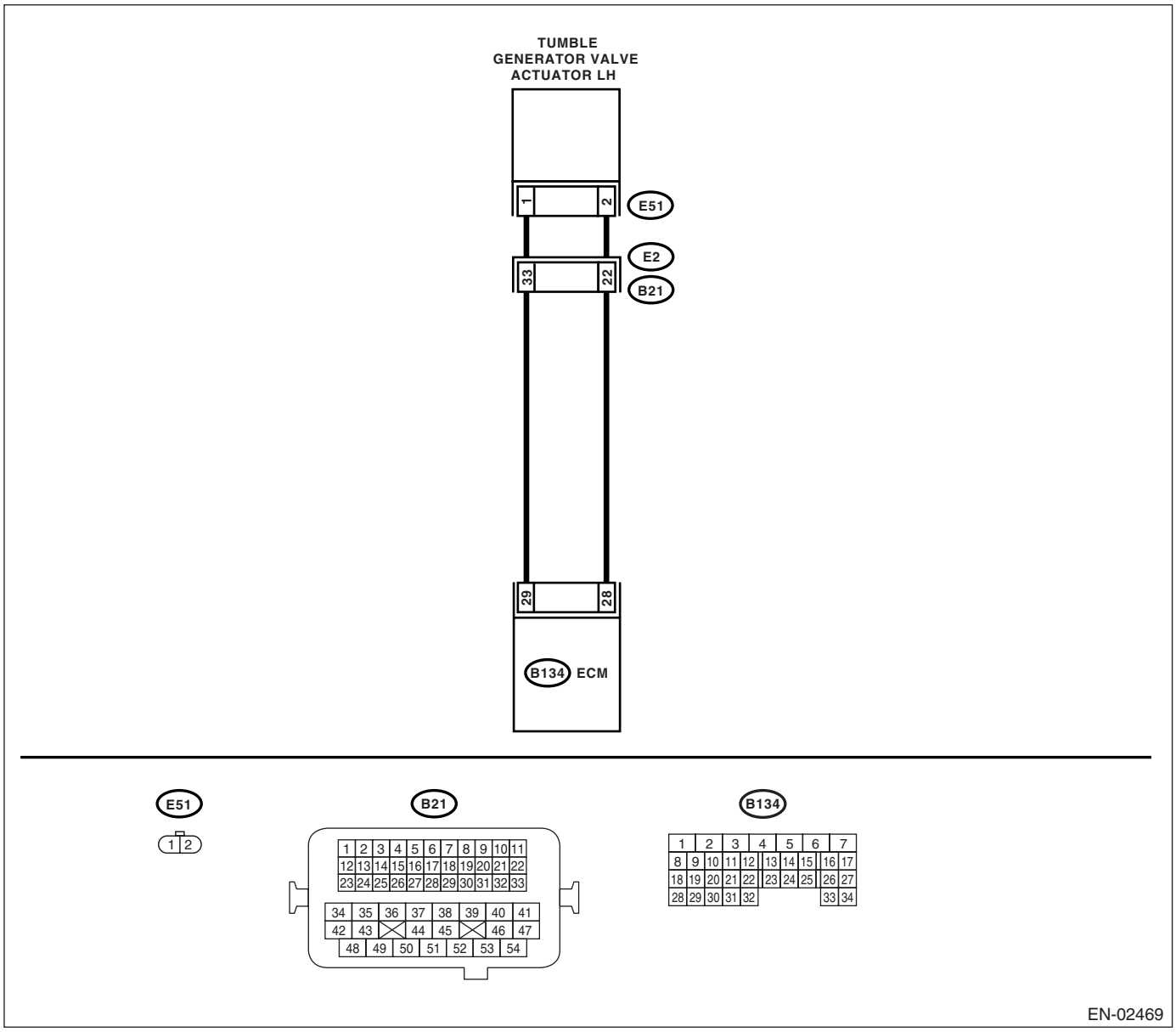
DTC DETECTING CONDITION:

Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from tumble generator valve connector. 3) Measure the voltage between tumble generator valve actuator and chassis ground. ***Connector & terminal*** ***(E51) No. 1 (+) — Chassis ground (−):*** ***(E51) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Replace the tumble generator valve assembly. <Ref. to FU(H4SO 2.5)-28, Tumble Generator Valve Assembly.>	Repair the battery short circuit between ECM and tumble generator valve actuator.

BQ:DTC P1110 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:
Immediately at fault recognition.
TROUBLE SYMPTOM:

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P1110.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

BR:DTC P1111 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> NOTE: It is not necessary to inspect DTC P1111.	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

BS:DTC P1152 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (LOW) (BANK1 SENSOR1)

DTC DETECTING CONDITION:

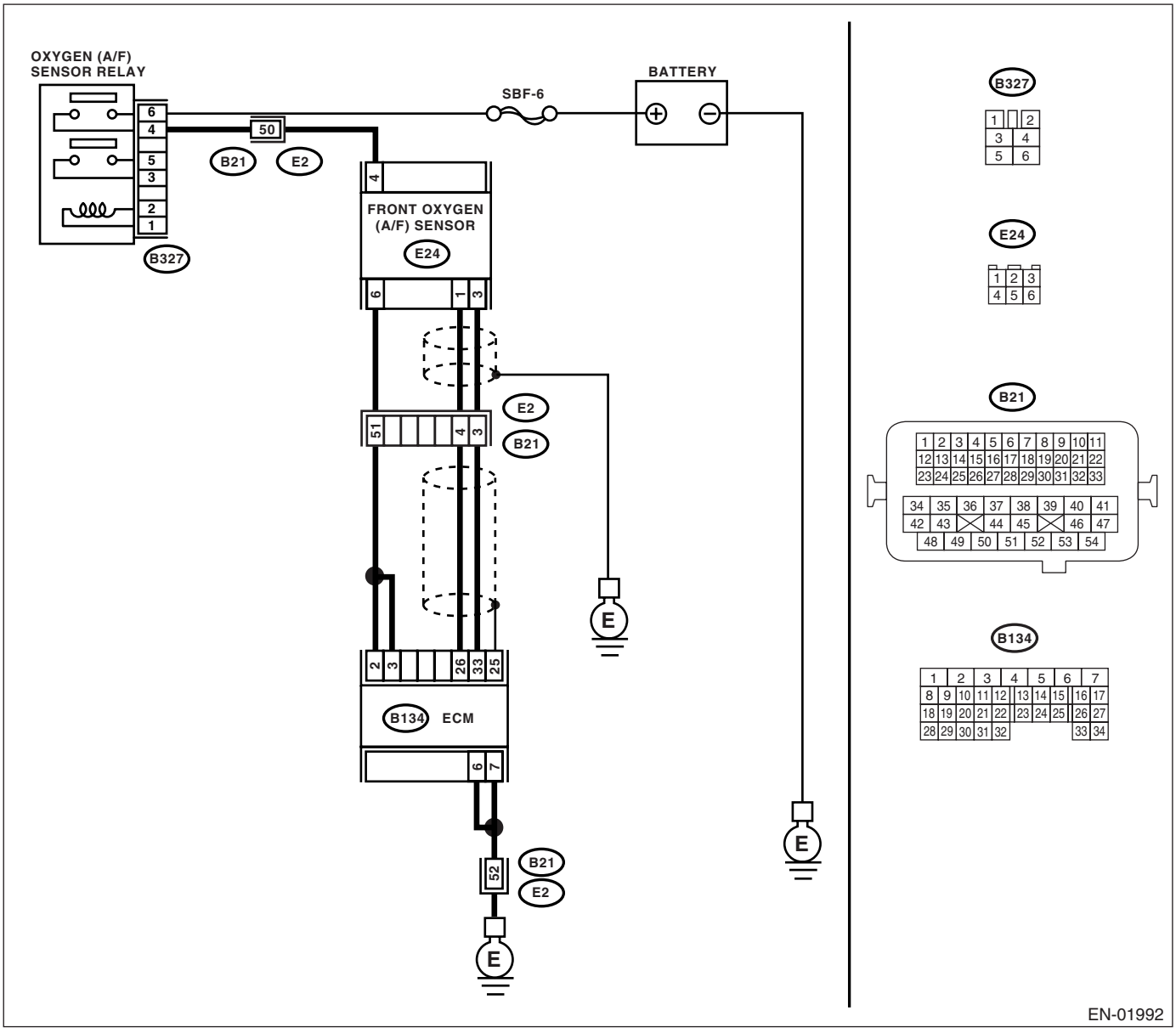
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E24) No. 1:*** ***(B134) No. 33 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
3	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

BT:DTC P1153 O2 SENSOR CIRCUIT RANGE/PERFORMANCE (HIGH) (BANK1 SENSOR1)

DTC DETECTING CONDITION:

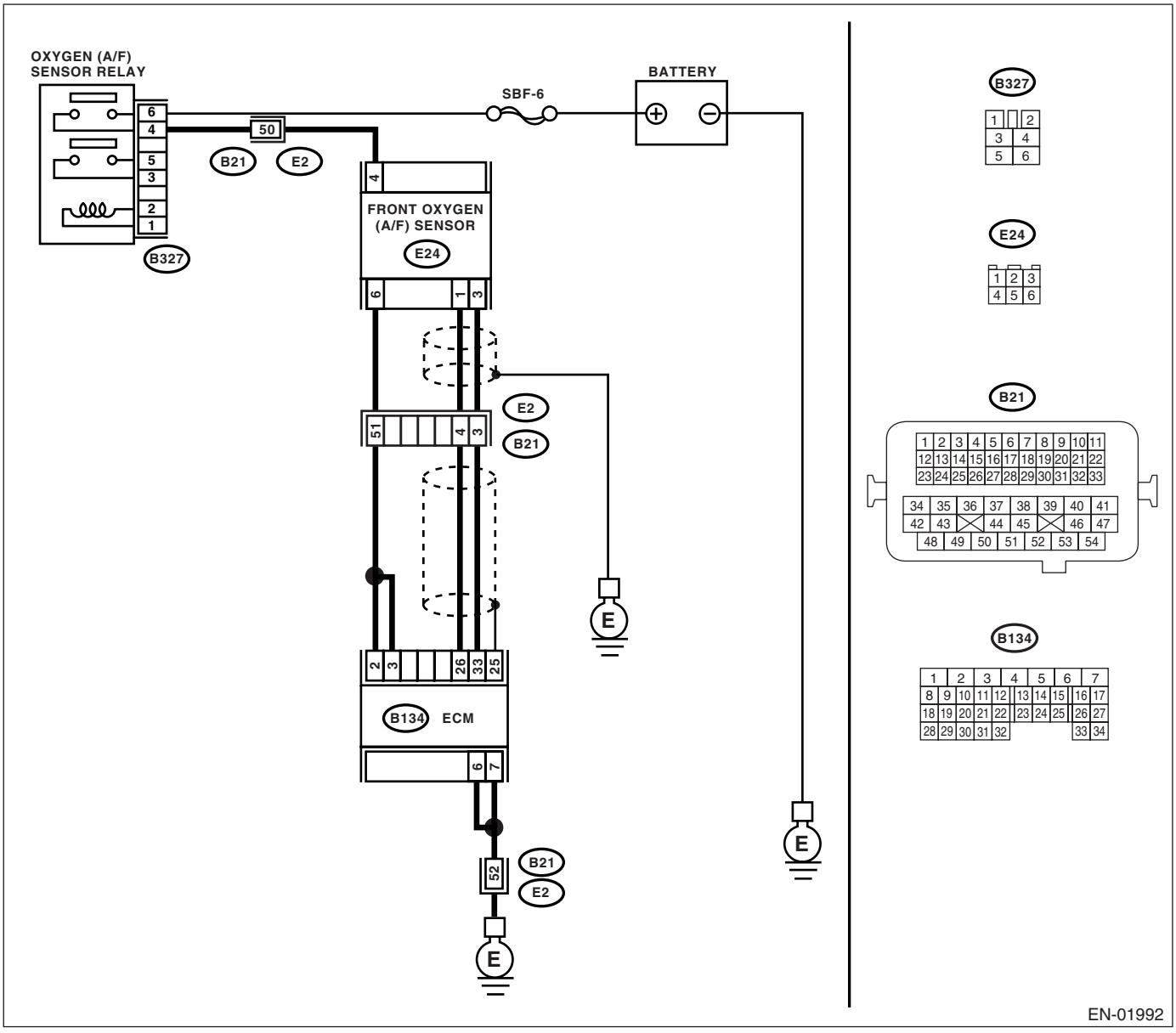
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
4	**CHECK OUTPUT SIGNAL FOR ECM.** 1) Connect the connector to ECM and front oxygen (A/F) sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.
6	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 4.95 V?	Go to step **7.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4SO 2.5)-34, Front Oxygen (A/F) Sensor.>

Step		Check	Yes	No
7	**CHECK OUTPUT SIGNAL FOR ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. After repair, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the poor contact in ECM connector.

BU:DTC P1160 RETURN SPRING FAILURE

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-231, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BV:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-222, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BW:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BX:DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-222, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BY:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BZ:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H4SO 2.5)(diag)-222, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CA:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H4SO 2.5)(diag)-224, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CB:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition.

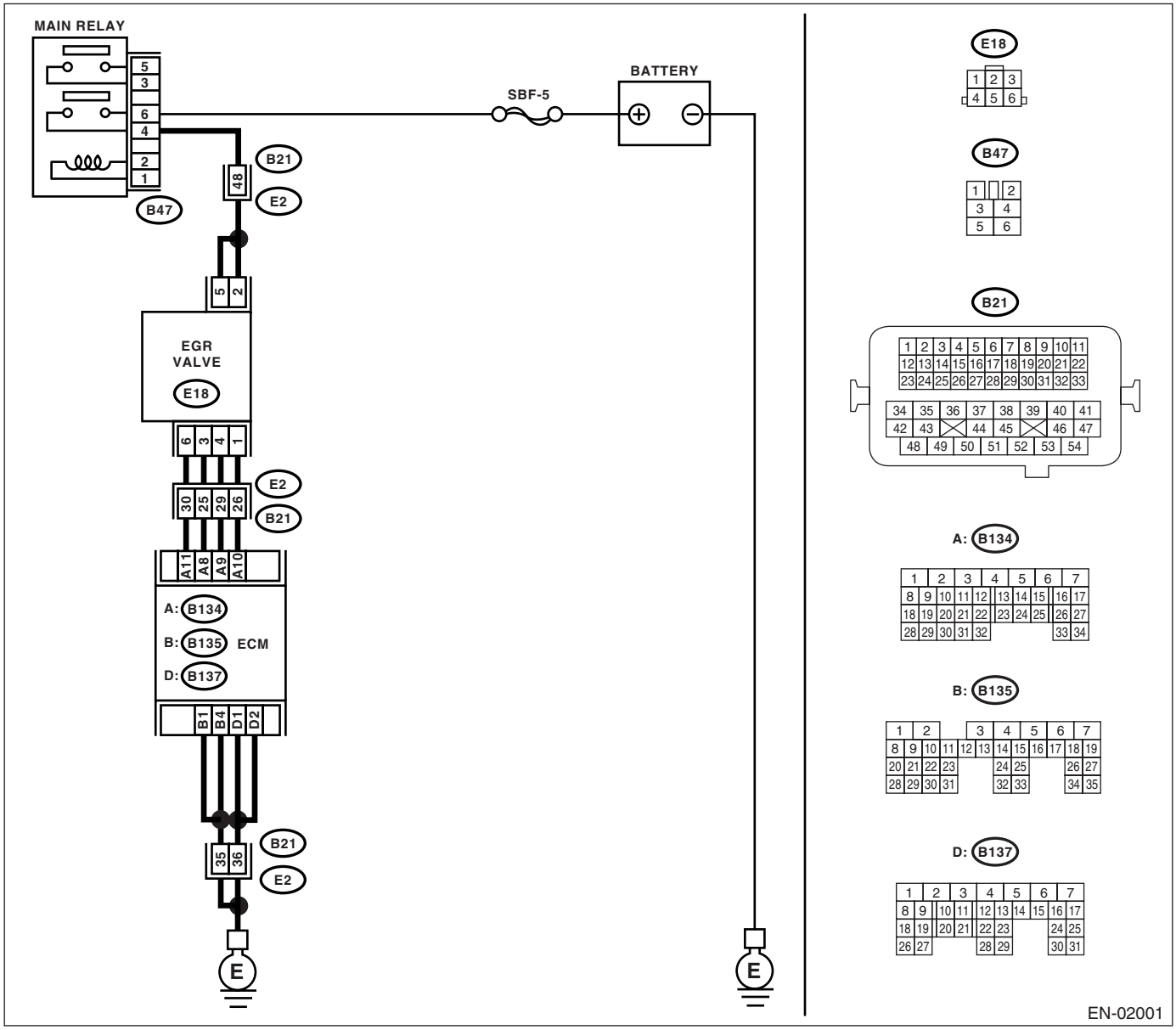
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (–):*** ***(E18) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — (E18) No. 3:*** ***DTC P1494; (B134) No. 10 — (E18) No. 1:*** ***DTC P1496; (B134) No. 9 — (E18) No. 4:*** ***DTC P1498; (B134) No. 8 — (E18) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and EGR solenoid valve connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — Chassis ground:*** ***DTC P1494; (B134) No. 10 — Chassis ground:*** ***DTC P1496; (B134) No. 9 — Chassis ground:*** ***DTC P1498; (B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair the poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H4SO 2.5)-30, EGR Valve.>

CC:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition.

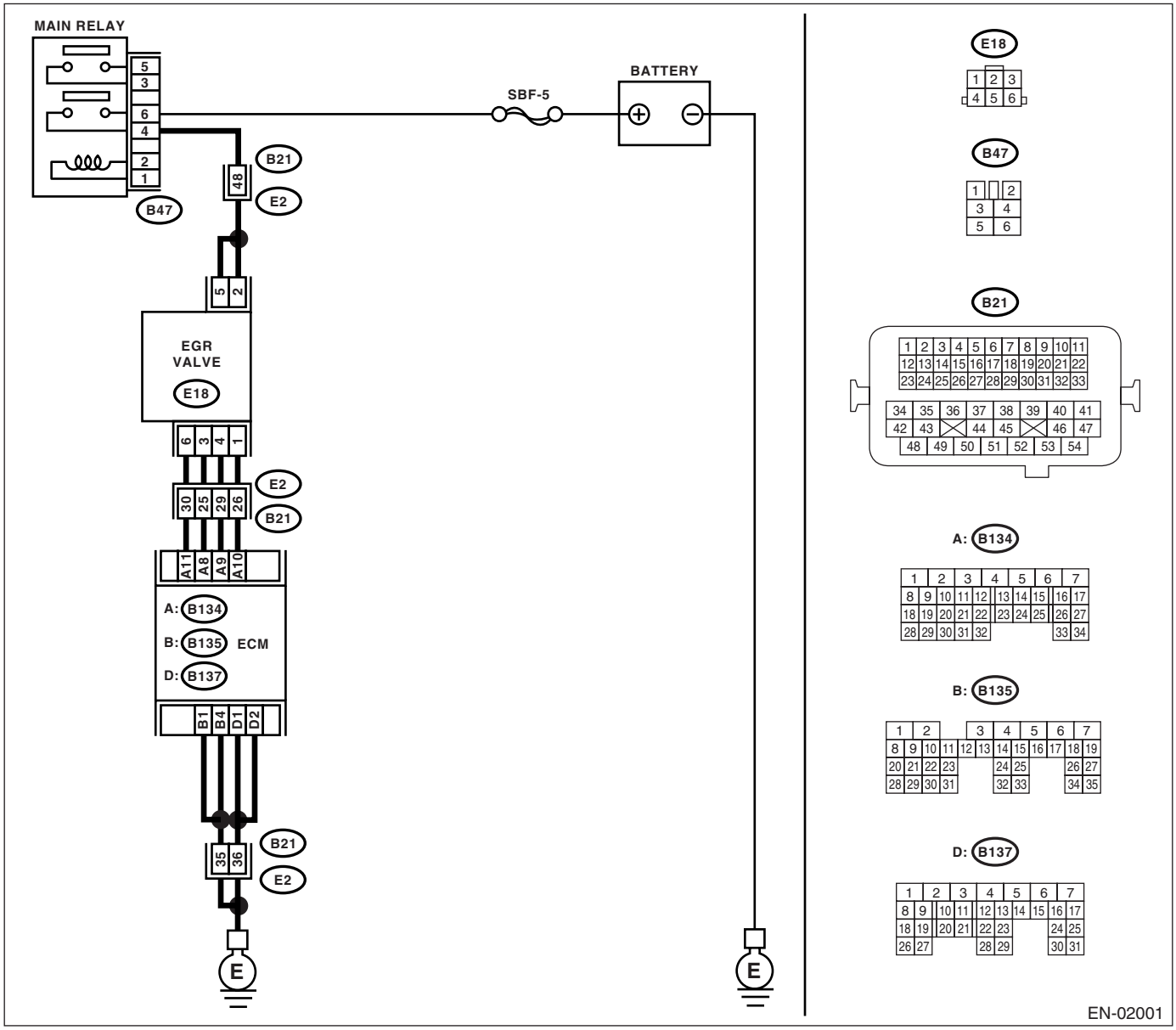
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM connector and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 11 (+) — Chassis ground (–):*** ***DTC P1495; (B134) No. 10 (+) — Chassis ground (–):*** ***DTC P1497; (B134) No. 9 (+) — Chassis ground (–):*** ***DTC P1499; (B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short in harness between ECM and EGR solenoid valve connector. After repairing, replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

CD:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

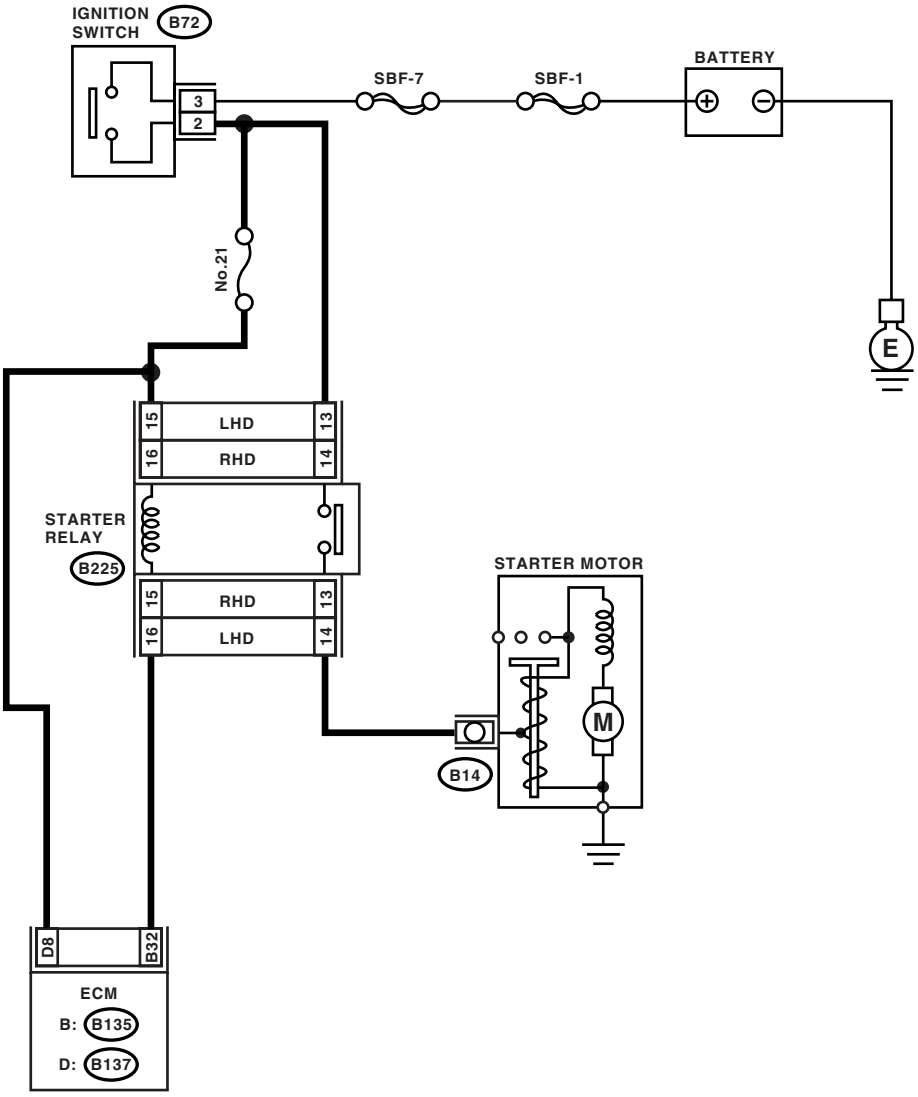
Failure of engine to start

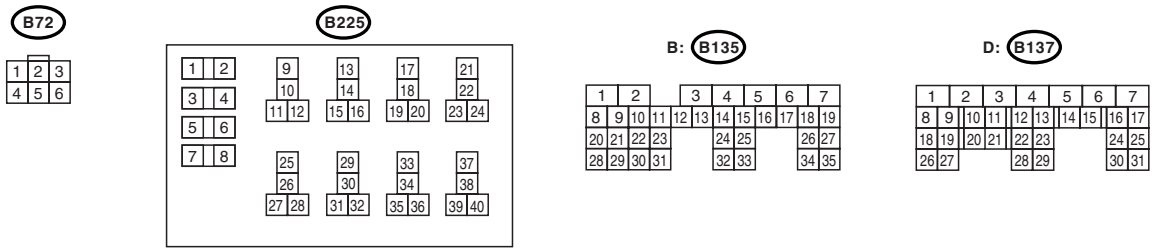
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model





EN-02455

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK OPERATION OF STARTER MOTOR.** Place the inhibitor switch in the “P” or “N” range.	Does the starter motor operate when ignition switch to START?	Repair the harness and connector. NOTE: In this case, repair the following: • Open or ground short circuit in harness between ECM and starter motor connector • Poor contact in ECM connector	Check starter motor circuit. <Ref. to EN(H4SO 2.5)(diag)-55, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CE:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

DTC DETECTING CONDITION:

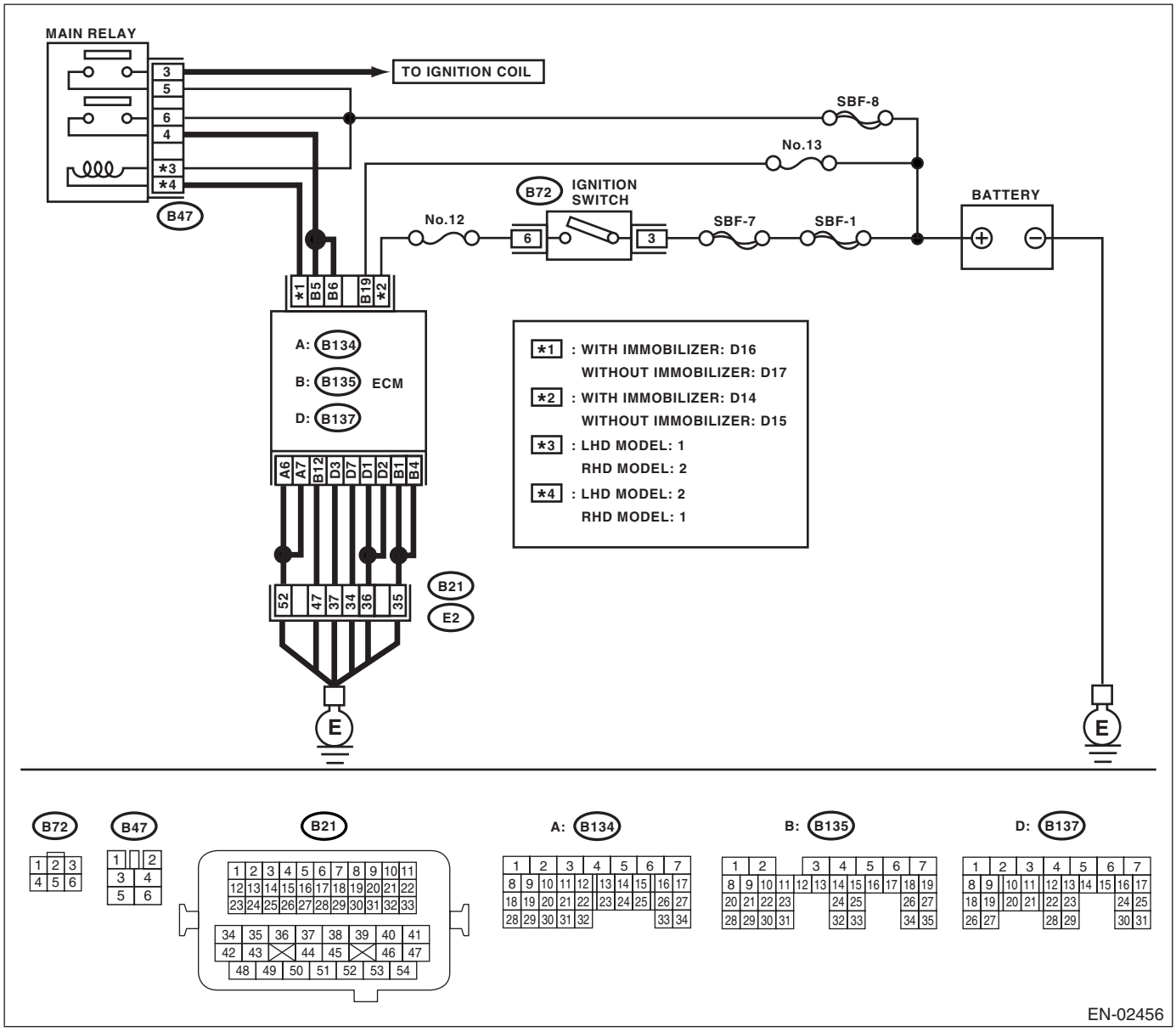
Immediately at fault recognition.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM connector and battery terminal.	Go to step **4.**
4	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

CF:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

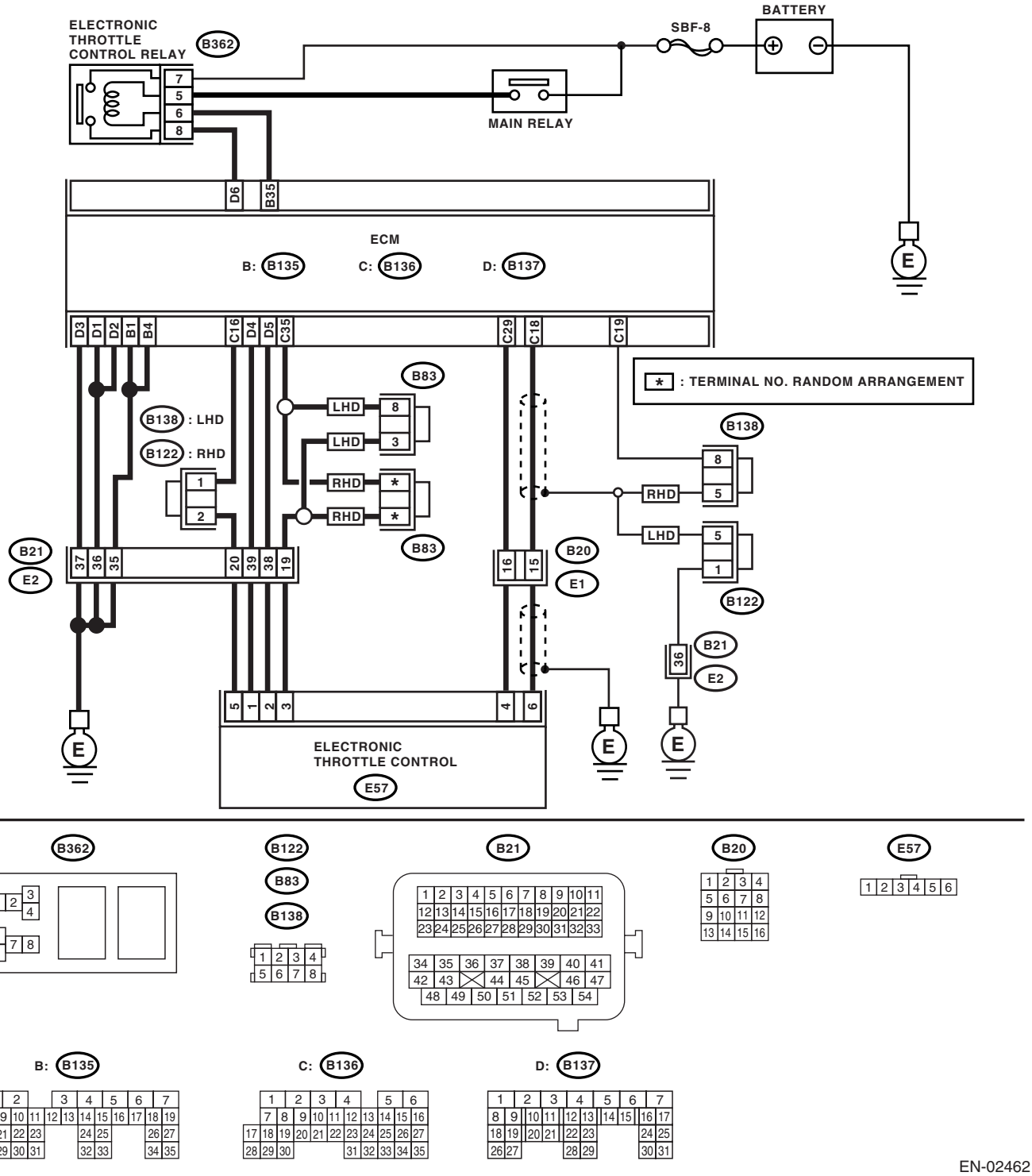
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



EN-02462

- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **5.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and electronic throttle control relay.

	Step	Check	Yes	No
7	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **8.**	Go to step **10.**
8	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **9.**	Go to step **10.**
9	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit of harness connector.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Repair the ground short circuit of harness.
12	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
13	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **14.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
14	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.63 V?	Go to step **15.**	Go to step **17.**
15	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.73 V?	Go to step **16.**	Go to step **17.**

	Step	Check	Yes	No
16	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **22.**
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **18.**	Repair the open circuit of harness connector.
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **19.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **20.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **21.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
21	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **22.**	Repair the short circuit to sensor power supply.
22	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except for the electric control throttle relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.81 — 0.87 V?	Go to step **23.**	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
23	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 1.64 — 1.70 V?	Go to step **24.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.

	Step	Check	Yes	No
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 5 — (E57) No. 2:*** ***(B137) No. 4 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit of harness connector.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (−):*** ***(E57) No. 1 (+) — Engine ground (−):***	Is the voltage less than 5 V?	Go to step **26.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
26	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **27.**	Repair the short circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance more than 1 MΩ?	Go to step **28.**	Repair the short circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **29.**	Repair the open circuit of harness.
29	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **30.**	Replace the electronic throttle control.
30	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers. Check that the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the electronic throttle control.

CG:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

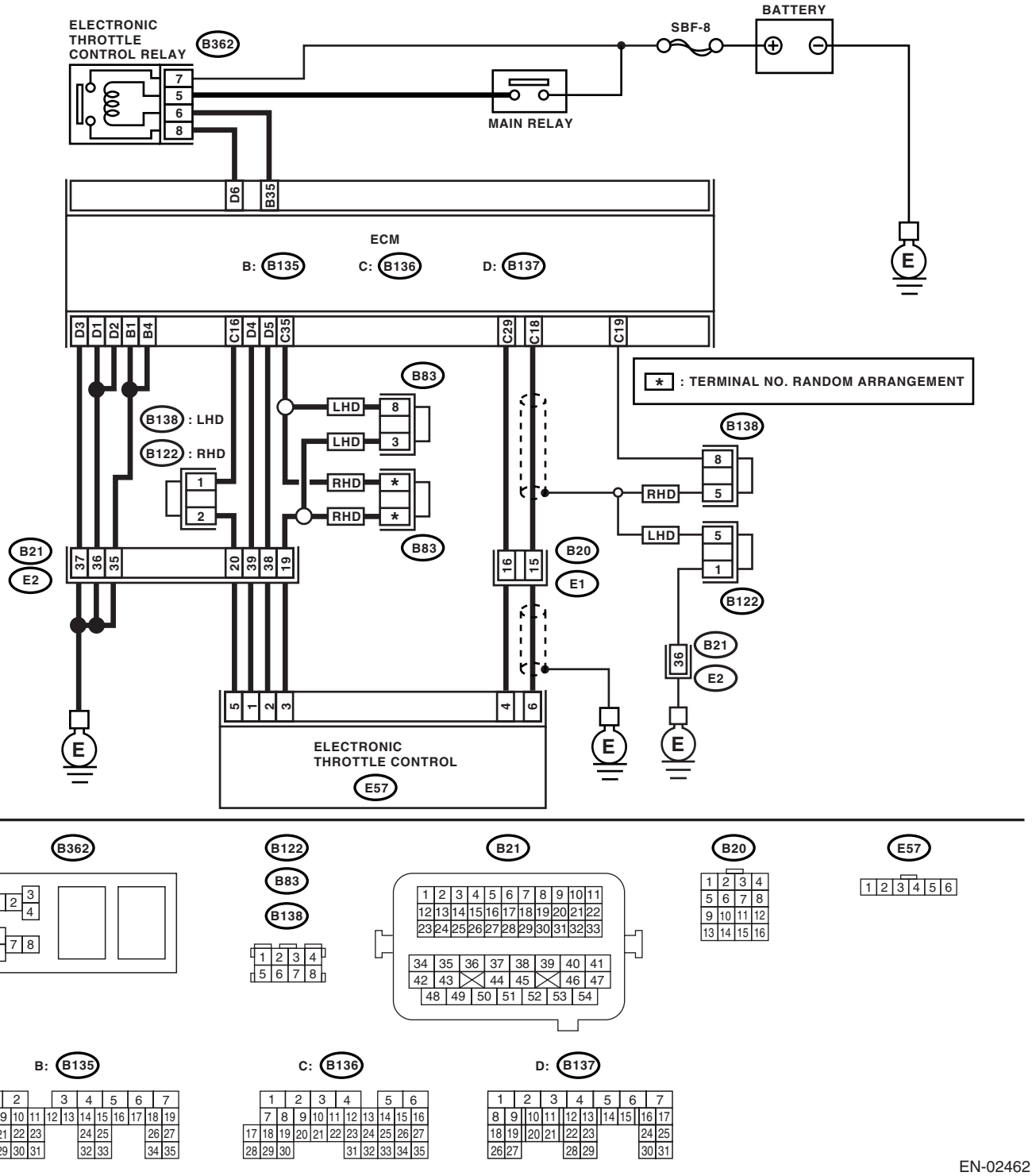
- Erroneous idling
- Poor driving performance
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **5.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the open circuit in harness between ECM and electronic throttle control relay.

CH:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

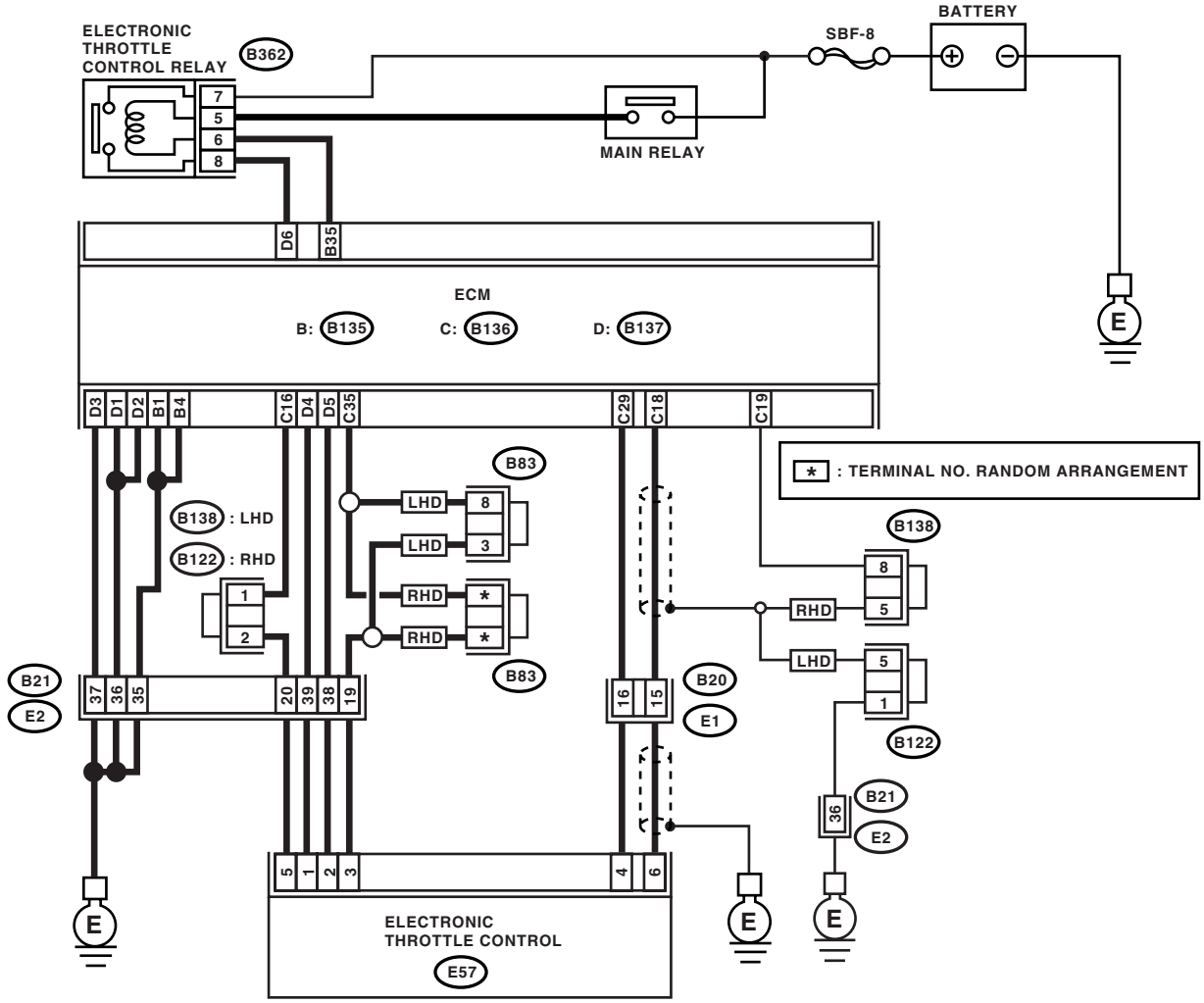
Immediately at fault recognition.

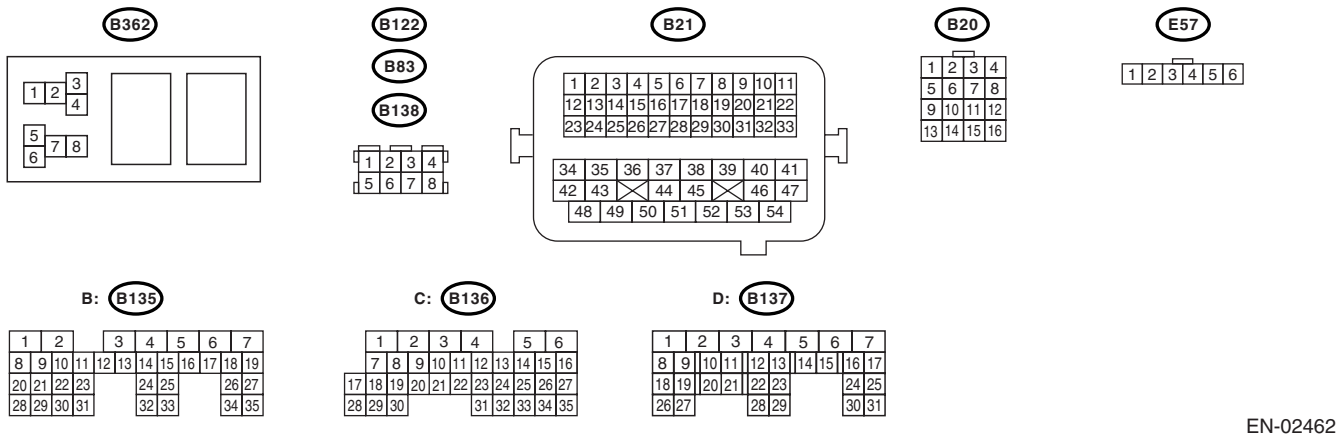
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model





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• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Replace the electronic throttle control relay.
3	**CHECK POWER SUPPLY SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **4.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the ground short circuit in harness between ECM and electronic throttle control relay.

CI: DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4SO 2.5)(diag)-231, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CJ:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

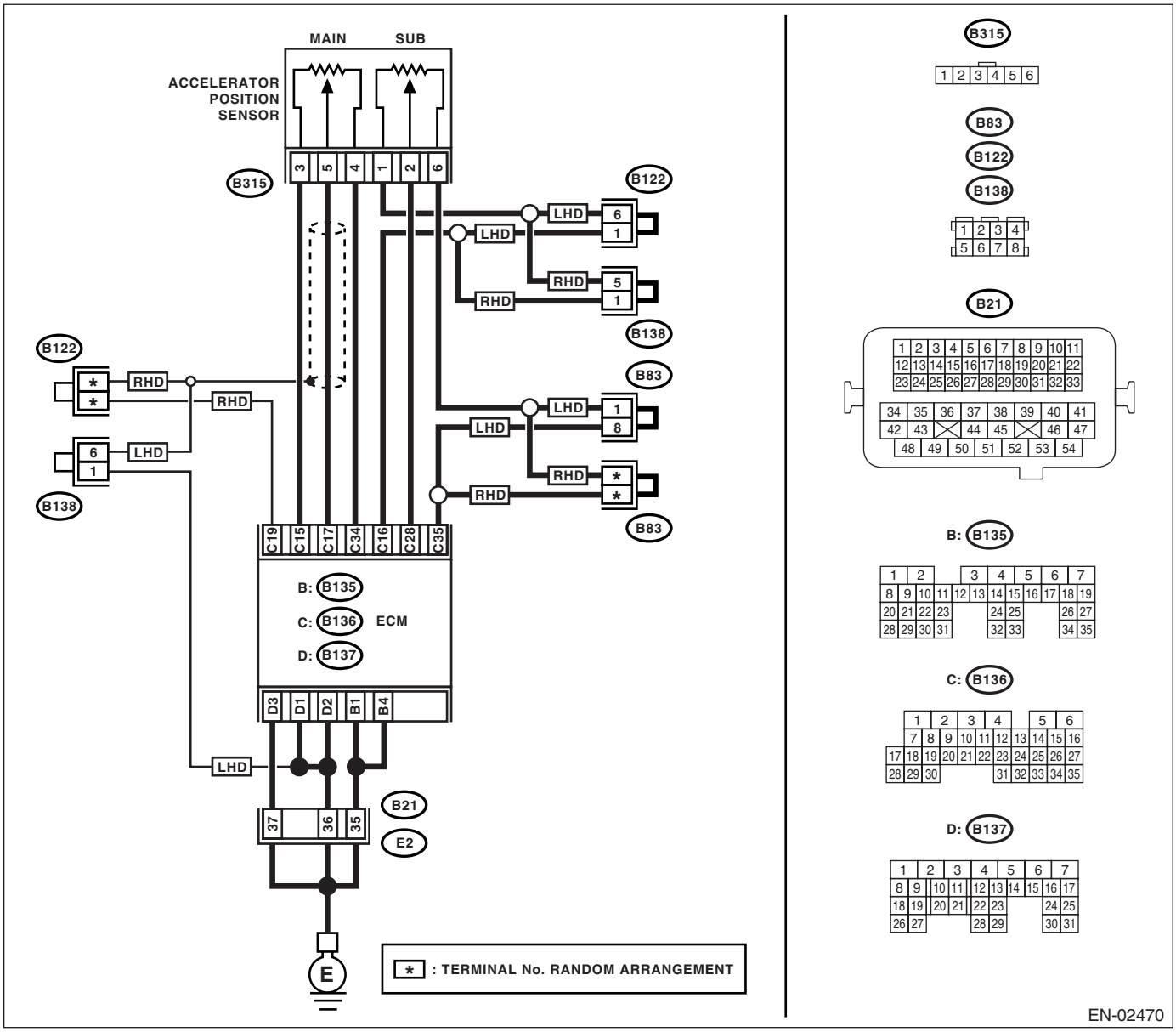
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **9.**	Replace the accelerator position sensor.
9	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the accelerator position sensor.

CK:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

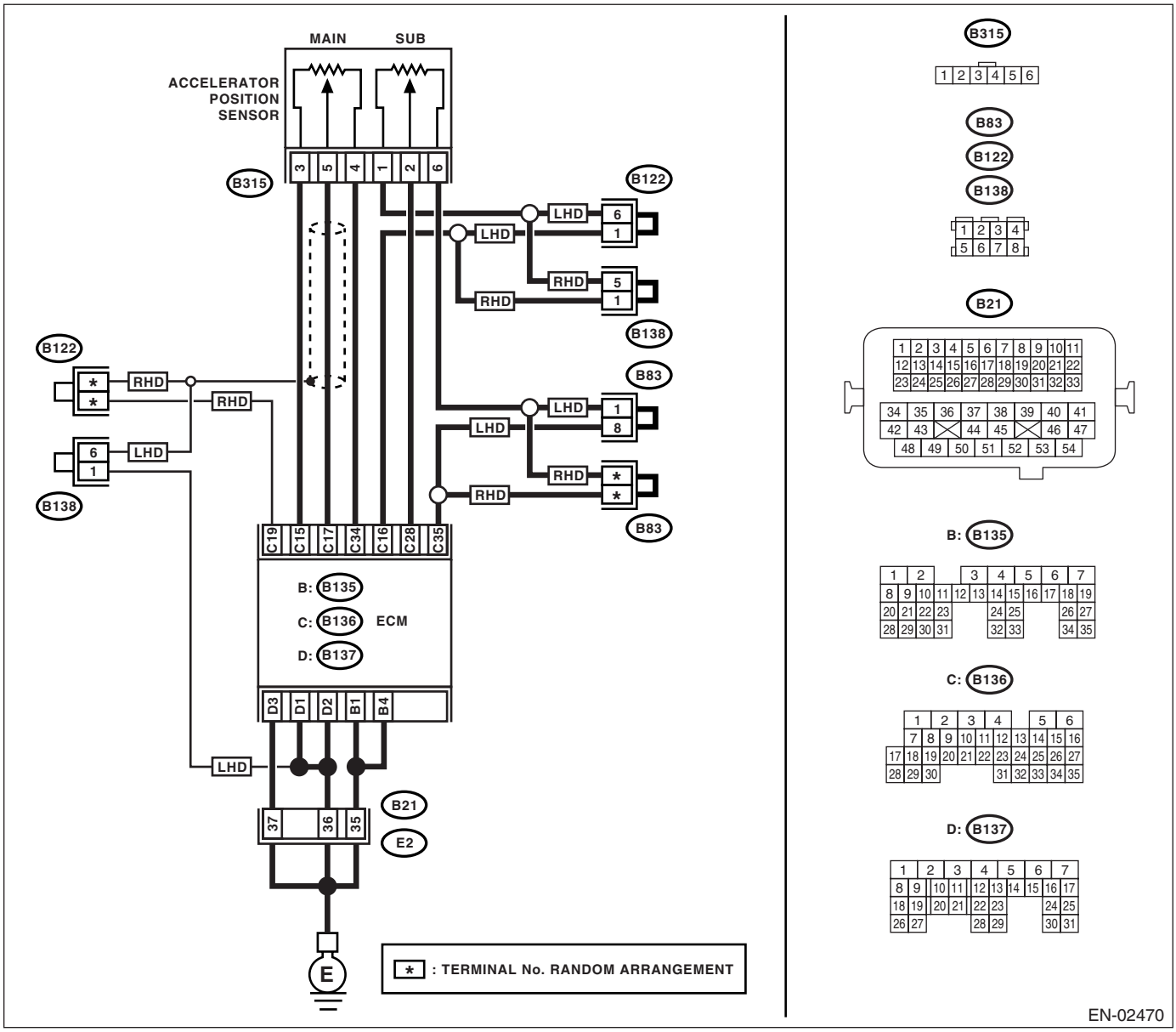
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **7.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

CL:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

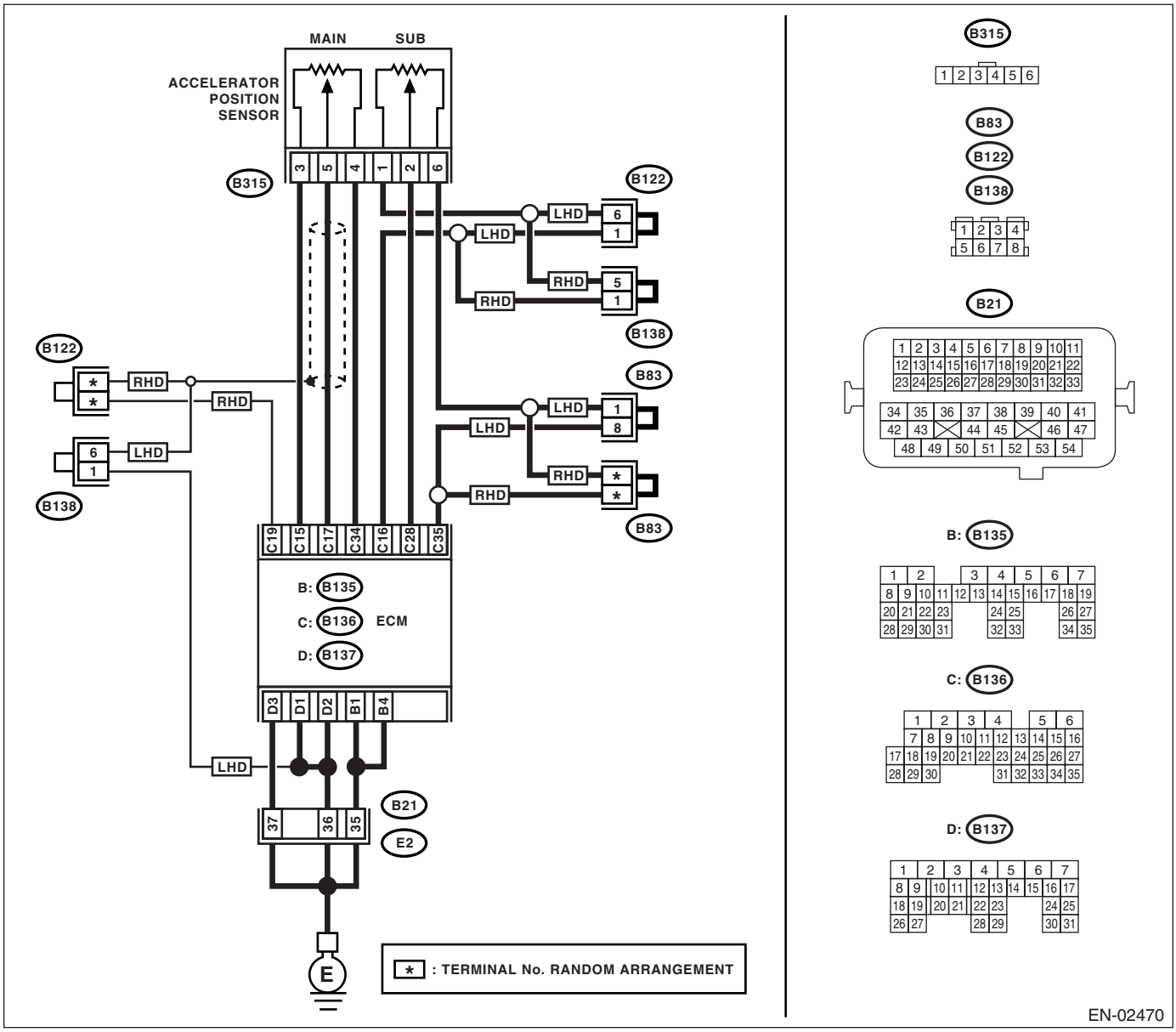
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the chassis short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **9.**	Replace the accelerator position sensor.
9	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the accelerator position sensor.

CM:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

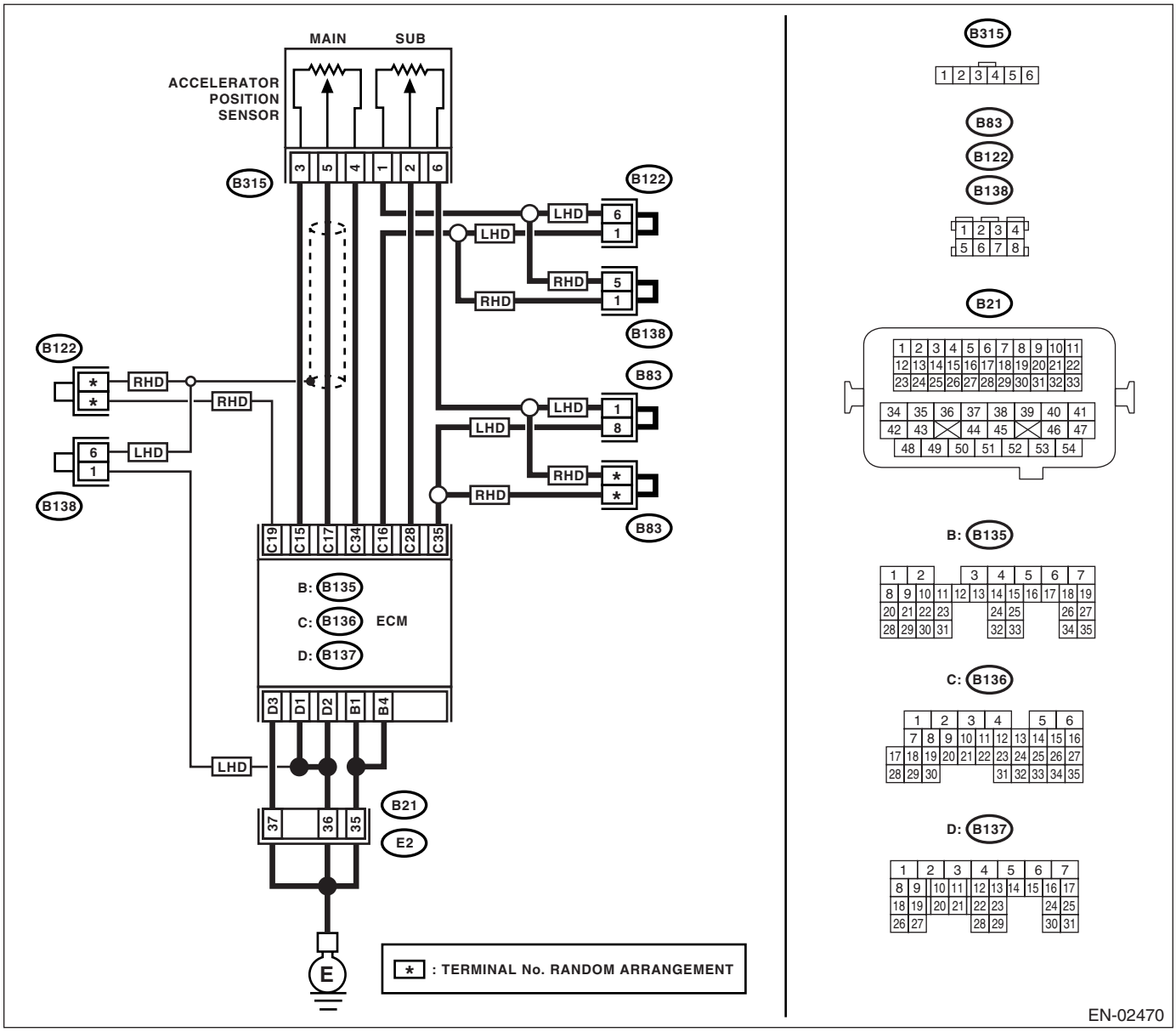
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **7.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

CN:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

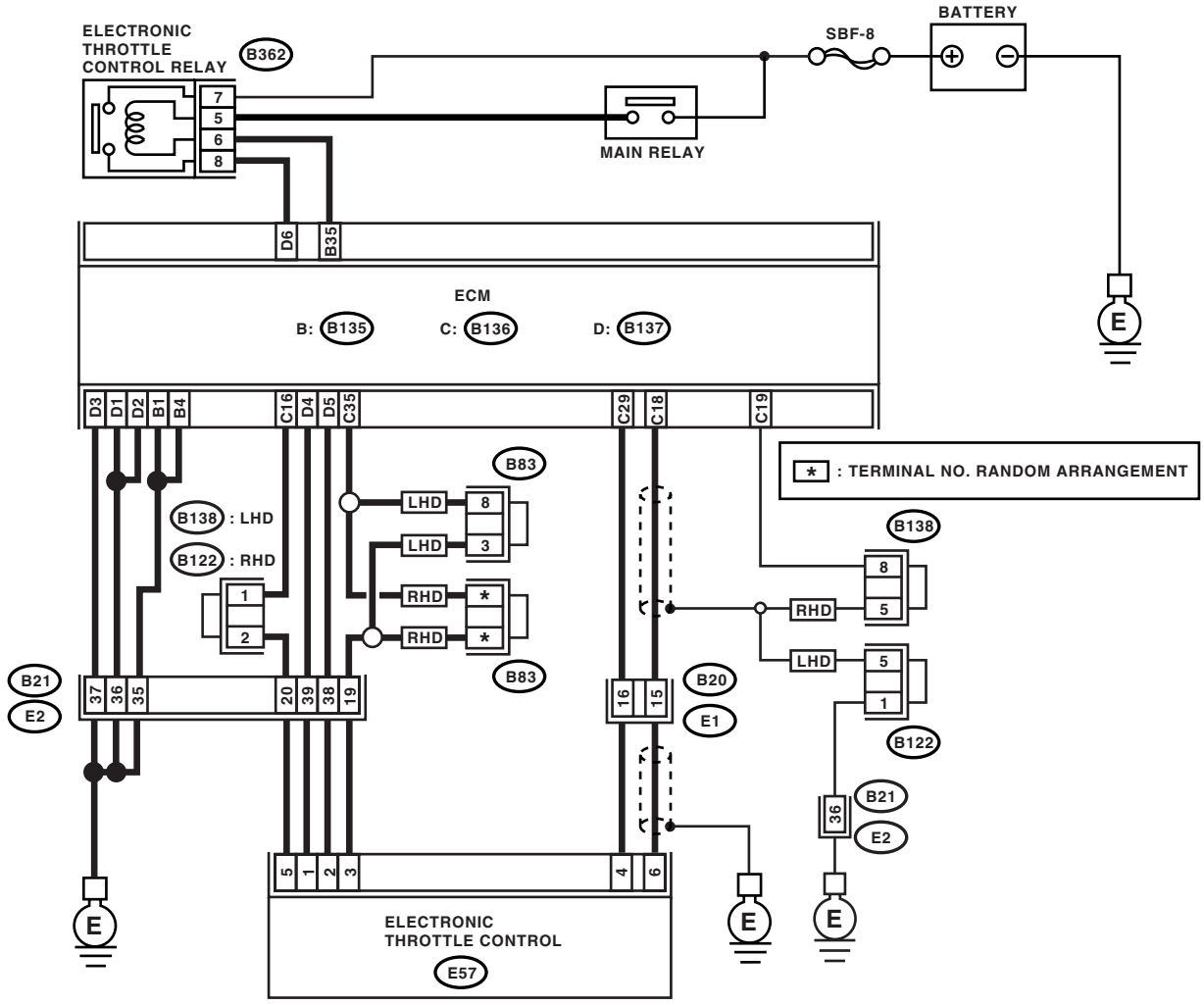
- Erroneous idling
- Poor driving performance

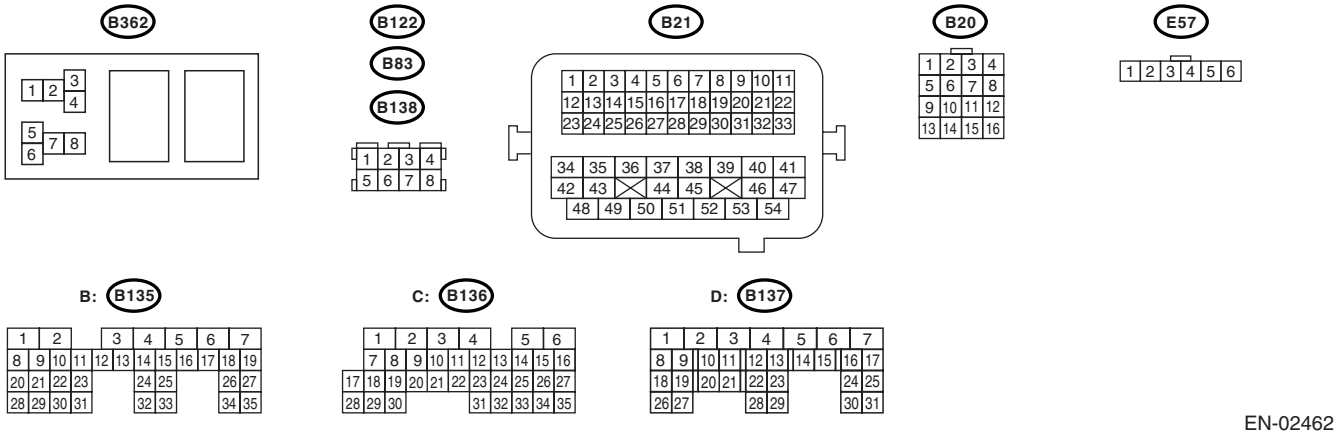
CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model





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• KA and KS model

NOTE:
Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **5.**
3	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **15.**
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit of harness.
7	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>

	Step	Check	Yes	No
8	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **9.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
9	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **10.**	Go to step **12.**
10	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **11.**	Go to step **12.**
11	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit of harness connector.
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **14.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **16.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.

	Step	Check	Yes	No
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **17.**	Repair the short circuit to sensor power supply.
17	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connectors from the electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 6 — (E57) No. 4:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the short circuit of harness.

CO:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" / "E" VOLTAGE RATIONALITY

DTC DETECTING CONDITION:

Immediately at fault recognition.

TROUBLE SYMPTOM:

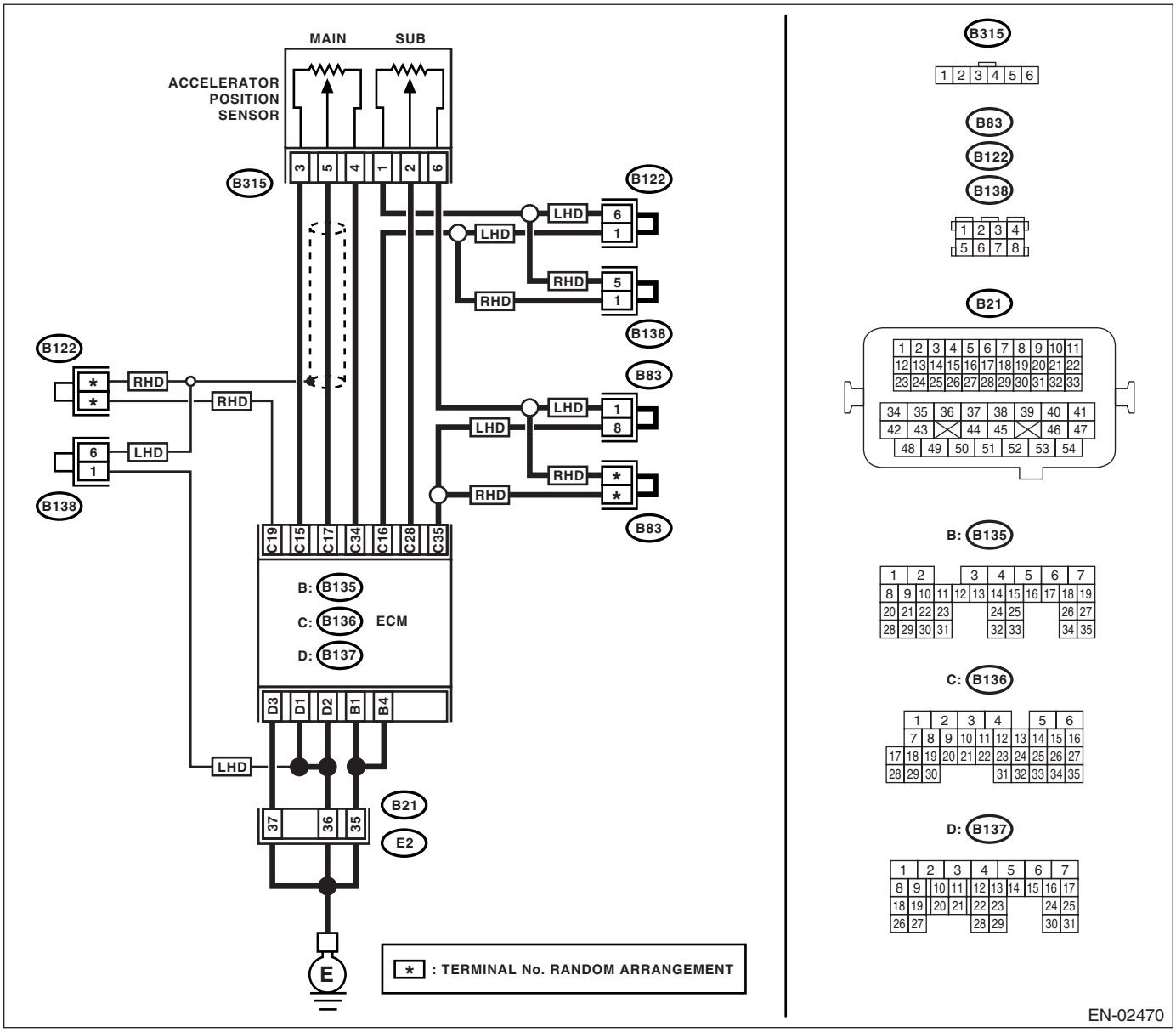
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4SO 2.5)(diag)-41, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4SO 2.5)(diag)-34, Inspection Mode.>.

WIRING DIAGRAM:

- EC, EK and K4 model



- KA and KS model

NOTE:

Fuel injection system for KA and KS model is the same as 2.0 L model. Refer to EN(H4SO 2.0) section.

	Step	Check	Yes	No
1	**CHECK OPTION CODE.**	Is the option code EC, EK or K4?	Go to step **2.**	Refer to EN(H4SO 2.0) section. <Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: Fuel injection system for KA and KS model is the same as 2.0 L model.
2	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **13.**
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **9.**	Replace the accelerator position sensor.
9	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **10.**	Replace the accelerator position sensor.
10	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **11.**	Replace the accelerator position sensor.
11	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **12.**	Replace the accelerator position sensor.
12	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **13.**	Replace the accelerator position sensor.
13	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **14.**	Go to step **15.**
14	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **19.**
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **16.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **17.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (–):*** ***(B315) No. 2 (+) — Engine ground (–):***	Is the voltage less than 6 V?	Go to step **18.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the short circuit to sensor power supply.
19	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between connector terminals of accelerator position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Repair the short circuit in harness between ECM connector and accelerator position sensor connector.

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4SO 2.0)-83, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4)
2. Rough idling	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay 12) EGR valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Mass air flow and intake air temperature sensor 5) EGR valve
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) EGR valve 13) Tumble generator valve
5. Engine stalls, engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Electronic throttle control 9) Fuel pump and fuel pump relay 10) EGR valve 11) Tumble generator valve

Symptom	Problem parts
6. Surge	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay 9) EGR valve 10) Tumble generator valve
7. Spark knock	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) EGR valve 8) Tumble generator valve
8. After burning in exhaust system	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

FUEL INJECTION (FUEL SYSTEMS)

FU(H4DOTC)

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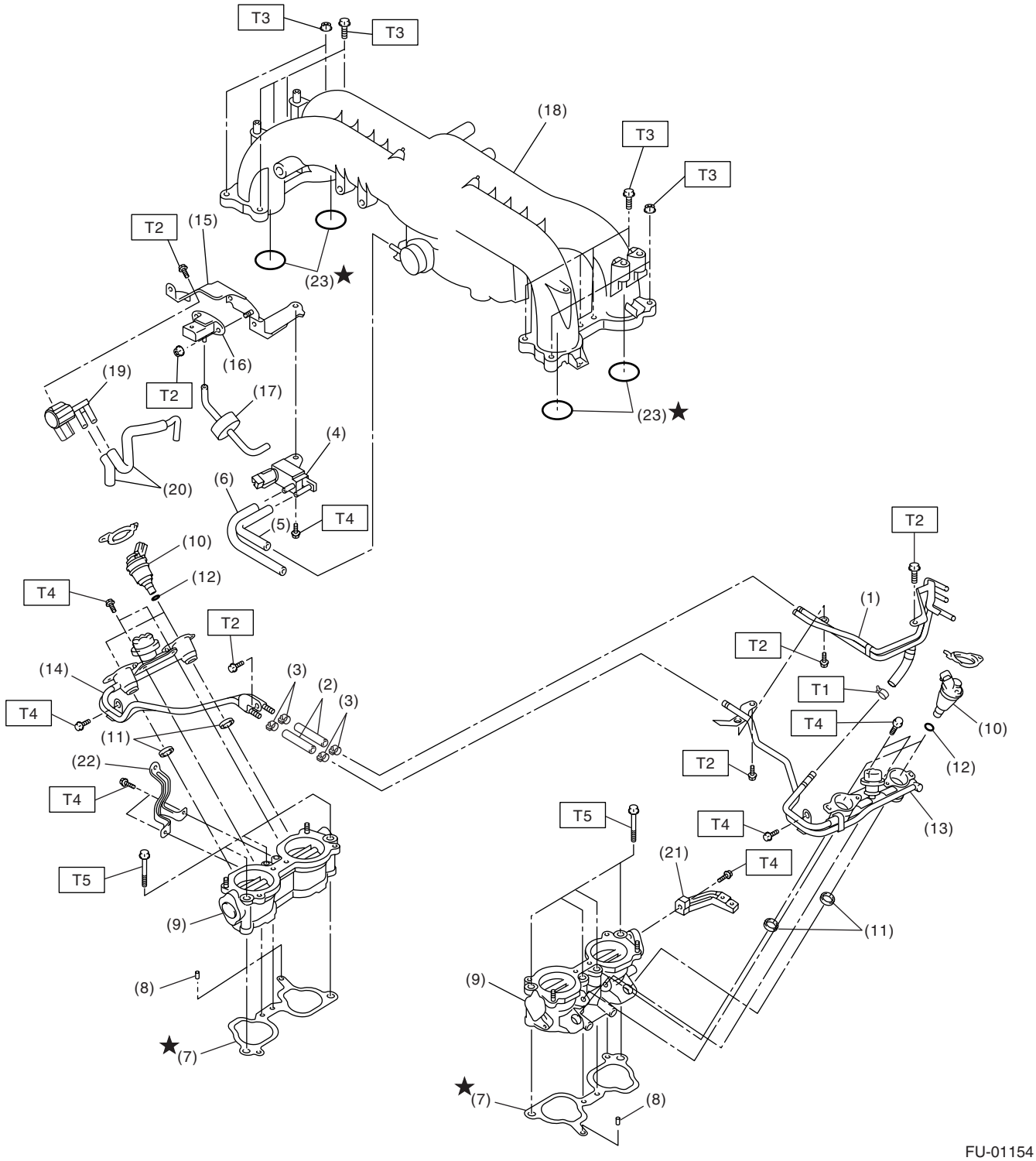
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	550 — 850 kPa (5.61 — 8.67 kg/cm^2, 79.8 — 123.3 psi)
	Discharge	155 ℓ (40.9 US gal, 34.1 Imp gal)/h or more. [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

1. INTAKE MANIFOLD

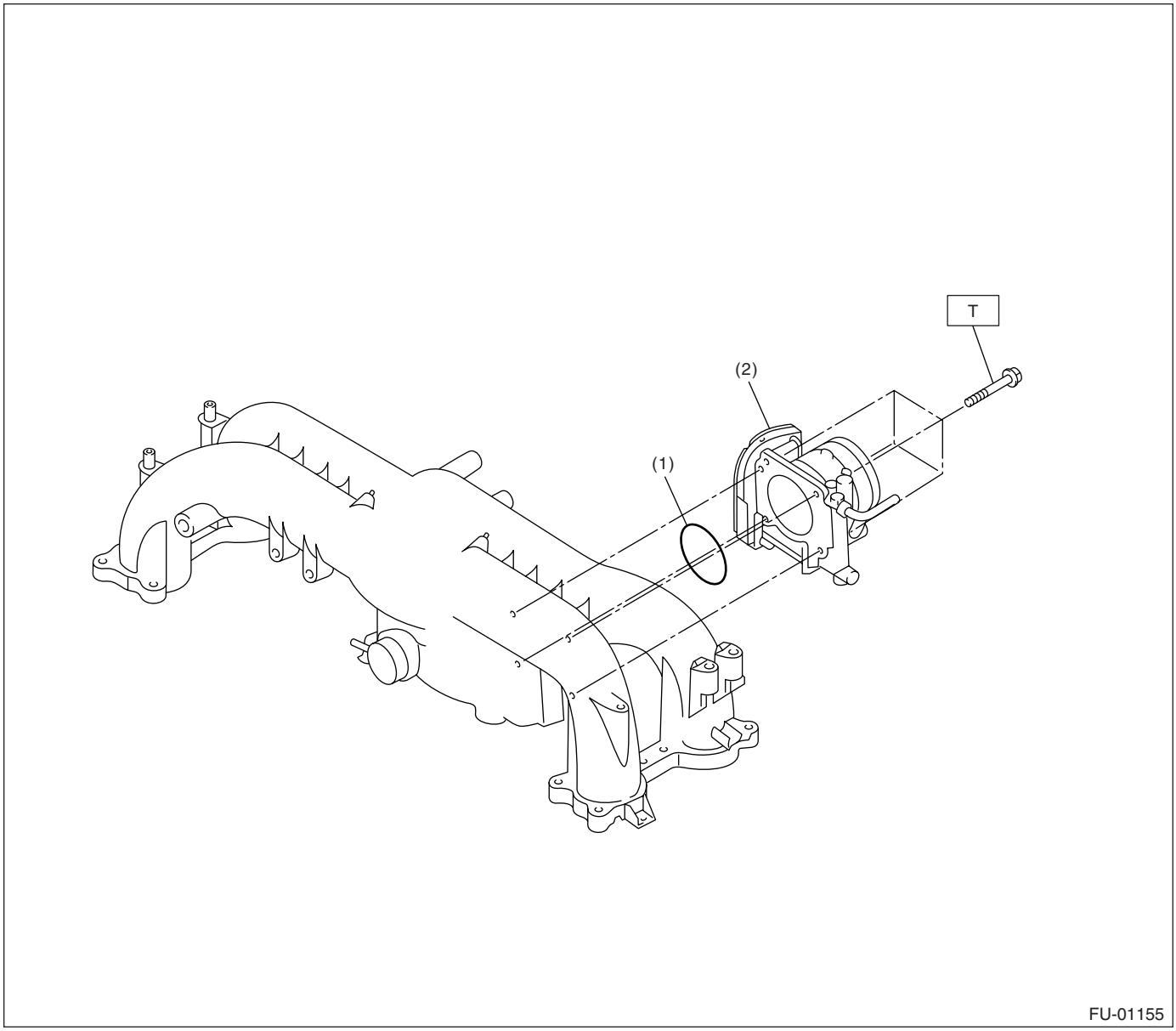


FU-01154

(1) Fuel pipe ASSY
(2) Fuel hose
(3) Clip
(4) Purge control solenoid valve
(5) Vacuum hose
(6) Vacuum control hose
(7) Intake manifold gasket
(8) Guide pin
(9) Intake manifold (lower)
(10) Fuel injector
(11) Seal ring
(12) O-ring
(13) Fuel injector pipe LH
(14) Fuel injector pipe RH
(15) Solenoid valve bracket
(16) Manifold absolute pressure sensor
(17) Filter
(18) Intake manifold
(19) Wastegate control solenoid valve ASSY
(20) Vacuum hose
(21) Ground stay
(22) Coolant filler tank stay
(23) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.5 (0.15, 1.1)
T2: 6.5 (0.66, 4.8)
T3: 8.3 (0.85, 6.1)
T4: 19 (1.94, 13.7)
T5: 25 (2.5, 18.1)

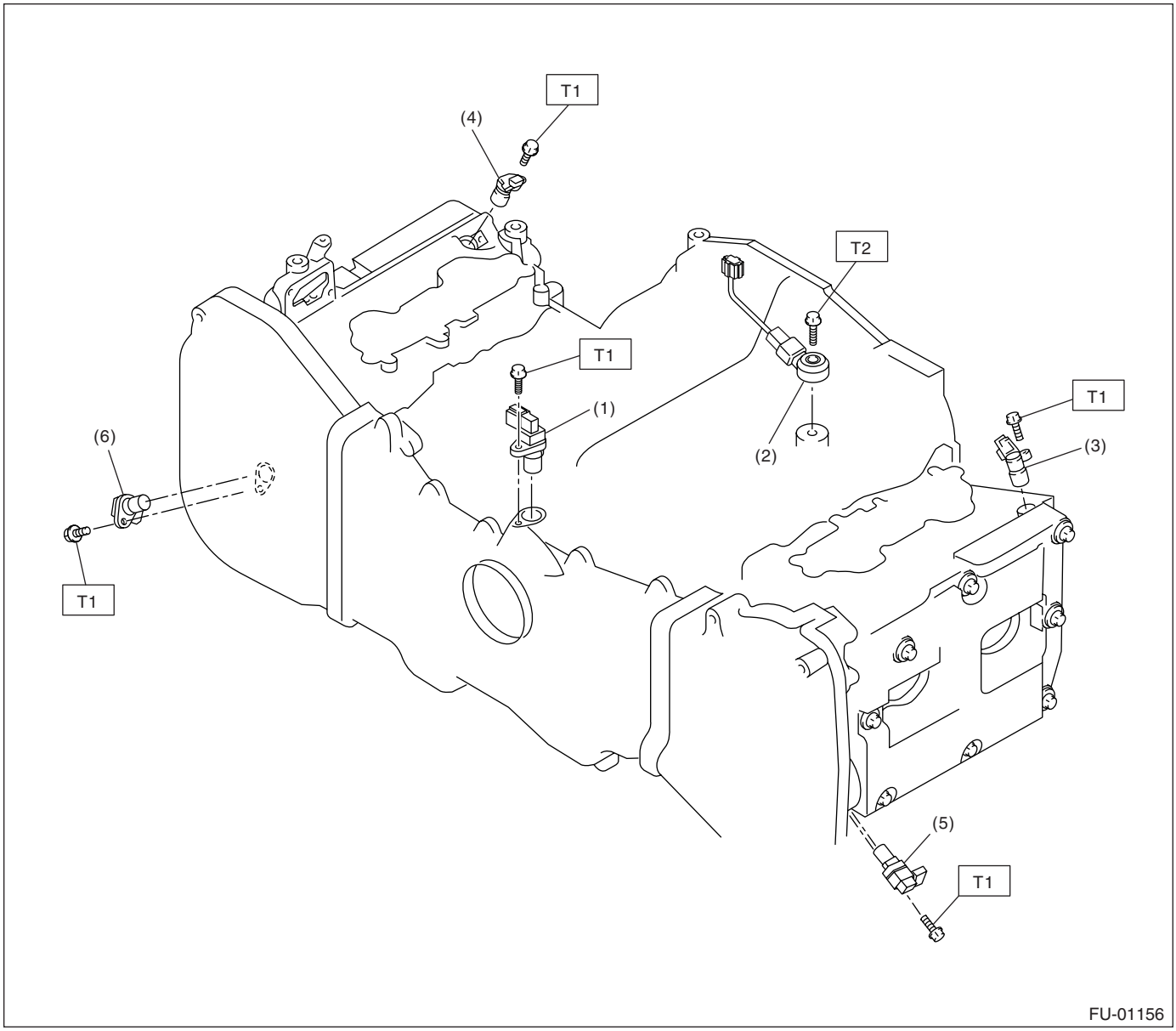
2. AIR INTAKE SYSTEM



(1) O-ring
(2) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)
T: 8 (0.8, 5.9)

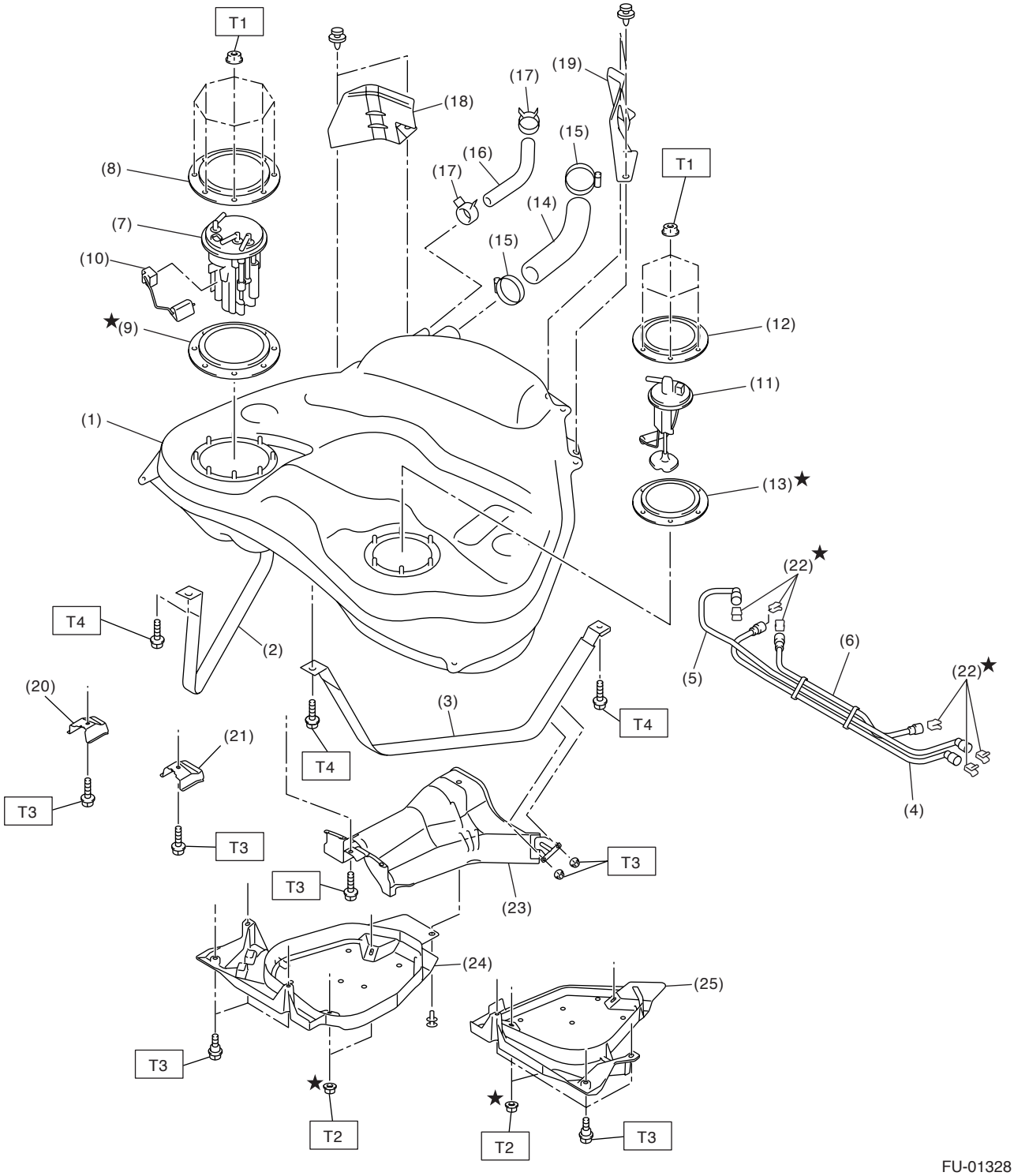
3. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS



(1) Crankshaft position sensor
(2) Knock sensor
(3) Intake camshaft position sensor LH
(4) Intake camshaft position sensor RH
(5) Exhaust camshaft position sensor LH
(6) Exhaust camshaft position sensor RH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 24 (2.4, 17.4)

4. FUEL TANK

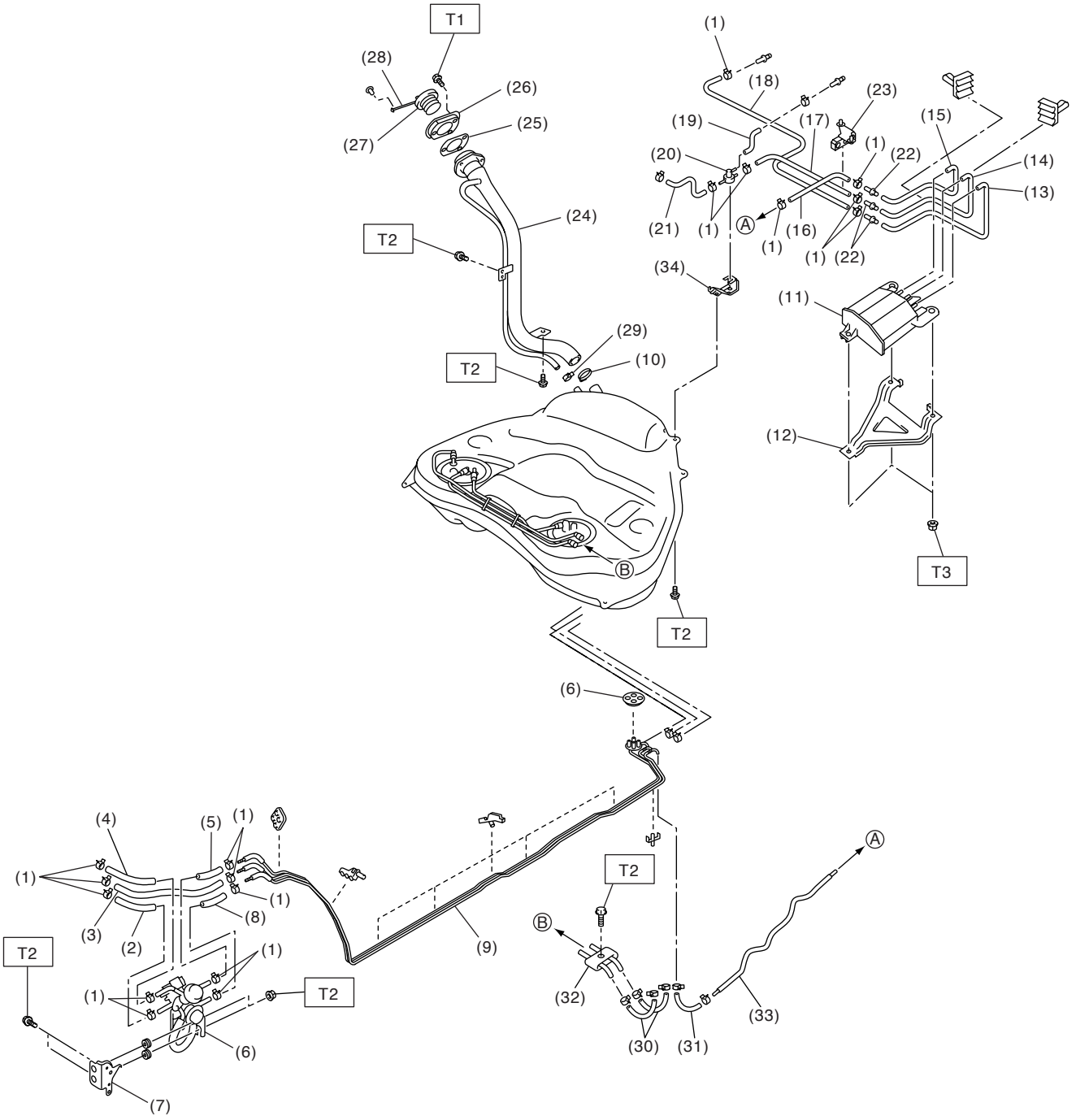


FU-01328

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump ASSY
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Protector RH (Rear)
(19) Protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 9.0 (0.92, 6.6)
T3: 17.5 (1.78, 12.9)
T4: 33 (3.4, 25)

5. FUEL LINE



FU-01329

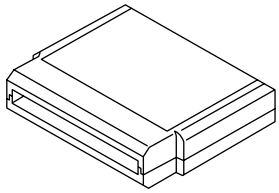
(1) Clip
(2) Fuel return hose A
(3) Evaporation hose
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel bypass valve
(7) Fuel bypass valve bracket
(8) Fuel return hose B
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Fuel hose connector
(33) Purge pipe
(34) Two-way valve bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.2)
T2: 7.5 (0.76, 5.53)
T3: 8.3 (0.85, 6.1)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

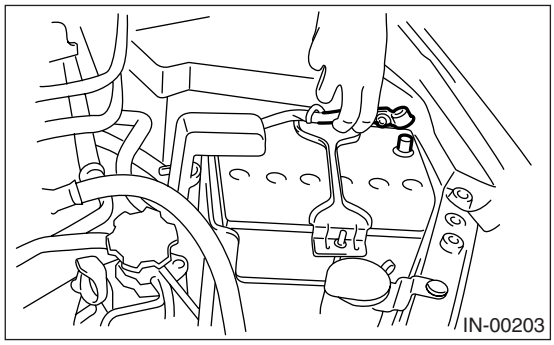
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

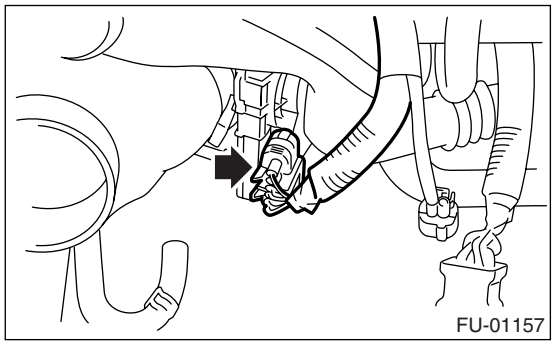
2. Throttle Body

A: REMOVAL

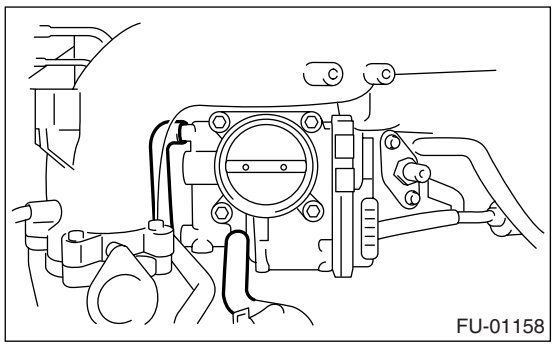
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Disconnect the connectors from throttle position sensor.



5) Disconnect the engine coolant hose from throttle body.



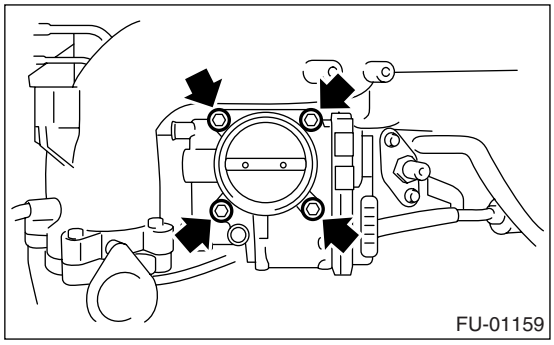
6) Remove the bolts which secure throttle body to intake manifold.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use new O-rings.

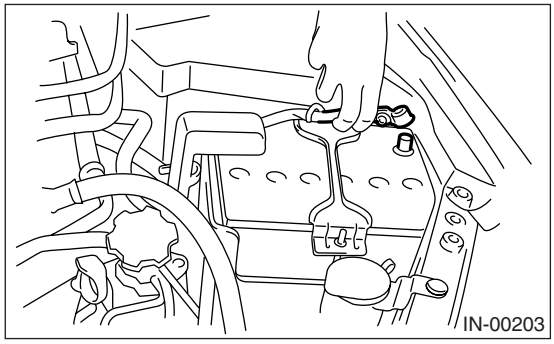
Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



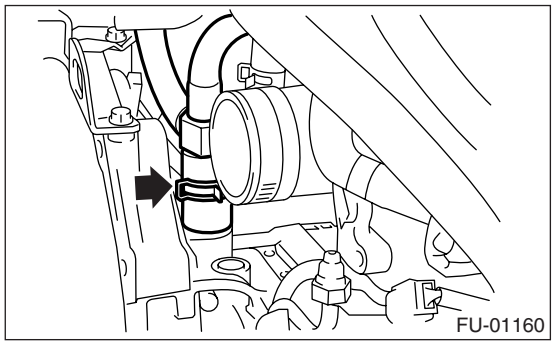
3. Intake Manifold

A: REMOVAL

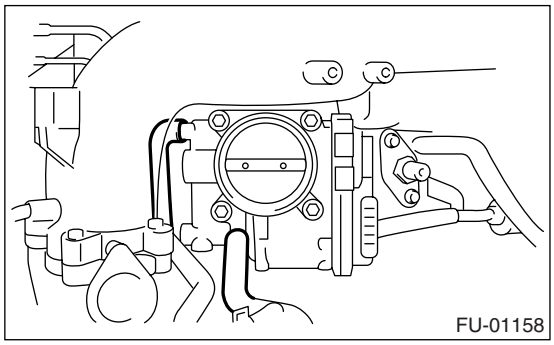
1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the collector cover.
4) Disconnect the ground cable from battery.



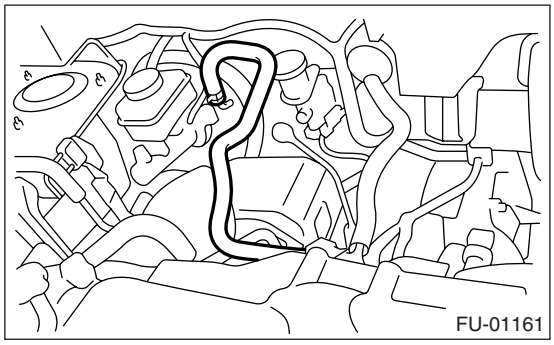
5) Lift-up the vehicle.
6) Remove the under cover.
7) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt).
8) Remove the intake duct from air cleaner case.
9) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
10) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
11) Remove the coolant filler tank.
<Ref. to CO(H4DOTC)-31, REMOVAL, Coolant Filler Tank.>
12) Disconnect the PCV hose assembly from cylinder block.



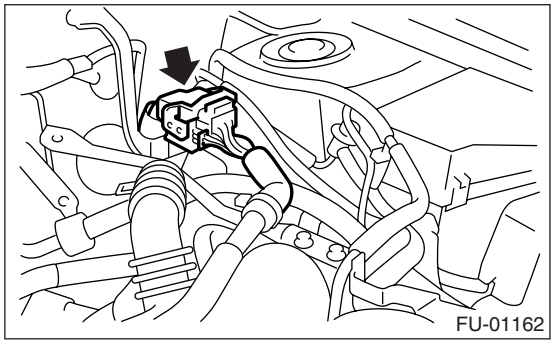
13) Disconnect the engine coolant hose from throttle body.

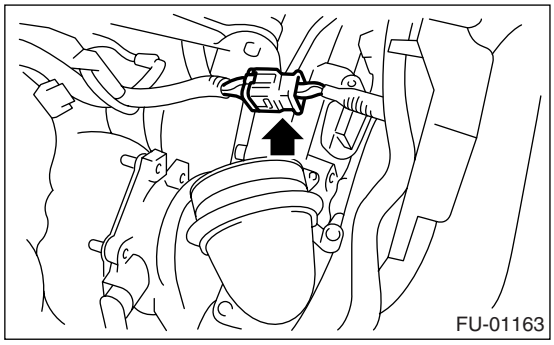


14) Disconnect the brake booster hose.

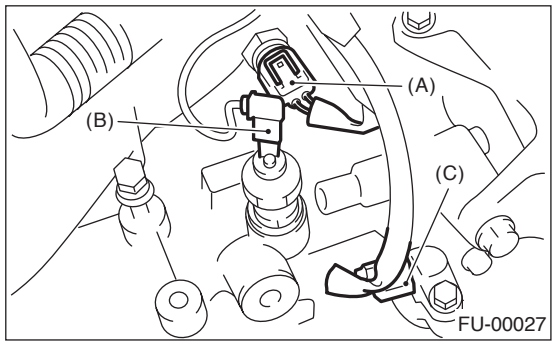


15) Disconnect the engine harness connectors from bulkhead harness connectors.

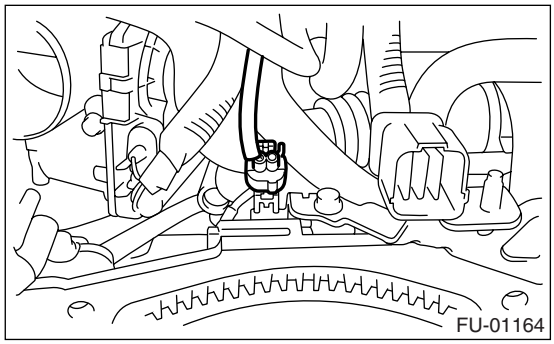




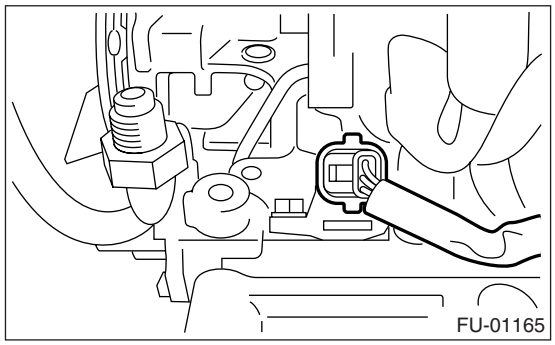
16) Disconnect the connectors from the engine coolant temperature sensor (A), oil pressure switch (B) and crankshaft position sensor (C).



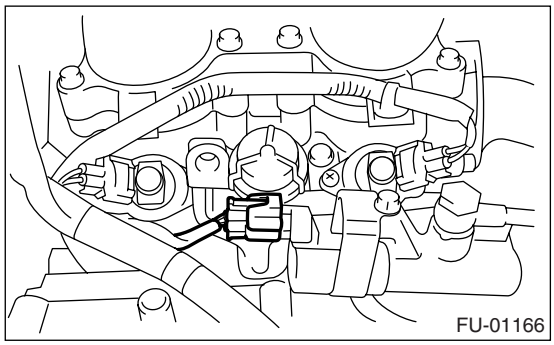
17) Disconnect the knock sensor connector.



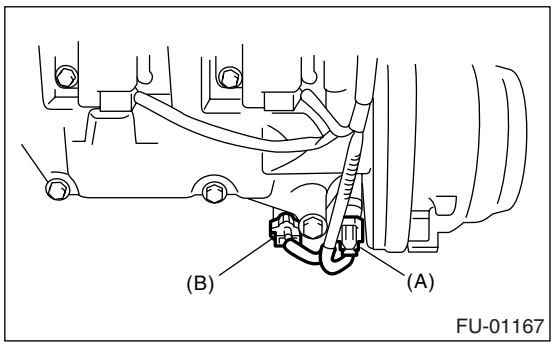
18) Disconnect the connector from intake camshaft position sensor.



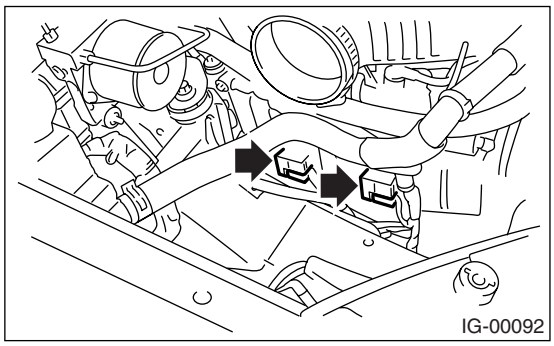
19) Disconnect the connector from the intake oil flow control solenoid valve.



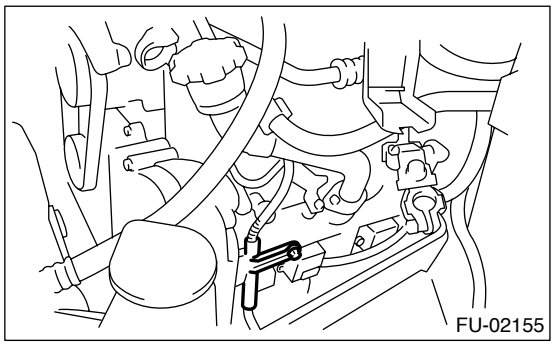
20) Disconnect the connector from the exhaust camshaft position sensor (A) and exhaust oil flow control solenoid valve (B).



21) Disconnect the connector from ignition coil.

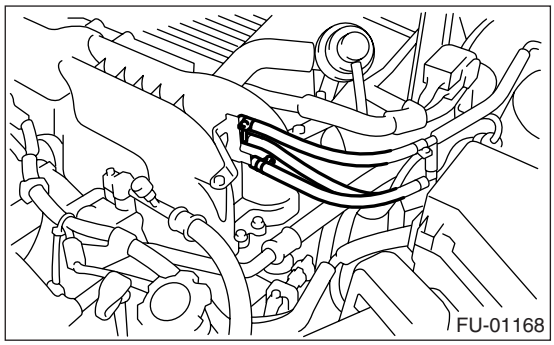


22) Remove the engine harness bracket from rocker cover.

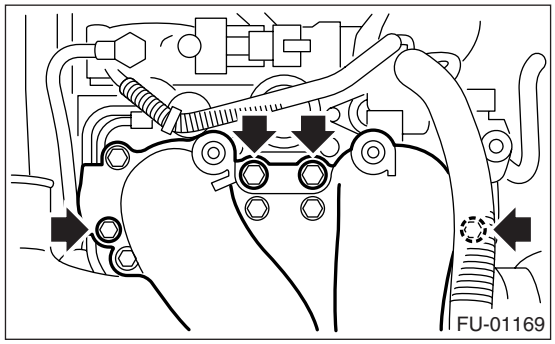


23) Disconnect the fuel delivery hose, return hose and evaporation hose.

CAUTION:
- **Be careful not to spill fuel.**
- **Catch the fuel from hoses using a container or cloth.**



24) Remove the bolts which hold intake manifold onto the cylinder heads.



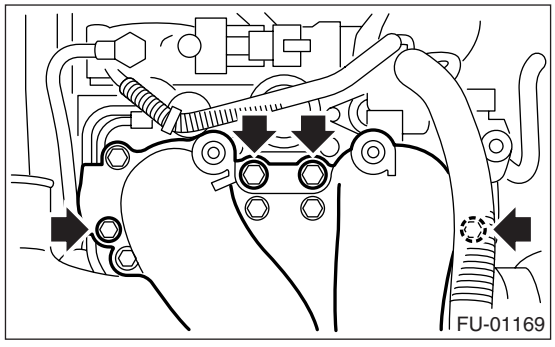
25) Remove the intake manifold.

B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

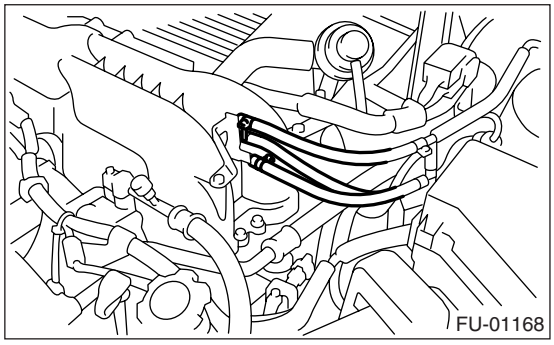
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



2) Connect the fuel delivery hose, return hose and evaporation hose.

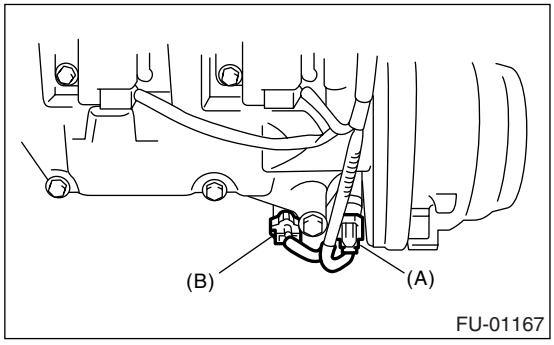
NOTE:
If fuel hoses or clamps are damaged, replace them with new ones.



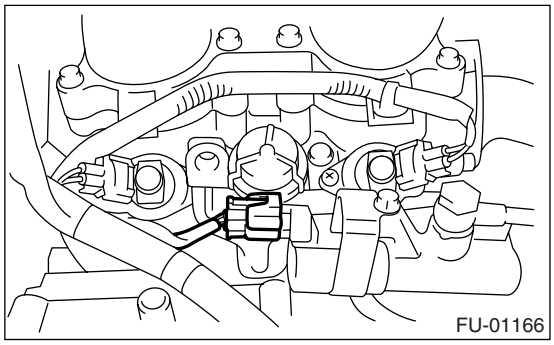
3) Tighten the hose clamp screws.

Tightening torque:
1.25 N·m (0.13 kgf-m, 0.94 ft-lb)

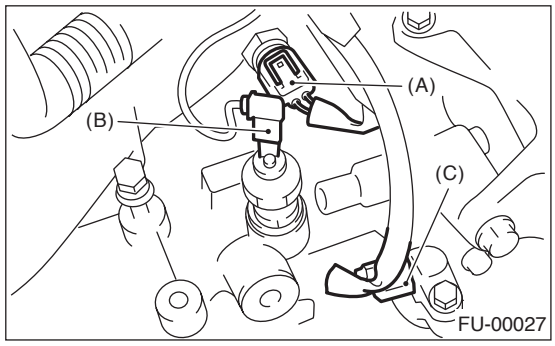
4) Connect the connector to the exhaust camshaft position sensor (A) and exhaust oil flow control solenoid valve (B).



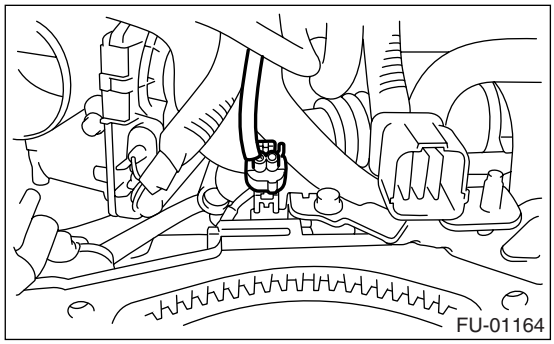
5) Connect the connector to intake oil flow control solenoid valve.



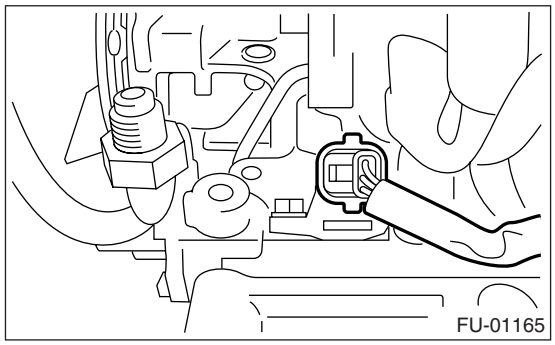
6) Connect the connector to the engine coolant temperature sensor (A), oil pressure switch (B) and crankshaft position sensor (C).



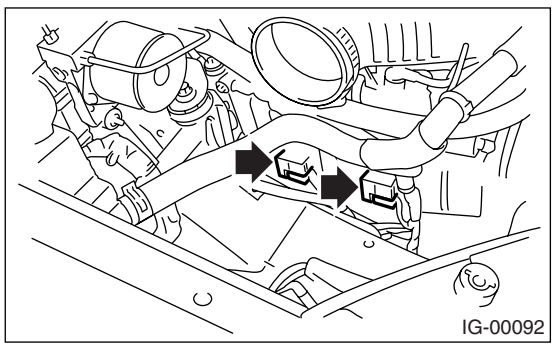
7) Connect the connector to knock sensor.



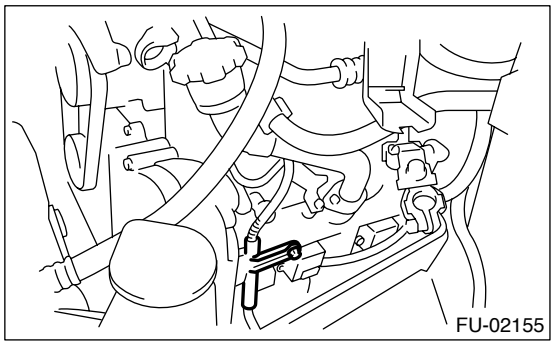
8) Connect the connector to intake camshaft position sensor.



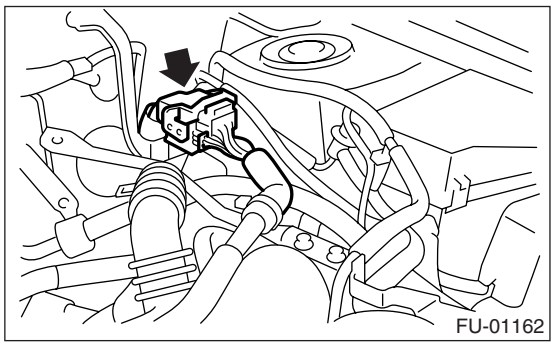
9) Connect the connector to ignition coil.

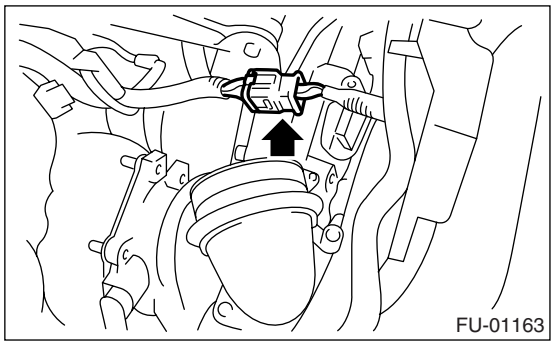


10) Install the engine harness bracket to rocker cover.

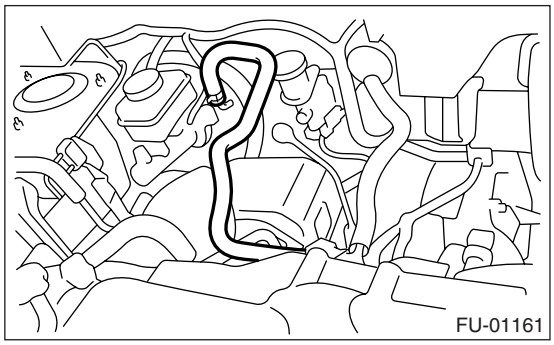


11) Connect the engine harness connector to bulkhead harness connector.

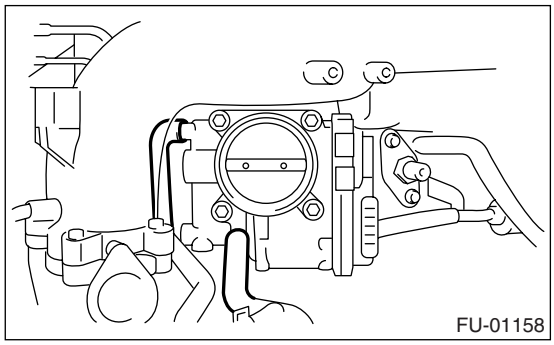




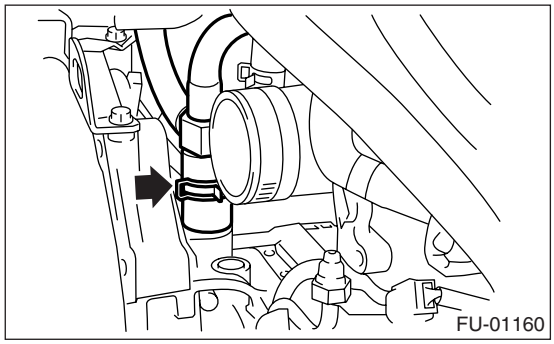
12) Connect the brake booster hose.



13) Connect the engine coolant hose to throttle body.



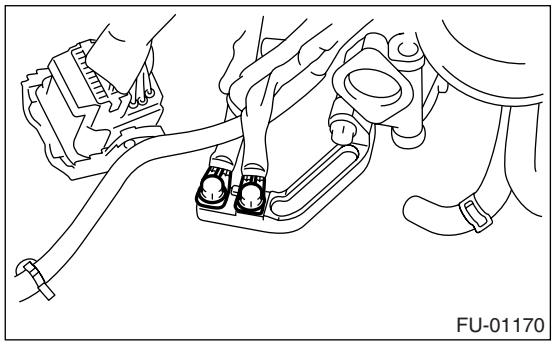
14) Connect the PCV hose assembly to cylinder block.



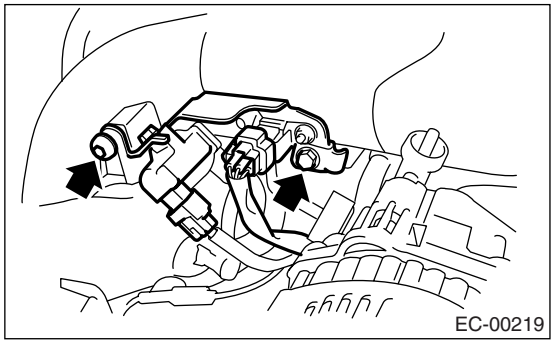
15) Install the coolant filler tank.
<Ref. to CO(H4DOTC)-31, INSTALLATION, Coolant Filler Tank.>
16) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
17) Install the intake duct to air cleaner case.
18) Install the fuse of fuel pump to main fuse box.
19) Connect the battery ground cable to battery.
20) Lift-up the vehicle.
21) Install the under cover.
22) Fill with engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
23) Install the collector cover.

C: DISASSEMBLY

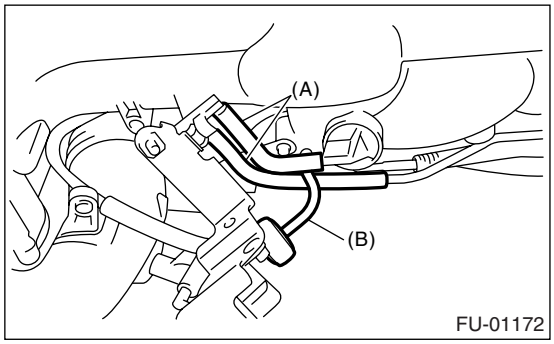
1) Disconnect the engine ground terminal from ground stay.



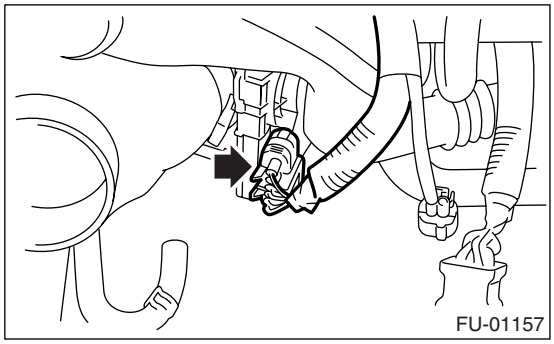
2) Remove the solenoid valve bracket assembly from intake manifold, and disconnect the connector from the wastegate control solenoid valve, manifold absolute pressure sensor and purge control solenoid valve.



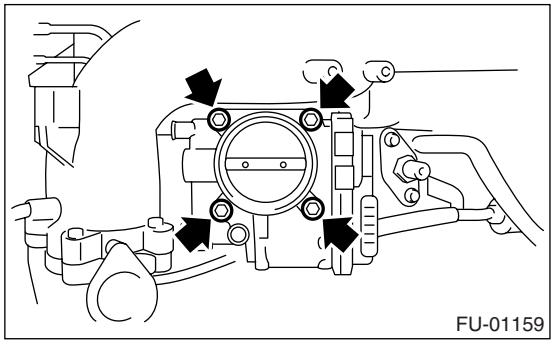
3) Disconnect the evaporation hoses (A) and filter assembly (B).



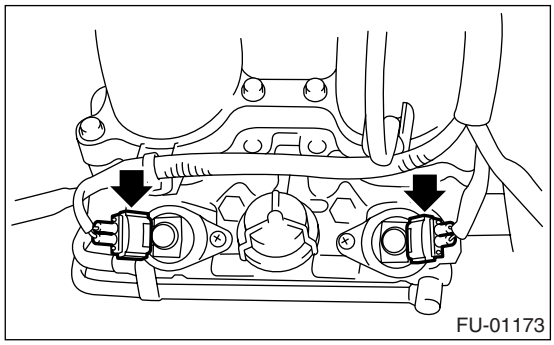
4) Disconnect the connectors from throttle position sensor.



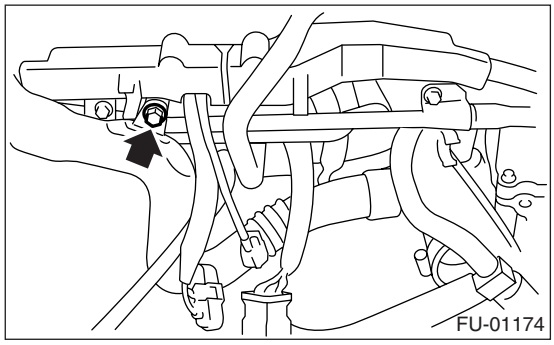
5) Remove the throttle body from intake manifold.



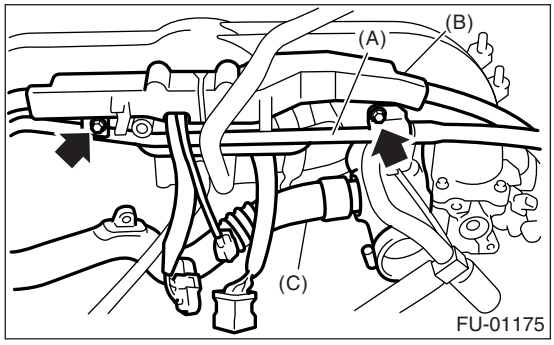
6) Disconnect the connectors from fuel injector.



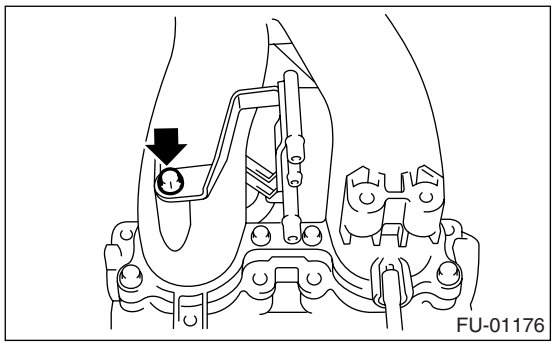
7) Remove the bolt which secures the air bypass pipe to intake manifold.



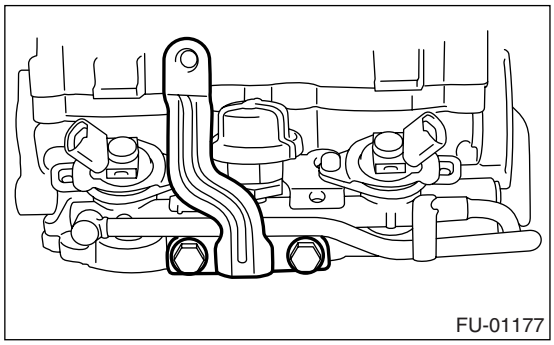
8) Disconnect the PCV pipe (A), harness assembly (B) and intake duct (C) from intake manifold.



9) Remove the bolt which holds fuel injector pipe LH onto the front side of intake manifold.

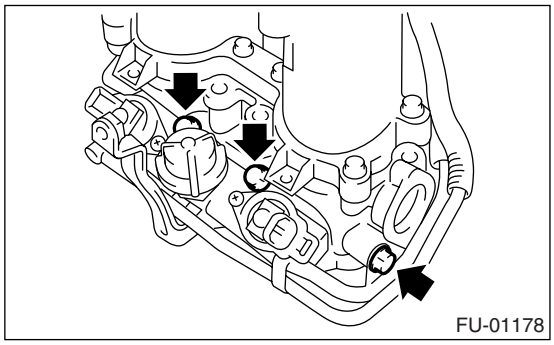


10) Remove the coolant filler tank stay from intake manifold.

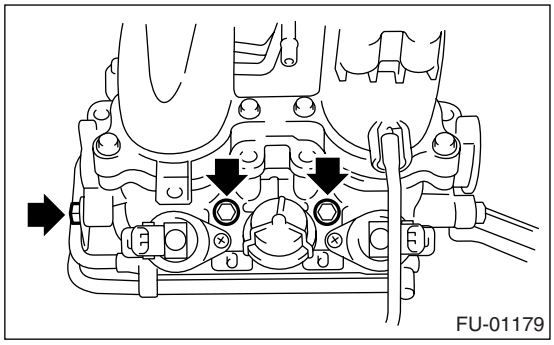


11) Remove the bolts which hold fuel injector pipe onto intake manifold.

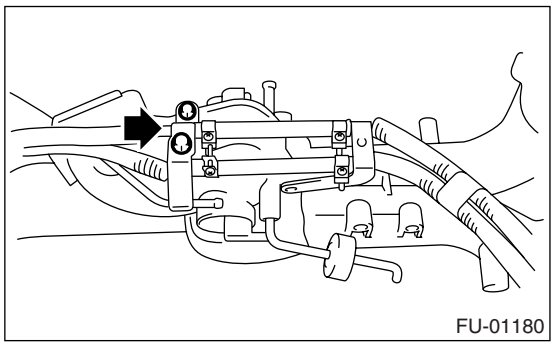
- RH side



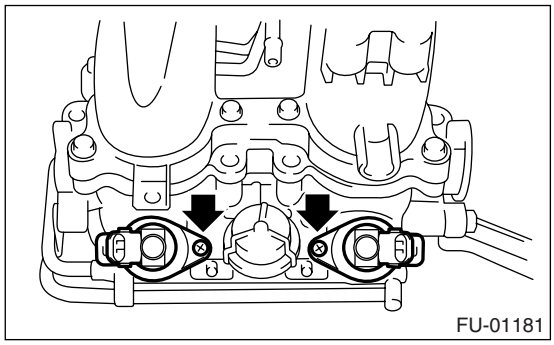
- LH side



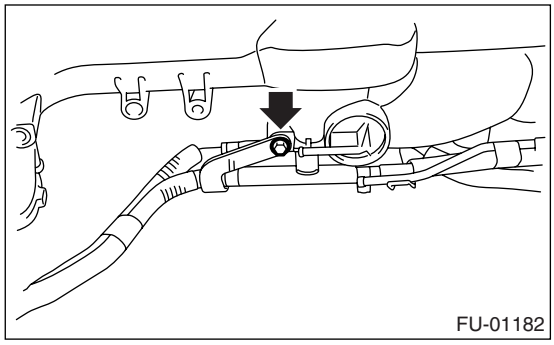
12) Remove the bolt which holds the fuel pipe to intake manifold.



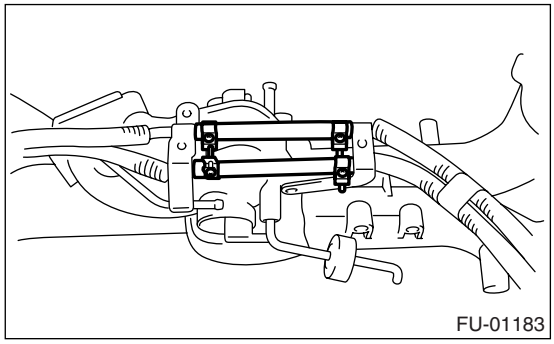
13) Remove the fuel injectors.



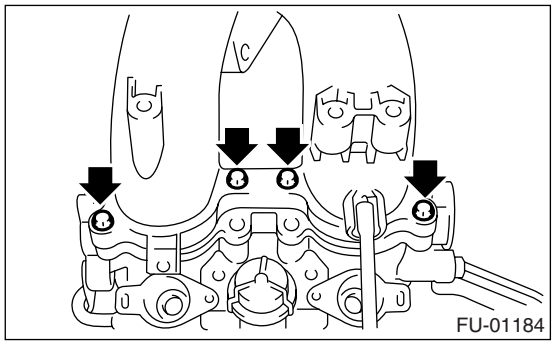
14) Remove the bolts which hold the fuel injector pipe RH onto the lower side of intake manifold.



15) Loosen the clamp which holds fuel hose to injector pipe, and then disconnect the pipe from fuel hose.



16) Remove the fuel injector pipe.
17) Remove the intake manifold (upper) from intake manifold (lower).

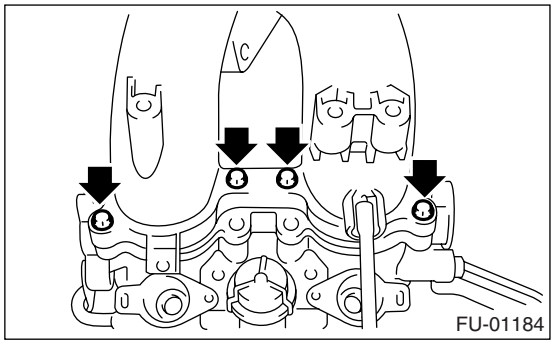


D: ASSEMBLY

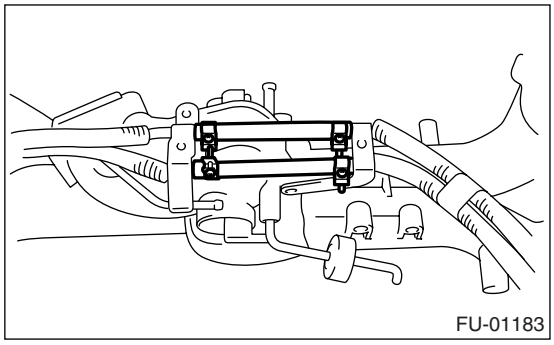
1) Install the intake manifold (lower) to intake manifold (upper).

NOTE:
Use new O-rings.

Tightening torque:
8.3 N·m (0.85 kgf-m, 6.1 ft-lb)

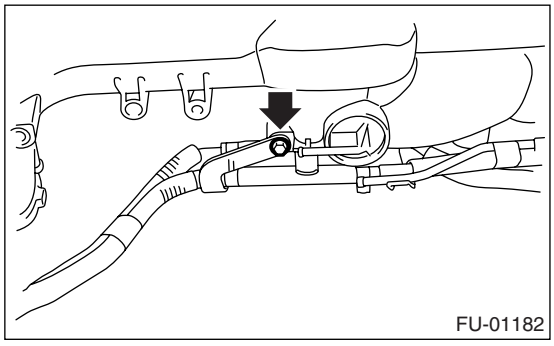


2) Install the fuel injector pipe.
3) Connect the both fuel injector pipes with a fuel hose and secure them with clamps.

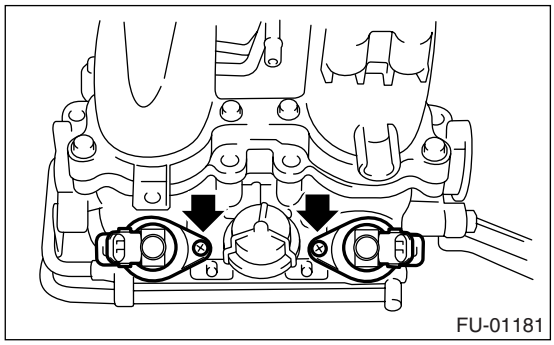


4) Tighten the bolt which secures the fuel injector pipe RH onto the lower side of intake manifold.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

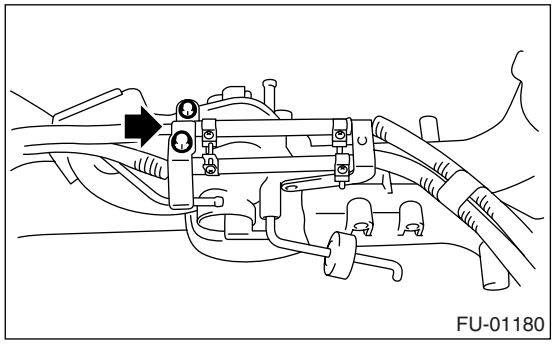


5) Install the fuel injectors.



6) Tighten the bolt which secures fuel pipe onto intake manifold.

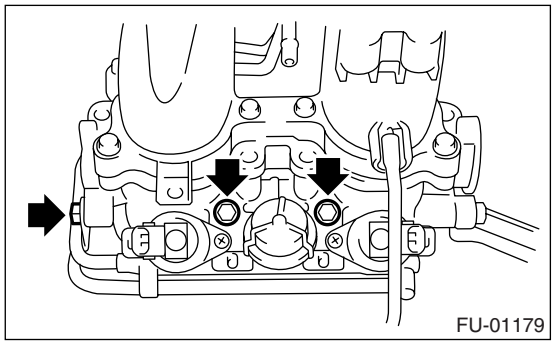
Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



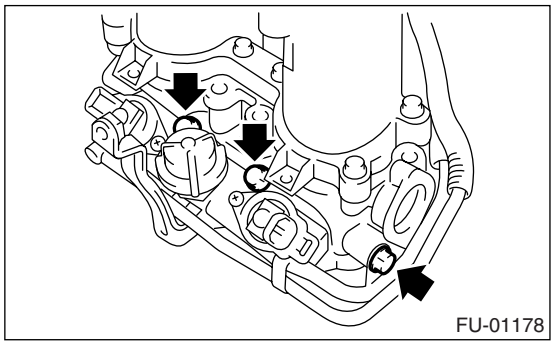
7) Tighten the bolts which secure fuel injector pipe onto intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)

- LH side

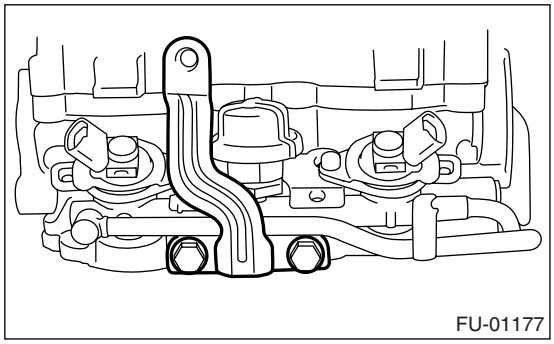


- RH side



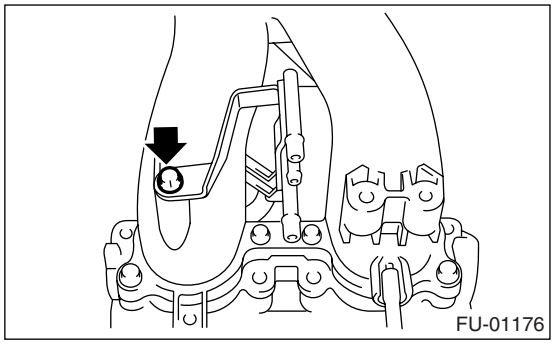
8) Install the coolant filler tank stay to intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



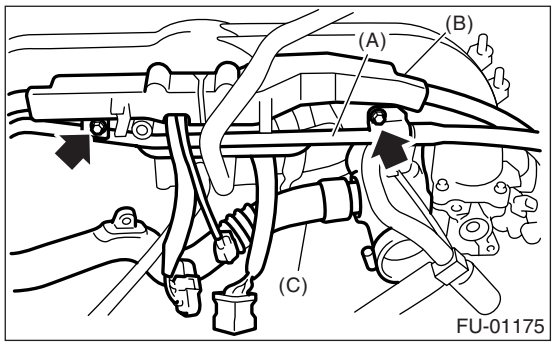
9) Tighten the bolt which installs fuel injector pipe LH on the front side of intake manifold.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



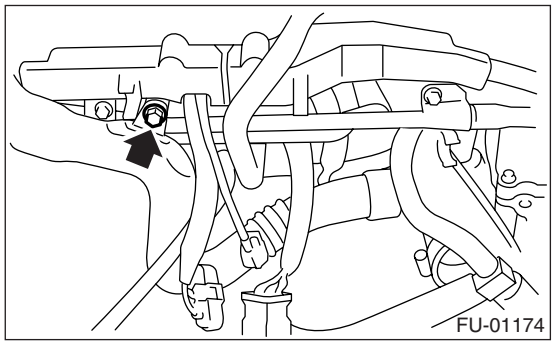
10) Install the PCV pipe (A), harness assembly (B) and intake duct (C) to intake manifold.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

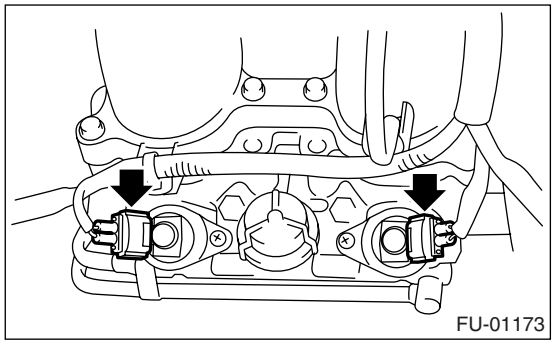


11) Tighten the bolt which secures air bypass pipe onto intake manifold.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



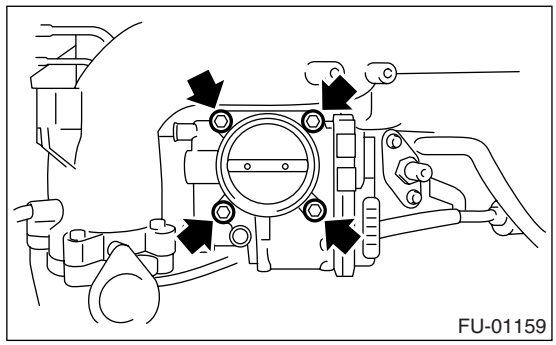
12) Connect the connectors to fuel injector.



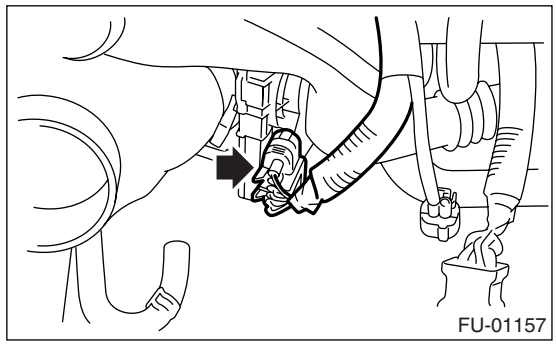
13) Install the throttle body to intake manifold.

NOTE:
Use new O-rings.

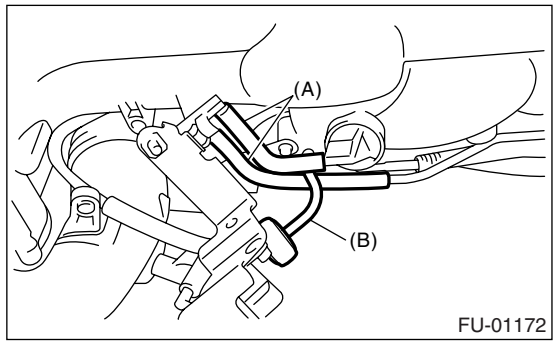
Tightening torque:
8 N·m (0.8 kgf-m, 5.9 ft-lb)



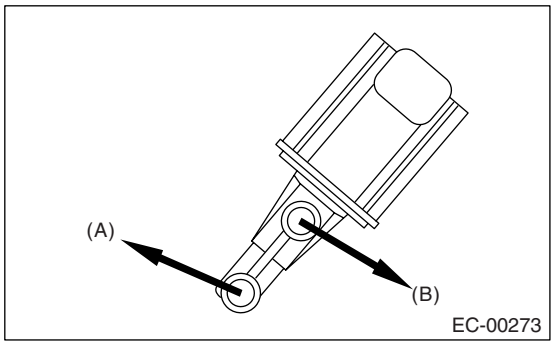
14) Connect the connector to throttle position sensor.



15) Connect the evaporation hoses (A) and filter assembly (B).



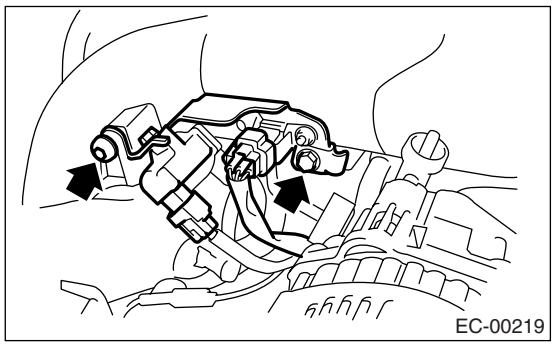
NOTE:
Connect the evaporation hose as shown in the figure.



(A) To intake manifold
(B) To evaporation pipe

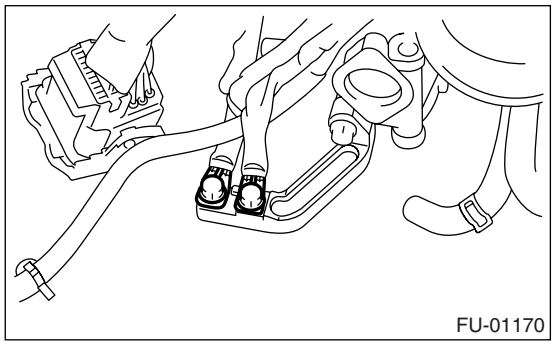
16) Connect the connector to the wastegate control solenoid valve, manifold absolute pressure sensor and purge control solenoid valve, and install the solenoid bracket assembly to intake manifold.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



17) Install the engine ground terminal to ground stay.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



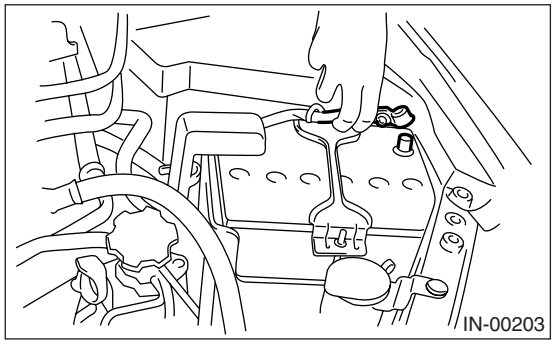
E: INSPECTION

Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

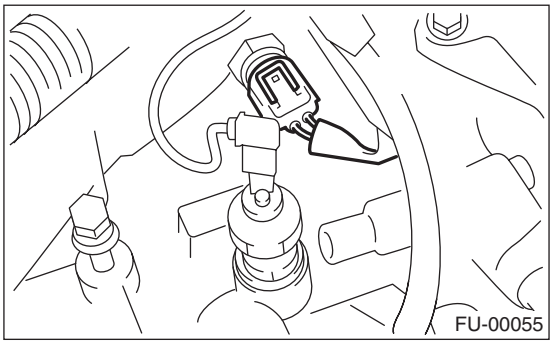
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
4) Drain coolant. <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
5) Disconnect the connectors from engine coolant temperature sensor.



6) Remove the engine coolant temperature sensor.

B: INSTALLATION

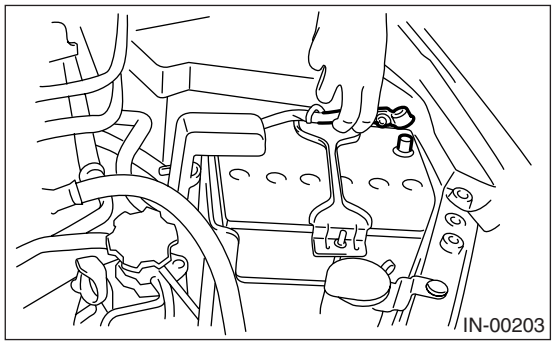
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

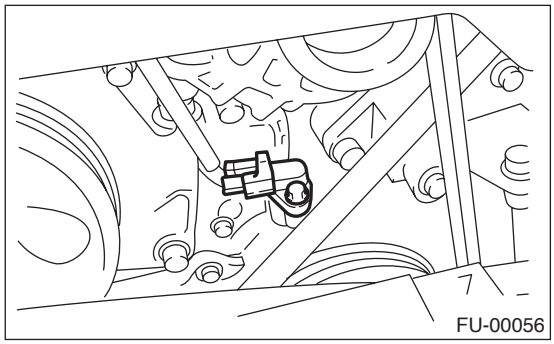
5. Crankshaft Position Sensor

A: REMOVAL

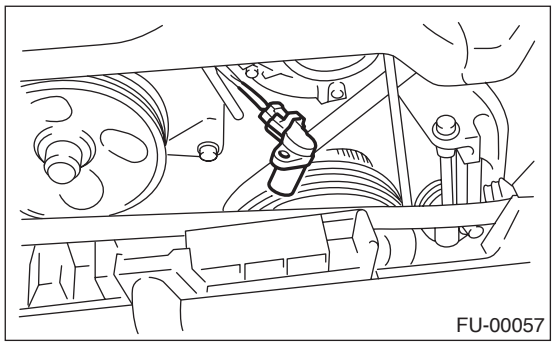
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the bolt which installs crankshaft position sensor to cylinder block.



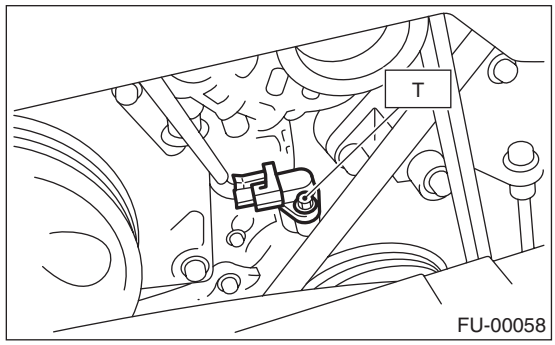
4) Remove the crankshaft position sensor, and disconnect the connector from it.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
T: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

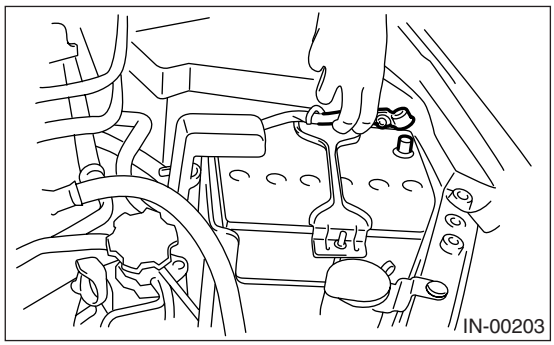


6. Camshaft Position Sensor

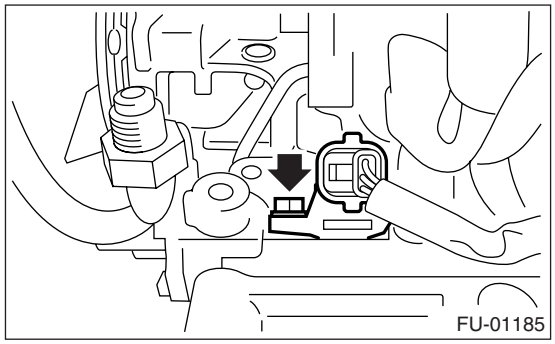
A: REMOVAL

1. INTAKE SIDE

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



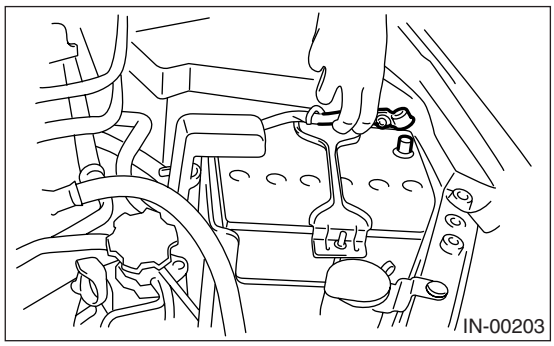
3) Disconnect the connector from camshaft position sensor RH.
4) Remove the camshaft position sensor RH from the rear side of cylinder head.



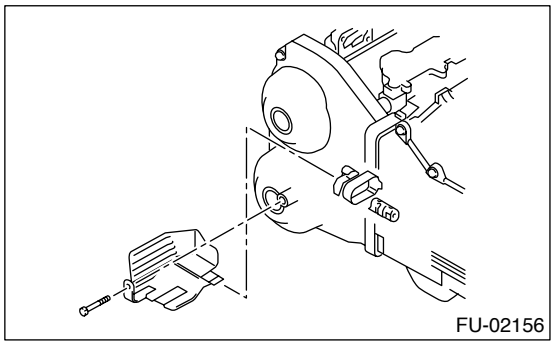
5) Remove the camshaft position sensor LH in the same procedure as RH.

2. EXHAUST SIDE

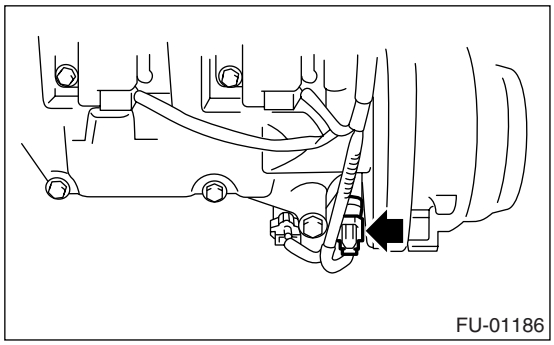
1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Remove the under cover.
4) Remove the sensor cover.



5) Disconnect the connector from camshaft position sensor RH.
6) Remove the camshaft position sensor RH from the lower side of cylinder head.



7) Remove the camshaft position sensor LH in the same procedure as RH.

B: INSTALLATION

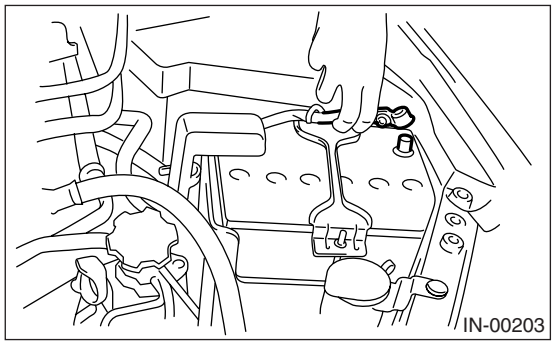
Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

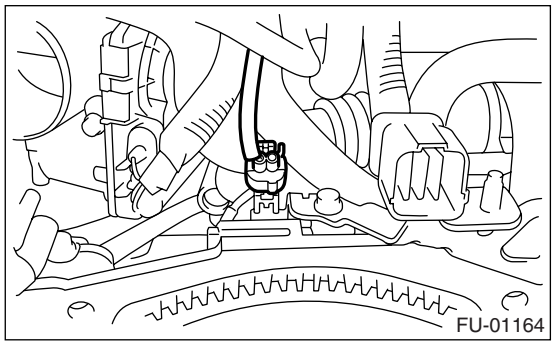
7. Knock Sensor

A: REMOVAL

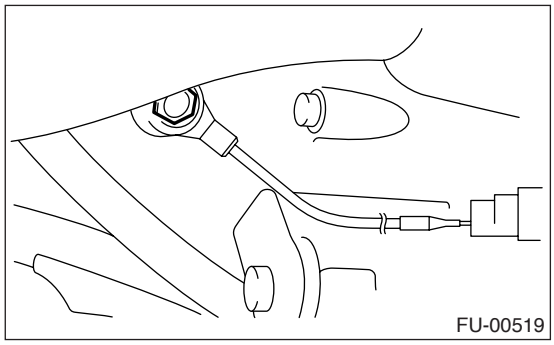
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Disconnect the knock sensor connector.



5) Remove the knock sensor from cylinder block.

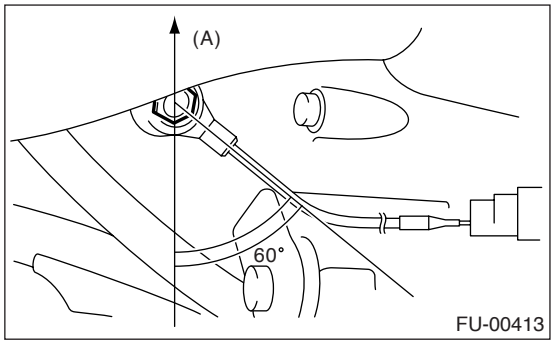


B: INSTALLATION

1) Install the knock sensor to cylinder block.

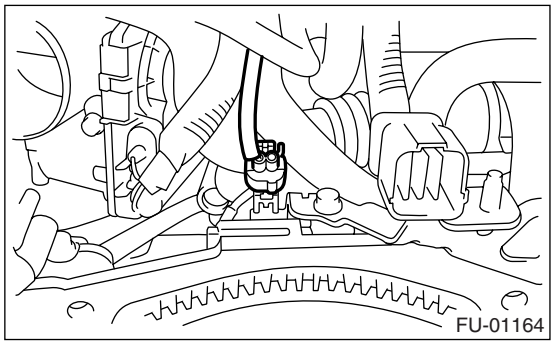
NOTE:
Extraction area of knock sensor cord must be positioned at a 60° angle relative to the engine rear.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

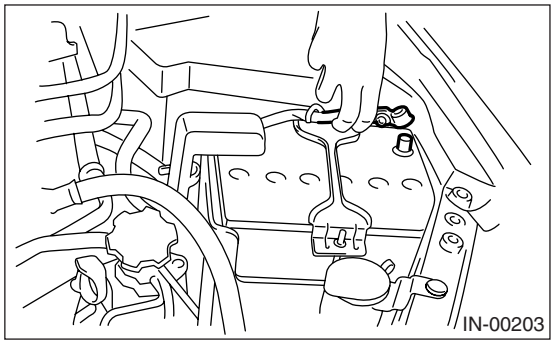


(A) Front side

2) Connect the knock sensor connector.



3) Install the intercooler.
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Connect the battery ground cable to battery.



5) Install the collector cover.

8. Throttle Position Sensor

A: SPECIFICATION

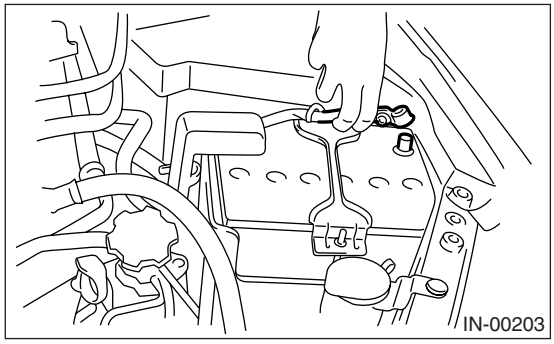
Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body.

Refer to “Throttle Body” for removal and installation. <Ref. to FU(H4DOTC)-12, REMOVAL, Throttle Body.> <Ref. to FU(H4DOTC)-12, INSTALLATION, Throttle Body.>

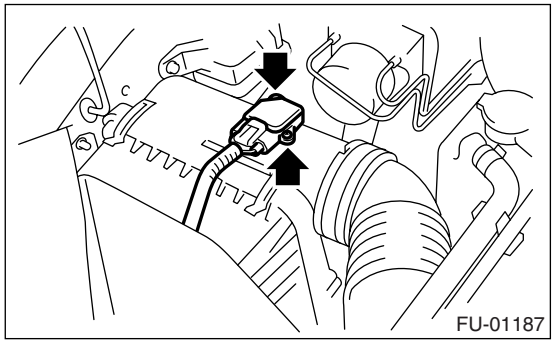
9. Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.
3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

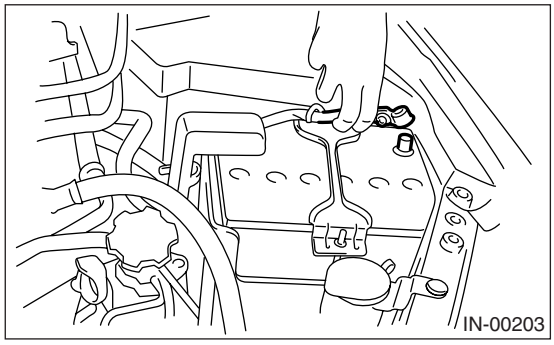
Install in the reverse order of removal.

Tightening torque:
1.0 N·m (0.10 kgf-m, 0.74 ft-lb)

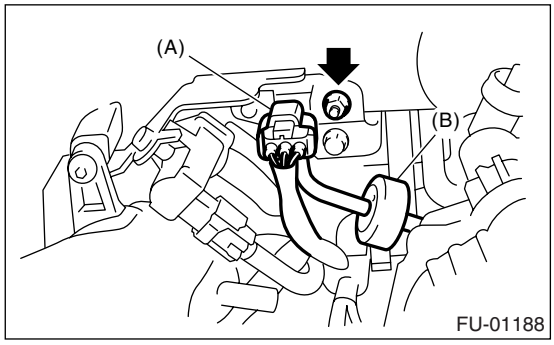
10. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Disconnect the connector from manifold absolute pressure sensor (A), and remove the filter assembly (B) from intake manifold.
4) Remove the manifold absolute pressure sensor from solenoid valve bracket.



B: INSTALLATION

Install in the reverse order of removal.

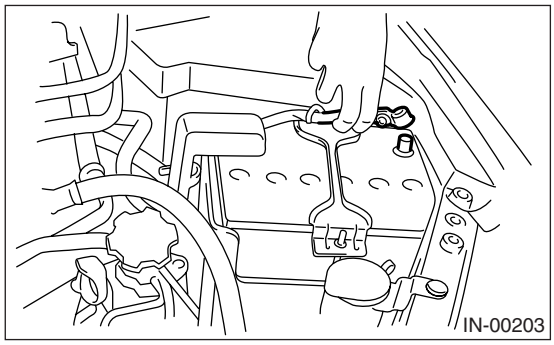
Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

11.Fuel Injector

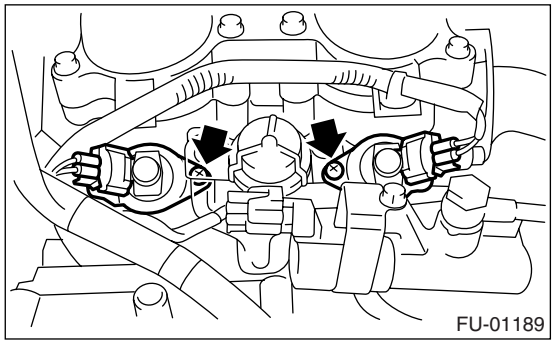
A: REMOVAL

1. RH SIDE

1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the collector cover.
4) Disconnect the ground cable from battery.

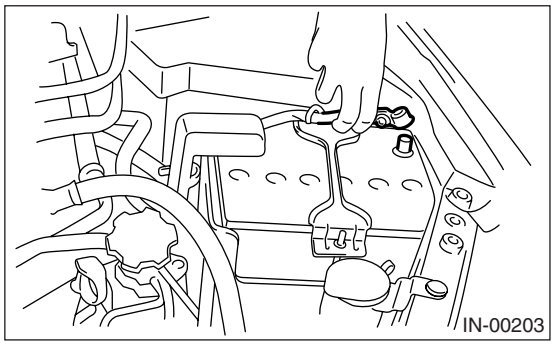


5) Remove the coolant filler tank.
<Ref. to CO(H4DOTC)-31, REMOVAL, Coolant Filler Tank.>
6) Disconnect the connector from fuel injector.
7) Remove the screw and remove the fuel injector.

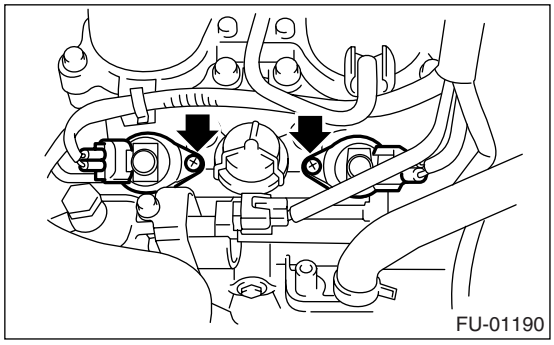


2. LH SIDE

1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Remove the collector cover.
4) Disconnect the ground cable from battery.



5) Disconnect the connector from fuel injector.
6) Remove the screw and remove the fuel injector.



B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

NOTE:
Use new O-rings.

Tightening torque:
3.5 N·m (0.36 kgf-m, 2.6 ft-lb)

2. LH SIDE

Install in the reverse order of removal.

NOTE:
Use new O-rings.

Tightening torque:
3.5 N·m (0.36 kgf-m, 2.6 ft-lb)

12. Oil Flow Control Solenoid Valve

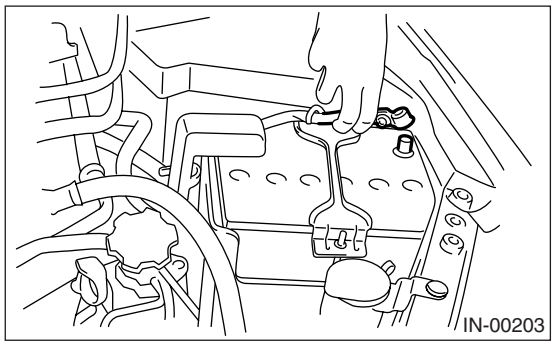
A: REMOVAL

1. INTAKE SIDE

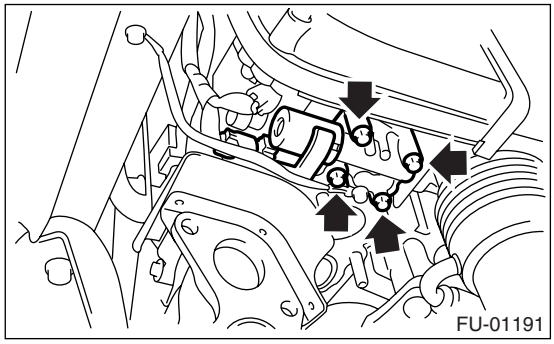
Oil flow control solenoid valve forms a unit with camshaft cap.
Refer to “Camshaft” for removal. <Ref. to ME(H4DOTC)-53, REMOVAL, Camshaft.>

2. EXHAUST SIDE

1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Remove the under cover.
4) Remove the oil flow control solenoid valve from cylinder head.



B: INSTALLATION

1. INTAKE SIDE

Install in the reverse order of removal.

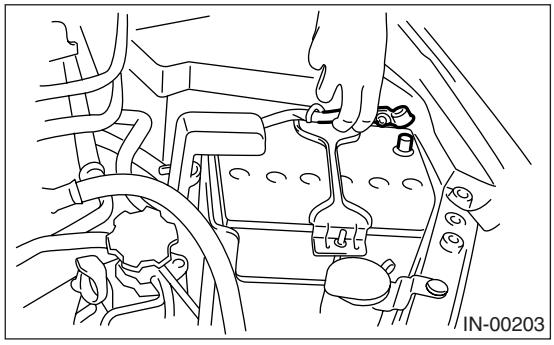
2. EXHAUST SIDE

Install in the reverse order of removal.

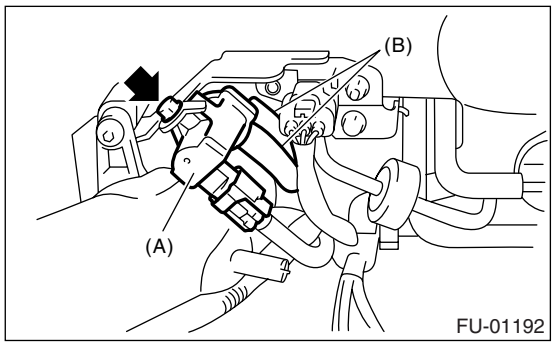
13. Wastegate Control Solenoid Valve

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Disconnect the connector from wastegate control solenoid valve (A).
4) Disconnect the pressure hose (B) from wastegate control solenoid valve.
5) Remove the wastegate control solenoid valve from bracket.



B: INSTALLATION

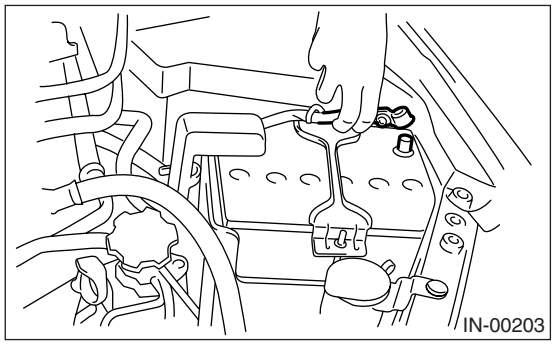
Install in the reverse order of removal.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)

14.Front Oxygen (A/F) Sensor

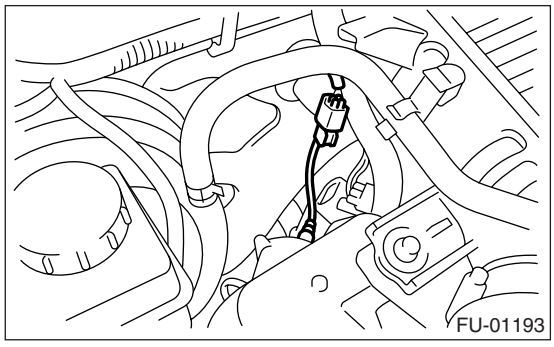
A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Disconnect the connector from front oxygen (A/F) sensor.
4) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
5) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



B: INSTALLATION

1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

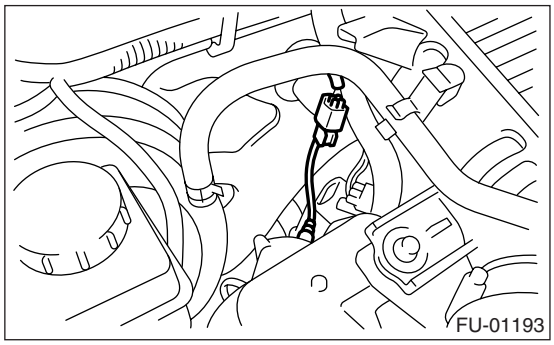
Anti-seize compound:
SS-30 JET LUBE

CAUTION:
Never apply anti-seize compound to protector of front oxygen (A/F) sensor.

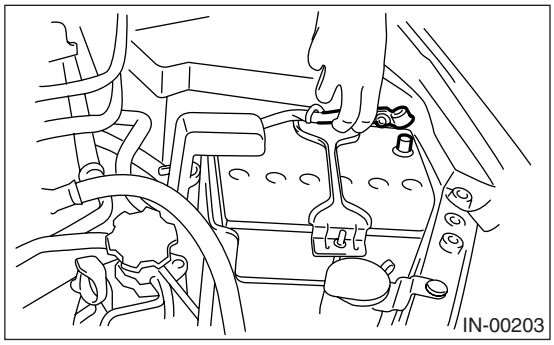
2) Install the front oxygen (A/F) sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

3) Connect the connector of front oxygen (A/F) sensor.



4) Connect the battery ground cable to battery.

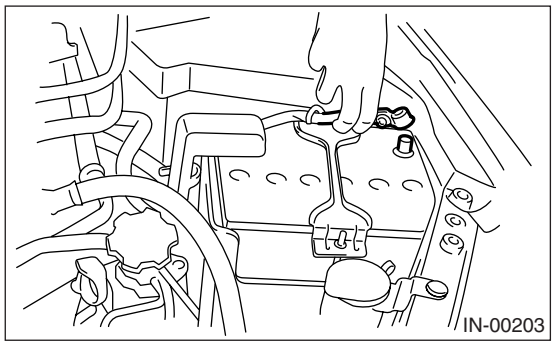


5) Install the collector cover.

15.Rear Oxygen Sensor

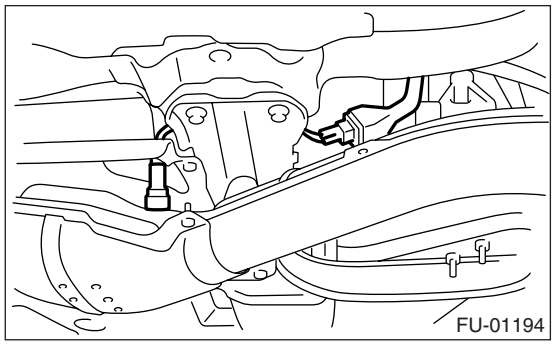
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Lift-up the vehicle.
3) Disconnect the connector from rear oxygen sensor.
4) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
5) Remove the rear oxygen sensor.

CAUTION:
When removing the rear oxygen sensor, wait until exhaust pipe cools, otherwise it will damage exhaust pipe.



B: INSTALLATION

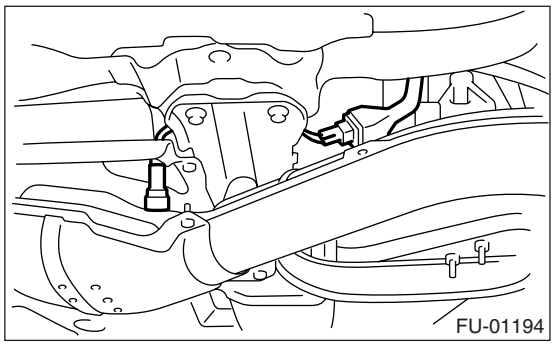
1) Before installing rear oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of rear oxygen (A/F) sensor to make the next removal easier.

Anti-seize compound:
SS-30 JET LUBE

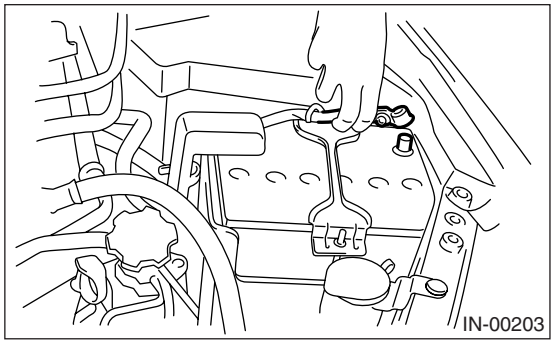
CAUTION:
Never apply anti-seize compound to protector of rear oxygen sensor.

2) Install the rear oxygen sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)



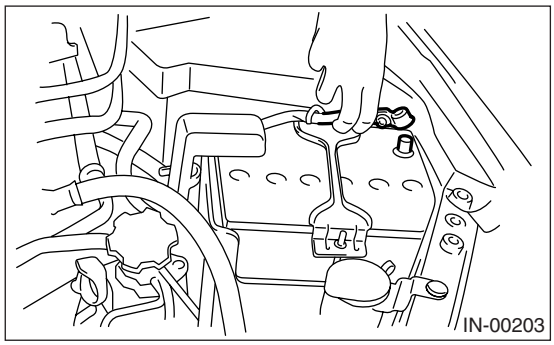
3) Connect the connector to rear oxygen sensor.
4) Lower the vehicle.
5) Connect the battery ground cable to battery.



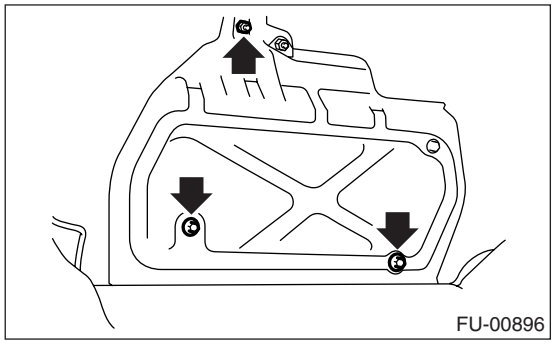
16.Engine Control Module (ECM)

A: REMOVAL

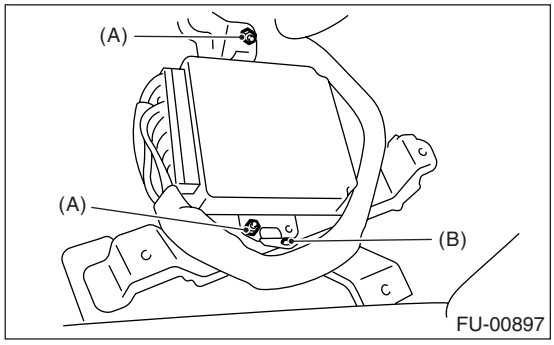
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger side. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger's seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold the ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

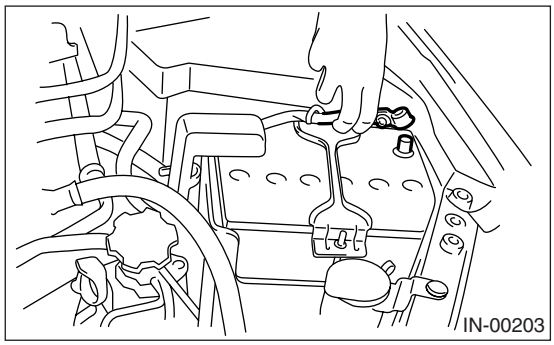
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to the fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

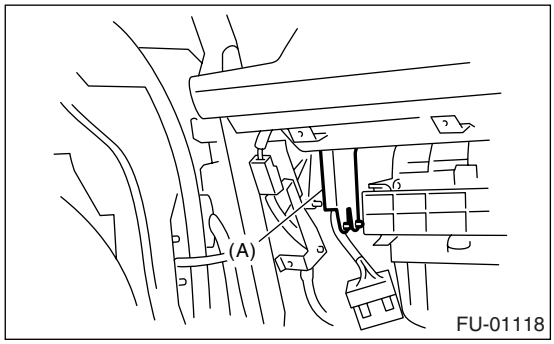
17.Main Relay

A: REMOVAL

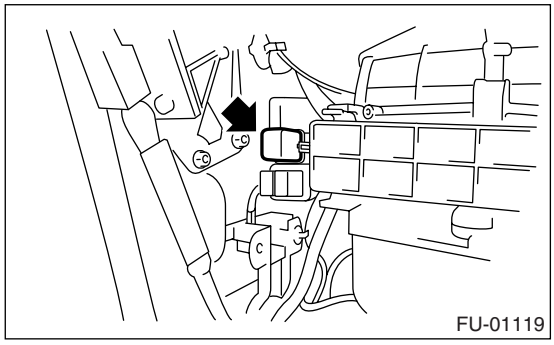
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



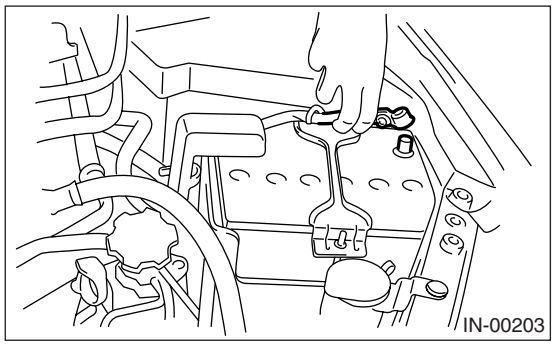
B: INSTALLATION

Install in the reverse order of removal.

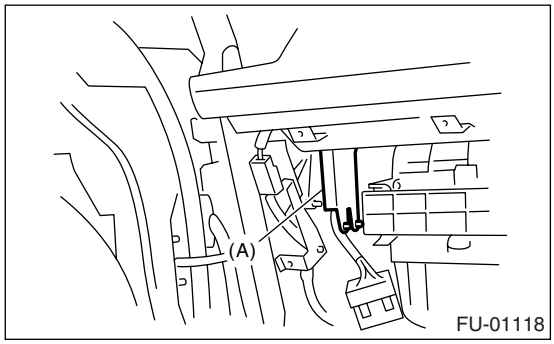
18.Fuel Pump Relay

A: REMOVAL

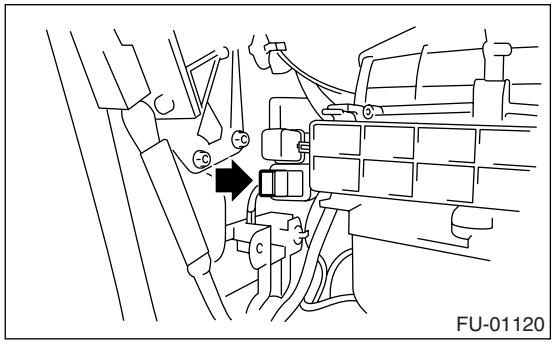
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



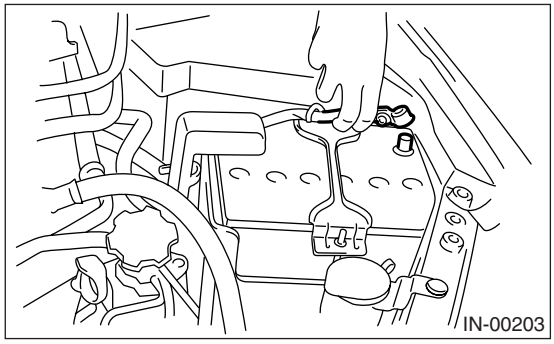
B: INSTALLATION

Install in the reverse order of removal.

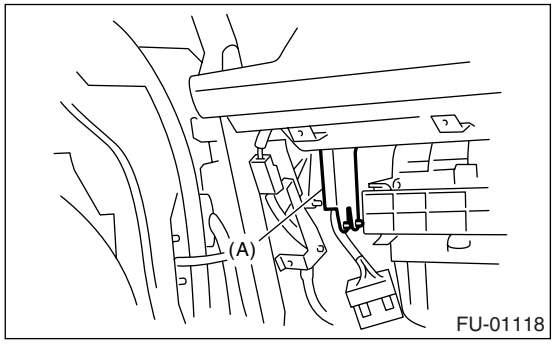
19. Electronic Throttle Control Relay

A: REMOVAL

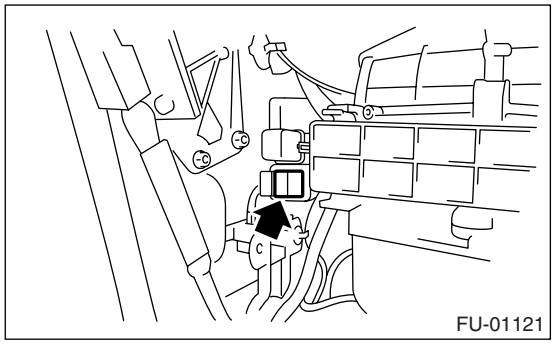
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from electronic throttle control relay.



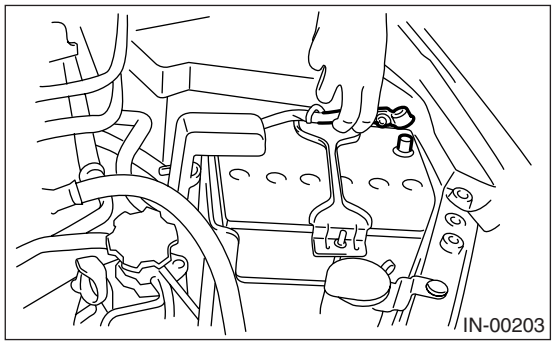
B: INSTALLATION

Install in the reverse order of removal.

20.Fuel Pump Control Unit

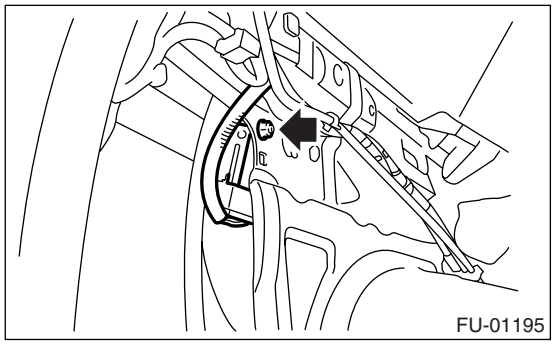
A: REMOVAL

1) Disconnect the ground cable from battery.



2) Remove the rear quarter trim. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>

3) Remove the fuel pump control unit.



4) Disconnect the connector from fuel pump control unit.

B: INSTALLATION

Install in the reverse order of removal.

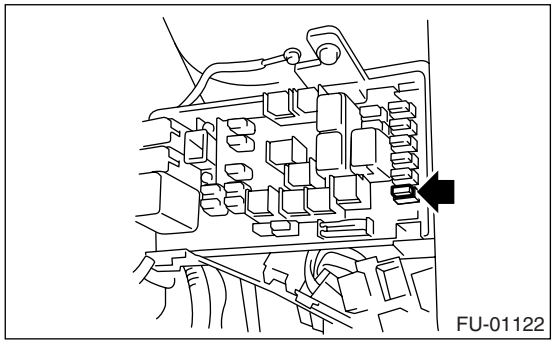
21.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuse of fuel pump from main fuse box.

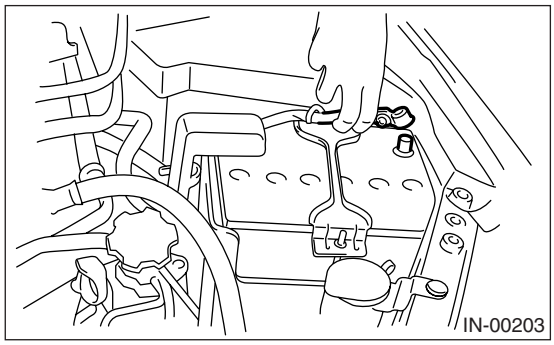


2) Start the engine and run it until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

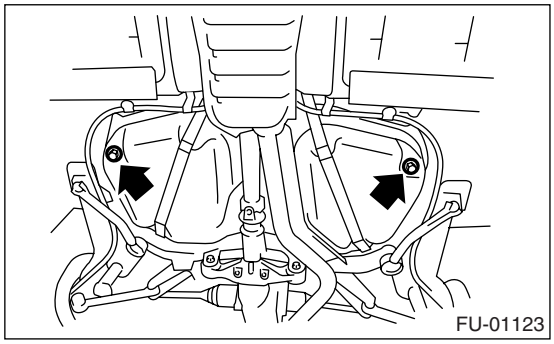
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove drain plug from fuel tank to drain fuel from the fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

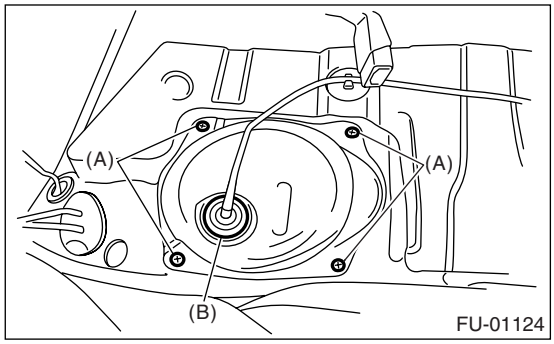
Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

22.Fuel Tank

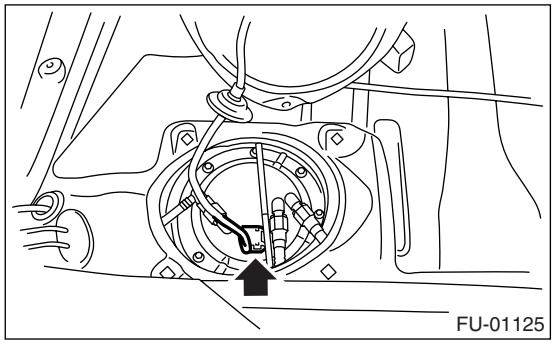
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

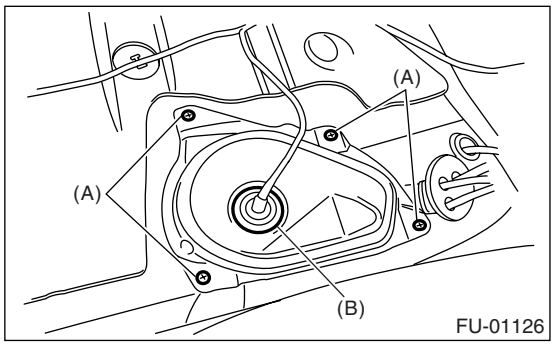
1) Set the vehicle on a lift.
2) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Drain fuel from the fuel tank.
<Ref. to FU(H4DOTC)-40, DRAINING FUEL, PROCEDURE, Fuel.>
4) Remove the rear seat.
5) Remove the service hole cover from fuel pump.
(1) Remove the bolt (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



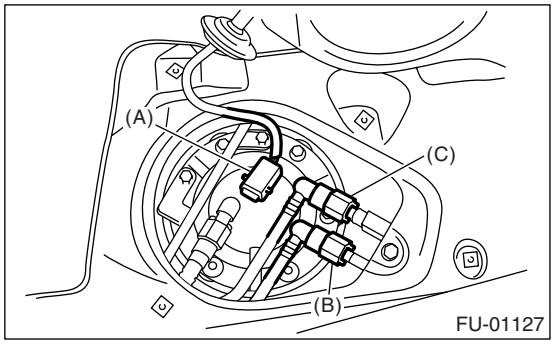
6) Disconnect the connector from fuel pump.



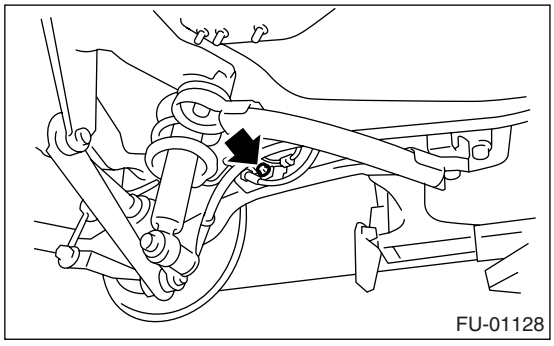
7) Remove the service hole cover from fuel sub level sensor.
(1) Remove the bolt (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



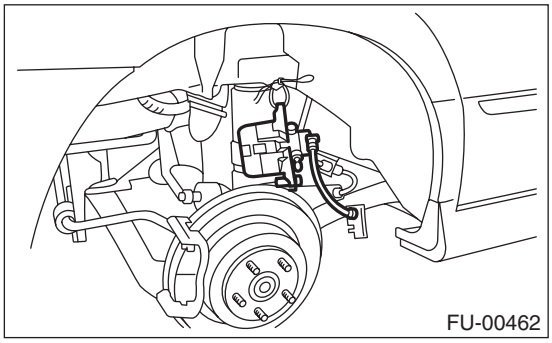
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector from the fuel delivery (B) and return hose (C).
<Ref. to FU(H4DOTC)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>



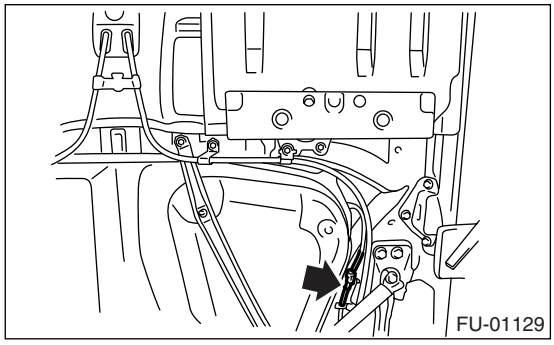
10) Remove the rear wheel.
11) Remove the bolts which secure rear brake hose installation bracket.



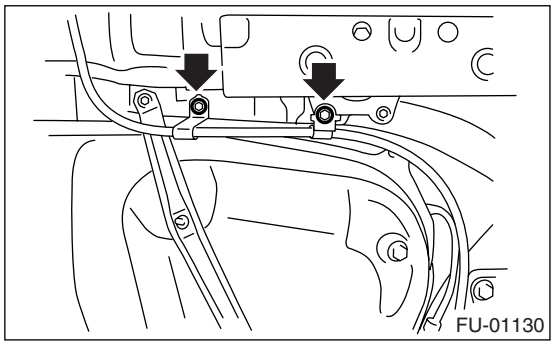
12) Remove the rear brake caliper and tie it to the side of vehicle body.

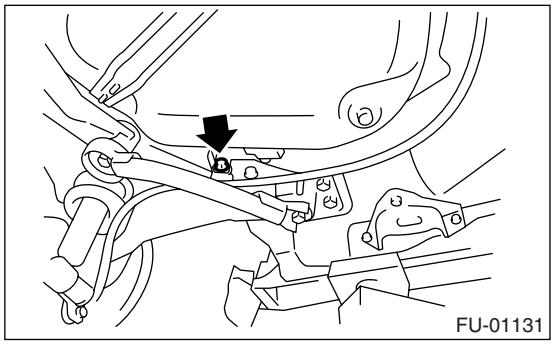


13) Remove the parking brake cable from parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
14) Lift-up the vehicle.
15) Remove the rear exhaust pipe.
<Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install parking brake cable clamp.

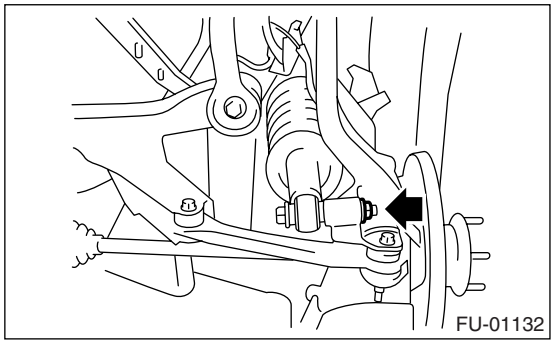




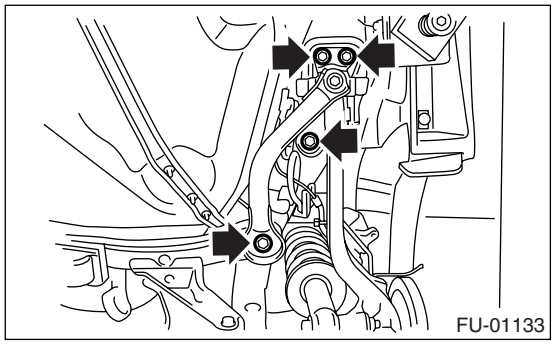
20) Remove the rear suspension assembly.

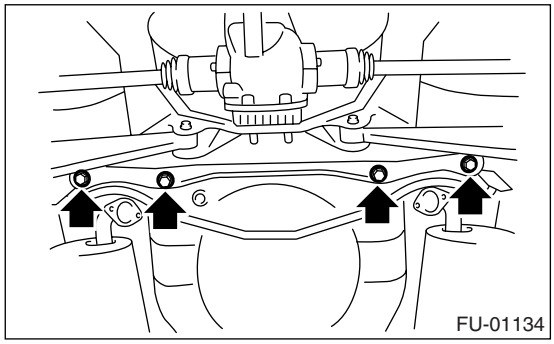
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs the rear shock absorber to rear suspension arm.



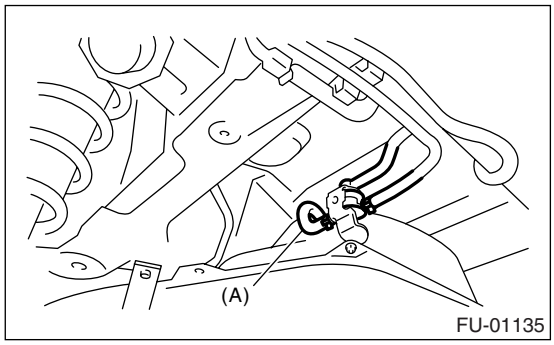
(3) Remove the bolts which secure the rear suspension assembly to body.



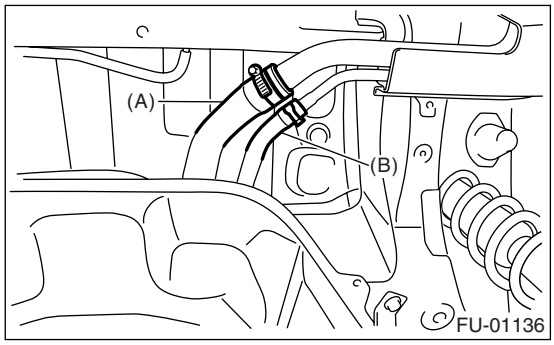


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

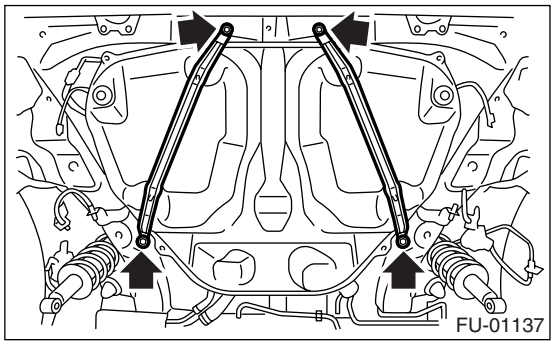


22) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands and dismount the fuel tank from vehicle.

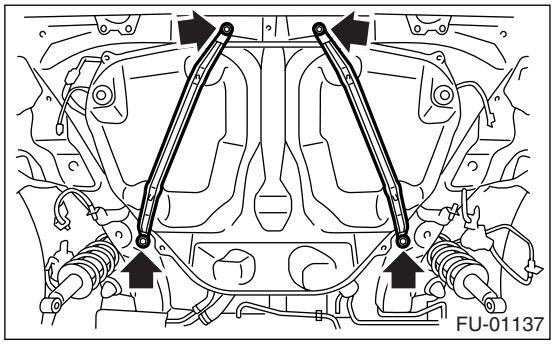
WARNING:
A helper is required to perform this work.



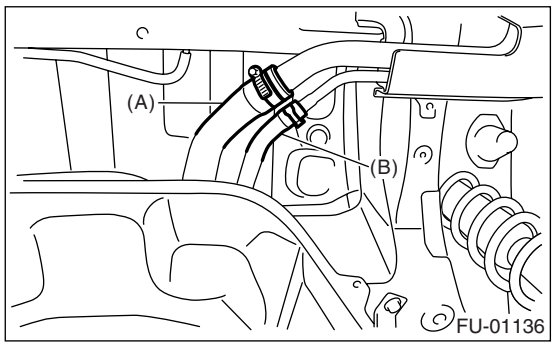
B: INSTALLATION

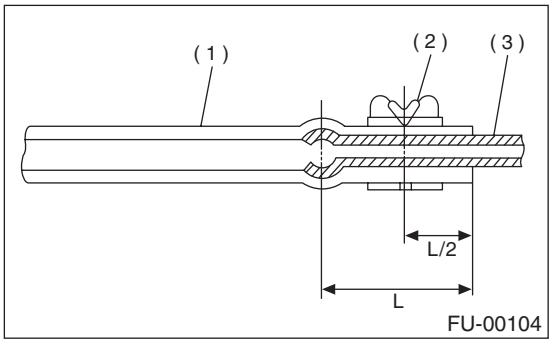
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

WARNING:
A helper is required to perform this work.



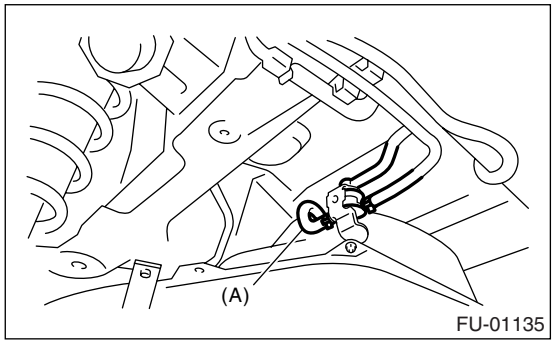
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipes

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolt of fuel tank band.

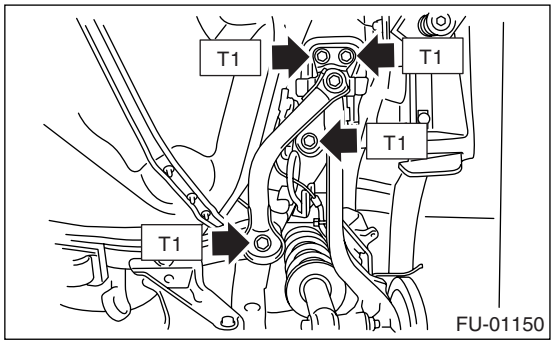
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

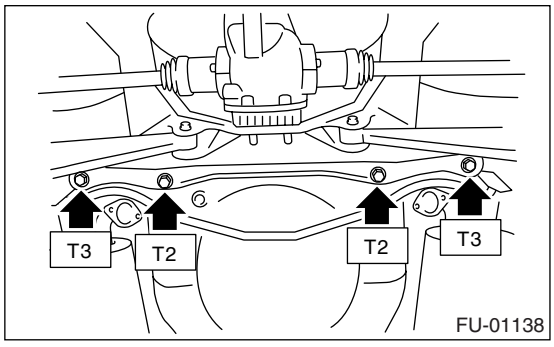
5) Install the rear suspension assembly.

CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Support the rear suspension assembly, and then tighten the bolts which secure the rear suspension assembly to body.

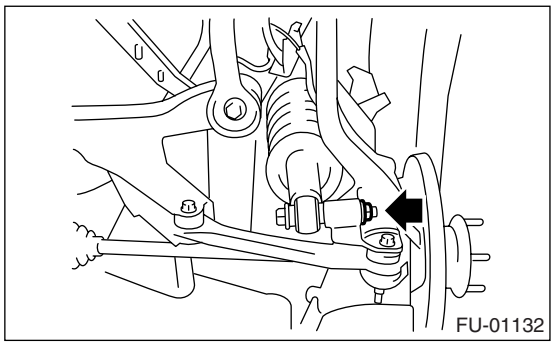
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.2 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





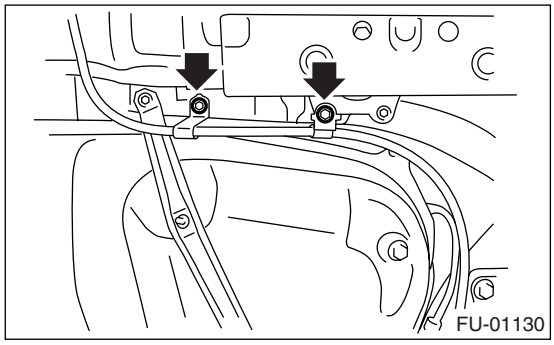
(3) Tighten the bolt which installs the rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

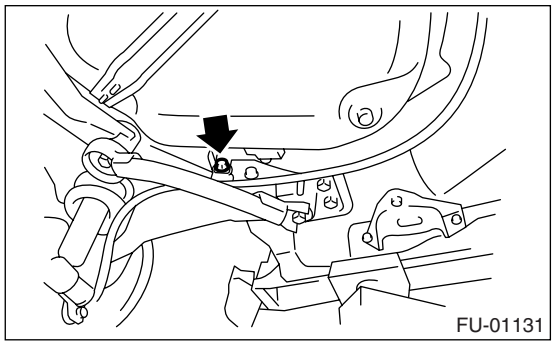


6) Tighten the bolts which install parking brake cable clamp.

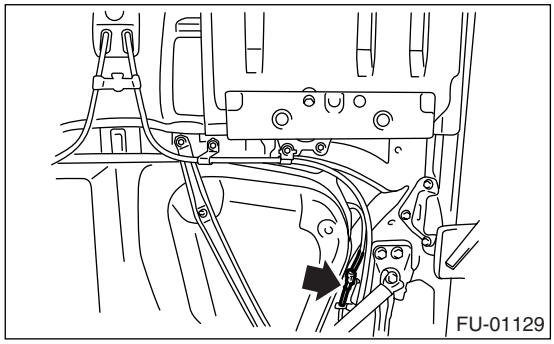
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)



7) Connect the connector to ABS wheel speed sensor.

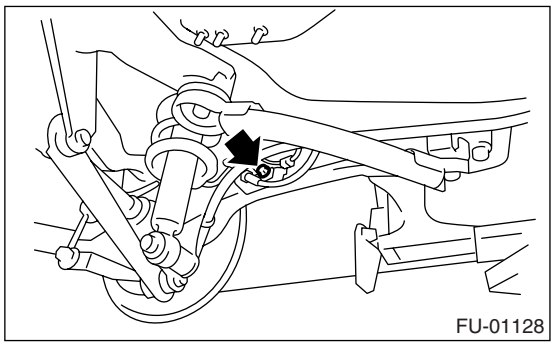


8) Install the heat shield cover.

Tightening torque:
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

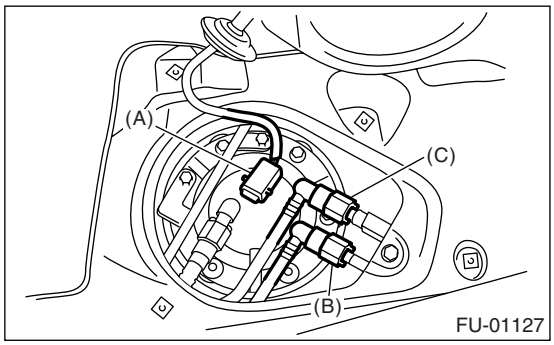
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe.
<Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-8, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolts which secure the rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

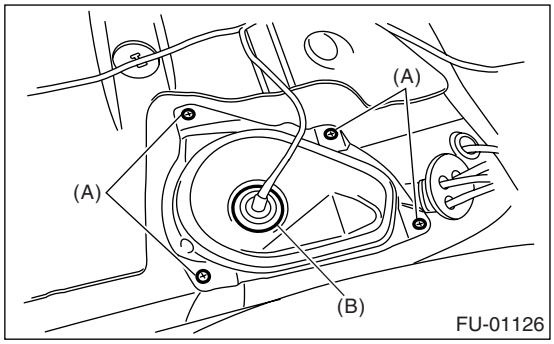


15) Install the rear wheel.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector to the fuel delivery (B) and return hose (C).
<Ref. to FU(H4DOTC)-57, INSTALLATION, Fuel Delivery, Return and Evaporation Lines.>

NOTE:
Be careful not to misconnect the delivery side and return side.

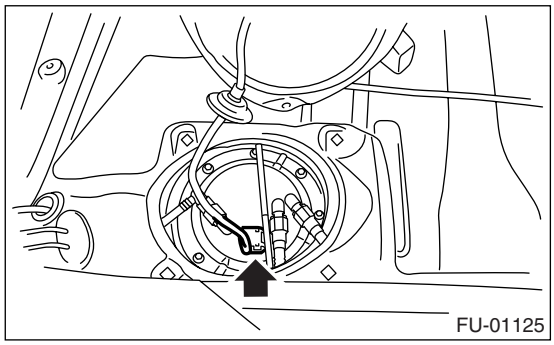


19) Install the service hole cover of fuel sub level sensor.

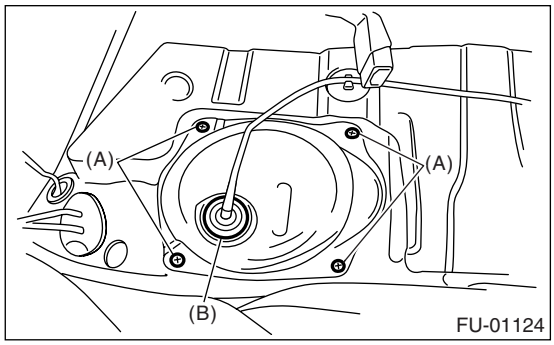


(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

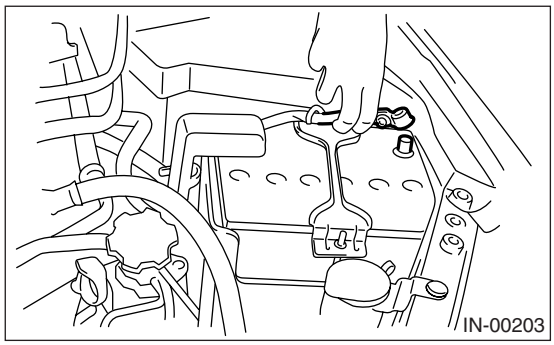
1) Check that the fuel tank is not holed, cracked or otherwise damaged.
2) Make sure that the fuel hoses and fuel pipes are not cracked and that connections are tight.

23.Fuel Filler Pipe

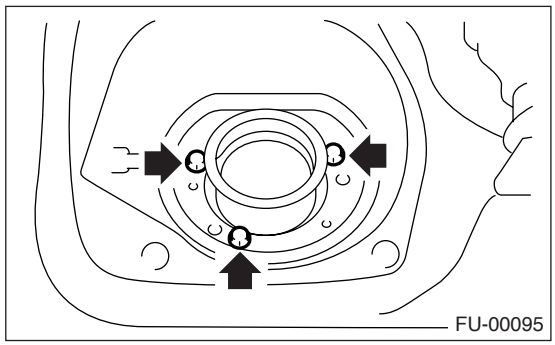
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

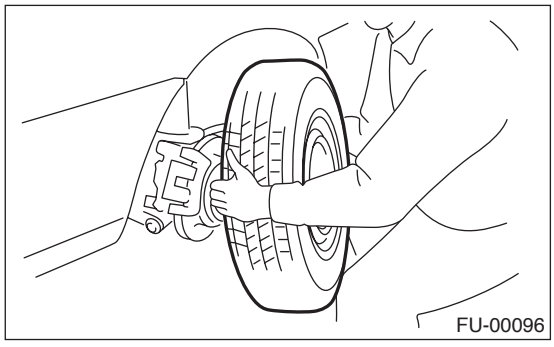
1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the filler cap.
3) Disconnect the ground cable from battery.



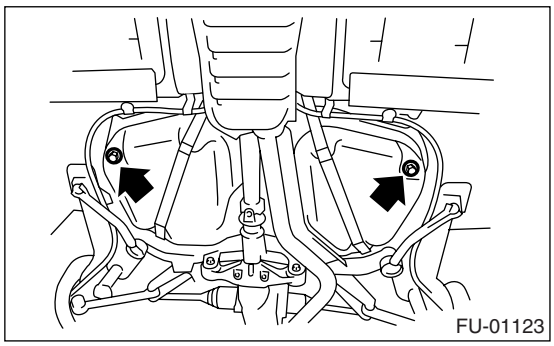
4) Remove the screws which secure packing.



5) Lift-up the vehicle.
6) Remove the rear wheel RH.



7) Set a container under the vehicle and remove drain plug from fuel tank to drain fuel from the fuel tank.

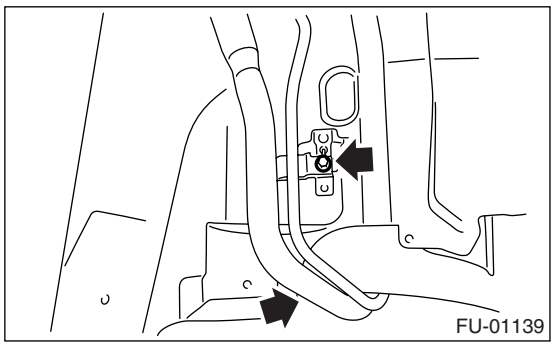


8) Tighten the fuel drain plug.

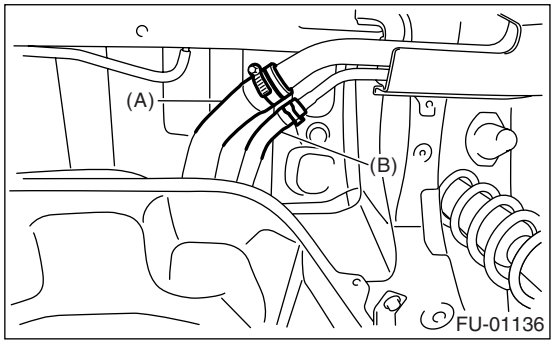
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

9) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
10) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
11) Remove the bolts which hold the fuel filler pipe bracket on the body.



12) Loosen the clamp, and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

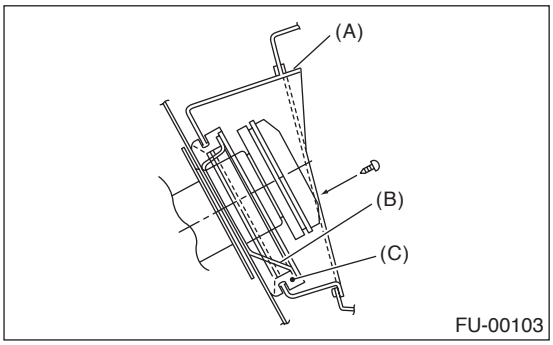


13) Remove the fuel filler pipe to under side of the vehicle.

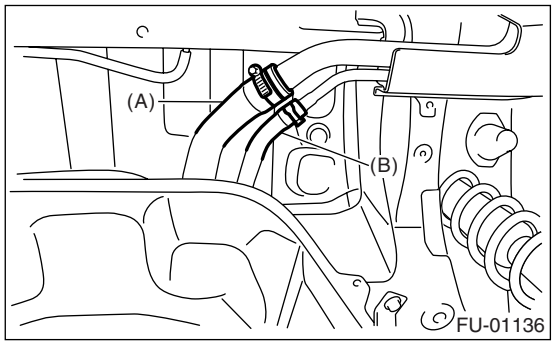
B: INSTALLATION

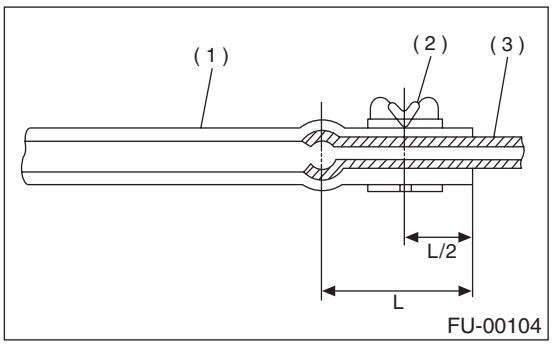
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C) and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward the inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent pipe (B) to specified position, and then tighten the clamp.

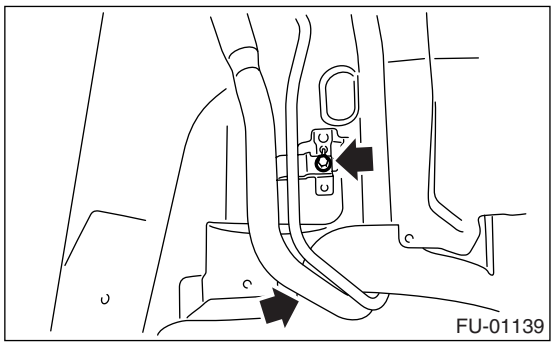




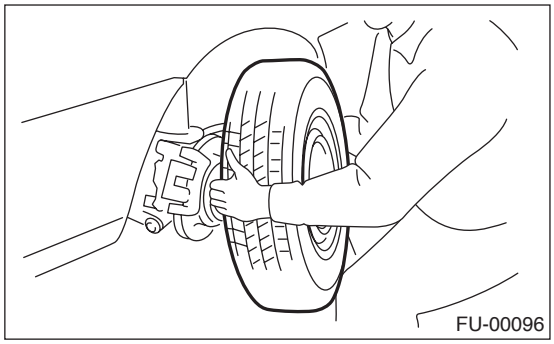
(1) Hose
(2) Clip or clamp
(3) Pipes

5) Tighten the bolts which hold the fuel filler pipe bracket on the body.

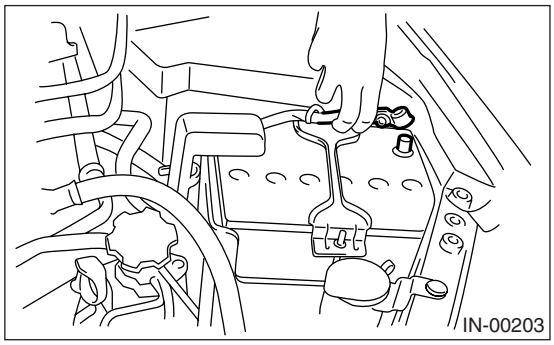
Tightening torque:
7.5 N·m (0.75 kgf-m, 5.4 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Install the fuse of fuel pump to main fuse box.
11) Connect the battery ground cable to battery.



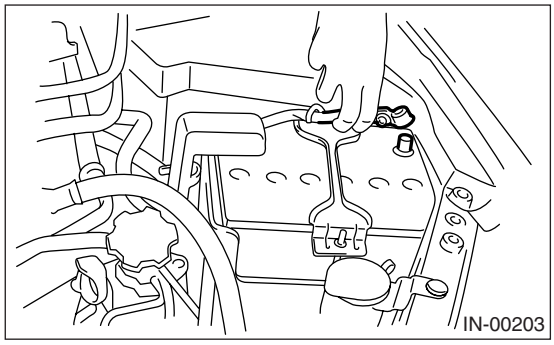
24.Fuel Pump

A: REMOVAL

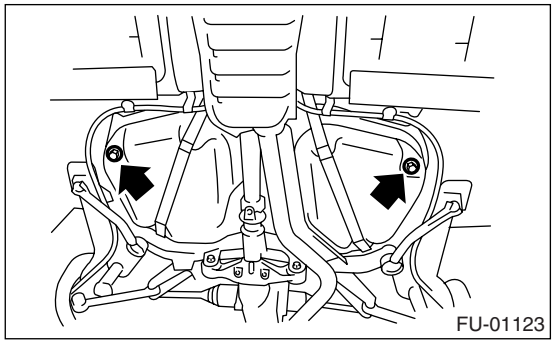
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Open the fuel filler flap lid and remove the fuel filler cap.
3) Disconnect the ground cable from battery.



4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle and remove the drain plug from fuel tank to drain fuel from the fuel tank.

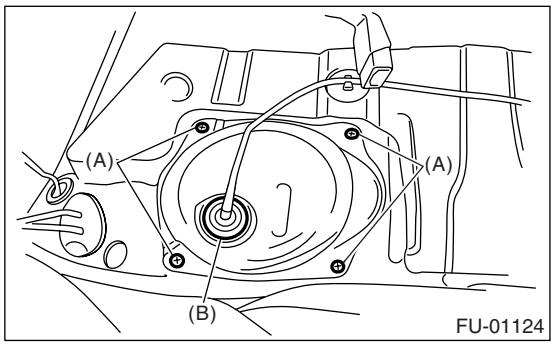


7) Tighten the fuel drain plug.

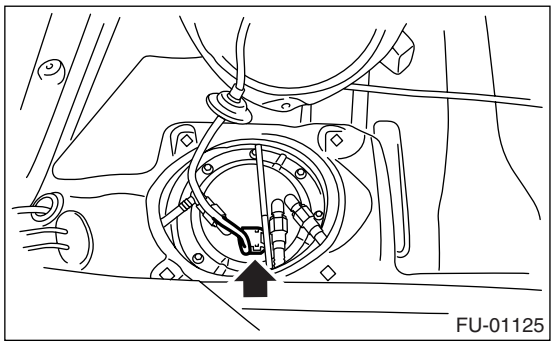
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

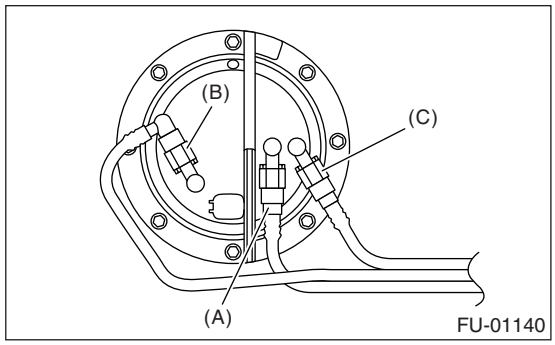
8) Remove the rear seat.
9) Remove the service hole cover.
(1) Remove the bolt (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



10) Disconnect the connector from fuel pump.



11) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4DOTC)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
12) Remove the nuts which install the fuel pump assembly onto fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

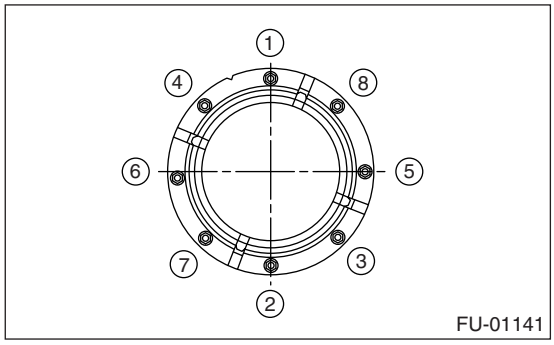
13) Take off the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
• Use a new gasket.
• Ensure the sealing portion is free from fuel or foreign particles before installation.
• Tighten the nuts to specified torque in the order as shown in the figure.

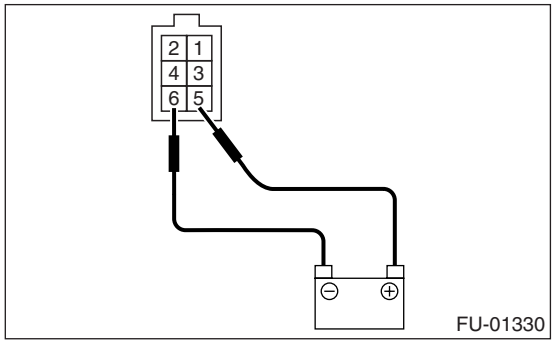
Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump, and apply the battery power supply to check whether the pump operate.

WARNING:
• Wipe off the fuel completely.
• Keep battery as far apart from fuel pump as possible.
• Be sure to turn the battery supply to ON and OFF on the battery side.
• Do not run fuel pump for a long time under non-load condition.



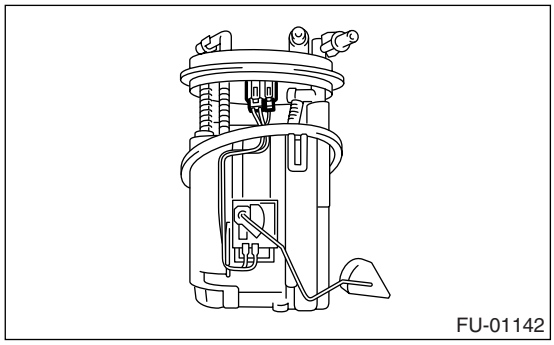
25.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place “NO FIRE” signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly.
<Ref. to FU(H4DOTC)-49, REMOVAL, Fuel Pump.>
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

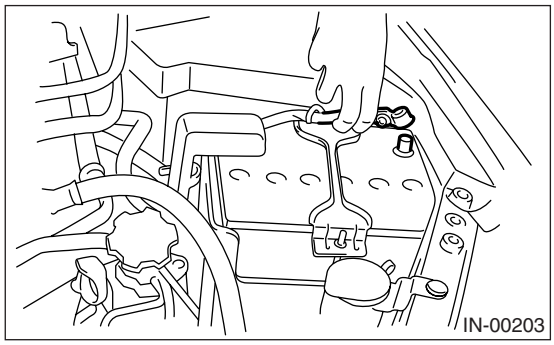
Install in the reverse order of removal.

26.Fuel Sub Level Sensor

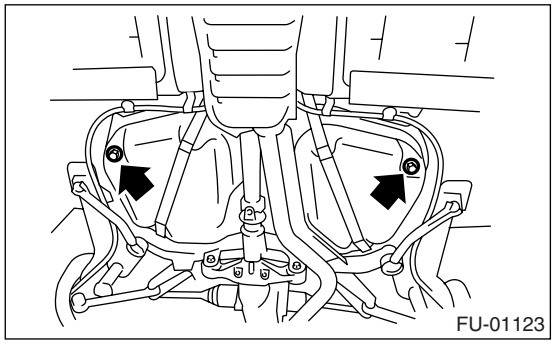
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

1) Disconnect the ground cable from battery.



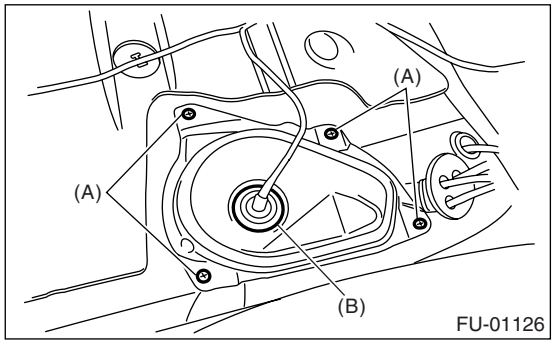
2) Lift-up the vehicle.
3) Set a container under the vehicle and remove the drain plug from fuel tank to drain the fuel from fuel tank.



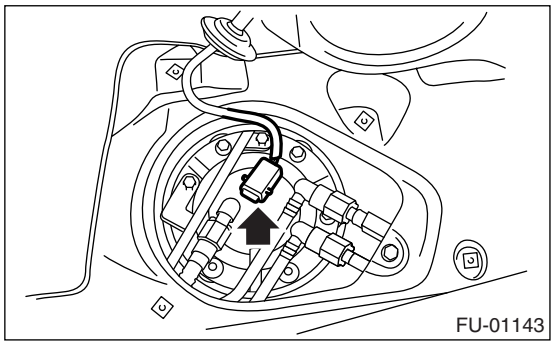
4) Tighten the fuel drain plug.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

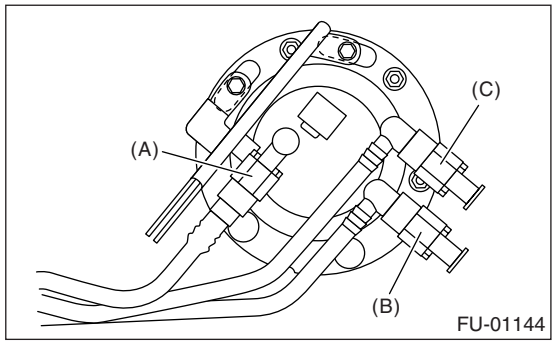
5) Remove the rear seat.
6) Remove the service hole cover.
   (1) Remove the bolt (A).
   (2) Push the grommet (B) down under the body and remove the service hole cover.



7) Disconnect the connector from fuel sub level sensor.



8) Disconnect the quick connector and then disconnect the fuel delivery hose, return hose and jet pump hose. <Ref. to FU(H4DOTC)-56, REMOVAL, Fuel Delivery, Return and Evaporation Lines.>
9) Remove the bolts which install the fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

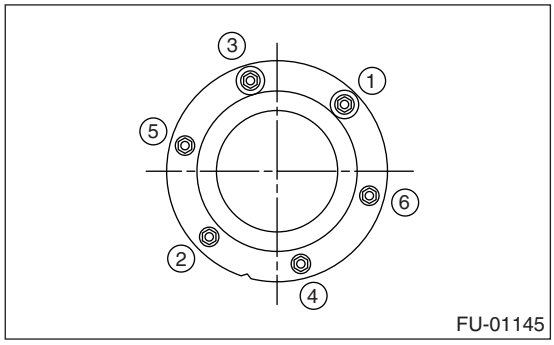
10) Remove the fuel sub level sensor.

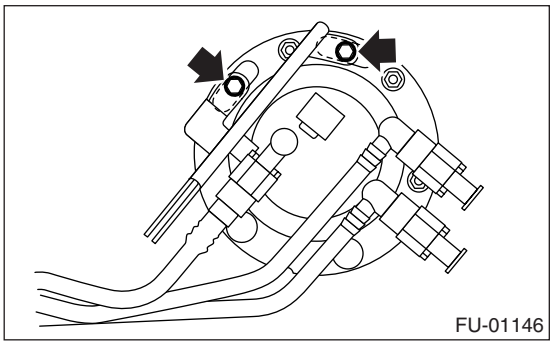
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
• Use a new gasket.
• Ensure the sealing portion is free from fuel and foreign particles before installation.
• Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)





27.Fuel Filter

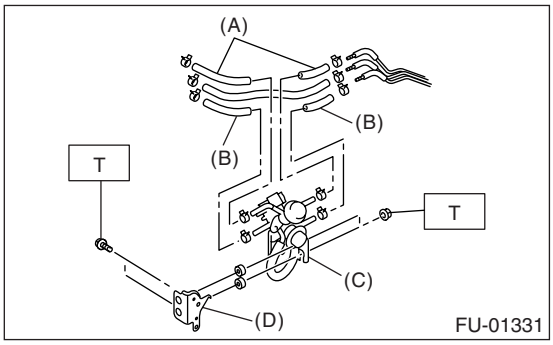
A: SPECIFICATION

Fuel filter forms a unit with fuel pump.
Refer to “Fuel Pump” for removal and installation. <Ref. to FU(H4DOTC)-49, REMOVAL, Fuel Pump.> <Ref. to FU(H4DOTC)-50, INSTALLATION, Fuel Pump.>

28.Fuel Bypass Valve

A: REMOVAL

1) Release the fuel pressure.
<Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
2) Disconnect the fuel return line and delivery line from fuel bypass valve.
3) Remove the fuel bypass valve from vehicle.

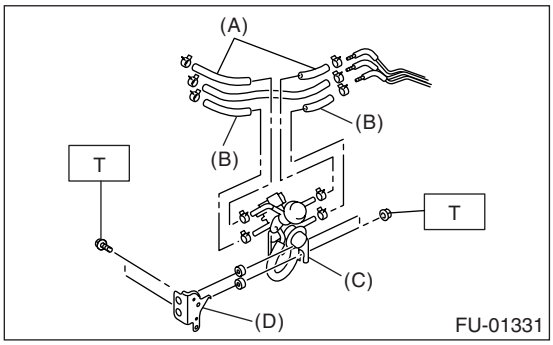


(A) Fuel return line
(B) Fuel delivery line
(C) Fuel bypass valve
(D) Fuel bypass valve bracket

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.53 ft-lb)

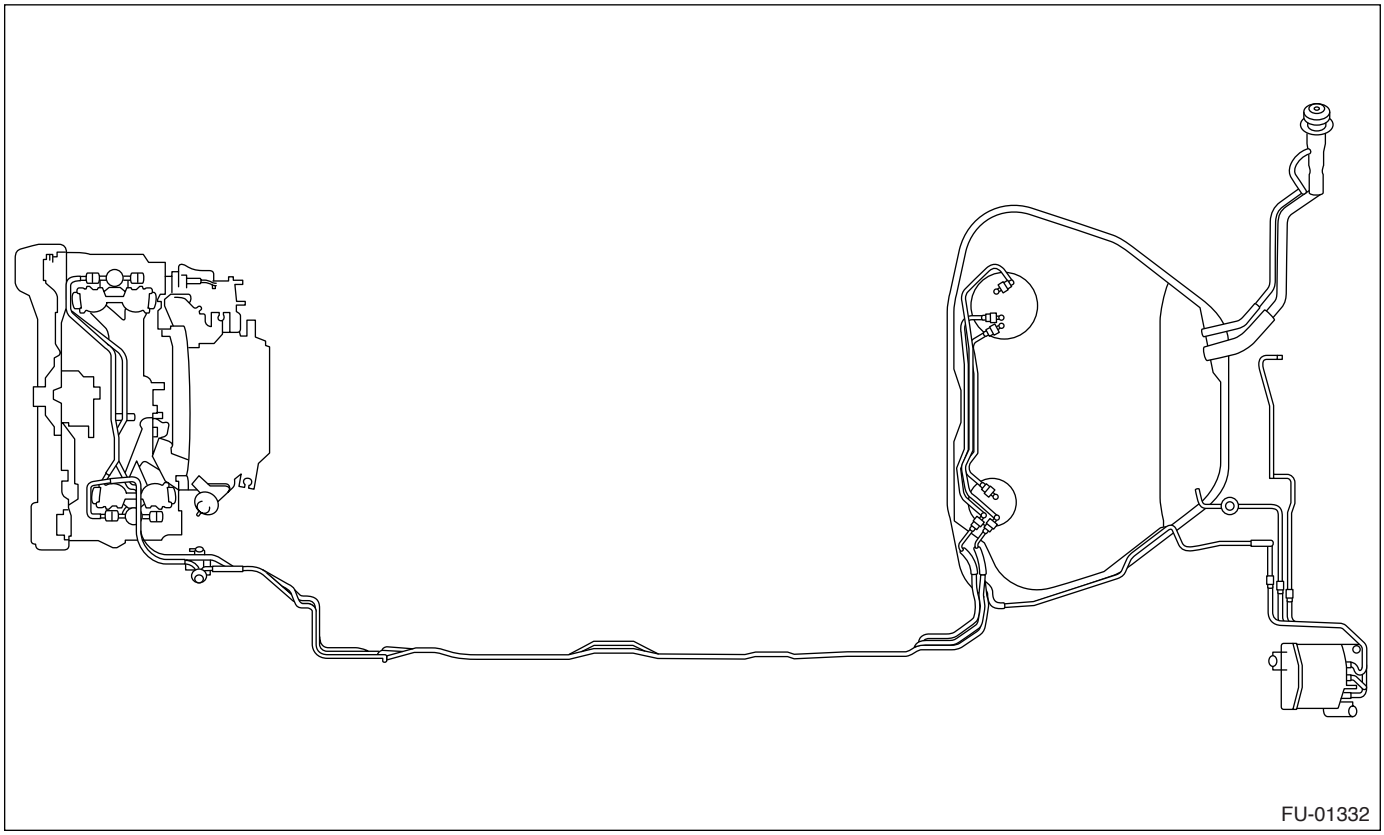


(A) Fuel return line
(B) Fuel delivery line
(C) Fuel bypass valve
(D) Fuel bypass valve bracket

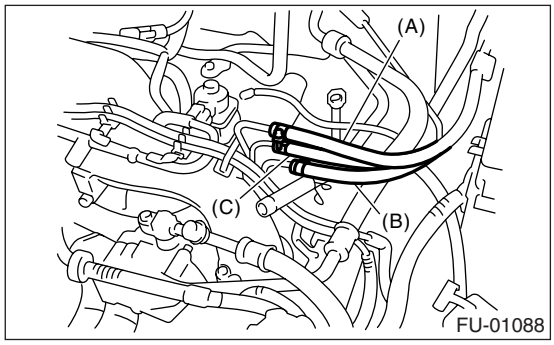
29.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.

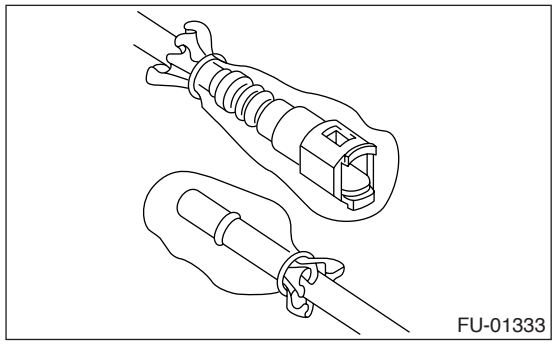


6) In the engine compartment, disconnect the fuel delivery hoses, return hoses and evaporation hose.



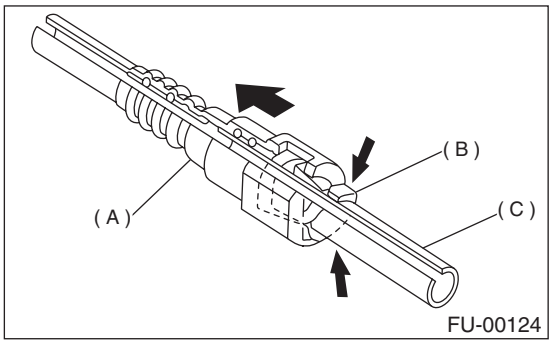
(A) Fuel delivery hose
(B) Return hose
(C) Evaporation hose

7) Lift-up the vehicle.
8) Remove the fuel tank. <Ref. to FU(H4DOTC)-41, REMOVAL, Fuel Tank.>
9) Separate the quick connector of fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag etc.



(3) Hold the connector (A) and push retainer (B) down.
(4) Pull out the connector (A) from retainer (B).

CAUTION:
Always use a new retainer.

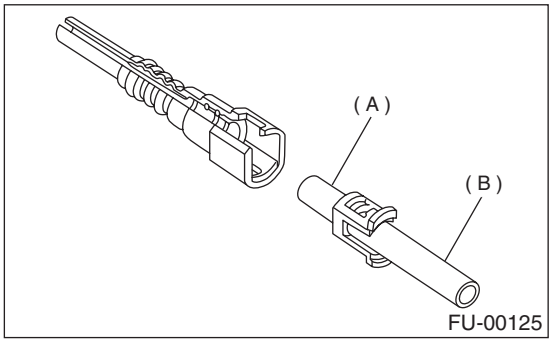


(A) Connector
(B) Retainer
(C) Pipes

B: INSTALLATION

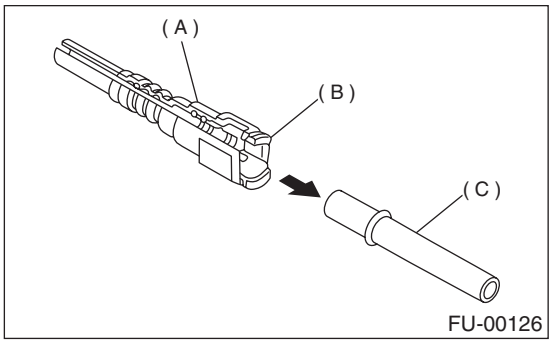
1) Connect the quick connector on fuel line.

CAUTION:
• Always use a new retainer.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



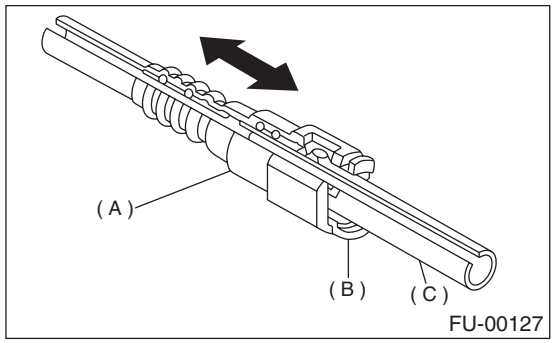
(A) Seal surface
(B) Pipes

(1) Set the new retainer (B) to connector (A).
(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipes

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect hoses and their connections for fuel leakage.

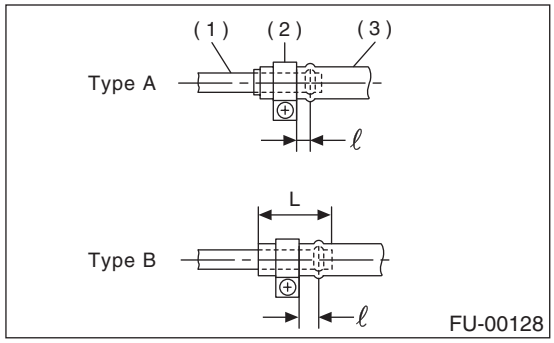


(A) Connector
(B) Retainer
(C) Pipes

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount of inserting is specified.
Type B: When the amount of inserting is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

L: 22.5±2.5 mm (0.886±0.098 in)

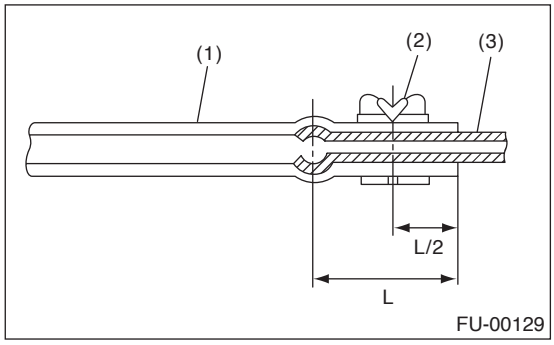


(1) Pipes
(2) Clamp
(3) Hose

3) Connect the return hose and evaporation hose to pipe by approx. 15 mm (0.59 in) from the hose end.

Fuel return hose:
L = 22.5±2.5 mm (0.885±0.098 in)
Fuel evaporation hose:
L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect hoses and their connections for fuel leakage.



(1) Hose
(2) Clip
(3) Pipes

C: INSPECTION

1) Make sure that there are no cracks on the fuel pipes and fuel hoses.
2) Make sure that the fuel pipe and fuel hose connections are tightened firmly.

30.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump does not operate.	
	❍ Defective terminal contact.	Inspect contact, especially ground, and tighten it securely.
	❍ Trouble in electromagnetic or electronic circuit parts.	Replace the faulty parts.
2)	Lowering of fuel pump function.	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter.	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose.	Clean, correct or replace the fuel pipe or hose.
5)	Air is mixed in the fuel system.	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe.	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator.	Replace.
2. Leakage or blow out of fuel		
1)	Loosened joints of the fuel pipe.	Retightening.
2)	Cracked fuel pipe, hose and fuel tank.	Replace.
3)	Defective welding part on the fuel tank.	Replace.
4)	Defective drain packing of the fuel tank.	Replace.
5)	Clogged air breather tube or air vent tube.	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe.	Retightening.
2)	Defective packing air tightness on the fuel saucer.	Correct or replace the packing.
3)	Inoperative fuel pump modulator or circuit.	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor.	Replace.
2)	Defective operation of fuel meter.	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump.	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain the water from both the fuel filter and fuel tank or use water removing agent in the fuel tank.
• Before using a water removing agent, follow the cautions that noted on the bottle.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H4DOTC)

Page

1. General Description 2
2. Front Catalytic Converter 3
3. Rear Catalytic Converter 4
4. Canister 5
5. Purge Control Solenoid Valve 6
6. Two-way Valve 7
7. PCV Valve 8

1. General Description

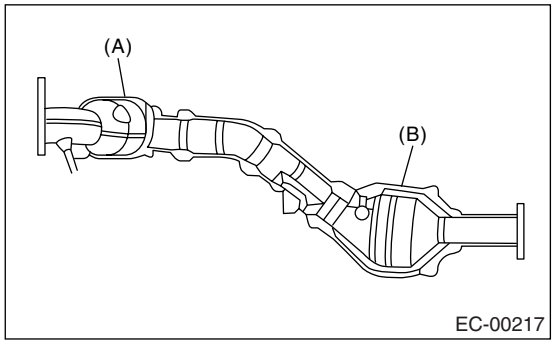
A: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

1) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
2) Separate the front catalytic converter (A) from rear catalytic converter (B).



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use new gasket.

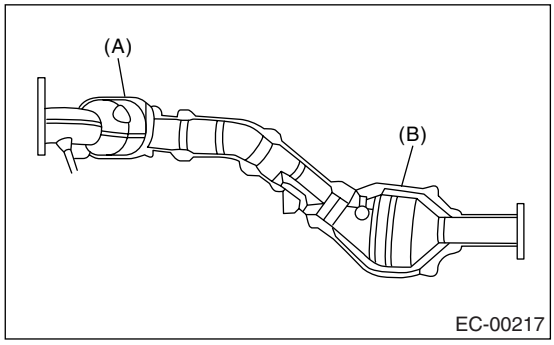
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

1) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
2) Separate the rear catalytic converter (B) from front catalytic converter (A).



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use new gasket.

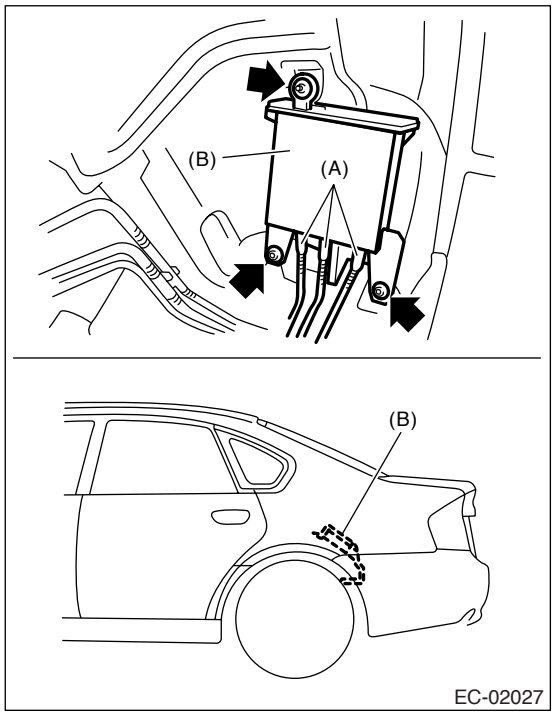
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the rear wheel LH.
3) Remove the rear mud guard LH.
4) Remove the canister protector.
5) Disconnect the quick connector (A).
6) Remove the canister (B) from body.

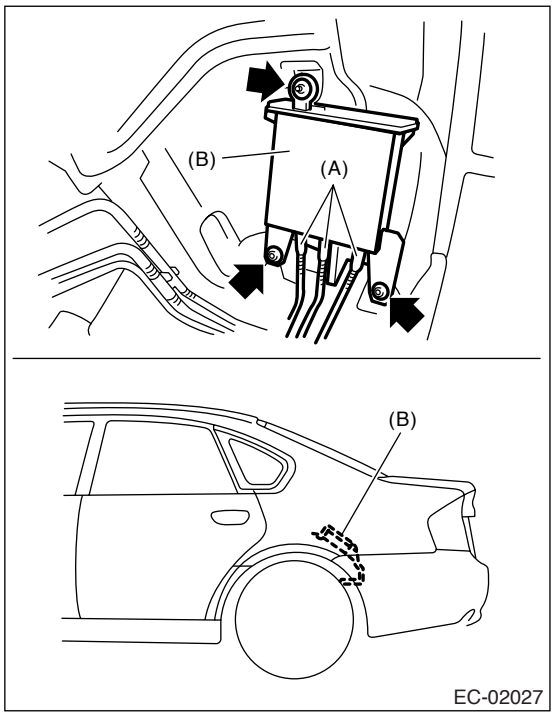


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure there are no damage or dust on the connection of quick connector. If necessary, clean the seal surface of pipe.

Tightening torque:
8.3 N·m (0.85 kgf-m, 6.1 ft-lb)



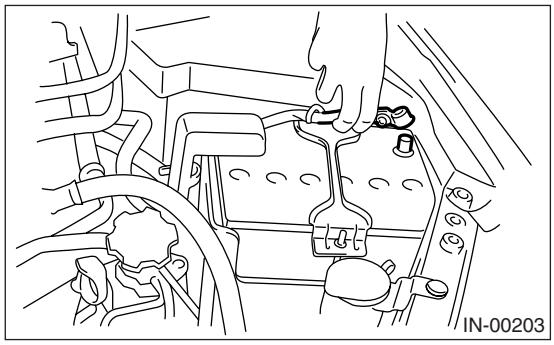
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

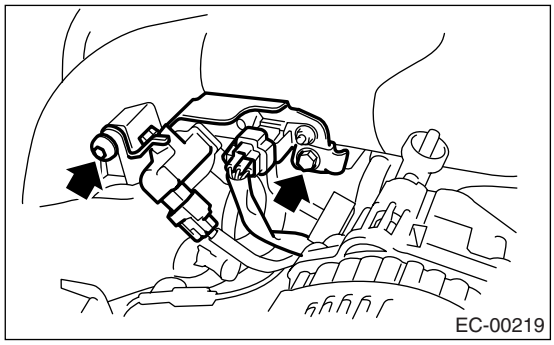
5. Purge Control Solenoid Valve

A: REMOVAL

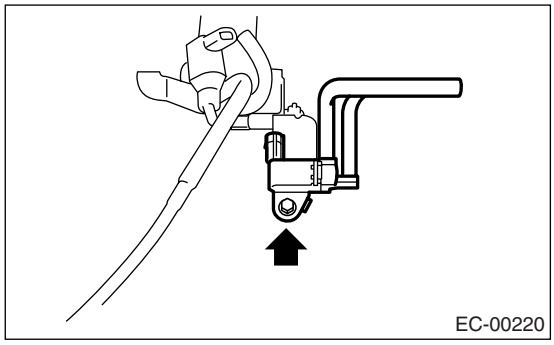
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the solenoid valve bracket assembly from intake manifold.



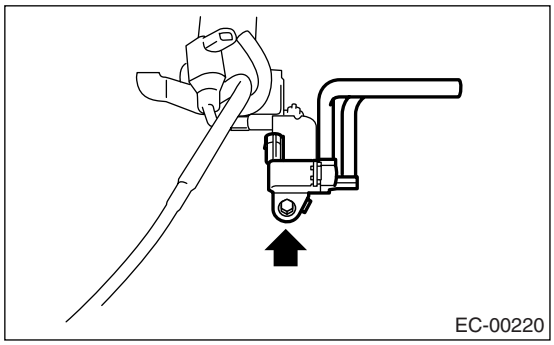
4) Disconnect the connector from purge control solenoid valve.
5) Disconnect the evaporation hose from the intake manifold and fuel pipe assembly.
6) Remove the purge control solenoid valve from solenoid valve bracket assembly.



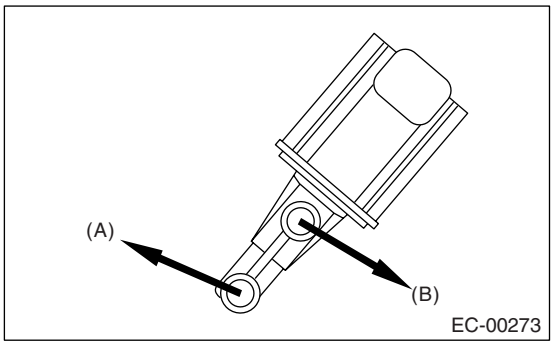
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)

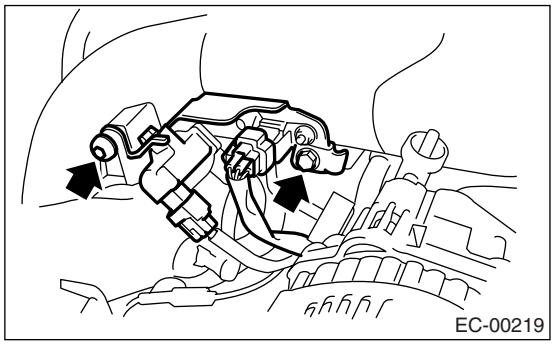


NOTE:
Connect the evaporation hose as shown in the figure.



(A) To intake manifold
(B) To fuel pipe ASSY

Tightening torque:
19 N·m (1.94 kgf-m, 13.7 ft-lb)



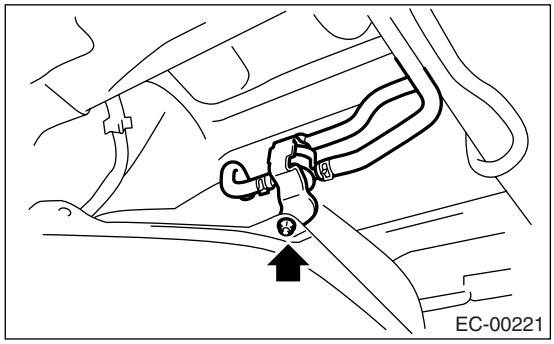
C: INSPECTION

Make sure the hoses are not cracked or loose.

6. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Disconnect the evaporation hoses from two-way valve.
3) Remove the two-way valve as a unit with bracket from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

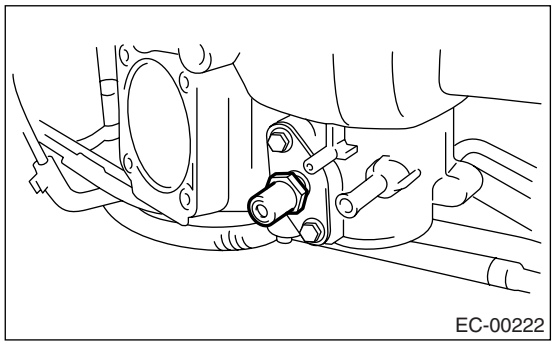
C: INSPECTION

Make sure the hoses are not cracked or loose.

7. PCV Valve

A: REMOVAL

1) Remove the intake manifold.
<Ref. to FU(H4DOTC)-13, REMOVAL, Intake Manifold.>
2) Remove the PCV valve from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the bolt threads of PCV valve.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
23 N·m (2.35 kgf-m, 17.0 ft-lb)

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

INTAKE (INDUCTION)

IN(H4DOTC)

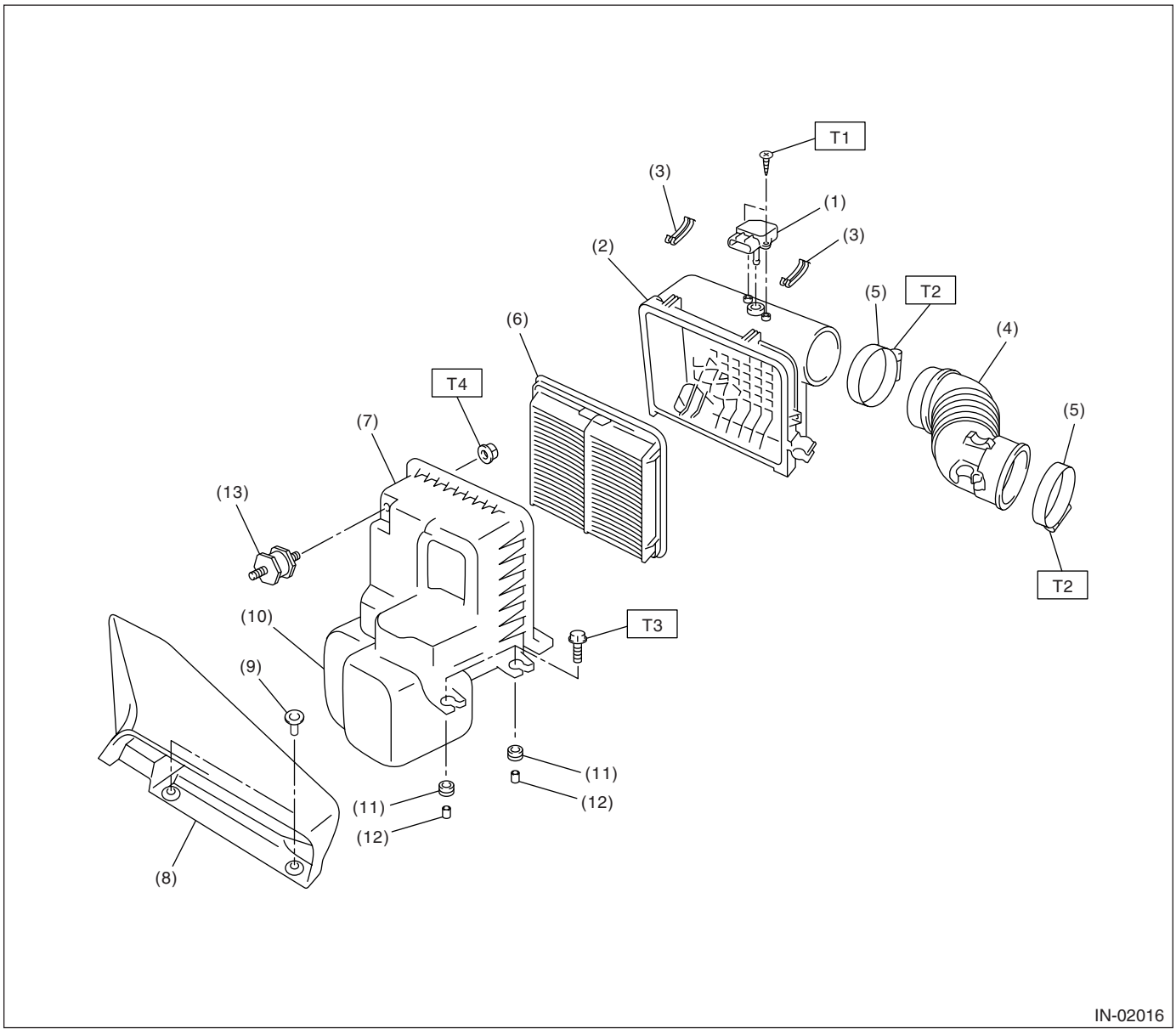
Page

1. General Description 2
2. Air Cleaner Element 7
3. Air Cleaner Case 8
4. Air Intake Duct 9
5. Resonator Chamber 10
6. Intake Duct 11
7. Intercooler 12
8. Turbocharger 14
9. Air By-pass Valve 16

1. General Description

A: COMPONENT

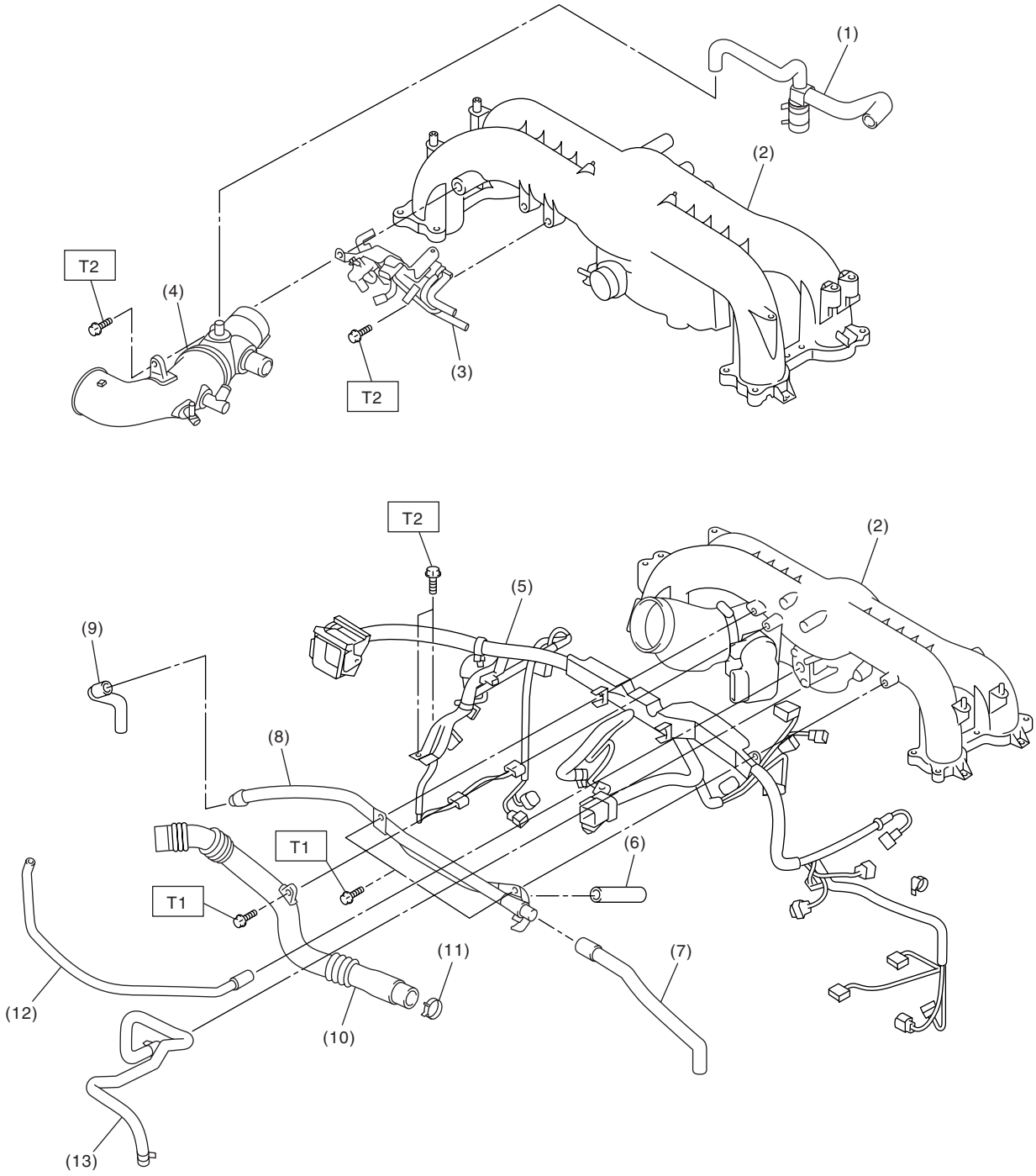
1. AIR CLEANER



(1)	Mass air flow and intake air temperature sensor	(7)	Air cleaner case (front)
(2)	Air cleaner case (rear)	(8)	Air intake duct
(3)	Clip	(9)	Clip
(4)	Air intake boot	(10)	Resonator chamber
(5)	Clamp	(11)	Cushion
(6)	Air cleaner element	(12)	Spacer
		(13)	Cushion

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.0 (0.10, 0.74)
T2: 2.5 (0.25, 1.8)
T3: 6.0 (0.61, 4.4)
T4: 7.5 (0.76, 5.5)

2. INTAKE DUCT

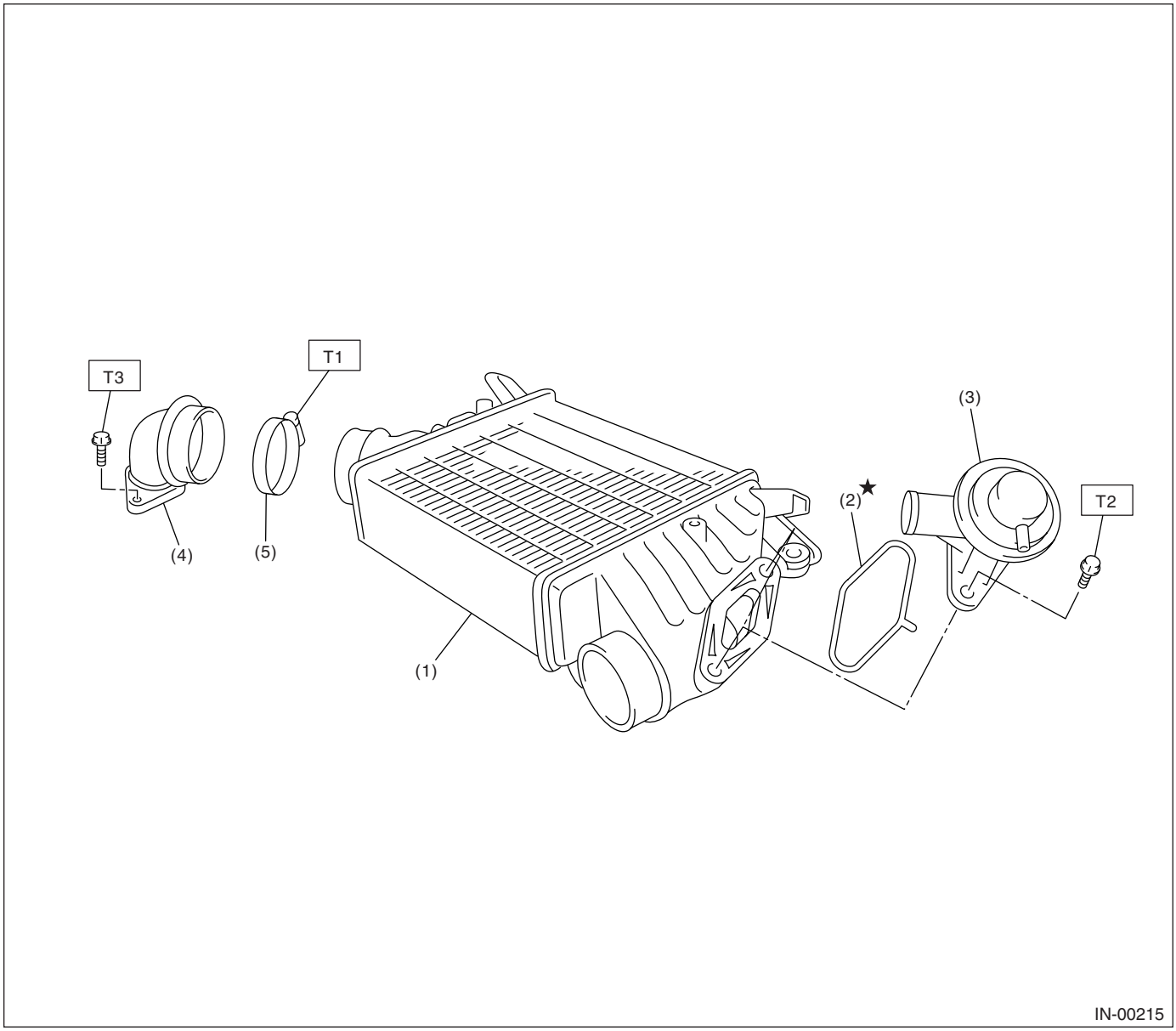


IN-00214

(1) PCV hose ASSY
(2) Intake manifold
(3) Solenoid valve bracket ASSY
(4) Intake duct
(5) Engine harness ASSY
(6) Vacuum hose
(7) Vacuum hose
(8) PCV pipe
(9) Vacuum hose
(10) Air by-pass pipe
(11) Clamp
(12) Vacuum hose
(13) Brake booster hose

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 19 (1.9, 13.7)

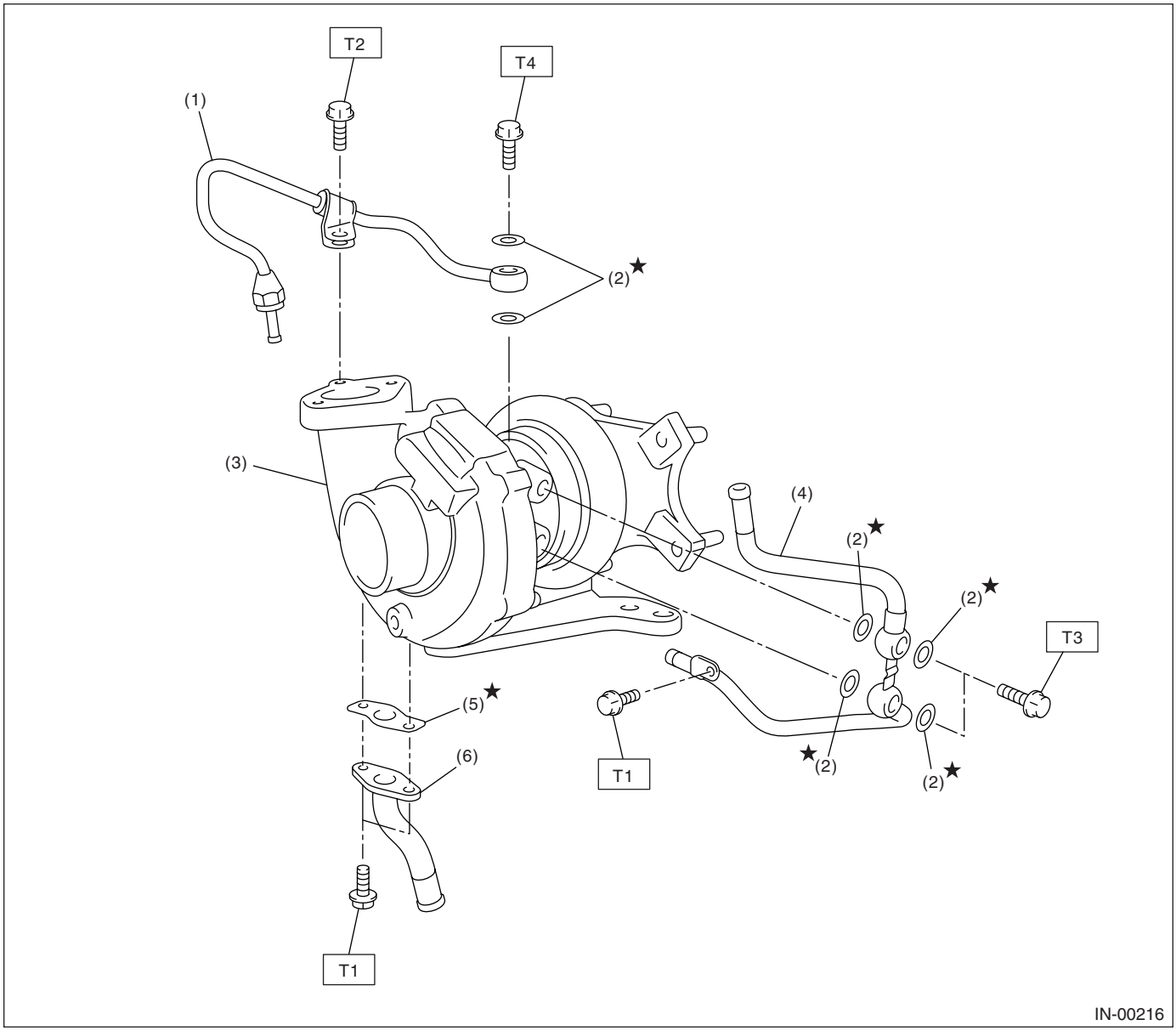
3. INTERCOOLER



(1) Intercooler
(2) Gasket
(3) Air by-pass valve
(4) Intake duct
(5) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.0 (0.3, 2.2)
T2: 6.5 (0.66, 4.8)
T3: 16 (1.6, 11.6)

4. TURBOCHARGER



(1) Oil inlet pipe
(2) Metal gasket
(3) Turbocharger
(4) Water pipe
(5) Gasket
(6) Oil outlet pipe

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.7 (0.48, 3.5)
T2: 5.0 (0.51, 3.7)
T3: 23 (2.3, 17.0)
T4: 16 (1.6, 11.8)

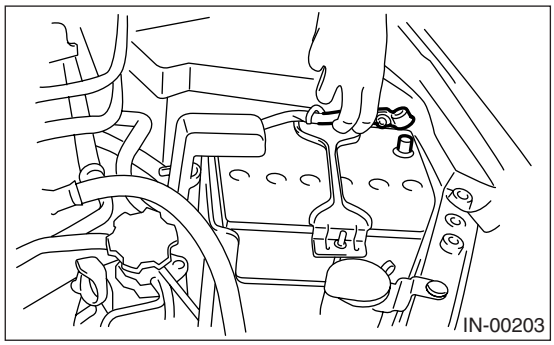
B: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

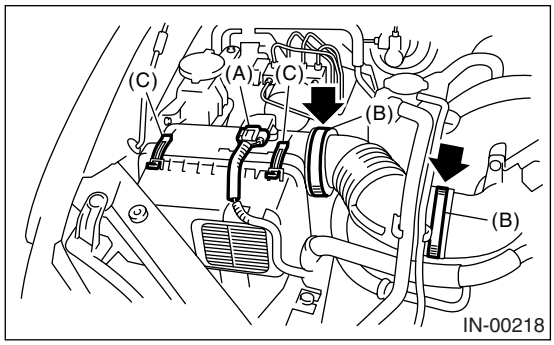
2. Air Cleaner Element

A: REMOVAL

1) Disconnect the ground cable from battery.



2) Disconnect the connector (A) from mass air flow sensor.
3) Loosen the clamps (B) which connect air intake boot to intake duct.
4) Remove the clips (C) from air cleaner case.

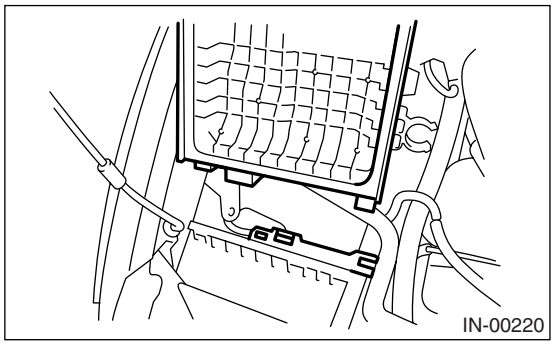


5) Remove the air cleaner case (rear) and air intake boot.
6) Remove the air cleaner element.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
When installing the air cleaner case (rear), align the protrusion part of air cleaner case (rear) to the hole of air cleaner case (front).



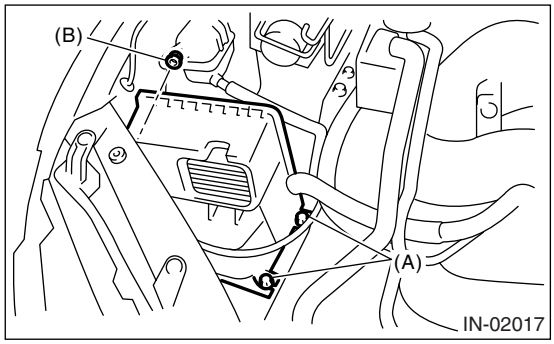
C: INSPECTION

Replace if excessively damaged or dirty.

3. Air Cleaner Case

A: REMOVAL

1) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
2) Remove the air cleaner element.
<Ref. to IN(H4DOTC)-7, REMOVAL, Air Cleaner Element.>
3) Remove the bolts (A) and nut (B) which install air cleaner case (front) on the body.



4) Remove the air cleaner case (front).

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Bolt: 6.0 N·m (0.61 kgf-m, 4.4 ft-lb)
Nut: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

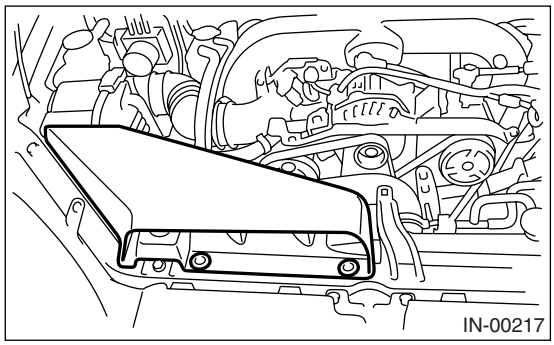
C: INSPECTION

Check for cracks or loose connections.

4. Air Intake Duct

A: REMOVAL

Remove the clips which install the air intake duct on the front side of body.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Check for cracks or loose connection.
2) Inspect that no foreign objects in the air intake duct.

5. Resonator Chamber

A: REMOVAL

Refer to “Air Cleaner Case” for removal procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>

B: INSTALLATION

Refer to “Air Cleaner Case” for installation procedure because the resonator chamber forms a single unit with air cleaner case. <Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>

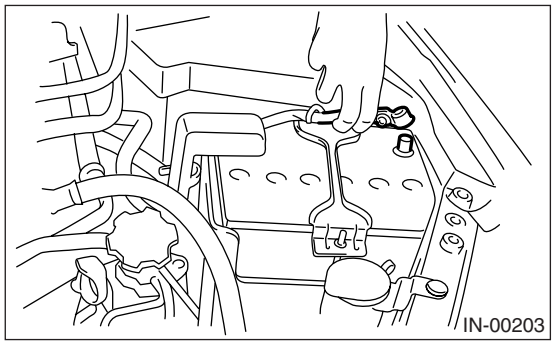
C: INSPECTION

Check for cracks or loose connections.

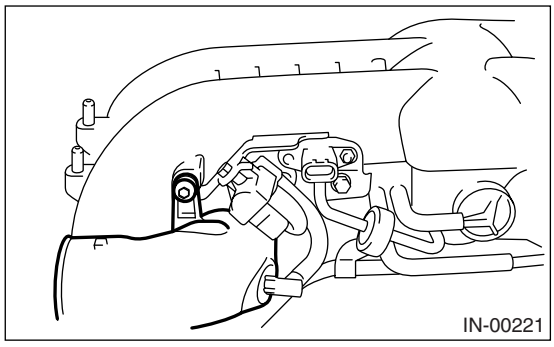
6. Intake Duct

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



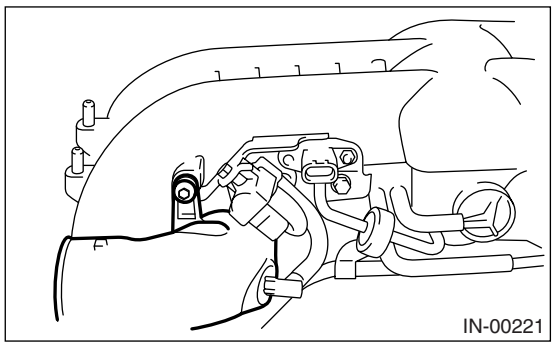
3) Remove the intake manifold.
<Ref. to FU(H4DOTC)-13, REMOVAL, Intake Manifold.>
4) Remove the sensor, engine harness and fuel pipe attached to the intake manifold. <Ref. to FU(H4DOTC)-17, DISASSEMBLY, Intake Manifold.>
5) Remove the intake duct from intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

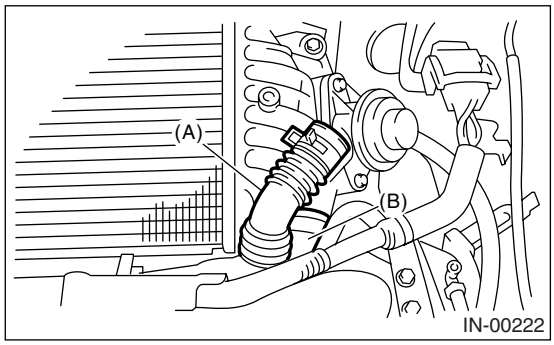
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



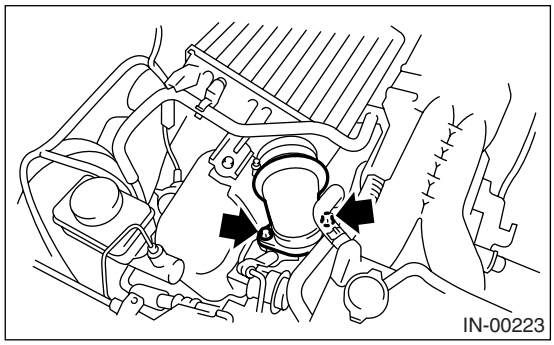
7. Intercooler

A: REMOVAL

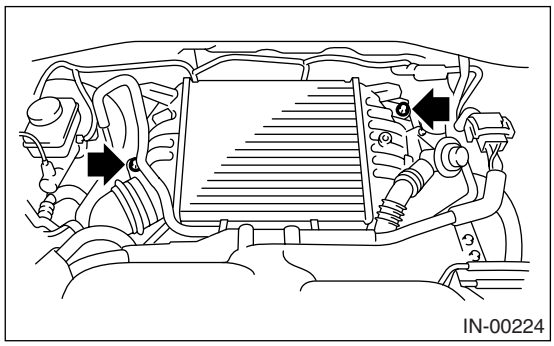
1) Remove the collector cover.
2) Loosen the clamp, and then remove the air by-pass pipe (A) from air by-pass valve.
3) Loosen the clamp, and then remove the intake duct (B) from intercooler.



4) Remove the bolts which secure intake duct to turbocharger.



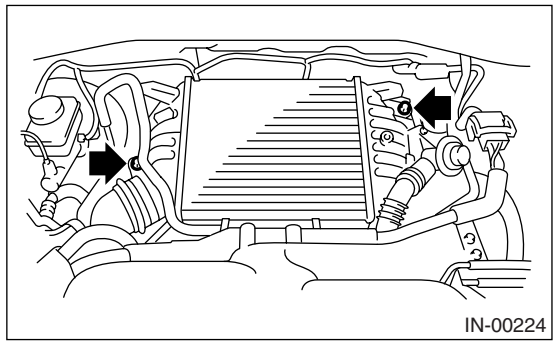
5) Remove the bolts which secure intercooler to bracket, and then remove the intercooler.

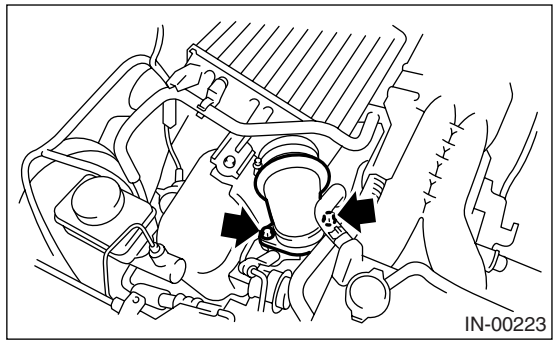


B: INSTALLATION

Install in the reverse order of removal.

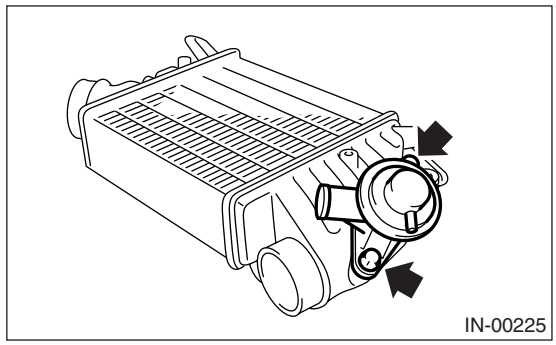
Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)





C: DISASSEMBLY

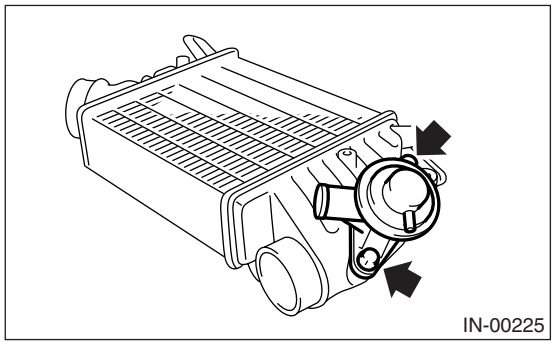
1) Remove the intake ducts from intercooler.
2) Remove the air by-pass valve from intercooler.



D: ASSEMBLY

Assemble in the reverse order of disassembly.

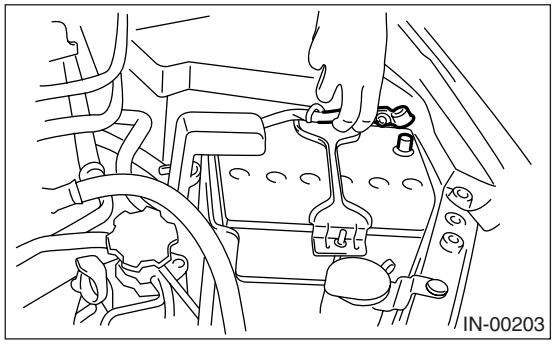
Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



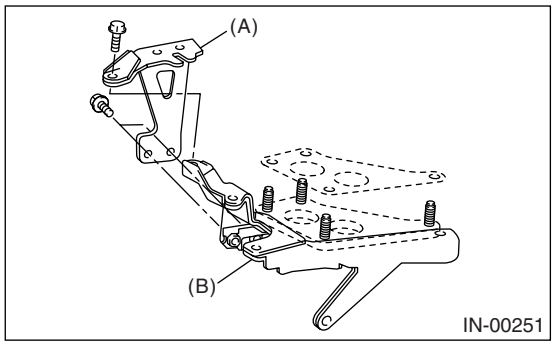
8. Turbocharger

A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.

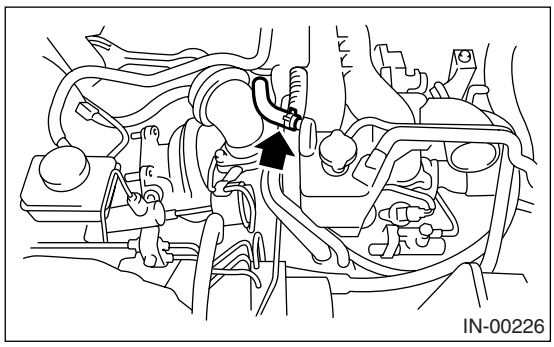


4) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the intercooler bracket RH.
6) Remove the linear motion mounting.
<Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
7) Remove the linear motion mounting bracket.

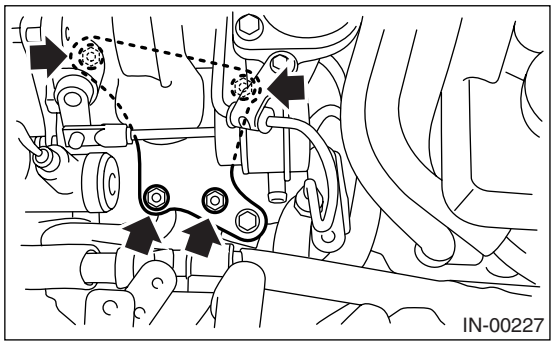


(A) Linear motion mounting bracket
(B) Turbocharger bracket

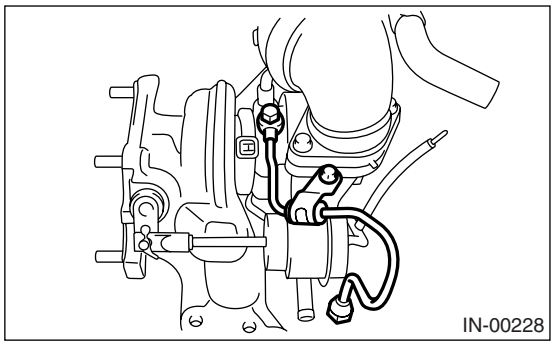
8) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
9) Lower the vehicle.
10) Disconnect the engine coolant hose which is connected to coolant filler tank.



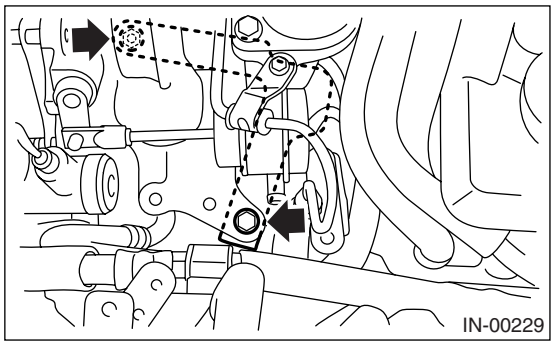
11) Separate the turbocharger joint pipe from turbocharger.



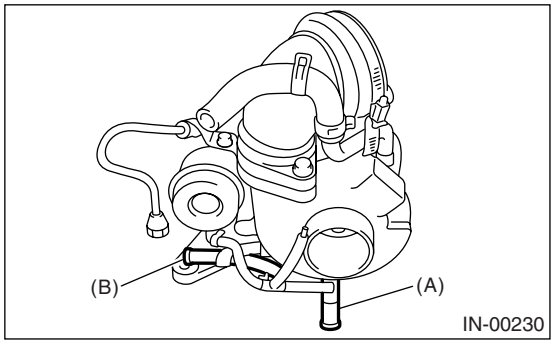
12) Remove the bolts which secure oil pipe bracket to turbocharger.
13) Remove the oil inlet pipe from turbocharger.



14) Remove the bolts which secure turbocharger to bracket.



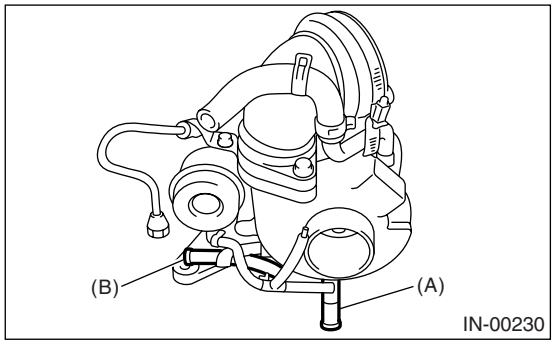
15) Disconnect the hoses from the oil outlet pipe (A) and coolant pipe (B) located under the turbocharger.



16) Take out the turbocharger from engine compartment.

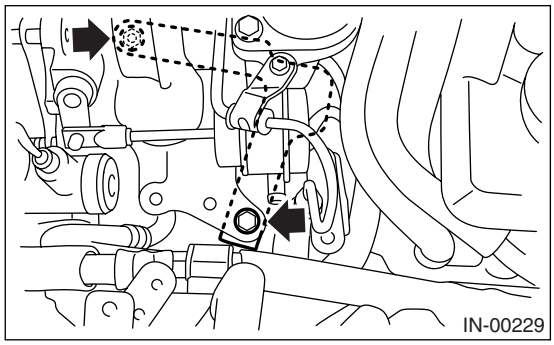
B: INSTALLATION

1) Connect the hoses to the oil outlet pipe (A) and coolant pipe (B) located under the turbocharger.



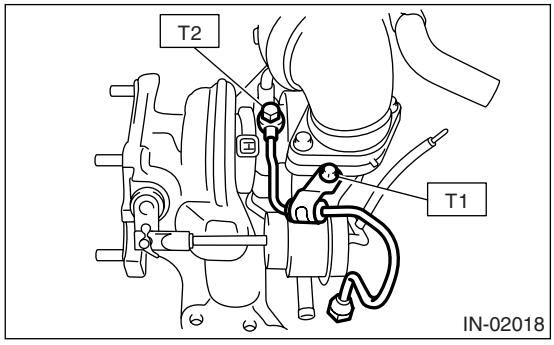
2) Install the turbocharger to bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 24.6 ft-lb)



3) Install the oil inlet pipe to turbocharger.

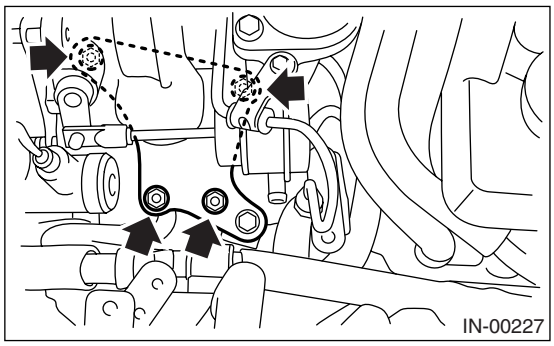
Tightening torque:
T1: 5.0 N·m (0.51 kgf-m, 3.7 ft-lb)
T2: 16 N·m (1.6 kgf-m, 11.6 ft-lb)



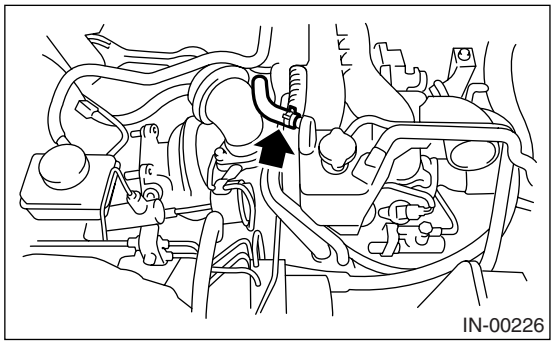
4) Install the joint pipe to turbocharger.

NOTE:
Use a new gasket.

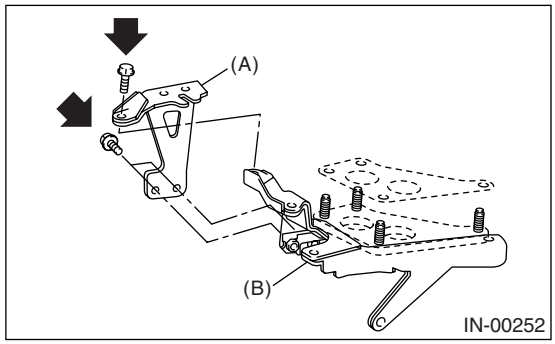
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)



5) Connect the engine coolant hose which is connected to the coolant filler tank.



6) Lift-up the vehicle.
7) Install the center exhaust pipe.
<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.>
8) Install the linear motion mounting bracket.



(A) Linear motion mounting bracket
(B) Turbocharger bracket

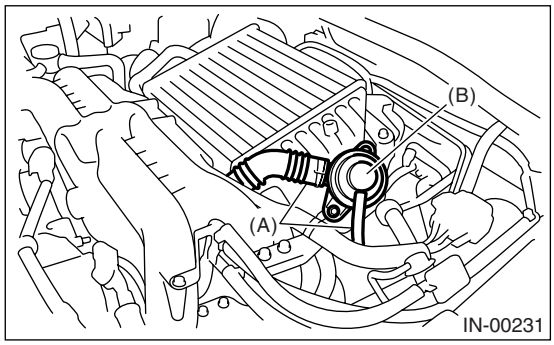
Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)

9) Install the linear motion mounting.
<Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>
10) Install the intercooler bracket RH.
11) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
12) Install the collector cover.

9. Air By-pass Valve

A: REMOVAL

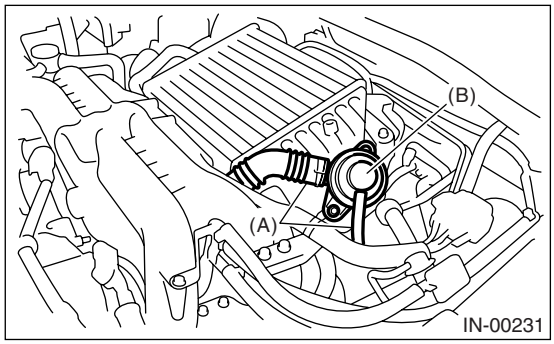
1) Remove the collector cover.
2) Disconnect the air by-pass hose (A) from air by-pass valve.
3) Remove the air by-pass valve (B) from intercooler.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.5 N·m (0.66 kgf-m, 4.8 ft-lb)



(A) Air by-pass hose
(B) Air by-pass valve

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

MECHANICAL

ME(H4DOTC)

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1. General Description

A: SPECIFICATION

Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 4-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Belt driven, double overhead camshaft, 4 valves/cylinder
	Bore × Stroke mm (in)			92 × 75 (3.62 × 2.95)
	Displacement cm^3 (cu in)			1,994 (121.67)
	Compression ratio			9.5
	Compression pressure (at 400 rpm) kPa (kg/cm^2, psi)			1,100 — 1,300 (11.2 — 13.3, 160 — 189)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Open	Max.retard	ATDC 6°
			Min.advance	BTDC 37°
		Close	Max.retard	ABDC 62°
			Min.advance	ABDC 19°
	Exhaust valve timing	Open	Max.retard	BBDC 60°
			Min.advance	BBDC 30°
		Close	Max.retard	BTDC 2°
			Min.advance	ATDC 28°
	Valve clearance mm (in)	Intake		$0.20\ ^{+0.04}_{-0.06}$ ($0.0079\ ^{+0.0016}_{-0.0024}$)
		Exhaust		0.35±0.05 (0.0138±0.0020)
	Idle speed [“P”/“N” range] rpm		No-load	650±50
			A/C ON	825±50
	Ignition order			1 → 3 → 2 → 4
	Ignition timing BTDC/rpm			14°±3°/650

NOTE:
OS: Oversize US: Undersize

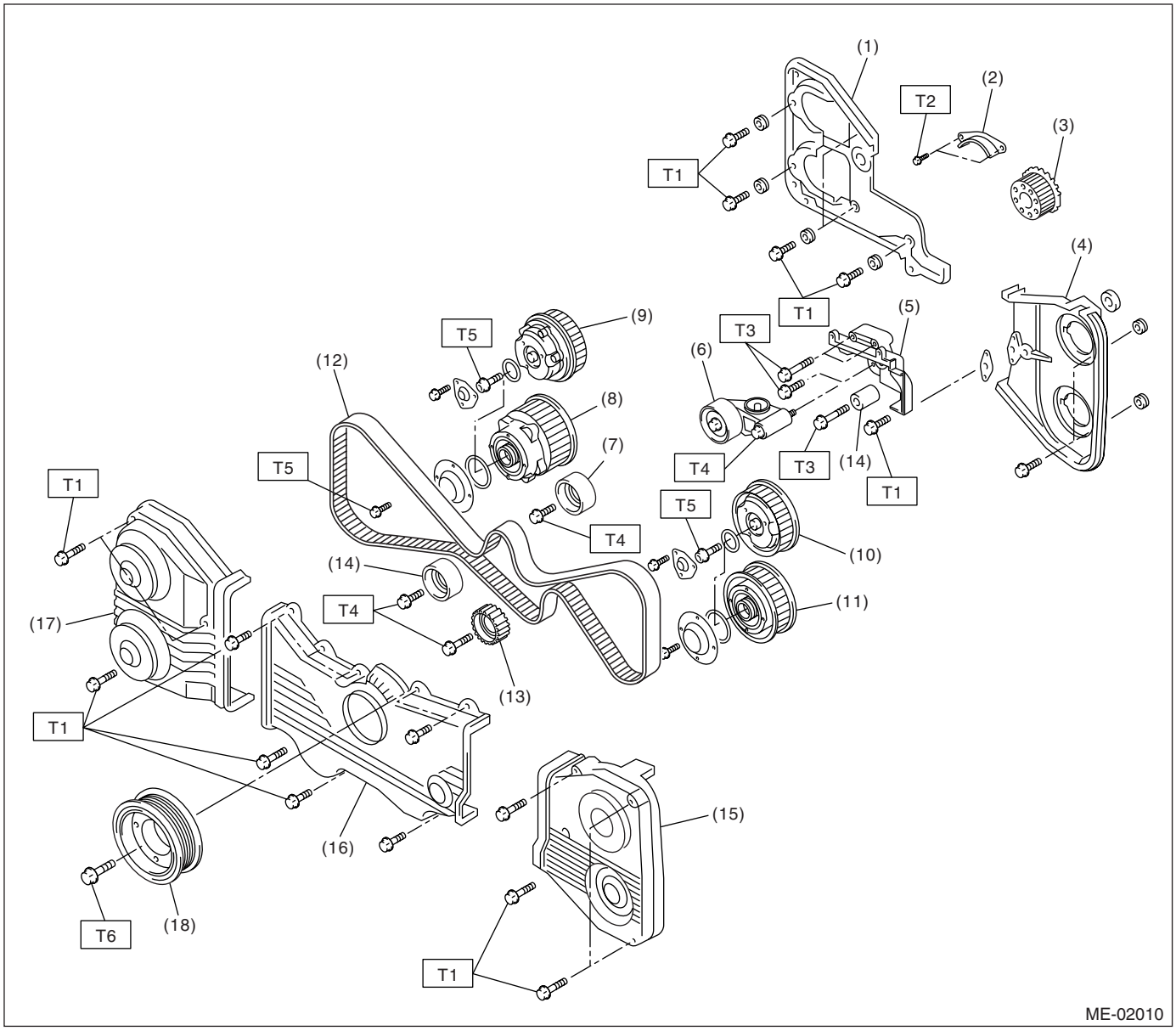
Belt tension adjuster	Protrusion of adjuster rod mm (in)			5.2 — 6.2 (0.205 — 0.244)
Belt tensioner	Spacer O.D. mm (in)			17.955 — 17.975 (0.7069 — 0.7077)
	Tensioner bush I.D. mm (in)			18.0 — 18.08 (0.7087 — 0.7118)
	Clearance between spacer and bush mm (in)		Standard	0.025 — 0.125 (0.0010 — 0.0049)
	Side clearance of spacer mm (in)		Standard	0.2 — 0.55 (0.0079 — 0.0217)
Camshaft	Bend limit mm (in)			0.020 (0.0079) or less
	Side clearance mm (in)		Standard	0.068 — 0.116 (0.0027 — 0.0047)
	Cam lobe height mm (in)	Intake	Standard	45.85 — 45.95 (1.805 — 1.809)
		Exhaust	Standard	45.75 — 45.85 (1.801 — 1.805)
	Journal O.D. mm (in)	Standard	Front	37.946 — 37.963 (1.4939 — 1.4946)
			Center rear	29.946 — 29.963 (1.1790 — 1.1796)
	Clearance at journal mm (in)		Standard	0.037 — 0.072 (0.0015 — 0.0028)
Cylinder Head	Surface warpage limit mm (in)			0.035 (0.0014)
	Grinding limit mm (in)			0.3 (0.012)
	Standard height mm (in)			127.5 (5.02)
Valve seat	Refacing angle			90°
	Contacting width mm (in)	Intake	Standard	0.6 — 1.4 (0.024 — 0.055)
		Exhaust	Standard	1.2 — 1.8 (0.047 — 0.071)
Valve guide	Inside diameter mm (in)			6.000 — 6.012 (0.2362 — 0.2367)
	Protrusion above head mm (in)			15.8 — 16.2 (0.622 — 0.638)

Valve	Head edge thickness mm (in)	Intake	Standard	1.0 — 1.4 (0.039 — 0.055)
		Exhaust	Standard	1.3 — 1.7 (0.051 — 0.067)
	Stem outer diameters mm (in)	Intake		5.955 — 5.970 (0.2344 — 0.2350)
		Exhaust		5.945 — 5.960 (0.2341 — 0.2346)
	Valve stem gap mm (in)	Standard	Intake	0.030 — 0.057 (0.0012 — 0.0022)
			Exhaust	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)	Intake		104.4 (4.110)
		Exhaust		104.65 (4.1201)
Valve springs	Free length mm (in)			44.67 (1.759)
	Squareness			2.5°, 2.0 mm (0.079 in)
	Tension/spring height N (kgf, lb)/mm (in)		Set	206 — 236 (21.0 — 24.1, 46.3 — 53.1)/36.0 (1.417)
			Lift	485 — 537 (49.5 — 54.8, 109 — 121)/26.00 (1.024)
Cylinder block	Surface warpage limit (mating with cylinder head) mm (in)			0.025 (0.00098)
	Grinding limit mm (in)			0.1 (0.004)
	Cylinder inner diameter mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
			B	91.995 — 92.005 (3.6218 — 3.6222)
	Taper mm (in)		Standard	0.015 (0.0006)
	Out-of-roundness mm (in)		Standard	0.010 (0.0004)
	Piston clearance mm (in)		Standard	−0.010 — 0.010 (−0.00039 — 0.00039)
	Boring limit mm (in)			0.5 (0.020)
Piston	Outer diameter mm (in)	Standard	A	92.005 — 92.015 (3.6222 — 3.6226)
			B	91.995 — 92.005 (3.6219 — 3.6222)
		0.25 (0.0098) OS		92.245 — 92.265 (3.6317 — 3.6467)
		0.50 (0.0197) OS		92.495 — 92.515 (3.6415 — 3.6423)
Piston pin	Standard clearance between piston and piston pin mm (in)		Standard	0.004 — 0.008 (0.0002 — 0.0003)
	Degree of fit			Piston pin must be fitted into position with thumb at 20°C (68°F).
Piston ring	Ring closed gap mm (in)	Top ring	Standard	Outer circle side: 0.20 — 0.25 (0.0079 — 0.0098)
				Inner circle side: 0.20 — 0.35 (0.0079 — 0.014)
		Second ring	Standard	0.40 — 0.50 (0.016 — 0.020)
		Oil ring	Standard	0.20 — 0.50 (0.0079 — 0.0197)
	Ring groove gap mm (in)	Top ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)
		Second ring	Standard	0.030 — 0.070 (0.0012 — 0.0028)
Connecting rod	Bend or twist per 100 mm (3.94 in) in length mm (in)		Limit	0.10 (0.0039)
	Side clearance of large end mm (in)		Standard	0.070 — 0.330 (0.0028 — 0.0130)
Bearing of large end	Oil clearance mm (in)		Standard	0.026 — 0.052 (0.0010 — 0.0020)
	Bearing size (Thickness at center) mm (in)	Standard		1.486 — 1.498 (0.0585 — 0.0590)
		0.03 (0.0012) US		1.504 — 1.512 (0.0592 — 0.0595)
		0.05 (0.0020) US		1.514 — 1.522 (0.0596 — 0.0599)
		0.25 (0.0098) US		1.614 — 1.622 (0.0635 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)		Standard	0 — 0.022 (0 — 0.0009)

Crankshaft	Bend limit			mm (in)	0.035 (0.0014)
	Crank pin and crank journal	Out-of-roundness		mm (in)	0.005 (0.0002) or less
		Grinding limit (dia.)		mm (in)	51.750 (2.0374)
	Crank pin outer diameter mm (in)		Standard		51.984 — 52.000 (2.0466 — 2.0472)
			0.03 (0.0012) US		51.954 — 51.970 (2.0454 — 2.0461)
			0.05 (0.0020) US		51.934 — 51.950 (2.0447 — 2.0453)
			0.25 (0.0098) US		51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter mm (in)		Standard		59.992 — 60.008 (2.3619 — 2.3625)
			0.03 (0.0012) US		59.962 — 59.978 (2.3607 — 2.3613)
			0.05 (0.0020) US		59.942 — 59.958 (2.3599 — 2.3605)
			0.25 (0.0098) US		59.742 — 59.758 (2.3520 — 2.3527)
	Side clearance			mm (in)	Standard 0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance			mm (in)	Standard 0.010 — 0.030 (0.00039 — 0.0012)
Main bearing	Bearing size (Thickness at center) mm (in)	#1, #3	Standard		1.998 — 2.011 (0.0787 — 0.0792)
			0.03 (0.0012) US		2.017 — 2.020 (0.0794 — 0.0795)
			0.05 (0.0020) US		2.027 — 2.030 (0.0798 — 0.0799)
			0.25 (0.0098) US		2.127 — 2.130 (0.0837 — 0.0839)
		#2, #4, #5	Standard		2.000 — 2.013 (0.0787 — 0.0793)
			0.03 (0.0012) US		2.019 — 2.022 (0.0795 — 0.0796)
			0.05 (0.0020) US		2.029 — 2.032 (0.0799 — 0.0800)
			0.25 (0.0098) US		2.129 — 2.132 (0.0838 — 0.0839)

B: COMPONENT

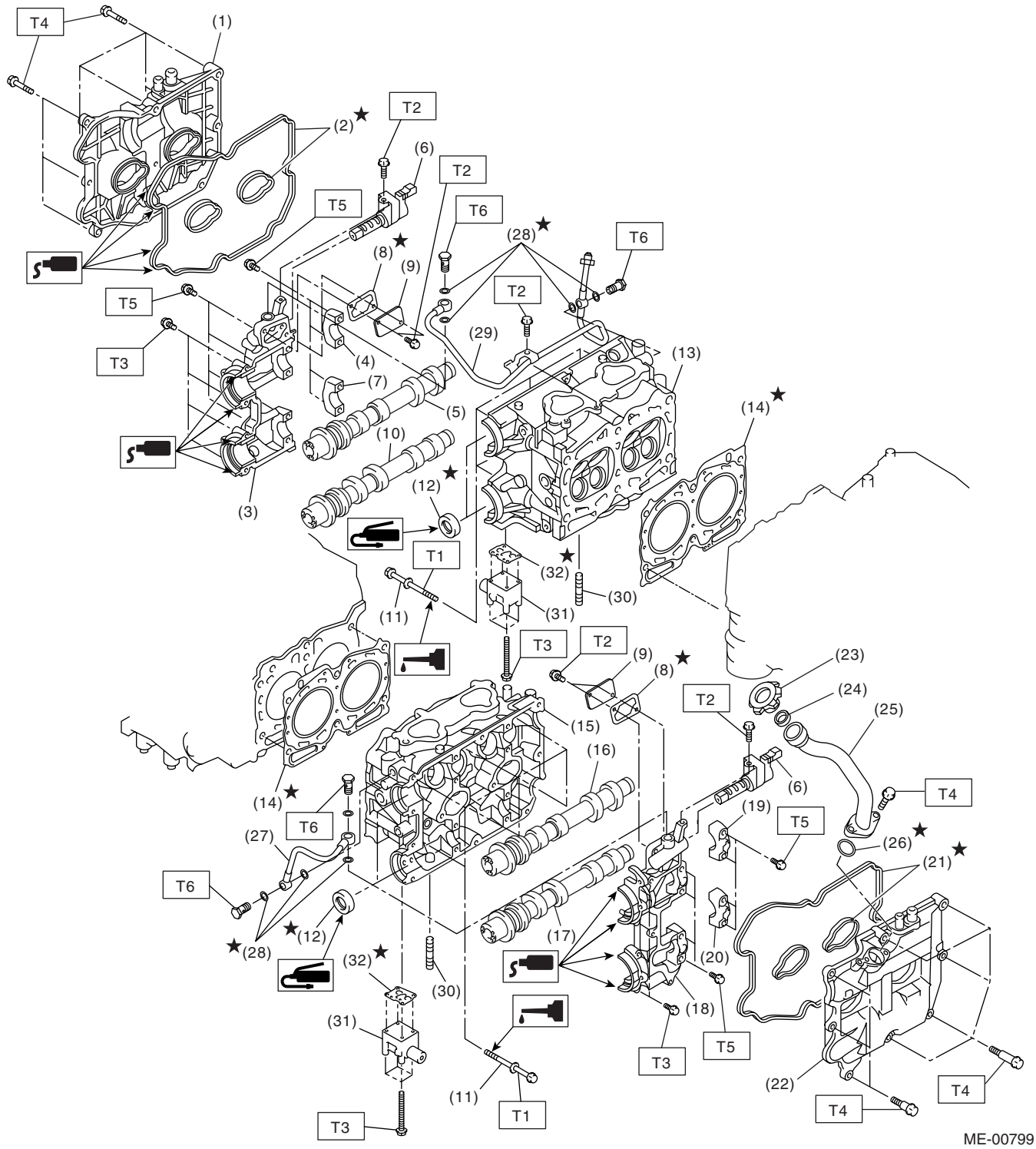
1. TIMING BELT



(1) Timing belt cover No. 2 (RH)
(2) Timing belt guide
(3) Crank sprocket
(4) Timing belt cover No. 2 (LH)
(5) Tensioner bracket
(6) Automatic belt tension adjuster ASSY
(7) Belt idler
(8) Exhaust cam sprocket (RH)
(9) Intake cam sprocket (RH)
(10) Intake cam sprocket (LH)
(11) Exhaust cam sprocket (LH)
(12) Timing Belt
(13) Belt idler No. 2
(14) Belt idler
(15) Timing belt cover (LH)
(16) Front belt cover
(17) Timing belt cover (RH)
(18) Crank pulley

Tightening torque: N·m (kgf-m, ft-lb)
T1: 5 (0.5, 3.6)
T2: 10 (1.0, 7.2)
T3: 25 (2.5, 18.1)
T4: 39 (4.0, 28.9)
T5: <Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
T6: <Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>

2. CYLINDER HEAD AND CAMSHAFT

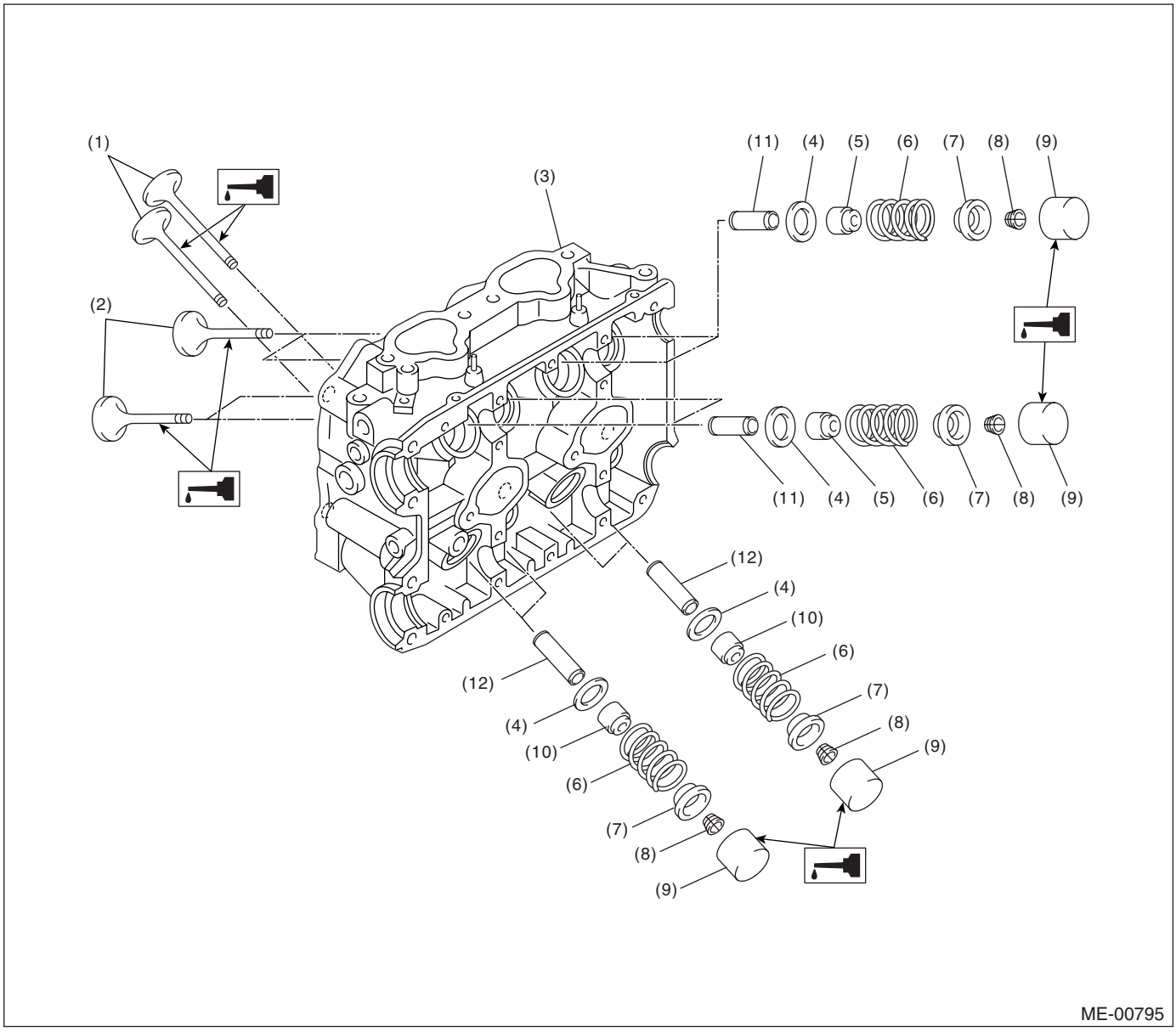


(1) Rocker cover (RH)
(2) Rocker cover gasket (RH)
(3) Camshaft cap (Front RH)
(4) Intake camshaft cap (Rear RH)
(5) Intake camshaft (RH)
(6) Oil flow control solenoid valve (Intake)
(7) Exhaust camshaft cap (Rear RH)
(8) Gasket
(9) Oil return cover
(10) Exhaust camshaft (RH)
(11) Cylinder head bolt
(12) Oil seal
(13) Cylinder head (RH)
(14) Cylinder head gasket
(15) Cylinder head (LH)
(16) Intake camshaft (LH)
(17) Exhaust camshaft (LH)
(18) Camshaft cap (Front LH)
(19) Intake camshaft cap (Rear LH)
(20) Exhaust camshaft cap (Rear LH)
(21) Rocker cover gasket (LH)
(22) Rocker cover (LH)
(23) Oil filler cap
(24) Gasket
(25) Oil filler duct
(26) O-ring
(27) Oil pipe (LH)
(28) Gasket
(29) Oil pipe (RH)
(30) Stud bolt
(31) Oil flow control solenoid valve (Exhaust)
(32) Gasket

Tightening torque: N·m (kgf-m, ft-lb)

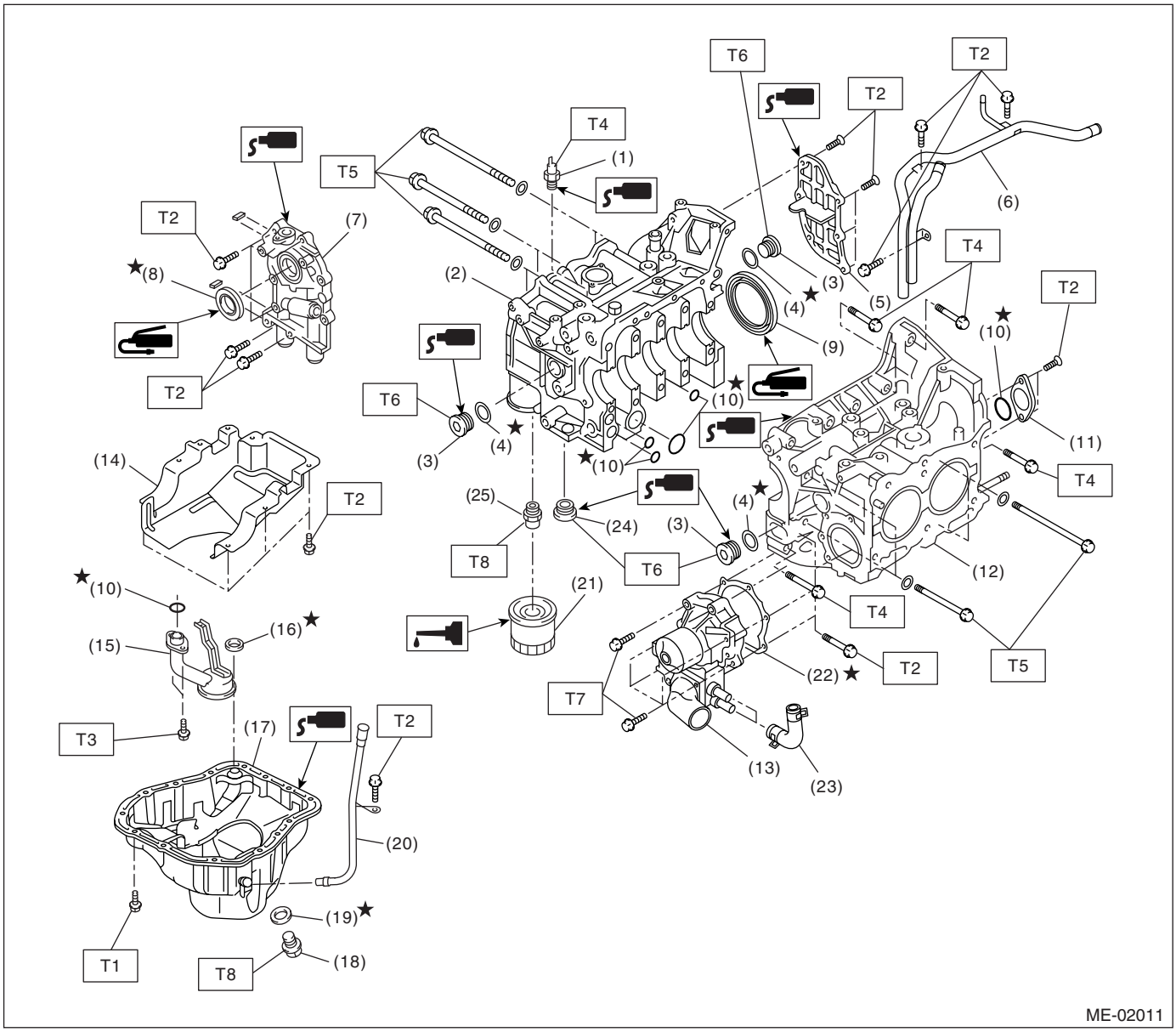
T1:	***<Ref. to ME(H4DOTC)-59, INSTALLATION, Cylinder Head.>***
T2:	***8 (0.8, 5.9)***
T3:	***10 (1.0, 7.2)***
T4:	***6.4 (0.65, 4.7)***
T5:	***20 (2.0, 14.5)***
T6:	***29 (3.0, 21.4)***

3. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve springs
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

4. CYLINDER BLOCK

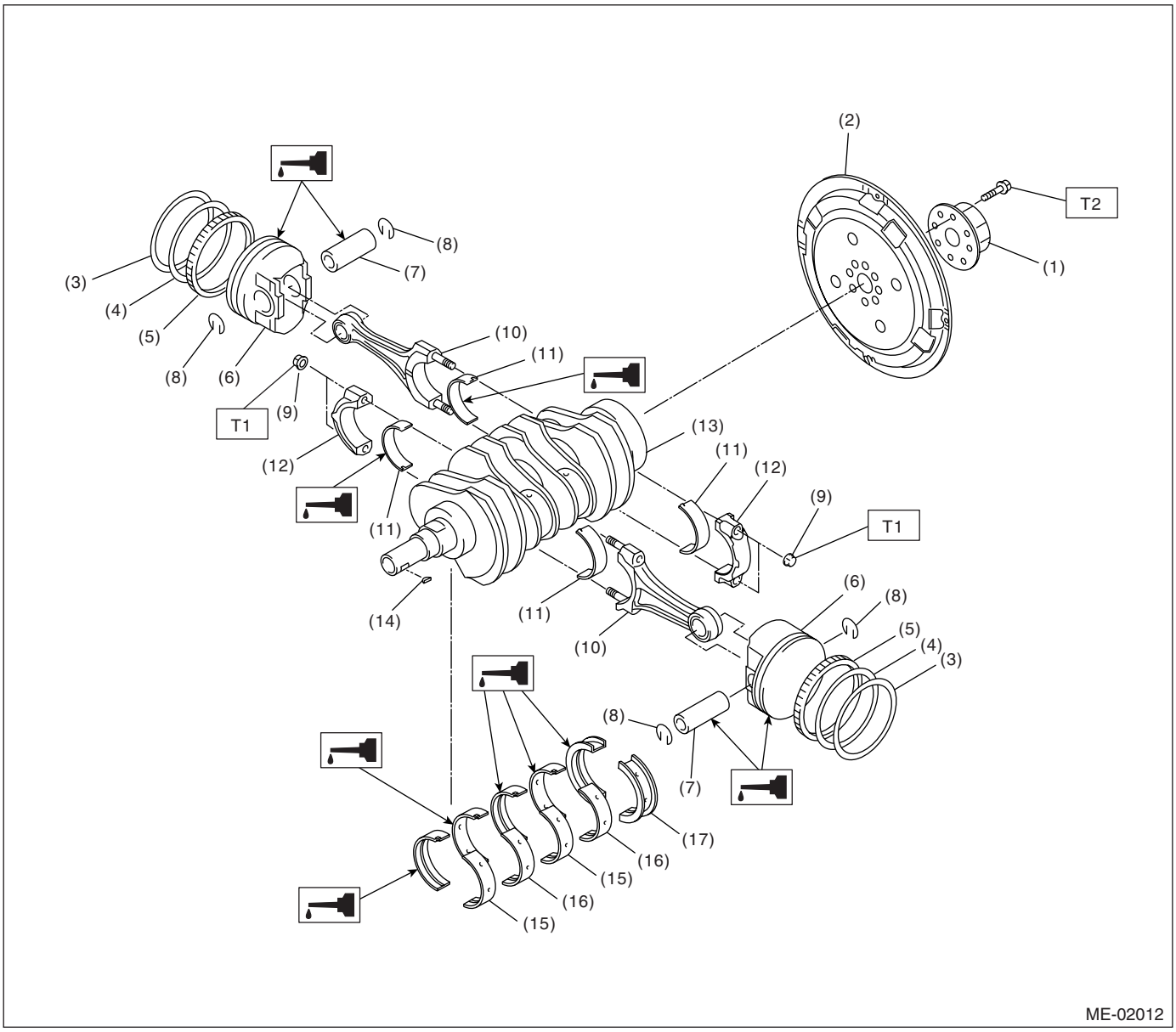


(1) Oil pressure switch
(2) Cylinder block (RH)
(3) Service hole plug
(4) Gasket
(5) Oil separator cover
(6) Water by-pass pipe
(7) Oil pump
(8) Front oil seal
(9) Rear oil seal
(10) O-ring
(11) Service hole cover
(12) Cylinder block (LH)
(13) Water pump
(14) Baffle plate
(15) Oil strainer
(16) Gasket
(17) Oil pan
(18) Drain plug
(19) Metal gasket
(20) Oil level gauge guide
(21) Oil filter
(22) Gasket
(23) Water pump hose
(24) Plug
(25) Connector

Tightening torque: N·m (kgf-m, ft-lb)

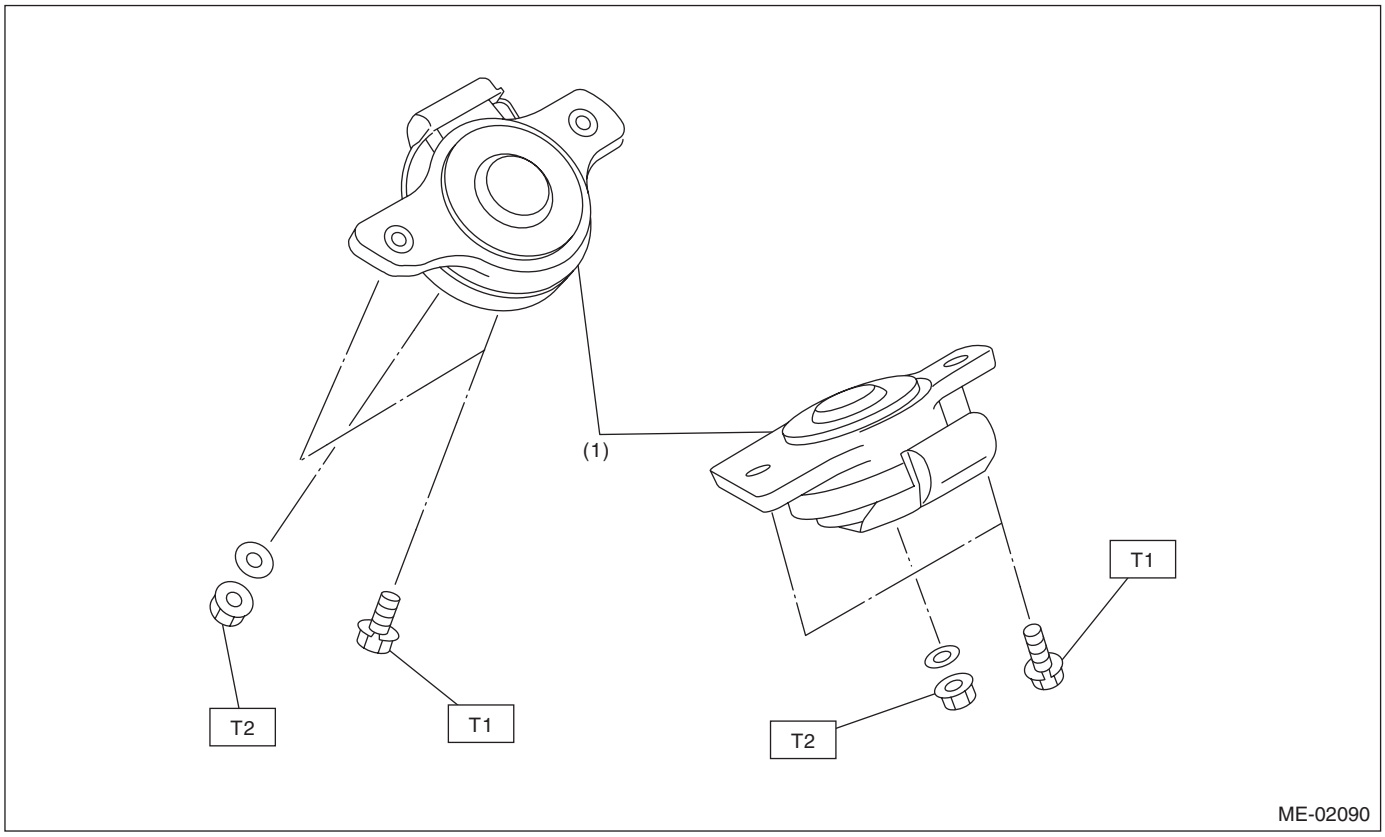
T1: 5 (0.5, 3.6)
T2: 6.4 (0.65, 4.7)
T3: 10 (1.0, 7.2)
T4: 25 (2.5, 18.1)
T5: <Ref. to ME(H4DOTC)-69, INSTALLATION, Cylinder Block.>
T6: 70 (7.1, 51.6)
T7: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)
T8: 44 (4.5, 33)

5. CRANKSHAFT AND PISTON



(1)	Reinforcement	(8)	Snap ring	(15)	Crankshaft bearing #1, #3
(2)	Drive plate	(9)	Connecting rod nut	(16)	Crankshaft bearing #2, #4
(3)	Top ring	(10)	Connecting rod	(17)	Crankshaft bearing #5
(4)	Second ring	(11)	Connecting rod bearing		
(5)	Oil ring	(12)	Connecting rod cap	***Tightening torque: N·m (kgf-m, ft-lb)***	
(6)	Piston	(13)	Crankshaft	***T1:***	***52 (5.3, 38.4)***
(7)	Piston pin	(14)	Woodruff key	***T2:***	***72 (7.3, 53.1)***

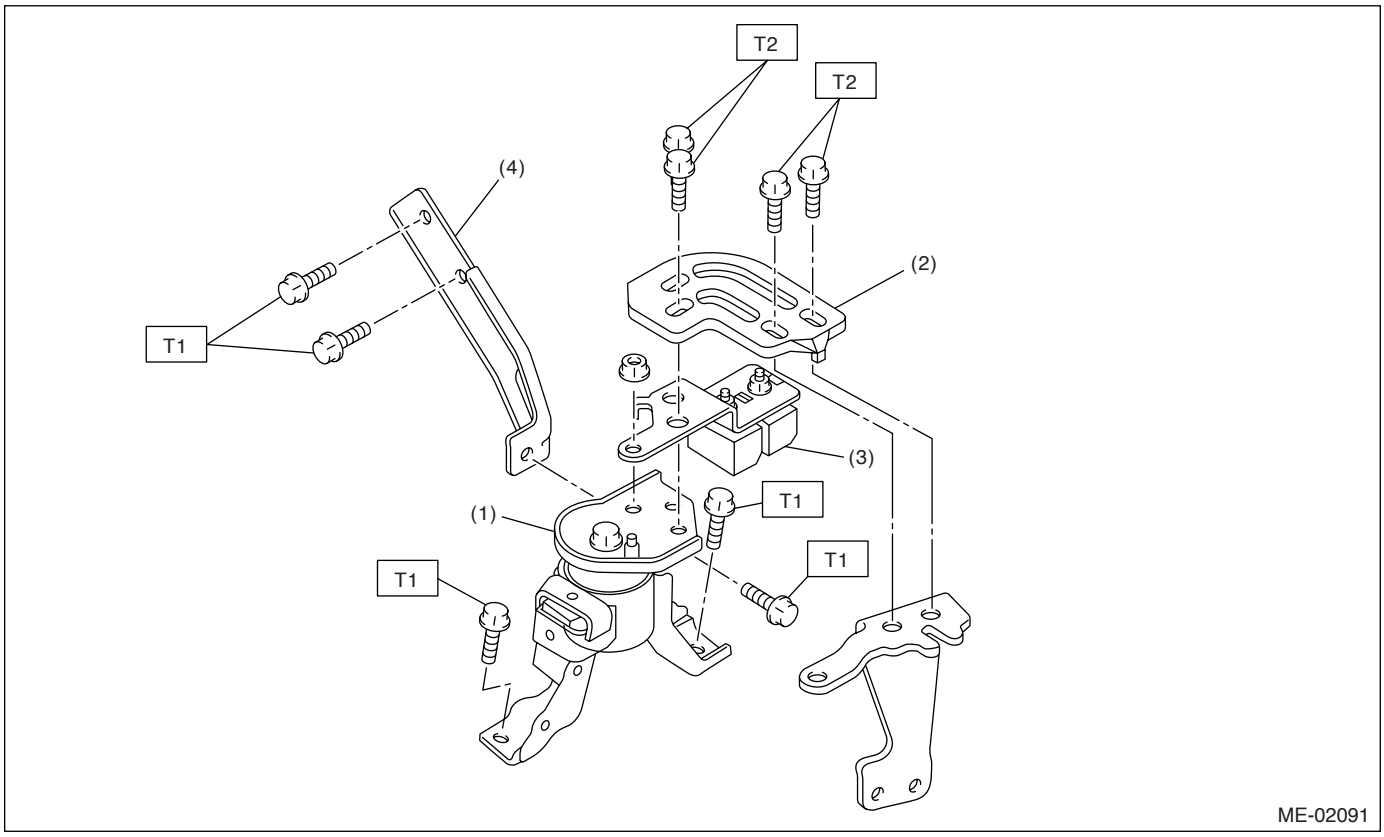
6. ENGINE MOUNTING



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 62.7)

7. LINEAR MOTION MOUNTING



(1) Linear motion mounting
(2) Linear motion mounting bracket
(3) Dynamic damper
(4) Bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 33 (3.4, 24.3)
T2: 30 (3.1, 22.1)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools, or not to stain seats and windows with coolant or oil. Place a cover over fender, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOL

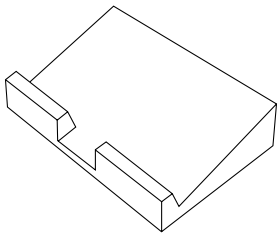
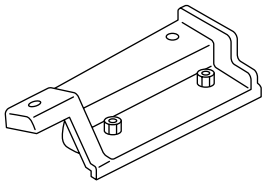
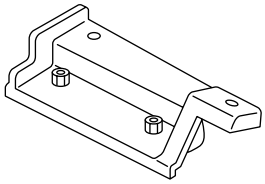
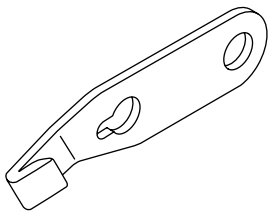
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498267600	498267600	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST-498457000	498457000	ENGINE STAND ADAPTER RH	Used with ENGINE STAND (499817000).
 ST-498457100	498457100	ENGINE STAND ADAPTER LH	Used with ENGINE STAND (499817000).
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of drive plate when loosening/tightening crank pulley bolt.

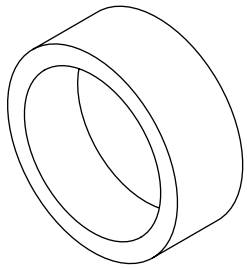
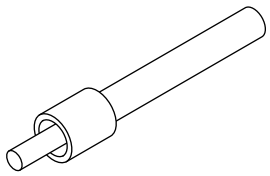
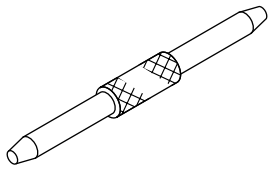
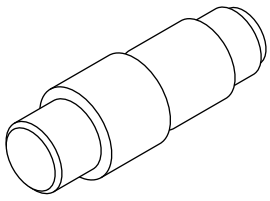
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398744300	398744300	PISTON GUIDE	Used for installing piston in cylinder.
 ST-498857100	498857100	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST-499017100	499017100	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST-499037100	499037100	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.

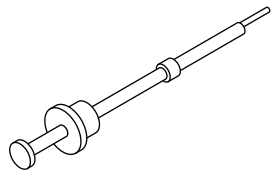
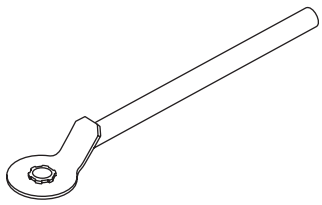
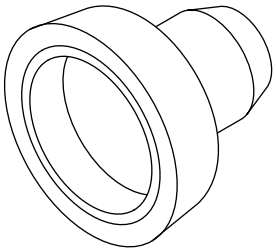
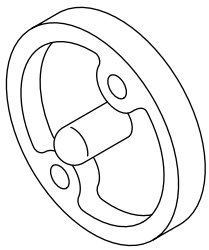
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499097700	499097700	PISTON PIN REMOVER ASSY	Used for removing piston pin.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing the intake cam sprocket and exhaust cam sprocket.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

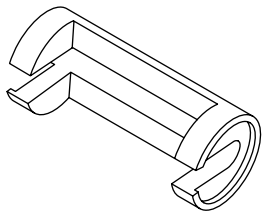
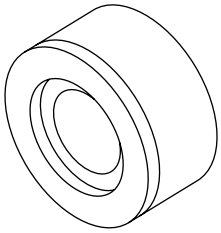
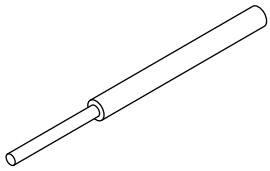
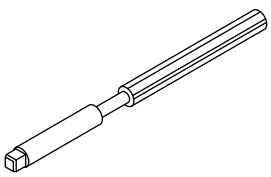
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA020	18251AA020	VALVE GUIDE ADJUSTER	Used for installing intake and exhaust valve guides.
 ST-499767200	499767200	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499767400	499767400	VALVE GUIDE REAMER	Used for reaming valve guides.

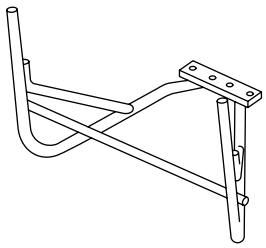
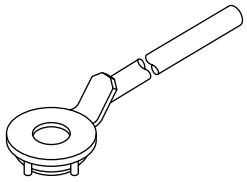
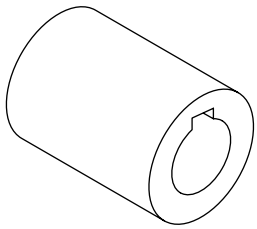
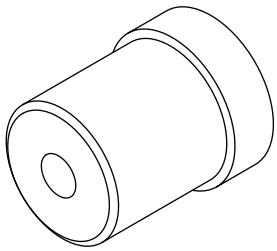
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499817000	499817000	ENGINE STAND	• Stand used for engine disassembly and assembly. • Used with ENGINE STAND ADAPTER RH (498457000) & LH (498457100).
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt.
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil pump oil seal.

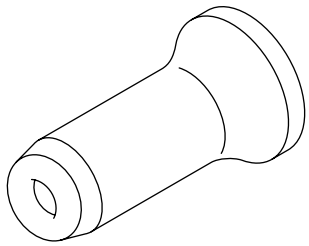
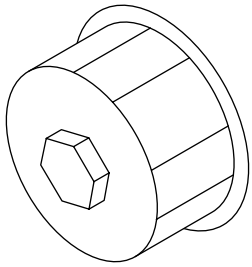
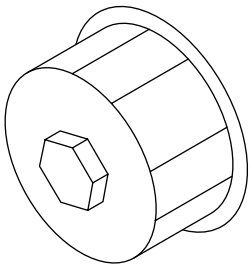
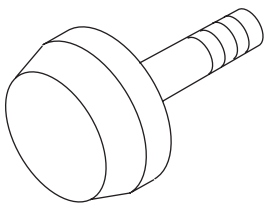
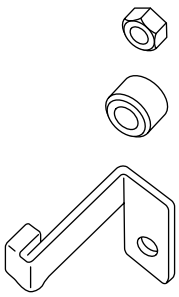
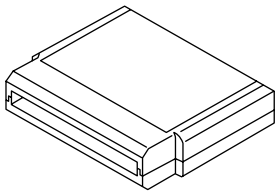
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587600	499587600	OIL SEAL INSTALLER	Used for installing camshaft oil seal for DOHC engine.
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))
 ST-499597200	499597200	OIL SEAL GUIDE	• Used for installing camshaft oil seal for DOHC engine. • Used with OIL SEAL INSTALLER (499587600)

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from vehicle.

- V-belt
- Timing belt
- Camshaft
- Cylinder head

2. Compression

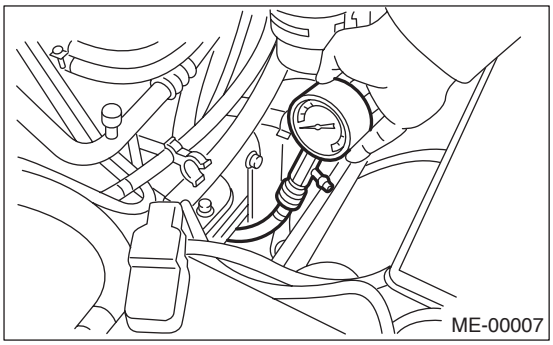
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) Remove the collector cover.
2) After warming-up the engine, turn the ignition switch to OFF.
3) Make sure that the battery is fully charged.
4) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
5) Remove all the spark plugs.
<Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>
6) Fully open the throttle valve.
7) Check the starter motor for satisfactory performance and operation.
8) Hold the compression gauge tight against the spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

9) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



10) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression pressure (Throttle fully open):
Standard:
1,100 — 1,300 kPa (11.2 — 13.3 kg/cm^2, 160 — 189 psi)
Difference between cylinders:
49 kPa (0.5 kgf/cm^2, 7 psi) or less

3. Idle Speed

A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine, and read the engine idle speed.
12) Check the idle speed when unloaded. (With headlights, heater fan, rear defroster, radiator fan, air conditioning, etc. OFF)

Idle speed [No load and gears in neutral]: 650±50 rpm

13) Check the idle speed when loaded. (Turn the air conditioning switch to “ON” and operate the compressor for at least one minute before measurement.)

Idle speed [A/C “ON”, and gears in neutral]: 825±50 rpm

NOTE:
Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted. If the idle speed is out of specifications, refer to General Diagnosis Table under “Engine Control System”. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

1) Before checking the ignition timing, check the following:
   (1) Ensure the air cleaner element is free from clogging, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine and check the ignition timing at idle speed.

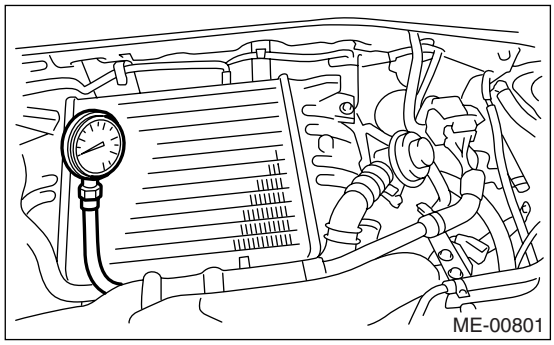
Ignition timing [BTDC/rpm]:
14°±3°/650

If the timing is not correct, check the ignition control system. Refer to “Engine Control System”. <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Remove the collector cover.
2) Idle the engine.
3) Disconnect the brake vacuum hose from intake manifold, and then install the vacuum gauge.
4) Keep the engine at idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, internal condition of the engine can be diagnosed as described below.



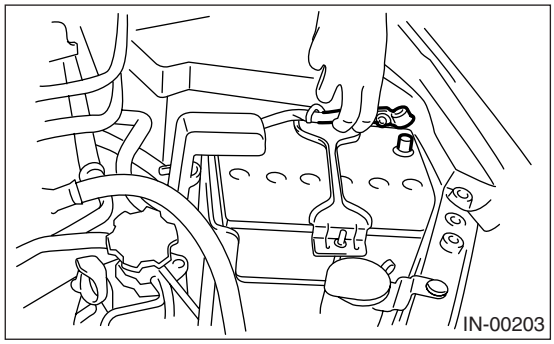
Vacuum pressure (at idling, A/C "OFF"):
−66.7 kPa (−500 mmHg, −19.70 inHg) or less

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle motion is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket, or disconnected or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Back pressure too high, or exhaust system clogged
3. Needle intermittently drops to the lower position than normal.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Sticky valve
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

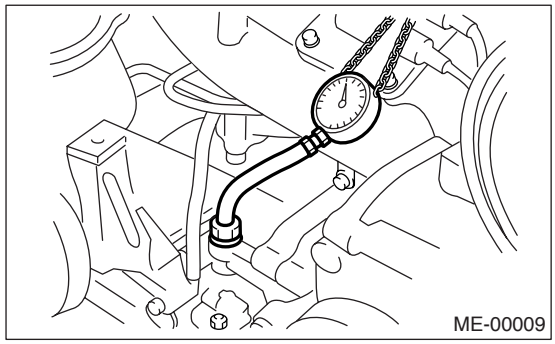
6. Engine Oil Pressure

A: INSPECTION

1) Remove the collector cover.
2) Remove the oil pressure switch from engine cylinder block. <Ref. to LU(H4DOTC)-16, REMOVAL, Oil Pressure Switch.>
3) Connect the oil pressure gauge hose to cylinder block.
4) Connect the battery ground cable to battery.



5) Start the engine, and measure the oil pressure.



Oil pressure:
Standard:
98 kPa (1.0 kgf/cm^2, 14 psi) or more (At 600 rpm)
588 kPa (6.0 kgf/cm^2, 85 psi) or more (At 6,000 rpm)

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H4DOTC)-18, INSPECTION, Engine Lubrication System Trouble in General.>
• If the oil pressure warning light is turned to ON and oil pressure is within specification, replace the oil pressure switch. <Ref. to LU(H4DOTC)-18, INSPECTION, Engine Lubrication System Trouble in General.>

NOTE:
The specified value is based on an engine oil temperature of 80°C (176°F).

6) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H4DOTC)-16, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

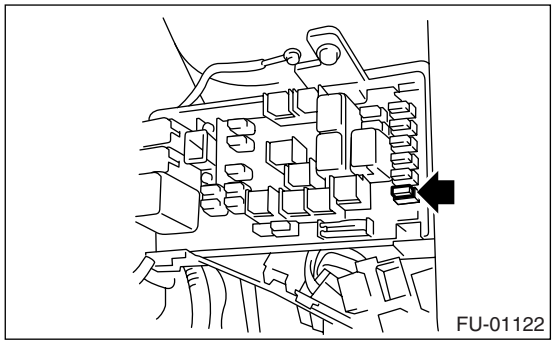
7. Fuel Pressure

A: INSPECTION

WARNING:
Before removing the fuel pressure gauge, release the fuel pressure.

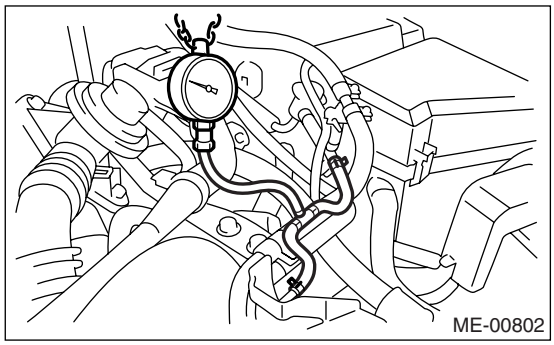
NOTE:
When the fuel pressure is out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Remove the collector cover.
2) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.>
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Disconnect the fuel delivery hose and connect fuel pressure gauge.
5) Remove the fuse of fuel pump from main fuse box.


FU-01122

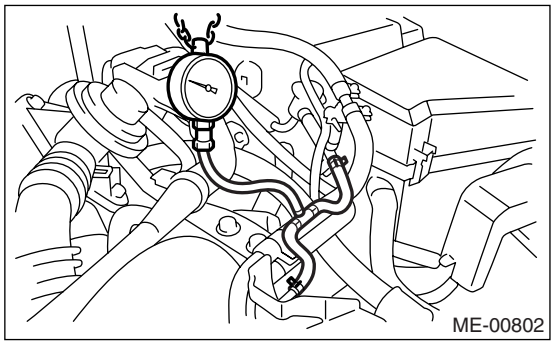
6) Start the engine.
7) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 284 — 314 kPa (2.9 — 3.2 kgf/cm^2, 41 — 46 psi)


ME-00802

8) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard: 230 — 260 kPa (2.35 — 2.65 kgf/cm^2, 33 — 38 psi)


ME-00802

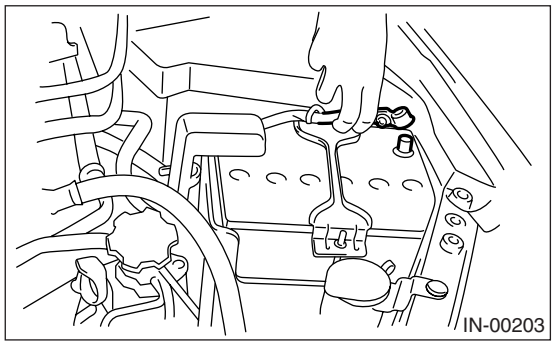
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

A: INSPECTION

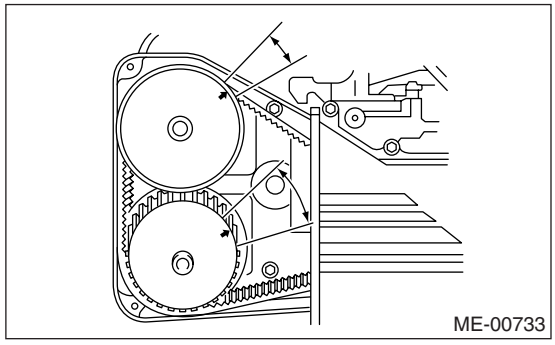
Inspection and adjustment of valve clearance should be performed while engine is cold.

1) Lift-up the vehicle.
2) Remove the under cover.
3) Lower the vehicle.
4) Remove the collector cover.
5) Disconnect the ground cable from battery.



6) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
7) Remove a bolt which secures timing belt cover (RH).
8) Loosen the remaining bolts which secure timing belt cover (RH), then remove the timing belt cover.
9) When inspecting #1 and #3 cylinders:
   (1) Remove the air cleaner case.
   <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
   (2) Disconnect the connector from ignition coil.
   (3) Remove the ignition coil.
   (4) Place a suitable container under the vehicle.
   (5) Disconnect the PCV hose from rocker cover (RH).
   (6) Remove the bolts, then remove the rocker cover (RH).
10) When inspecting #2 and #4 cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.
   (2) Disconnect the connector from ignition coil.
   (3) Remove the ignition coil.
   (4) Place a suitable container under the vehicle.
   (5) Disconnect the PCV hose from rocker cover (LH).
   (6) Remove the bolts, then remove the rocker cover (LH).
11) Turn the crank pulley clockwise until arrow mark on the cam sprocket is set to position shown in the figure.

NOTE:
Turn the crankshaft using a socket wrench.

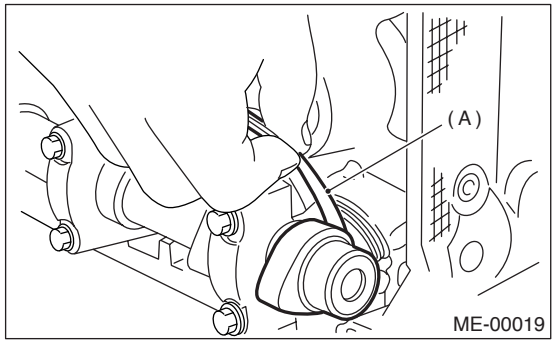


12) Measure the #1 cylinder intake valve and #3 cylinder exhaust valve clearance by using thickness gauge (A).

NOTE:
• Insert the thickness gauge in as horizontal a direction as possible with respect to the valve lifter.
• Measure the exhaust valve clearances while lifting-up the vehicle.

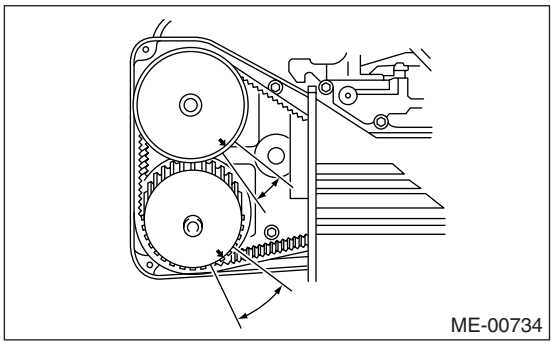
Valve clearance
Intake:
$0.20^{+0.04}_{-0.06}$ mm ($0.0079^{+0.0016}_{-0.0024}$ in)
Exhaust:
0.35 ± 0.05 mm (0.0138 ± 0.0020 in)

• If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.

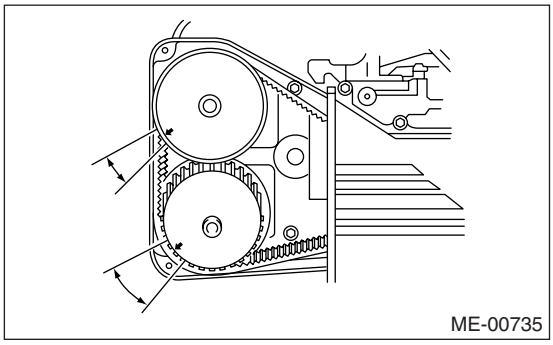


13) If necessary, adjust the valve clearance. <Ref. to ME(H4DOTC)-28, ADJUSTMENT, Valve Clearance.>
14) Further turn the crank pulley clockwise and then measure the valve clearances again.

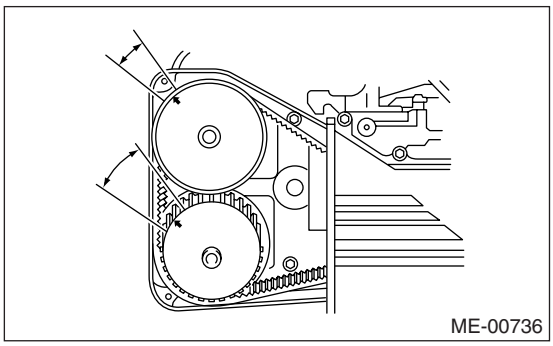
(1) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #2 cylinder exhaust valve and #3 cylinder intake valve clearances.



(2) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #2 cylinder intake valve and #4 cylinder exhaust valve clearances.



(3) Set the arrow mark on cam sprocket to the position shown in the figure, and measure the #1 cylinder exhaust valve and #4 cylinder intake valve clearances.



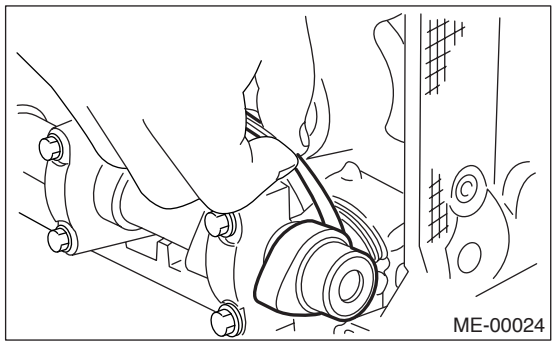
15) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

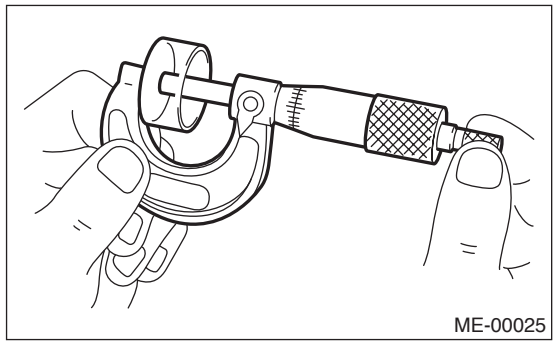
CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances. <Ref. to ME(H4DOTC)-27, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.



2) Remove the camshaft. <Ref. to ME(H4DOTC)-53, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of valve lifter with a micrometer.



5) Select a valve lifter of suitable thickness based on the measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: (mm)
Intake valve: S = (V + T) − 0.20 Exhaust valve: S = (V + T) − 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

Part number	Thickness mm (in)
13228 AB101	4.68 (0.1843)
13228 AB111	4.69 (0.1846)
13228 AB121	4.70 (0.1850)
13228 AB131	4.71 (0.1854)
13228 AB141	4.72 (0.1858)
13228 AB151	4.73 (0.1862)
13228 AB161	4.74 (0.1866)
13228 AB171	4.75 (0.1870)
13228 AB181	4.76 (0.1874)
13228 AB191	4.77 (0.1878)
13228 AB201	4.78 (0.1882)
13228 AB211	4.79 (0.1886)
13228 AB221	4.80 (0.1890)
13228 AB231	4.81 (0.1894)
13228 AB241	4.82 (0.1898)
13228 AB251	4.83 (0.1902)
13228 AB261	4.84 (0.1906)
13228 AB271	4.85 (0.1909)
13228 AB281	4.86 (0.1913)
13228 AB291	4.87 (0.1917)
13228 AB301	4.88 (0.1921)
13228 AB311	4.89 (0.1925)
13228 AB321	4.90 (0.1929)
13228 AB331	4.91 (0.1933)
13228 AB341	4.92 (0.1937)
13228 AB351	4.93 (0.1941)
13228 AB361	4.94 (0.1945)
13228 AB371	4.95 (0.1949)
13228 AB381	4.96 (0.1953)
13228 AB391	4.97 (0.1957)
13228 AB401	4.98 (0.1961)
13228 AB411	4.99 (0.1965)
13228 AB421	5.00 (0.1969)
13228 AB431	5.01 (0.1972)
13228 AB441	5.02 (0.1976)
13228 AB451	5.03 (0.1980)
13228 AB461	5.04 (0.1984)
13228 AB471	5.05 (0.1988)
13228 AB481	5.06 (0.1992)
13228 AB491	5.07 (0.1996)
13228 AB501	5.08 (0.2000)
13228 AB511	5.09 (0.2004)
13228 AB521	5.10 (0.2008)
13228 AB531	5.11 (0.2012)
13228 AB541	5.12 (0.2016)
13228 AB551	5.13 (0.2020)
13228 AB561	5.14 (0.2024)
13228 AB571	5.15 (0.2028)
13228 AB581	5.16 (0.2031)
13228 AB591	5.17 (0.2035)
13228 AB601	5.18 (0.2039)

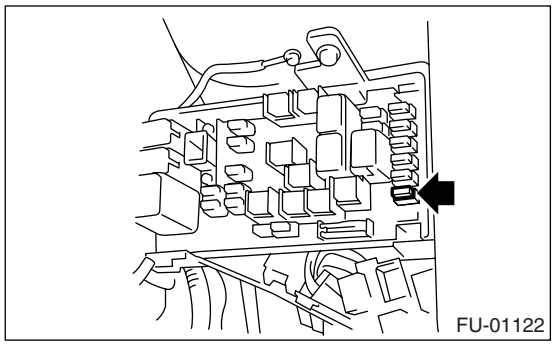
Part number	Thickness mm (in)
13228 AB611	5.19 (0.2043)
13228 AB621	5.20 (0.2047)
13228 AB631	5.21 (0.2051)
13228 AB641	5.22 (0.2055)
13228 AB651	5.23 (0.2059)
13228 AB661	5.24 (0.2063)
13228 AB671	5.25 (0.2067)
13228 AB681	5.26 (0.2071)
13228 AB691	5.27 (0.2075)
13228 AB701	4.38 (0.1724)
13228 AB711	4.40 (0.1732)
13228 AB721	4.42 (0.1740)
13228 AB731	4.44 (0.1748)
13228 AB741	4.46 (0.1756)
13228 AB751	4.48 (0.1764)
13228 AB761	4.50 (0.1771)
13228 AB771	4.52 (0.1780)
13228 AB781	4.54 (0.1787)
13228 AB791	4.56 (0.1795)
13228 AB801	4.58 (0.1803)
13228 AB811	4.60 (0.1811)
13228 AB821	4.62 (0.1819)
13228 AB831	4.64 (0.1827)
13228 AB841	4.66 (0.1835)
13228 AB851	5.29 (0.2083)
13228 AB861	5.31 (0.2091)
13228 AB871	5.33 (0.2098)
13228 AB881	5.35 (0.2106)
13228 AB891	5.37 (0.2114)
13228 AB901	5.39 (0.2122)
13228 AB911	5.41 (0.2123)
13228 AB921	5.43 (0.2138)
13228 AB931	5.45 (0.2146)
13228 AB941	5.47 (0.2154)
13228 AB951	5.49 (0.2161)
13228 AB961	5.51 (0.2169)
13228 AB971	5.53 (0.2177)
13228 AB981	5.55 (0.2185)
13228 AB991	5.57 (0.2193)
13228 AC001	5.59 (0.2201)
13228 AC011	5.61 (0.2209)
13228 AC021	5.63 (0.2217)
13228 AC031	5.65 (0.2224)

6) Inspect all valves for clearance again at this stage. If the valve clearance is not correct, repeat the procedure over again from the first step.
7) After inspection, install the related parts in the reverse order of removal.

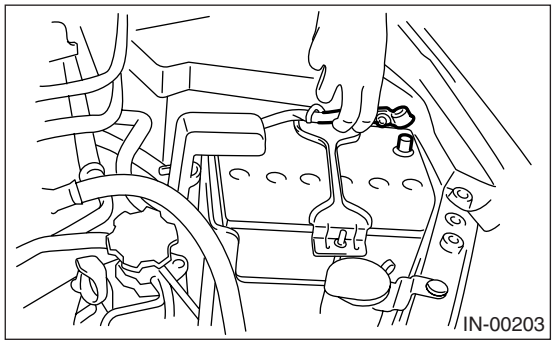
9. Engine Assembly

A: REMOVAL

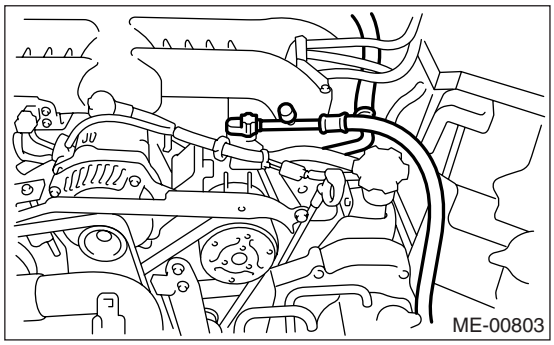
1) Set the vehicle on a lift.
2) Open the front hood fully and support with a front food stay.
3) Collect the refrigerant from A/C system. <Ref. to AC-20, Refrigerant Recovery Procedure.>
4) Release the fuel pressure.
   (1) Remove the fuse of fuel pump from main fuse box.



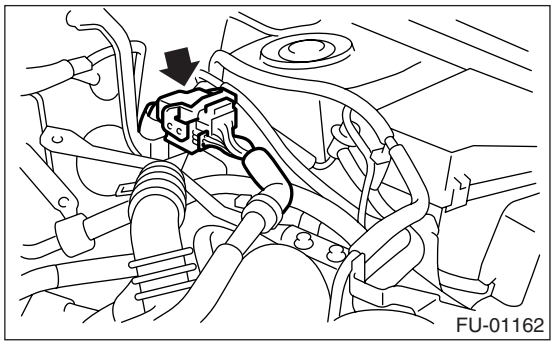
   (2) Start the engine, and run until stalls.
   (3) After the engine stalls, crank it for 5 seconds more.
   (4) Turn the ignition switch to OFF.
5) Remove the fuel filler cap.
6) Remove the collector cover.
7) Disconnect the ground cable from battery.

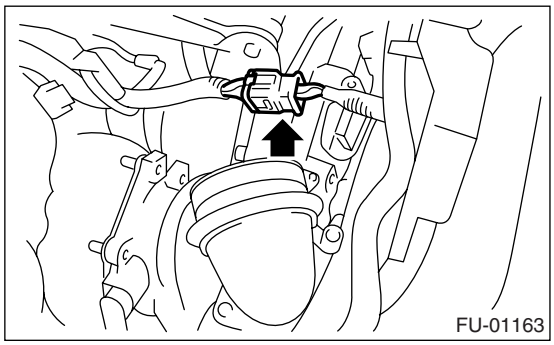


8) Remove the radiator from vehicle. <Ref. to CO(H4DOTC)-19, REMOVAL, Radiator.>
9) Remove the coolant filler tank.
<Ref. to CO(H4DOTC)-31, REMOVAL, Coolant Filler Tank.>
10) Disconnect the A/C pressure hoses from A/C compressor.

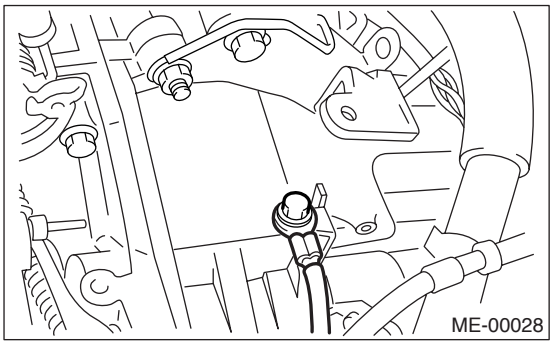


11) Repair the air intake system.
   (1) Remove the intercooler. (DOHC turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
   (2) Remove the air cleaner element and air cleaner case. <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
12) Disconnect the following connectors and cables.
   (1) Engine harness connectors

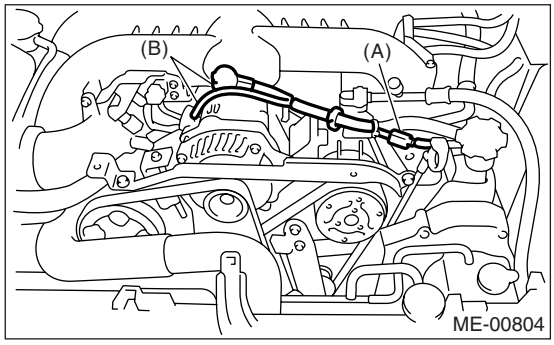




(2) Engine ground terminals

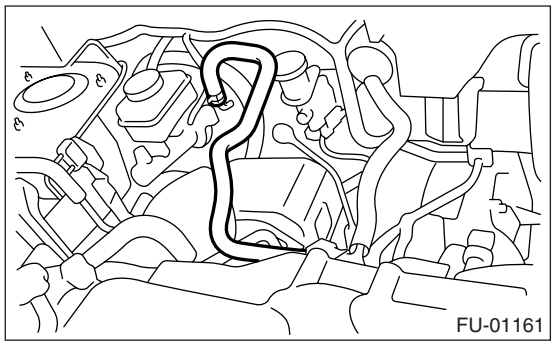


(3) Generator connector, terminal and A/C compressor connector

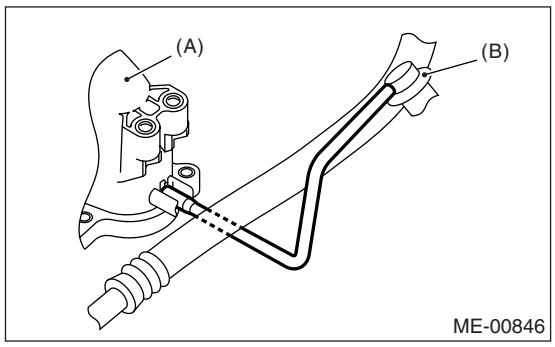


(A) A/C compressor connector
(B) Generator connector and terminal

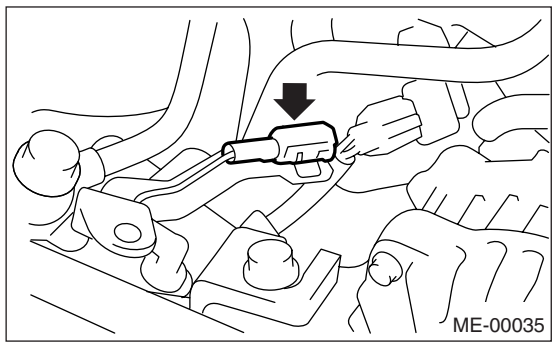
13) Disconnect the following hoses.
(1) Brake booster vacuum hose



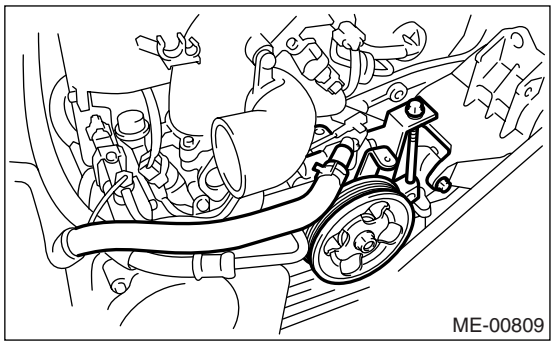
(2) Heater inlet and outlet hoses
(3) Remove the hose between intake manifold (A) and pressure regulator (B).



14) Remove the power steering pump from bracket.
(1) Loosen the lock bolt and slider bolt, and remove the front side belt. <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, REMOVAL, V-belt.>
(2) Disconnect the power steering switch connector.



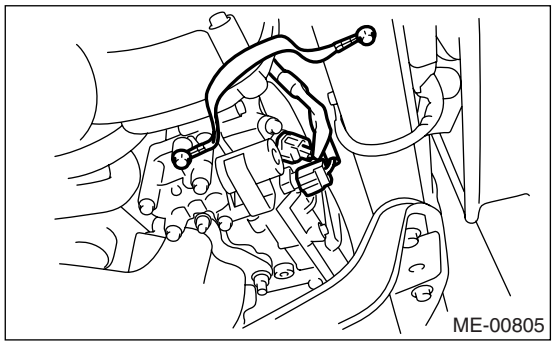
(3) Remove the power steering pump from engine.

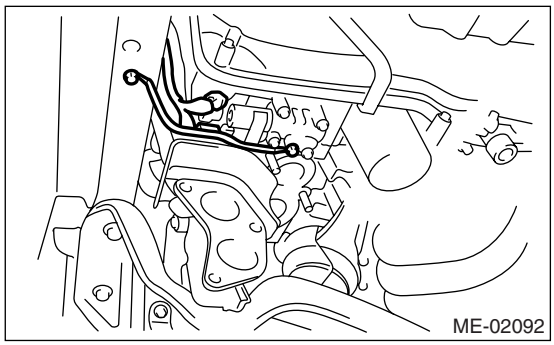


(4) Place the power steering pump on the right side wheel apron.

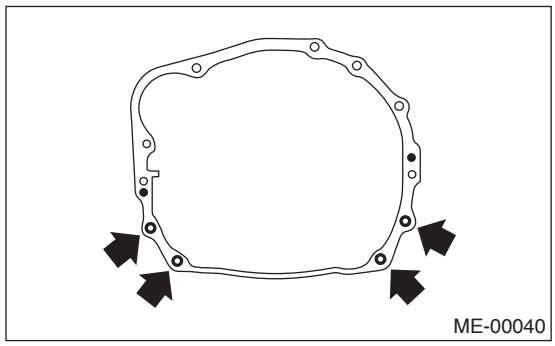
15) Remove the linear motion mounting. <Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
16) Lift-up the vehicle.
17) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>

18) Disconnect the oil flow control solenoid valve connector and ground cable.

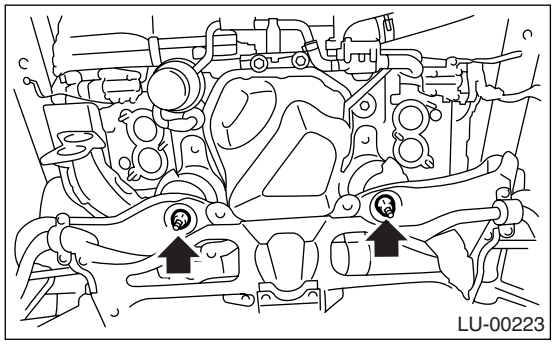

ME-00805


ME-02092

19) Remove the nuts which hold lower side of the transmission to engine.

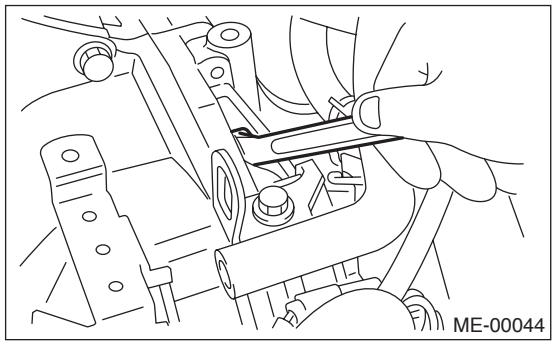

ME-00040

20) Remove the nuts which install front cushion rubber onto front crossmember.

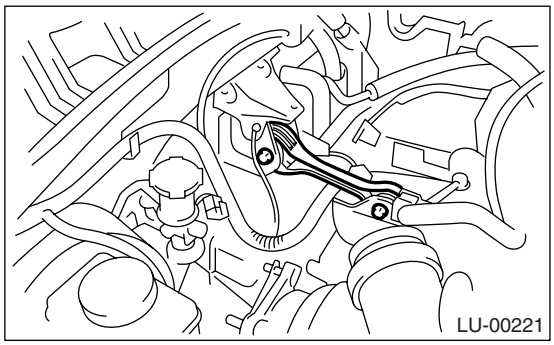

LU-00223

21) Separate the torque converter clutch from drive plate.

(1) Lower the vehicle.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Remove other bolts while rotating the engine using a socket wrench.

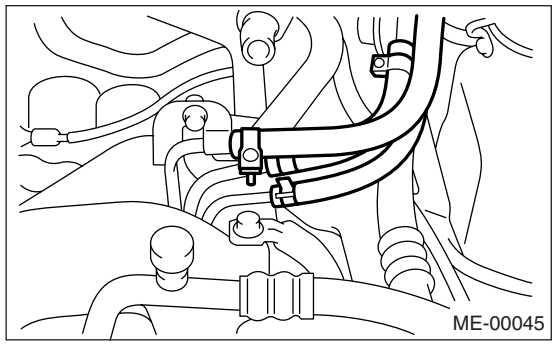

ME-00044

22) Remove the pitching stopper.

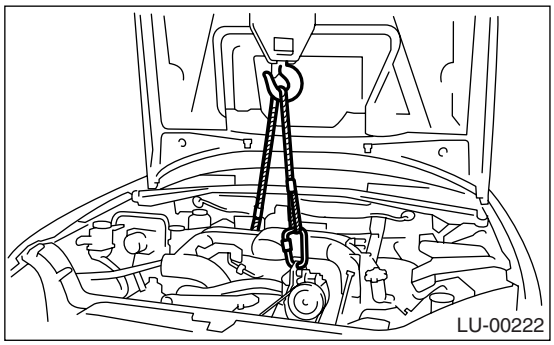

LU-00221

23) Disconnect the fuel delivery hose, return hose and evaporation hose.

CAUTION:
• Collect fuel from the hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

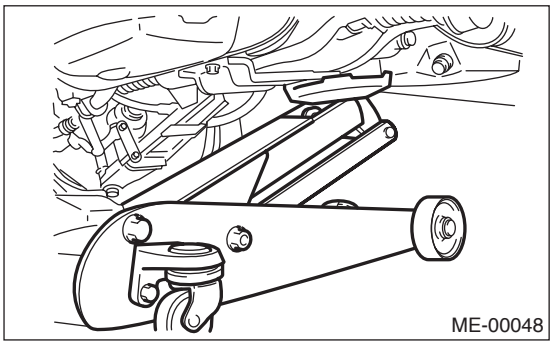

ME-00045

24) Support the engine with a lifting device and wire ropes.


LU-00222

25) Support the transmission with a garage jack.

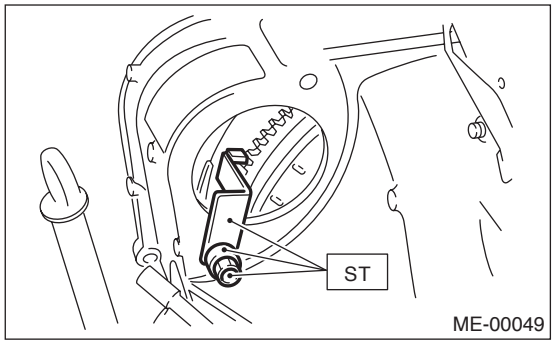
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.


ME-00048

CAUTION:
Before moving the engine away from transmission, check to be sure no work has been overlooked.

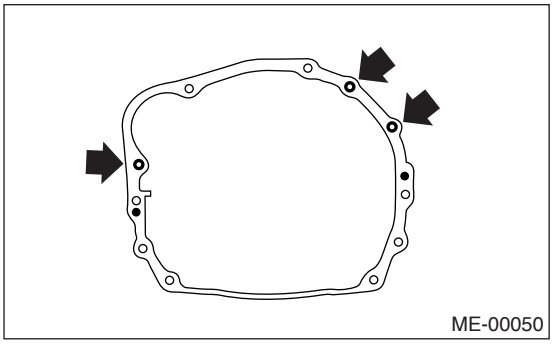
26) Separation of engine and transmission.
(1) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
(2) Install the ST to converter case.

ST 498277200 STOPPER SET



ME-00049

(3) Remove the bolts which hold upper side of the transmission to engine.


ME-00050

27) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

28) Remove the front cushion rubbers.

B: INSTALLATION

1) Install the front cushion rubbers to engine.

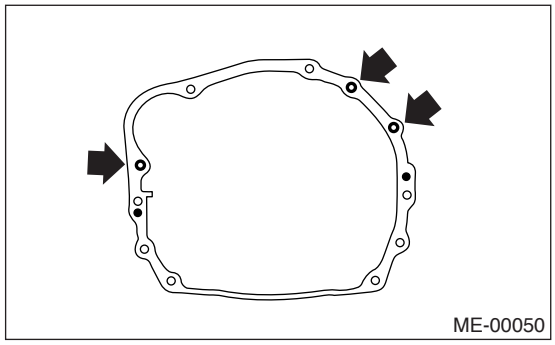
Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

2) Install the engine onto transmission.
Position the engine in engine compartment and align it with transmission.

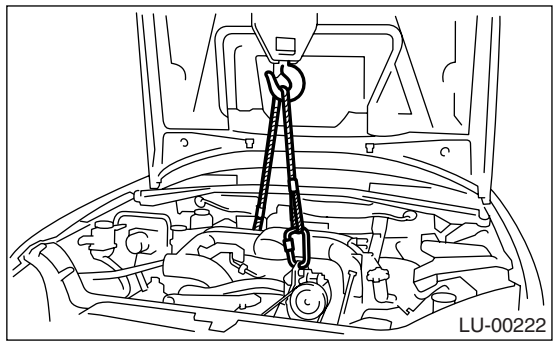
NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil pressure gauge, etc.

3) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)


ME-00050

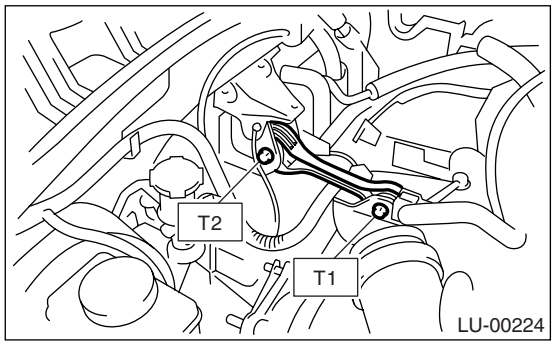
4) Remove the lifting device and wire ropes.


LU-00222

5) Remove the garage jack.

6) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



7) Remove the ST from converter case.

NOTE:
Be careful not to drop the ST into the converter case when removing the ST.
ST 498277200 STOPPER SET

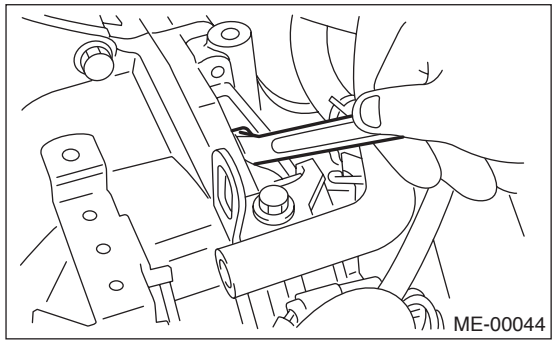
8) Install the starter. <Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>

9) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine by using ST.

CAUTION:
Be careful not to drop bolts into the torque converter clutch housing.

ST 499977400 CRANK PULLEY WRENCH

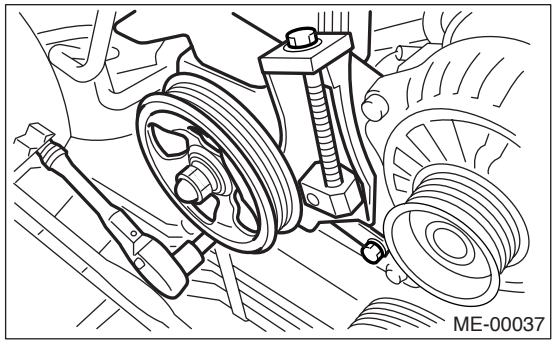
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



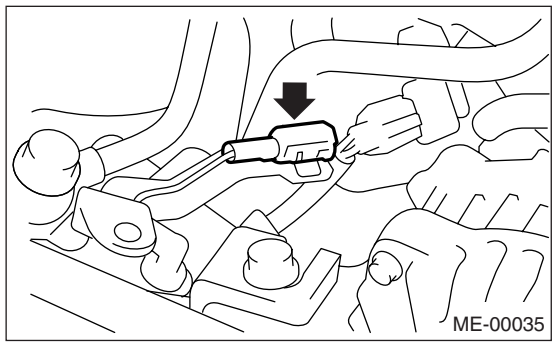
10) Install the linear motion mounting. <Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>

11) Install the power steering pump on bracket.
(1) Install the power steering pump.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



(2) Connect the power steering switch connector.

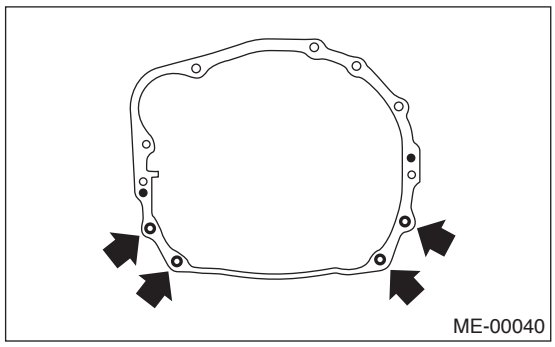


(3) Install the front side belt and adjust it. <Ref. to ME(H4DOTC)-39, FRONT SIDE BELT, INSTALLATION, V-belt.>

12) Lift-up the vehicle.

13) Tighten the nuts which hold lower side of the transmission to engine.

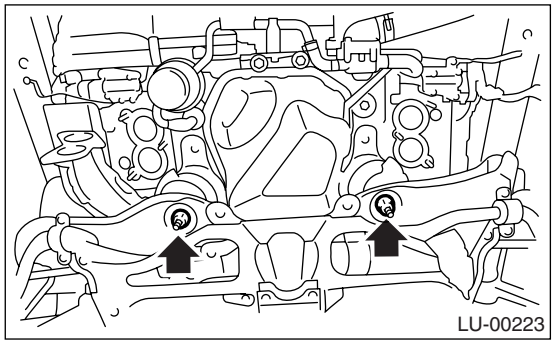
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



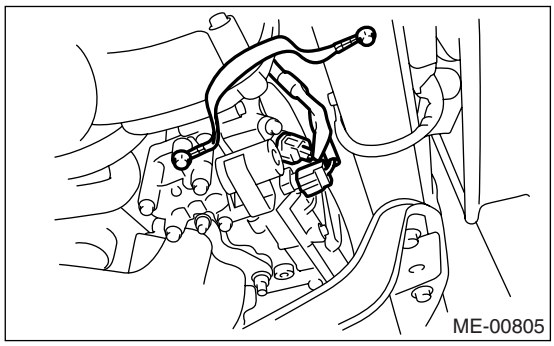
14) Tighten the nuts which install the front cushion rubber onto crossmember.

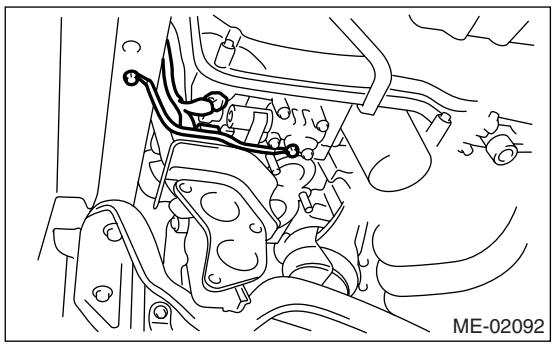
Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

NOTE:
Make sure the front cushion rubber mounting bolts and locator are securely installed.



15) Install the center exhaust pipe.
<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.>
16) Connect the oil flow control solenoid valve connector and ground cable of exhaust side.

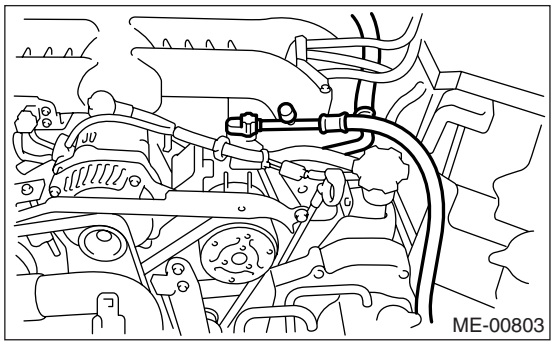




17) Lower the vehicle.
18) Connect the following hoses.
(1) Fuel delivery hose, return hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
(4) Pressure regulator hose
19) Connect the following connectors and terminals.
(1) Engine ground terminals
(2) Engine harness connectors
(3) Generator connector and terminal
(4) A/C compressor connector
20) Install the air intake system.
(1) Install the intercooler. (DOHC turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
(2) Install the air cleaner element and air cleaner case. <Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>
21) Install the A/C pressure hoses.

NOTE:
Use new O-rings.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



22) Install the radiator. <Ref. to CO(H4DOTC)-20, INSTALLATION, Radiator.>
23) Install the coolant filler tank. (DOHC turbo model) <Ref. to CO(H4DOTC)-31, INSTALLATION, Coolant Filler Tank.>
24) Install the window washer tank.
25) Install the battery to vehicle, and connect the battery ground terminal.
26) Fill engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
27) Charge the A/C system with refrigerant.
<Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
28) Install the collector cover.
29) Remove the front hood stay, and close the front hood.
30) Take off the vehicle from a lift.

C: INSPECTION

1) Check pipes and hoses are connected firmly.
2) Check the engine coolant and ATF are at specified levels.

10.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H4DOTC)-30, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting;
35 N·m (3.6 kgf-m, 25.8 ft-lb)

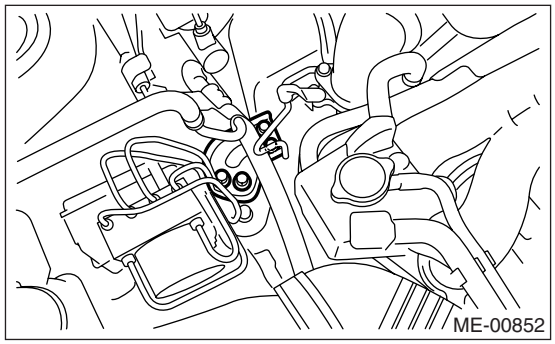
C: INSPECTION

Make sure that cracks or other damages do not exist.

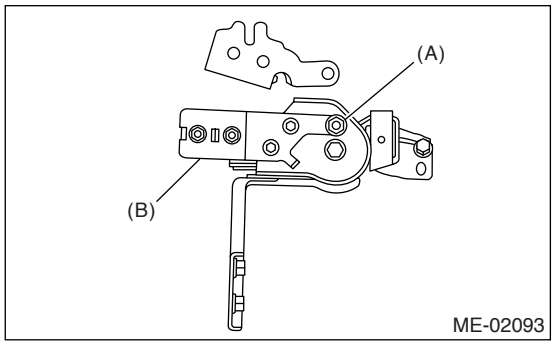
11.Linear Motion Mounting

A: REMOVAL

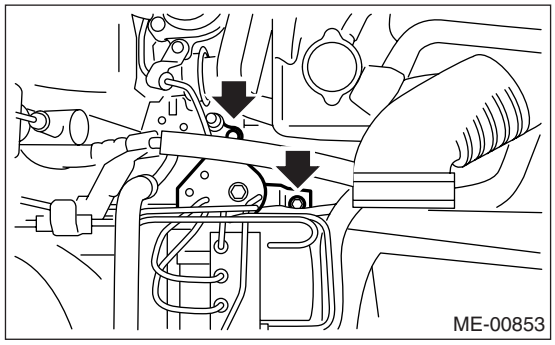
1) Remove the collector cover.
2) Remove the air cleaner case.
3) Remove the linear motion mounting bracket.



4) Remove the speed nut (A), and remove the dynamic damper (B).



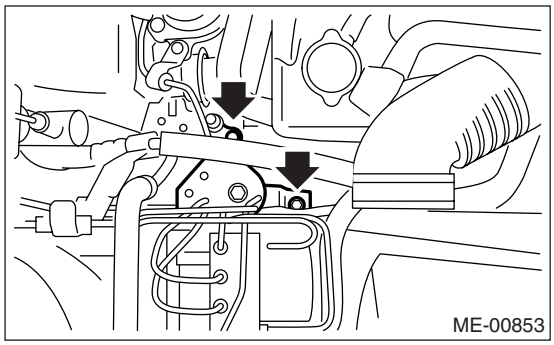
5) Remove the linear motion mounting.



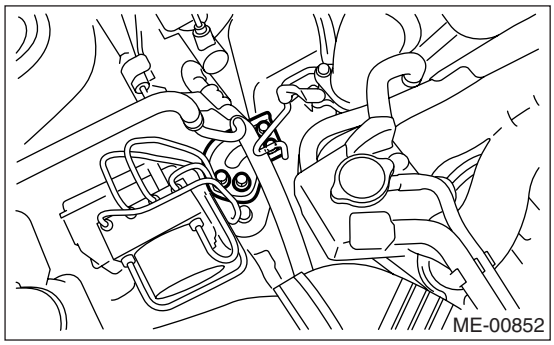
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)



Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)

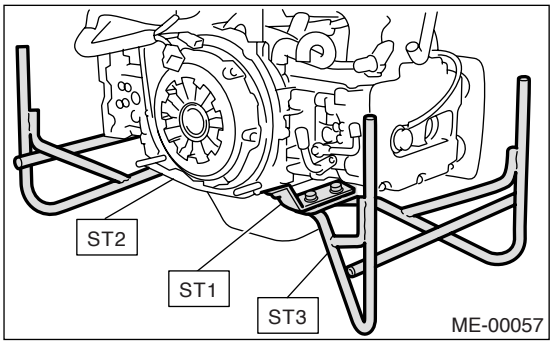


12.Preparation for Overhaul

A: PROCEDURE

1) After removing the engine from body, secure it in the STs shown below.

ST1	498457000	ENGINE STAND ADAPTER RH
ST2	498457100	ENGINE STAND ADAPTER LH
ST3	499817000	ENGINE STAND



2) In this section the procedures described under each index are all connected and stated in order. It will be the complete procedure for overhauling of the engine itself when you go through all steps in the process.
Therefore, in this section, to conduct the particular procedure within the flow of a section, you need to go back and conduct the procedure described previously in order to do that particular procedure.

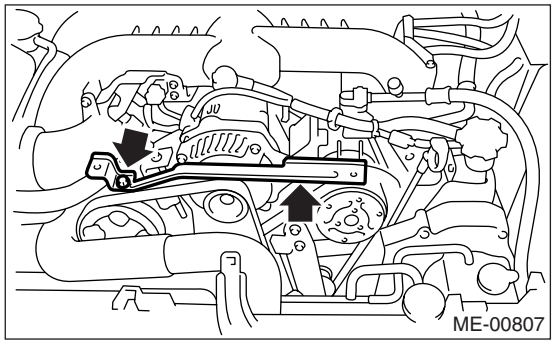
13.V-belt

A: REMOVAL

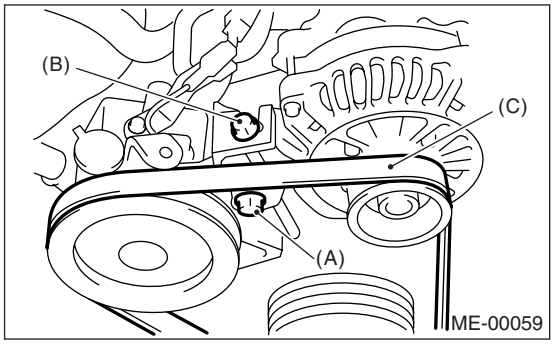
NOTE:
Perform the following procedures with the engine installed to the body.

1. FRONT SIDE BELT

1) Remove the collector cover.
2) Remove the V-belt covers.

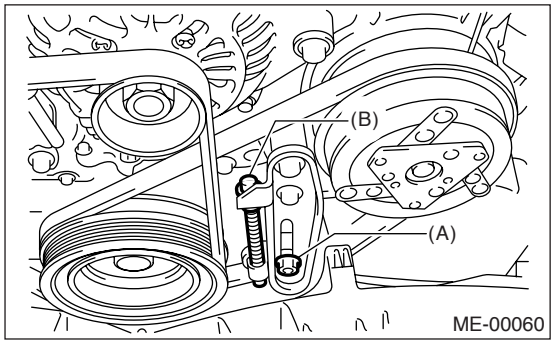


3) Loosen the lock bolt (A).
4) Loosen the slider bolt (B).
5) Remove the front side belt (C).

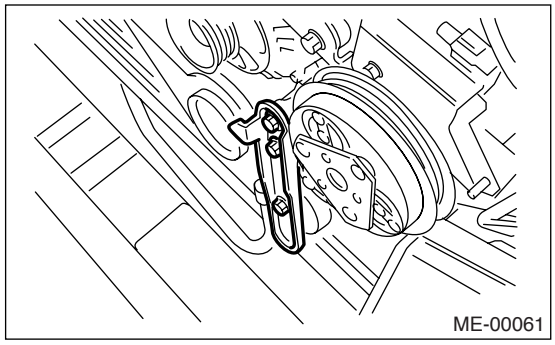


2. REAR SIDE BELT

1) Loosen the lock nut (A).
2) Loosen the slider bolt (B).



3) Remove the A/C belt.
4) Remove the A/C belt tensioner.



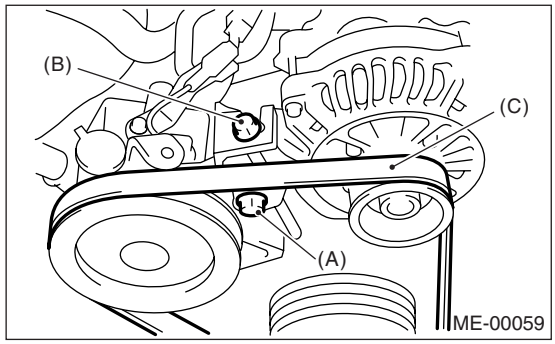
B: INSTALLATION

NOTE:
Wipe off any oil or water on the belt and pulley.

1. FRONT SIDE BELT

1) Install a V-belt (C), and tighten the slider bolt so as to obtain the specified belt tension. <Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>
2) Tighten the lock bolt (A).
3) Tighten the slider bolt (B).

Tightening torque:
Lock bolt (A):
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Slider bolt (B):
8 N·m (0.8 kgf-m, 5.9 ft-lb)

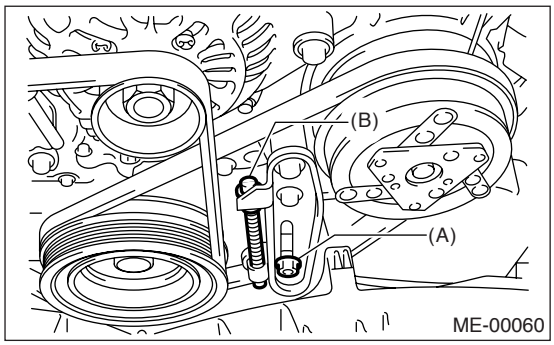


2. REAR SIDE BELT

1) Remove the A/C belt tensioner.
2) Install a V-belt, and tighten the slider bolt (B) so as to obtain the specified belt tension.
<Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>

3) Tighten the lock nut (A).

Tightening torque:
Lock nut (A):
22.6 N·m (2.3 kgf-m, 16.6 ft-lb)



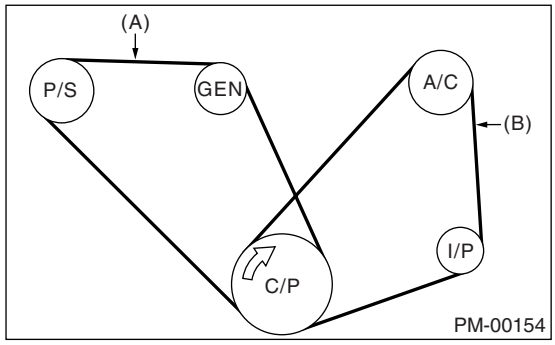
C: INSPECTION

1) Replace the belts, if crack, fraying or wear is found.
2) Check the V-belt tension and adjust it if necessary by changing the generator installing position and idler pulley installing position.

Belt tension (with belt tension gauge)

(A)
When installing new parts:
618 — 755 N (63 — 77 kgf, 139 — 170 lb)
At inspection:
490 — 640 N (50 — 65 kgf, 110 — 144 lb)

(B)
When installing new parts:
740 — 880 N (75 — 90 kgf, 166 — 198 lb)
At inspection:
350 — 450 N (36 — 46 kgf, 78 — 101 lb)

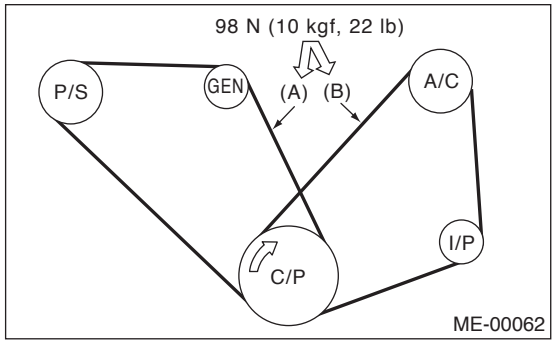


(A) Front side belt
(B) Rear side belt
C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

Belt tension (without belt tension gauge)

(A)
When installing new parts:
7 — 9 mm (0.276 — 0.354 in)
At inspection:
9 — 11 mm (0.354 — 0.433 in)

(B)
When installing new parts:
7.5 — 8.5 mm (0.295 — 0.335 in)
At inspection:
9.0 — 10.0 mm (0.354 — 0.394 in)

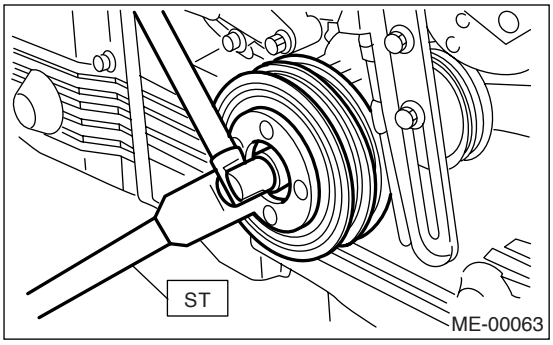


C/P Crank pulley
GEN Generator
P/S Power steering oil pump pulley
A/C A/C compressor pulley
I/P Idler pulley

14.Crank Pulley

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley bolt. To lock the crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH

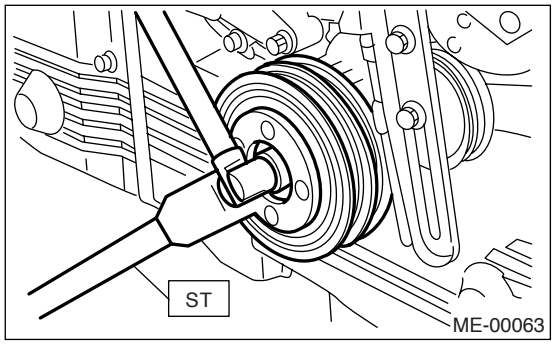


3) Remove the crank pulley.

B: INSTALLATION

1) Install the crank pulley.
2) Install the pulley bolt.
To lock the crankshaft, use ST.
ST 499977400 CRANK PULLEY WRENCH
(1) Clean the crank shaft thread using compressed air.
(2) Apply engine oil to the crank pulley bolt seat and thread.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts.

Tightening torque:
130 N·m (13.3 kgf-m, 95.9 ft-lb)



3) Confirm that the tightening angle of the crank pulley bolt is 45° or more. Perform the following procedures when less than 45°.

CAUTION:
If the tightening angle of crank pulley bolt is less than 45°, the bolt should be damaged. In this case, the bolt must be replaced.

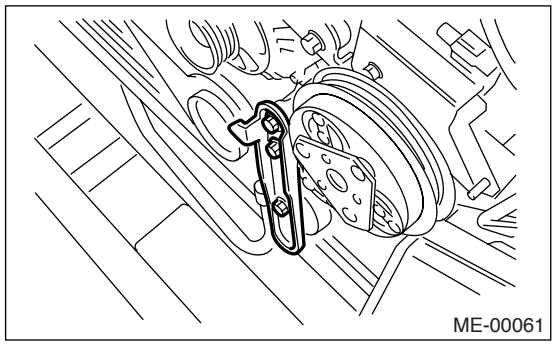
(1) Replace and clean the crank pulley bolts.

Crank pulley bolt:
Part No. 12369AA011

(2) Clean the crankshaft thread using compressed air.
(3) Tighten the bolts temporarily with tightening torque of 44 N·m (4.5 kgf-m, 33 ft-lb).
(4) Tighten the crank pulley bolts keeping them in an angle 45° — 60°.

NOTE:
Conduct the tightening procedures by confirming the turning angle of the crank pulley bolt referring to the gauge indicated on the timing belt cover.

4) Install the A/C belt tensioner.



5) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

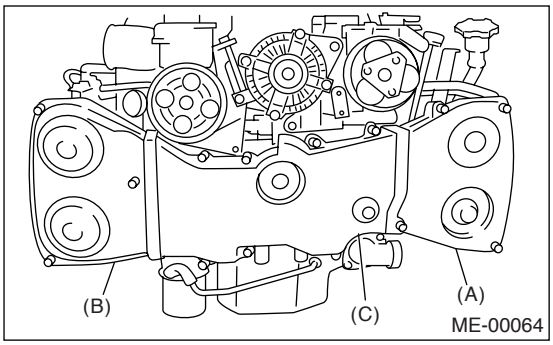
C: INSPECTION

1) Check the V-belt is not worn or otherwise damaged.
2) Check the tension of the belt. <Ref. to ME(H4DOTC)-40, INSPECTION, V-belt.>

15.Timing Belt Cover

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover (LH) (A).
4) Remove the timing belt cover (RH) (B).
5) Remove the front timing belt cover (C).



B: INSTALLATION

1) Install the front timing belt cover (C).

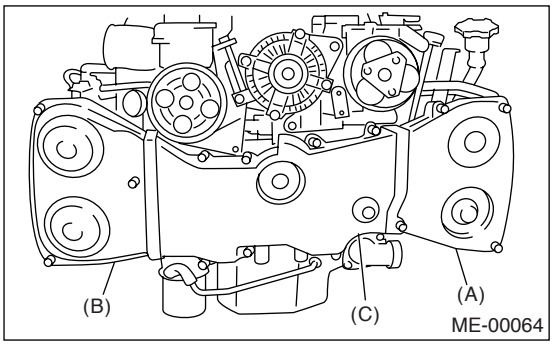
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

2) Install the timing belt cover (RH) (B).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

3) Install the timing belt cover (LH) (A).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



4) Install the crank pulley. <Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
5) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

C: INSPECTION

Check the cover for damage.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

MECHANICAL

ME(H4DOTC)

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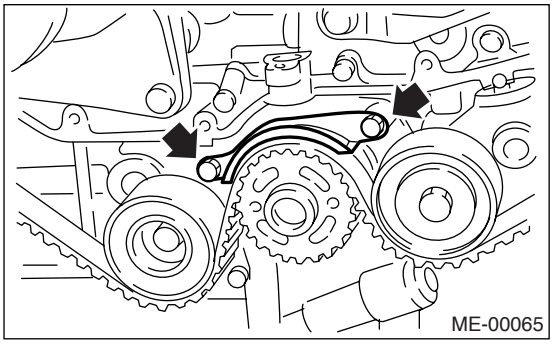
16.Timing Belt

A: REMOVAL

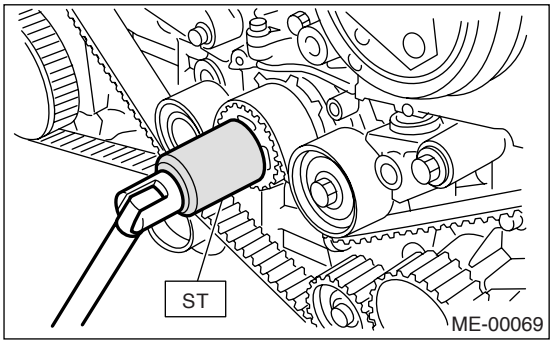
1. TIMING BELT

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt guide.

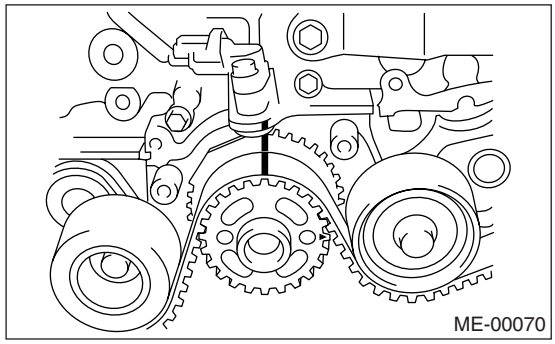


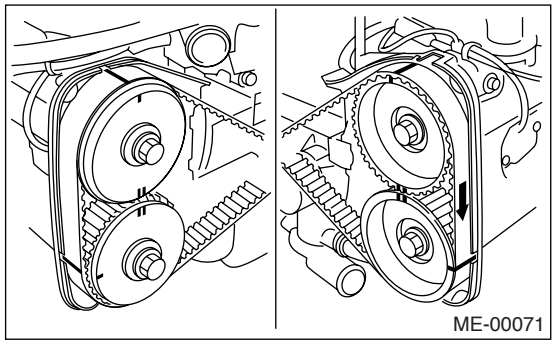
5) If the alignment mark or arrow mark (which indicates rotation direction) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.
(1) Turn the crankshaft using ST, and align the alignment marks on crank sprocket, intake cam sprocket (LH), exhaust cam sprocket (LH), intake cam sprocket (RH) and exhaust cam sprocket (RH) with notches of timing belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET

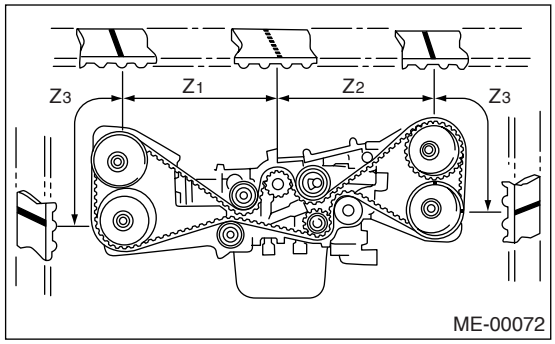


(2) Using white paint, put alignment and/or arrow marks on the timing belts in relation to the cam sprockets.

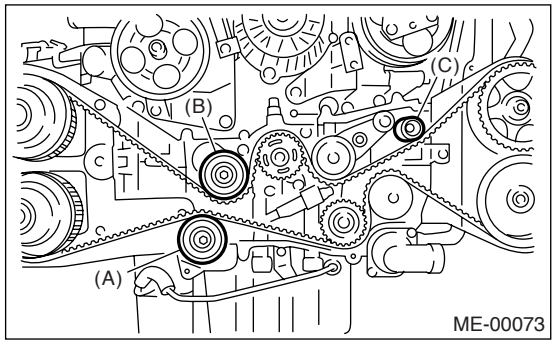




Z_1: 54.5 tooth length
Z_2: 51 tooth length
Z_3: 28 tooth length



6) Remove the belt idler (A).

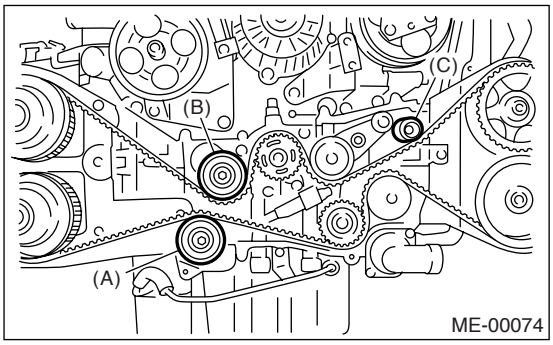


7) Remove the timing belt.

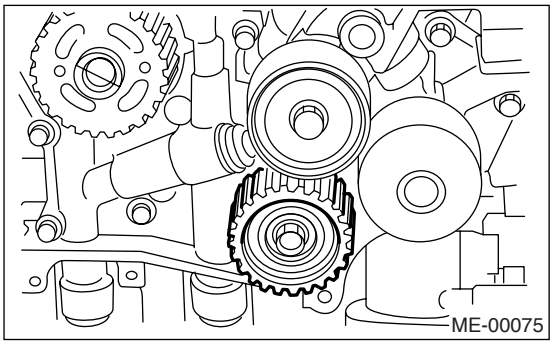
CAUTION:
After the timing belt has been removed, never rotate the intake and exhaust cam sprocket. If the cam sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

2. BELT IDLER AND AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY

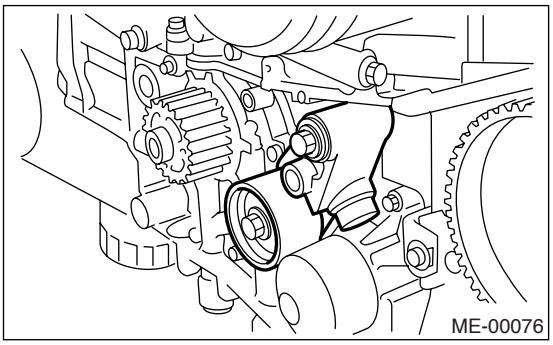
1) Remove the belt idler (B) and (C).



2) Remove the belt idler No. 2.



3) Remove the automatic belt tension adjuster assembly.



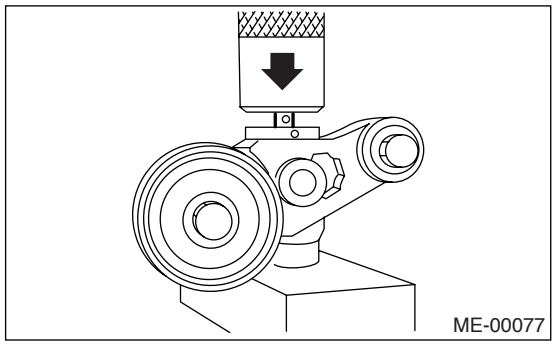
B: INSTALLATION

1. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

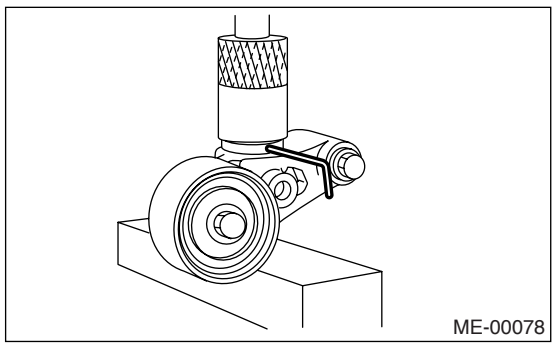
1) Preparation for installation of automatic belt tension adjuster assembly.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Be sure to move the adjuster rod down slowly applying a pressure of 294 N (30 kgf, 66 lb).
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.
• Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to the vertical pressing tool.
(2) Slowly move the adjuster rod down with a pressure of 294 N (30 kgf, 66 lb) until the adjuster rod is aligned with the stopper pin hole in the cylinder.

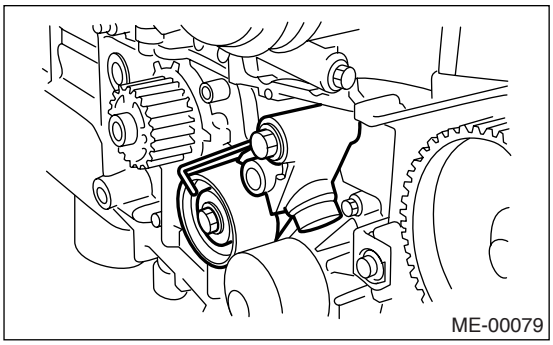


(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (0.08 in) (nominal) dia. hex wrench inserted into the stopper pin hole in cylinder, secure the adjuster rod.



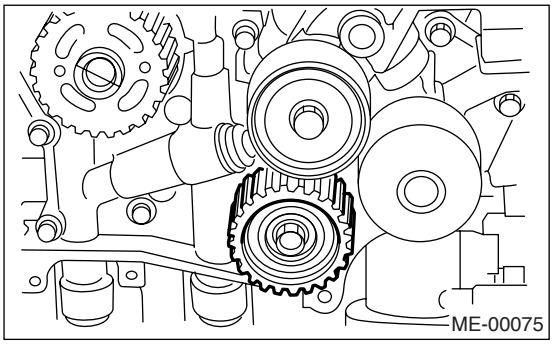
2) Install the automatic belt tension adjuster assembly.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



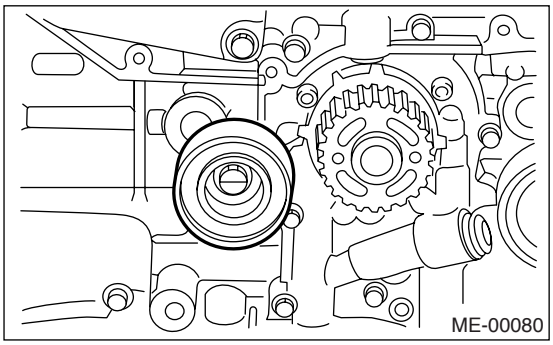
3) Install the belt idler No. 2.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



4) Install the belt idlers.

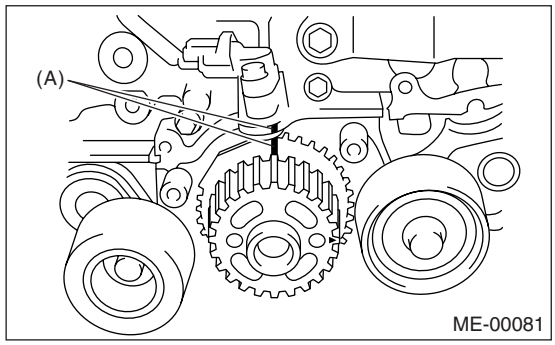
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



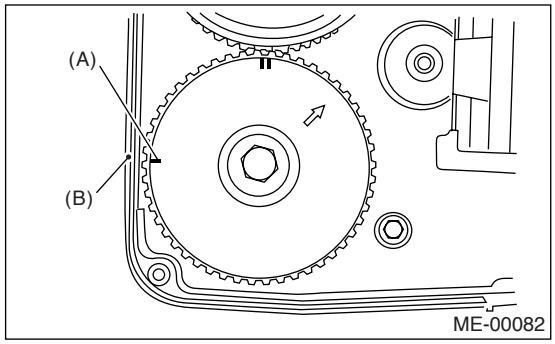
2. TIMING BELT

1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4DOTC)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>
2) Crankshaft and cam sprocket alignment

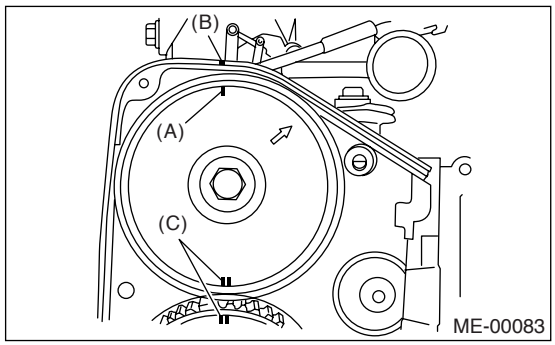
(1) Align the mark (A) on crank sprocket with the mark on oil pump cover at cylinder block.



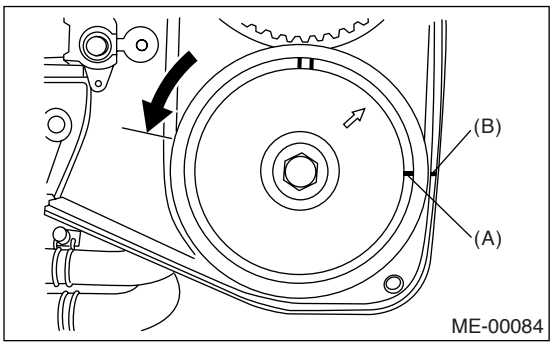
(2) Align single line mark (A) on the exhaust cam sprocket (RH) with notch (B) on timing belt cover.



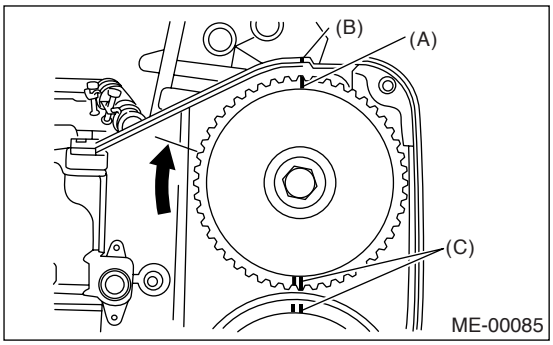
(3) Align single line mark (A) on the intake cam sprocket (RH) with notch (B) on timing belt cover. (Ensure double lines (C) on intake and exhaust cam sprockets are aligned.)



(4) Align single line mark (A) on exhaust cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket counterclockwise (as viewed from front of engine).

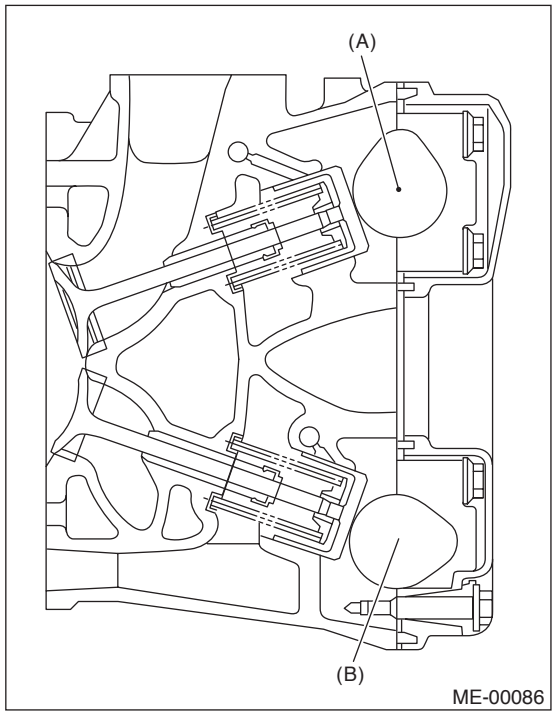


(5) Align single line mark (A) on intake cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket clockwise (as viewed from front of engine).
Ensure double lines (C) on intake and exhaust cam sprockets are aligned.



(6) Ensure that the cam and crank sprockets are positioned properly.

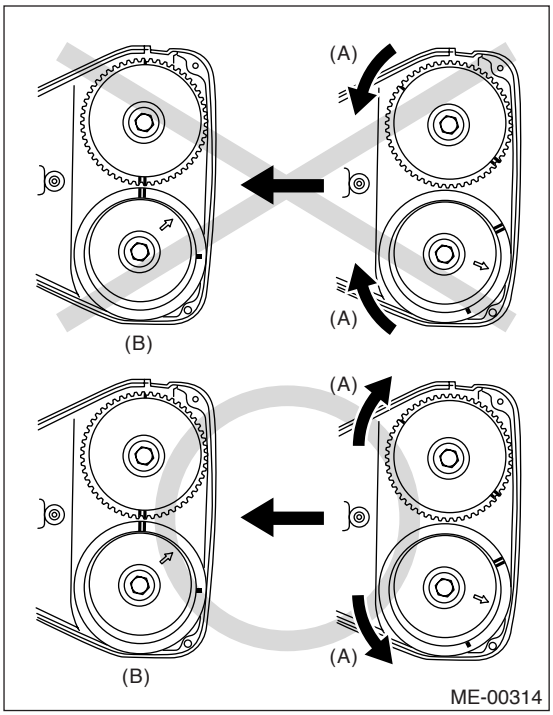
CAUTION:
• Intake and exhaust camshafts for this DOHC engine can be independently rotated with the timing belts removed. As can be seen from the figure, if the intake and exhaust valves are lifted simultaneously, their heads will interfere with each other, resulting in bent valves.



(A) Intake camshaft
(B) Exhaust camshaft

• When the timing belts are not installed, four camshafts are held at the "zero-lift" position, where all cams on camshafts do not push the intake and exhaust valves down. (Under this condition, all valves remain unlifted.)
• When the camshafts are rotated to install the timing belts, #2 intake and #4 exhaust cam of camshafts (LH) are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Camshafts (RH) are held so that their cams do not push valves down.
• Camshafts (LH) must be rotated from the "zero-lift" position to the position where the timing belt is to be installed with the smallest possible angle, in order to prevent mutual interference of intake and exhaust valve heads.

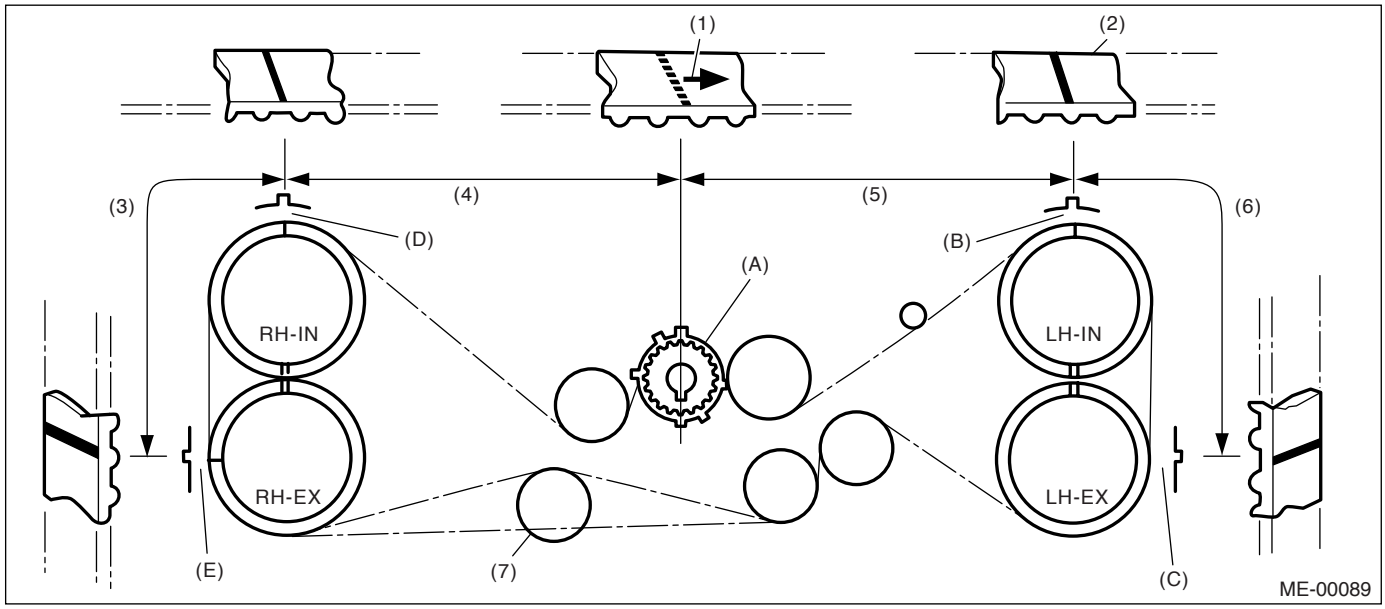
• Do not allow the camshafts to rotate in the direction shown in the figure as this causes both intake and exhaust valves to lift simultaneously, resulting in interference with their heads.



(A) Revolving direction
(B) Timing belt installation position

3) Installation of timing belt:
Align the alignment mark on the timing belt with marks on the sprockets in the alphabetical order shown in the figure. While aligning marks, position the timing belt properly.

CAUTION:
• Disengagement of more than one timing belt tooth may result in interference between valve and piston.
• Ensure the belt's rotating direction is correct.

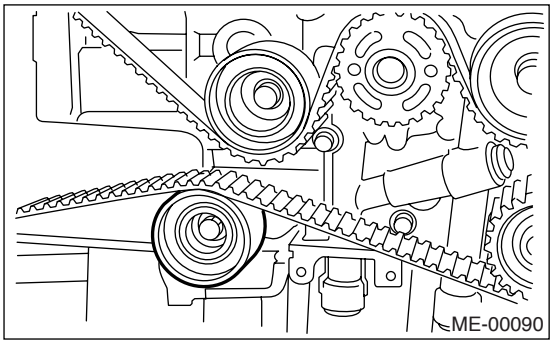


(1) Arrow mark
(2) Timing belt
(3) 28 tooth length
(4) 54.5 tooth length
(5) 51 tooth length
(6) 28 tooth length
(7) Install it in the end

4) Install the belt idlers.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

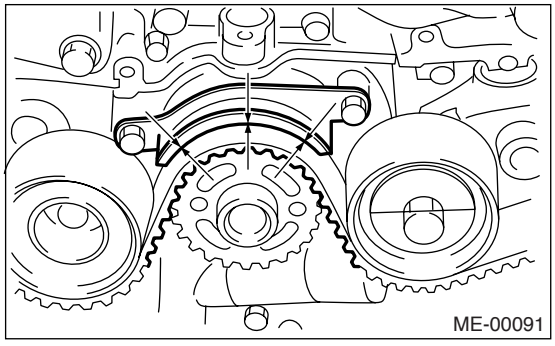
NOTE:
Make sure that the marks on the timing belt and sprockets are aligned.



5) After ensuring that the marks on the timing belt and sprockets are aligned, remove the stopper pin from tensioner adjuster.

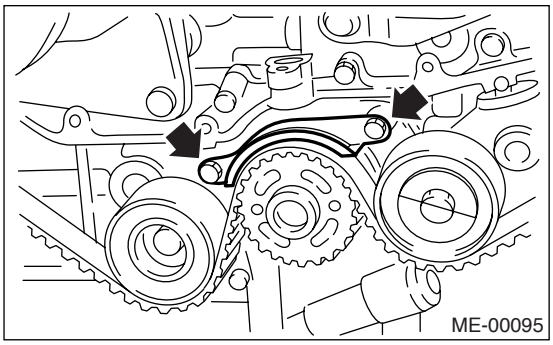
6) Install the timing belt guide.
(1) Temporarily tighten the bolts.
(2) Check and adjust the clearance between timing belt and timing belt guide.

Clearance:
1.0±0.5 mm (0.039±0.020 in)



(3) Tighten the bolt.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)



7) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
8) Install the crank pulley.
<Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
9) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

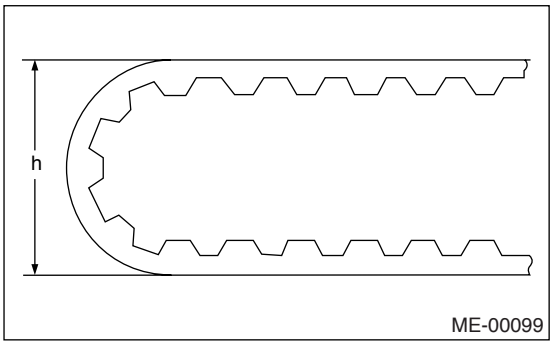
C: INSPECTION

1. TIMING BELT

1) Check the timing belt teeth for breaks, cracks and wear. If any fault is found, replace the timing belt.
2) Check the condition of the backside of timing belt. If cracks are found, replace the timing belt.

CAUTION:
• Be careful not to let oil, grease or engine coolant contact the belt. Remove quickly and thoroughly if this happens.
• Do not bend the timing belt sharply.

In radial diameter h:
60 mm (2.36 in) or more



2. AUTOMATIC BELT TENSION ADJUSTER

1) Visually check the oil seals for leaks, and rod ends for abnormal wear and scratches. If necessary, replace the automatic belt tension adjuster assembly.

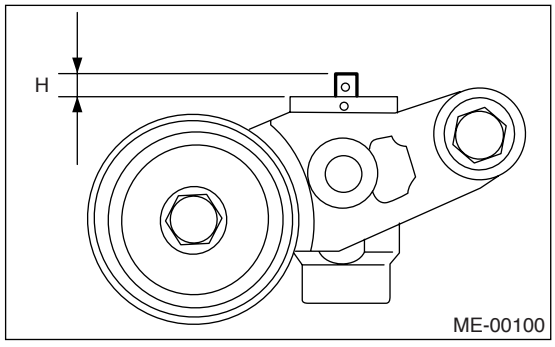
NOTE:
Slight trace of oil at rod's oil seal does not indicate a problem.

2) Check that the adjuster rod does not move when a pressure of 294 N (30 kgf, 66 lb) is applied to it. This is to check adjuster rod stiffness.
3) If the adjuster rod is not stiff and moves freely when applying 294 N (30 kgf, 66 lb), check it using the following procedures:
(1) Slowly press the adjuster rod down to the end surface of the cylinder. Repeat this operation two to three times.
(2) With the adjuster rod moved all the way up, apply a pressure of 294 N (30 kgf, 66 lb) to it. Check the adjuster rod stiffness.
(3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new one.

CAUTION:
• Always use a vertical type pressing tool to move the adjuster rod down.
• Do not use a lateral type vise.
• Push the adjuster rod vertically.
• Press-in the push adjuster rod gradually taking more than three minutes.
• Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
• Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.

4) Measure the amount of rod protrusion beyond the body. If it is not within specifications, replace with a new one.

Amount of rod protrusion H:
5.7±0.5 mm (0.224±0.020 in)



3. BELT TENSION PULLEY

1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the belt tension pulley if faulty.
2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play occurs.
3) Check the belt tension pulley for grease leakage.

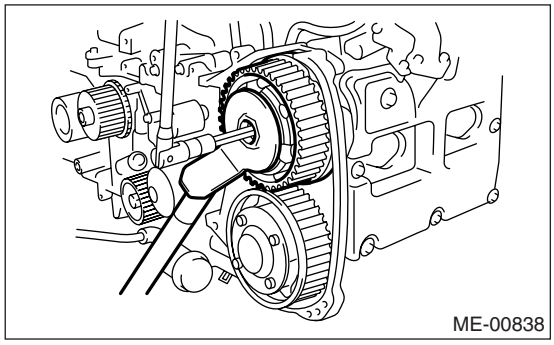
4. BELT IDLER

1) Check the belt idler for smooth rotation. Replace if noise or excessive play occurs.
2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
3) Check the belt idler for grease leakage.

17.Cam Sprocket

A: REMOVAL

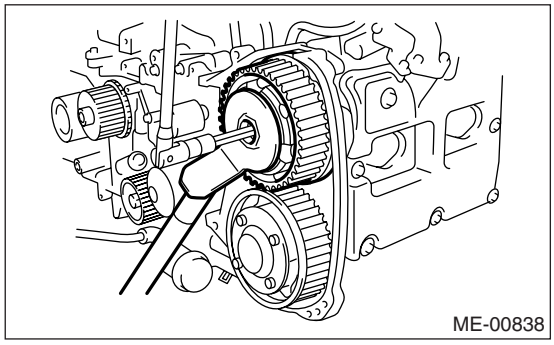
1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt.
<Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. To lock the camshaft, use ST.
ST 499977500 CAM SPROCKET WRENCH



B: INSTALLATION

1) Install the cam sprocket. To lock the camshaft, use ST.

Tightening torque:
Tighten to 29.5 N·m (3.0 kgf-m, 21.8 ft-lb) of torque, and then tighten further by 45°



2) Install the timing belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, Timing Belt.>
3) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
4) Install the crank pulley.
<Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
5) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

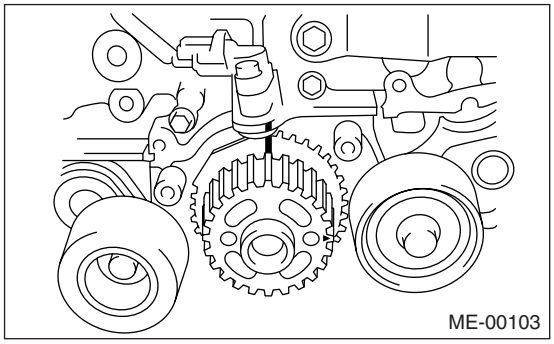
C: INSPECTION

1) Check the cam sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between cam sprocket and key.
3) Check the cam sprocket protrusion used for sensor for damage and contamination of foreign matter.

18.Crank Sprocket

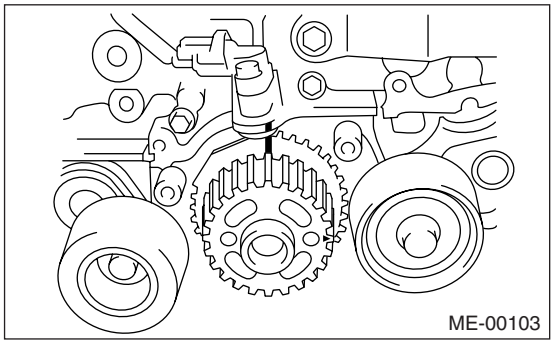
A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt.
<Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket.
<Ref. to ME(H4DOTC)-51, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket.



B: INSTALLATION

1) Install the crank sprocket.



2) Install the cam sprocket.
<Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
3) Install the timing belt.
<Ref. to ME(H4DOTC)-44, INSTALLATION, Timing Belt.>
4) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
5) Install the crank pulley. <Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
6) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

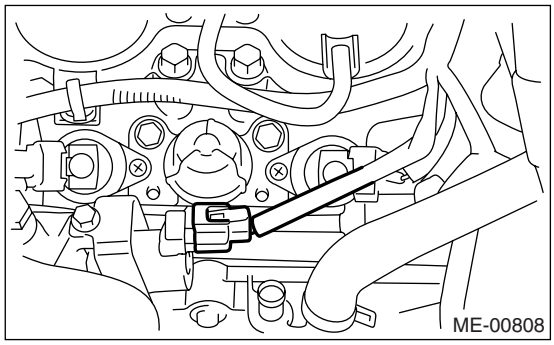
C: INSPECTION

1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.
3) Check the crank sprocket protrusion used for sensor for damage and contamination of foreign matter.

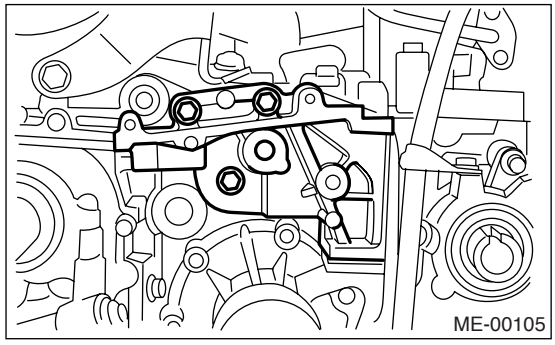
19.Camshaft

A: REMOVAL

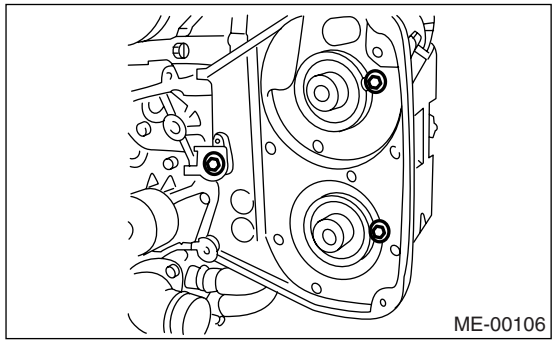
1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley. <Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt. <Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-51, REMOVAL, Cam Sprocket.>
6) Remove the crank sprocket. <Ref. to ME(H4DOTC)-52, REMOVAL, Crank Sprocket.>
7) Disconnect the oil flow control solenoid valve assembly connector.


ME-00808

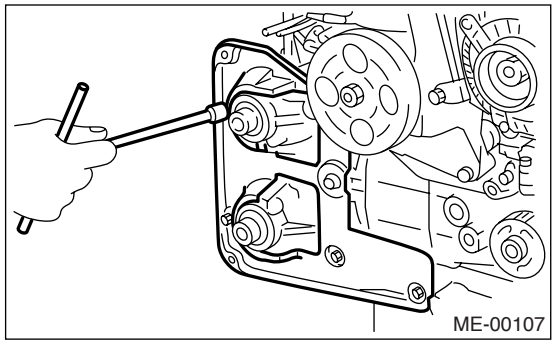
8) Remove the tensioner bracket.


ME-00105

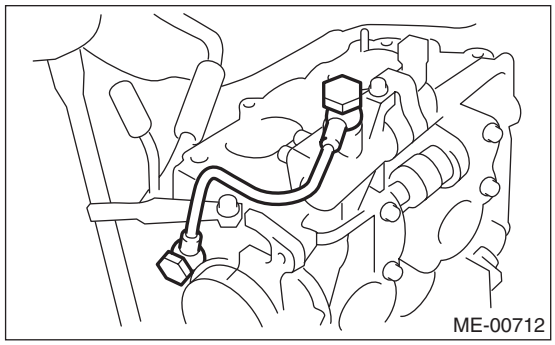
9) Remove the timing belt cover No. 2 (LH).


ME-00106

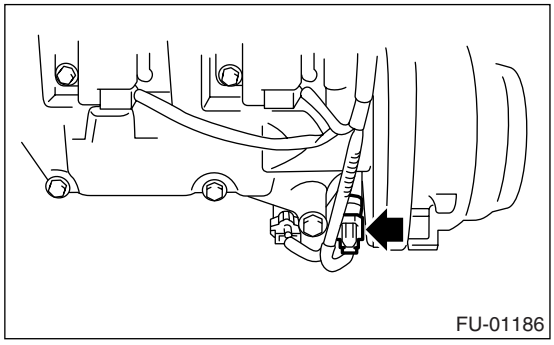
10) Remove the timing belt cover No. 2 (RH).


ME-00107

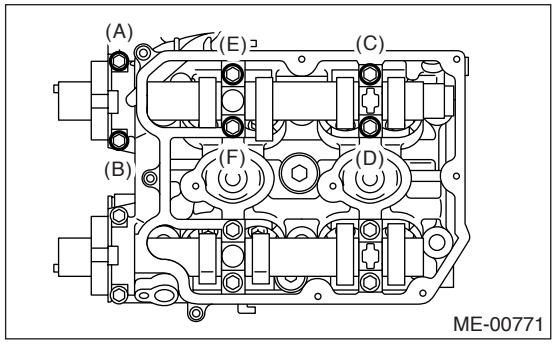
11) Remove the spark plug cords.
12) Remove the oil level gauge guide. (LH side)
13) Remove the rocker cover and gasket.
14) Remove the oil pipe.


ME-00712

15) Remove the camshaft position sensor on exhaust side.

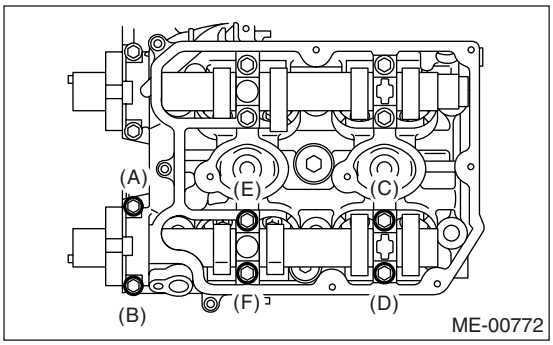

FU-01186

16) Loosen the oil flow control solenoid valve assembly and intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



ME-00771

17) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



18) Remove the oil flow control solenoid valve assembly, intake camshaft cap and camshaft.
19) Remove the exhaust camshaft caps and camshaft.

NOTE:
Arrange camshaft caps in order so that they can be installed in their original positions.

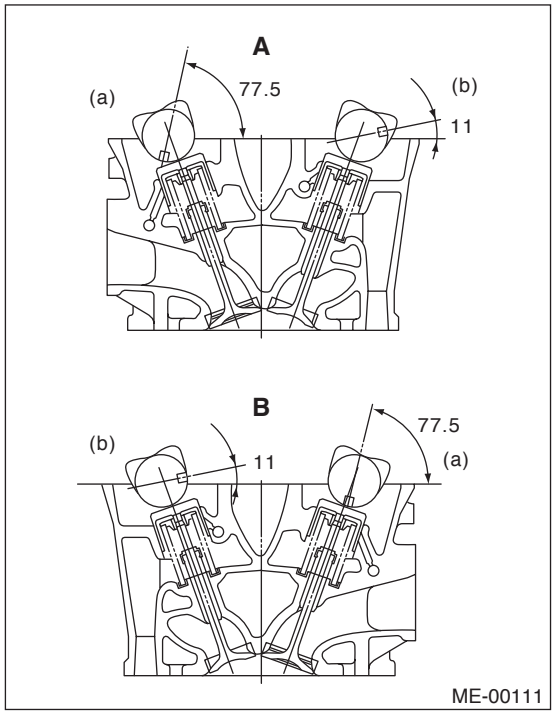
20) Similarly, remove the camshafts (RH) and related parts.

B: INSTALLATION

1) Camshaft installation:
Apply engine oil to the cylinder head at camshaft bearing location before installing the camshaft. Install the camshaft so that each valve is close to or in contact with “base circle” of cam lobe.

NOTE:
• When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.
• Camshaft (RH) need not be rotated when set at the position shown in the figure.
Intake camshaft (LH):
Rotate 80° clockwise.

Exhaust camshaft (LH):
Rotate 45° counterclockwise.

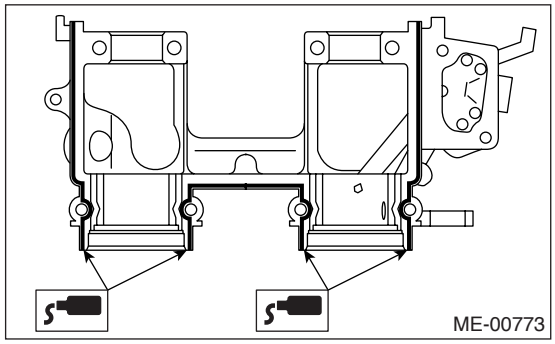


A Cylinder head (LH)
B Cylinder head (RH)
(a) Intake camshaft
(b) Exhaust camshaft

2) Camshaft cap and oil flow control solenoid valve assembly installation:
(1) Apply small amount of liquid gasket to the cap mating surface.

NOTE:
Do not apply liquid gasket excessively. Otherwise, the excessive liquid gasket may come out and flow toward oil seal, resulting in oil leaks.

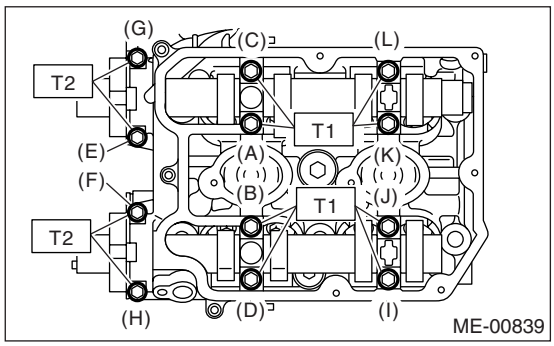
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(2) Apply engine oil to the cap bearing surface, and install the cap on camshaft as shown by identification mark.

(3) Gradually tighten the camshaft cap and oil control valve assembly in at least two stages in alphabetical sequence shown in the figure, and then tighten to the specified torque.

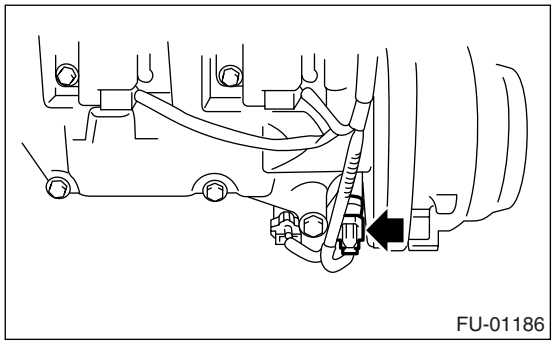
Tightening torque:
T1: 10 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(4) After tightening the camshaft cap, ensure the camshaft rotates only slightly while holding it at “base circle”.

3) Install the camshaft position sensor on exhaust side.

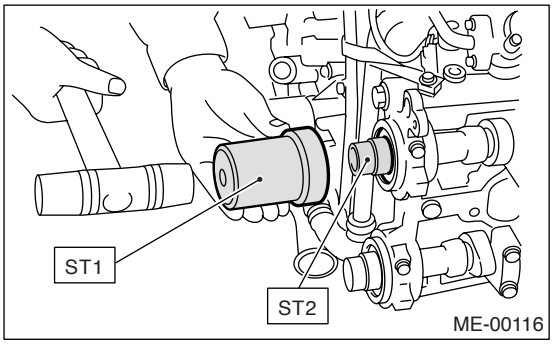
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



4) Camshaft oil seal installation:
Apply grease to the new oil seal lips and press onto the front end of camshaft by using ST1 and ST2.

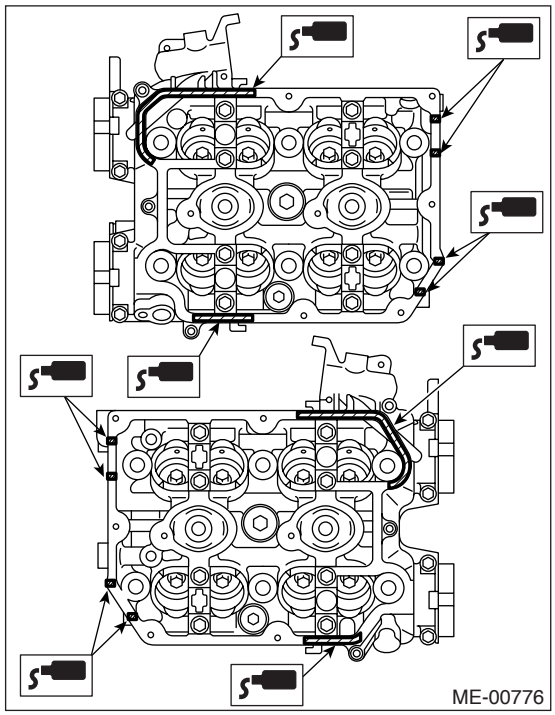
NOTE:
Use a new oil seal.

ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE



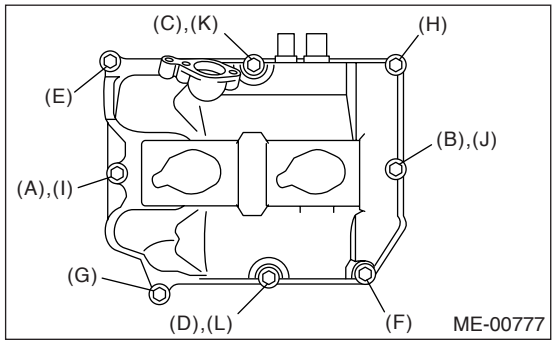
5) Rocker cover installation:
(1) Install the gasket on rocker cover. Install the peripheral gasket and ignition coil gasket.
(2) Apply liquid gasket to the designated point of cylinder head.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



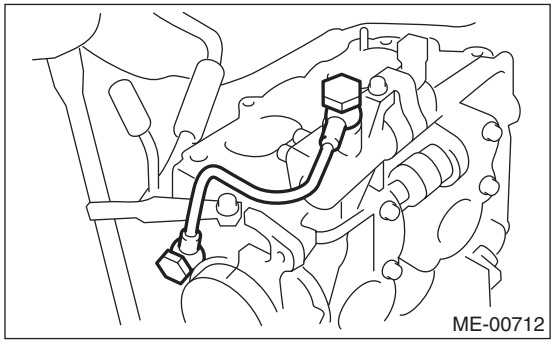
(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.
(4) Tighten the rocker cover tightening bolt in alphabetical sequence shown in the figure, and then tighten to the specified torque.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

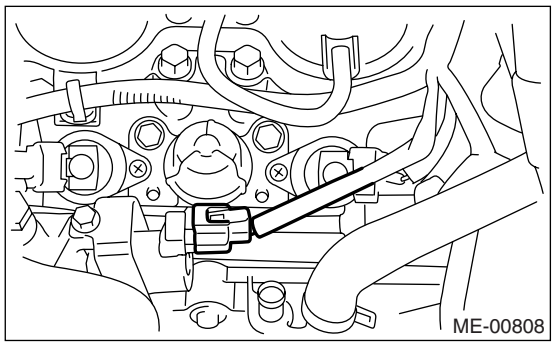


6) Install the oil pipe.

Tightening torque:
29 N·m (3.0 kgf-m, 21.4 ft-lb)

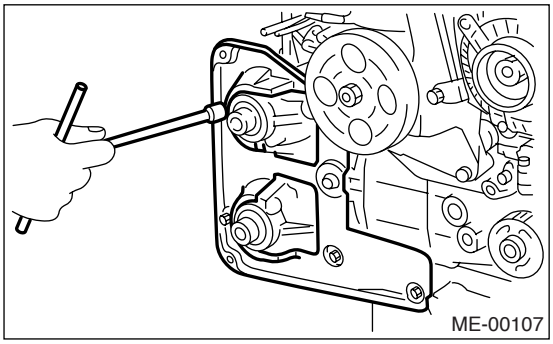


7) Connect the oil flow control solenoid valve connector.



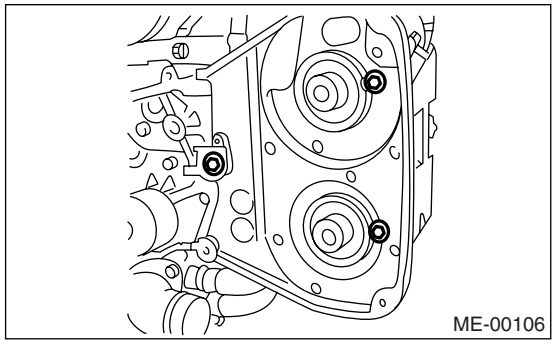
8) Install the spark plug cord.
9) Similarly, install the parts on right-hand side.
10) Install the timing belt cover No. 2 (RH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



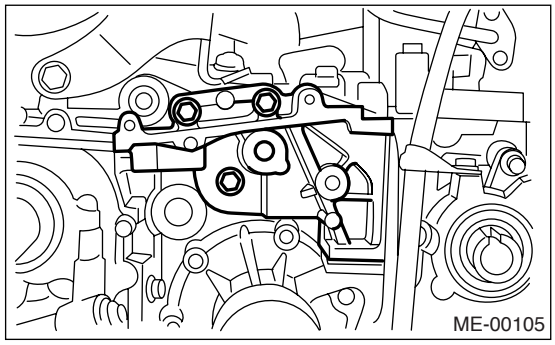
11) Install the timing belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



12) Install the tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

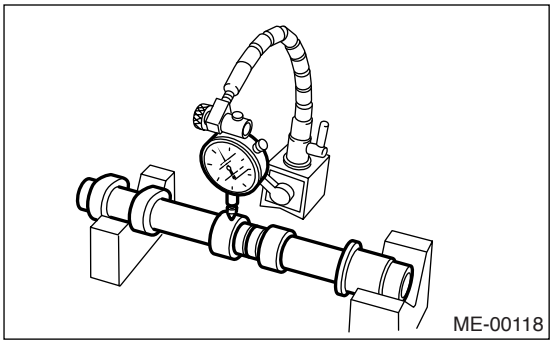


13) Install the crank sprocket.
<Ref. to ME(H4DOTC)-52, INSTALLATION, Crank Sprocket.>
14) Install the cam sprocket.
<Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
15) Install the timing belt. <Ref. to ME(H4DOTC)-44, INSTALLATION, Timing Belt.>
16) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
17) Install the crank pulley.
<Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
18) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

C: INSPECTION

1) Measure the bend, and repair or replace if necessary.

Standard value:
0.020 mm (0.0008 in) or less

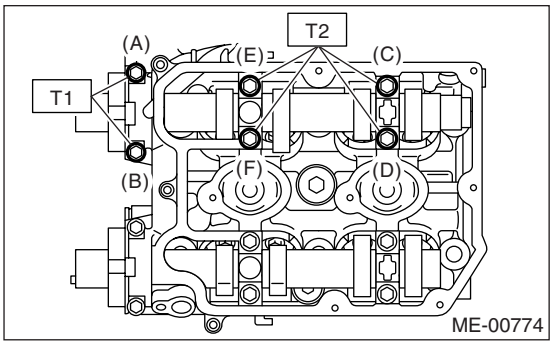


2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outside diameter of camshaft journal. If the journal diameter is not within specification, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard value mm (in)	37.946 — 37.963 (1.4939 — 1.4946)	29.946 — 29.963 (1.1790 — 1.1796)

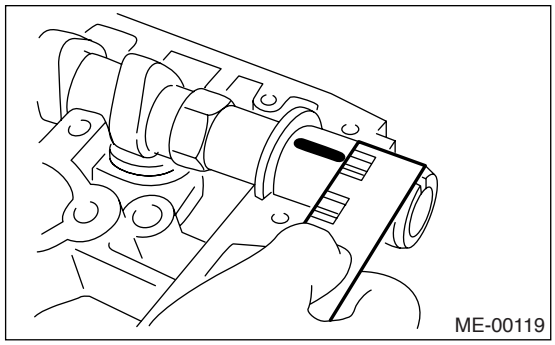
4) Measurement of the camshaft journal oil clearance:
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on cylinder head. (Without installing the valve rocker.)
(3) Place a plastigauge across each of the camshaft journals.
(4) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to the specified torque. Do not turn the camshaft.

Tightening torque:
T1: 10 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.5 ft-lb)



(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal. If oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)



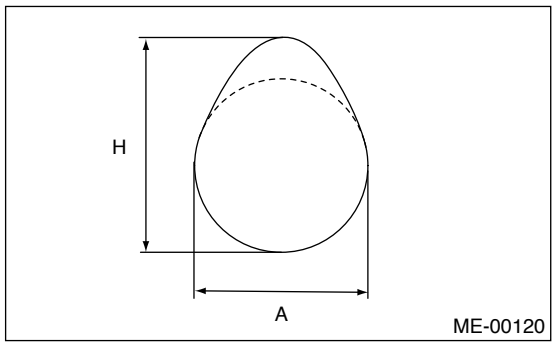
(7) Completely remove the plastigauge.

5) Check the cam face condition, and remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds the limit or has partial wear, replace it.

Cam height H:

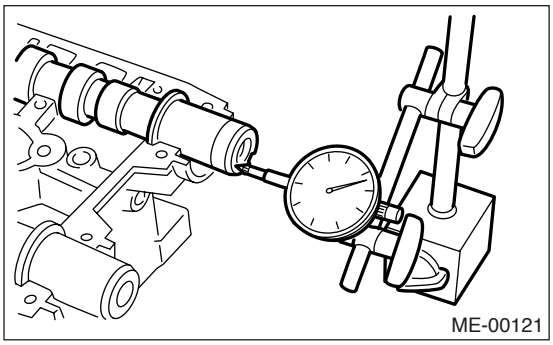
Standard
Intake
45.85 — 45.95 mm (1.805 — 1.809 in)
Exhaust
45.75 — 45.85 mm (1.801 — 1.805 in)

Cam base circle diameter A:
37.0 mm (1.457 in)



6) Measure the side clearance of camshaft with dial gauge. If the clearance exceeds the limit or has partial wear, replace the caps and cylinder head as a set. If necessary, replace the camshaft.

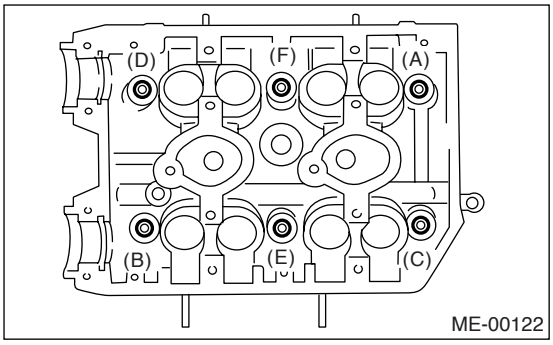
Standard:
0.068 — 0.116 mm (0.0027 — 0.0047 in)



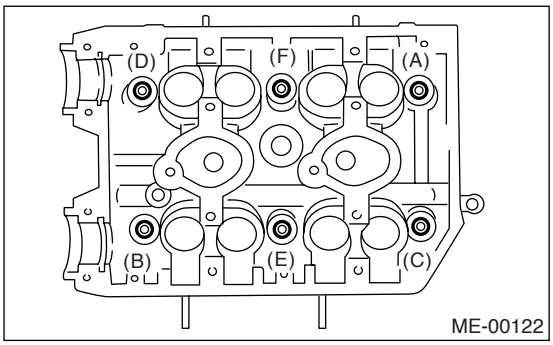
20.Cylinder Head

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
2) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
3) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
4) Remove the timing belt.
<Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
5) Remove the cam sprocket.
<Ref. to ME(H4DOTC)-51, REMOVAL, Cam Sprocket.>
6) Remove the intake manifold.
<Ref. to FU(H4DOTC)-13, REMOVAL, Intake Manifold.>
7) Remove the bolt which installs the A/C compressor bracket on cylinder head.
8) Remove the camshaft. <Ref. to ME(H4DOTC)-53, REMOVAL, Camshaft.>
9) Remove the cylinder head bolts in alphabetical sequence shown in the figure.
Leave the bolts (A) and (D) engaged by three or four threads to prevent the cylinder head from falling.



10) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
Remove the bolts (A) and (D) to remove cylinder head.



11) Remove the cylinder head gasket.

CAUTION:
Be careful not to scratch the mating surface of cylinder head and cylinder block.

12) Similarly, remove the cylinder head (RH).

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

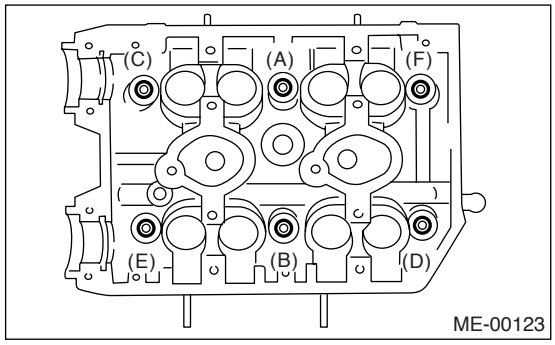
CAUTION:
- **Use new cylinder head gaskets.**
- **Be careful not to scratch the mating surface of cylinder head and cylinder block.**

2) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and bolt threads.
(2) Tighten all bolts to 29 N·m (3.0 kgf-m, 21.4 ft-lb) in alphabetical sequence.
(3) Retighten all bolts to 69 N·m (7.0 kgf-m, 51 ft-lb) in alphabetical sequence.
(4) Back off all bolts by 180° in the reverse order of installation, and back them off again by 180°.
(5) Tighten all bolts to 49 N·m (5.0 kgf-m, 36 ft-lb) in alphabetical sequence.
(6) Tighten all bolts by 80 — 90° in alphabetical sequence.
(7) Tighten all bolts by 40 — 45° in alphabetical sequence.

CAUTION:
Do not tighten the bolts more than 45°.

(8) Further tighten the bolts (A) and (B) by 40 — 45°.

CAUTION:
Ensure the total "re-tightening angle" [in the former two steps], do not exceed 90°.



3) Install the camshaft. <Ref. to ME(H4DOTC)-54, INSTALLATION, Camshaft.>
4) Install the A/C compressor bracket on cylinder head.
5) Install the intake manifold.
<Ref. to FU(H4DOTC)-15, INSTALLATION, Intake Manifold.>

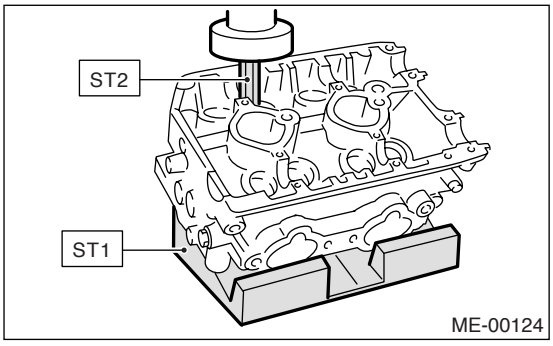
6) Install the cam sprocket.
<Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
7) Install the timing belt.
<Ref. to ME(H4DOTC)-44, INSTALLATION, Timing Belt.>
8) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
9) Install the crank pulley.
<Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
10) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

C: DISASSEMBLY

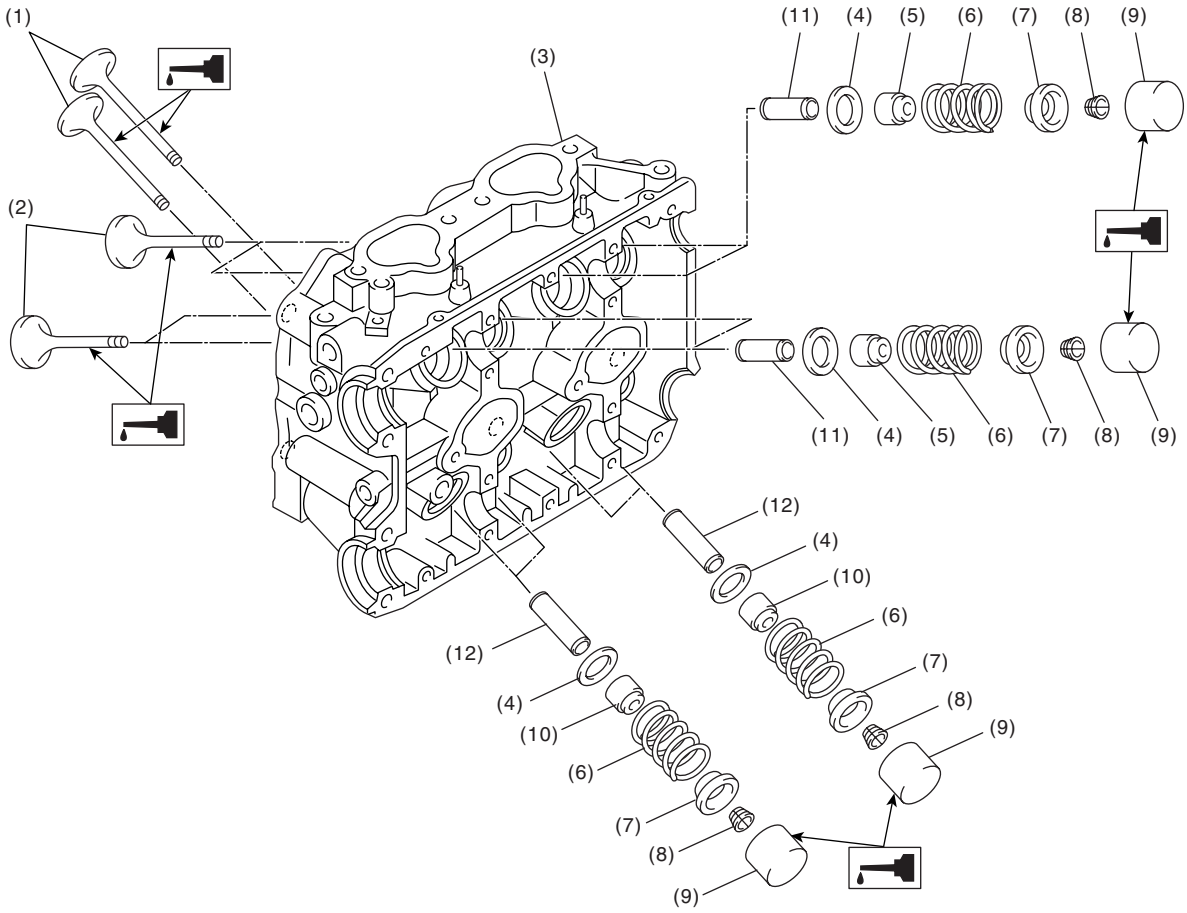
1) Remove the valve lifter.
2) Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

CAUTION:
- **Mark each valve to prevent confusion.**
- **Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.**



D: ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Cylinder head
(4) Valve spring seat
(5) Intake valve oil seal
(6) Valve spring
(7) Retainer
(8) Retainer key
(9) Valve lifter
(10) Exhaust valve oil seal
(11) Intake valve guide
(12) Exhaust valve guide

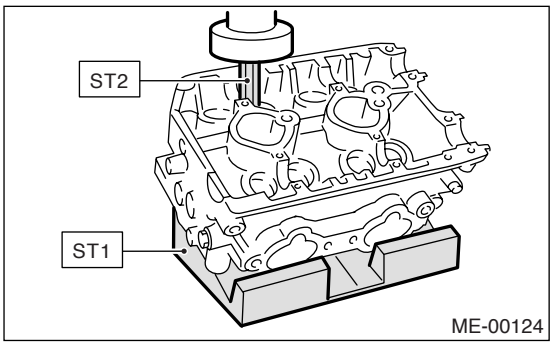
1) Installation of valve spring and valve:
(1) Coat the stem of each valve with engine oil and insert the valve into valve guide.

NOTE:
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

(2) Set the cylinder head on ST1.
(3) Install the valve spring and retainer using ST2.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499718000 VALVE SPRING REMOVER

NOTE:
Be sure to install the valve spring with their close-coiled end facing the seat on the cylinder head.



(4) Compress the valve spring and fit the valve spring retainer key.
(5) After installing, tap the valve spring retainers lightly with a wooden hammer for better seating.

2) Apply oil to the surfaces of the valve lifter.
3) Install the valve lifter.

E: INSPECTION

1. CYLINDER HEAD

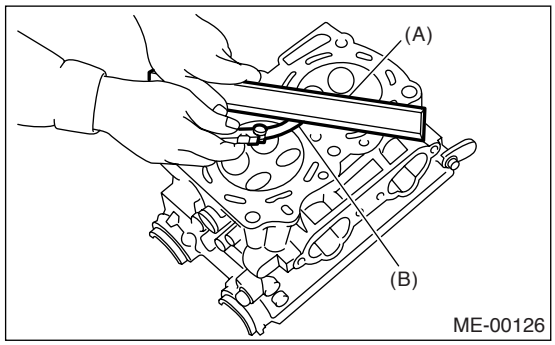
1) Make sure that cracks or other damages do not exist. In addition to visual inspection, inspect important areas by means of red lead check.
2) Measure the warping of the cylinder head surface that mates with crankcase using a straight edge (A) and thickness gauge (B).
If the warping exceeds the limit, regrind the surface with a surface grinder.

Warping limit:
0.035 mm (0.0014 in)

Grinding limit:
0.3 mm (0.012 in)

Standard height of cylinder head:
127.5 mm (5.02 in)

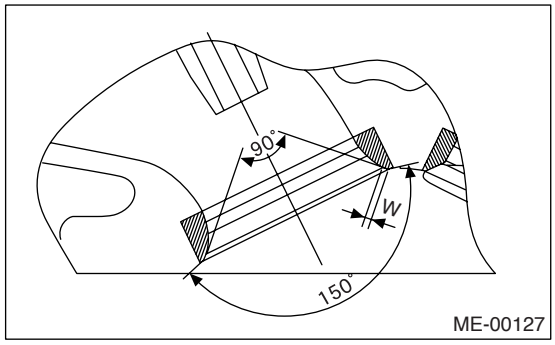
NOTE:
Uneven torque for the cylinder head nuts can cause warping. When reinstalling, pay special attention to the torque so as to tighten evenly.



2. VALVE SEAT

Inspect the intake and exhaust valve seats, and correct the contact surfaces with a valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:
Intake
Standard
0.6 — 1.4 mm (0.024 — 0.055 in)
Exhaust
Standard
1.2 — 1.8 mm (0.047 — 0.071 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring the outer diameter of valve stem and inner diameter of valve guide respectively with a micrometer.

Clearance between the valve guide and valve stem:
Standard
Intake
0.030 — 0.057 mm (0.0012 — 0.0022 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

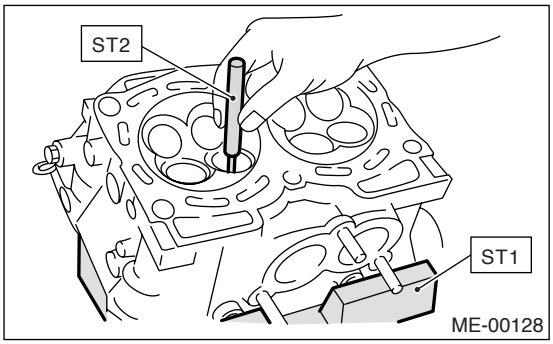
2) If the clearance between valve guide and stem exceeds the standard value, replace the valve guide or valve itself whichever shows greater amount of wear or has abnormality such as scratch. See the following procedure for valve guide replacement.

Valve guide inner diameter:
6.000 — 6.012 mm (0.2362 — 0.2367 in)

Valve stem outer diameters:
Intake
5.955 — 5.970 mm (0.2344 — 0.2350 in)
Exhaust
5.945 — 5.960 mm (0.2341 — 0.2346 in)

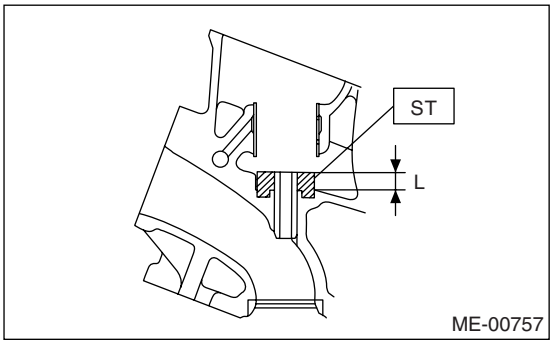
(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides fit the holes in ST1.
(2) Insert the ST2 into valve guide and press it down to remove the valve guide.

ST1 498267600 CYLINDER HEAD TABLE
ST2 499767200 VALVE GUIDE REMOVER



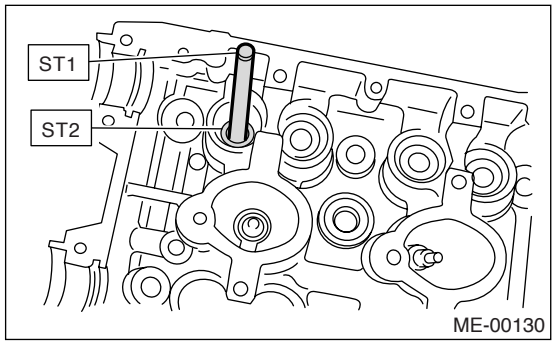
(3) Turn the cylinder head upside down and place the ST as shown in the figure.

ST 18251AA020 VALVE GUIDE ADJUSTER



(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.
(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert the ST1 into valve guide. Press-in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499767200 VALVE GUIDE REMOVER
ST2 18251AA020 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
15.8 — 16.2 mm (0.622 — 0.638 in)

(7) Ream the inside of valve guide using ST. Put the reamer in valve guide, and rotate the reamer slowly clockwise pushing it lightly. Bring the reamer back while rotating it clockwise. After reaming, clean the valve guide to remove chips.

ST 499767400 VALVE GUIDE REAMER

NOTE:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chip, use a new reamer or remedy the reamer.

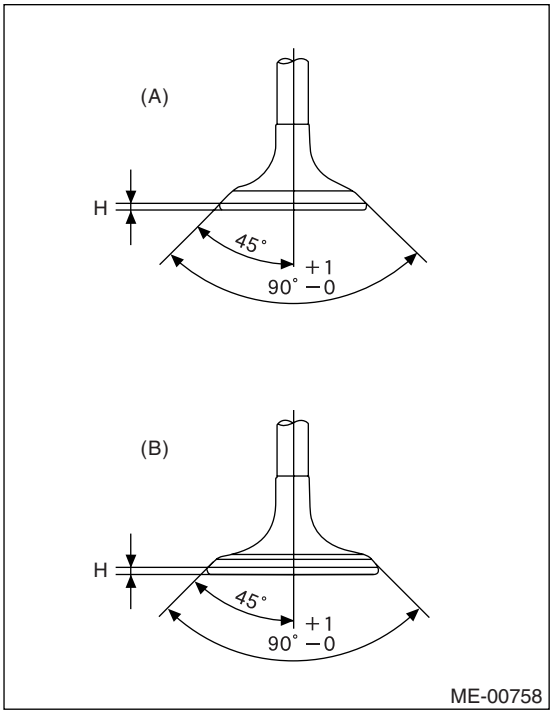
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace them if damaged, worn, deformed, or if “H” is exceed the standard value or if they have partial wear.

H:
Intake (A)
Standard
1.0 — 1.4 mm (0.039 — 0.055 in)
Exhaust (B)
Standard
1.3 — 1.7 mm (0.051 — 0.067 in)

Valve overall length:
Intake (A)
104.4 mm (4.110 in)
Exhaust (B)
104.65 mm (4.1201 in)

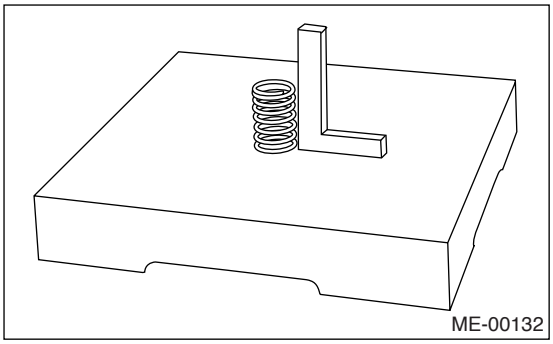


2) Put a small amount of grinding compound on the seat surface, and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

5. VALVE SPRINGS

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard value presented in the table.
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top of spring using a try square.

Free length mm (in)		44.67 (1.759)
Tension/spring height N (kgf, lb)/mm (in)	Set	206 — 236 (21.0 — 24.1, 46.3 — 53.1)/36.0 (1.417)
	Lift	485 — 537 (21.0 — 24.1, 109 — 121) /26.0 (1.024)
Squareness		2.5°, 2.0 mm (0.079 in)



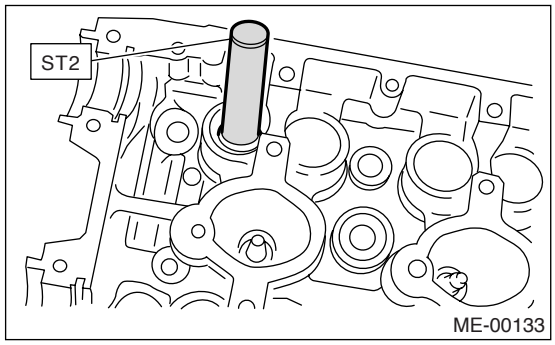
6. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with a new one, if the lip is damaged or spring is out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Place the cylinder head on ST1.
2) Press-fit the oil seal to the specified dimension indicated in the figure using ST2.
ST1 498267600 CYLINDER HEAD TABLE
ST2 498857100 VALVE OIL SEAL GUIDE

NOTE:
• Apply engine oil to oil seal before force-fitting.
• Differentiate between the intake valve oil seal and exhaust valve oil seal by noting their difference in color.

Color of rubber part:
Intake [Black]
Exhaust [Brown]

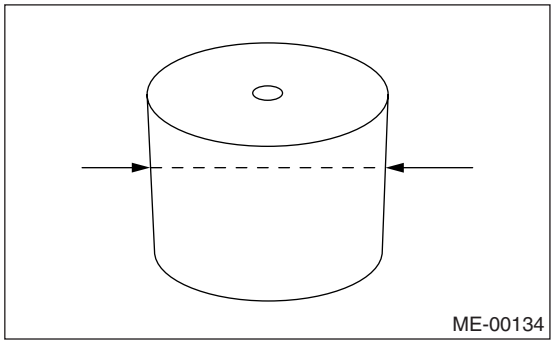
Color of spring part:
Intake [Silver]
Exhaust [Silver]



7. VALVE LIFTER

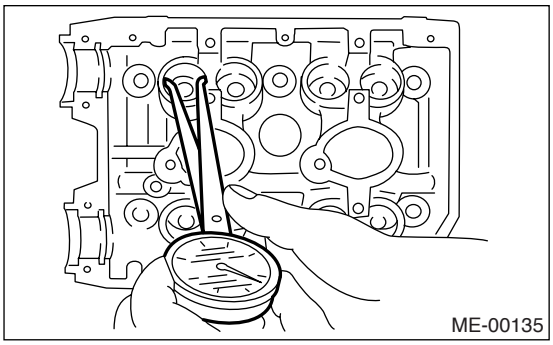
1) Check the valve lifter visually.
2) Measure the outer diameter of valve lifter.

Outer diameter:
34.959 — 34.975 mm (1.3763 — 1.3770 in)



3) Measure the inner diameter of valve lifter mating part on cylinder head.

Inner diameter:
34.994 — 35.016 mm (1.3777 — 1.3786 in)



NOTE:
If difference between outer diameter of valve lifter and inner diameter of valve lifter mating part is over the standard or has partial wear in inner surface, replace the cylinder head.

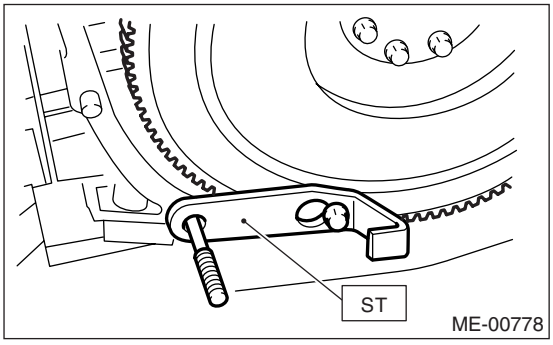
Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

21.Cylinder Block

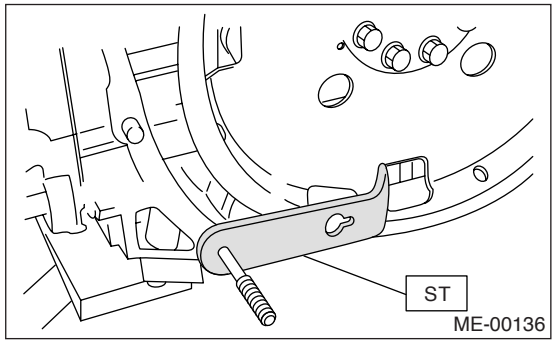
A: REMOVAL

NOTE:
Before conducting this procedure, drain engine oil completely.

1) Remove the intake manifold.
<Ref. to FU(H4DOTC)-13, REMOVAL, Intake Manifold.>
2) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
3) Remove the crank pulley.
<Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>
4) Remove the timing belt cover.
<Ref. to ME(H4DOTC)-42, REMOVAL, Timing Belt Cover.>
5) Remove the timing belt.
<Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
6) Remove the cam sprocket.
<Ref. to ME(H4DOTC)-51, REMOVAL, Cam Sprocket.>
7) Remove the crank sprocket.
<Ref. to ME(H4DOTC)-52, REMOVAL, Crank Sprocket.>
8) Remove the generator and A/C compressor with their brackets.
9) Remove the cylinder head.
<Ref. to ME(H4DOTC)-59, REMOVAL, Cylinder Head.>
ST 498497100 CRANKSHAFT STOPPER

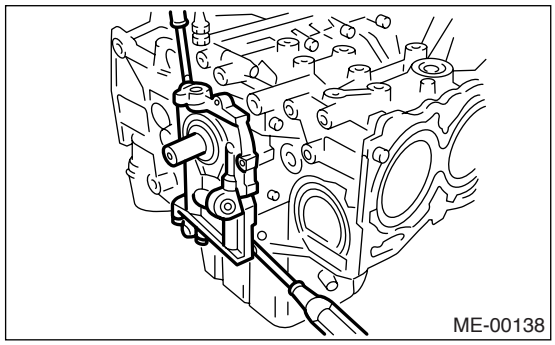


10) Remove the drive plate.
To lock crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

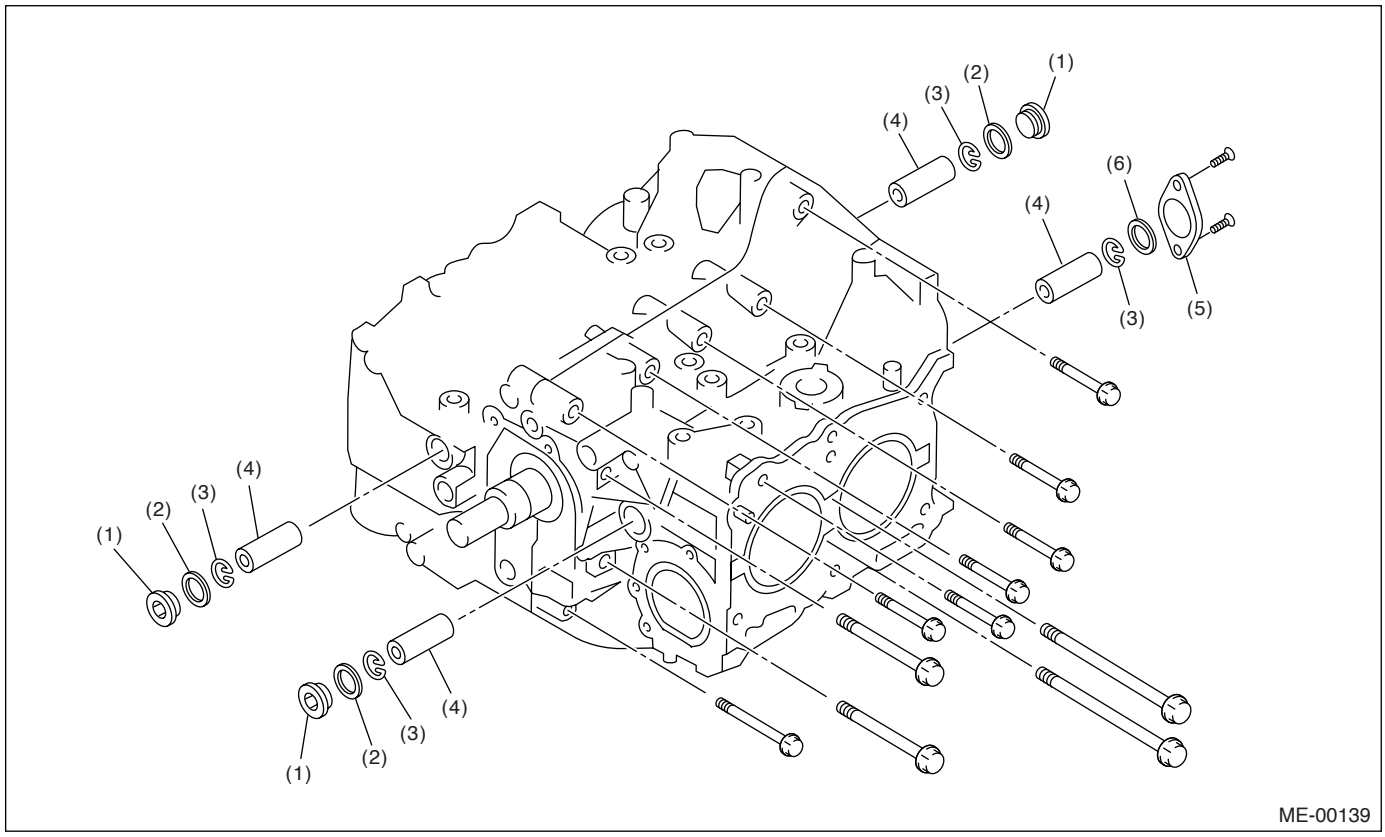


11) Remove the oil separator cover.
12) Remove the oil pump by using flat tip screwdriver.

CAUTION:
Be careful not to scratch the mating surface of cylinder block and oil pump.

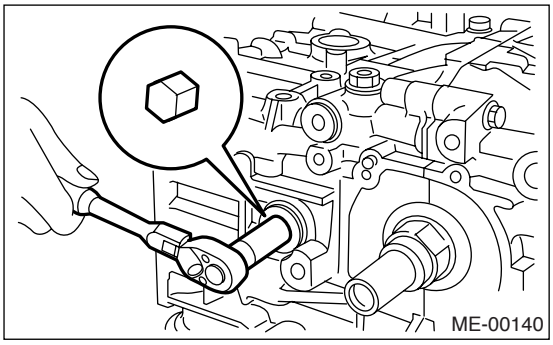


13) Remove the water by-pass pipe for heater.
14) Remove the oil filter.
15) Removal of oil pan:
(1) Place the cylinder block to face the #2 and #4 cylinder side upward.
(2) Remove the bolts which secure oil pan to cylinder block.
(3) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan. Do not use a screwdriver or similar tools in place of oil pan cutter.
16) Remove the oil strainer stay.
17) Remove the oil strainer.
18) Remove the baffle plate.
19) Remove the water pipe.
20) Remove the water pump.

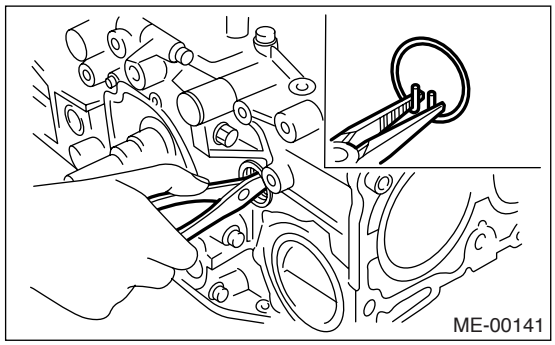


(1) Service hole plug
(2) Gasket
(3) Snap ring
(4) Piston pin
(5) Service hole cover
(6) O-ring

21) Remove the service hole cover and service hole plugs using a hexagon wrench [14 mm].

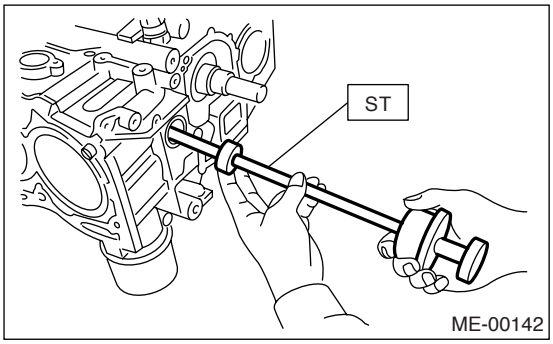


22) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston snap ring through service hole of #1 and #2 cylinders.



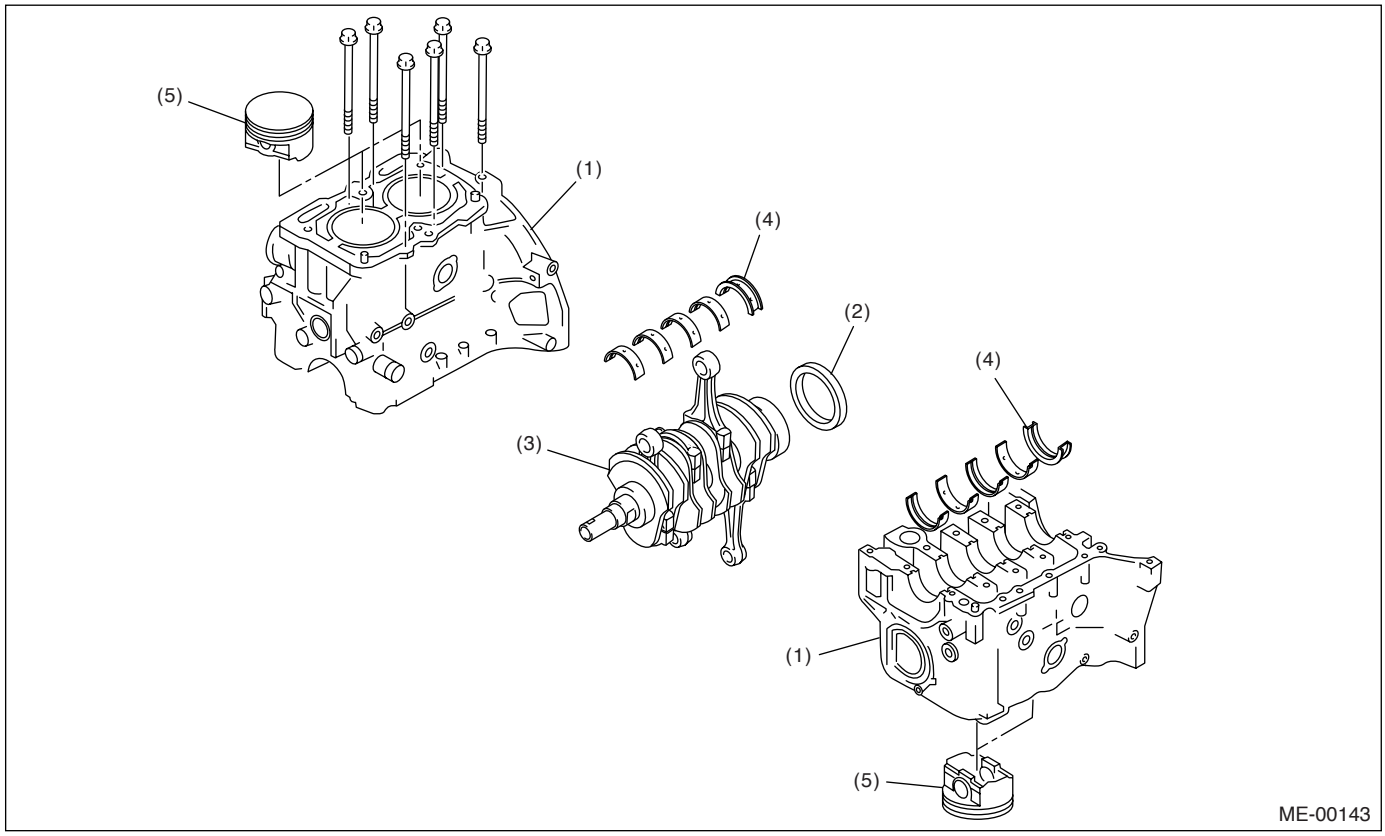
23) Draw out the piston pins from #1 and #2 pistons using ST.
ST 499097700 PISTON PIN REMOVER

NOTE:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



24) Similarly remove the piston pins from #3 and #4 pistons.
25) Remove the bolts which connect cylinder block on the side of #2 and #4 cylinders.
26) Back off the bolts which connect cylinder block on the side of #1 and #3 cylinders two or three turns.
27) Place the cylinder block to face the #1 and #3 cylinder side upward, and remove cylinder block connecting bolts.
28) Separate the cylinder block (LH) and (RH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.



(1) Cylinder block
(2) Rear oil seal
(3) Crankshaft
(4) Crankshaft bearing
(5) Piston

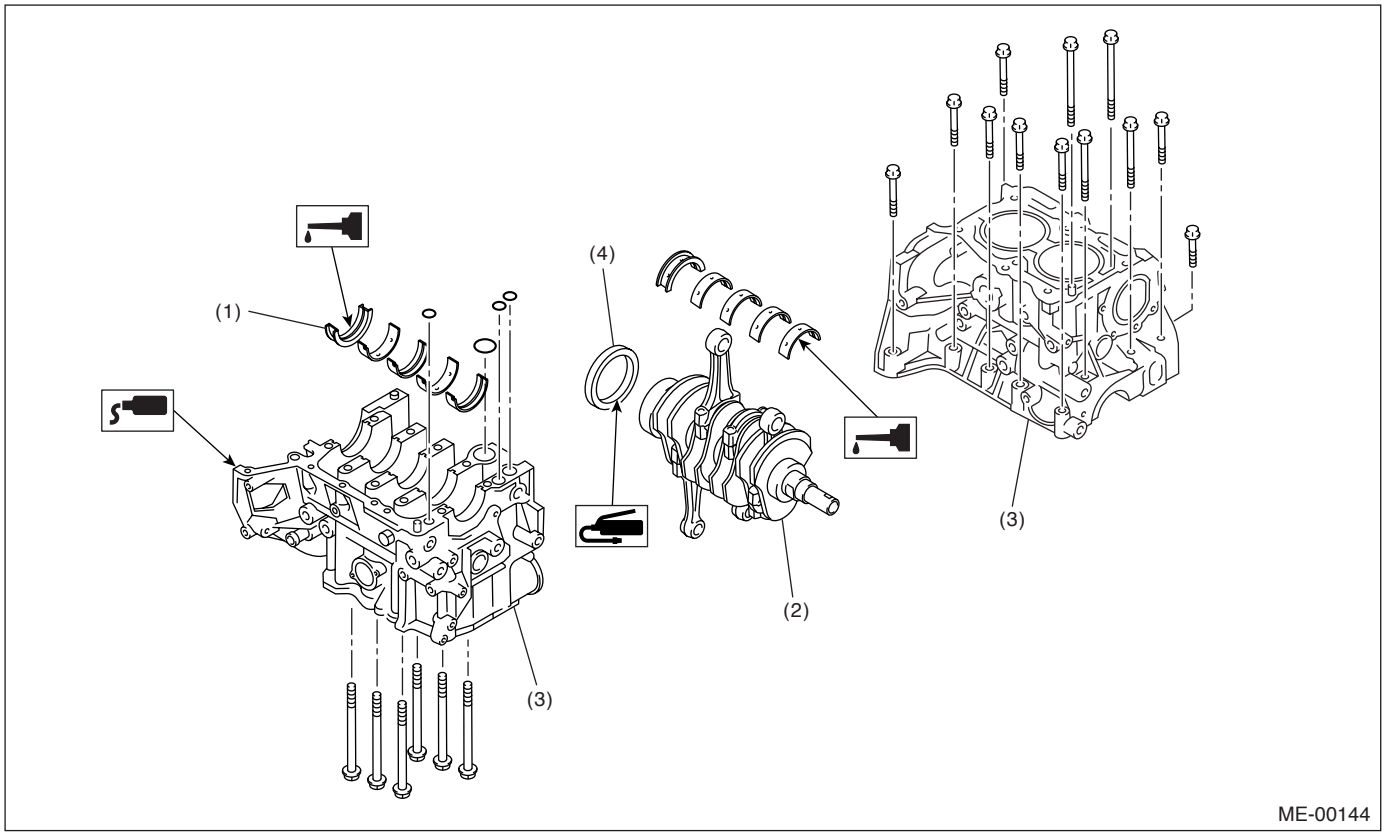
29) Remove the rear oil seal.
30) Remove the crankshaft together with connecting rod.
31) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:
Do not confuse the combination of crankshaft bearings.
Press the bearing at the end opposite to locking lip.

32) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:
Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION

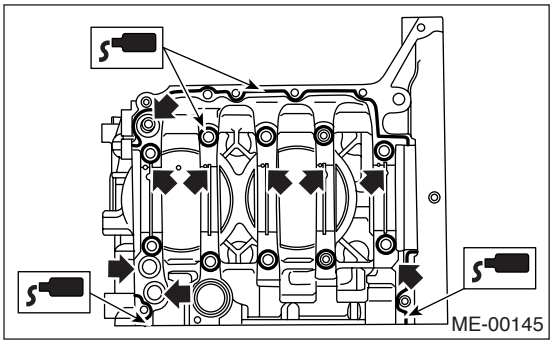


(1) Crankshaft bearing
(2) Crankshaft
(3) Cylinder block
(4) Rear oil seal

1) Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.
2) Position the crankshaft on the #2 and #4 cylinder block.
3) Apply liquid gasket to the mating surface of #1 and #3 cylinder block, and position it on #2 and #4 cylinder block.

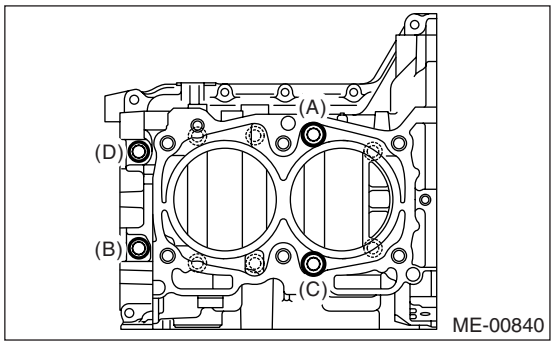
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent

NOTE:
Do not allow liquid gasket to run over to O-ring grooves, oil passages, bearing grooves, etc.



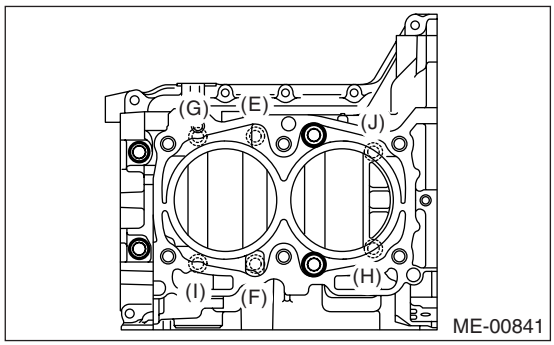
4) Apply a coat of engine oil to washers and bolt threads.
5) Tighten the 10 mm cylinder block connecting bolts on LH side (A — D) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



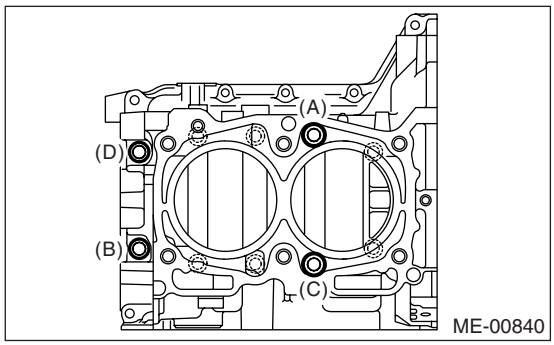
6) Tighten the 10 mm cylinder block connecting bolts on RH side (E — J) in alphabetical sequence.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



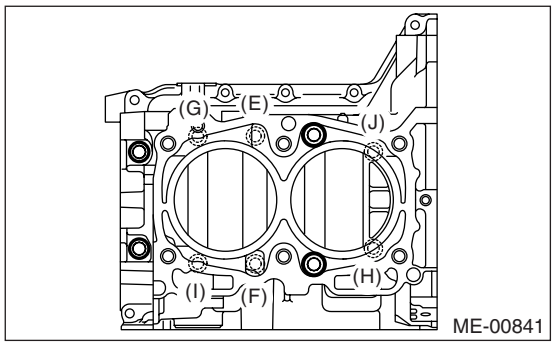
7) Further tighten the LH side bolts (A — D) in alphabetical sequence.

Tightening torque:
(A), (C): 20 N·m (2.0 kgf-m, 14.8 ft-lb)
(B), (D): 15 N·m (1.5 kgf-m, 10.8 ft-lb)

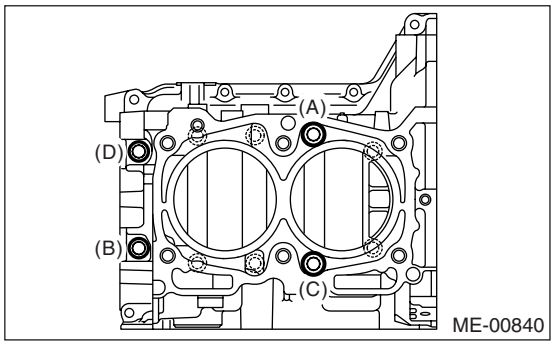


8) Further tighten the RH side bolts (E — J) in alphabetical sequence.

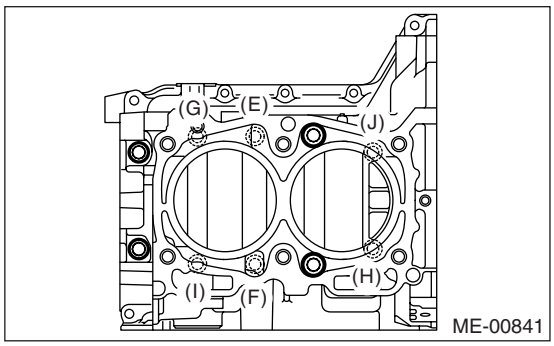
Tightening torque:
(E), (F), (G), (I): 20 N·m (2.0 kgf-m, 14.8 ft-lb)
(H), (J): 18 N·m (1.8 kgf-m, 13.3 ft-lb)



9) Further tighten the LH side bolts (A — D) to 90° in alphabetical sequence.

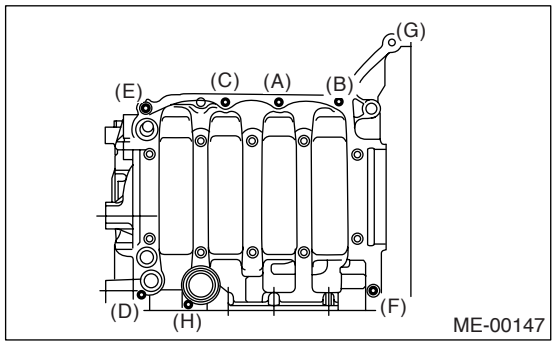


10) Further tighten the RH side bolts (E — J) to 90° in alphabetical sequence.



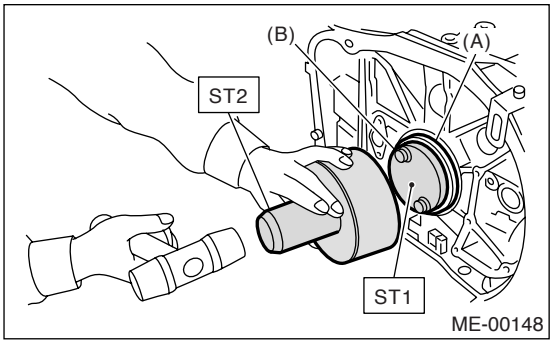
11) Tighten the 8 mm and 6 mm cylinder block connecting bolts on LH side (A — H) in alphabetical sequence.

Tightening torque:
(A) — (G): 25 N·m (2.5 kgf-m, 18.1 ft-lb)
(H): 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



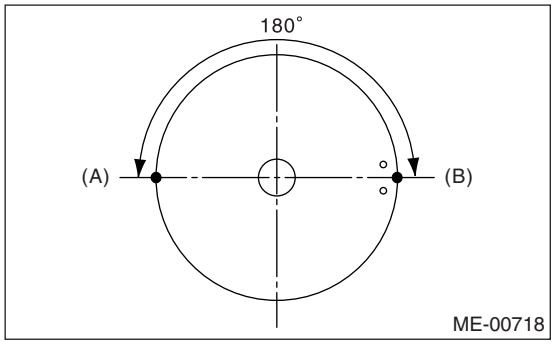
12) Install the rear oil seal using ST1 and ST2.

ST1	499597100	CRANKSHAFT OIL SEAL GUIDE
ST2	499587200	CRANKSHAFT OIL SEAL INSTALLER

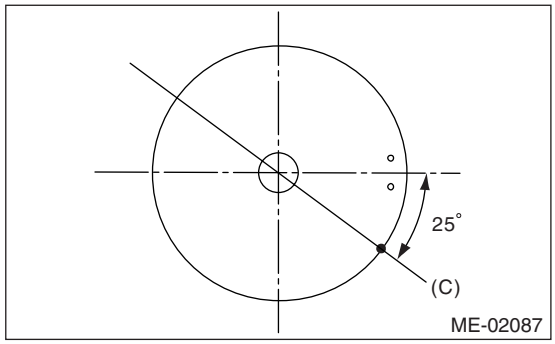


(A) Rear oil seal
(B) Flywheel attaching bolt

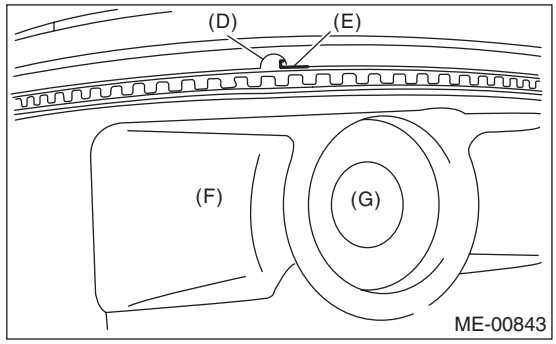
13) Position the top ring gap at (A) or (B) in the figure.
14) Position the second ring gap at 180° on the reverse side of the top ring gap.



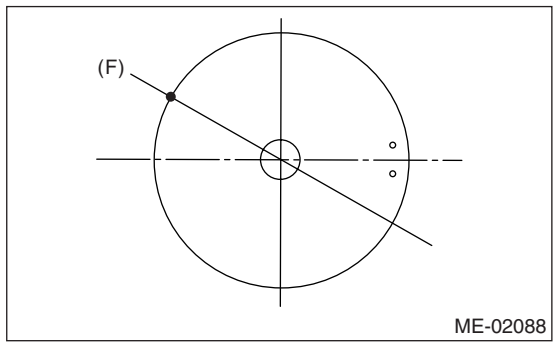
15) Position the upper rail gap at (C) in the figure.



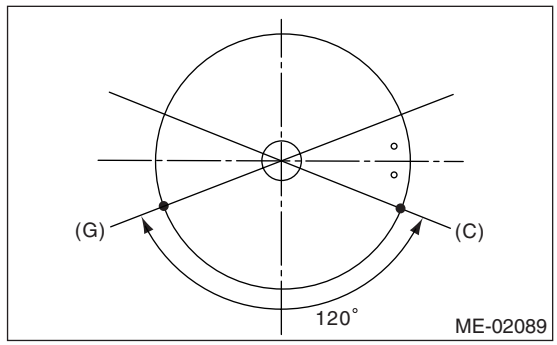
16) Align the upper rail spin stopper (E) to the side hole (D) on the piston.



17) Position the expander gap at 180° on the reverse side of (C) that shown (F) in the figure.



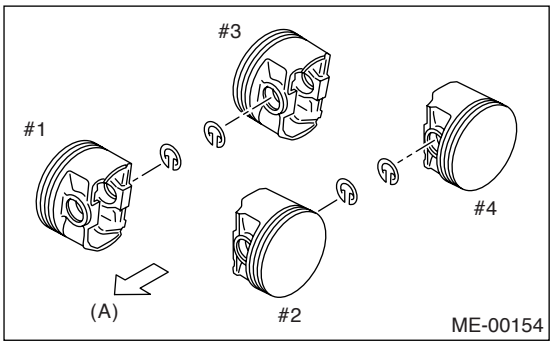
18) Position the lower rail gap at 120° on counterclockwise of (C) that shown (G) in the figure.



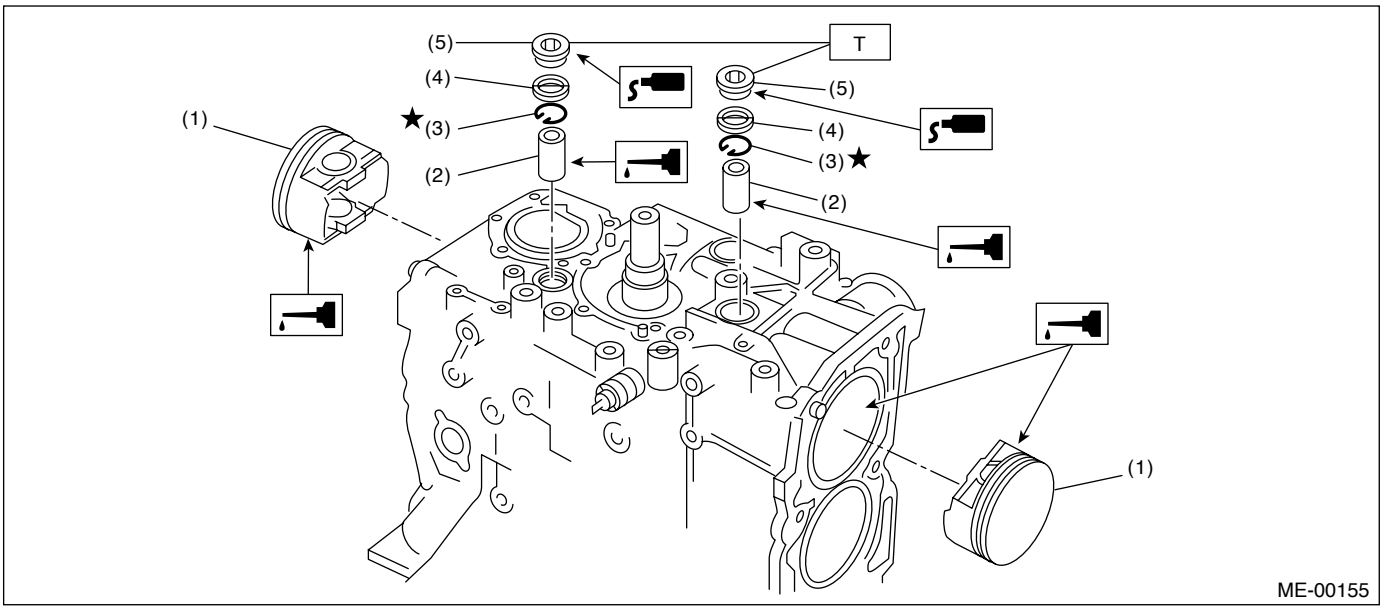
CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.

19) Install the snap ring.
Install snap rings in the piston holes located opposite to the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new snap rings.



(A) Front side



(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug

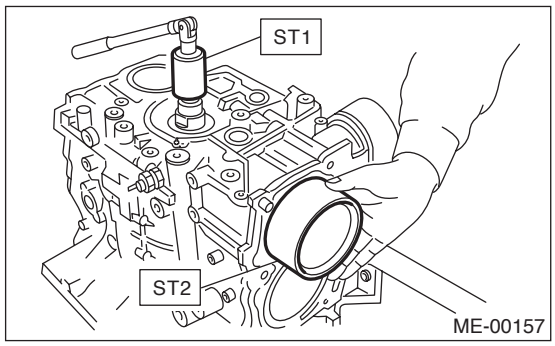
Tightening torque: N·m (kgf-m, ft-lb)
T: 70 (7.1, 51.6)

20) Installation of piston:
(1) Place the cylinder block to face the #1 and #2 cylinder side upward.
(2) Using the ST1, turn the crankshaft so that #1 and #2 connecting rods are set at bottom dead center.

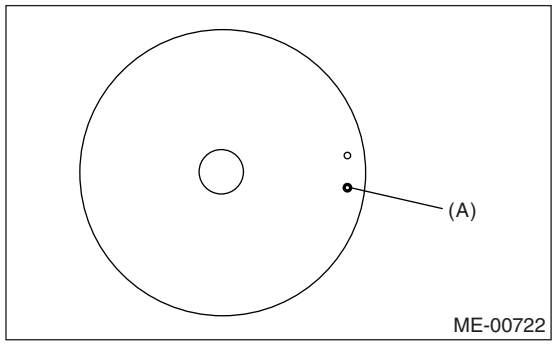
ST1 499987500 CRANKSHAFT SOCKET

(3) Apply a coat of engine oil to the pistons and cylinders and insert pistons in their cylinders using ST2.

ST2 398744300 PISTON GUIDE



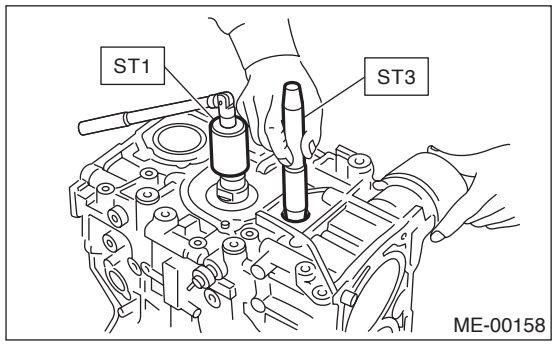
NOTE:
Piston front mark faces towards the front of engine.



(A) Front mark

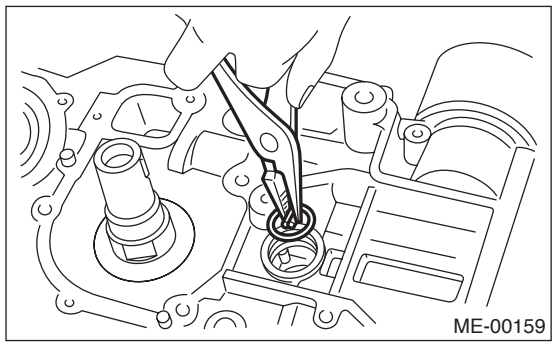
21) Installation of piston pin:
(1) Apply a coat of engine oil to ST3 before insertion, and then insert it into the service hole to align piston pin hole with connecting rod small end.

ST3 499017100 PISTON PIN GUIDE



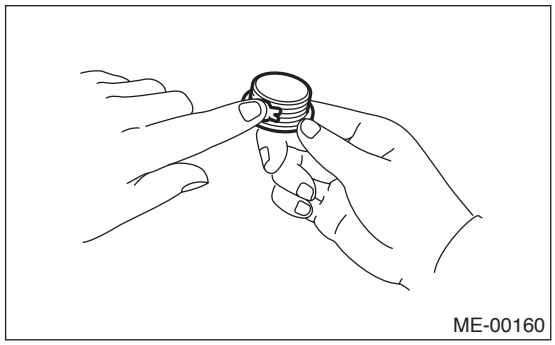
(2) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
(3) Install the snap ring.

NOTE:
Use new snap rings.



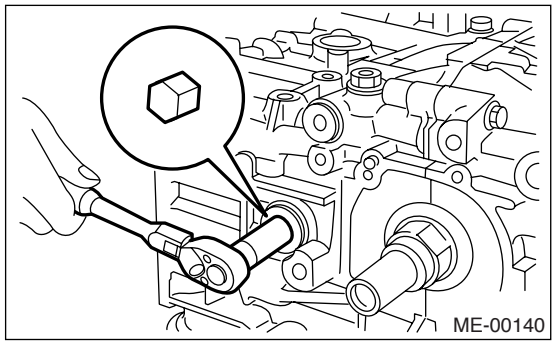
(4) Apply liquid gasket around the service hole plug.

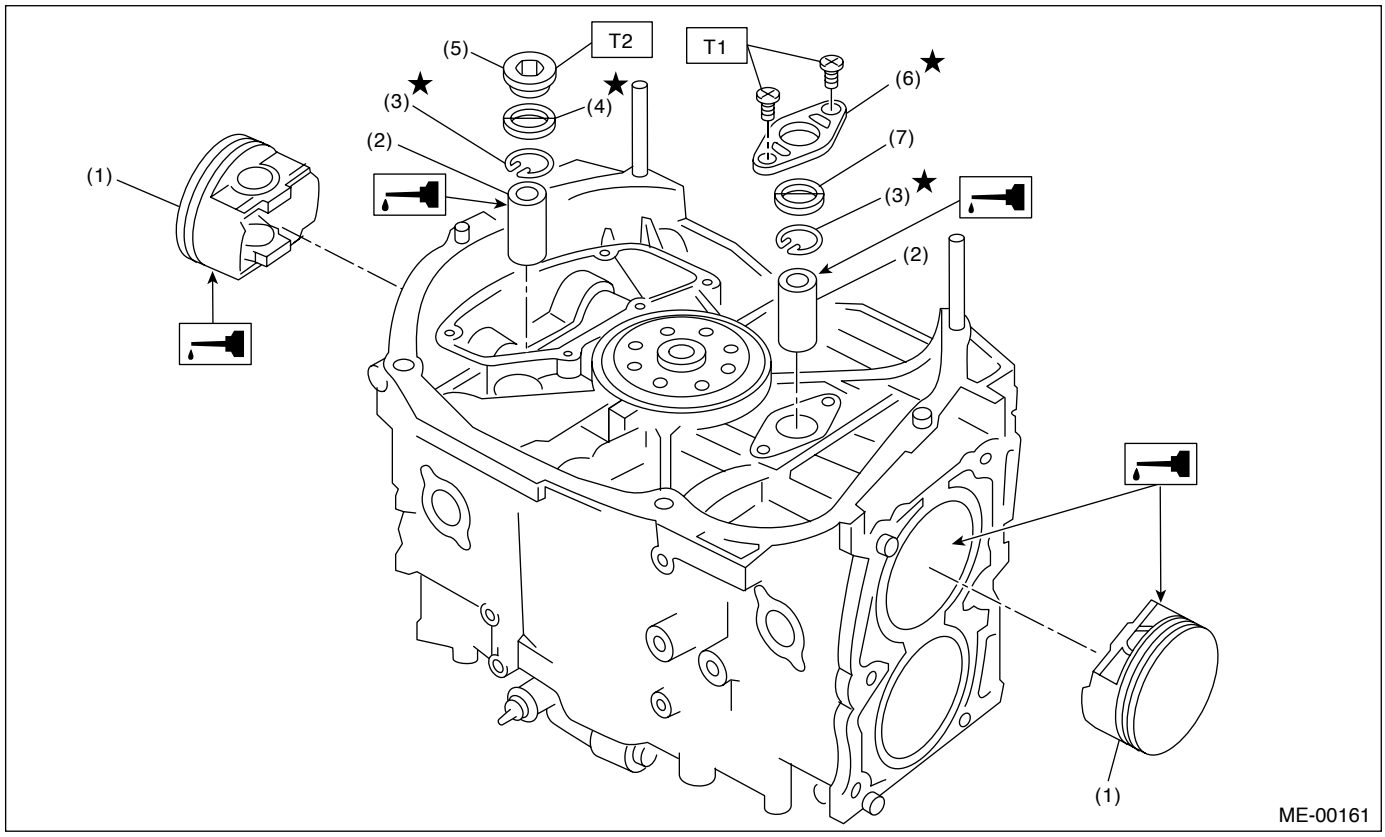
Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(5) Install the service hole plug and gasket.

NOTE:
Use a new gasket.





(1) Piston
(2) Piston pin
(3) Snap ring
(4) Gasket
(5) Service hole plug
(6) Service hole cover
(7) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 70 (7.1, 51.6)

(6) Place the cylinder block to face the #3 and #4 cylinder side upward. Following the same procedures as used for #1 and #2 cylinders, install the pistons and piston pins.

22) Install the water pipe.

23) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

24) Install the oil strainer and O-ring.

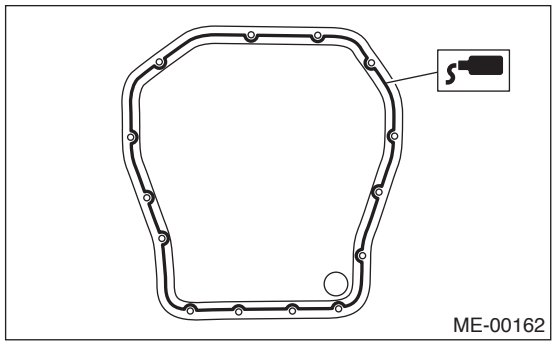
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

25) Install the oil strainer stay.

26) Apply liquid gasket to mating surfaces and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

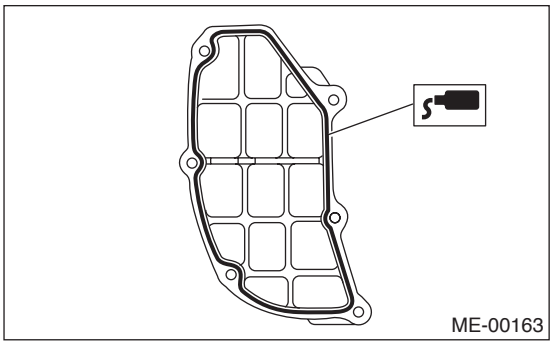


27) Apply liquid gasket to mating surfaces and install the oil separator cover.

NOTE:
Install them within 20 min. from applying liquid gasket.

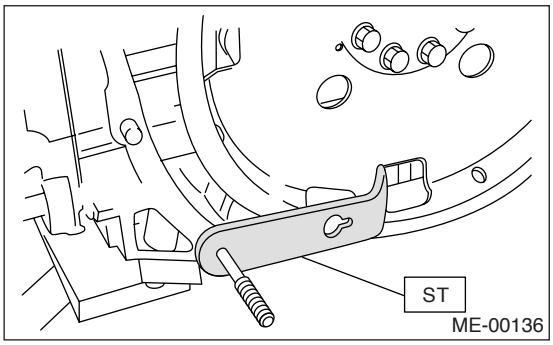
Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



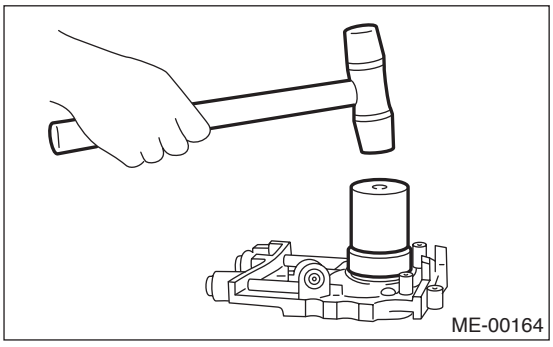
28) Install the drive plate.
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
72 N·m (7.3 kgf-m, 53.1 ft-lb)



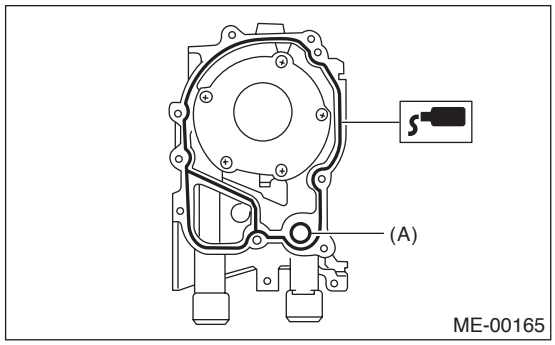
29) Installation of oil pump:
(1) Install the front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new front oil seal.



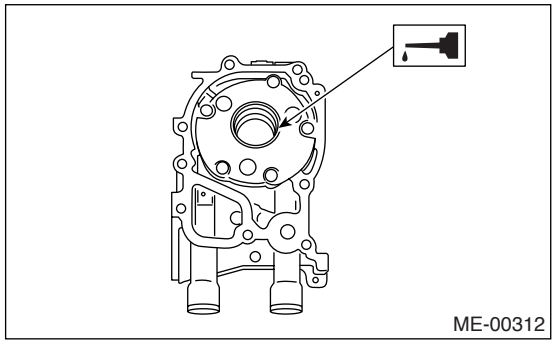
(2) Apply liquid gasket to the matching surface of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



(A) O-ring

(3) Apply a coat of engine oil to the inside of oil seal.



(4) Install the oil pump on cylinder block. Be careful not to damage the oil seal during installation.

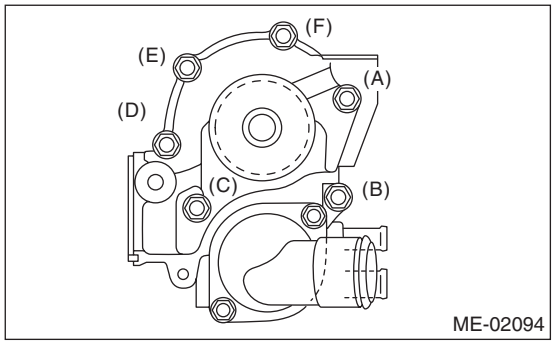
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

CAUTION:
• Do not forget to install the O-ring and seal when installing the oil pump.
• Align the flat surface of oil pump's inner rotor with crankshaft before installation.

30) Install the water pump and gasket.

Tightening torque:
First: 12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second: 12 N·m (1.2 kgf-m, 8.7 ft-lb)

CAUTION:
• Be sure to use a new gasket.
• When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.

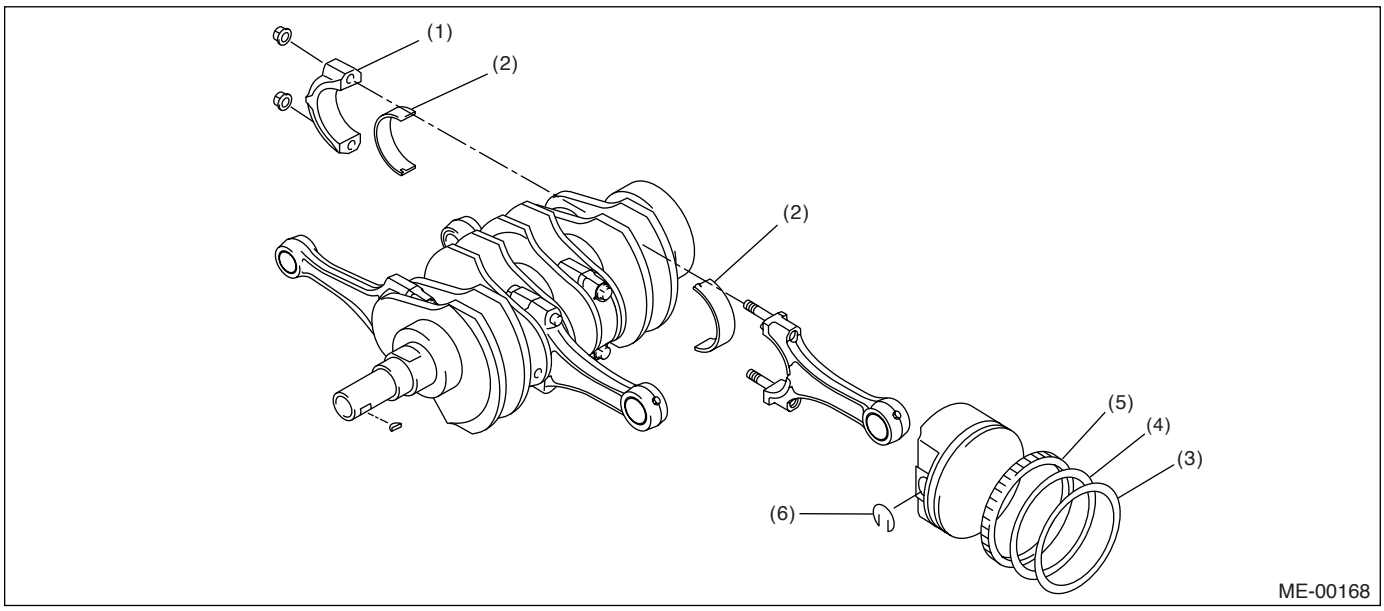


31) Install the water by-pass pipe for heater.
32) Install the oil filter.
33) Install the water by-pass pipe between oil cooler and water pump.
34) Install the water pipe.

NOTE:
Always use new O-rings.

35) Install the cylinder head.
<Ref. to ME(H4DOTC)-59, INSTALLATION, Cylinder Head.>
36) Install the oil level gauge guide. (LH side)
37) Install the rocker cover.
38) Install the crank sprocket.
<Ref. to ME(H4DOTC)-52, INSTALLATION, Crank Sprocket.>
39) Install the cam sprocket.
<Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
40) Install the timing belt.
<Ref. to ME(H4DOTC)-44, INSTALLATION, Timing Belt.>
41) Install the timing belt cover.
<Ref. to ME(H4DOTC)-42, INSTALLATION, Timing Belt Cover.>
42) Install the crank pulley.
<Ref. to ME(H4DOTC)-41, INSTALLATION, Crank Pulley.>
43) Install the generator and A/C compressor brackets on cylinder head.
44) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>
45) Install the intake manifold.
<Ref. to FU(H4DOTC)-15, INSTALLATION, Intake Manifold.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Snap ring

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

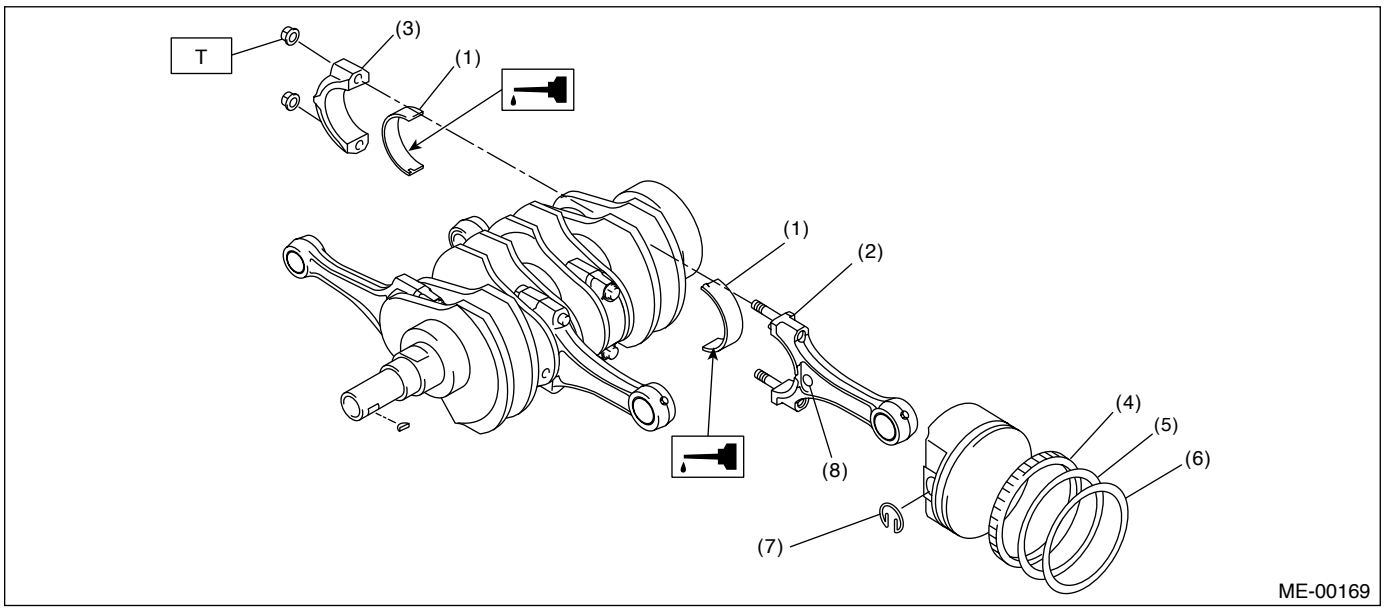
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order to prevent confusion.

3) Remove the piston rings using a piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order to prevent confusion.

5) Remove the snap ring.

D: ASSEMBLY



(1) Connecting rod bearing
(2) Connecting rod
(3) Connecting rod cap
(4) Oil ring
(5) Second ring
(6) Top ring
(7) Snap ring
(8) Side mark

Tightening torque: N·m (kgf-m, ft-lb)
T: 45 (4.6, 33)

1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
2) Install the connecting rod on crankshaft.

NOTE:
Position each connecting rod with the side marked facing forward.

3) Install the connecting rod cap.
Ensure the arrow mark on connecting rod cap facing front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge, and correct by grinding if necessary.

Warping limit:
0.025 mm (0.00098 in)

Grinding limit:
0.1 mm (0.004 in)

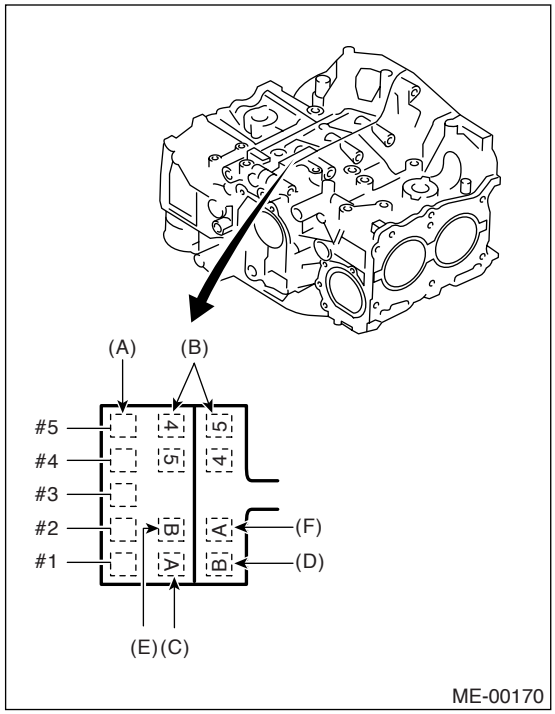
Standard height of cylinder block:
201.0 mm (7.91 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
• Measurement should be performed at a temperature of 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines in selecting a standard piston.

Standard diameter:
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6219 — 3.6222 in)



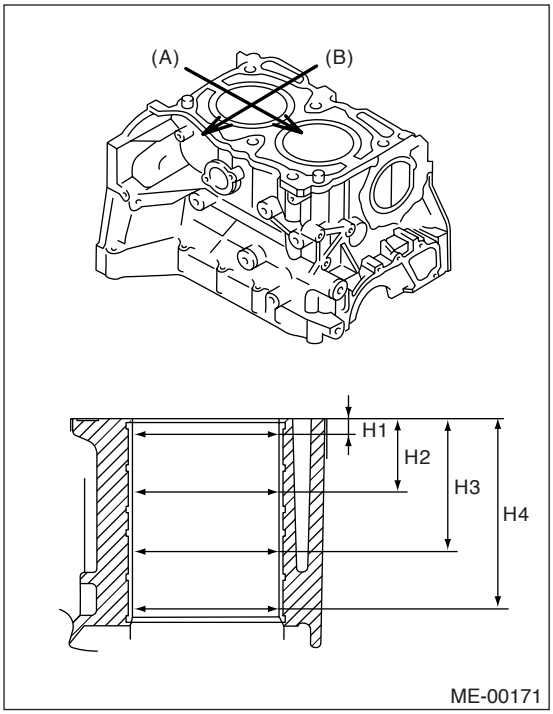
(A) Main journal size mark
(B) Cylinder block (RH) – (LH) combination mark
(C) #1 cylinder bore size mark
(D) #2 cylinder bore size mark
(E) #3 cylinder bore size mark
(F) #4 cylinder bore size mark

2) How to measure the inner diameter of each cylinder:
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights as shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Taper:
Standard
0.015 mm (0.0006 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)



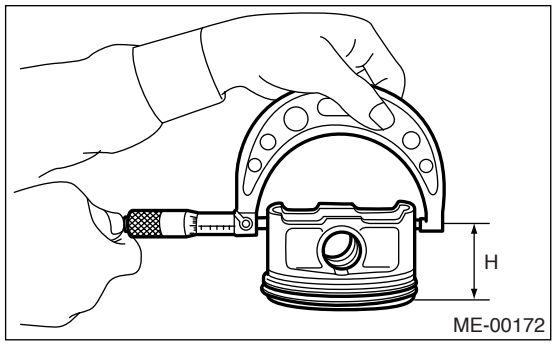
(A) Piston pin direction
(B) Thrust direction
H1: 10 mm (0.39 in)
H2: 45 mm (1.77 in)
H3: 80 mm (3.15 in)
H4: 115 mm (4.53 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height as shown in the figure. (Thrust direction)

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
40.0 mm (1.57 in)

Piston outer diameter:
Standard
A: 92.005 — 92.015 mm (3.6222 — 3.6226 in)
B: 91.995 — 92.005 mm (3.6219 — 3.6222 in)
0.25 mm (0.0098 in) oversize
92.245 — 92.265 mm (3.6317 — 3.6467 in)
0.50 mm (0.0197 in) oversize
92.495 — 92.515 mm (3.6415 — 3.6423 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
–0.010 — 0.010 mm (–0.00039 — 0.00039 in)

6) Boring and honing:
(1) If one of the values of taper, out-of-roundness, or cylinder-to-piston clearance exceeds the specified limit or is out of standard, or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only. Nor use an oversize piston for one cylinder only.

(2) If the cylinder inner diameter exceeds 92.515 mm (3.6423 in) after boring and honing, replace the crankcase.

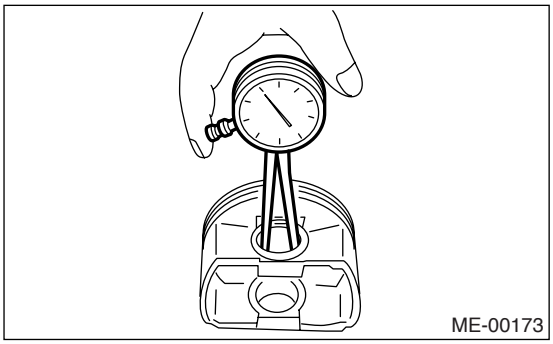
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

3. PISTON AND PISTON PIN

1) Check the pistons and piston pins for damage, cracks, and wear and the piston ring grooves for wear and damage. Replace if defective.

2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H4DOTC)-79, CYLINDER AND PISTON, INSPECTION, Cylinder Block.> If any of the clearances is out of specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with your thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)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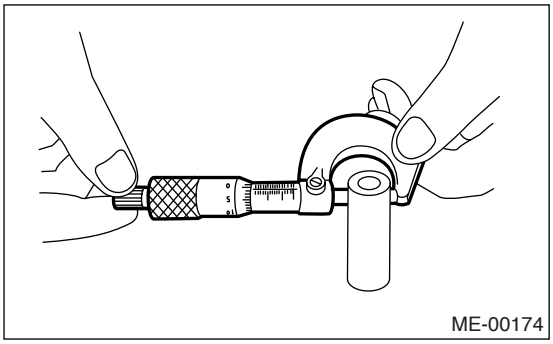
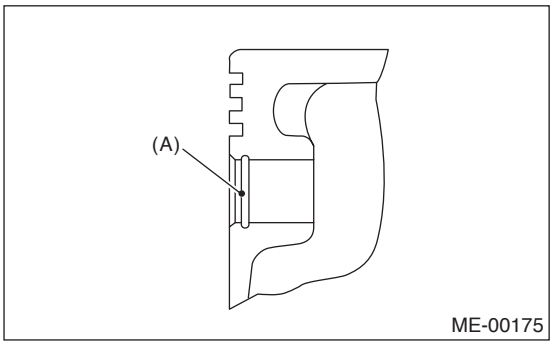

ME-00174

4) Check the snap ring installation groove on the piston for burr (A). If necessary, remove burr from the groove so that the piston pin can lightly move.



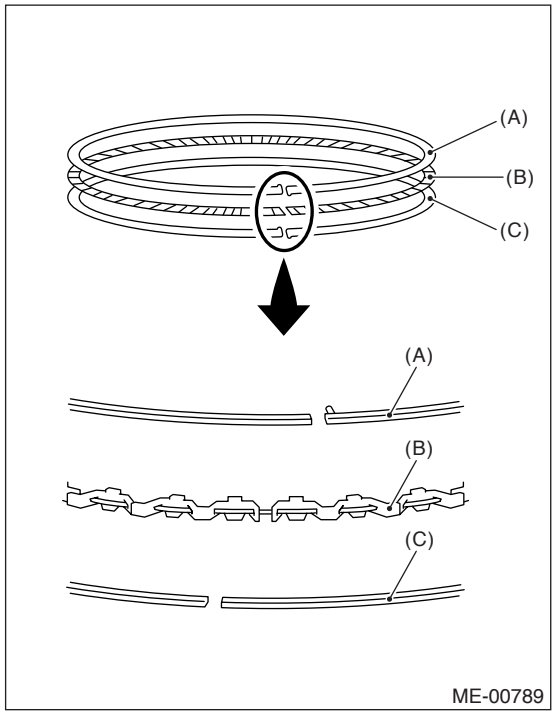
ME-00175

5) Check the piston pin snap ring for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

CAUTION:
• Marks are displayed on the end of top and second rings. When installing the rings to the piston, face those marks upward.
• Oil ring consists of the upper rail, expander and lower rail. When installing on piston, be careful of each rail's direction.



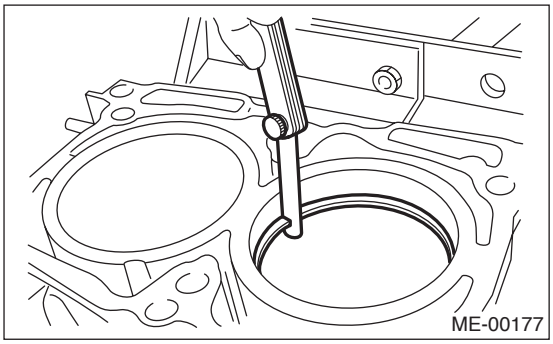
ME-00789

(A) Upper rail
(B) Expander
(C) Lower rail

2) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

		Standard mm (in)
Piston ring gap	Top ring	Outer circle side: 0.20 — 0.25 (0.0079 — 0.0098) Inner circle side: 0.20 — 0.30 (0.0079 — 0.014)
	Second ring	0.40 — 0.50 (0.016 — 0.020)
	Oil ring rail	0.20 — 0.50 (0.0079 — 0.0197)

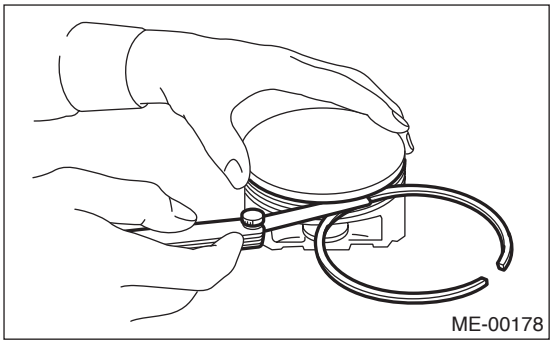
NOTE:
Difference between outer and inner perimeters of top ring should be within 0.05 mm (0.0020 in).



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

NOTE:
Before measuring the clearance, clean the piston ring groove and piston ring.

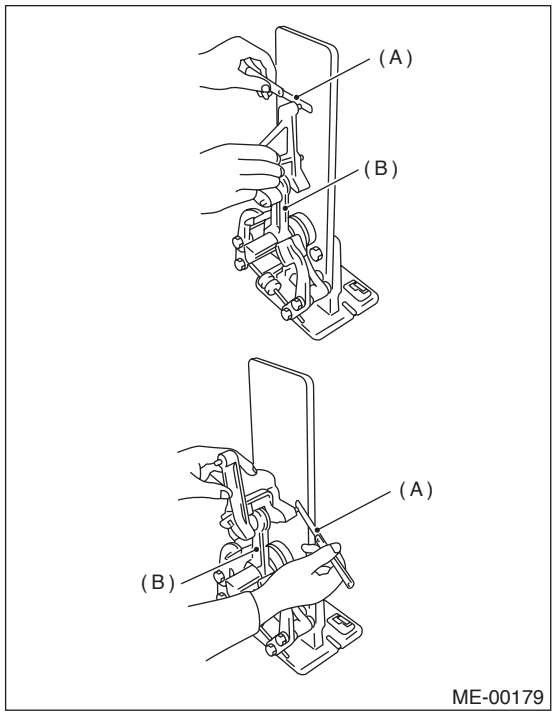
		Standard mm (in)
Clearance between piston ring and piston ring groove	Top ring	0.030 — 0.070 (0.0012 — 0.0028)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)



5. CONNECTING ROD

1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if the bend or twist exceeds the limit.

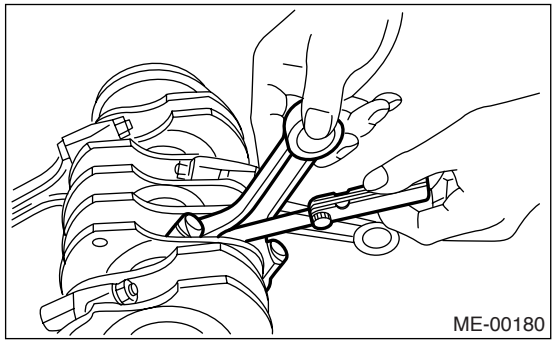
Limit of bend or twist per 100 mm (3.94 in) in length:
0.10 mm (0.0039 in)



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). If side clearance exceeds the limit or has partial wear, replace the connecting rod.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.
5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within the specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

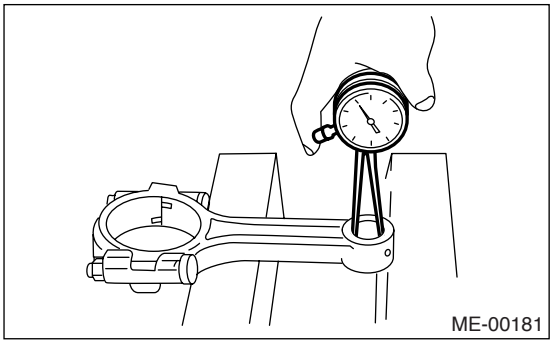
Connecting rod oil clearance:
Standard
0.026 — 0.052 mm (0.0010 — 0.0020 in)

Unit: mm (in)

Bearings	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.486 — 1.498 (0.0585 — 0.0590)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.504 — 1.512 (0.0592 — 0.0595)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.514 — 1.522 (0.0596 — 0.0599)	51.934 — 51.950 (2.0447 — 2.0453)
0.25 (0.0098) undersize	1.614 — 1.622 (0.0635 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)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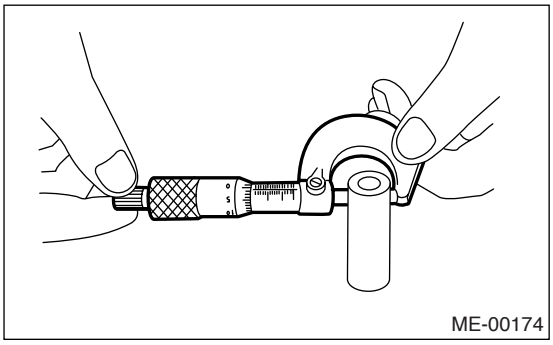
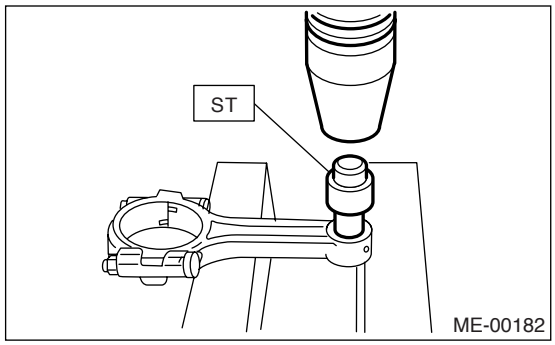

ME-00174

7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 499037100 CONNECTING ROD BUSHING REMOVER AND INSTALLER



ME-00182

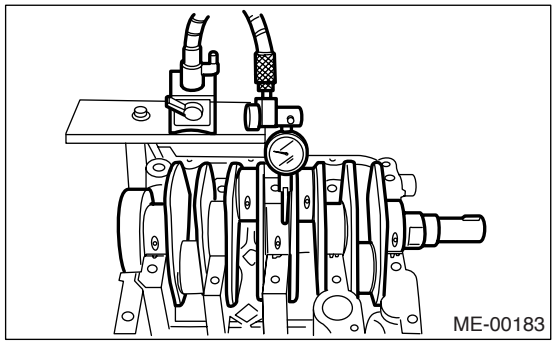
(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

1) Clean the crankshaft completely, and check it for cracks using red lead. Replace if defective.
2) Measure the bend of crankshaft. If it exceeds the limit, repair or replace it.

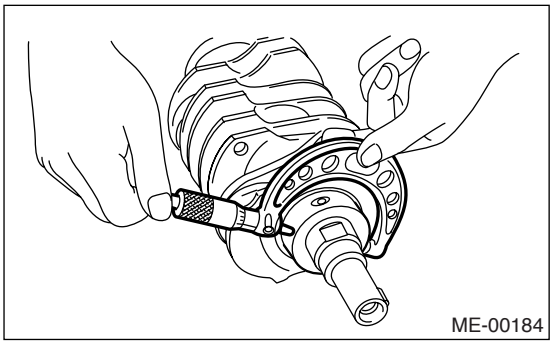
NOTE:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings, and then measure the crankshaft bend using a dial gauge.

Crankshaft bend limit:
0.035 mm (0.0014 in)


ME-00183

3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.005 mm (0.0002 in) or less
Cylindricality
0.006 mm (0.0002 in)
Grinding limit (dia.)
51.750 mm (2.0374 in)



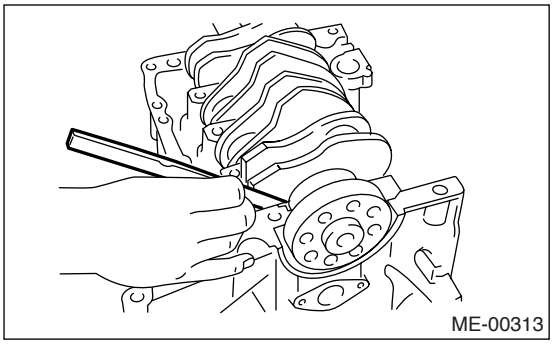
Unit: mm (in)

		Crank journal diameter		Crank pin diameter
		#1, #3	#2, #4, #5	
Standard	Journal O.D.	59.992 — 60.008 (2.3619 — 2.3625)	59.992 — 60.008 (2.3619 — 2.3625)	51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.998 — 2.011 (0.0787 — 0.0792)	2.000 — 2.013 (0.0787 — 0.0793)	1.486 — 1.498 (0.0585 — 0.0590)
0.03 (0.0012) undersize	Journal O.D.	59.962 — 59.978 (2.3607 — 2.3613)	59.962 — 59.978 (2.3607 — 2.3613)	51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.017 — 2.020 (0.0794 — 0.0795)	2.019 — 2.022 (0.0795 — 0.0796)	1.504 — 1.512 (0.0592 — 0.0595)
0.05 (0.0020) undersize	Journal O.D.	59.942 — 59.958 (2.3599 — 2.3605)	59.942 — 59.958 (2.3599 — 2.3605)	51.934 — 51.950 (2.0447 — 2.0453)
	Bearing size (Thickness at center)	2.027 — 2.030 (0.0798 — 0.0799)	2.029 — 2.032 (0.0799 — 0.0800)	1.514 — 1.522 (0.0596 — 0.0599)
0.25 (0.0098) undersize	Journal O.D.	59.742 — 59.758 (2.3520 — 2.3527)	59.742 — 59.758 (2.3520 — 2.3527)	51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.127 — 2.130 (0.0837 — 0.0839)	2.129 — 2.132 (0.0838 — 0.0839)	1.614 — 1.622 (0.0635 — 0.0639)

O.D. : Outer Diameter

4) Measure the thrust clearance of crankshaft at center bearing. If clearance exceeds the limit, replace the bearing.

Crankshaft side clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.00039 — 0.0012 in)

22.Intake and Exhaust Valve

A: SPECIFICATION

Refer to “Cylinder Head” for removal and installation procedures of intake and exhaust valves. <Ref. to ME(H4DOTC)-59, REMOVAL, Cylinder Head.> <Ref. to ME(H4DOTC)-59, INSTALLATION, Cylinder Head.>

23.Piston

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of pistons. <Ref. to ME(H4DOTC)-66, REMOVAL, Cylinder Block.> <Ref. to ME(H4DOTC)-69, INSTALLATION, Cylinder Block.>

24.Connecting Rod

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of connecting rod. <Ref. to ME(H4DOTC)-66, REMOVAL, Cylinder Block.> <Ref. to ME(H4DOTC)-69, INSTALLATION, Cylinder Block.>

25.Crankshaft

A: SPECIFICATION

Refer to “Cylinder Block” for removal and installation procedures of crankshaft. <Ref. to ME(H4DOTC)-66, REMOVAL, Cylinder Block.> <Ref. to ME(H4DOTC)-69, INSTALLATION, Cylinder Block.>

26.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refers to the possibility of the cause of trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

Symptom	Problem parts, etc.	Possible cause	RANK
1. Engine does not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective ignition starter switch	C
		Defective inhibitor switch or neutral switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
	Immobilizer system <Ref. to IM(diag)-2, Basic Diagnostic Procedure.>		A
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

Symptom	Problem parts, etc.	Possible cause	RANK
3) Initial combustion occurs.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B

Symptom	Problem parts, etc.	Possible cause	RANK
2. Rough idle and engine stall	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Belt	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling System	Over-heating	C
	Other	Evaporative emission control system malfunction	A
		Stuck or damaged throttle valve	B

Symptom	Problem parts, etc.	Possible cause	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling System	Over-heating	C
		Over-cooling	C
	Other	Evaporative emission control system malfunction	A
4. Surging	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
	Cooling System	Over-heating	B
	Other	Evaporative emission control system malfunction	C

Symptom	Problem parts, etc.	Possible cause	RANK
5. Engine does not return to idle.	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Other	Stuck or damaged throttle valve	A
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling System	Over-heating	B
	Other	Evaporative emission control system malfunction	B
7. After burning in exhaust system	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
	Lubrication system	Incorrect oil pressure	C
	Cooling System	Over-cooling	C
	Other	Evaporative emission control system malfunction	C
8. Knocking	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
	Cooling System	Over-heating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter O-ring	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

Symptom	Problem parts, etc.	Possible cause	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Belt	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
	Lubrication system	Incorrect oil pressure	C
	Cooling System	Over-cooling	C

27.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn crankshaft main bearing • Worn connecting rod bearing (large end)
	Oil pressure is normal.	• Loose flywheel mounting bolts • Damaged engine mounting
High-pitched clank	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is 1,000 to 2,000 rpm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam gear • Worn camshaft journal bore in crankcase
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting case/adjacent part
Valve tappet noise	—	• Incorrect valve clearance

NOTE*:
When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, carry out the clear memory mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and inspection mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.> after connecting the fuel injector connector.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

EXHAUST

EX(H4DOTC)

Page

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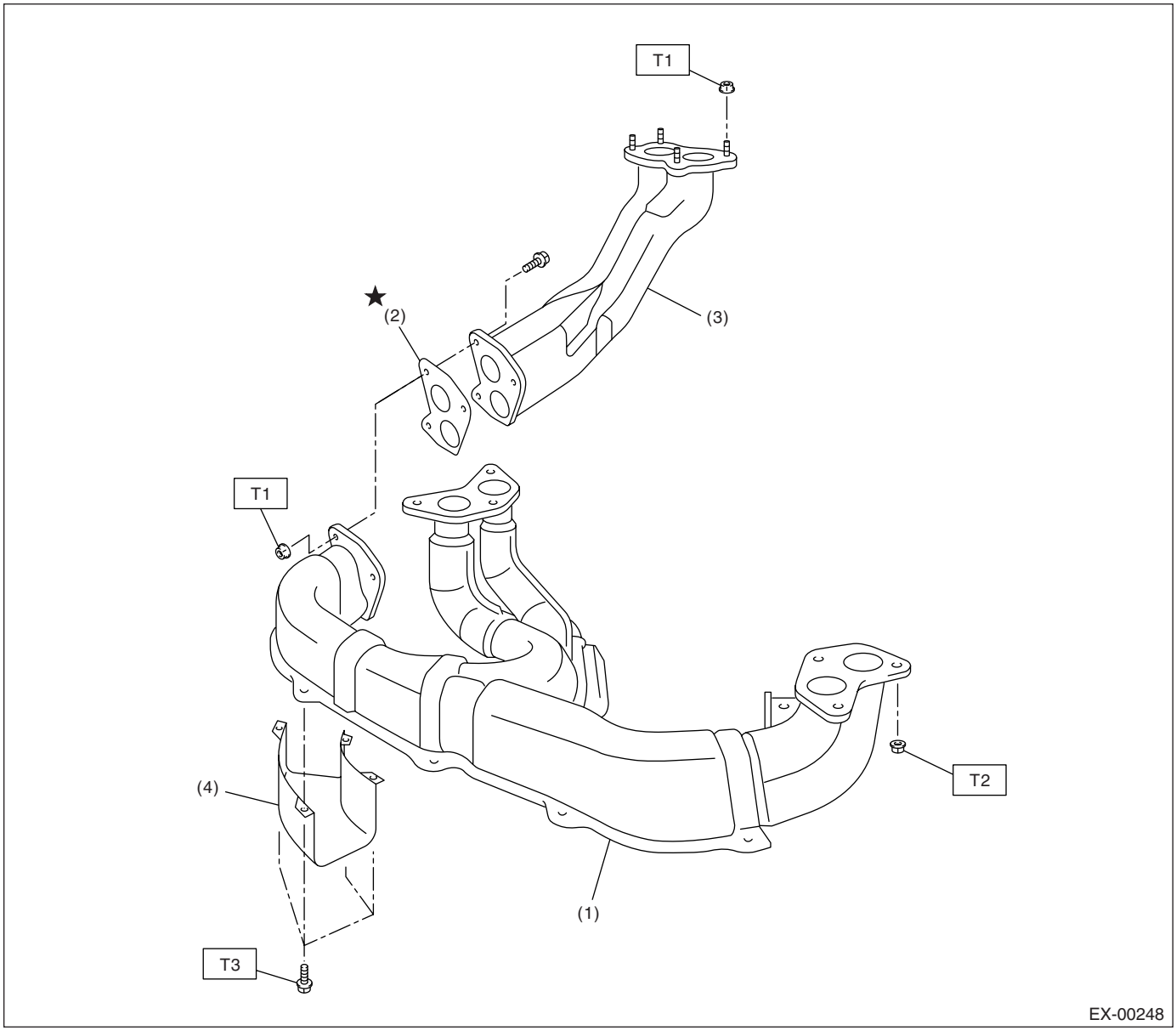
2. Front Exhaust Pipe....5
3. Center Exhaust Pipe 6
4. Joint Pipe 10
5. Rear Exhaust Pipe 11
6. Muffler 12

1. General Description

A: COMPONENT

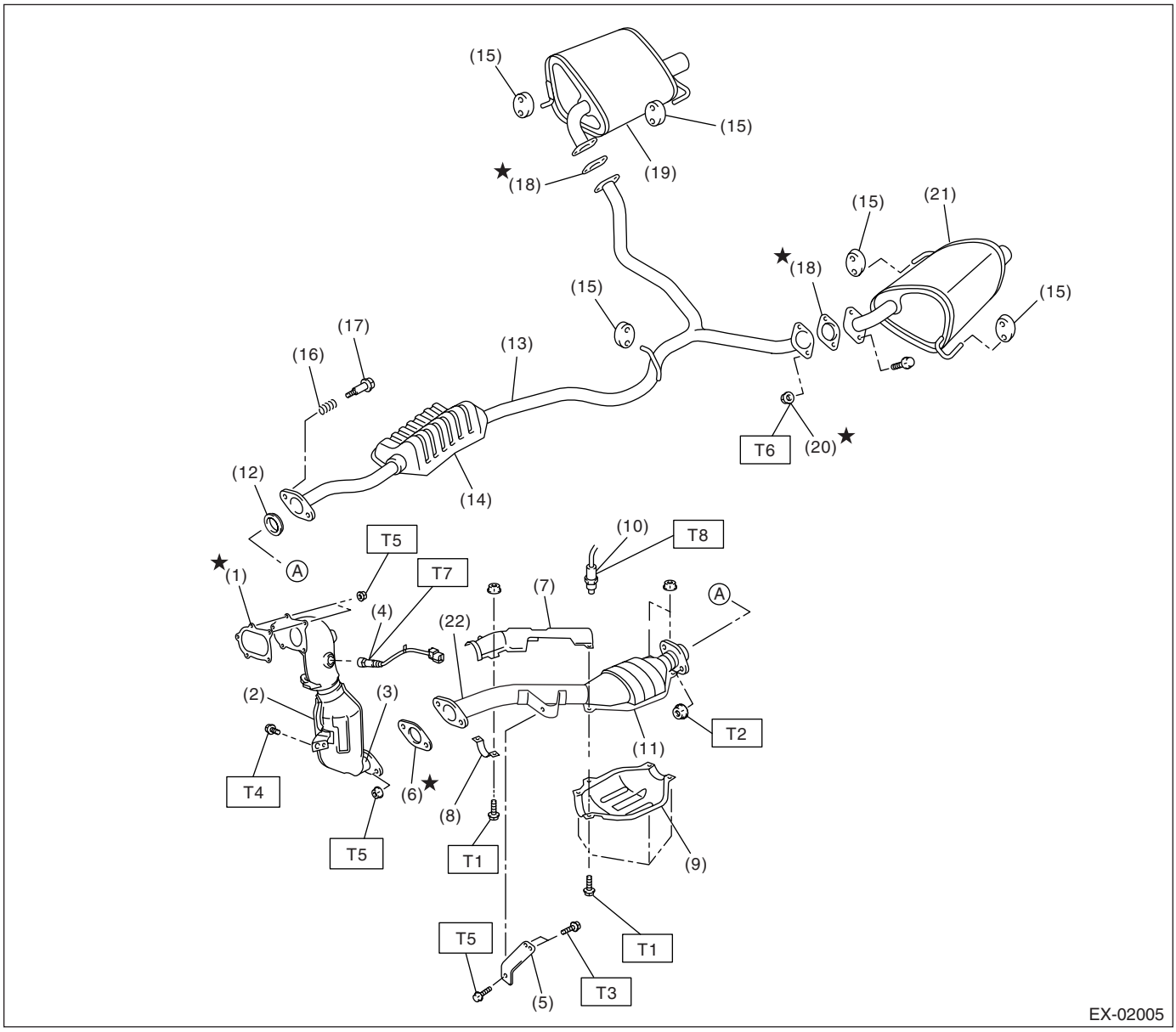
1. FRONT EXHAUST PIPE



(1) Front exhaust pipe ASSY
(2) Gasket
(3) Turbocharger joint pipe
(4) Front exhaust pipe cover

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26.0)
T2: 30 (3.1, 22.1)
T3: 7.5 (0.76, 5.5)

2. CENTER AND REAR EXHAUST PIPE, AND MUFFLER



(1) Gasket
(2) Front catalytic converter
(3) Center exhaust pipe (Front)
(4) Front oxygen (A/F) sensor
(5) Bracket
(6) Gasket
(7) Center pipe upper cover (Rear)
(8) Clamp
(9) Rear catalytic converter lower cover
(10) Rear oxygen sensor
(11) Rear catalytic converter
(12) Gasket
(13) Rear exhaust pipe
(14) Chamber
(15) Cushion rubber
(16) Spring
(17) Bolt
(18) Gasket
(19) Muffler (RH)
(20) Self-locking nut
(21) Muffler (LH)
(22) Center exhaust pipe (Rear)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 13 (1.3, 9.6)
T2: 18 (1.8, 13.3)
T3: 23 (2.3, 17.0)
T4: 30 (3.1, 22.1)
T5: 35 (3.6, 26.0)
T6: 48 (4.9, 35.4)
T7: <Ref. to FU(H4DOTC)-33, INSTALLATION, Front Oxygen (A/F) Sensor.>
T8: <Ref. to FU(H4DOTC)-34, INSTALLATION, Rear Oxygen Sensor.>

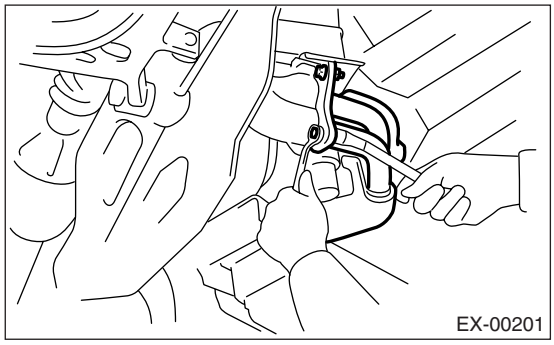
B: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

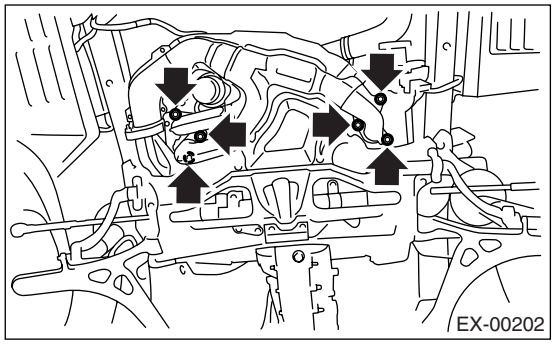
2. Front Exhaust Pipe

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the front exhaust pipe cover.
4) Remove the nuts which hold front exhaust pipe assembly onto turbocharger joint pipe.



5) While holding the front exhaust pipe assembly, remove the nuts which hold front exhaust pipe assembly to cylinder head exhaust port.



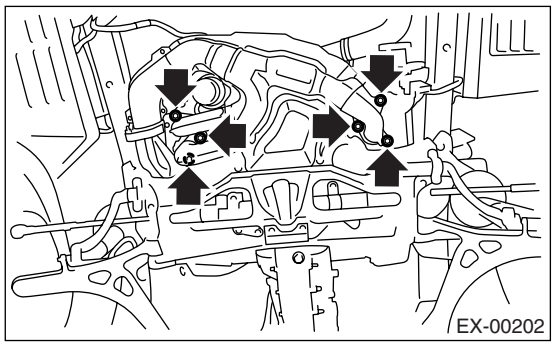
6) Remove the front exhaust pipe assembly.

B: INSTALLATION

NOTE:
Use a new gasket.

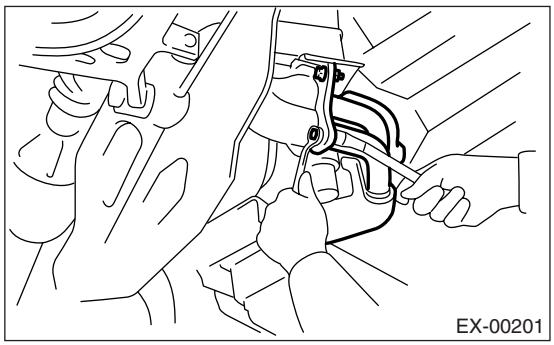
1) Install the front exhaust pipe assembly.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



2) Install the front exhaust pipe assembly to turbocharger joint pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



3) Install the front exhaust pipe cover.
4) Install the under cover.
5) Lower the vehicle.

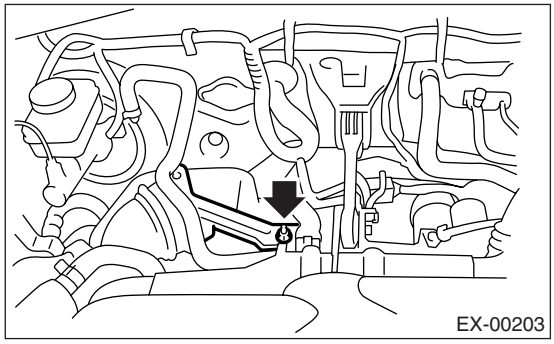
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check the rear exhaust pipe for holes or rust.

3. Center Exhaust Pipe

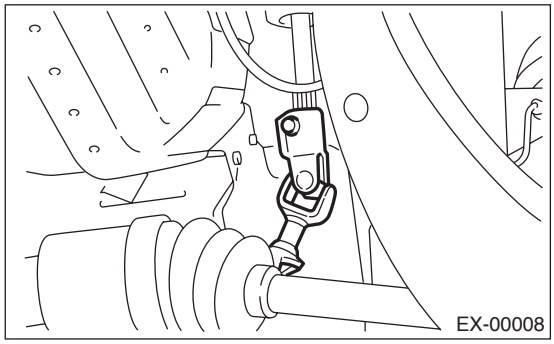
A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.
4) Remove the intercooler. <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
5) Remove the intercooler bracket.

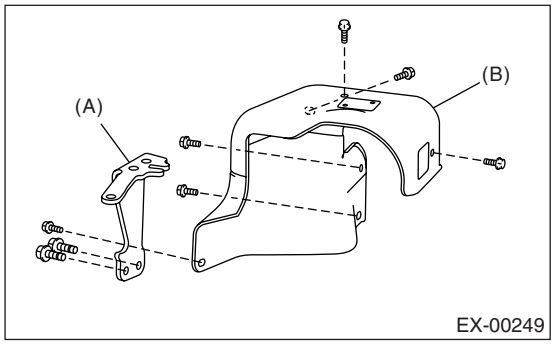

EX-00203

6) Lift-up the vehicle.
7) Remove the under cover.
8) Remove the universal joint bolts and then remove the universal joint.

CAUTION:
Scribe alignment marks on the universal joint so that it can be reassembled at the original serration.


EX-00008

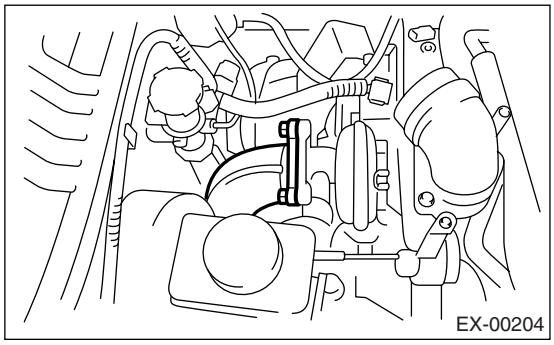
9) Lower the vehicle.
10) Remove the linear motion mounting. <Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
11) Remove the linear motion mounting bracket.
12) Remove the turbocharger cover.



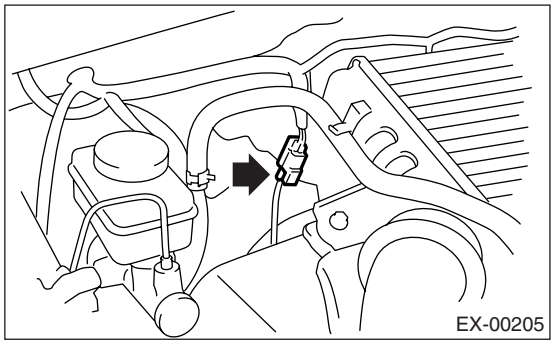
EX-00249

(A) Linear motion mounting bracket
(B) Turbocharger cover

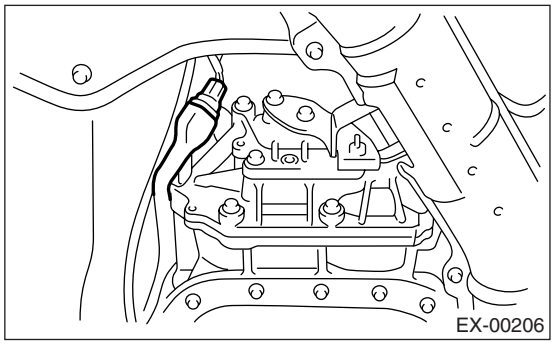
13) Separate the center exhaust pipe from turbocharger.


EX-00204

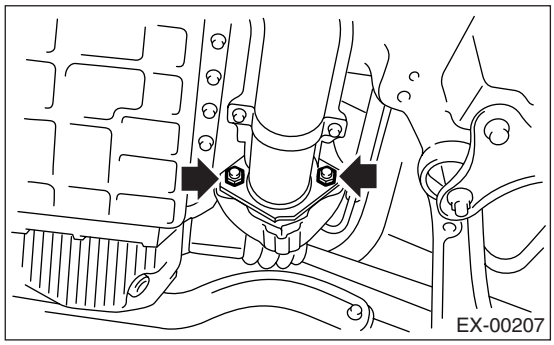
14) Disconnect the connector from front oxygen (A/F) sensor.


EX-00205

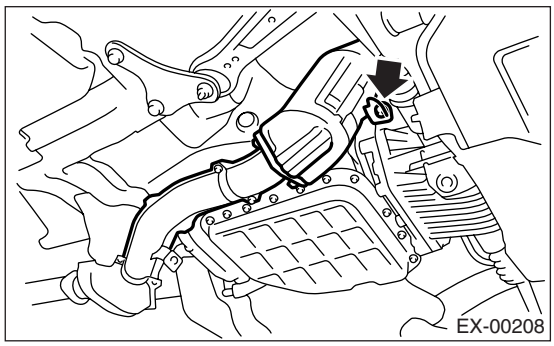
15) Lift-up the vehicle.
16) Disconnect the connector from rear oxygen sensor.


EX-00206

17) Separate the center exhaust pipe from rear exhaust pipe.

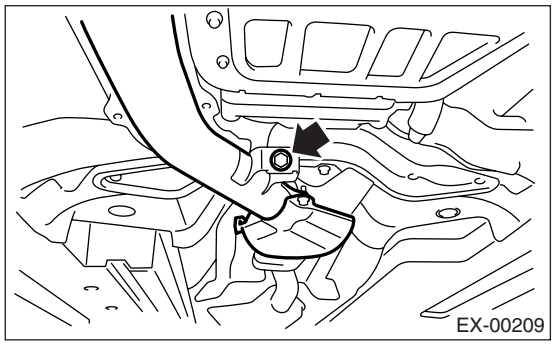


18) Remove the bolt which holds center exhaust pipe bracket to transmission.



19) Remove the intercooler bracket.
20) Remove the bolt which holds center exhaust pipe to hanger bracket.

CAUTION:
Be careful not to pull down the center exhaust pipe.



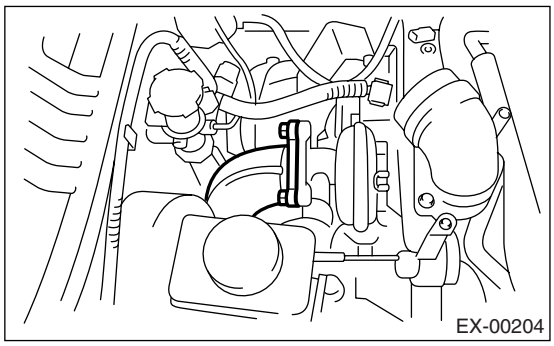
21) Remove the center exhaust pipe.

B: INSTALLATION

NOTE:
Use a new gasket.

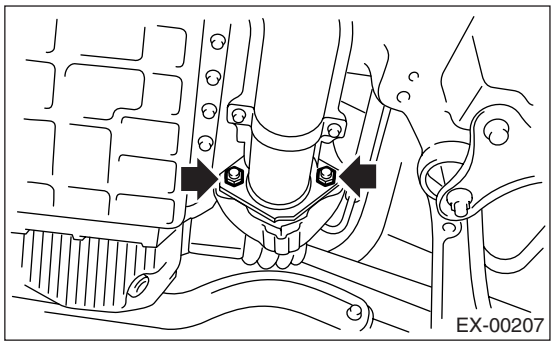
1) Install the center exhaust pipe and temporarily tighten the bolt which holds center exhaust pipe to hanger bracket.
2) Temporarily tighten the bolt which holds center exhaust pipe to transmission.
3) Connect the center exhaust pipe to turbocharger.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

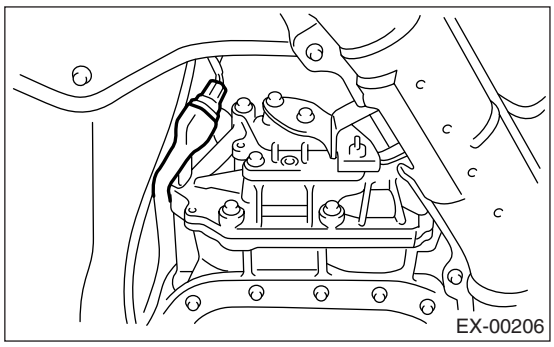


4) Install the center exhaust pipe to rear exhaust pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

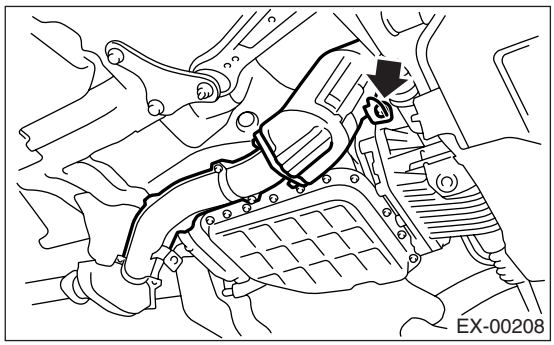


5) Connect the connector to rear oxygen sensor.



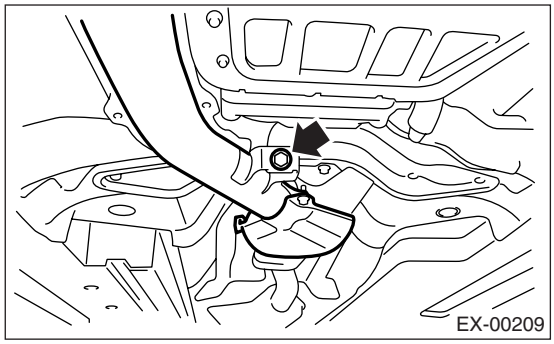
6) Tighten the bolt which holds center exhaust pipe bracket to transmission.

Tightening torque:
30 N·m (3.1 kgf-m, 22.1 ft-lb)



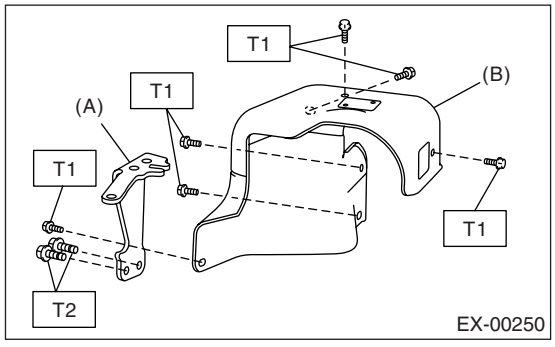
7) Tighten the bolt which holds center exhaust pipe to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



8) Lower the vehicle.
9) Install the turbocharger cover.
10) Install the linear motion mounting bracket.

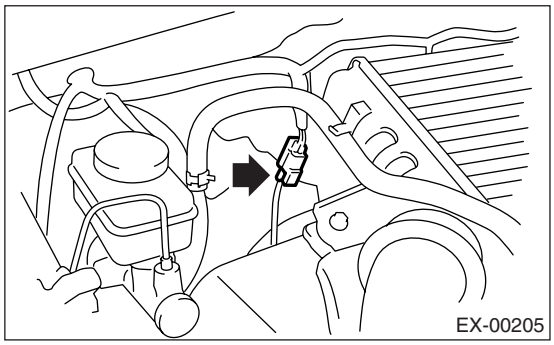
Tightening torque:
T1: 7.4 N·m (0.75 kgf-m, 5.4 ft-lb)
T2: 40 N·m (4.1 kgf-m, 29.5 ft-lb)



(A) Linear motion mounting bracket
(B) Turbocharger cover

11) Install the linear motion mounting. <Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>

12) Connect the connector of front oxygen (A/F) sensor.

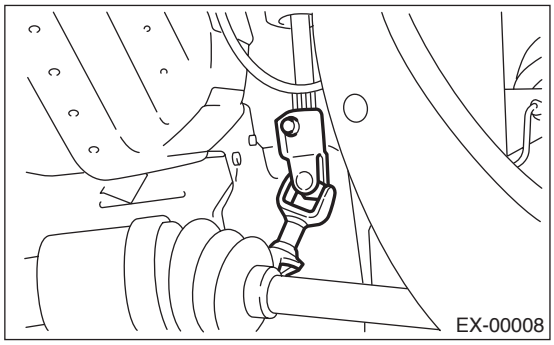


13) Lift-up the vehicle.
14) Install the universal joint.
(1) Align the bolt hole on the long yoke side of universal joint with the cutout at the serrated section of shaft end, and then insert the universal joint.
(2) Align the bolt hole on the short yoke side of universal joint with the cutout at the serrated section of gearbox assembly. Lower the universal joint completely.
(3) Temporarily tighten the bolt of short yoke side. Raise the universal joint to make sure the bolt is properly passing through the cutout at the serrated section.
(4) Tighten the long yoke side bolt, and also tighten the short yoke side bolt.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

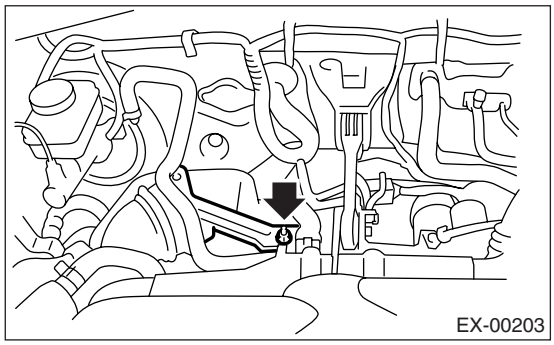
CAUTION:
• Make sure the universal joint bolts are tightened through the shaft serration notches.
• Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

Standard clearance between gearbox and DOJ:
15 mm (0.59 in) or more



15) Install the under cover.
16) Lower the vehicle.

17) Install the intercooler bracket.



18) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
19) Install the collector cover.

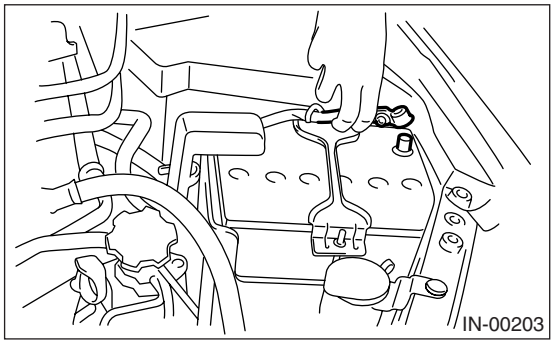
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check the rear exhaust pipe for holes or rust.

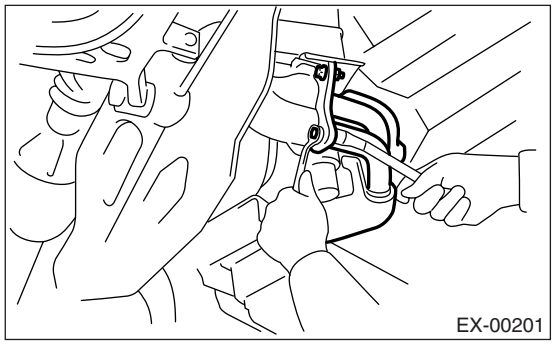
4. Joint Pipe

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the front exhaust pipe cover.
6) Remove the nuts which hold front exhaust manifold to turbocharger joint pipe.

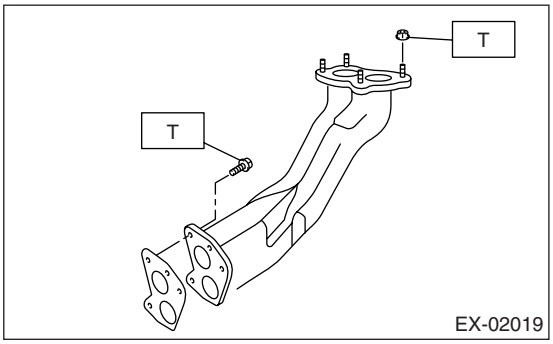


7) Remove the center exhaust pipe.
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
8) Remove the turbocharger. <Ref. to IN(H4DOTC)-14, REMOVAL, Turbocharger.>
9) Remove the joint pipe from the lower side of vehicle.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
T: 35 N·m (3.6 kgf-m, 26.0 ft-lb)



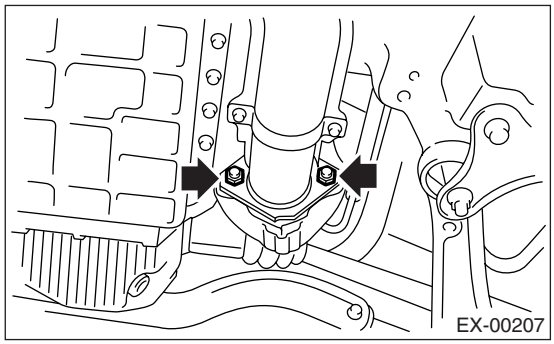
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check the rear exhaust pipe for holes or rust.

5. Rear Exhaust Pipe

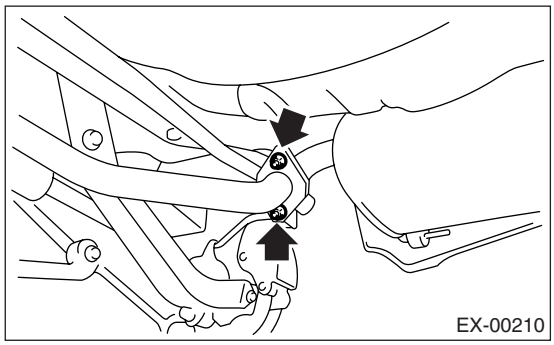
A: REMOVAL

1) Lift-up the vehicle.
2) Separate the rear exhaust pipe from center exhaust pipe.



3) Separate the rear exhaust pipe from both mufflers.

CAUTION:
Be careful not to pull down the rear exhaust pipe.



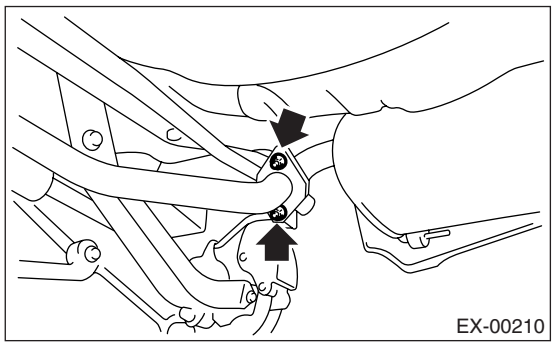
4) Remove the rear exhaust pipe.

B: INSTALLATION

NOTE:
Use a new gasket.

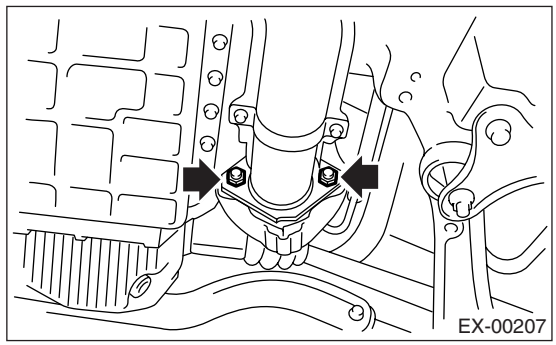
1) Install the rear exhaust pipe to both mufflers.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



2) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)



3) Lower the vehicle.

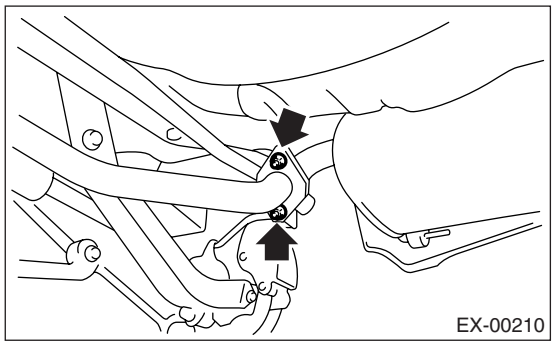
C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check the rear exhaust pipe for holes or rust.
3) Check the cushion rubber for wear or crack.

6. Muffler

A: REMOVAL

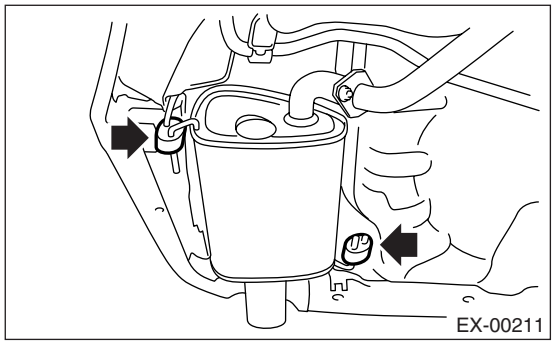
1) Separate the muffler (RH) from rear exhaust pipe.



2) Remove the cushion rubbers, and detach the muffler.

CAUTION:
Be careful not to drop the muffler during removal.

NOTE:
To facilitate removal, apply a coat of spray type lubricant to the mating area of cushion rubbers in advance.



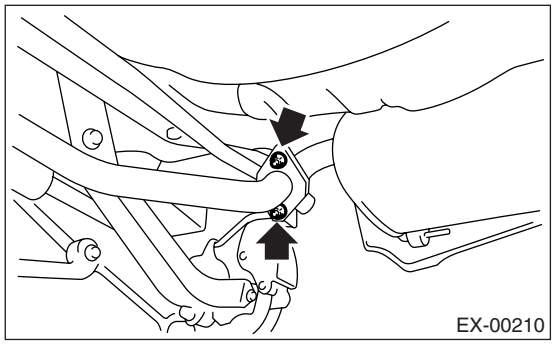
3) Perform the same procedure for muffler (LH).

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Always use a new gasket and self-locking nuts.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)



C: INSPECTION

1) Check the connections and welds for exhaust leaks.
2) Check the mufflers for holes or rust.
3) Check the cushion rubber for wear or crack.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

FUEL INJECTION (FUEL SYSTEMS)

FU(H4DOTC)

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COOLING

CO(H4DOTC)

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1. General Description

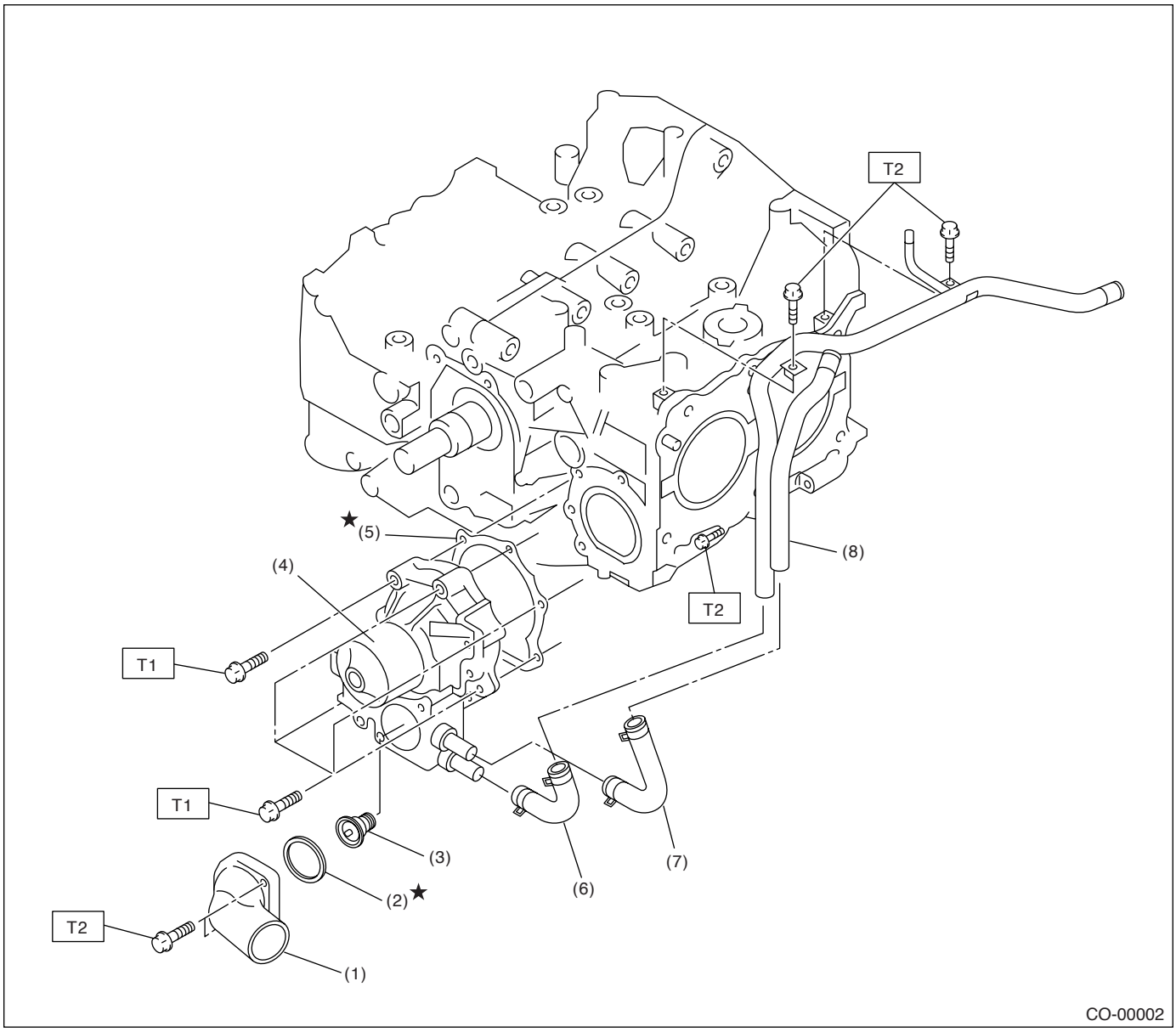
A: SPECIFICATION

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)			Approx. 7.3 (7.7, 6.4)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge amount ℓ (US gal, Imp gal)/min	20 (5.3, 4.4)
		Pump speed — Discharge pressure	760 rpm — 2.9 kPa (0.3 mAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance II	Discharge amount ℓ (US gal, Imp gal)/min	100 (26.4, 22.0)
		Pump speed — Discharge pressure	3,000 rpm — 49.0 kPa (5.0 mAq)
		Engine coolant temperature	85°C (185°F)
	Discharge performance III	Discharge amount ℓ (US gal, Imp gal)/min	200 (52.8, 44.0)
		Pump speed — Discharge pressure	6,000 rpm — 225.4 kPa (23.0 mAq)
		Engine coolant temperature	85°C (185°F)
	Impeller diameter mm (in)		76 (2.99)
	Number of impeller vanes		8
	Pump pulley diameter mm (in)		60 (2.36)
	Clearance between impeller and case	Standard mm (in)	0.5 — 1.5 (0.020 — 0.059)
Thermostat	Type		Wax pellet type
	Starting temperature to open		76 — 80°C (169 — 176°F)
	Fully opens		91°C (196°F)
	Valve lift mm (in)		9.0 (0.354) or more
	Valve bore mm (in)		35 (1.38)
Radiator fan	Motor input	Main fan W	90
		Sub fan W	90
	Fan diameter / Blades	Main fan	300 mm (11.8 in) /4
		Sub fan	300 mm (11.8 in) /5
Radiator	Type		Down flow
	Core dimensions	Width × Height × Thickness mm (in)	687.4 × 340 × 16 (27.06 × 13.39 × 0.63)
	Pressure range in which cap valve is open	Coolant filler tank side kPa (kg/cm^2, psi)	Above: 108±15 (1.1±0.15, 16±2) Below: −1.0 — −4.9 (−0.01 — −0.05, −0.1 — −0.7)
		Radiator side kPa (kg/cm^2, psi)	Above only: 137±14.7 (1.40±0.15, 20±2.1)
	Fins		Corrugated fin type
Reservoir tank	Capacity ℓ (US qt, Imp qt)		0.45 (0.48, 0.40)

Vehicle speed	A/C compressor load	Engine coolant temperature		
		95°C (203°F) or less	96 — 99°C (205 — 210°F)	100°C (212°F) or more
		Operation of radiator fan	Operation of radiator fan	Operation of radiator fan
19 km/h (12 MPH) or less	OFF	OFF	Low-Speed	High-Speed
	Low	Low-Speed	Low-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
20 — 69 km/h (12 — 43 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	High-Speed	High-Speed	High-Speed
	High	High-Speed	High-Speed	High-Speed
70 — 105 km/h (43 — 65 MPH)	OFF	OFF	Low-Speed	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	Low-Speed	High-Speed	High-Speed
106 km/h (66 MPH) or more	OFF	OFF	OFF	High-Speed
	Low	OFF	Low-Speed	High-Speed
	High	OFF	Low-Speed	High-Speed

B: COMPONENT

1. WATER PUMP



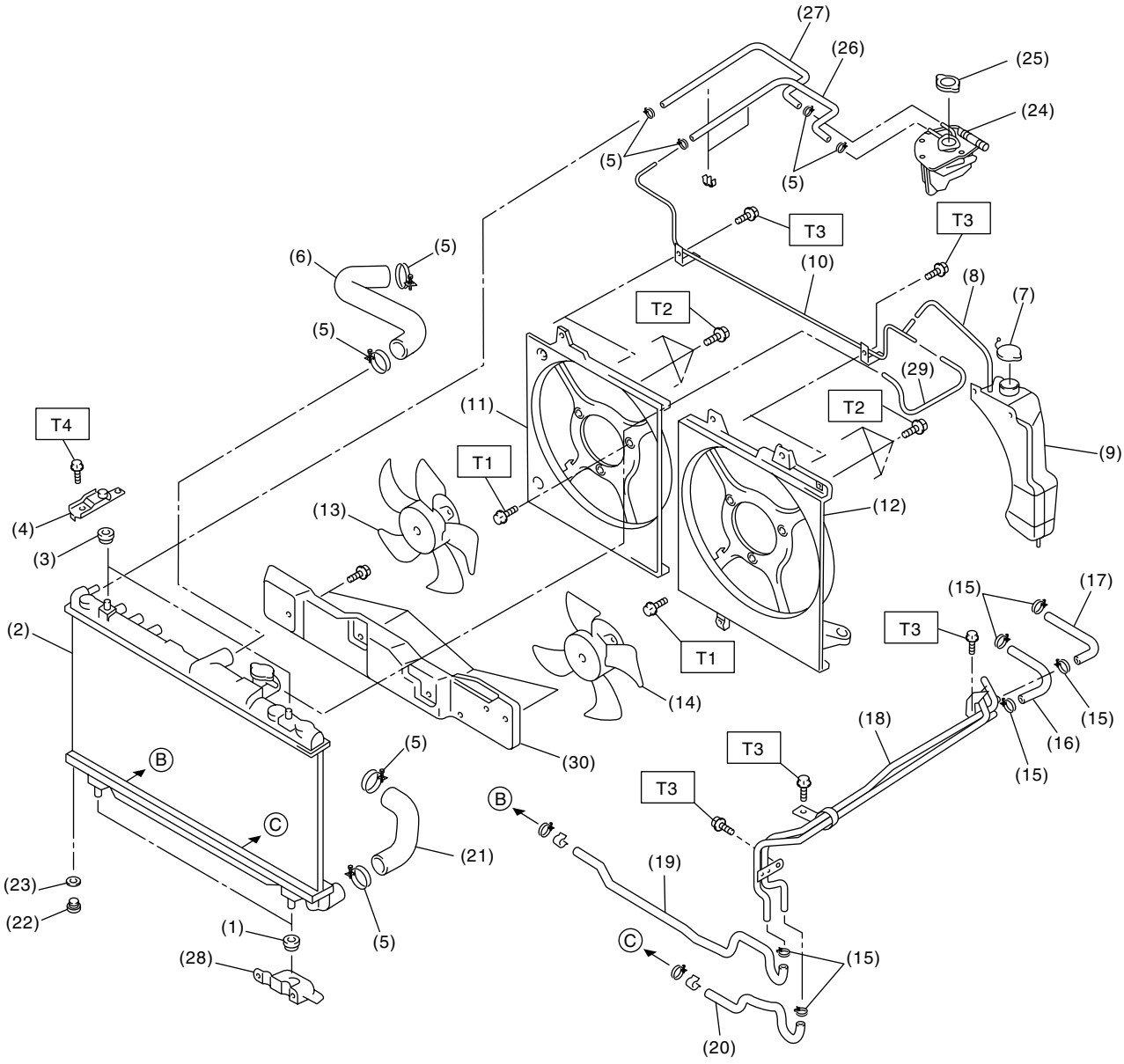
(1)	Thermostat cover	(5)	Gasket
(2)	Gasket	(6)	Heater by-pass hose
(3)	Thermostat	(7)	Coolant filler by-pass hose
(4)	Water pump ASSY	(8)	Water by-pass pipe

Tightening torque: N·m (kgf-m, ft-lb)

T1: First 12 (1.2, 8.7)
Second 12 (1.2, 8.7)

T2: 12 (1.2, 8.7)

2. RADIATOR AND RADIATOR FAN



CO-02004

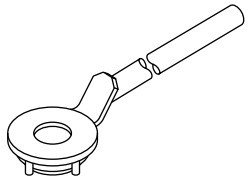
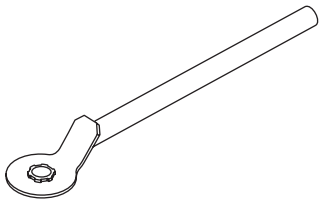
(1) Radiator lower cushion
(2) Radiator
(3) Radiator upper cushion
(4) Radiator upper bracket
(5) Clamp
(6) Radiator inlet hose
(7) Engine coolant reservoir tank cap
(8) Overflow hose A
(9) Engine coolant reservoir tank
(10) Overflow pipe
(11) Radiator sub fan shroud
(12) Radiator main fan shroud
(13) Radiator sub fan ASSY
(14) Radiator main fan ASSY
(15) ATF hose clamp
(16) ATF inlet hose A
(17) ATF outlet hose A
(18) ATF pipe
(19) ATF inlet hose B
(20) ATF outlet hose B
(21) Radiator outlet hose
(22) Radiator drain plug
(23) O-ring
(24) Engine coolant filler tank
(25) Radiator cap (Engine coolant filler tank cap)
(26) Engine overflow hose
(27) Engine air breather hose
(28) Radiator lower bracket
(29) Overflow hose B
(30) Heat shield cover

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*3.4 (0.35, 2.5)*
T2:	*4.4 (0.45, 3.3)*
T3:	*7.5 (0.76, 5.5)*
T4:	*18 (1.8, 13.0)*

C: CAUTION

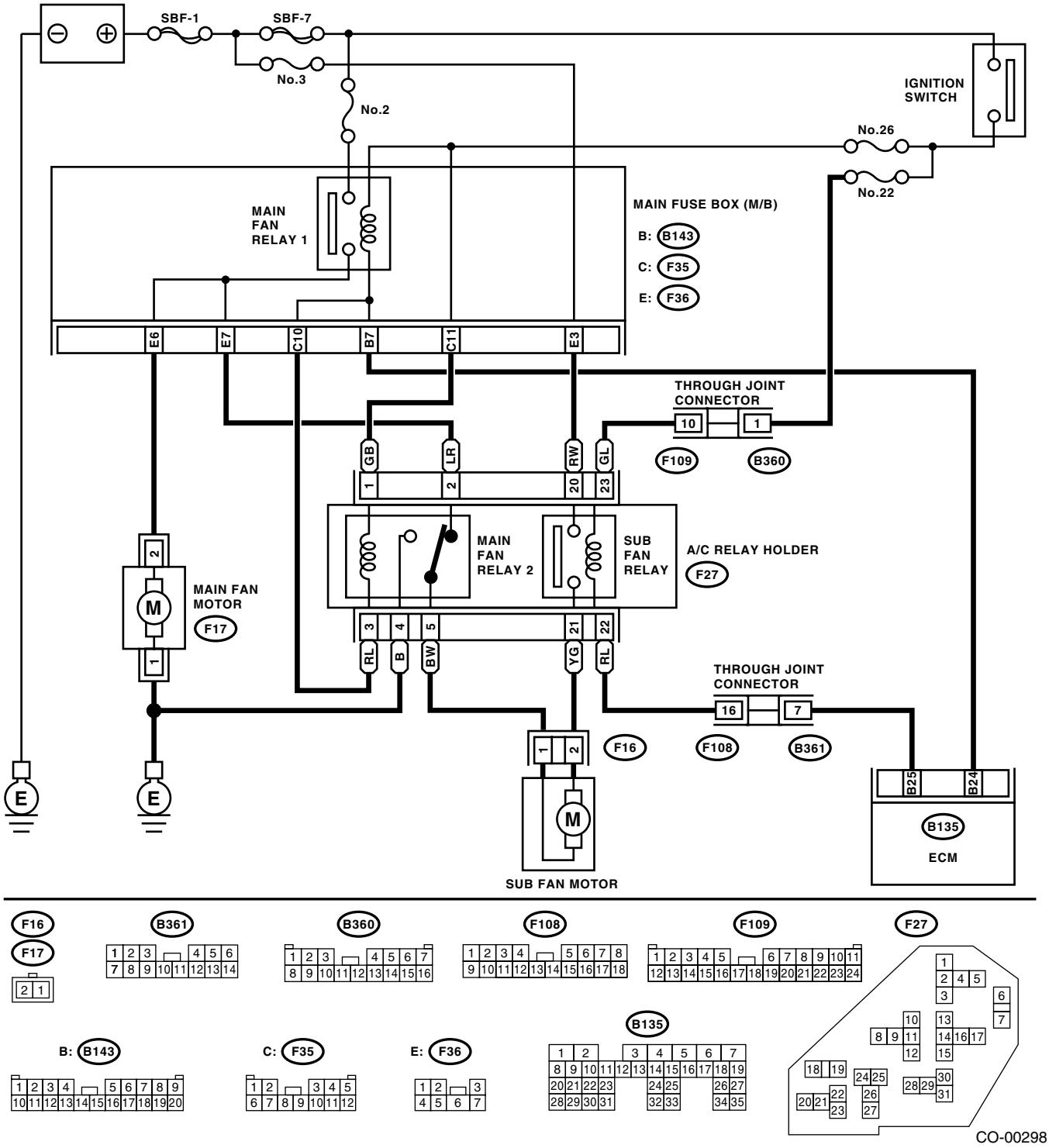
• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping crank pulley when loosening and tightening crank pulley bolts.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing the intake and exhaust camshaft sprocket.

2. Radiator Fan System

A: WIRING DIAGRAM



B: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is more than 96°C (205°F).
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOMS:

Radiator main and sub fan do not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4DOTC)(diag)-31, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at low speed?	Go to step **2.**	Go to step **3.**
2	**CHECK OPERATION OF RADIATOR FAN.** 1) Connect the test mode connector. 2) Turn the ignition switch to ON. 3) Perform the compulsory operation check for the radiator fan relay using Subaru Select Monitor. NOTE: • When performing the compulsory operation check for the radiator fan relay using Subaru Select Monitor, the radiator main fan and sub fan will repeat such a operation as low speed revolution → high speed revolution → OFF in this order. • Refer to Compulsory Valve Operation Check Mode for more operation procedure. <Ref. to EN(H4DOTC)(diag)-31, Compulsory Valve Operation Check Mode.>	Do the radiator main fan and sub fan rotate at high speed?	Radiator fan system is normal.	Go to step **27.**
3	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the sub fan relay from A/C relay holder. 3) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 20 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK POWER SUPPLY TO SUB FAN RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between sub fan relay terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 23 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **6.**

	Step	Check	Yes	No
5	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 3. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
6	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Repair the power supply line.
7	**CHECK SUB FAN RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between sub fan relay terminals. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Replace the sub fan relay.
8	**CHECK SUB FAN RELAY.** 1) Connect the terminals No. 22 and No. 23 of sub fan relay to battery. 2) Measure the resistance between sub fan relay terminals. ***Terminals*** ***No. 20 — No. 21:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the sub fan relay.
9	**CHECK HARNESS BETWEEN SUB FAN RELAY TERMINAL AND SUB FAN MOTOR CONNECTOR.** 1) Disconnect the connector from sub fan motor. 2) Measure the resistance of harness between sub fan relay terminal and sub fan motor connector. ***Connector & terminal*** ***(F16) No. 2 — (F27) No. 21:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness between sub fan relay terminal and sub fan motor connector.
10	**CHECK HARNESS BETWEEN SUB FAN MOTOR CONNECTOR AND MAIN FAN RELAY 2 CONNECTOR.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance of harness between sub fan motor connector and main fan relay 2 connector. ***Connector & terminal*** ***(F16) No. 1 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open harness between sub fan motor connector and main fan relay 2 connector.
11	**CHECK POOR CONTACT.** Check the poor contact in sub fan motor connector.	Is there poor contact in sub fan motor connector?	Repair the poor contact in sub fan motor connector.	Go to step **12.**
12	**CHECK SUB FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of sub fan motor, and the ground (–) terminal to terminal No. 1.	Does the sub fan rotate?	Go to step **13.**	Replace the sub fan motor.
13	**CHECK MAIN FAN RELAY 2.** Measure the resistance of main fan relay 2. ***Terminals*** ***No. 2 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the main fan relay 2.

	Step	Check	Yes	No
14	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 2 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F27) No. 2:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness between main fan relay 2 terminal and main fan motor connector.
15	**CHECK MAIN FAN MOTOR AND GROUND CIRCUIT.** Measure the resistance between main fan motor connector and chassis ground. ***Connector & terminal*** ***(F17) No. 1 — Chassis ground:***	Is the resistance less than5 Ω?	Go to step **16.**	Repair the open circuit in harness between main fan motor connector and chassis ground.
16	**CHECK POOR CONTACT.** Check poor contact in main fan motor connector.	Is there poor contact in main fan motor connector?	Repair the poor contact in main fan motor connector.	Go to step **17.**
17	**CHECK MAIN FAN MOTOR.** Connect the battery positive (+) terminal to terminal No. 2 of main fan motor, and the ground (−) terminal to terminal No. 1.	Does the main fan rotate?	Go to step **18.**	Replace the main fan motor.
18	**CHECK HARNESS BETWEEN SUB FAN RELAY AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between sub fan relay terminal and ECM connector. ***Connector & terminal*** ***(B135) No. 25 — (F27) No. 22:***	Is the resistance less than 1 Ω?	Go to step **19.**	Repair the open circuit in harness between sub fan relay terminal and ECM.
19	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there a poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-27, Read Diagnostic Trouble Code (DTC).>
20	**CHECK MAIN FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from A/C relay holder. 3) Measure the resistance of terminal in main fan relay 1 switch.	Is the resistance more than 1 MΩ?	Go to step **21.**	Replace the main fan relay 1.
21	**CHECK MAIN FAN RELAY 1.** 1) Connect the terminal of main fan relay 1 coil side terminal to battery. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω?	Go to step **22.**	Replace the main fan relay 1.
22	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 TERMINAL AND MAIN FAN MOTOR CONNECTOR.** 1) Disconnect the connector from main fan motor. 2) Measure the resistance of harness between main fan relay 1 terminal and main fan motor connector. ***Connector & terminal*** ***(F17) No. 2 — (F36) No. 6:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit of harness between main fan relay 1 terminal and main fan motor connector.

	Step	Check	Yes	No
23	**CHECK HARNESS BETWEEN MAIN FAN RELAY 1 AND ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance between main fan relay 1 terminal and ECM connector. ***Connector & terminal*** ***(B135) No. 24 — (B143) No. 7:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness between main fan relay 1 terminal and ECM.
24	**CHECK HARNESS BETWEEN MAIN FAN RELAY 2 AND ECM.** Measure the resistance between main fan relay 2 terminal and ECM connector. ***Connector & terminal*** ***(B135) No. 24 — (F27) No. 3:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit of harness between main fan relay 2 terminal and ECM.
25	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 2 and No. 26. 3) Check the condition of fuse.	Is the fuse blown out?	Replace the fuse.	Go to step **26.**
26	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there a poor contact in ECM connector?	Repair the poor contact in ECM connector.	Repair the power supply circuit for main fuse box.
27	**CHECK OPERATION OF RADIATOR FAN.** Check the sub fan rotates when both fans do not rotate at high speed under the step 2.	Does the sub fan rotate?	Go to step **20.**	Go to step **28.**
28	**CHECK GROUND CIRCUIT OF MAIN FAN RELAY 2.** 1) Remove the main fan relay 2 from A/C relay holder. 2) Measure the resistance between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **29.**	Repair the open circuit in harness between main fan relay 2 and chassis ground.
29	**CHECK POWER SUPPLY TO MAIN FAN RELAY 2.** 1) Turn the ignition switch to ON. 2) Measure the voltage between main fan relay 2 terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **30.**	Repair the power supply line.
30	**CHECK MAIN FAN RELAY 2.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 2. 3) Measure the resistance of main fan relay 2. ***Terminals*** ***(F27) No. 4 — (F27) No. 5:***	Is the resistance more than 1 MΩ?	Go to step **31.**	Replace the main fan relay 2.
31	**CHECK MAIN FAN RELAY 2.** 1) Connect the battery to terminals No. 1 and No. 3 of main fan relay 2. 2) Measure the resistance of main fan relay 2. ***Terminals*** ***(F27) No. 4 — (F27) No. 5:***	Is the resistance less than 1 Ω?	Go to step **23.**	Replace the main fan relay 2.

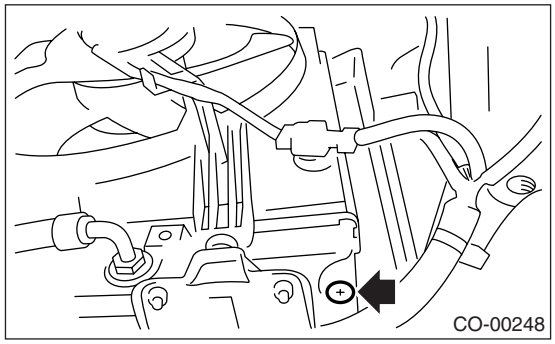
3. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain plug to drain engine coolant into container.

NOTE:
Remove the coolant filler tank cap so that engine coolant will drain faster.



4) Install the drain plug.

2. FILLING OF ENGINE COOLANT

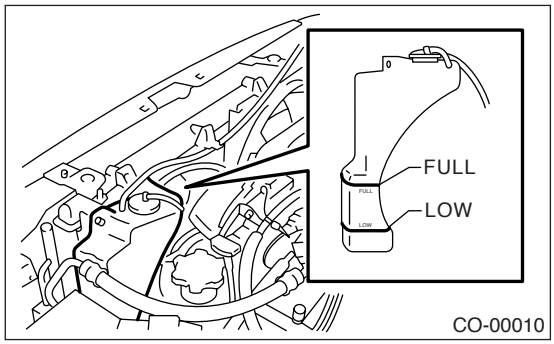
1) Remove the collector cover.
2) Fill engine coolant into coolant filler tank up to the filler neck position.

Coolant capacity (fill up to "FULL" level):
Approx. 7.3 ℓ (7.7 US qt, 6.4 Imp qt)

CAUTION:
Do not confuse the cap of coolant filler tank and cap of radiator.

NOTE:
• When pouring the engine coolant, the radiator side cap must not be removed.
• The SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crank-case. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

3) Fill engine coolant into the reservoir tank up to "FULL" level.

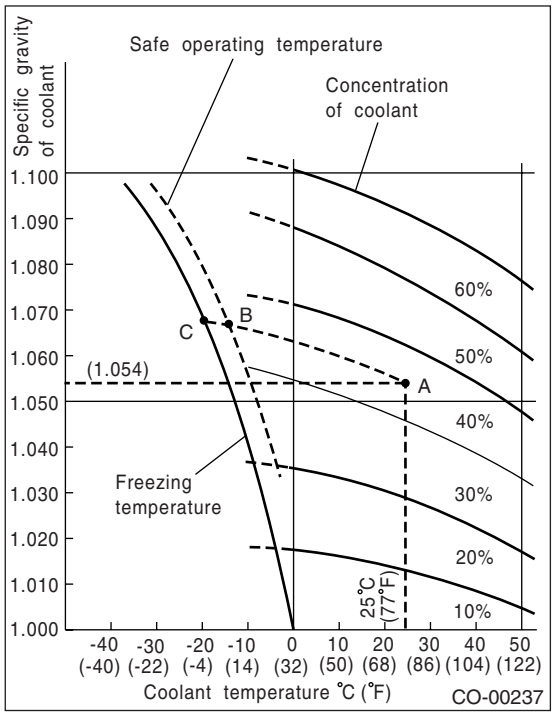


4) Warm up the engine completely for more than five minutes at 2,000 to 3,000 rpm.
5) If the engine coolant level drops in coolant filler tank, add engine coolant to filler neck position.
6) If the engine coolant level drops from "FULL" level of reservoir tank, add engine coolant to "FULL" level.
7) Attach the coolant filler tank cap and reservoir tank cap properly.
8) Install the collector cover.

B: INSPECTION

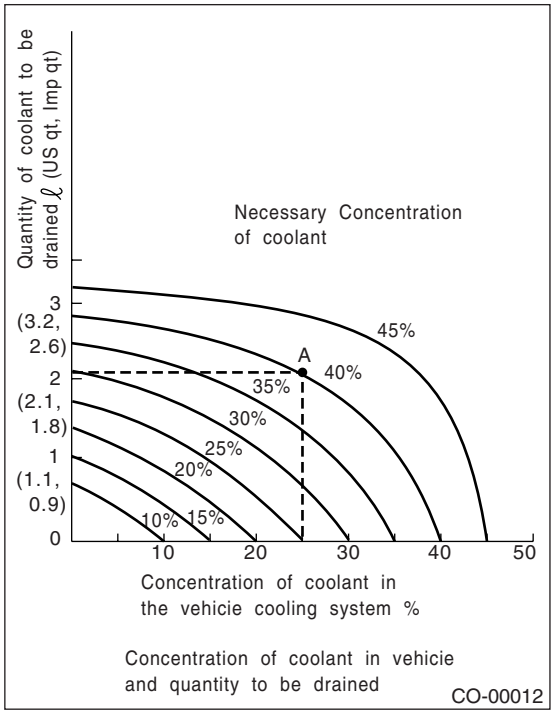
1. RERATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERTAURE

Concentration and safe operating temperature of SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.
[Example]
If the coolant temperature is 25°C (77°F) and its specific gravity is 1.054, the concentration is 45% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

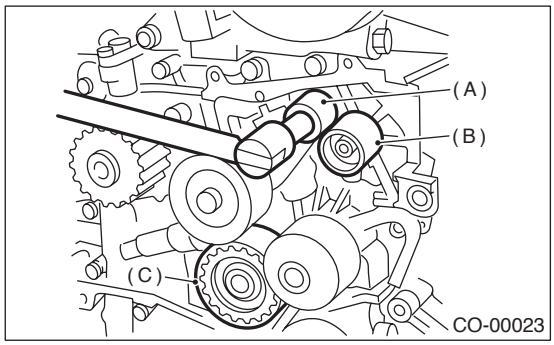
To adjust the concentration of coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.
If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.



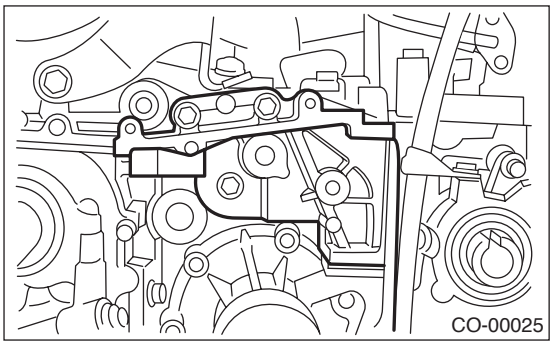
4. Water Pump

A: REMOVAL

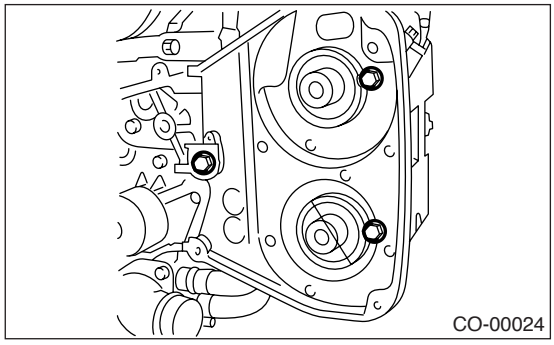
1) Remove the collector cover.
2) Remove the radiator. <Ref. to CO(H4DOTC)-19, REMOVAL, Radiator.>
3) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
4) Remove the timing belt. <Ref. to ME(H4DOTC)-43, REMOVAL, Timing Belt.>
5) Remove the automatic belt tension adjuster (A).
6) Remove the belt idler (B).
7) Remove the belt idler No. 2 (C).



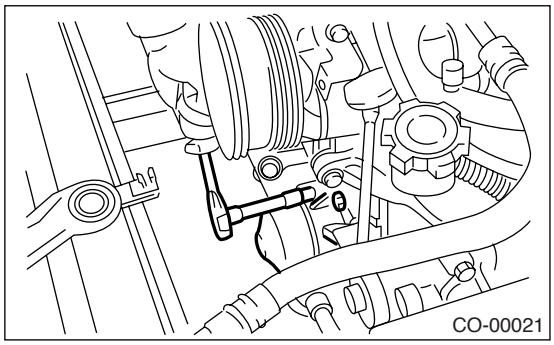
8) Remove the camshaft position sensor. <Ref. to FU(H4DOTC)-25, REMOVAL, Camshaft Position Sensor.>
9) Remove the cam sprocket (LH) using ST. <Ref. to ME(H4DOTC)-51, REMOVAL, Cam Sprocket.>
10) Remove the tensioner bracket.



11) Remove the belt cover No. 2 (LH).



12) Disconnect the hose from water pump.
13) Remove the water pump.

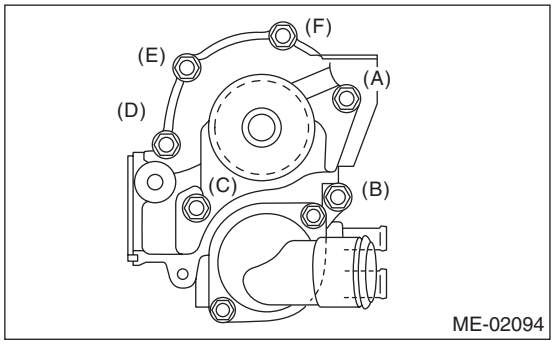


B: INSTALLATION

1) Install the water pump onto cylinder block (LH).

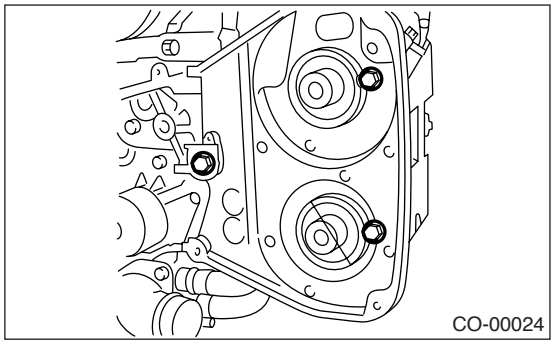
NOTE:
- Always use new gasket.
- When installing the water pump, tighten the bolts in two stages in alphabetical sequence as shown in the figure.

Tightening torque:
First:
12 N·m (1.2 kgf-m, 8.7 ft-lb)
Second:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



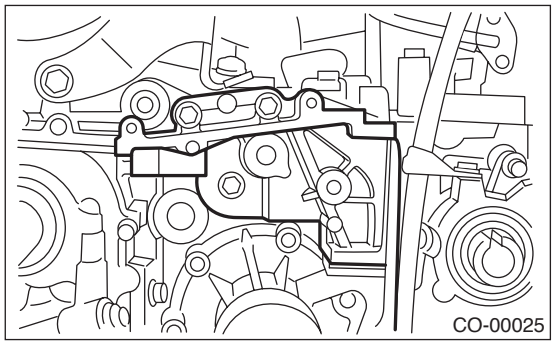
2) Install the hose to water pump.
3) Install the belt cover No. 2 (LH).

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



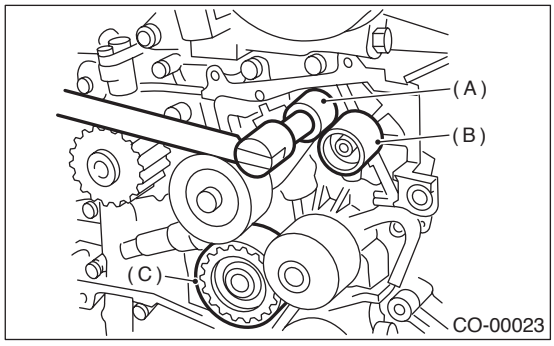
4) Install the tensioner bracket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



5) Install the cam sprocket (LH) using ST. <Ref. to ME(H4DOTC)-51, INSTALLATION, Cam Sprocket.>
6) Install the camshaft position sensor. <Ref. to FU(H4DOTC)-25, INSTALLATION, Camshaft Position Sensor.>
7) Install the belt idler No. 2 (C).
8) Install the belt idler (B).
9) Install the automatic belt tension adjuster (A) which has a tension rod held by a pin. <Ref. to ME(H4DOTC)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

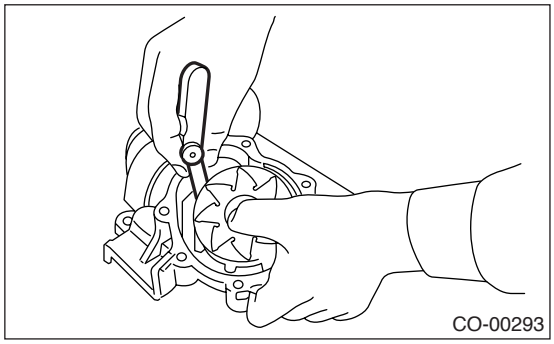


10) Install the timing belt. <Ref. to ME(H4DOTC)-45, TIMING BELT, INSTALLATION, Timing Belt.>
11) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>
12) Install the radiator. <Ref. to CO(H4DOTC)-20, INSTALLATION, Radiator.>
13) Install the collector cover.

C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump pulley for abnormalities.
3) Make sure the impeller is not deformed or damaged.
4) Inspect the clearance between impeller and pump case.

Clearance between impeller and pump case:
Standard value
0.5 — 1.5 mm (0.020 — 0.059 in)

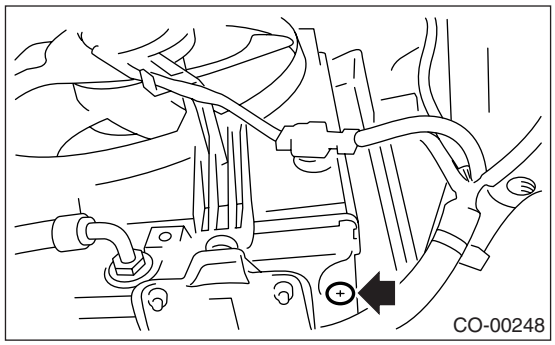


5) After water pump installation, check the pulley shaft for engine coolant leaks and noise. If leaks or noise are noted, replace the water pump assembly.

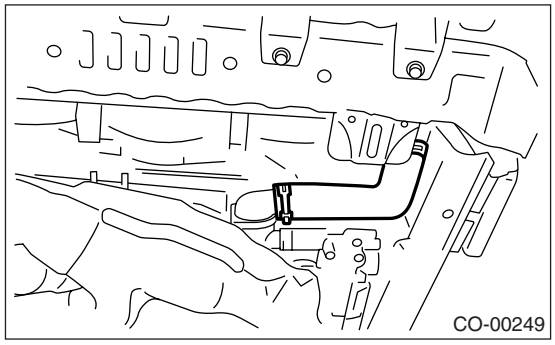
5. Thermostat

A: REMOVAL

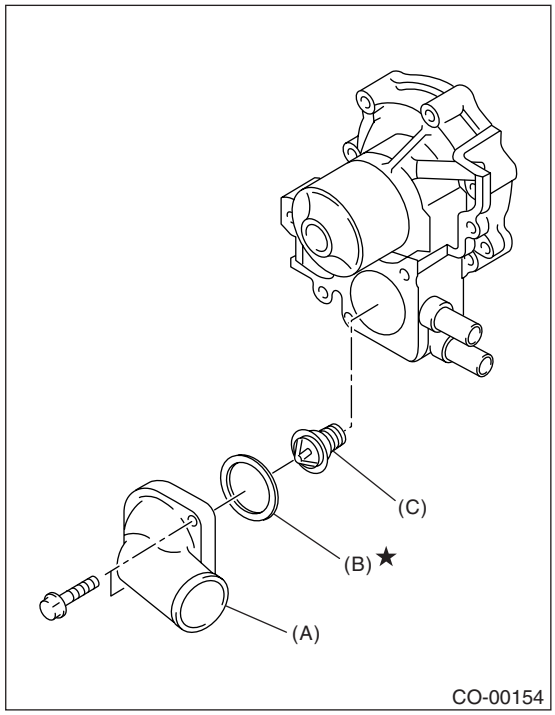
1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain engine coolant completely.
<Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>



5) Disconnect the radiator outlet hose from the thermostat cover.



6) Remove the thermostat cover, and then remove the gasket and thermostat.



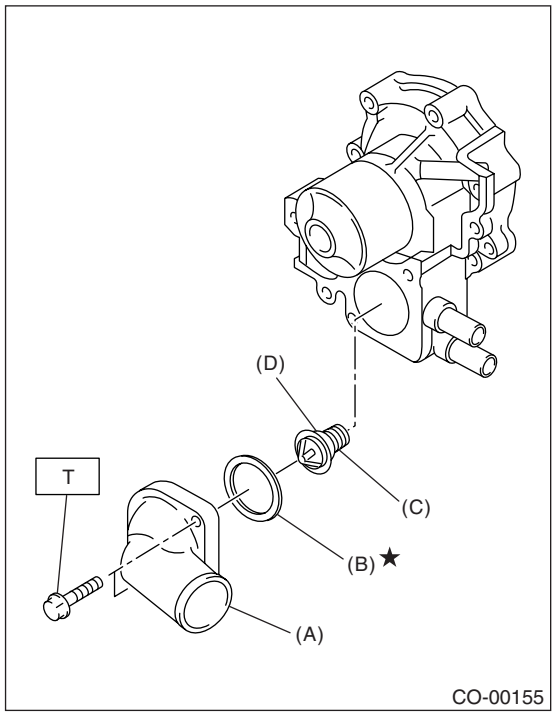
(A) Thermostat cover
(B) Gasket
(C) Thermostat

B: INSTALLATION

1) Install the gasket to thermostat, and install the thermostat and gasket to water pump as a unit. Then, install the thermostat cover.

NOTE:
• When reinstalling the thermostat, use a new gasket.
• The thermostat must be installed with the jiggle pin facing upward.

Tightening torque:
12 N·m (1.2 kgf-m, 8.7 ft-lb)



(A) Thermostat cover
(B) Gasket
(C) Thermostat
(D) Jiggle pin

2) Connect the radiator outlet hose to thermostat cover.
3) Install the under cover.
4) Lower the vehicle.
5) Fill with engine coolant. <Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

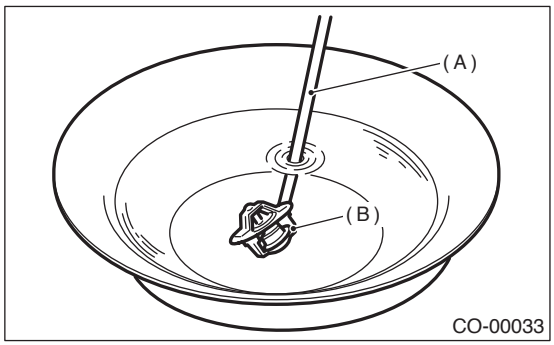
• Inspection method

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should be to the specification.

Starting temperature to open:
76 — 80°C (169 — 176°F)

Fully opens:
91°C (196°F)

Valve lift:
9.0 mm (0.354 in) or more



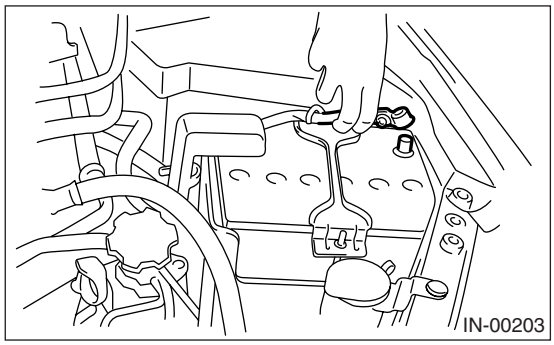
(A) Thermometer
(B) Thermostat

6. Radiator

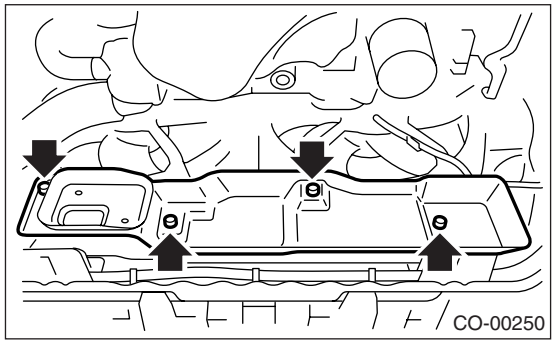
A: REMOVAL

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.

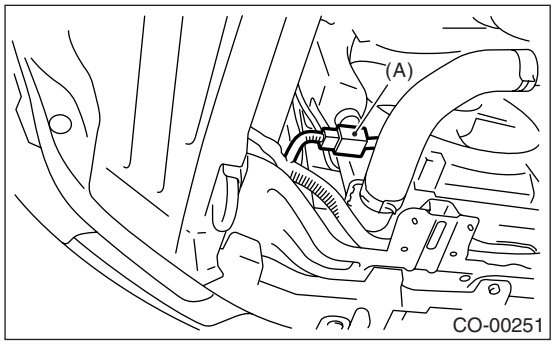


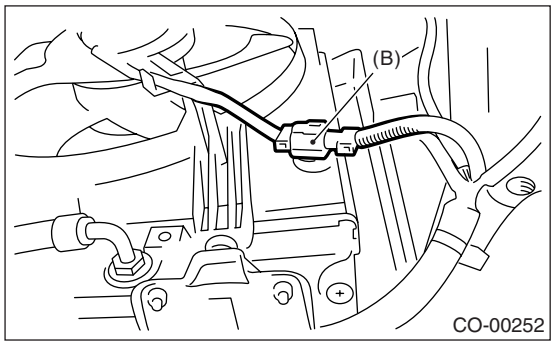
4) Lift-up the vehicle.
5) Remove the under cover.
6) Remove the heat shield cover from radiator.



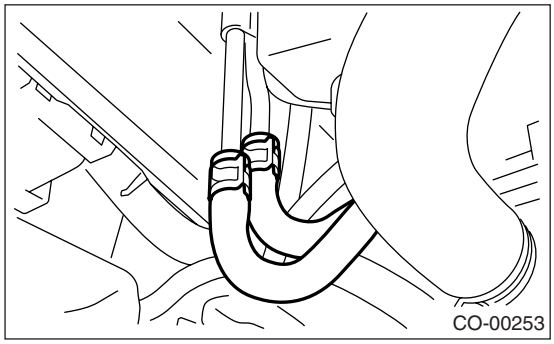
7) Drain engine coolant completely.
<Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

8) Disconnect the connectors of radiator main fan motor (A) and sub fan motor (B).

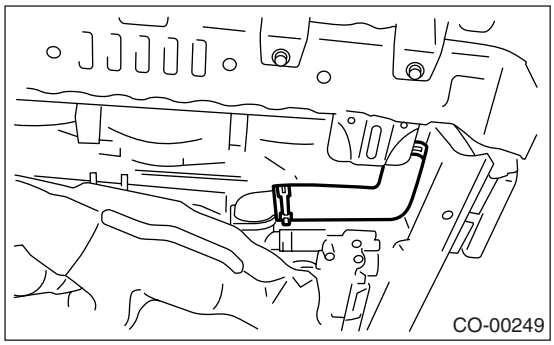




9) Disconnect the ATF cooler hoses from ATF pipes.
Plug the ATF pipe to prevent ATF leaks.

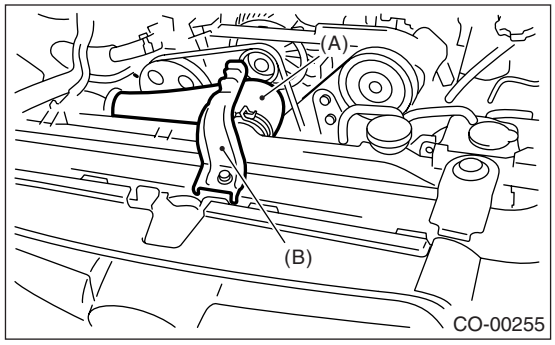


10) Disconnect the radiator outlet hose from thermostat cover.

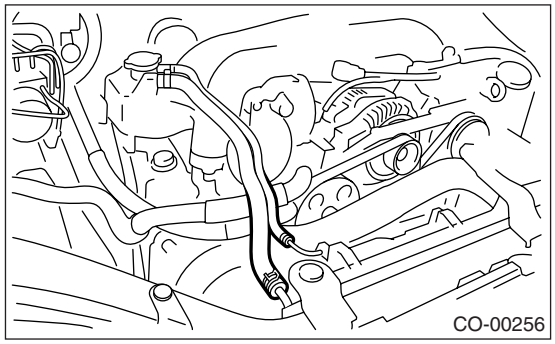


11) Lower the vehicle.
12) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
13) Disconnect the over flow hose.

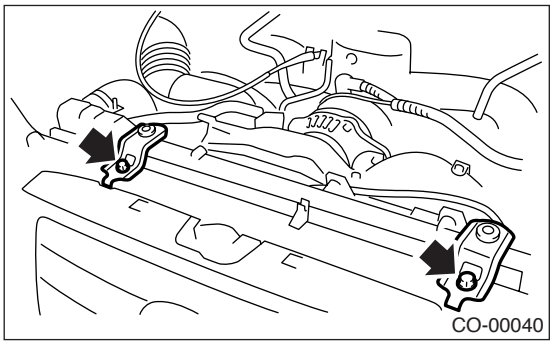
14) Remove the reservoir tank. <Ref. to CO(H4DOTC)-30, REMOVAL, Reservoir Tank.>
15) Disconnect the radiator inlet hose (A) from radiator.
16) Remove the hood stay holder (B).



17) Disconnect the two coolant filler tank hoses from radiator.



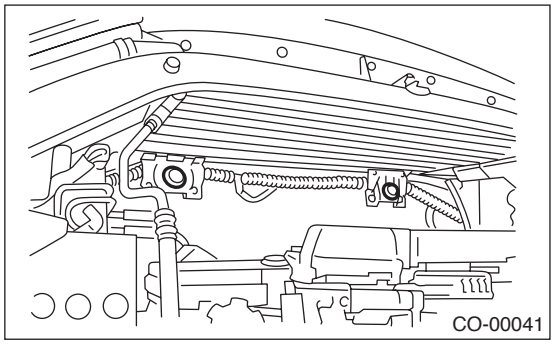
18) Remove the radiator upper brackets.



19) While lifting the radiator up, slide it to the left.
20) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to holes on the radiator lower bracket.

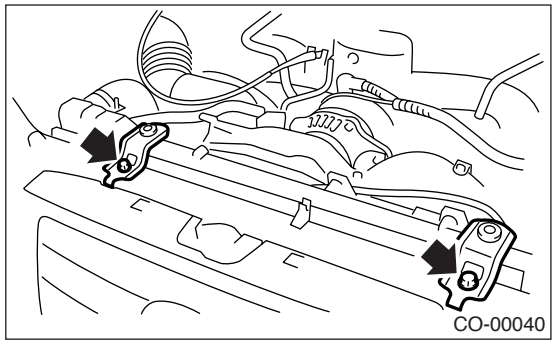


2) Install the radiator to vehicle.

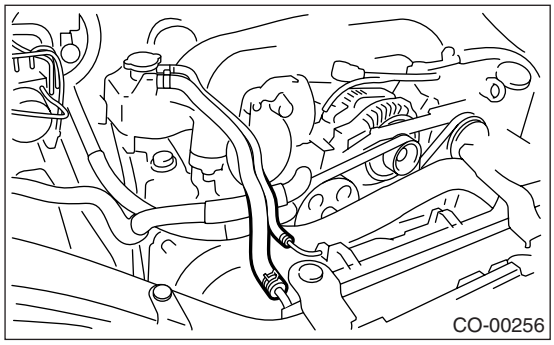
NOTE:
Make pins on the lower side of radiator be fitted into the radiator lower cushions on body side.

3) Install the radiator upper brackets and tighten the bolts.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

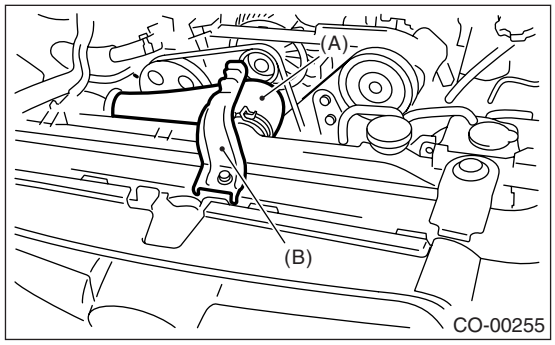


4) Connect the two coolant filler tank hoses to radiator.

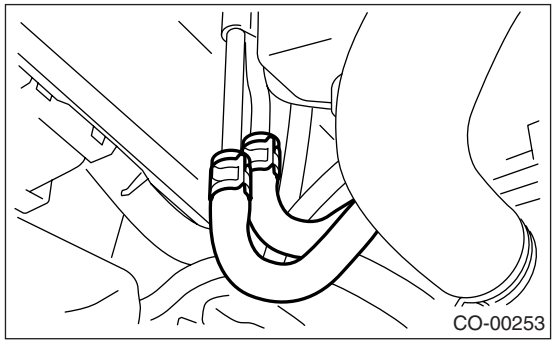


5) Connect the radiator inlet hose (A).

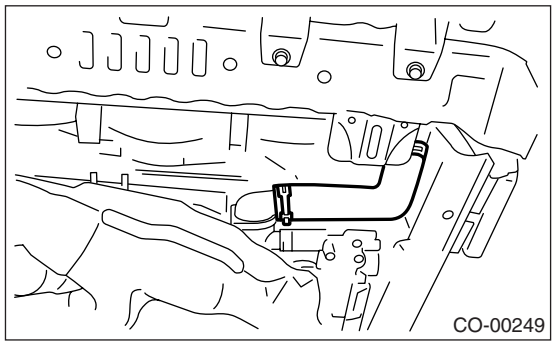
6) Install the hood stay holder (B).



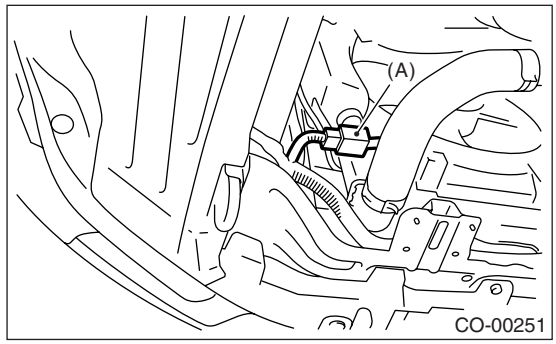
7) Install the reservoir tank. <Ref. to CO(H4DOTC)-30, INSTALLATION, Reservoir Tank.>
8) Connect the over flow hose.
9) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.>
10) Lift-up the vehicle.
11) Connect the ATF cooler hoses.

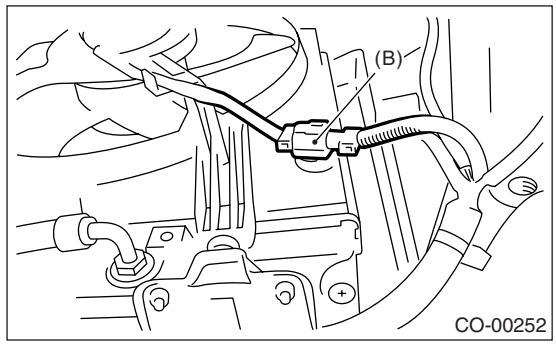


12) Connect the radiator outlet hose.

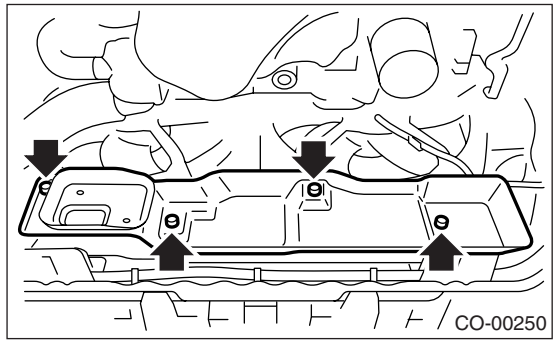


13) Connect the connectors to radiator main fan motor (A) and sub fan motor (B).

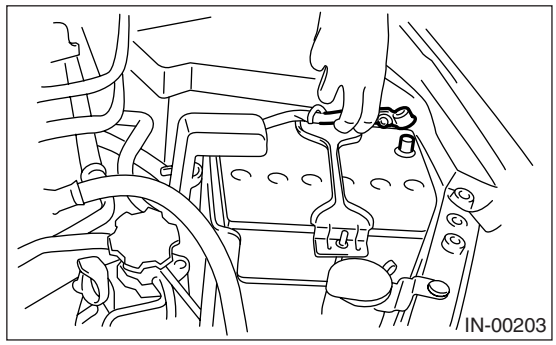




14) Install the heat shield cover.



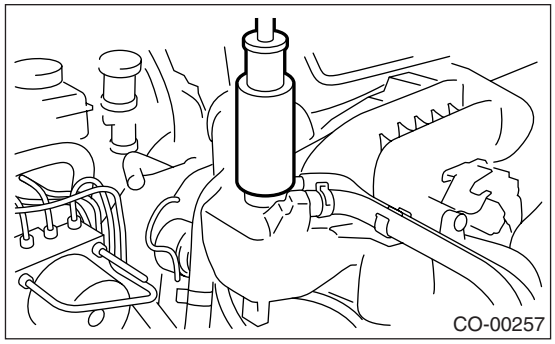
15) Install the under cover.
16) Lower the vehicle.
17) Connect the battery ground cable to battery.



18) Fill engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
19) Check the ATF level. <Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>
20) Install the collector cover.

C: INSPECTION

1) Remove the coolant filler tank cap and fill engine coolant to coolant filler tank, then attach the tester to radiator in place of cap.



2) Apply a pressure of 122 kPa (1.2 kg/cm^2, 18 psi) to the radiator to check if:

- Engine coolant leaks at or around radiator.
- Engine coolant leaks at/around hoses or connections.

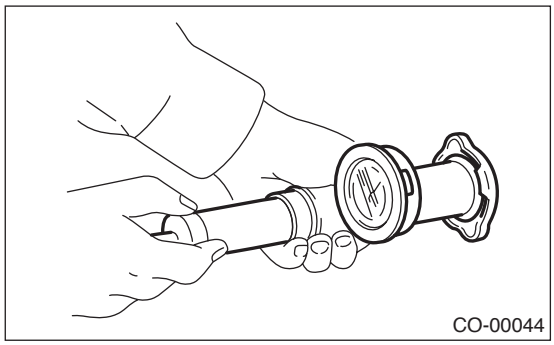
CAUTION:

- **Inspection must be carried out at the side of coolant filler tank, not at the side of radiator.**
- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful not to deform the filler neck of coolant filler tank when installing or removing the tester.**

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Coolant filler tank side

Standard pressure:

93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)

Service limit pressure:

83 kPa (0.85 kg/cm^2, 12 psi)

Radiator side

Standard pressure:

122 — 152 kPa (1.24 — 1.55 kg/cm^2, 18 — 22 psi)

Service limit pressure:

112 kPa (1.14 kg/cm^2, 16 psi)

CAUTION:

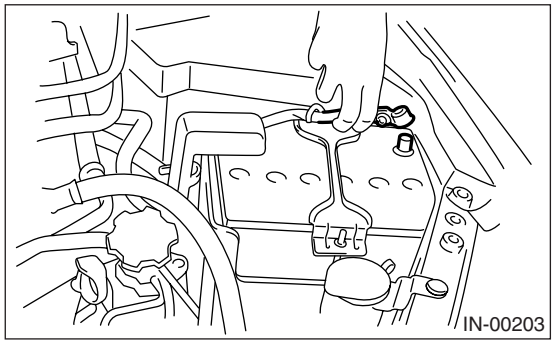
• Be sure to remove foreign matter and rust from the cap in advance. Otherwise, results of pressure test will be incorrect.

• Not to confuse the cap of coolant filler tank and cap of radiator.

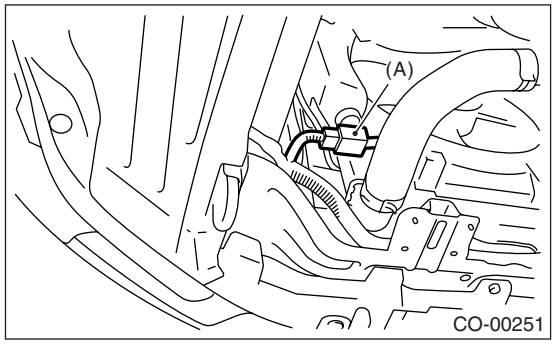
8. Radiator Main Fan and Fan Motor

A: REMOVAL

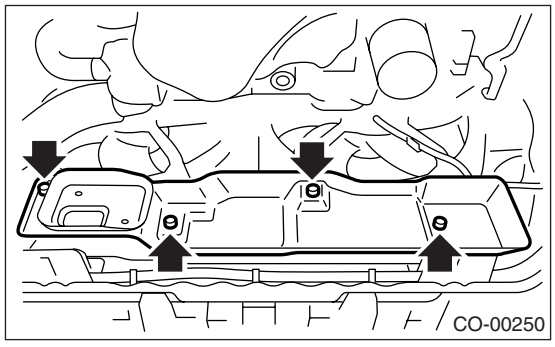
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



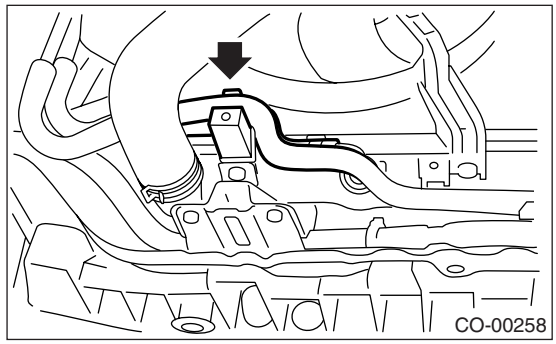
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the main fan motor connector (A).



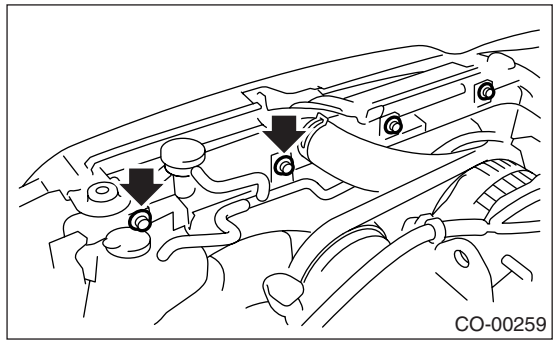
6) Remove the heat shield cover from radiator.



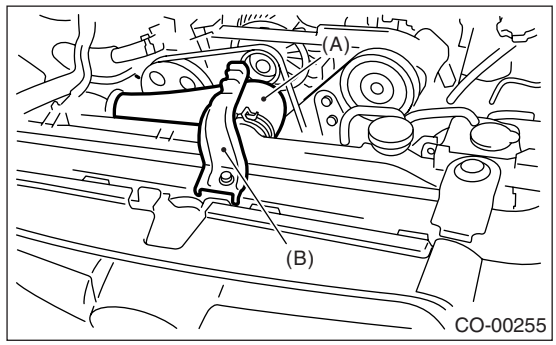
7) Drain the coolant about 1 ℓ (1.06 US qt, 0.88 Imp qt). <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
8) Remove the ATF hose from the clip of radiator main fan motor assembly.



9) Lower the vehicle.
10) Remove the air intake duct.
11) Disconnect the over flow hose.
12) Remove the over flow pipe.
13) Remove the reservoir tank. <Ref. to CO(H4DOTC)-30, REMOVAL, Reservoir Tank.>
14) Remove the mounting bolts from radiator main fan motor assembly.



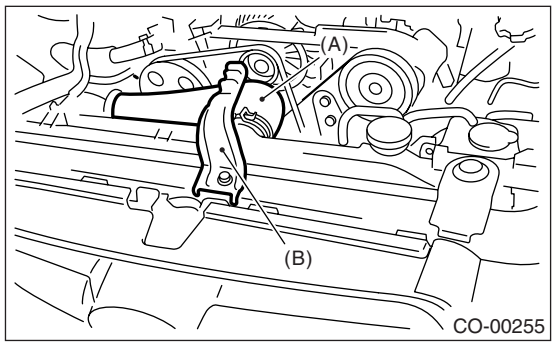
15) Disconnect the radiator inlet hose (A) from radiator.
16) Remove the hood stay holder (B).



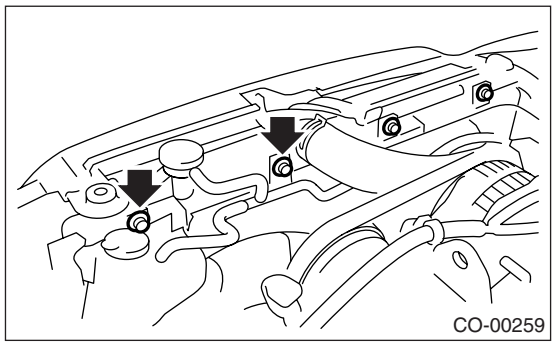
17) Remove the radiator main fan motor assembly from vehicle.

B: INSTALLATION

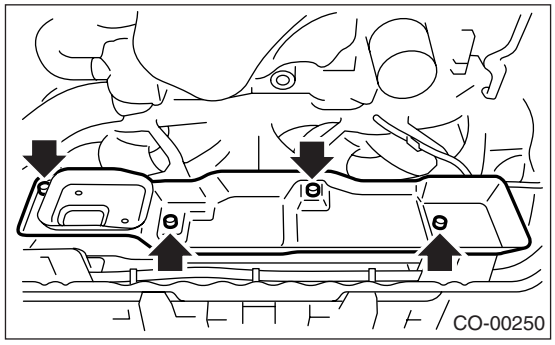
1) Install the radiator main fan motor assembly to vehicle.
2) Connect the radiator inlet hose (A) to radiator.
3) Install the hood stay holder (B).



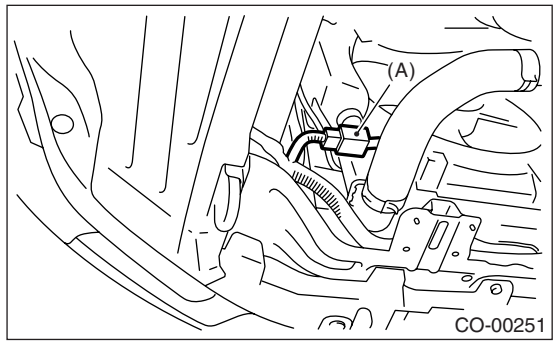
4) Install the mounting bolts of radiator main fan motor assembly.



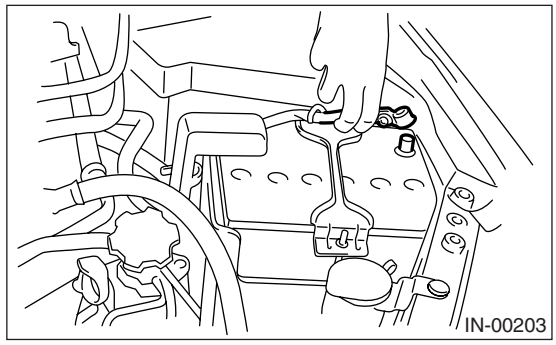
5) Install the reservoir tank. <Ref. to CO(H4DOTC)-30, INSTALLATION, Reservoir Tank.>
6) Install the over flow pipe.
7) Connect the over flow hose.
8) Install the air intake duct.
9) Lift-up the vehicle.
10) Attach the ATF hose to the clip of radiator main fan motor assembly.
11) Install the heat shield cover to radiator.



12) Connect the main fan motor connector (A).



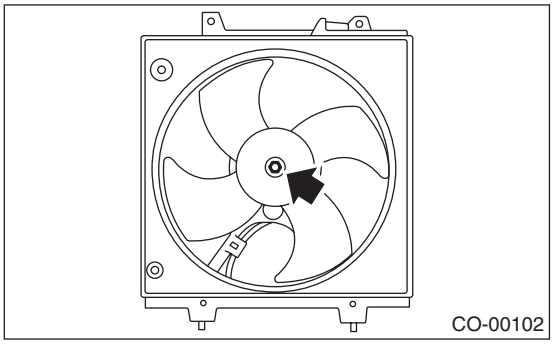
13) Install the under cover.
14) Lower the vehicle.
15) Connect the battery ground cable to battery.



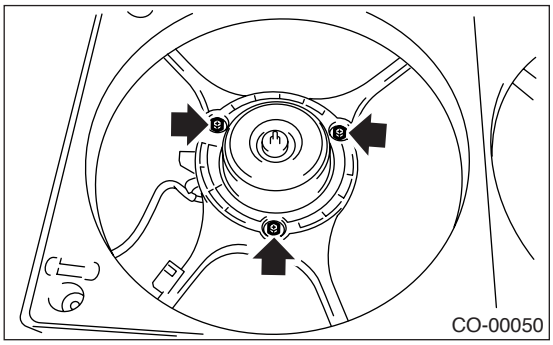
16) Fill engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
17) Install the collector cover.

C: DISASSEMBLY

1) Remove the clip which holds fan motor connector onto shroud.
2) Remove the nut which holds fan itself onto fan motor and shroud assembly.



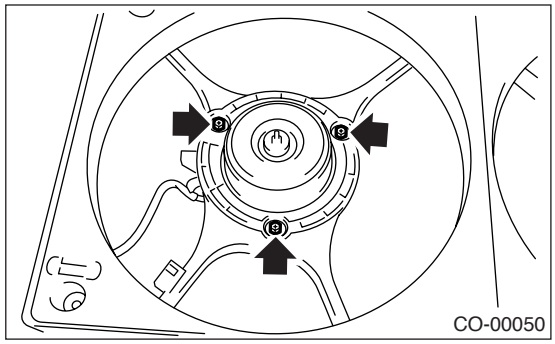
3) Remove the bolts which hold fan motor onto shroud.



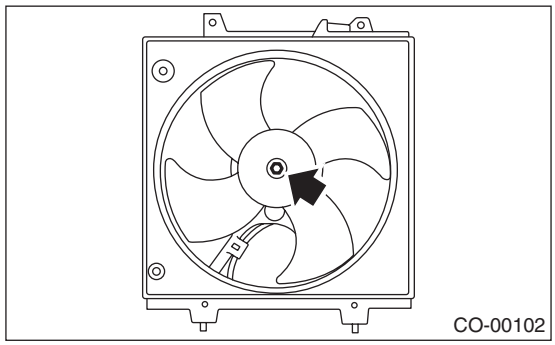
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



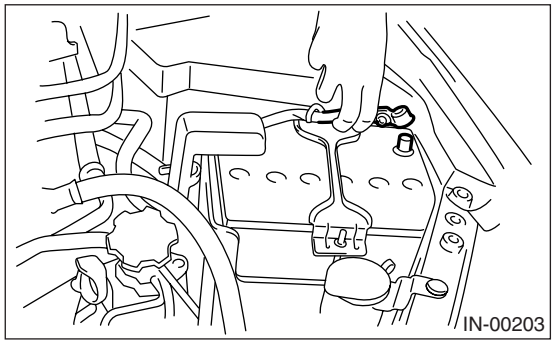
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



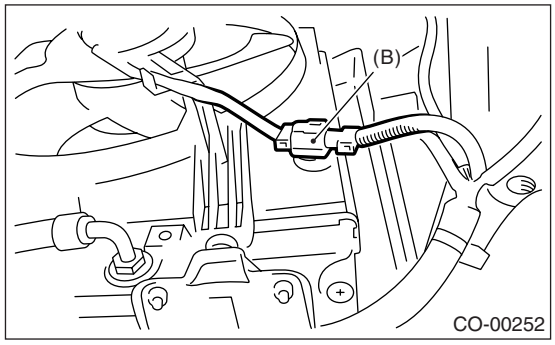
9. Radiator Sub Fan and Fan Motor

A: REMOVAL

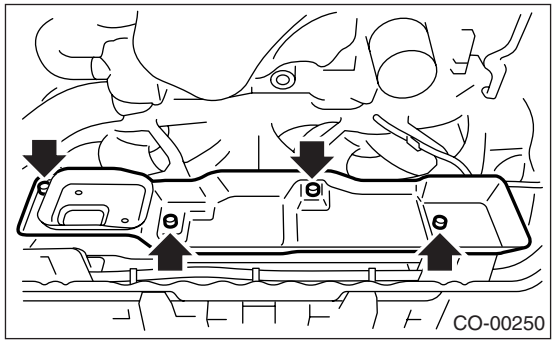
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



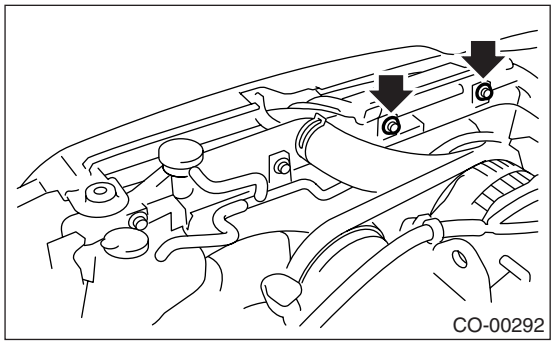
3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the sub fan motor connector (B).



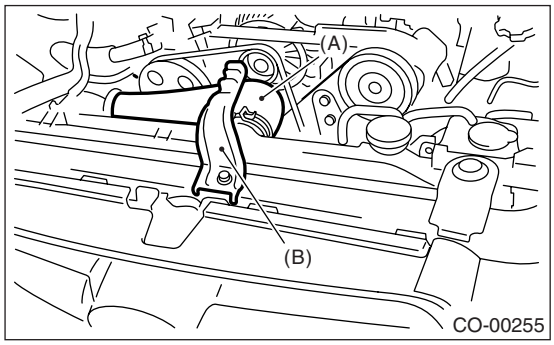
6) Remove the heat shield cover from radiator.



7) Drain the coolant about 1 ℓ (1.06 US qt, 0.88 Imp qt). <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
8) Remove the ATF hose from the clip of radiator sub fan motor assembly.
9) Lower the vehicle.
10) Remove the air intake duct.
11) Disconnect the over flow hose.
12) Remove the over flow pipe.
13) Remove the reservoir tank. <Ref. to CO(H4DOTC)-30, REMOVAL, Reservoir Tank.>
14) Remove the mounting bolts of radiator sub fan motor assembly.



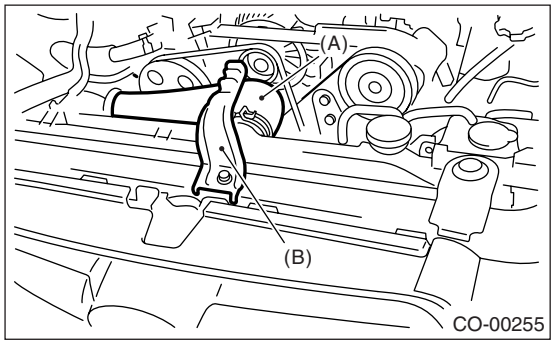
15) Disconnect the radiator inlet hose (A) from radiator.
16) Remove the hood stay holder (B).



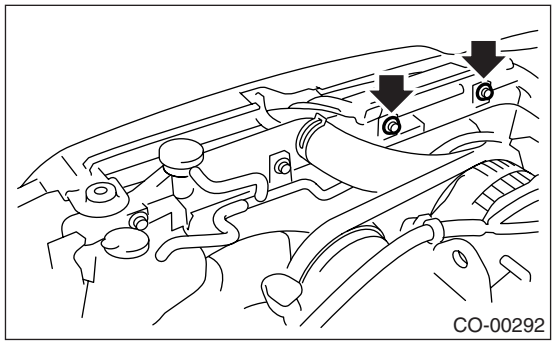
17) Remove the radiator sub fan motor assembly from vehicle.

B: INSTALLATION

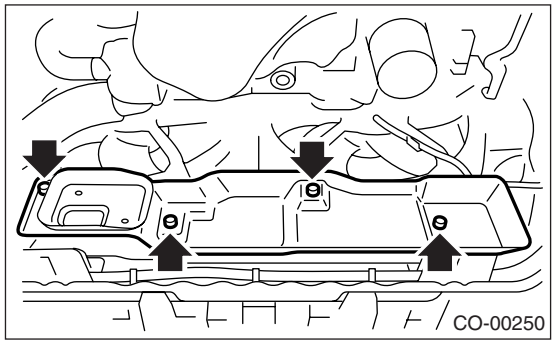
1) Install the radiator sub fan motor assembly to vehicle.
2) Connect the radiator inlet hose (A) to radiator.
3) Install the hood stay holder (B).



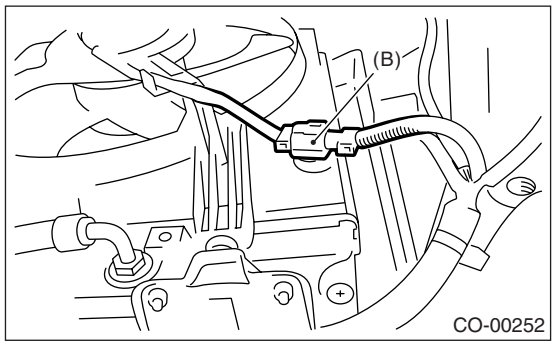
4) Install the mounting bolts of radiator sub fan motor assembly.



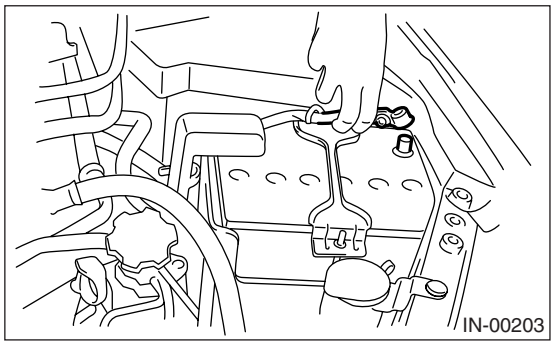
5) Install the reservoir tank. <Ref. to CO(H4DOTC)-30, INSTALLATION, Reservoir Tank.>
6) Install the over flow pipe.
7) Connect the over flow hose.
8) Install the air intake duct.
9) Lift-up the vehicle.
10) Attach the ATF hose to the clip of radiator sub fan motor assembly.
11) Install the heat shield cover to radiator.



12) Connect the sub fan motor connector (B).



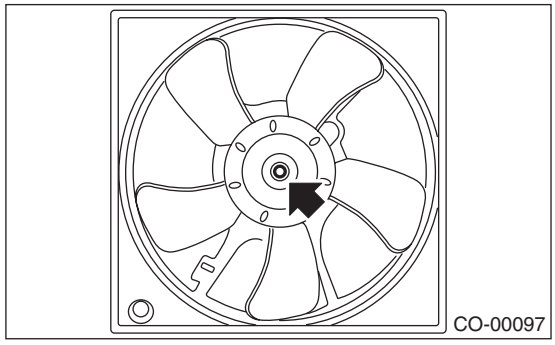
13) Install the under cover.
14) Lower the vehicle.
15) Connect the battery ground cable to battery.



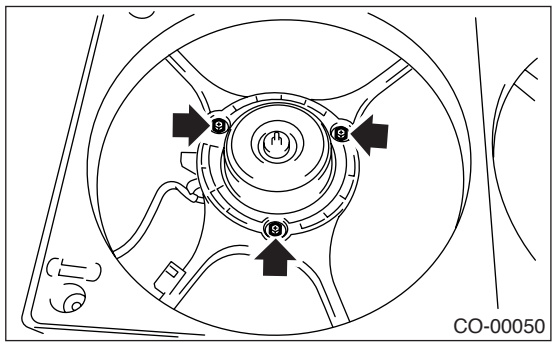
16) Fill engine coolant.
<Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
17) Install the collector cover.

C: DISASSEMBLY

1) Remove the clip which holds fan motor connector onto shroud.
2) Remove the nut which holds fan itself onto fan motor and shroud assembly.



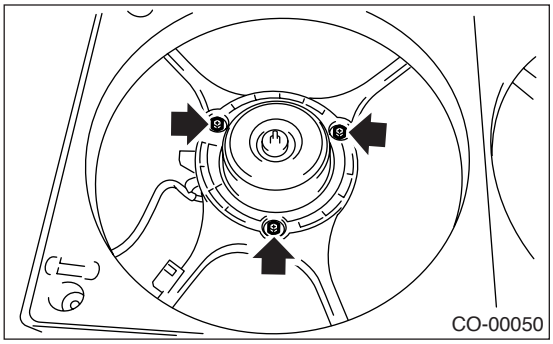
3) Remove the bolts which hold fan motor onto shroud.



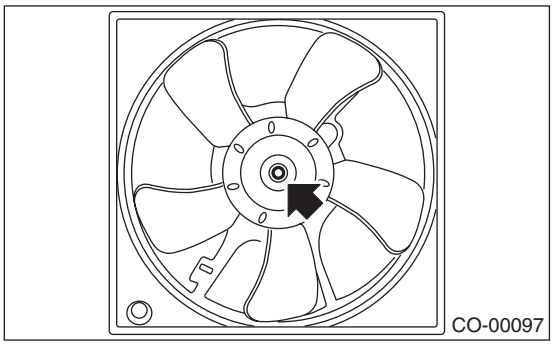
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)



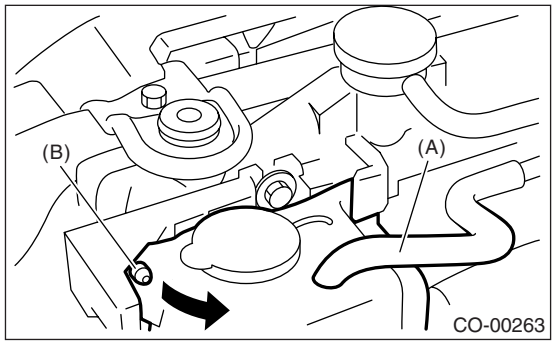
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)



10.Reservoir Tank

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the over flow hose (A).
3) Pull out the reservoir tank to the arrow direction while pushing the claw (B).



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

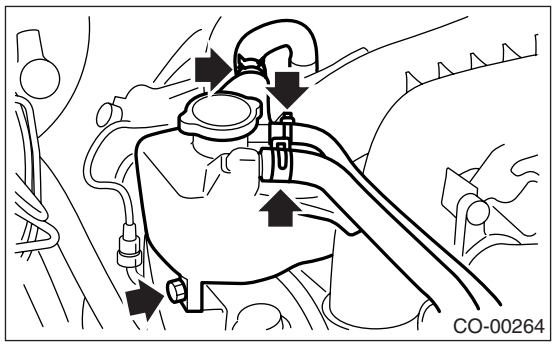
Make sure the engine coolant level is between “FULL” and “LOW”.

11.Coolant Filler Tank

A: REMOVAL

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

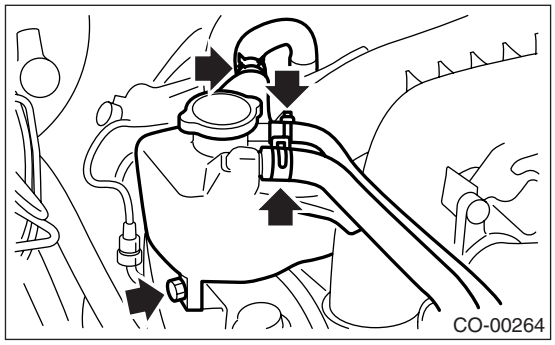
1) Remove the collector cover.
2) Drain the coolant about 3.0 ℓ (3.2 US qt, 2.6 Imp qt). <Ref. to CO(H4DOTC)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
3) Disconnect the engine coolant hoses from coolant filler tank.
4) Remove the bolts which install the coolant filler tank.
5) Disconnect the engine coolant hose which connects the under side of coolant filler tank.
6) Remove the coolant filler tank.



B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



2) Fill with engine coolant. <Ref. to CO(H4DOTC)-13, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Loose timing belt	Repair or replace timing belt tensioner.
	c. Oil on drive belt	Replace.
	d. Malfunction of thermostat	Replace.
	e. Malfunction of water pump	Replace.
	f. Clogged engine coolant passage	Clean.
	g. Improper ignition timing	Inspect and repair the ignition control system. <Ref. to EN(H4DOTC)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	h. Clogged or leaking radiator	Clean, repair or replace.
	i. Improper engine oil in engine coolant	Replace engine coolant.
	j. Air/fuel mixture ratio too lean	Inspect and repair the fuel injection system. <Ref. to EN(H4DOTC)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	k. Excessive back pressure in exhaust system	Clean or replace.
	l. Insufficient clearance between piston and cylinder	Adjust or replace.
	m. Slipping clutch	Repair or replace.
	n. Dragging brake	Adjustment.
	o. Defective radiator fan	Inspect radiator fan relay, engine coolant temperature sensor or radiator motor and replace there.
Over-cooling	a. Ambient temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Repair or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Repair or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Repair or replace.
	f. Damaged or cracked thermostat case	Repair or replace.
	g. Leakage from radiator	Repair or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE3

LUBRICATION

LU(H4DOTC)

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2. Oil Pressure System 6
3. Engine Oil....8
4. Oil Pump 9
5. Oil Pan and Strainer....13
6. Oil Pressure Switch....16
7. Engine Oil Filter....17
8. Engine Lubrication System Trouble in General....18

1. General Description

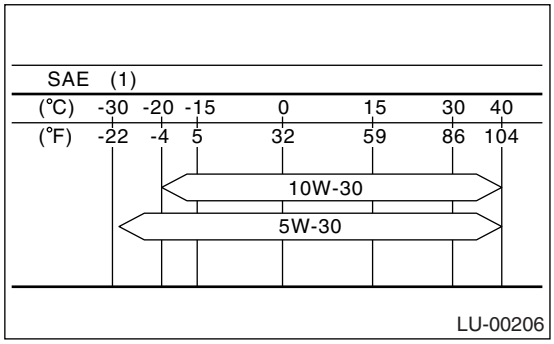
A: SPECIFICATION

Lubrication method					Forced lubrication
Oil pump	Pump type				Trochoid type
	Number of teeth	Inner rotor			9
		Outer rotor			10
	Outer rotor diameter × thickness			mm (in)	78 × 12 (3.07 × 0.47)
	Tip clearance between inner and outer rotors			mm (in)	0.04 — 0.14 (0.0016 — 0.0055)
	Side clearance between inner rotor and pump case			mm (in)	0.02 — 0.07 (0.0008 — 0.0028)
	Case clearance between outer rotor and pump case		Standard value	mm (in)	0.10 — 0.175 (0.0039 — 0.0069)
	Performance at 80°C (176°F)	600 rpm	Discharge pressure	kPa (kg/cm^2, psi)	98 (1.0, 14)
			Discharge	ℓ (US qt, Imp qt)/min.	6.5 (6.9, 5.7) or more
		6,000 rpm	Discharge pressure	kPa (kg/cm^2, psi)	588 (6.0, 85)
			Discharge	ℓ (US qt, Imp qt)/min.	59.0 (62.3, 51.9) or more
	Relief valve working pressure			kPa (kg/cm^2, psi)	588 (6.0, 85)
Oil filter	Filter type				Full-flow filter type
	Filtration area			cm^2 (sq in)	Outer diameter 68 mm (2.68 in): 800 (124) / Outer diameter 65 mm (2.56 in): 470 (72.9)
	By-pass valve opening pressure			kPa (kg/cm^2, psi)	160 (1.63, 23.2)
	Outer diameter × width			mm (in)	Outer diameter 68 mm (2.68 in): 68 × 65 (2.68 × 2.56) / Outer diameter 65 mm (2.56 in): 65 × 74.4 (2.56 × 2.93)
	Installation screw specifications				M 20 × 1.5
Oil pressure switch	Type				Immersed contact point type
	Working voltage — wattage				12 V — 3.4 W or less
	Warning light activation pressure			kPa (kg/cm^2, psi)	14.7 (0.15, 2.1)
	Proof pressure			kPa (kg/cm^2, psi)	981 (10, 142) or more
Oil capacity (at replacement)				ℓ (US qt, Imp qt)	4.0 (4.2, 3.5)

Recommended oil

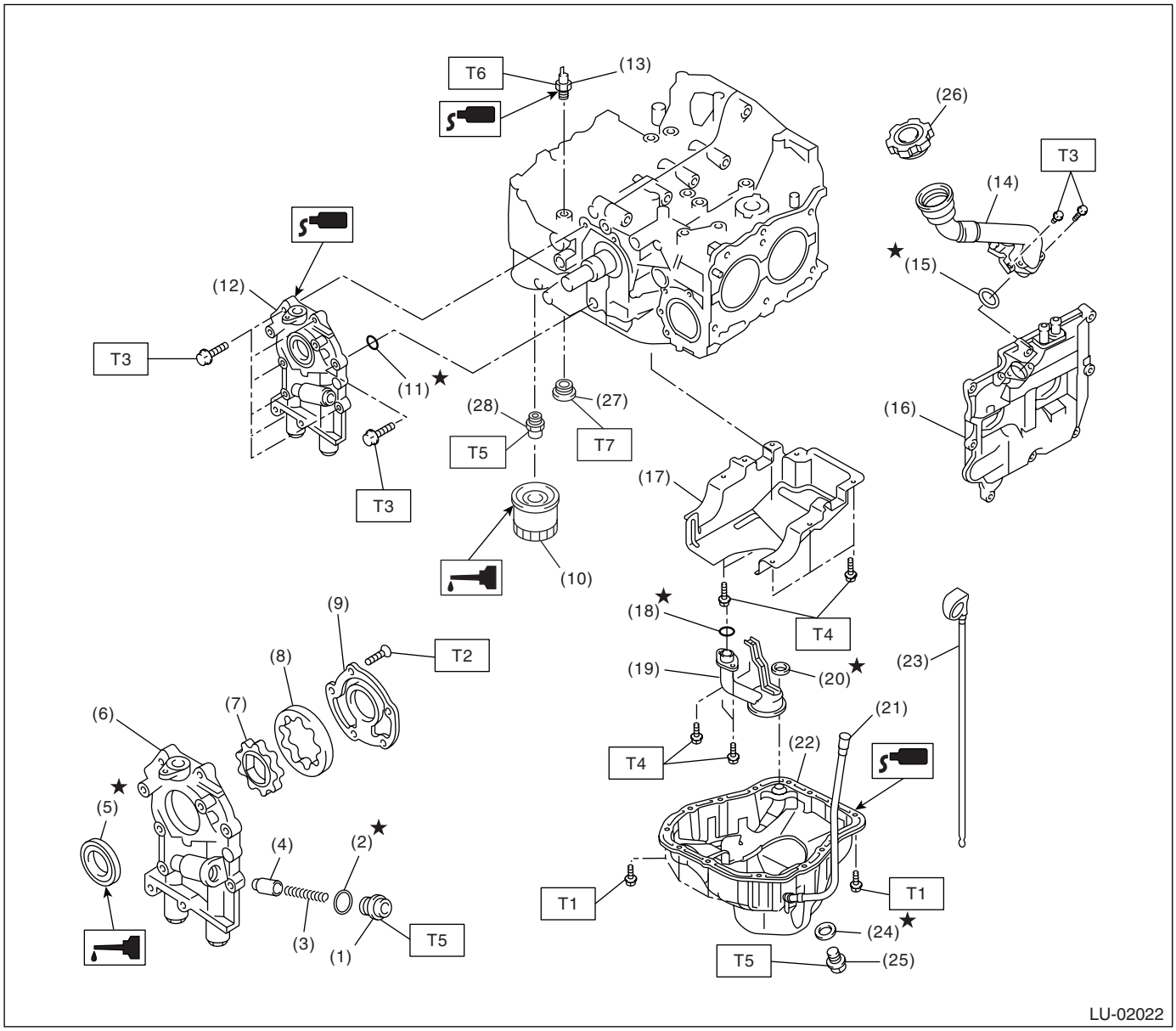
API classification

SL or SJ or SH with the words "Energy Conserving or Energy conserving II", CCMC specification G4 or G5, ACEA specification A1, A2 or A3, or New API mark displayed on the container (If it is impossible to get SL or SJ or SH grade, you may use SG grade.)



(1) SAE viscosity No. and applicable temperature

B: COMPONENT



(1) Plug
(2) Gasket
(3) Relief valve spring
(4) Relief valve
(5) Oil seal
(6) Oil pump case
(7) Inner rotor
(8) Outer rotor
(9) Oil pump cover
(10) Oil filter
(11) O-ring
(12) Oil pump ASSY
(13) Oil pressure switch
(14) Oil filler duct
(15) O-ring
(16) Rocker cover
(17) Baffle plate
(18) O-ring
(19) Oil strainer
(20) Gasket
(21) Oil level gauge guide
(22) Oil pan
(23) Oil level gauge
(24) Metal gasket
(25) Drain plug
(26) Oil filler cap
(27) Plug
(28) Connector

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***5 (0.5, 3.6)***
T2:	***5.4 (0.55, 4.0)***
T3:	***6.4 (0.65, 4.7)***
T4:	***10 (1.0, 7.0)***
T5:	***44 (4.5, 32.5)***
T6:	***25 (2.5, 18.1)***
T7:	***70 (7.1, 51.6)***

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOL

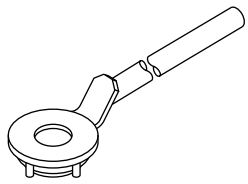
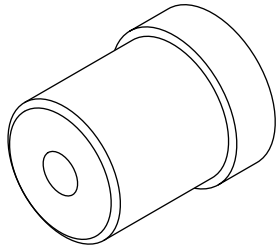
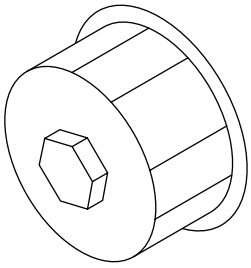
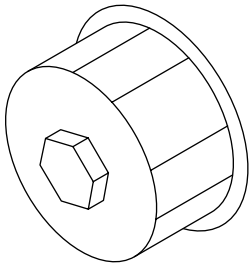
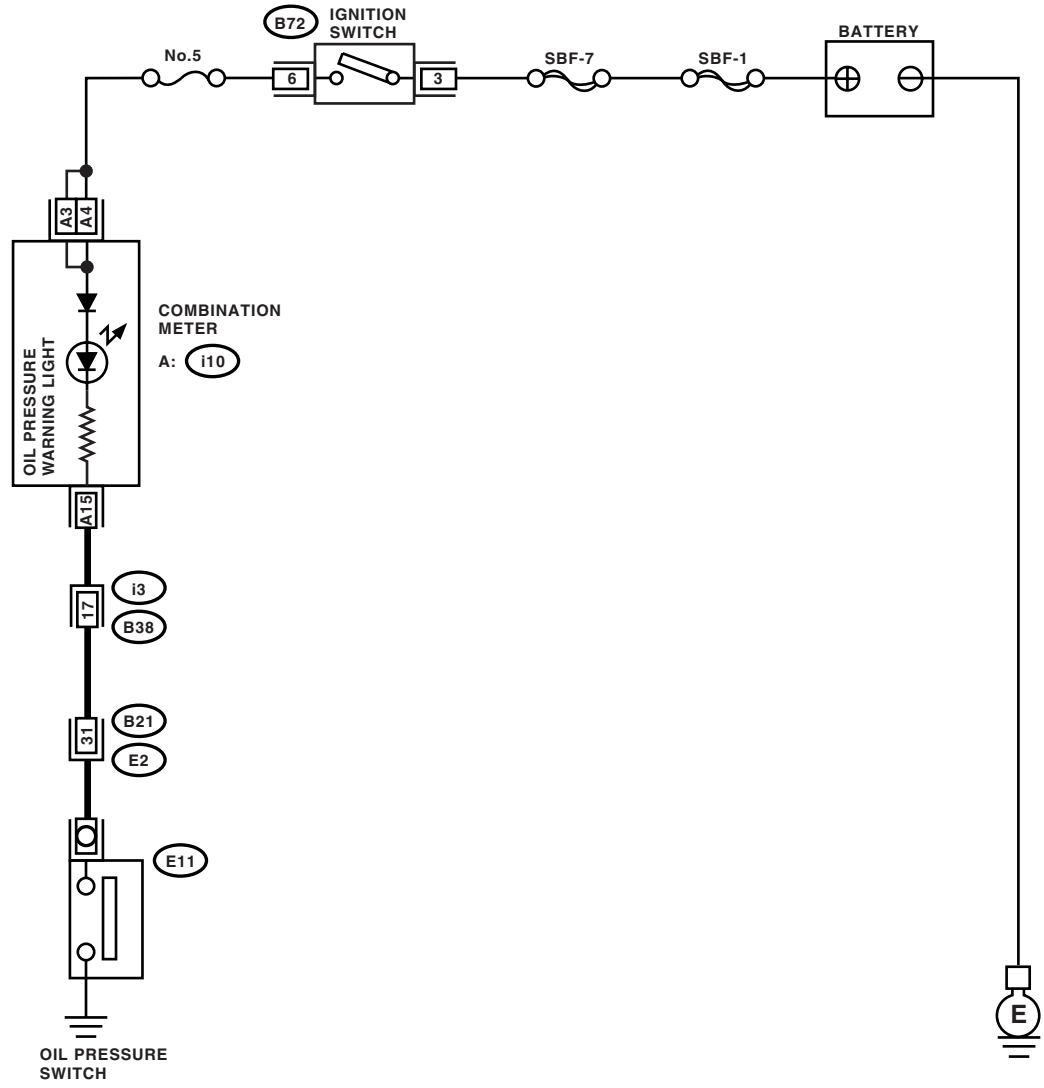
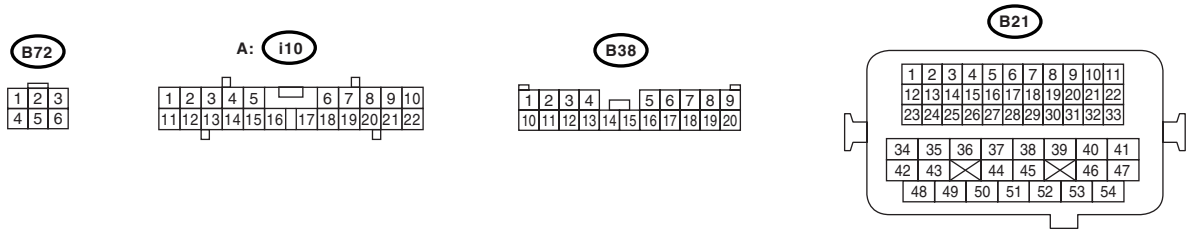
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977400	499977400	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt.
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil seal into oil pump.
 ST18332AA000	18332AA000	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 68 mm (2.68 in))

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18332AA010	18332AA010	OIL FILTER WRENCH	Used for removing and installing oil filter. (Outer diameter: 65 mm (2.56 in))

2. Oil Pressure System

A: WIRING DIAGRAM





LU-00241

B: INSPECTION

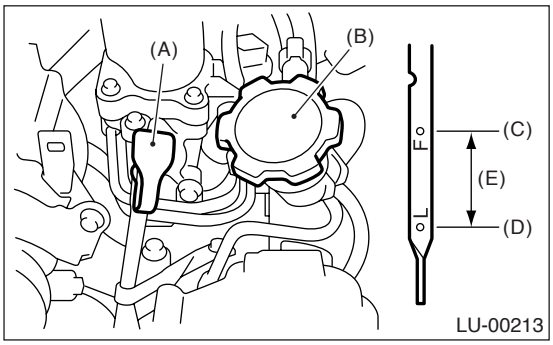
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1)Turn the ignition switch to ON (engine OFF). 2)Check the warning light of combination meter.	Does the warning light illuminate?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1)Turn the ignition switch to OFF. 2)Disconnect the connector from oil pressure switch. 3)Turn the ignition switch to ON. 4)Measure the voltage of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1)Turn the ignition switch to OFF. 2)Remove the combination meter. 3)Measure the resistance of combination meter. ***Terminals*** ***No. 4 — No. 15:*** ***No. 3 — No. 15:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and properly orientated.
4) Remove it again and check the engine oil level. If the engine oil level is below “L” line, add oil to bring the level up to “F” line.
5) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level show in the range between “F” line and notch mark. This is caused by thermal expansion of the engine oil.

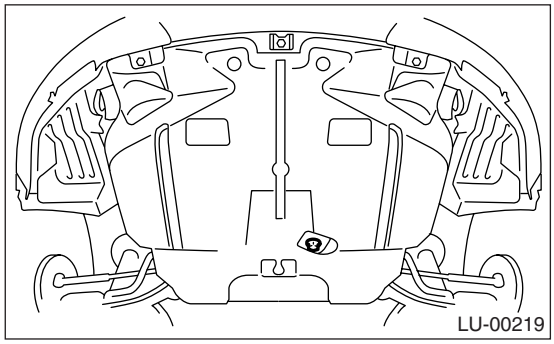
NOTE:
To prevent overfilling the engine oil, do not add oil above “F” line when the engine is cold.



(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

B: REPLACEMENT

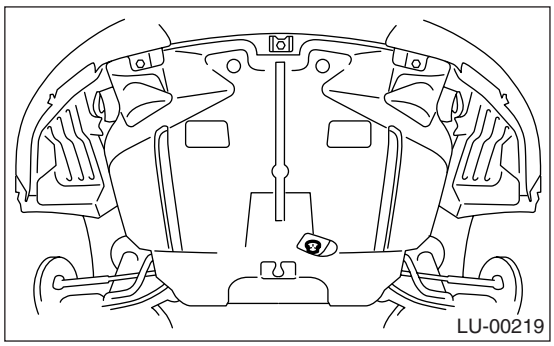
1) Open the engine oil filler cap for quick draining of engine oil.
2) Lift-up the vehicle.
3) Drain engine oil by loosening the engine oil drain plug.



4) Tighten the engine oil drain plug after draining engine oil.

NOTE:
Use a new metal gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

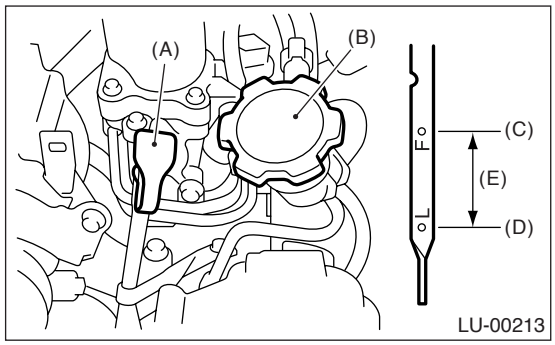


5) Use the engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to upper point on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

Recommended oil:
<Ref. to LU(H4DOTC)-2, SPECIFICATION, General Description.>

Engine oil capacity:
Upper level
4.0 ℓ (4.2 US qt, 3.5 Imp qt)
Lower level
3.0 ℓ (3.2 US qt, 2.6 Imp qt)

6) Close the engine oil filler cap.
7) Start the engine and warm it up for a time.
8) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

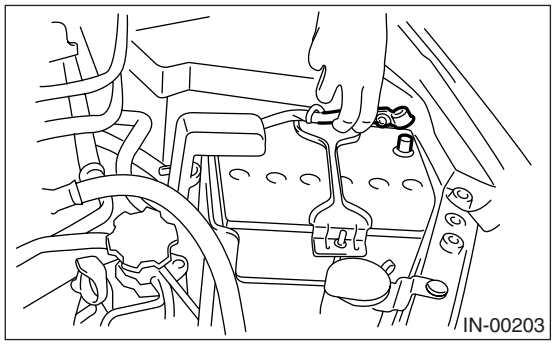


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level
(E) Approx. 1.0 ℓ (1.1 US qt, 0.9 Imp qt)

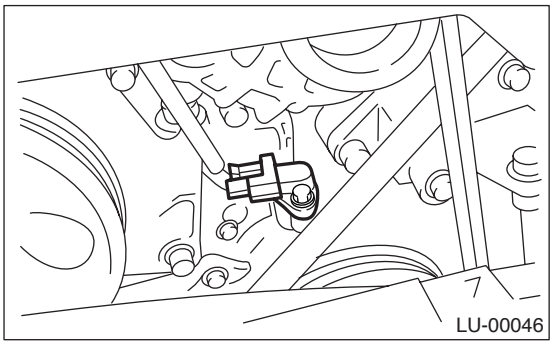
4. Oil Pump

A: REMOVAL

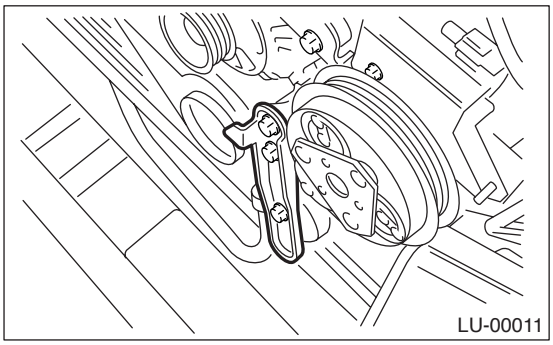
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



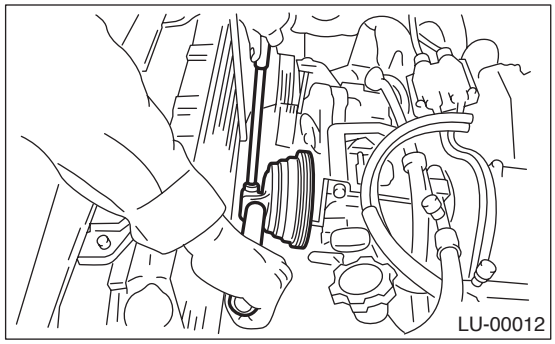
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the radiator. <Ref. to CO(H4DOTC)-19, REMOVAL, Radiator.>
6) Remove the crankshaft position sensor.



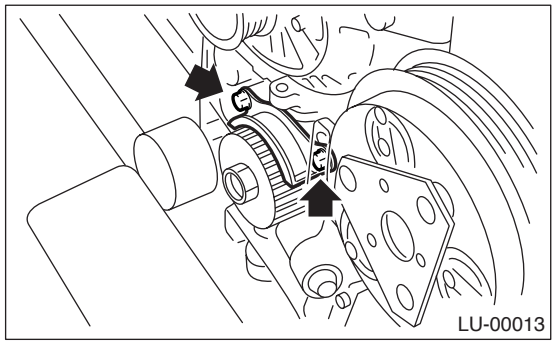
7) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>
8) Remove the rear side V-belt tensioner.



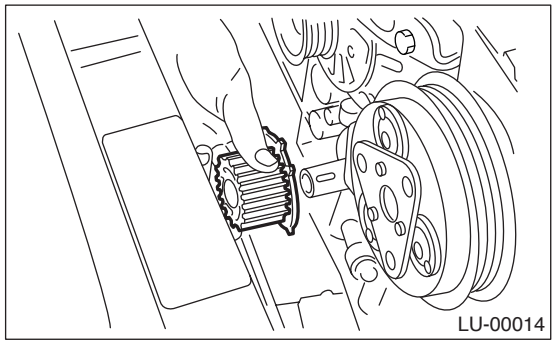
9) Remove the crank pulley by using ST. <Ref. to ME(H4DOTC)-41, REMOVAL, Crank Pulley.>



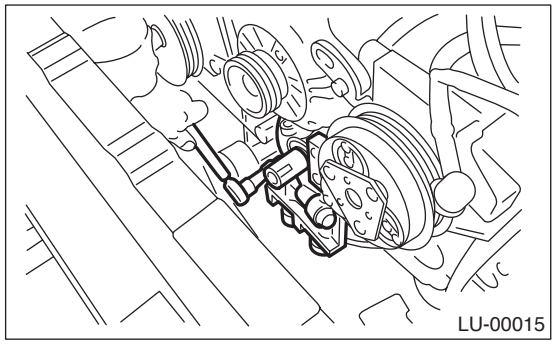
10) Remove the water pump. <Ref. to CO(H4DOTC)-15, REMOVAL, Water Pump.>
11) Remove the timing belt guide.



12) Remove the crank sprocket.

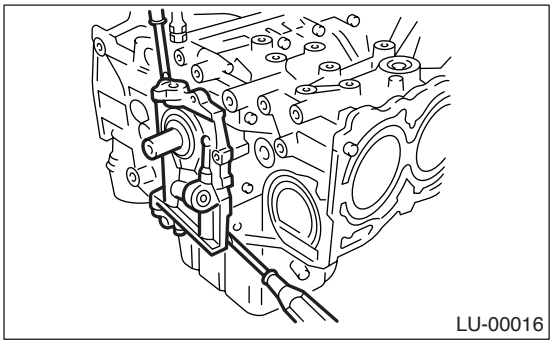


13) Remove the bolts which hold oil pump onto cylinder block.



14) Remove the oil pump by using flat bladed screwdriver.

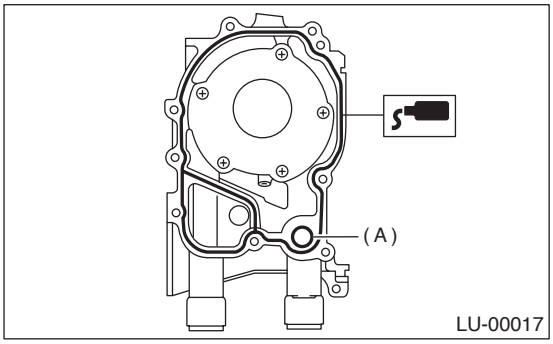
CAUTION:
Be careful not to scratch mating surfaces of cylinder block and oil pump.


LU-00016

B: INSTALLATION

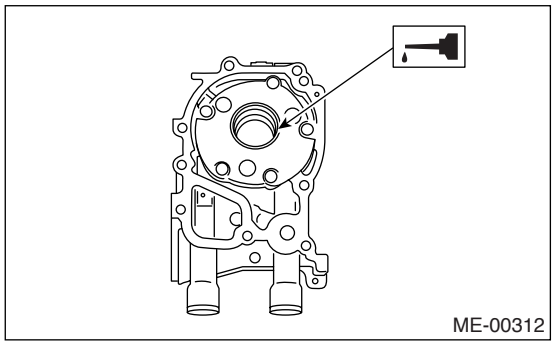
Install in the reverse order of removal.
Perform the following.
1) Apply liquid gasket to the matching surfaces of oil pump.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007) or equivalent



LU-00017

2) Replace the O-ring (A) with a new one.
3) Apply a coat of engine oil to the inside of oil seal.

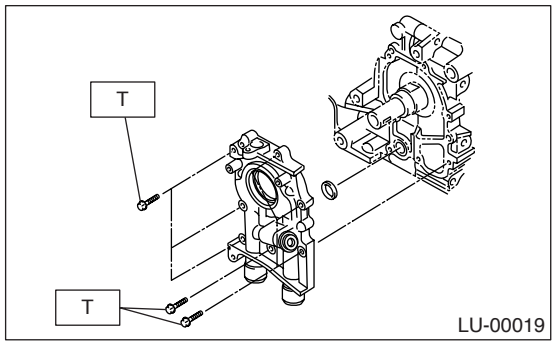

ME-00312

4) Position the oil pump, aligning the notched area with crankshaft, and push the oil pump straight.

CAUTION:
- **Make sure the oil seal lip is not folded.**
- **Be careful not to scratch oil seal when installing oil pump on cylinder block.**

5) Install the oil pump.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

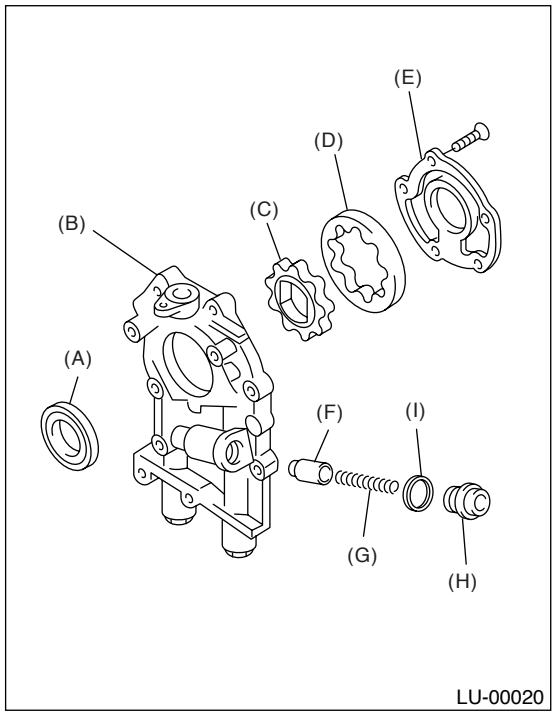


LU-00019

C: DISASSEMBLY

Remove the screws which secure oil pump cover and then disassemble oil pump. Inscribe alignment marks on the inner and outer rotors so that they can be replaced in their original positions during reassembly.

CAUTION:
Before disassembling the oil pump, remove the relief valve.



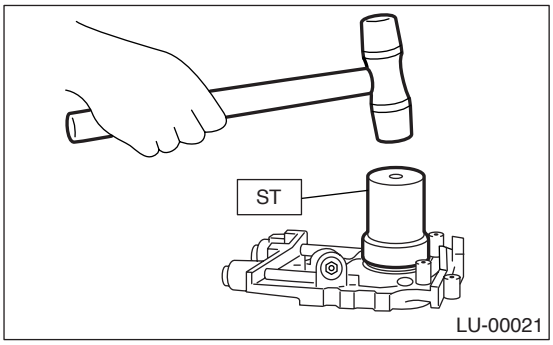
LU-00020

(A) Oil seal
(B) Pump case
(C) Inner rotor
(D) Outer rotor
(E) Pump cover
(F) Relief valve
(G) Relief valve spring
(H) Plug
(I) Gasket

D: ASSEMBLY

1) Install the front oil seal by using ST.
ST 499587100 OIL SEAL INSTALLER

NOTE:
Use a new oil seal.

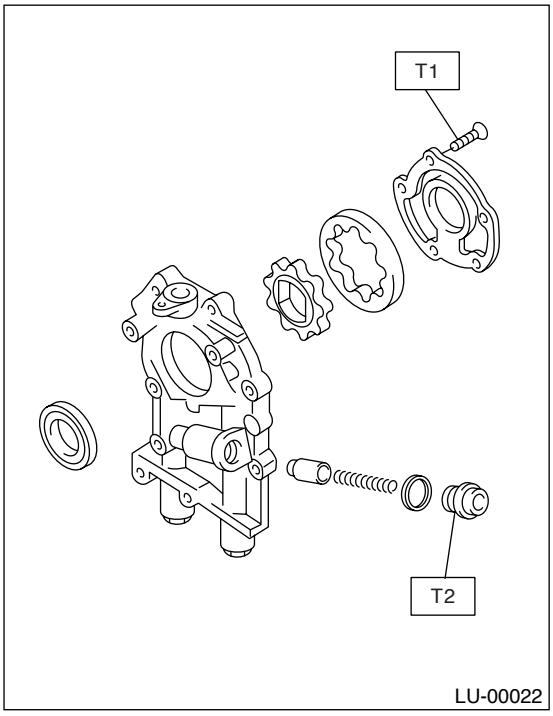


2) Apply a coat of engine oil to the inner and outer rotors.
3) Install the inner and outer rotors in their original positions.
4) Install the oil relief valve and relief valve spring and plug.

NOTE:
Use a new gasket.

5) Install the oil pump cover.

Tightening torque:
T1: 5.4 N·m (0.55 kgf-m, 4.0 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

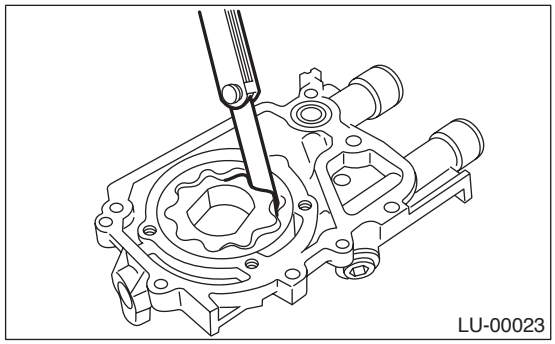


E: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance exceeds the standard value, replace the rotors as a matched set.

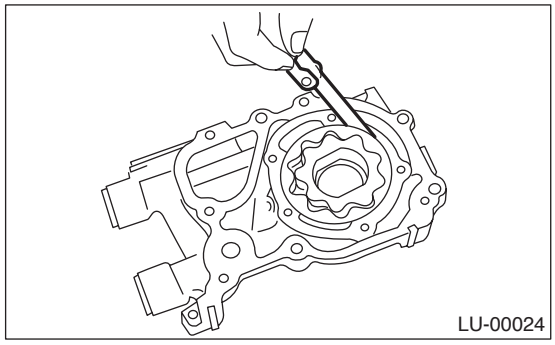
Tip clearance:
Standard value
0.04 — 0.14 mm (0.0016 — 0.0055 in)



2. CASE CLEARANCE

Measure the clearance between outer rotor and oil pump rotor housing. If the clearance exceeds the standard value, replace the oil pump case.

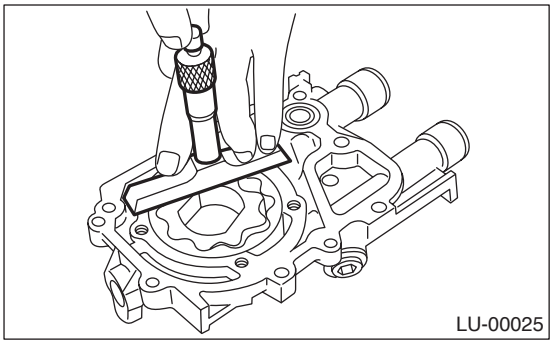
Case clearance:
Standard value
0.10 — 0.175 mm (0.0039 — 0.0069 in)



3. SIDE CLEARANCE

Measure the clearance between oil pump inner rotor and pump cover. If the clearance exceeds the standard value, replace the rotor or pump body.

Side clearance:
Standard value
0.02 — 0.07 mm (0.0008 — 0.0028 in)



4. OIL RELIEF VALVE

Check the valve for fitting condition and damage, and the relief valve spring for damage and deterioration. Replace the parts if defective.

Relief valve spring:
Free length
73.7 mm (2.902 in)
Installed length
54.7 mm (2.154 in)
Load when installed
93.1 N (9.49 kgf, 20.88 lb)

5. OIL PUMP CASE

Check the oil pump case for worn shaft hole, clogged oil passage, worn rotor chamber, cracks and other faults.

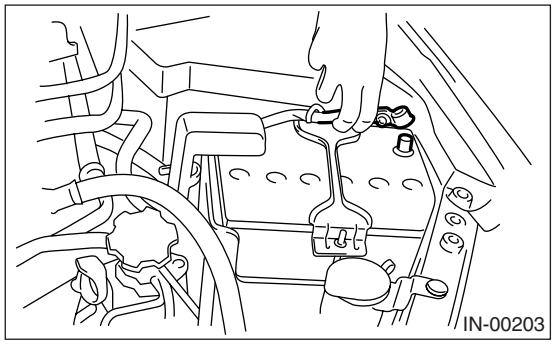
6. OIL SEAL

Check the oil seal lips for deformation, hardening, wear, etc. and replace if defective.

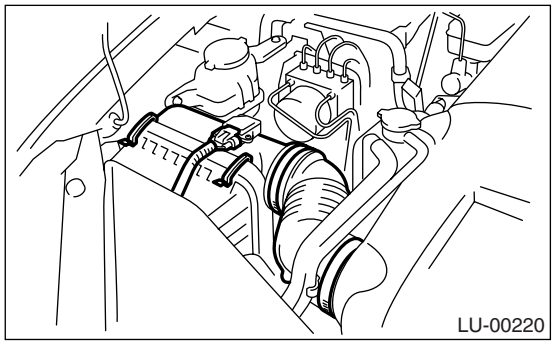
5. Oil Pan and Strainer

A: REMOVAL

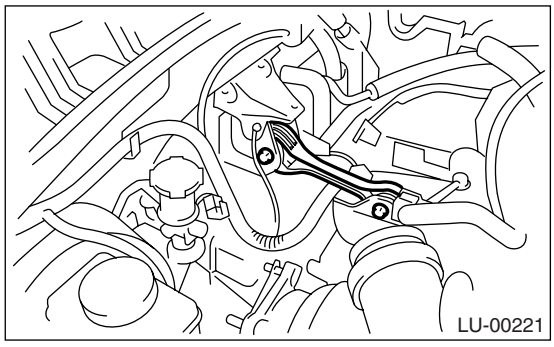
1) Set the vehicle on a lift.
2) Remove the front wheels.
3) Remove the collector cover.
4) Disconnect the ground cable from battery.



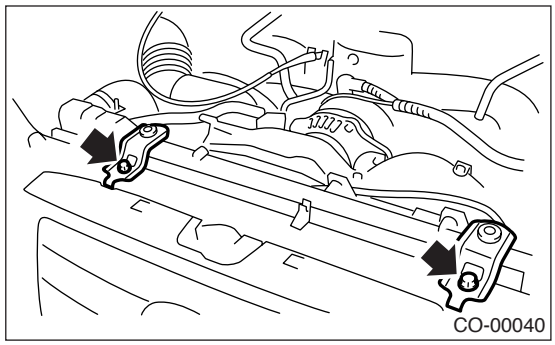
5) Disconnect the connector from mass airflow sensor.
6) Remove the air intake boot and air cleaner upper cover.



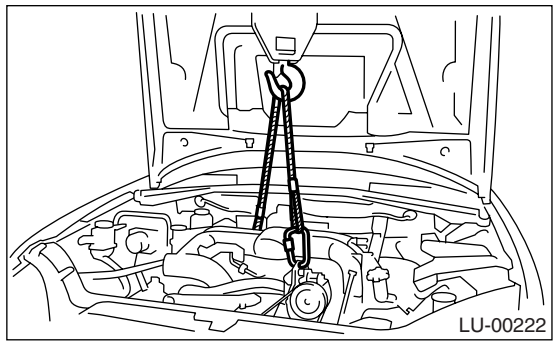
7) Remove the intercooler.
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
8) Remove the pitching stopper.



9) Remove the linear motion mounting.
<Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>
10) Remove the radiator upper brackets.



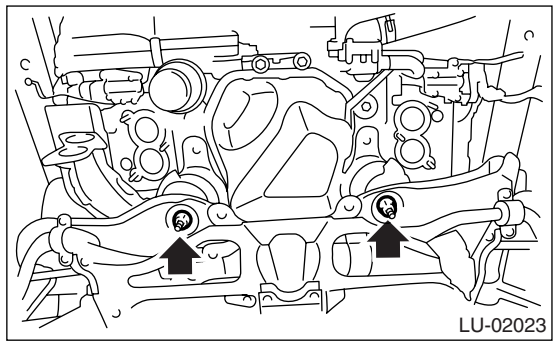
11) Support the engine with a lifting device and wire ropes.



12) Lift-up the vehicle.

CAUTION:
When lifting up the vehicle, raise up wire ropes at the same time.

13) Remove the under cover.
14) Drain engine oil.
15) Remove the front exhaust pipe.
<Ref. to EX(H4DOTC)-5, REMOVAL, Front Exhaust Pipe.>
16) Remove the nuts which install front cushion rubber onto front crossmember.

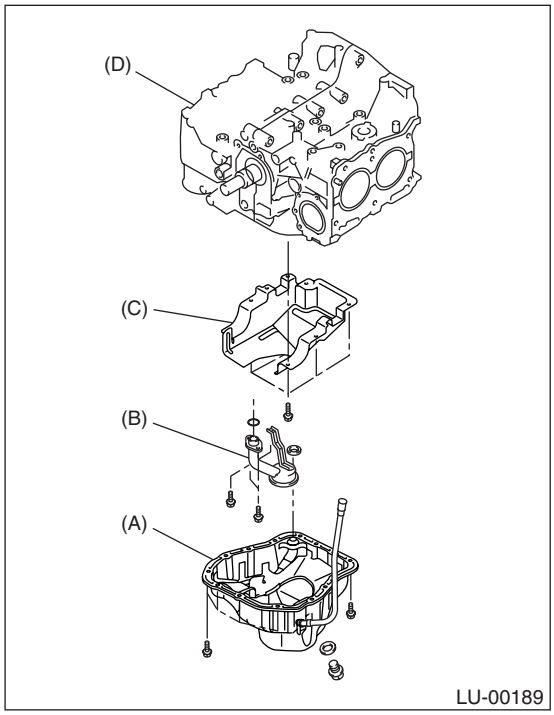


17) Remove the bolts which install oil pan on cylinder block with the engine raised up.
18) Insert the oil pan cutter blade into the clearance between cylinder block and oil pan.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

19) Remove the oil strainer.

20) Remove the baffle plate.



(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

B: INSTALLATION

CAUTION:
Before installing the oil pan, wipe clean the oil pan and the mating face of engine block.

1) Install the baffle plate.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

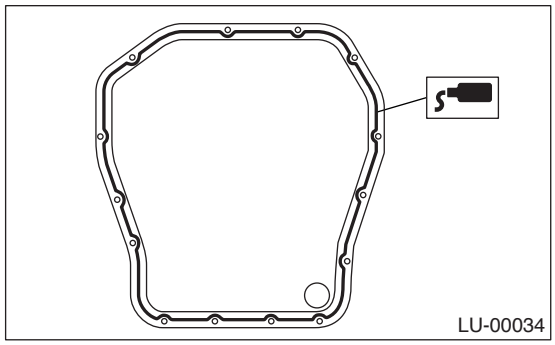
2) Install the oil strainer onto baffle plate.

NOTE:
Replace O-ring with new one.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

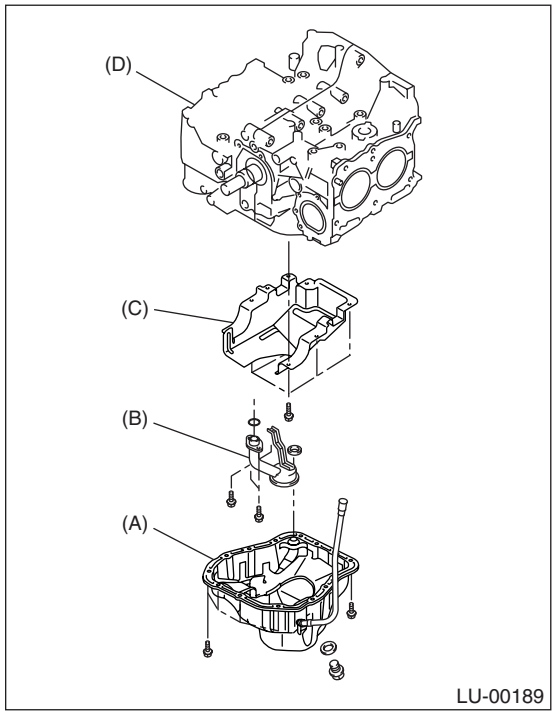
3) Apply liquid gasket to the mating surfaces and install the oil pan.

Liquid gasket:
THREE BOND 1207C (Part No. 004403012) or equivalent



4) Tighten the bolts which install oil pan onto engine block.

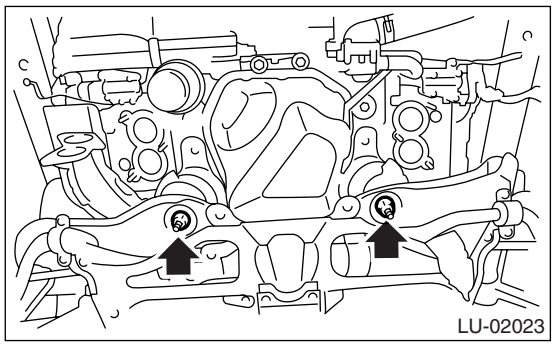
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)



(A) Oil pan
(B) Oil strainer
(C) Baffle plate
(D) Cylinder block

5) Lower the engine onto front crossmember.
6) Tighten the nuts which hold front cushion rubber onto front crossmember.

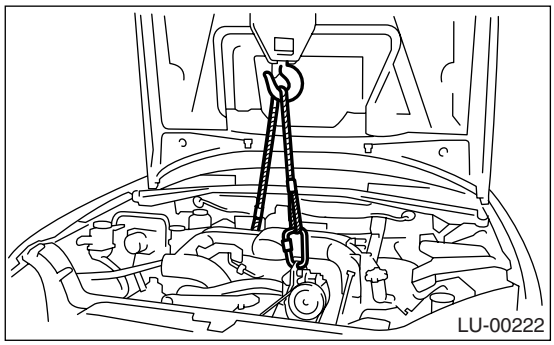
Tightening torque:
83 N·m (8.5 kgf-m, 61 ft-lb)



7) Install the front exhaust pipe.
<Ref. to EX(H4DOTC)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
8) Install the under cover.
9) Lower the vehicle.

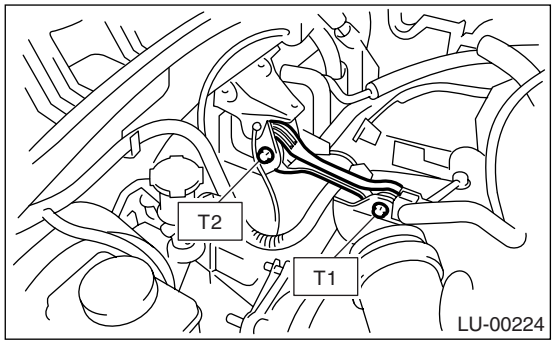
CAUTION:
When lowing the vehicle, lower the lift-up device and wire ropes at the same time.

10) Remove the lifting device and wire ropes.



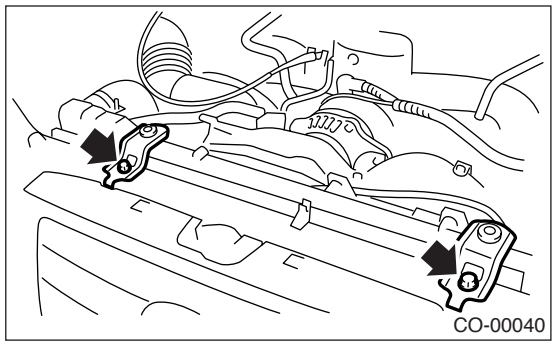
11) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)

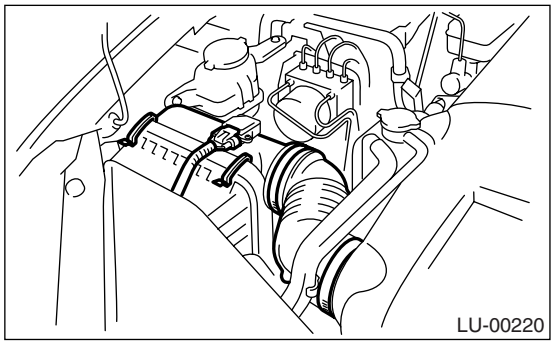


12) Install the linear motion mounting.
<Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>

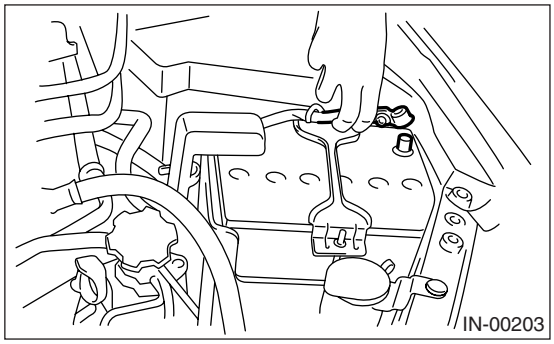
13) Install the radiator upper brackets.



14) Install the intercooler. <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
15) Install the air intake boot and air cleaner upper cover.
16) Connect the connector to mass air flow sensor.



17) Install the front wheels.
18) Install the collector cover.
19) Connect the battery ground cable to battery.



20) Fill engine oil. <Ref. to LU(H4DOTC)-8, INSPECTION, Engine Oil.>

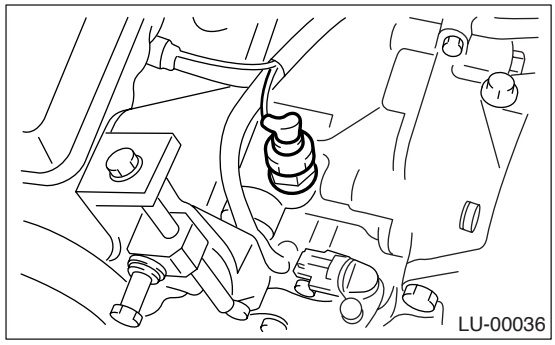
C: INSPECTION

Visually check that the oil pan, oil strainer, oil strainer stay and baffle plate are not damaged.

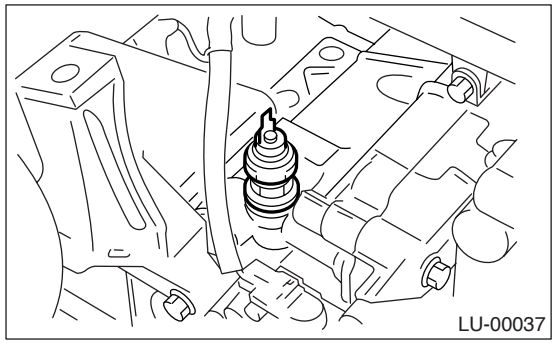
6. Oil Pressure Switch

A: REMOVAL

1) Remove the collector cover.
2) Remove the generator from bracket.
<Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.>
3) Disconnect the terminal from oil pressure switch.



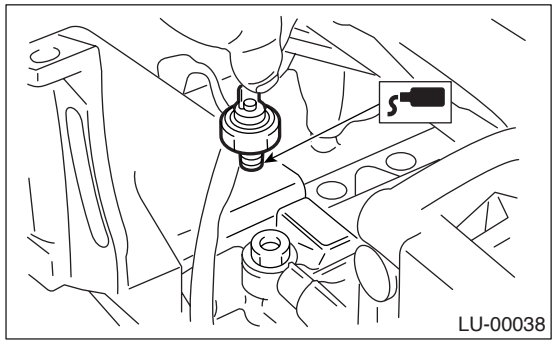
4) Remove the oil pressure switch.



B: INSTALLATION

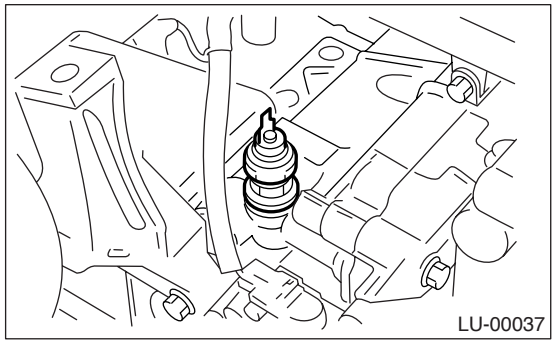
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket:
THREE BOND 1324 (Part No. 004403007) or equivalent

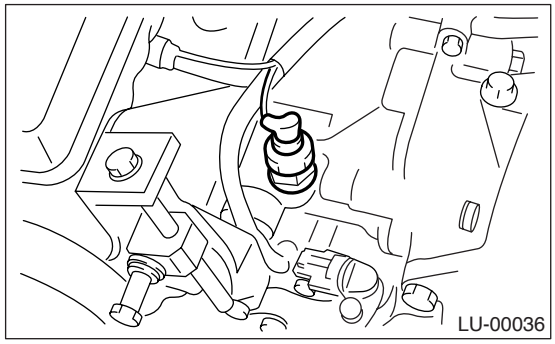


2) Install the oil pressure switch onto engine block.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



3) Connect the terminal to oil pressure switch.



4) Install the generator to bracket.
<Ref. to SC(H4SO 2.0)-14, INSTALLATION, Generator.>
5) Install the collector cover.

C: INSPECTION

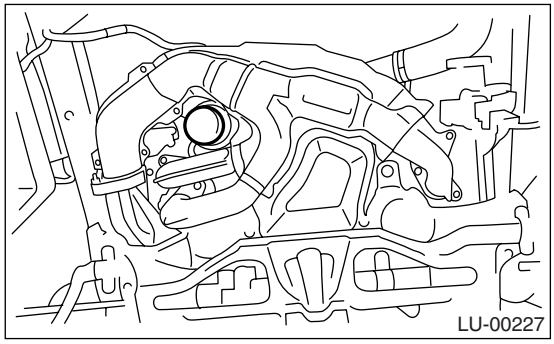
Make sure oil does not leak or seep from where the oil pressure switch is installed.

7. Engine Oil Filter

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the oil filter using STs.

ST 18332AA000 OIL FILTER WRENCH (Outer diameter: 68 mm (2.68 in))
ST 18332AA010 OIL FILTER WRENCH (Outer diameter: 65 mm (2.56 in))



B: INSTALLATION

1) Clean the oil filter installation surface on cylinder block or oil cooler.
2) Obtain a new oil filter and apply a thin coat of engine oil to seal rubber.
3) Install the oil filter, turning it by hand, being careful not to damage seal rubber.
4) Tighten more after the seal rubber contacts oil cooler.

NOTE:
• In case of oil filter in diameter 68 mm (2.68 in), tighten by approx. one turn.
• In case of oil filter in diameter 65 mm (2.56 in), tighten by approx. 2/3 to 3/4 turn.
• Over-tightening may cause oil leak.

5) Install the under cover.
6) Lower the vehicle.

C: INSPECTION

1) After installing the oil filter, run the engine and make sure that no oil is leaking around seal rubber.

NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level.
<Ref. to LU(H4DOTC)-8, INSPECTION, Engine Oil.>

8. Engine Lubrication System Trouble in General

A: INSPECTION

Before performing diagnosis, make sure that the engine oil level is correct and no oil leakage exists.

Symptom	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogging of oil filter	Replace.
		Malfunction of oil by-pass valve in oil filter	Clean or replace.
		Malfunction of oil relief valve in oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not come on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1).— 2).

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

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SPEED CONTROL SYSTEMS

SP(H4DOTC)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for Turbo model is included in SP(H4SO 2.0) section. <Ref. to SP(H4SO 2.0)-2, General Description.>

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
IGNITION	IG(H4DOTC)
STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

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FUJI HEAVY INDUSTRIES LTD. G2320GE3

IGNITION

IG(H4DOTC)

Page

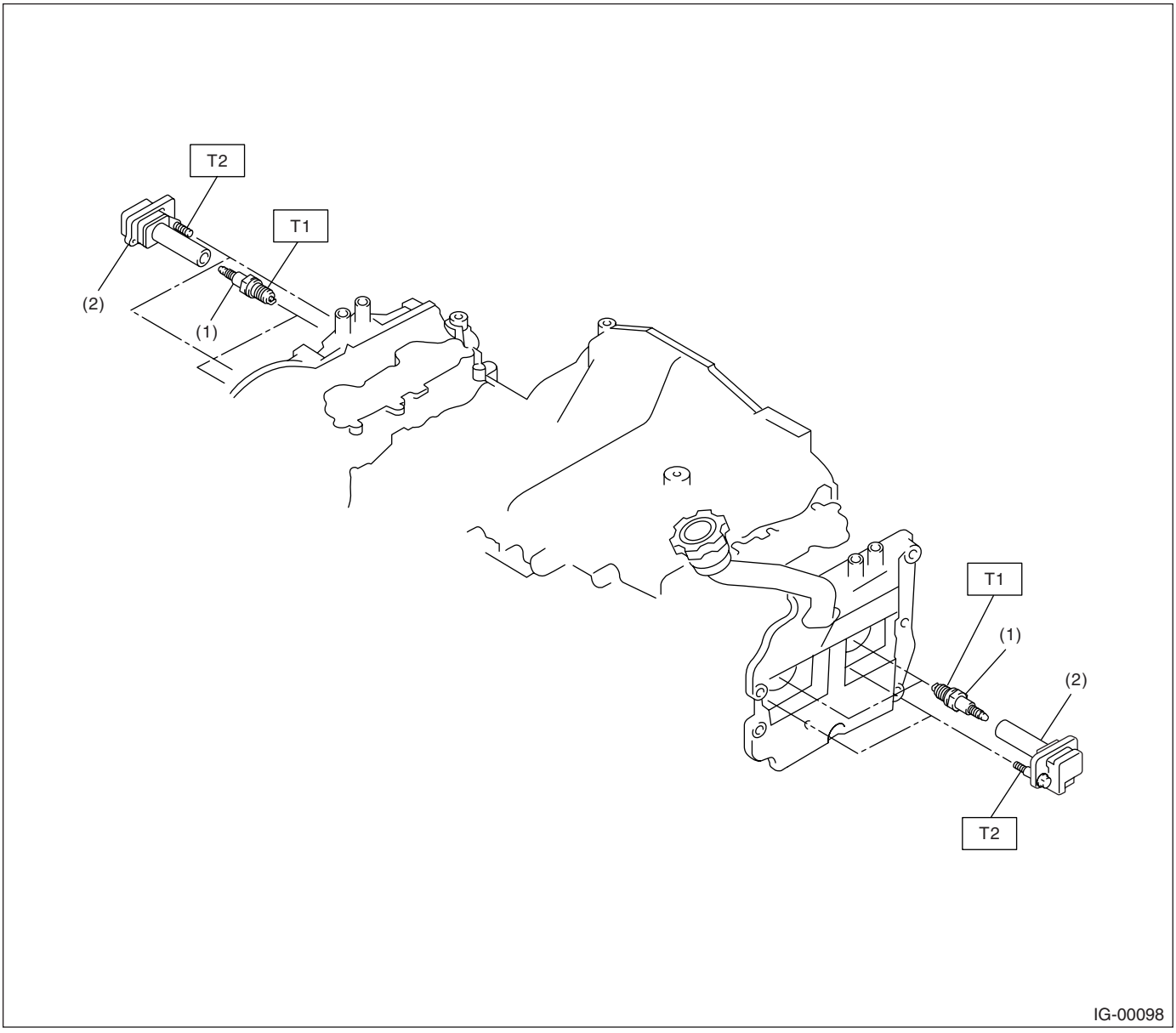
1. General Description 2
2. Spark Plug.....4
3. Ignition Coil & Ignitor ASSY 7

1. General Description

A: SPECIFICATION

Item		Specification
Ignition coil & ignitor ASSY	Model	FK0186
	Ignition system	Independent ignition coil
	Manufacturer	Diamond Electric
Spark plug	Manufacturer and type	NGK: ILFR6B
	Thread size (diameter, pitch, length) mm	14, 1.25, 19
	Spark plug gap mm (in)	0.7 — 0.8 (0.028 — 0.031)
	Electrode	Iridium

B: COMPONENT



(1) Spark plug
(2) Ignition coil & ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 21 (2.1, 15.2)
T2: 16 (1.6, 11.7)

C: CAUTION

• Wear work clothing, including a cap, protective goggle and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

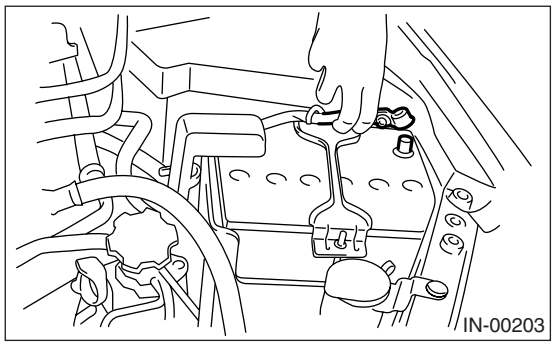
A: REMOVAL

CAUTION:
All spark plugs installed on an engine must be of the same heat range.

Spark plug:
<Ref. to IG(H4DOTC)-2, SPECIFICATION, General Description.>

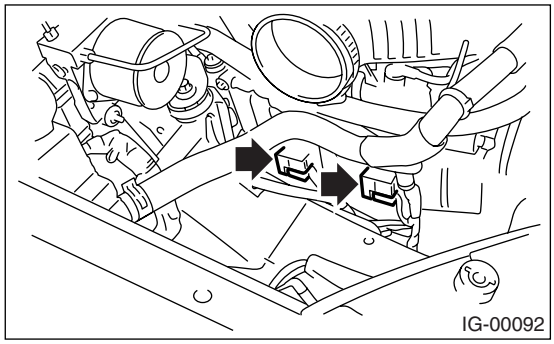
1. RH SIDE

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air cleaner case.
<Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
4) Disconnect the connector from ignition coil.
5) Remove the ignition coil.

NOTE:
Turn the #3 ignition coil by 180° to remove it.

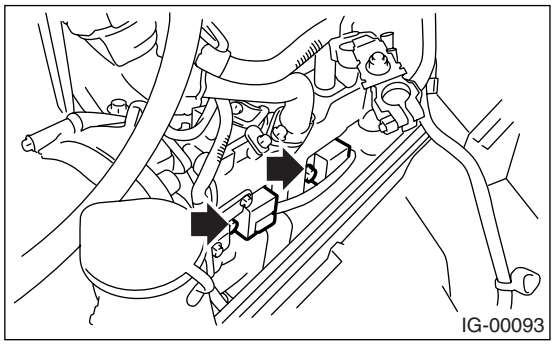


6) Remove the spark plug with a spark plug socket.

2. LH SIDE

1) Remove the collector cover.
2) Remove the battery and battery carrier.
3) Disconnect the connector from ignition coil.
4) Remove the ignition coil.

NOTE:
Turn the #4 ignition coil by 180° to remove it.



5) Remove the spark plug with a spark plug socket.

B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should only be applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approximately 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

Install in the reverse order of removal.

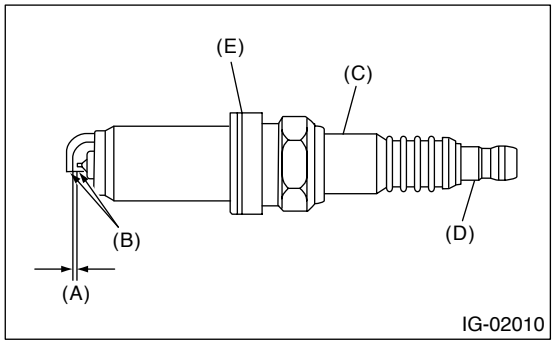
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should only be applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

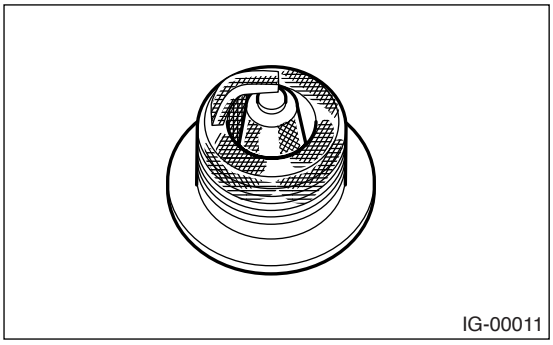
C: INSPECTION

Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.

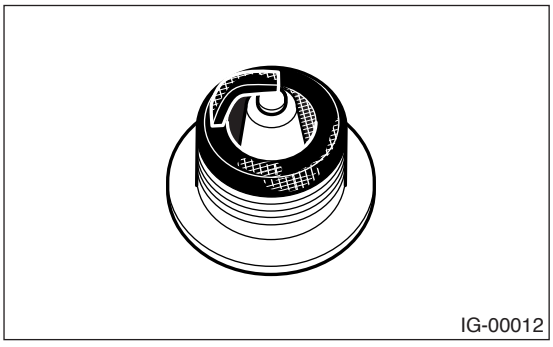


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Crack
(D) Damage
(E) Damaged gasket

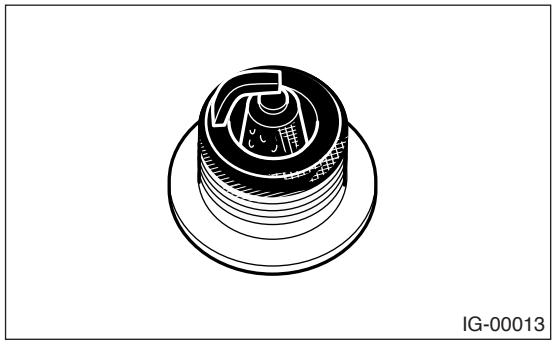
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



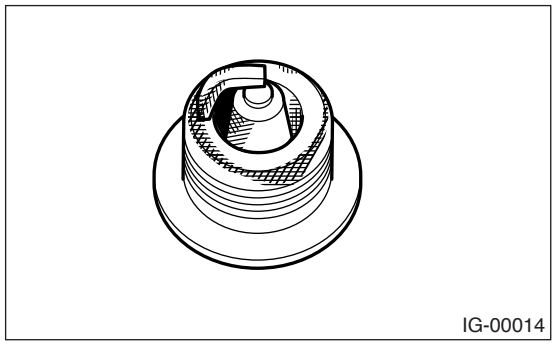
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in the city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.



3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.



4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating. Moreover, the appearance results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

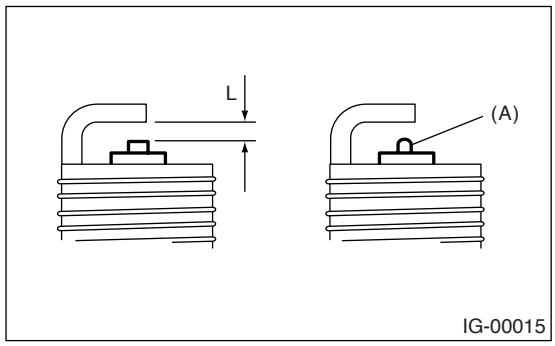


D: ADJUSTMENT

Clean the spark plugs using a wire brush.
Clean and remove the carbon or oxide deposits. But do not wear away ceramic insulator.
If deposits are too stubborn, replace the plugs.
After cleaning the spark plugs, correct the spark plug gap using a gap gauge.

NOTE:
Do not use a plug cleaner because the spark plugs are applied with iridium tip.

Spark plug gap: L
0.7 — 0.8 mm (0.028 — 0.031 in)



NOTE:
Replace with a new spark plug if this area (A) is worn to “ball” shape.

3. Ignition Coil & Ignitor ASSY

A: REMOVAL

Direct ignition type has been adopted. Refer to “Spark Plug” for removal procedure. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.>

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

C: INSPECTION

For inspection procedure, refer to “Diagnostics for Engine Starting Failure”. <Ref. to EN(H4DOTC)(diag)-48, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

Ignition Coil & Ignitor ASSY

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
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STARTING/CHARGING SYSTEMS	SC(H4DOTC)
ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

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STARTING/CHARGING SYSTEMS

SC(H4DOTC)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for Turbo model is included in SC(H4SO 2.0) section. <Ref. to SC(H4SO 2.0)-2, General Description.>

ENGINE SECTION 2

FUEL INJECTION (FUEL SYSTEMS)	FU(H4DOTC)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H4DOTC)
INTAKE (INDUCTION)	IN(H4DOTC)
MECHANICAL	ME(H4DOTC)
EXHAUST	EX(H4DOTC)
COOLING	CO(H4DOTC)
LUBRICATION	LU(H4DOTC)
SPEED CONTROL SYSTEMS	SP(H4DOTC)
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ENGINE (DIAGNOSTICS)	EN(H4DOTC)(diag)

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ENGINE (DIAGNOSTICS)

EN(H4DOTC)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H4DOTC)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Starting Failure". <Ref. to EN(H4DOTC)(diag)-42, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostic Table". <Ref. to EN(H4DOTC)(diag)-202, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON SCREEN.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read DTC on Subaru Select Monitor.	Is DTC displayed on the Subaru Select Monitor?	Record the DTC. Repair the trouble cause. <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnostics for malfunction indicator light circuit or combination meter. <Ref. to EN(H4DOTC)(diag)-33, Malfunction Indicator Light.>
4	**PERFORM THE DIAGNOSIS.** 1) Perform clear memory mode. <Ref. to EN(H4DOTC)(diag)-30, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H4DOTC)(diag)-28, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor?	Check on "Diagnostic Chart with Diagnostic Trouble Code (DTC)" <Ref. to EN(H4DOTC)(diag)-60, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Audio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure indicator light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of other parts except genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

CAUTION:
• All airbag system wiring harnesses and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

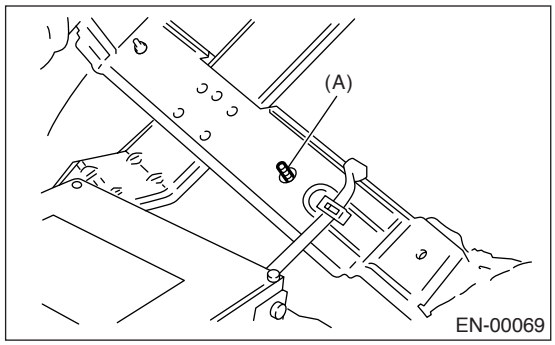
2) Never connect the battery in reverse polarity.
The ECM will be destroyed instantly.
The fuel injector and other part will be damaged.
3) Do not disconnect the battery terminals while the engine is running.
A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM, etc.
4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn the ignition switch to OFF.
5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

NOTE:
Immobilizer system must be registered when installing the ECM of the model with immobilizer. For doing so, all ignition keys and ID cards should be prepared. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

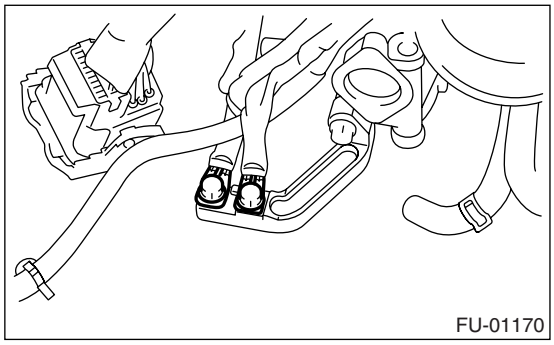
7) Connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts as the grounding point to the body when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

9) Use engine grounding terminal or engine proper as the grounding point to the body when measuring voltage and resistance in the engine compartment.



10) Every MFI-related part is a precision part. Do not drop them.
11) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control unit. (The ECM is located under the steering column, inside of the instrument panel lower trim panel.)
• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items above mentioned.
• Incorrect installation of the radio may affect the operation of the ECM.

12) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.

13) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes.
14) On the model with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis function.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

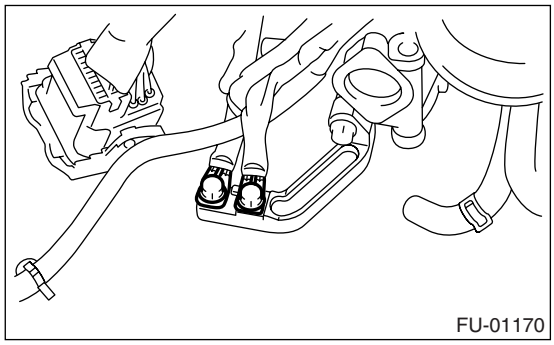
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

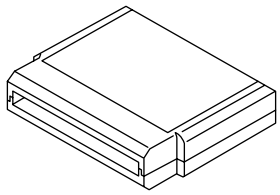
Make sure the engine grounding terminal is properly connected to the engine.



3. SELF-DIAGNOSIS FUNCTION

When detecting a malfunction by self-diagnosis function on ECM, malfunction indicator light illuminates and malfunction occurrence is displayed.
Calling the self-diagnosis result is performed by Subaru Select Monitor.

C: PREPARATION TOOL

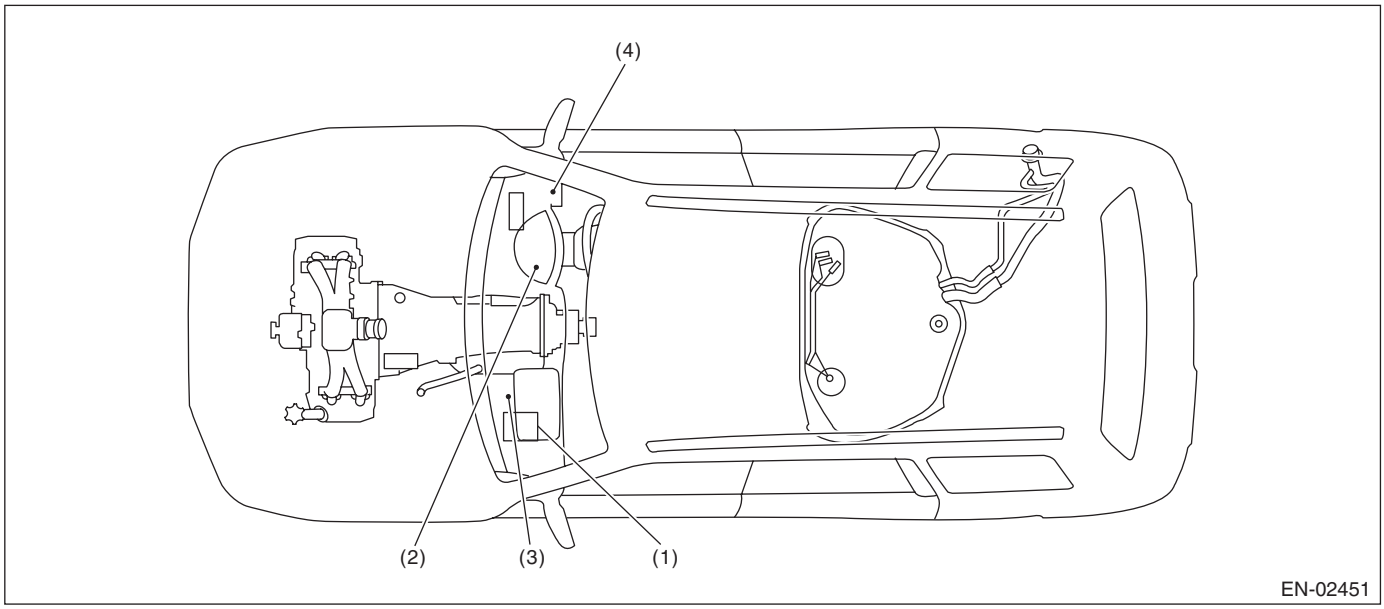
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

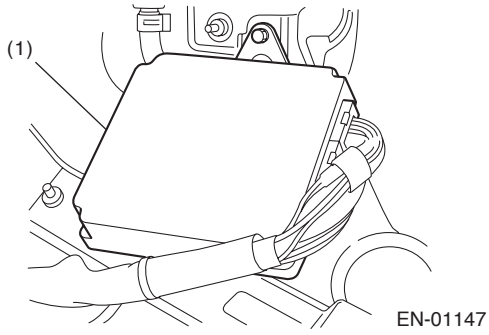
A: LOCATION

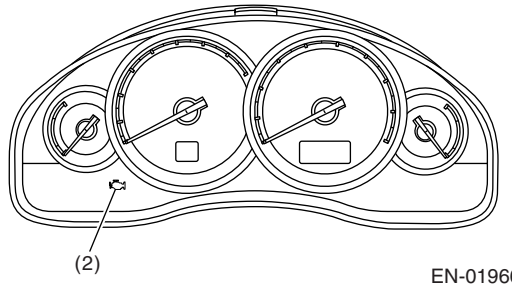
1. ENGINE

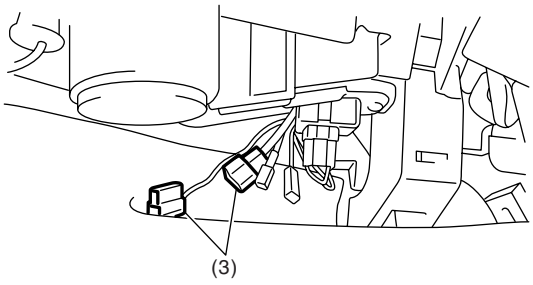
• Control module

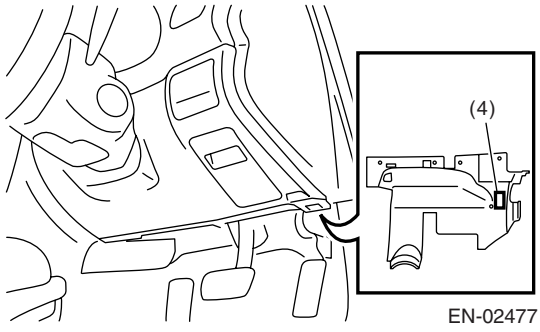


(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector

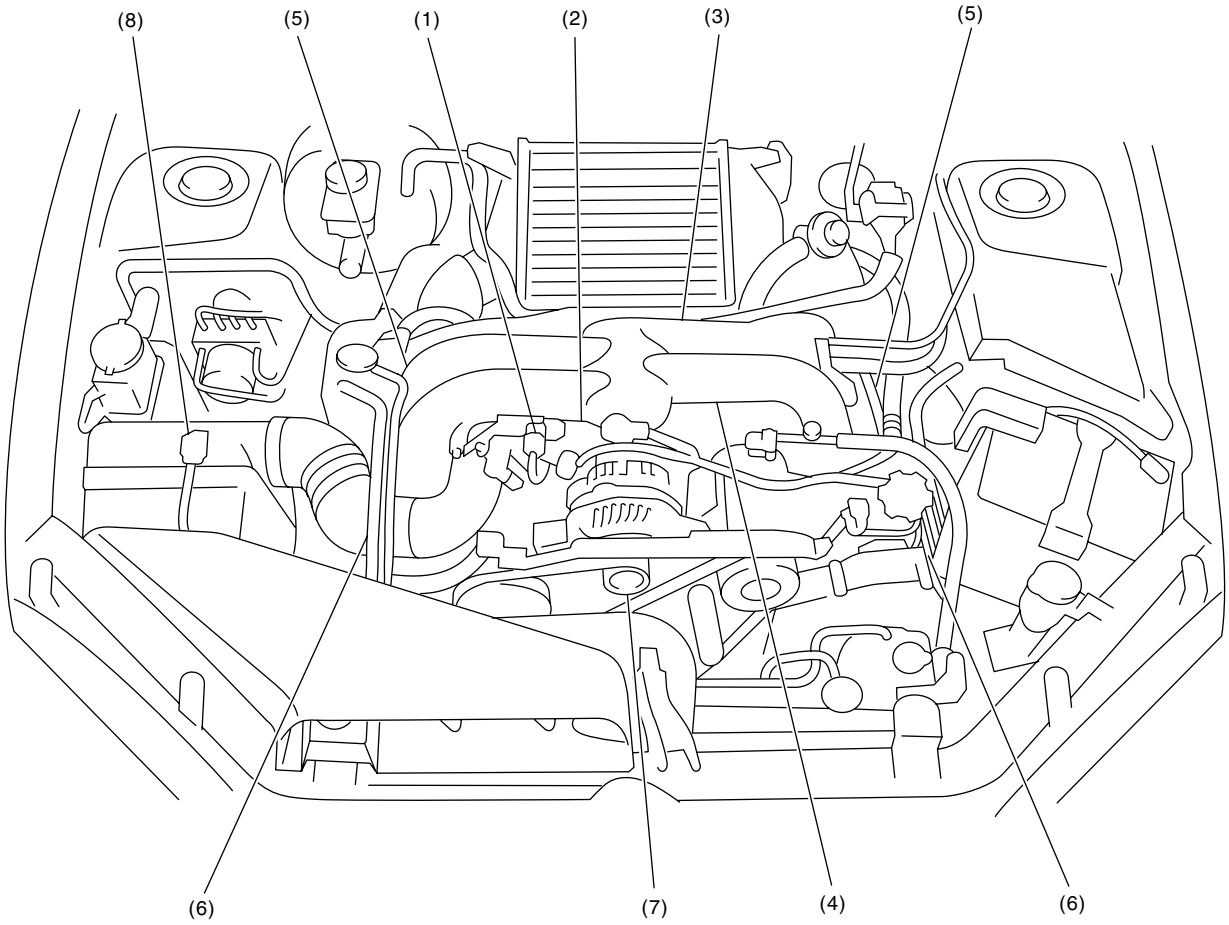






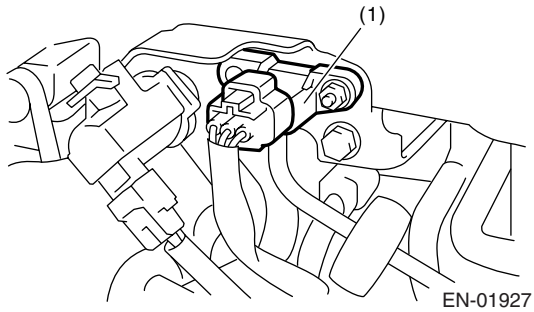


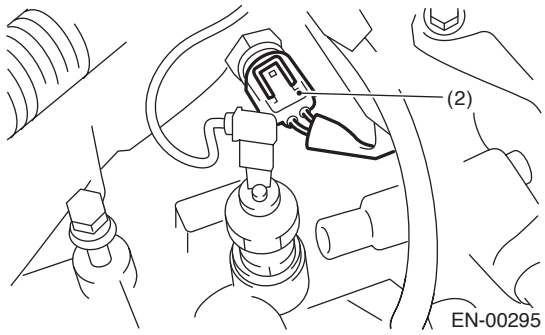
• Sensor

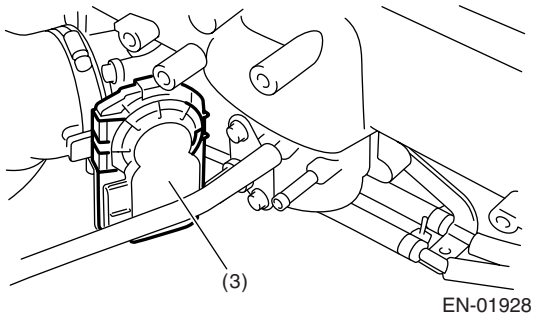


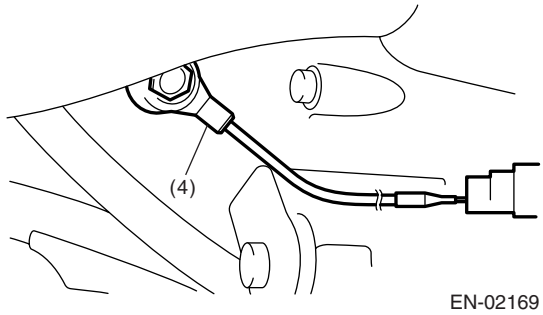
(1) Manifold absolute pressure sensor
(2) Engine coolant temperature sensor
(3) Electronic throttle control
(4) Knock sensor
(5) Intake camshaft position sensor
(6) Exhaust camshaft position sensor
(7) Crankshaft position sensor
(8) Mass air flow and intake air temperature sensor

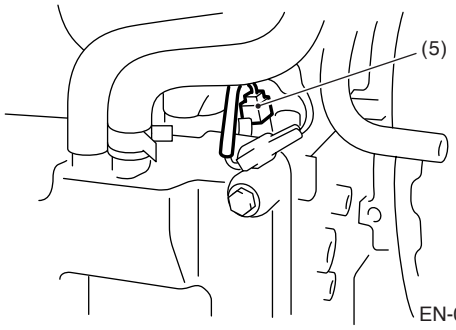
Electrical Component Location

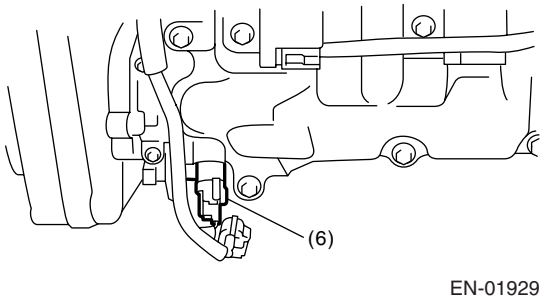


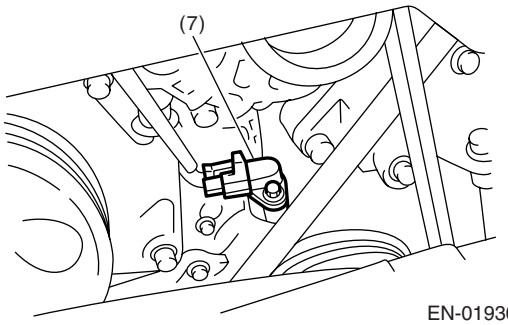


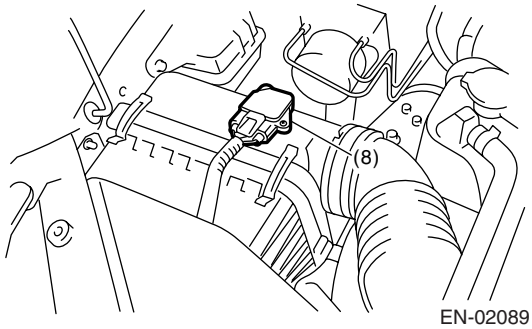


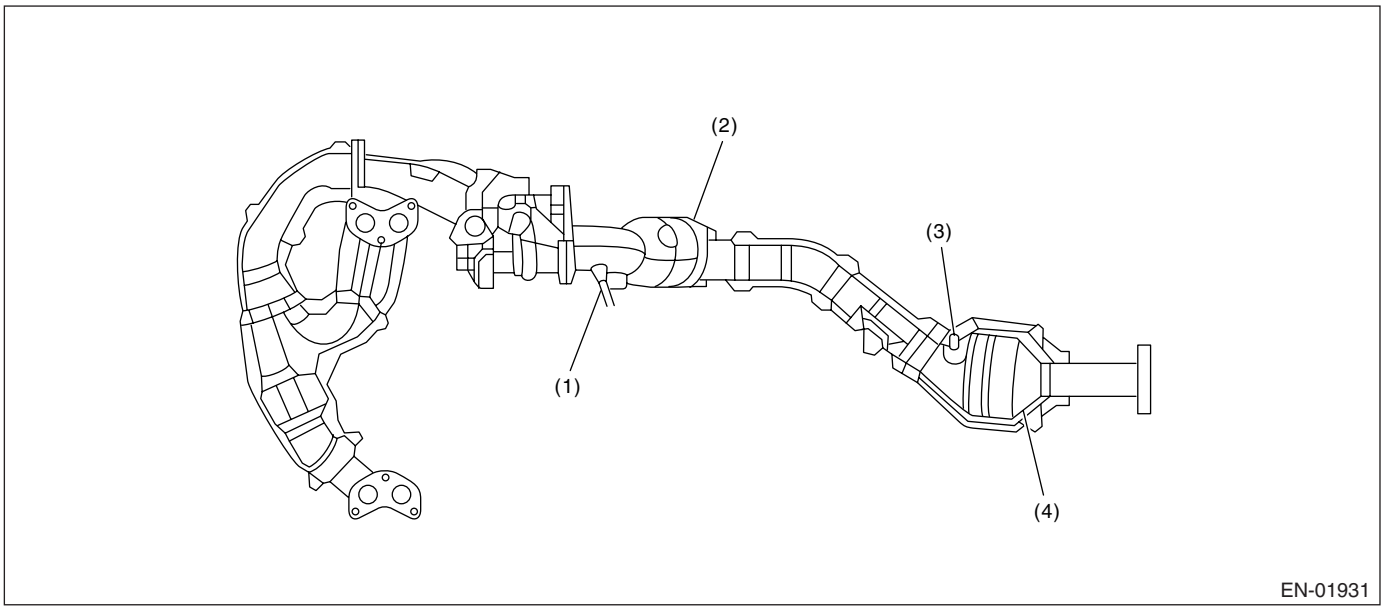




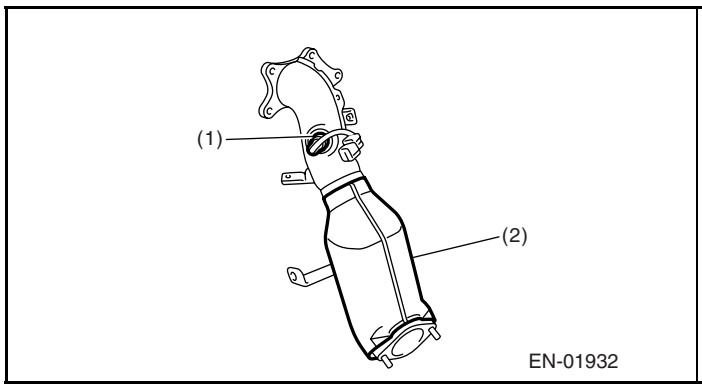


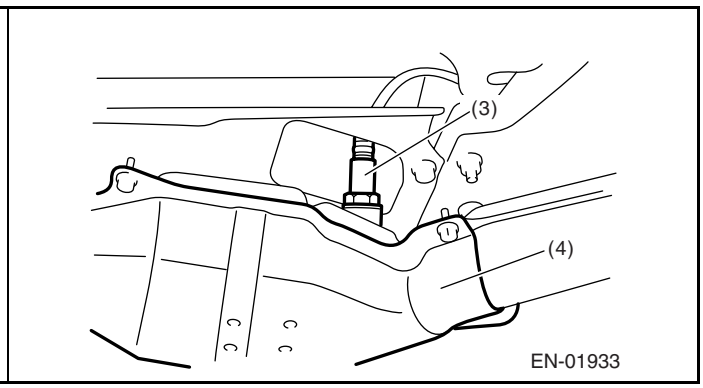




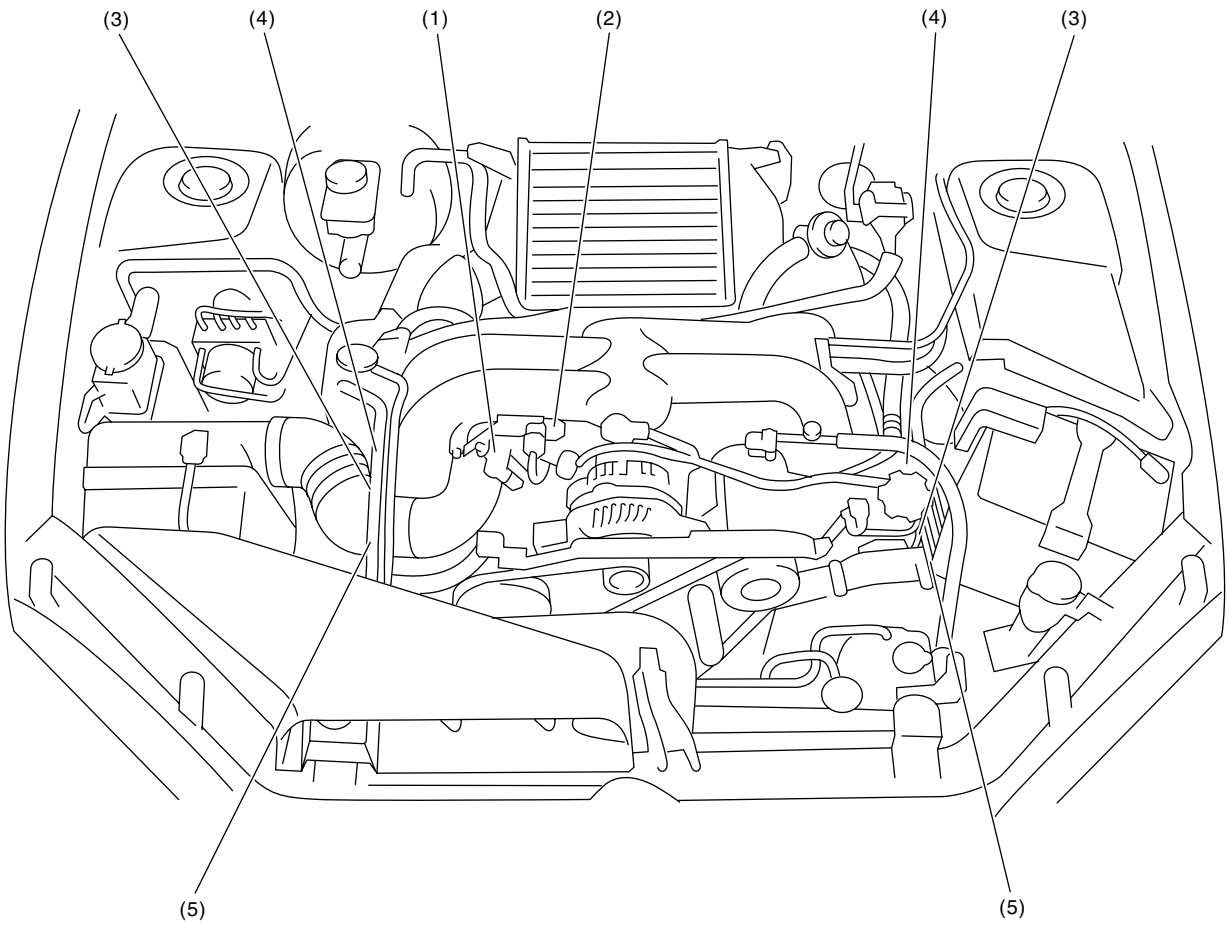


(1) Front oxygen (A/F) sensor
(2) Front catalytic converter
(3) Rear oxygen sensor
(4) Rear catalytic converter

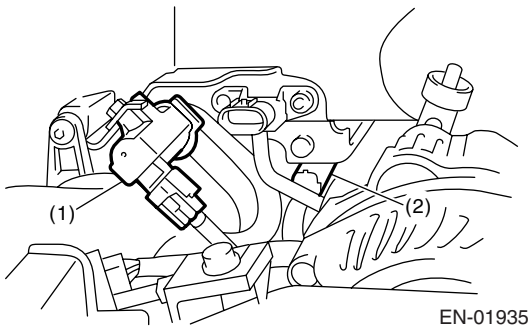




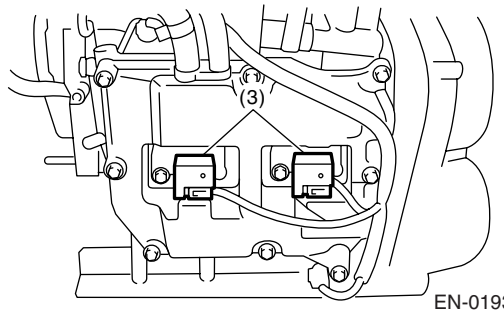
• Solenoid valve, actuator, emission control system parts and ignition system parts



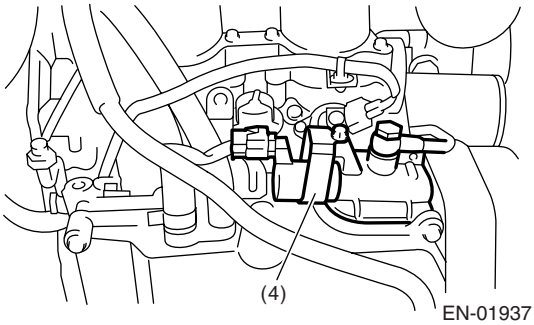
(1) Wastegate control solenoid valve
(2) Purge control solenoid valve
(3) Ignition coil
(4) Intake oil flow control solenoid valve
(5) Exhaust oil flow control solenoid valve



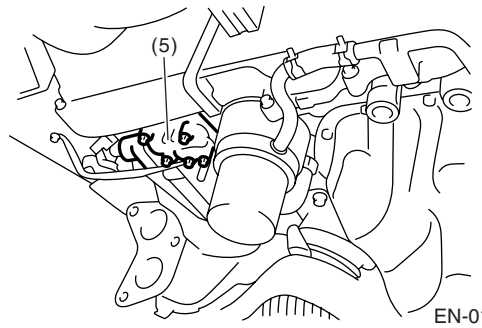
EN-01935



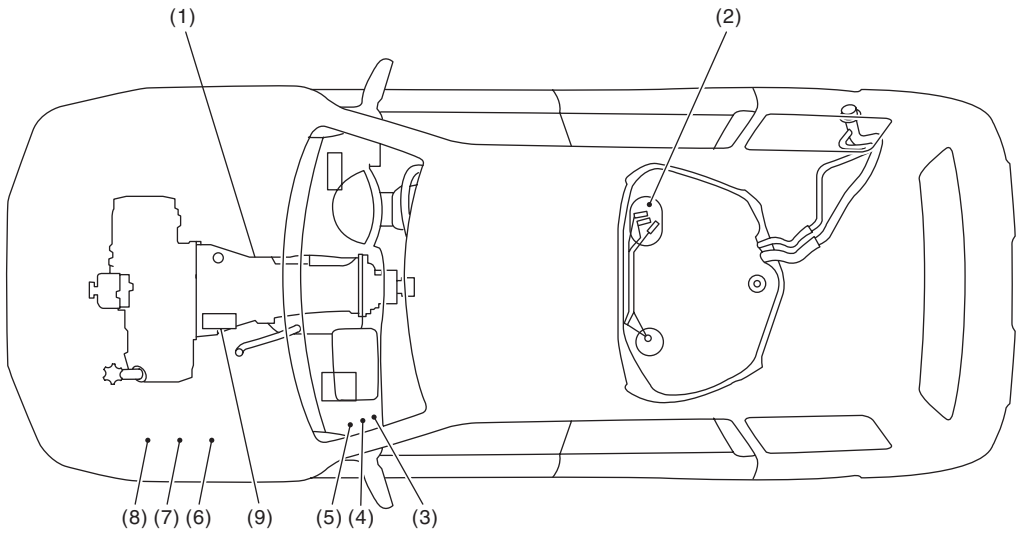
EN-01936



EN-01937

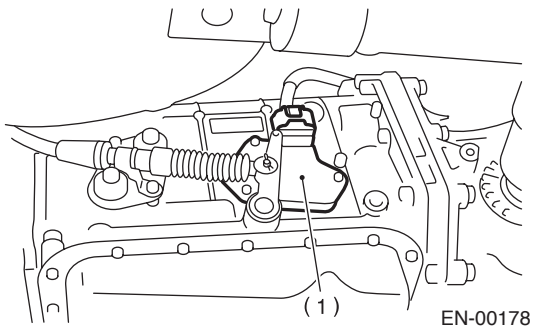


EN-01938

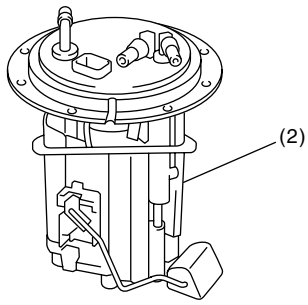


EN-01898

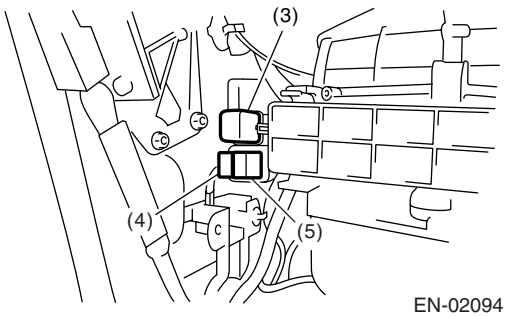
(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator main fan relay 1
(7) Radiator sub fan relay
(8) Radiator main fan relay 2
(9) Starter



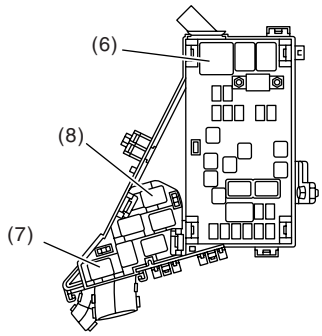
EN-00178



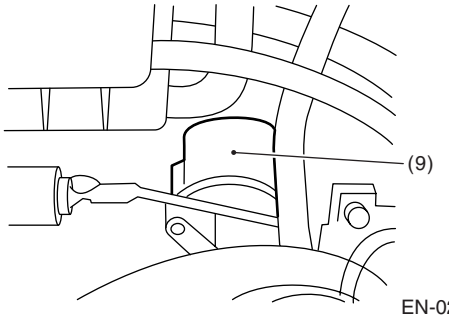
EN-02093



EN-02094



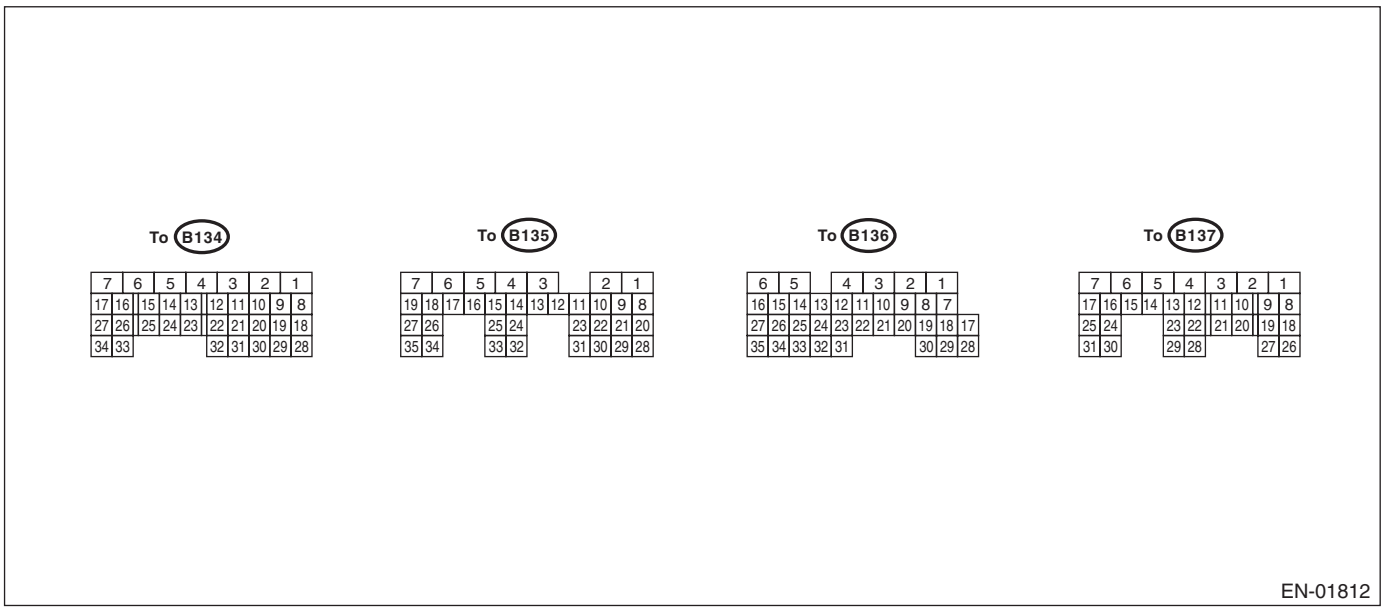
EN-02095



EN-02096

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B135	10	0	–7 — +7	Waveform
	Signal (–)	B135	22	0	0	—
	Shield	B135	31	0	0	—
Rear oxygen sensor	Signal	B137	25	0	0 — 0.9	—
	Shield	B137	31	0	0	—
	GND (sensor)	B136	35	0	0	—
Front oxygen (A/F) sensor heater	Signal 1	B134	3	—	—	Waveform
	Signal 2	B134	2	—	—	Waveform
Rear oxygen sensor heater signal		B135	2	0 — 13	—	Waveform
Engine coolant temperature sensor	Signal	B136	14	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
	GND (sensor)	B136	35	0	0	After engine is warmed-up.
Air flow sensor	Signal	B136	23	—	0.3 — 4.5	—
	Shield	B136	32	0	0	—
	GND	B136	31	0	0	—
Intake air temperature sensor signal		B136	13	0.3 — 4.6	0.3 — 4.6	—
Wastegate control solenoid valve		B134	32	0 or 10 — 13	0 or 13 — 14	Waveform
Starter switch		B137	8	0	0	Cranking: 8 — 14
A/C switch		B137	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B137	14	10 — 13	13 — 14	—
Neutral position switch		B137	9	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Test mode connector		B137	15	10 — 13	13 — 14	When connected: 0
Knock sensor	Signal	B136	25	2.8	2.8	—
	Shield	B136	33	0	0	—
Back-up power supply		B135	19	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B135	5	10 — 13	13 — 14	—
		B135	6	10 — 13	13 — 14	—
Sensor power supply		B136	16	5	5	—
Ignition control	#1	B135	18	0	13 — 14	Waveform
	#2	B135	17	0	13 — 14	Waveform
	#3	B135	16	0	13 — 14	Waveform
	#4	B135	16	0	13 — 14	Waveform
Fuel injector	#1	B136	6	10 — 13	1 — 14	Waveform
	#2	B136	5	10 — 13	1 — 14	Waveform
	#3	B136	4	10 — 13	1 — 14	Waveform
	#4	B136	3	10 — 13	1 — 14	Waveform
Fuel pump control unit	Signal 1	B137	28	10 — 13	13 — 14	—
	Signal 2	B135	27	0 or 5	0 or 5	Waveform
A/C relay control		B135	33	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 1 control		B135	25	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	—
Radiator fan relay 2 control		B135	24	ON: 0.5 or less OFF: 10 — 13	ON: 0.5 or less OFF: 13 — 14	Model with A/C
Malfunction indicator light		B134	17	—	—	Light “ON”: 1 or less Light “OFF”: 10 — 14
Engine speed output		B134	23	—	0 — 13 or more	Waveform
Purge control solenoid valve		B134	14	ON: 1 or less OFF: 10 — 13	ON: 1 or less OFF: 13 — 14	Waveform
Manifold absolute pressure sensor	Signal	B136	22	1.7 — 2.4	1.1 — 1.6	—
	Power supply	B136	16	5	5	
	GND (sensor)	B136	35	0	0	
Blower fan switch		B137	13	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	With manual A/C model only
Power steering oil pressure switch		B137	10	10 — 13	ON: 0 OFF: 13 — 14	—
Front oxygen (A/F) sensor signal (+)		B134	33	2.8 — 3.2	2.8 — 3.2	—
Front oxygen (A/F) sensor signal (–)		B134	26	2.4 — 2.7	2.4 — 2.7	—
Front oxygen (A/F) sensor shield		B134	25	0	0	—
SSM communication line		B137	20	Less than 1←→ More than 4	Less than 1←→ More than 4	—
GND (injector)		B137	7	0	0	—
GND (sensor)		B136	35	0	0	—
GND (ignition system)		B135	12	0	0	—
GND (power supply)		B135	4	0	0	—
		B135	1	0	0	—
GND (control system)		B137	1	0	0	—
		B137	2	0	0	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
GND (Front oxygen (A/F) sensor heater 1)		B134	7	0	0	—
GND (Front oxygen (A/F) sensor heater 2)		B134	6	0	0	—
Intake camshaft position sensor (LH)		B135	8	0 or 5	0 or 5	Waveform
Intake camshaft position sensor (RH)		B135	9	0 or 5	0 or 5	Waveform
Electronic throttle control	Main	B136	18	0.64 — 0.72 Fully open: 3.96	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully open: 3.96
	Sub	B136	29	1.51 — 1.58 Fully open: 4.17	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully open: 4.17
	Power supply	B136	16	5	5	—
	GND (sensor)	B136	35	0	0	—
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B137	6	10 — 13	13 — 14	—
Electronic throttle control motor relay		B135	35	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Intake AVCS solenoid (LH)	Signal (+)	B134	19	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	29	0	0	—
Intake AVCS solenoid (RH)	Signal (+)	B134	18	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	28	0	0	—
Exhaust AVCS solenoid (LH)	Signal (+)	B134	21	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	31	0	0	—
Exhaust AVCS solenoid (RH)	Signal (+)	B134	20	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
	Signal (–)	B134	30	0	0	—
Exhaust camshaft position sensor (LH)	Signal (+)	B135	20	0	–7 — +7	Waveform
	Signal (–)	B135	28	0	0	—
	Shield	B135	30	0	0	—
Exhaust camshaft position sensor (RH)	Signal (+)	B135	21	0	–7 — +7	Waveform
	Signal (–)	B135	29	0	0	—
	Shield	B135	30	0	0	—

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Accelerator position sensor	Main	B136	17	Fully closed: 1 Fully open: 3.3	Fully closed: 1 Fully open: 3.3	—
	Power supply	B136	15	5	5	—
	GND (sensor)	B136	34	0	0	—
	Sub	B136	28	Fully closed: 1 Fully open: 3.3	Fully closed: 1 Fully open: 3.3	—
	Shield	B137	2	0	0	—
	Power supply	B136	16	5	5	—
	GND (sensor)	B136	35	0	0	—
Starter relay		B135	32	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	ON: Cranking
A/C middle pressure switch		B136	30	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
Clear memory switch		B137	24	5	5	When connected: 0
Clutch switch		B134	1	When clutch pedal is depressed: 0 When clutch pedal is released: 10 — 13	When clutch pedal is depressed: 0 When clutch pedal is released: 13 — 14	—
Brake switch 1		B136	9	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B136	8	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch		B136	11	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Cruise control main switch		B136	7	ON: 0 OFF: 5	ON: 0 OFF: 5	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	Specification
Engine load	1.2 — 2.9 (%): Idling
	4.7 — 12.8 (%): 2,500 rpm racing

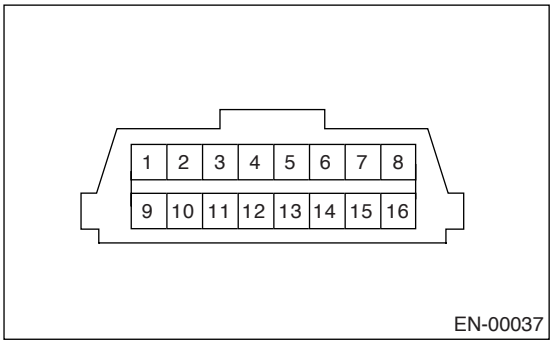
Measuring condition:
- After engine is warmed-up.
- Gear position is in neutral.
- A/C is turned off.
- Turn all accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than Subaru Select Monitor, because the circuit for the Subaru Select Monitor may be damaged.



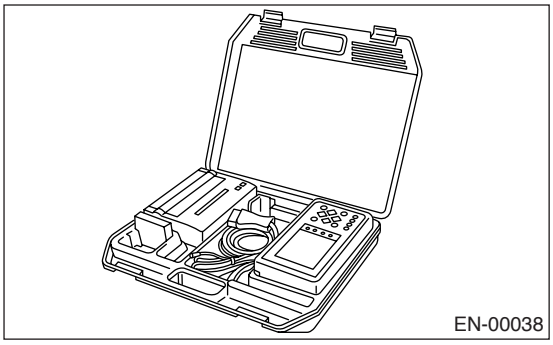
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Line end check signal 1	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. Subaru Select Monitor

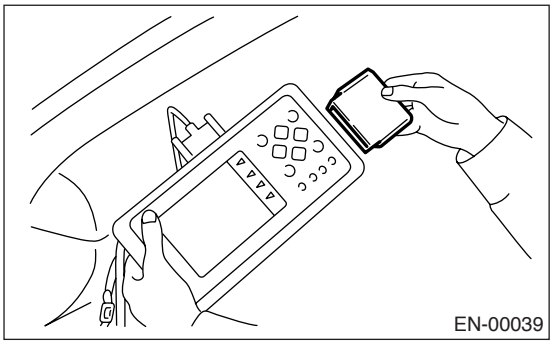
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>

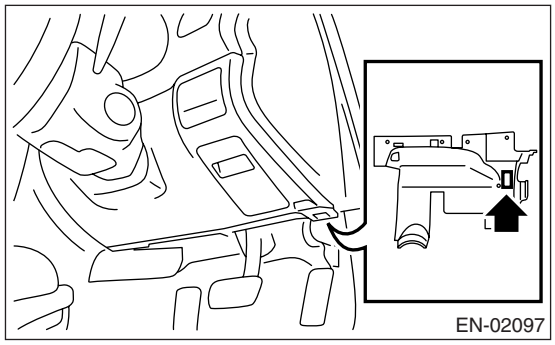


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

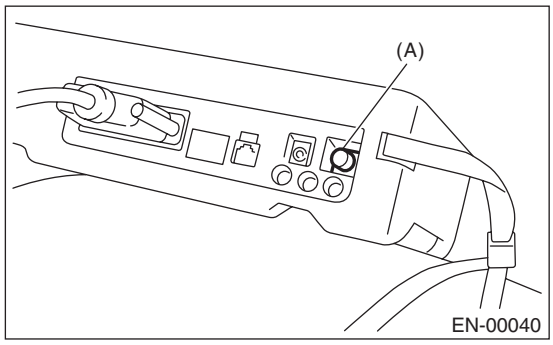
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTC. <Ref. to EN(H4DOTC)(diag)-27, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTC. <Ref. to EN(H4DOTC)(diag)-27, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine coolant temperature signal	Coolant Temp.	°C	80 — 100°C
A/F correction 1	A/F Correction #1	%	–10 — +10%
A/F learning 1	A/F Learning #1	%	–15 — +15%
Intake manifold absolute pressure	Mani. Absolute Pressure	mmHg	220 — 275 mmHg
Engine speed signal	Engine Speed	rpm	630 — 770 rpm (Agree with the tachometer indication)
Vehicle speed signal	Vehicle Speed	km/h	0 km/h (at parking)
Ignition timing signal	Ignition Timing	deg	10 — 15 deg
Intake air temperature signal	Intake Air Temp.	°C	20 — 50°C
Amount of intake air	Mass Air Flow	g/s	2.1 — 3.1 g/s
Throttle opening angle signal	Throttle Opening Angle	%	2.0 — 2.4%
Rear oxygen sensor voltage	Rear O2 Sensor	V	0 — 1.0 V
Battery voltage	Battery Voltage	V	12 — 15 V
Mass air flow voltage	Air Flow Sensor Voltage	V	1.0 — 1.7 V
Injection 1 pulse width	Fuel Injection #1 Pulse	ms	1.2 — 2.2 ms
Knock sensor correction	Knock Correction	deg	0.0 deg
Acceleration opening angle signal	Accel. Opening Angle	%	0.0%
Primary supercharged pressure control signal	Primary Control	%	0.0%
Purge control solenoid duty ratio	CPC Valve Duty Ratio	%	0 — 25%
Generator duty ratio	ALT Duty	%	0 — 100%
Fuel pump duty ratio	Fuel Pump Duty	%	30 — 40%
AVCS advance angle amount RH	VVT Adv. Ang. Amount R	deg	±5 deg
AVCS advance angle amount LH	VVT Adv. Ang. Amount L	deg	±5 deg
Oil flow control solenoid valve duty RH (AVCS)	OCV Duty R	%	0 — 20%
Oil flow control solenoid valve duty LH (AVCS)	OCV Duty L	%	0 — 20%
Oil flow control solenoid valve current RH	OCV Current R	mA	40 — 100 mA
Oil flow control solenoid valve current LH	OCV Current L	mA	40 — 100 mA
A/F sensor current value 1	A/F Sensor #1 Current	mA	–20 — 20 mA
A/F sensor resistance value 1	A/F Sensor #1 Resistance	ohm	27 — 35 mA
A/F sensor output lambda 1	A/F Sensor #1	—	1.0
A/F correction 3	A/F Correction #3	%	0.00%
Throttle motor duty	Throttle Motor Duty	%	–5%
Throttle power supply voltage	Throttle Motor Voltage	V	12 — 15 V
Sub throttle sensor voltage	Sub-throttle Sensor	V	1.5 V
Main throttle sensor voltage	Main-throttle Sensor	V	0.6 V
Sub accelerator sensor voltage	Sub-accelerator Sensor	V	1.1 V
Main accelerator sensor voltage	Main-accelerator Sensor	V	1.0 V
Atmospheric pressure signal	Atmospheric Pressure	mmHg	—
Intake manifold relative pressure	Mani. Relative Pressure	mmHg	Intake manifold absolute pressure – Atmospheric pressure

Remarks	Display	Unit of measure	Note (at idling)
Memory vehicle speed	Memorized Cruise Speed	km/h	—
Estimated cumulative driving distance	Estimated Cumulative Driving Distance	km	—
Exhaust AVCS retard angle amount RH	Exh. VVT Retard Ang. R	deg	±5 deg
Exhaust AVCS retard angle amount LH	Exh. VVT Retard Ang. L	deg	±5 deg
Exhaust oil flow control solenoid valve duty ratio RH	Exh. OCV Duty R	%	0 — 20%
Exhaust oil flow control solenoid valve duty ratio LH	Exh. OCV Duty L	%	0 — 20%
Exhaust oil flow control solenoid valve current value RH	Exh. OCV Current R	mA	40 — 100 mA
Exhaust oil flow control solenoid valve current value LH	Exh. OCV Current L	mA	40 — 100 mA

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» screen, select the {Current Data Display/Save}, and then press the [YES] key.
6) On the «Data Display Menu» screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, move the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Description	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	—
Condition of malfunction indicator light	MI (MIL)	ON or OFF
Monitoring test of misfire	Misfire monitoring	no support
Monitoring test of fuel system	Fuel system monitoring	complete or incomplete
Monitoring test of comprehensive component	Component monitoring	complete or incomplete
Test of catalyst	Catalyst Diagnosis	no support
Test of heating-type catalyst	Heated catalyst	no support
Test of evaporative emission purge control system	Evaporative purge system	no support
Test of secondary air system	Secondary air system	no support
Test of air conditioning system refrigerant	A/C system refrigerant	no support
Test of oxygen sensor	Oxygen sensor	complete or incomplete
Test of oxygen sensor heater	O2 Heater Diagnosis	complete or incomplete
Test of EGR system	EGR system	no support

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

6. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display» screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, move the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Remarks	Display	Message	LED "ON" requirements
AT/MT identification signal	AT Vehicle ID Signal	ON or OFF	Illuminate (AT model)
Test mode signal	Test Mode Signal	ON or OFF	When test mode connector is connected.
Clear memory signal	Clear Memory Terminal	ON or OFF	When clear memory connector is connected.
Neutral position switch signal	Neutral Position Switch	ON or OFF	When neutral position signal is entered.
Idle switch signal	Idle Switch Signal	ON or OFF	When idle switch signal is entered.
Ignition switch signal	Ignition Switch	ON or OFF	When ignition switch is turned to ON.
Power steering switch signal	P/S Switch	ON or OFF	When power steering switch is entered.
Handle switch signal	Handle SW	LHD or RHD	When handle switch signal is input.
Starter switch signal	Starter Switch	ON or OFF	When starter switch is input.
Air conditioning switch signal	A/C Switch	ON or OFF	When air conditioning switch is input.
Rear oxygen sensor rich signal	Rear O2 Rich Signal	ON or OFF	When rear oxygen sensor mixture ratio is rich.
Knocking signal	Knocking Signal	ON or OFF	When knocking signal is input.
Crankshaft position sensor signal	Crankshaft Position Signal	ON or OFF	When crankshaft position sensor signal is input.
Camshaft position sensor signal	Camshaft Position Signal	ON or OFF	When camshaft position sensor signal is input.
Rear defogger switch signal	Rear Defogger Switch	ON or OFF	When rear defogger switch is turned to ON.
Blower fan switch signal	Blower Fan Switch	ON or OFF	When blower fan switch is turned to ON.
Small light switch signal	Light Switch	ON or OFF	When small light switch is turned to ON.
Windshield wiper switch signal	Wiper SW	ON or OFF	When windshield wiper switch is turned to ON.
A/C middle pressure switch signal	A/C Mid Pressure Switch	ON or OFF	When A/C middle pressure switch is turned to ON.
Air conditioning relay signal	A/C Compressor Signal	ON or OFF	When air conditioning relay is in function.
Radiator fan relay 1 signal	Radiator Fan Relay #1	ON or OFF	When radiator fan relay 1 is in function.
Radiator fan relay 2 signal	Radiator Fan Relay #2	ON or OFF	When radiator fan relay 2 is in function.
AT retard angle demand signal	Retard Signal	ON or OFF	When AT retard angle demand signal is input.
AT fuel cut signal	Fuel Cut	ON or OFF	When AT fuel cut signal is input.

Remarks	Display	Message	LED “ON” requirements
Torque down output signal	Torque Down Output	ON or OFF	When torque down output signal is input.
Torque down demand signal	Request Torque Down	ON or OFF	When torque down demand signal is input.
AT coordinate permission signal	Torque Control Permission	ON or OFF	When AT coordinate permission signal is input.
Electronic throttle control motor relay signal	ETC Motor Relay	ON or OFF	When electronic throttle control motor relay is in function.
Clutch switch signal	Clutch Switch	ON or OFF	When clutch switch is turned to ON.
Stop light switch signal	Stop Light Switch	ON or OFF	When stop switch is turned to ON.
SET/COAST switch signal	SET/COAST Switch	ON or OFF	When SET/COAST switch is turned to ON.
RES/ACC switch signal	RESUME/ACCEL Switch	ON or OFF	When RES/ACC switch is turned to ON.
Brake switch signal	Brake Switch	ON or OFF	When brake switch is turned to ON.
Main switch signal	Main Switch	ON or OFF	When main switch is turned to ON.
Cancel switch signal	Cancel Switch	ON or OFF	When cancel switch is turned to ON.
Data reception signal	Body Int. Unit Data	ON or OFF	When data reception signal is entered.
Counter update signal	Body Int. Unit Count	ON or OFF	When counter update signal is entered.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

9. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>

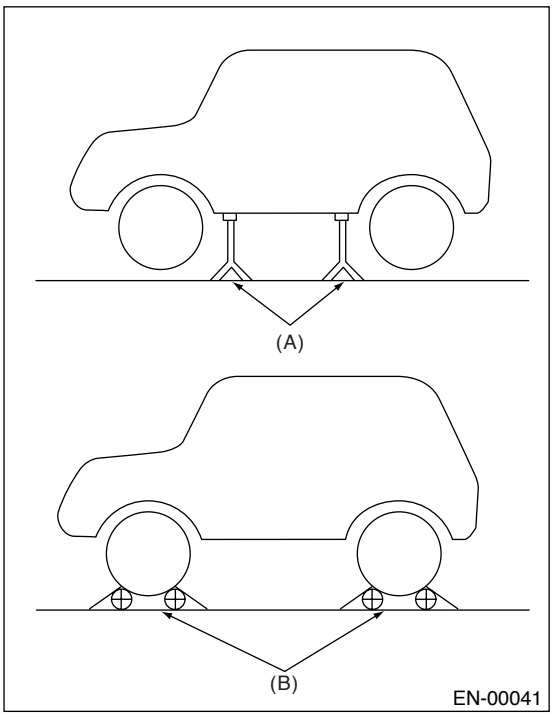
10.Inspection Mode

A: PROCEDURE

1. PREPARATION FOR THE INSPECTION MODE

1) Check battery voltage is more than 12 V and fuel remains half [20 to 40 ℓ (5.3 to 10.6 US gal, 4.4 to 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

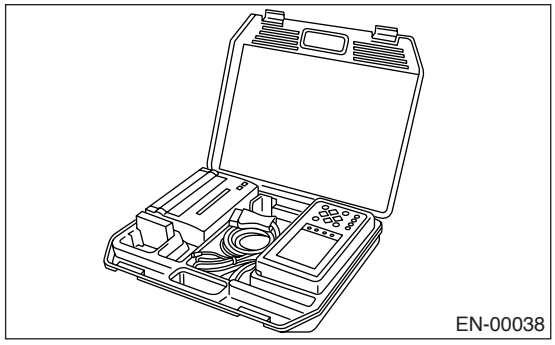
WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and the vehicle.
• Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.



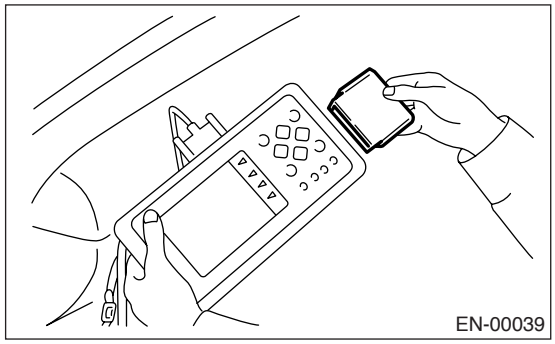
(A) Rigid rack
(B) Free rollers

2. SUBARU SELECT MONITOR

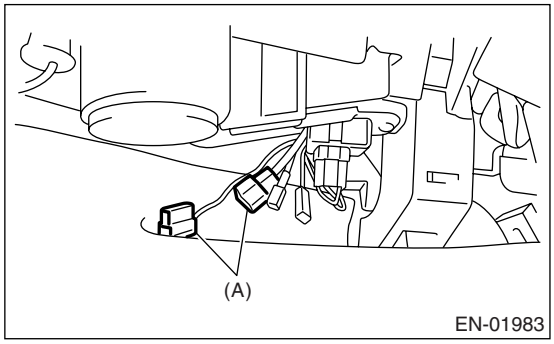
1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H4DOTC)(diag)-30, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>



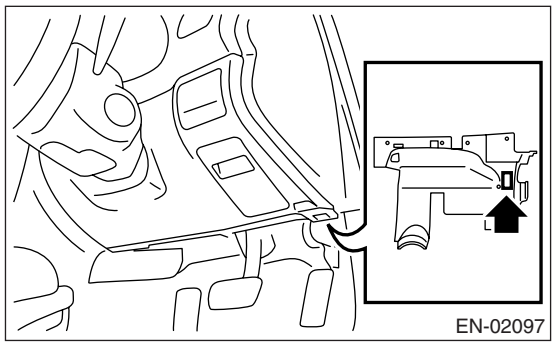
4) Connect the diagnosis cable to Subaru Select Monitor.
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located at the lower portion of glove box.

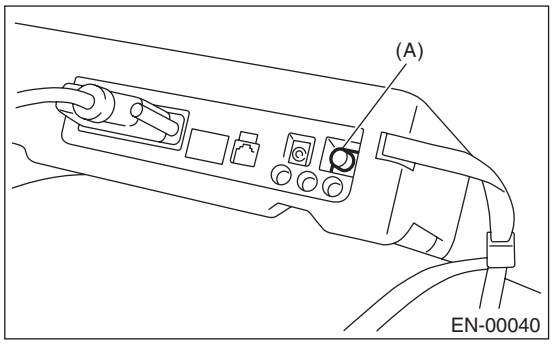


7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

8) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type was displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the "Perform D Check?" is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.
• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>

• Release the parking brake.
• The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis function.

11.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor to OFF.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

2. SUBARU SELECT MONITOR (OBD MODE)

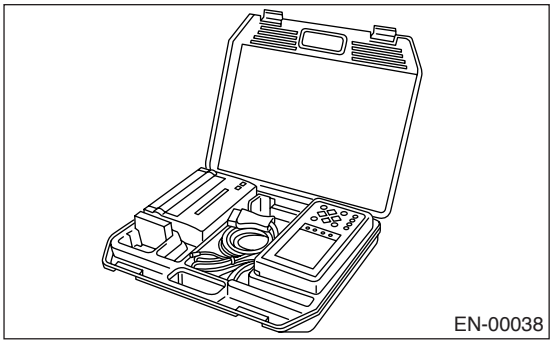
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF and then turn the Subaru Select Monitor switch to OFF.

NOTE:
For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

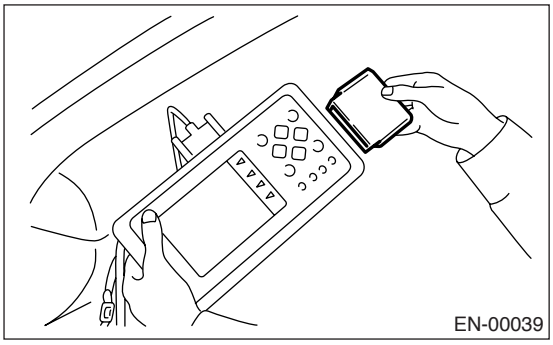
12. Compulsory Valve Operation Check Mode

A: OPERATION

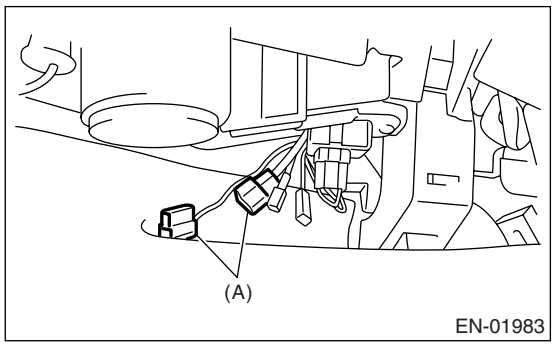
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>



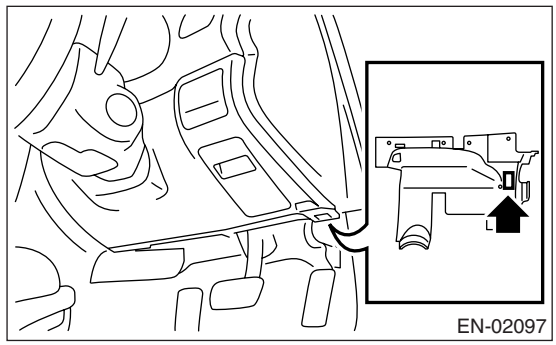
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H4DOTC)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) located at the lower portion of glove box.

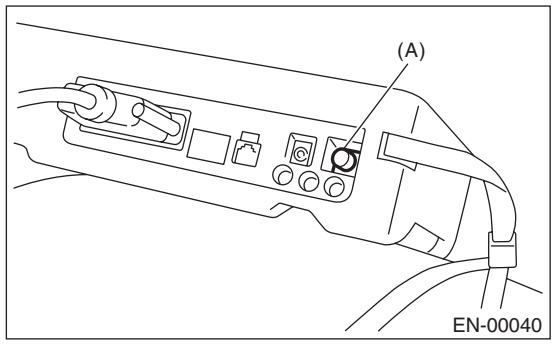


5) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

6) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type was displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) On the «Actuator ON/OFF Operation» screen, select the desired compulsory actuator and press the [YES] key.
13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

Description	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid
Compulsory wastegate control solenoid valve operation check	Wastegate control solenoid

NOTE:
• The following parts will be displayed but not functional.

Display
EGR Solenoid
ASV Solenoid
FICD Solenoid
Pressure Switching Solenoid
PCV Solenoid
AAI Solenoid
Vcut Solenoid
Fuel Tank Sensor Control Valve

• For detailed operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

13.Malfunction Indicator Light

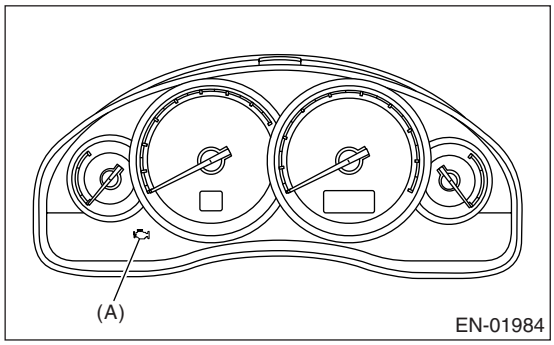
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H4DOTC)(diag)-34, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Check that the malfunction indicator light does not come on. <Ref. to EN(H4DOTC)(diag)-35, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Check that the malfunction indicator light does not go off. <Ref. to EN(H4DOTC)(diag)-37, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Check that the malfunction indicator light does not blink. <Ref. to EN(H4DOTC)(diag)-38, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Check that the malfunction indicator light remains blinking. <Ref. to EN(H4DOTC)(diag)-40, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

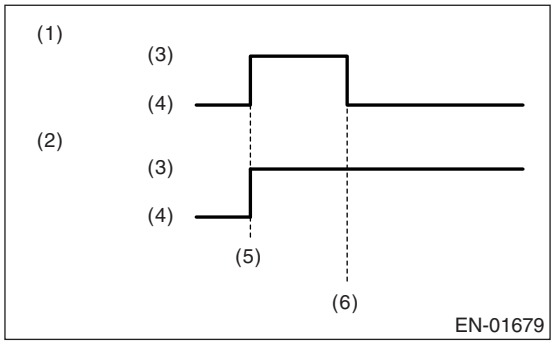
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H4DOTC)(diag)-35, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or the emission control system is malfunctioning.



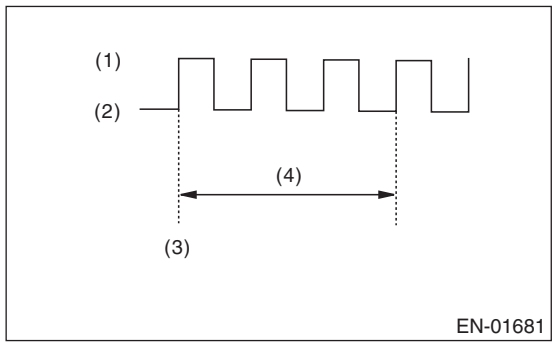
(1) No trouble
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) Turn the ignition switch to OFF and connect the test mode connector.

(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.

(2) Malfunction indicator light blinks at a cycle of 0.5 Hz after starting the engine. (During diagnosis)

(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble. Malfunction indicator light illuminates if faulty.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

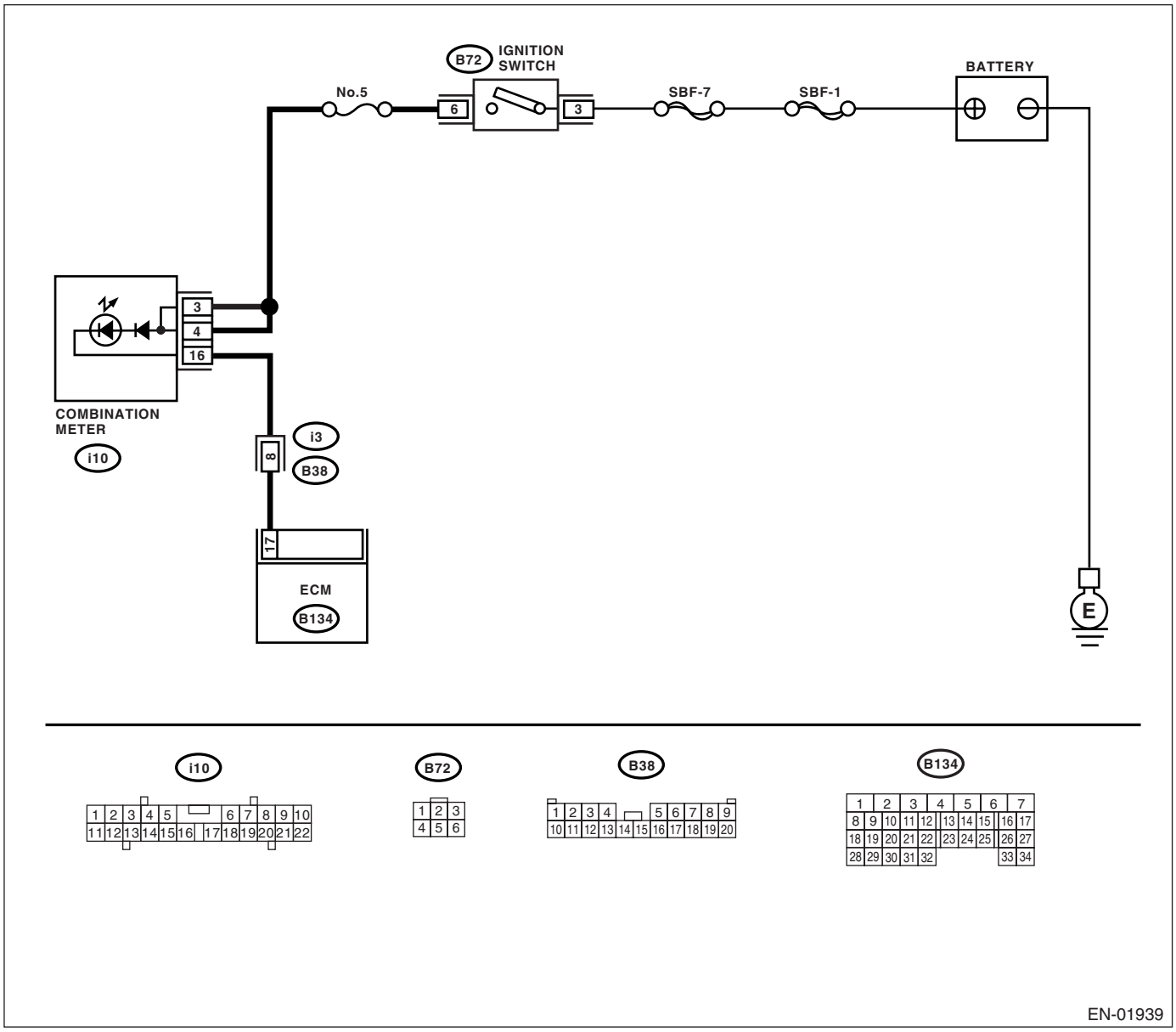
DIAGNOSIS:

The malfunction indicator light circuit is open or shorted.

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 17 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check for poor connection when shaking or pulling ECM connector and harness.	Does malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **3.**
3	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-16, Combination Meter Assembly.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 17 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the board of combination meter. <Ref. to IDI-16, Combination Meter Assembly.>	Check the following and repair if necessary. NOTE: • Blown out fuse • Open or short circuit in harness between fuse and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

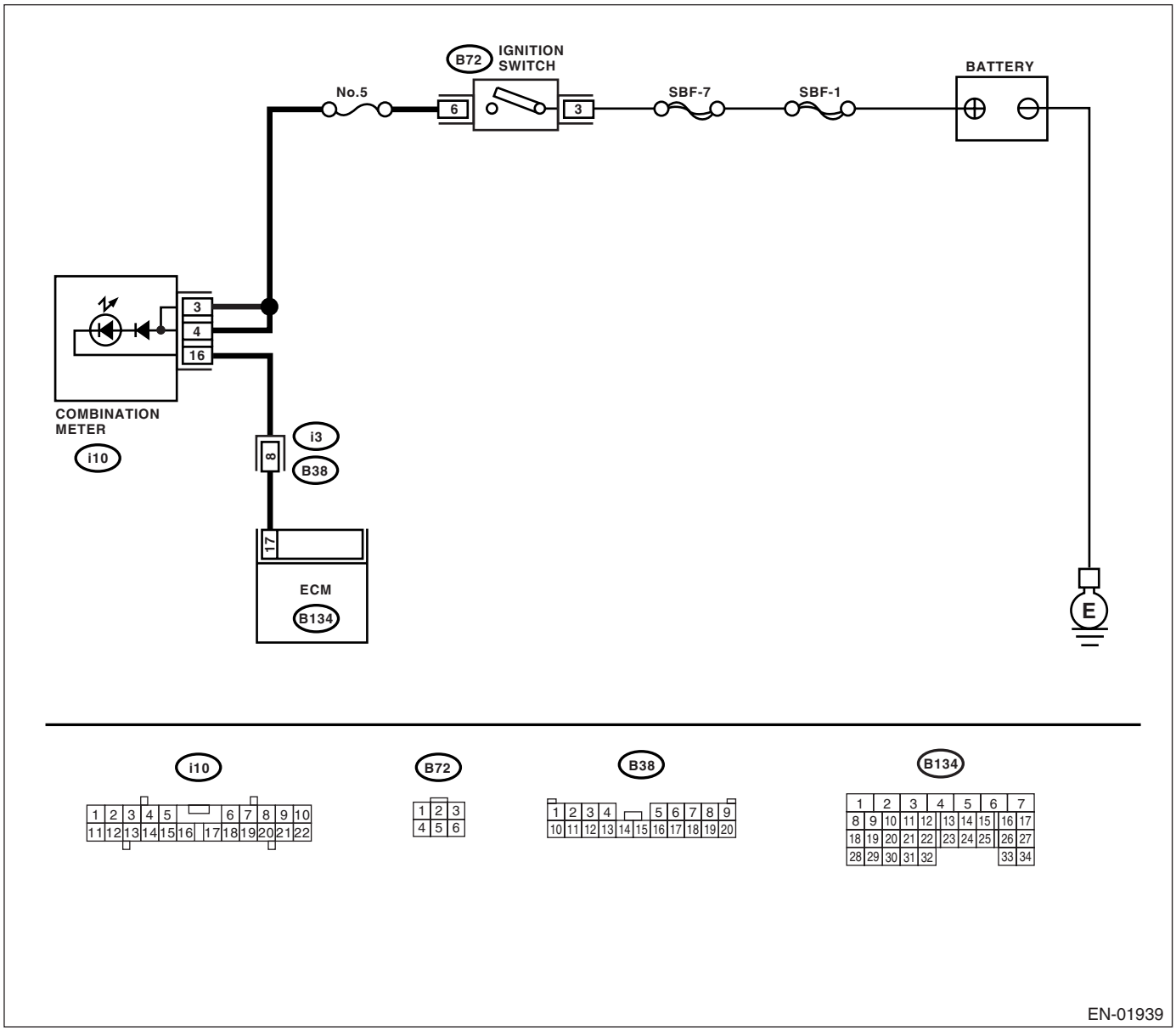
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

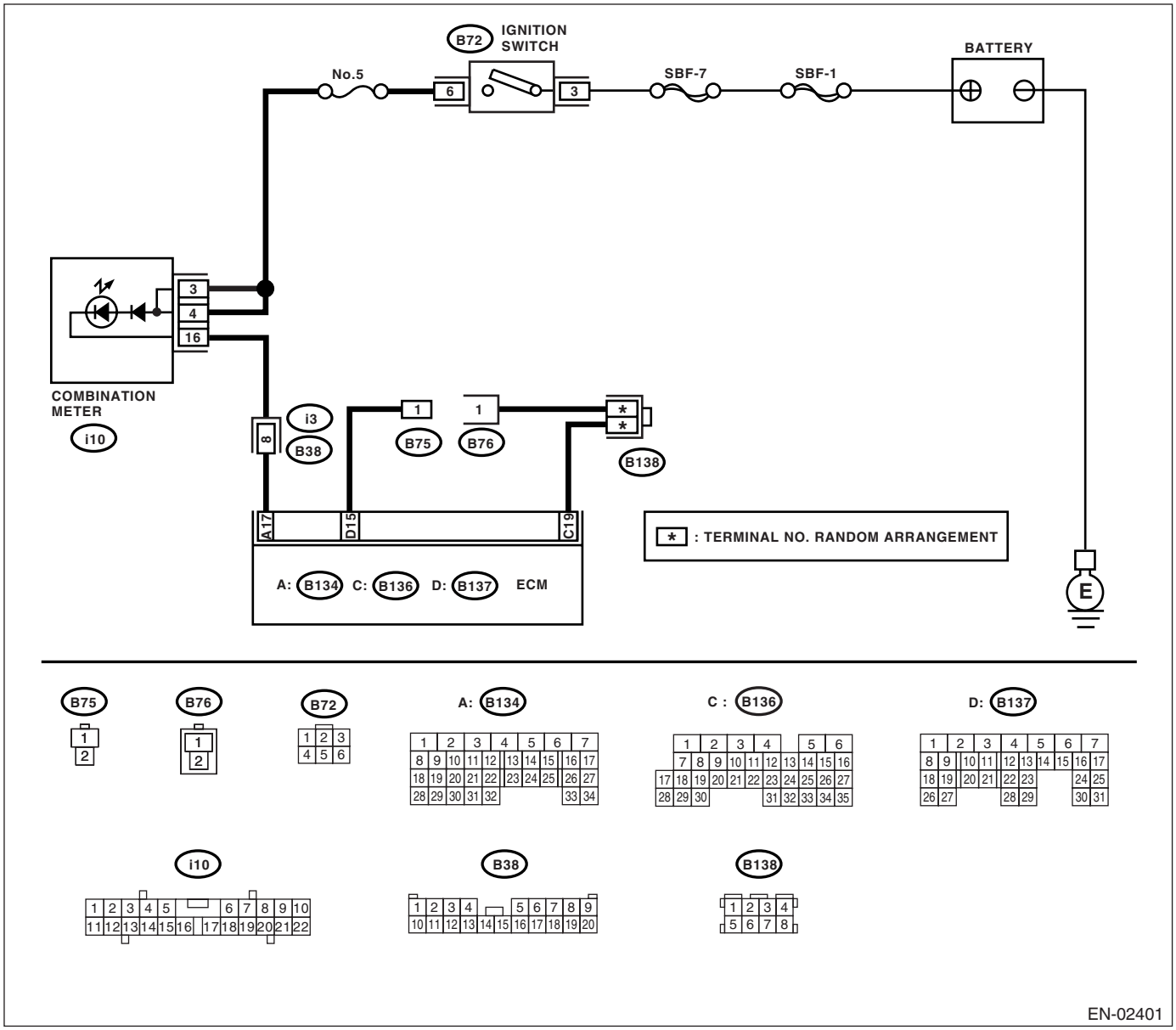
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

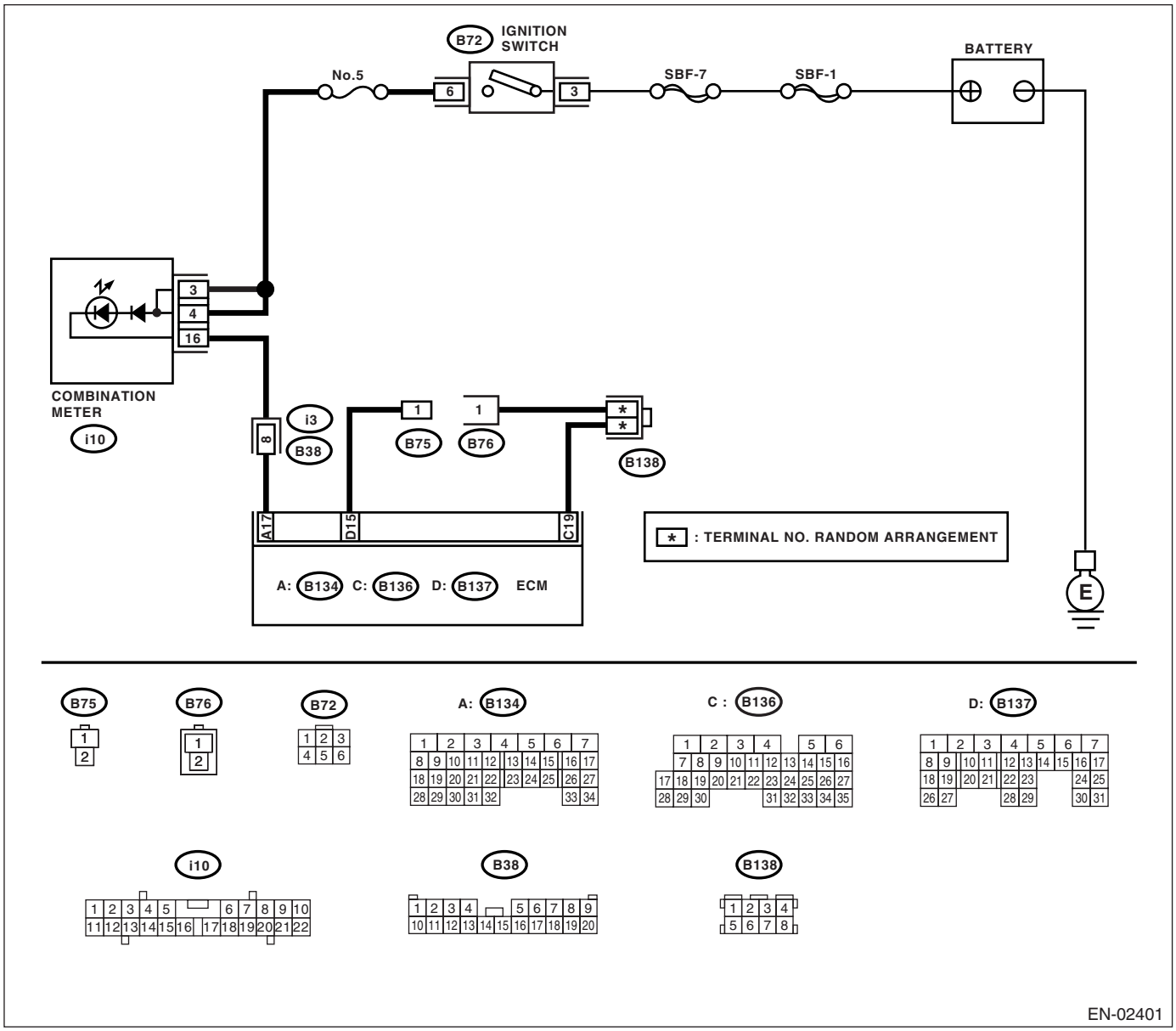
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does malfunction indicator light illuminate?	Go to step **2.**	Repair the malfunction indictor light circuit. <Ref. to EN(H4DOTC)(diag)-35, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does malfunction indicator light illuminate?	Repair the ground short circuit in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND ECU.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and ECM. ***Connector & terminal*** ***(B76) No. 1 — (B136) No. 19:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between test mode connector and ECM • Poor contact in joint connector
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** Measure the resistance of harness between ECM and test mode connector. ***Connector & terminal*** ***(B137) No. 15 — (B75) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.
TROUBLE SYMPTOM:
Malfunction indicator light blinks when test mode connector is not connected.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **2.**	System is in good order. NOTE: Malfunction indicator light blinks at a cycle of 3 Hz when test mode connector is connected.
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 15 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

14.Diagnostics for Engine Starting Failure

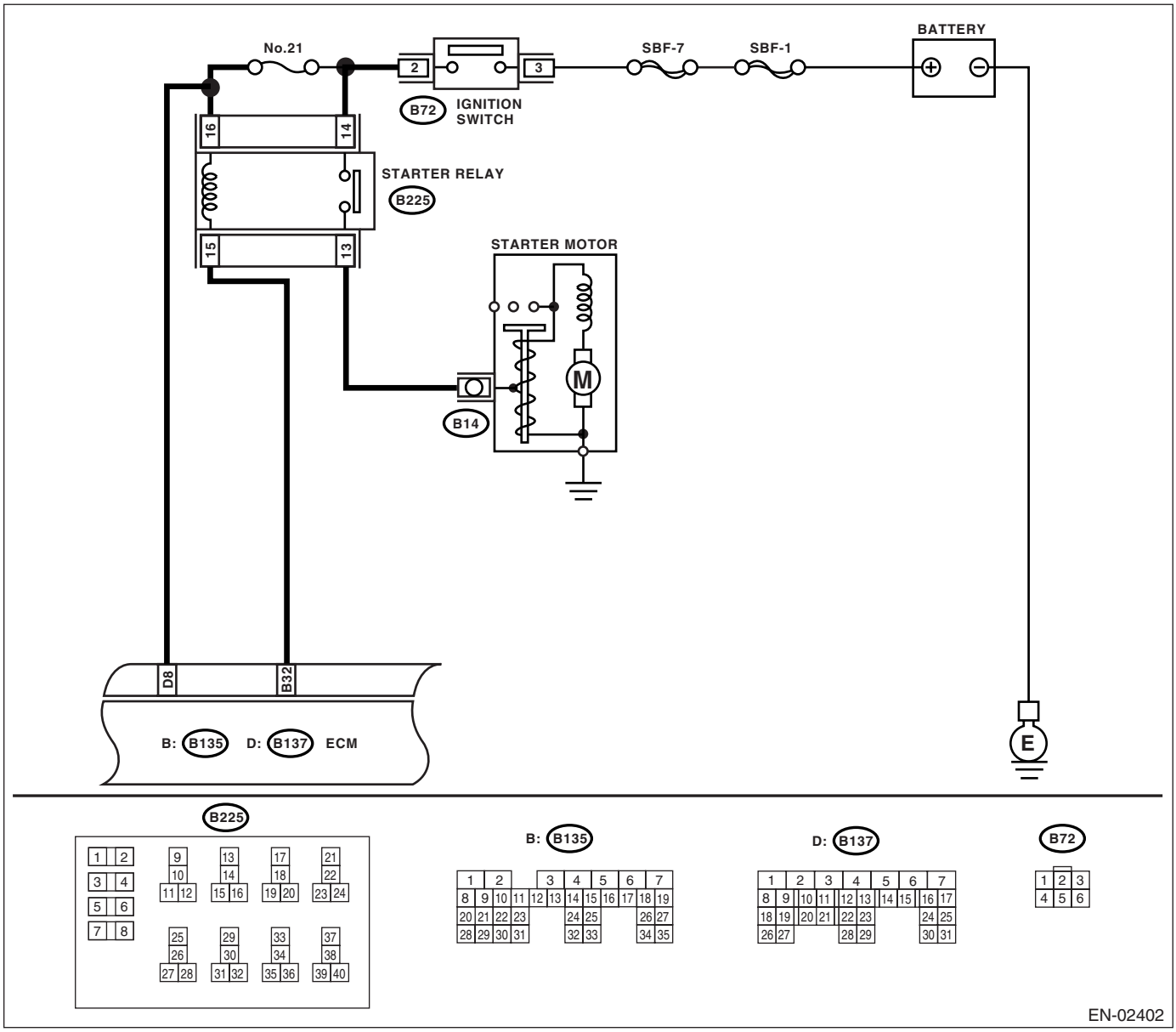
A: PROCEDURE

1. Check for fuel amount.
↓
2. Inspection of starter motor circuit. <Ref. to EN(H4DOTC)(diag)-43, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H4DOTC)(diag)-46, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H4DOTC)(diag)-48, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H4DOTC)(diag)-51, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H4DOTC)(diag)-53, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

B: STARTER MOTOR CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Diagnostics for Engine Starting Failure

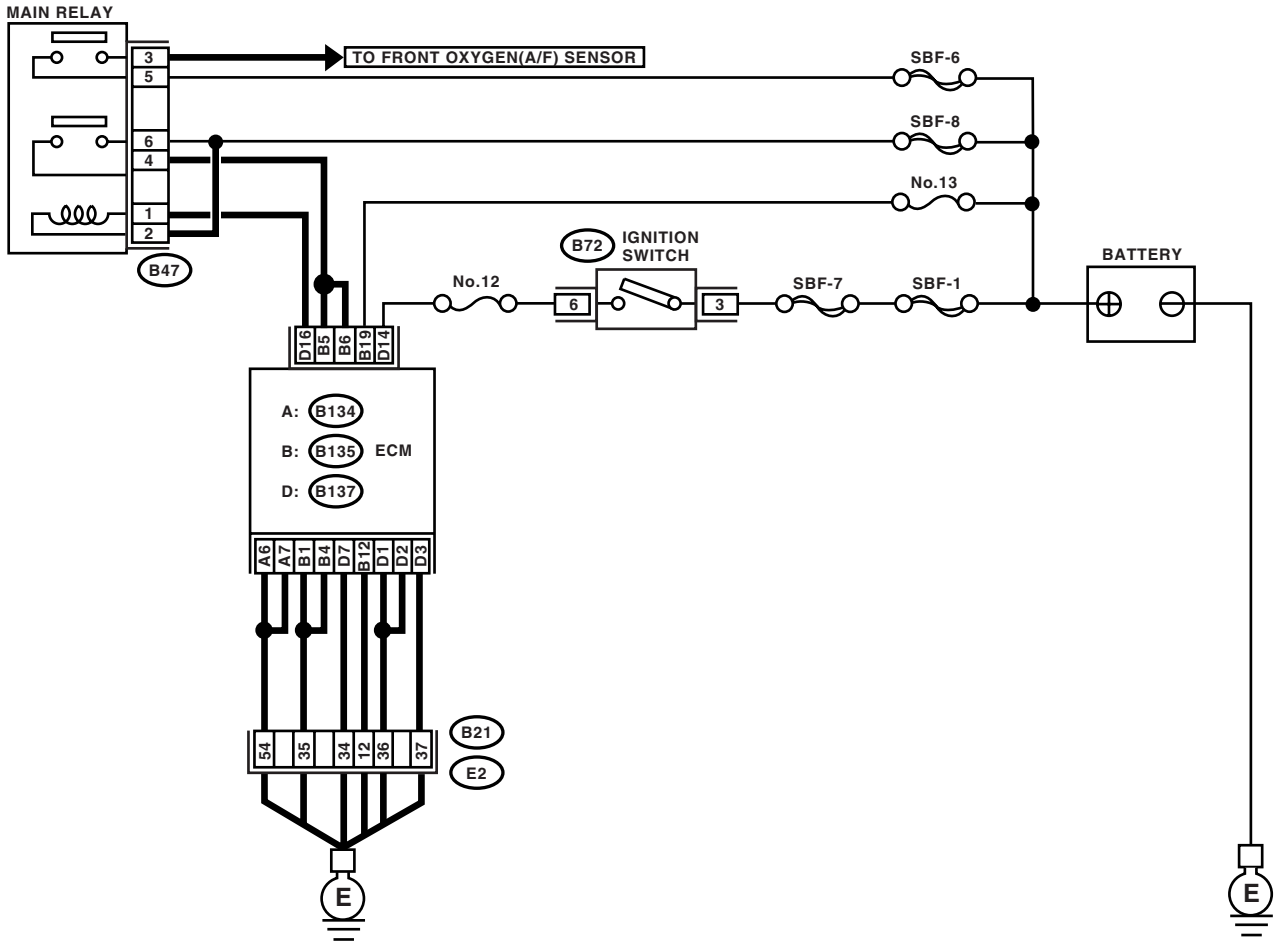
	Step	Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **2.**	Go to step **3.**
2	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H4DOTC)(diag)-27, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
3	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: Set the selector lever in the “P” or “N” range.	Is the voltage more than 10 V?	Go to step **4.**	Go to step **5.**
4	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ground cable terminal from starter motor. 3) Measure the resistance of ground cable between ground cable terminal and engine ground.	Is the resistance less than 5 Ω?	Check the starter motor. <Ref. to SC(H4SO 2.0)-6, Starter.>	Repair the open circuit of ground cable.
5	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Check the following and repair if necessary. • Blown out fuse • Open circuit in harness between ignition switch and battery
6	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals while turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **7.**	Replace the ignition switch.

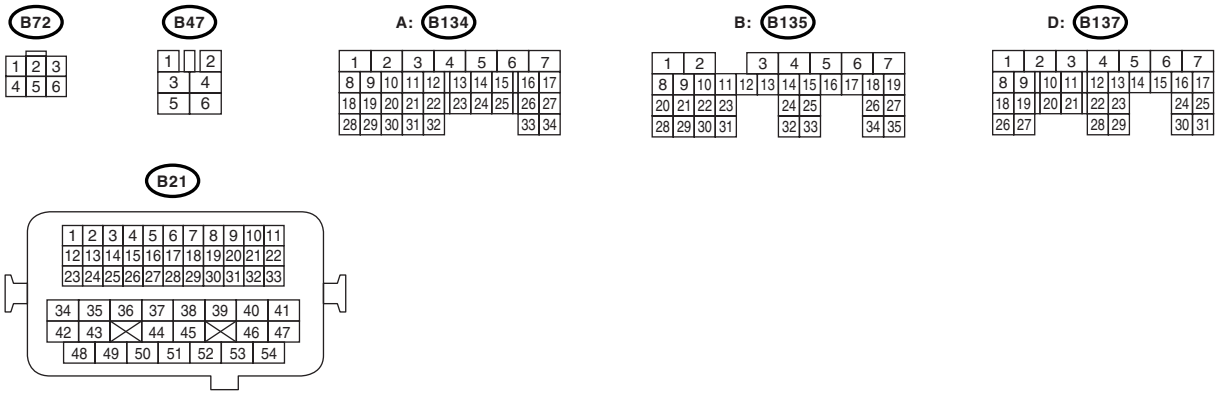
	Step	Check	Yes	No
7	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground while turning the ignition switch to START position. ***Connector & terminal*** ***(B225) No. 14 (+) — Chassis ground (–):*** ***(B225) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit in harness between starter relay and ignition switch.
8	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **9.**	Replace the starter relay.
9	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the starter relay connector. 3) Disconnect the connectors from ECM. 4) Measure the resistance of harness between ECM and starter relay connector. ***Connector & terminal*** ***(B135) No. 32 — (B225) No. 15:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between ECM and starter relay.
10	**CHECK INPUT VOLTAGE FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM. 3) Turn the ignition switch to START. 4) Measure the voltage between starter motor and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **11.**	Repair the open or ground short circuit in harness between starter relay and starter.
11	**CHECK HARNESS BETWEEN IGNITION SWITCH AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition switch and ECM. 3) Measure the resistance of harness between ignition switch and ECM connector. ***Connector & terminal*** ***(B137) No. 8 — (B72) No. 2:***	Is the resistance less than 1 Ω?	Check engine control module (ECM) power supply and ground line. <Ref. to EN(H4DOTC)(diag)-46, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>	Repair the open circuit between ignition switch and ECM.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





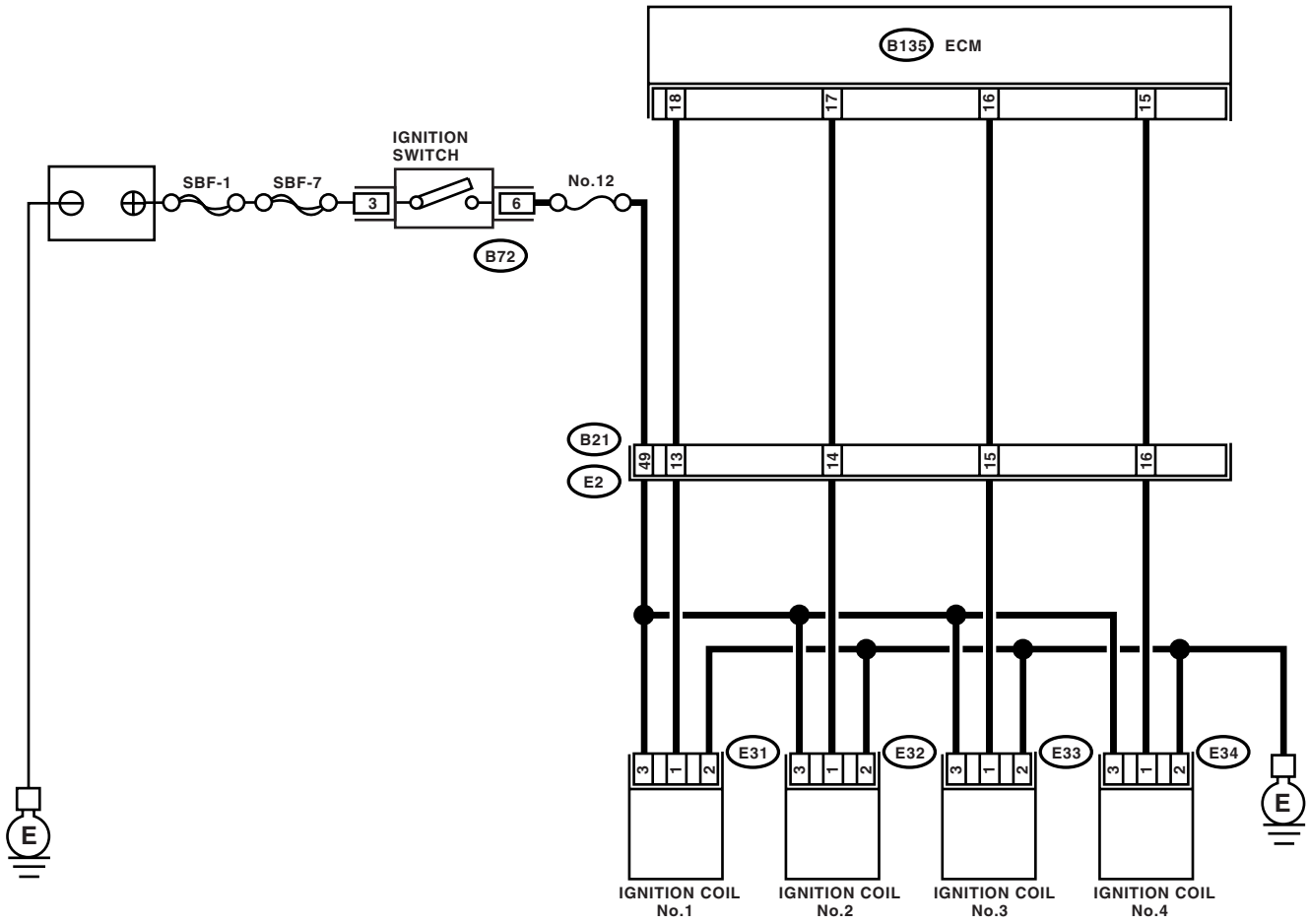
EN-02403

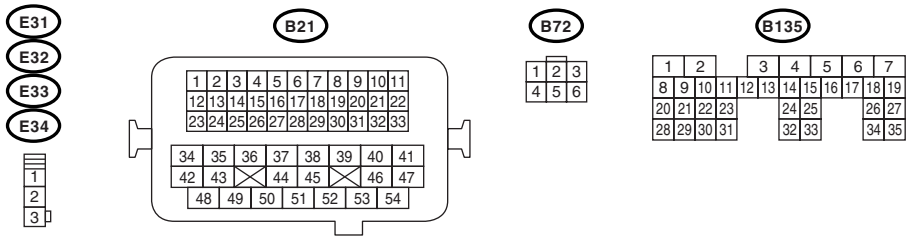
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B135) No. 12 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (−):*** ***(B47) No. 5 (+) — Chassis ground (−):*** ***(B47) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open or ground short circuit in harness of power supply circuit.
6	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the main relay connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H4DOTC)(diag)-48, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02404

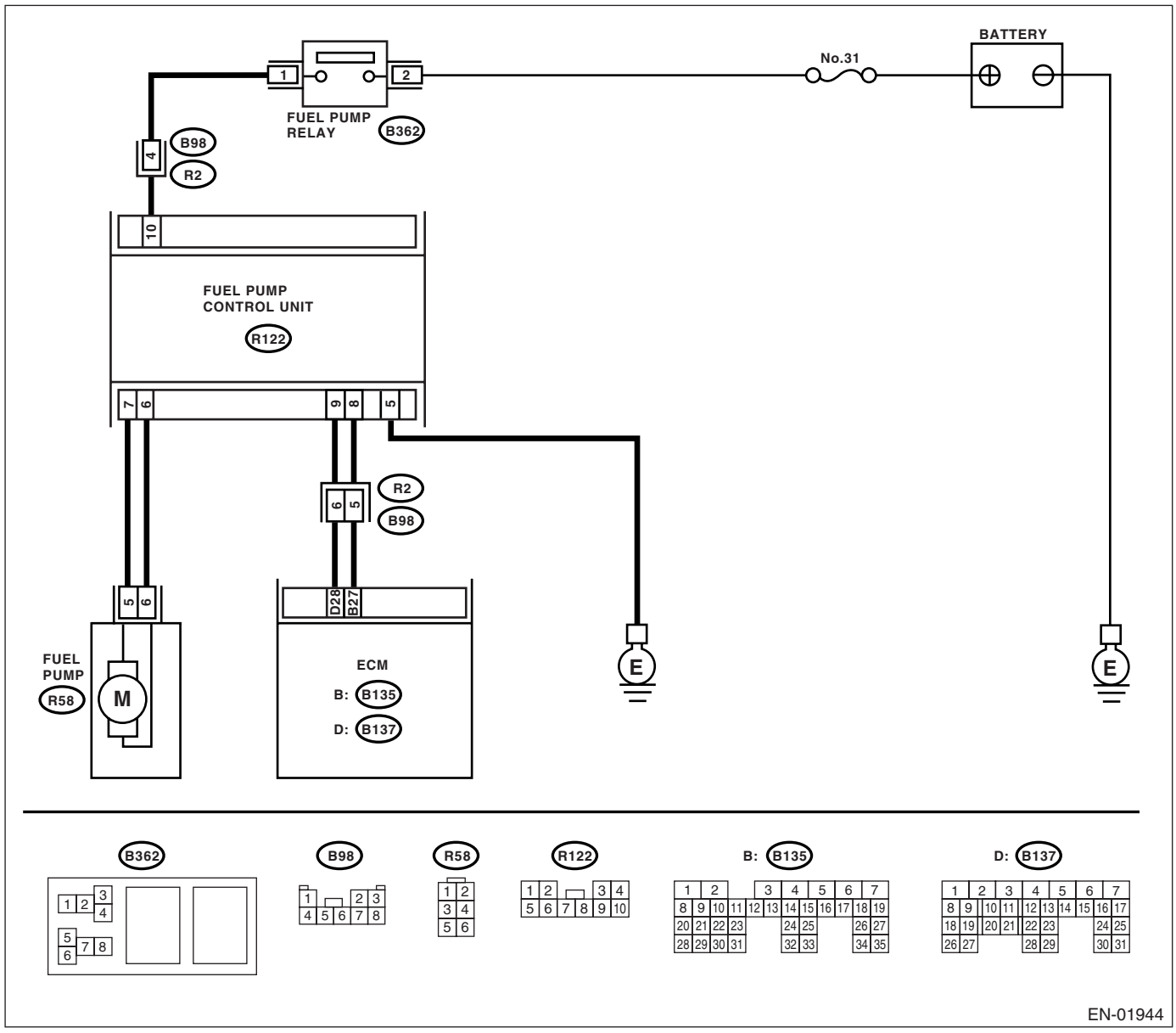
	Step	Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug. <Ref. to IG(H4DOTC)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H4DOTC)-5, INSPECTION, Spark Plug.>	Is the spark plug's status OK?	Go to step **2.**	Replace the spark plug.
2	**INSPECTION FOR SPARK OF IGNITION SYSTEM.** 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. <Ref. to FU(H4DOTC)-40, RELEASING OF FUEL PRESSURE, PROCEDURE, Fuel.> 3) Contact the spark plug's thread portion on engine. 4) While the throttle valve is opening fully, crank the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H4DOTC)(diag)-51, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY, and ignition switch connector • Poor contact in coupling connector
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil & ignitor ASSY. 4) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***(B135) No. 15 — (E34) No. 1:*** ***(B135) No. 16 — (E33) No. 1:*** ***(B135) No. 17 — (E32) No. 1:*** ***(B135) No. 18 — (E31) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in coupling connector

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***(B135) No. 15 — Engine ground:*** ***(B135) No. 16 — Engine ground:*** ***(B135) No. 17 — Engine ground:*** ***(B135) No. 18 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ignition coil & ignitor ASSY.

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

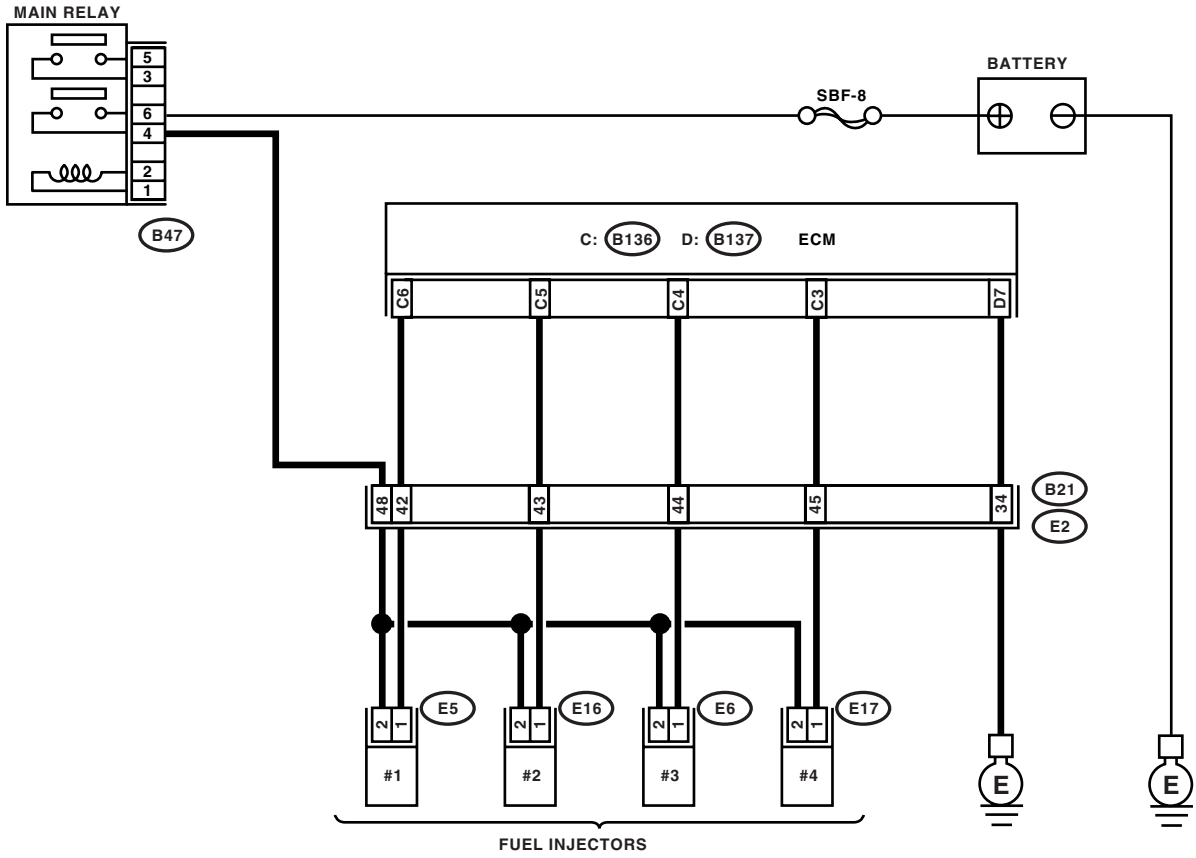


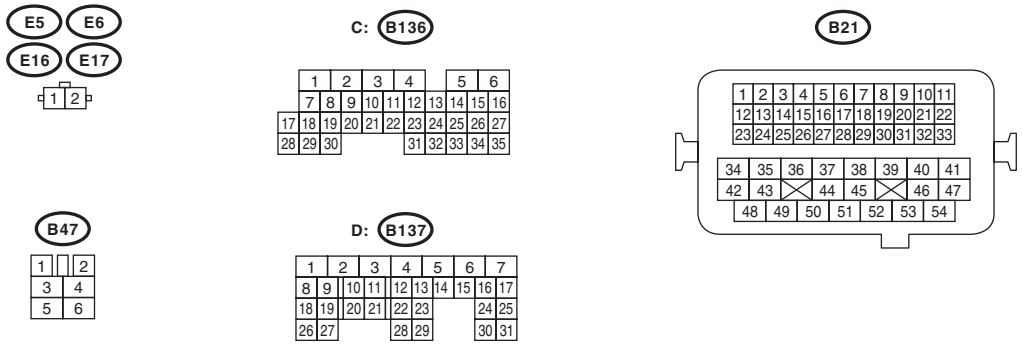
	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that fuel pump is in operation for 2 seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to “Compulsory Valve Operation Check Mode” for procedures. <Ref. to EN(H4DOTC)(diag)-31, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check the fuel injector circuit. <Ref. to EN(H4DOTC)(diag)-53, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display DTC. <Ref. to EN(H4DOTC)(diag)-27, OPERATION, Read Diagnostic Trouble Code (DTC).>

F: FUEL INJECTOR CIRCUIT

CAUTION:
• Check or repair only faulty parts.
• After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-01945

Diagnostics for Engine Starting Failure

	Step	Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits operating sound. Use a sound scope or attach a screwdriver to the injector for this check.	Does the fuel pump produce operating sound?	Check the fuel pressure. <Ref. to ME(H4DOTC)-26, INSPECTION, Fuel Pressure.>	Go to step **2.**
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***(B136) No. 6 — (E5) No. 1:*** ***(B136) No. 5 — (E16) No. 1:*** ***(B136) No. 4 — (E6) No. 1:*** ***(B136) No. 3 — (E17) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 6 — Chassis ground:*** ***(B136) No. 5 — Chassis ground:*** ***(B136) No. 4 — Chassis ground:*** ***(B136) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostic Table” <Ref. to EN(H4DOTC)(diag)-202, INSPECTION, General Diagnostic Table.>

15.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Note
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-60, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-62, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-64, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-67, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-69, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H4DOTC)(diag)-72, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-74, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Intake Air Pressure Sensor Circuit High Input	<Ref. to EN(H4DOTC)(diag)-76, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-78, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H4DOTC)(diag)-80, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-83, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H4DOTC)(diag)-85, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-88, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H4DOTC)(diag)-90, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-92, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-94, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H4DOTC)(diag)-96, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-98, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H4DOTC)(diag)-101, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H4DOTC)(diag)-103, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H4DOTC)(diag)-104, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-107, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H4DOTC)(diag)-109, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H4DOTC)(diag)-111, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0245	Turbo/Super Charger Wastegate Solenoid “A” Low	<Ref. to EN(H4DOTC)(diag)-114, DTC P0245 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0246	Turbo/Super Charger Wastegate Solenoid “A” High	<Ref. to EN(H4DOTC)(diag)-116, DTC P0246 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0261	Cylinder 1 Injector Circuit Low	<Ref. to EN(H4DOTC)(diag)-118, DTC P0261 CYLINDER 1 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0264	Cylinder 2 Injector Circuit Low	<Ref. to EN(H4DOTC)(diag)-118, DTC P0264 CYLINDER 2 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0267	Cylinder 3 Injector Circuit Low	<Ref. to EN(H4DOTC)(diag)-118, DTC P0267 CYLINDER 3 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0270	Cylinder 4 Injector Circuit Low	<Ref. to EN(H4DOTC)(diag)-119, DTC P0270 CYLINDER 4 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-122, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-124, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H4DOTC)(diag)-126, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1or Single Sensor)	<Ref. to EN(H4DOTC)(diag)-128, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	<Ref. to EN(H4DOTC)(diag)-130, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0350	Ignition Coil Primary/Secondary Circuit	<Ref. to EN(H4DOTC)(diag)-132, DTC P0350 IGNITION COIL PRIMARY/ SECONDARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0365	Camshaft Position Sensor “B” Circuit (Bank 1)	<Ref. to EN(H4DOTC)(diag)-135, DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0390	Camshaft Position Sensor “B” Circuit (Bank 2)	<Ref. to EN(H4DOTC)(diag)-137, DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H4DOTC)(diag)-139, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H4DOTC)(diag)-141, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H4DOTC)(diag)-143, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H4DOTC)(diag)-144, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0513	Incorrect Immobilizer Key	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H4DOTC)(diag)-146, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0562	System Voltage Low	<Ref. to EN(H4DOTC)(diag)-147, DTC P0562 SYSTEM VOLTAGE LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0563	System Voltage High	<Ref. to EN(H4DOTC)(diag)-149, DTC P0563 SYSTEM VOLTAGE HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H4DOTC)(diag)-151, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Read Access Memory (RAM) Error	<Ref. to EN(H4DOTC)(diag)-151, DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H4DOTC)(diag)-151, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H4DOTC)(diag)-152, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/ Performance (Bank 1)	<Ref. to EN(H4DOTC)(diag)-154, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H4DOTC)(diag)-154, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0851	Neutral Switch Input Circuit Low	<Ref. to EN(H4DOTC)(diag)-154, DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0852	Neutral Switch Input Circuit High	<Ref. to EN(H4DOTC)(diag)-154, DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1110	Atmospheric Pressure Sensor Circuit Malfunction (Low Input)	<Ref. to EN(H4DOTC)(diag)-155, DTC P1110 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1111	Atmospheric Pressure Sensor Circuit Malfunction (High Input)	<Ref. to EN(H4DOTC)(diag)-155, DTC P1111 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H4DOTC)(diag)-155, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-156, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H4DOTC)(diag)-158, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	Antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	<Ref. to IM(diag)-21, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	IMM Circuit Failure (Except Antenna Circuit)	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P1574	Key Communication Failure	<Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter Failure	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2088	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	<Ref. to EN(H4DOTC)(diag)-160, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	<Ref. to EN(H4DOTC)(diag)-162, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2090	OCV Solenoid Valve Signal B Circuit Open (Bank 1)	<Ref. to EN(H4DOTC)(diag)-164, DTC P2090 OCV SOLENOID VALVE SIGNAL B CIRCUIT OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2091	OCV Solenoid Valve Signal B Circuit Short (Bank 1)	<Ref. to EN(H4DOTC)(diag)-166, DTC P2091 OCV SOLENOID VALVE SIGNAL B CIRCUIT SHORT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	<Ref. to EN(H4DOTC)(diag)-168, DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	<Ref. to EN(H4DOTC)(diag)-170, DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2094	OCV Solenoid Valve Signal B Circuit Open (Bank 2)	<Ref. to EN(H4DOTC)(diag)-172, DTC P2094 OCV SOLENOID VALVE SIGNAL B CIRCUIT OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2095	OCV Solenoid Valve Signal B Circuit Short (Bank 2)	<Ref. to EN(H4DOTC)(diag)-174, DTC P2095 OCV SOLENOID VALVE SIGNAL B CIRCUIT SHORT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H4DOTC)(diag)-176, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H4DOTC)(diag)-181, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H4DOTC)(diag)-183, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	<Ref. to EN(H4DOTC)(diag)-184, DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-185, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H4DOTC)(diag)-188, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H4DOTC)(diag)-190, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H4DOTC)(diag)-193, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Note
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H4DOTC)(diag)-195, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H4DOTC)(diag)-198, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

16.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

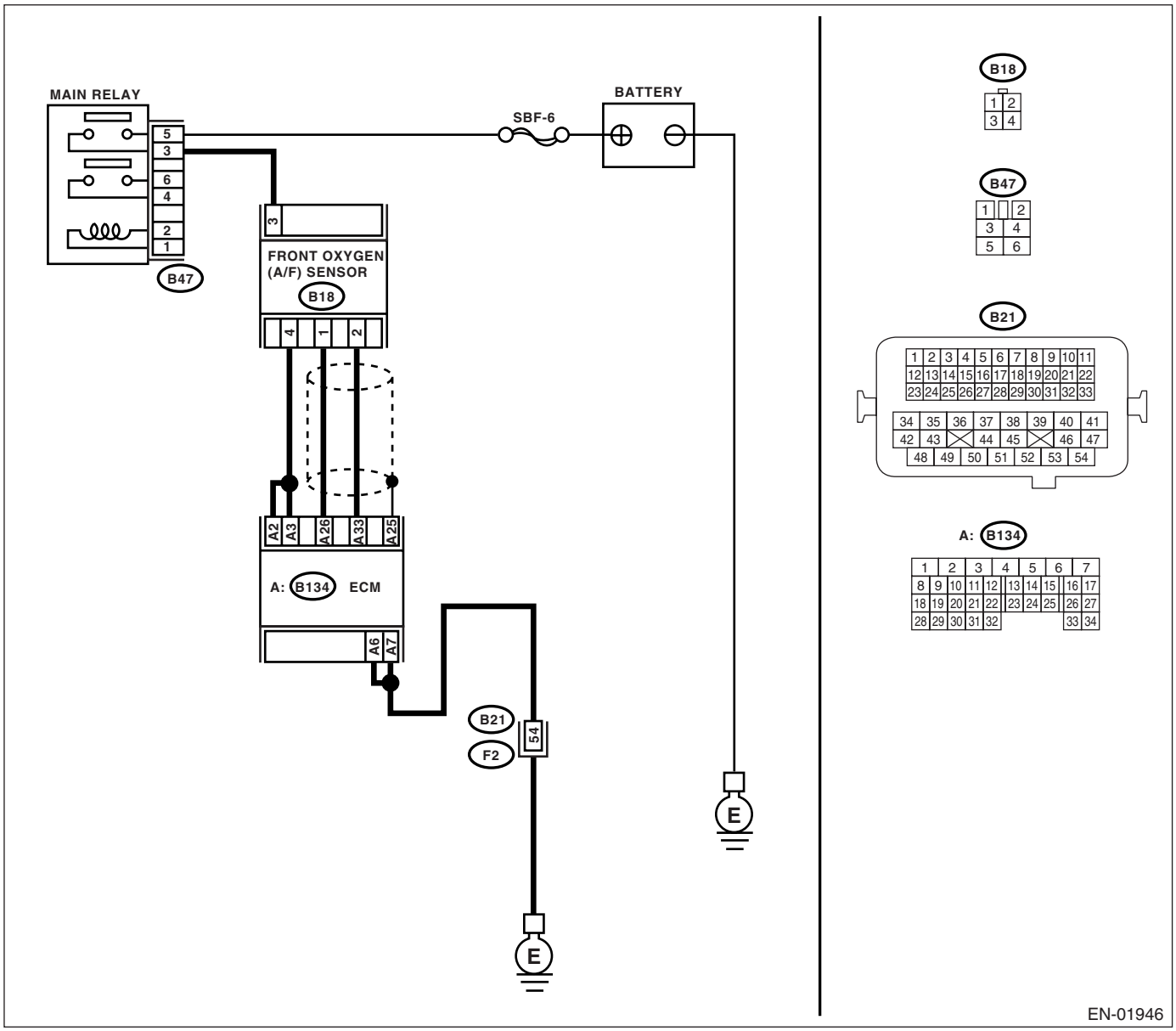
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(B18) No. 3 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
2	**CHECK HARNESS BETWEEN FRONT OXYGEN (A/F) SENSOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM. 3) Measure the voltage between front oxygen (A/F) sensor connector and ECM. ***Connector & terminal*** ***(B18) No. 4 — (B134) No. 2:*** ***(B18) No. 4 — (B134) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor.
3	**CHECK HARNESS BETWEEN FRONT OXYGEN (A/F) SENSOR AND ECM.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 — Chassis ground:*** ***(B134) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 2.4 Ω?	Repair the poor contact in ECM connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-33, Front Oxygen (A/F) Sensor.>

B: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

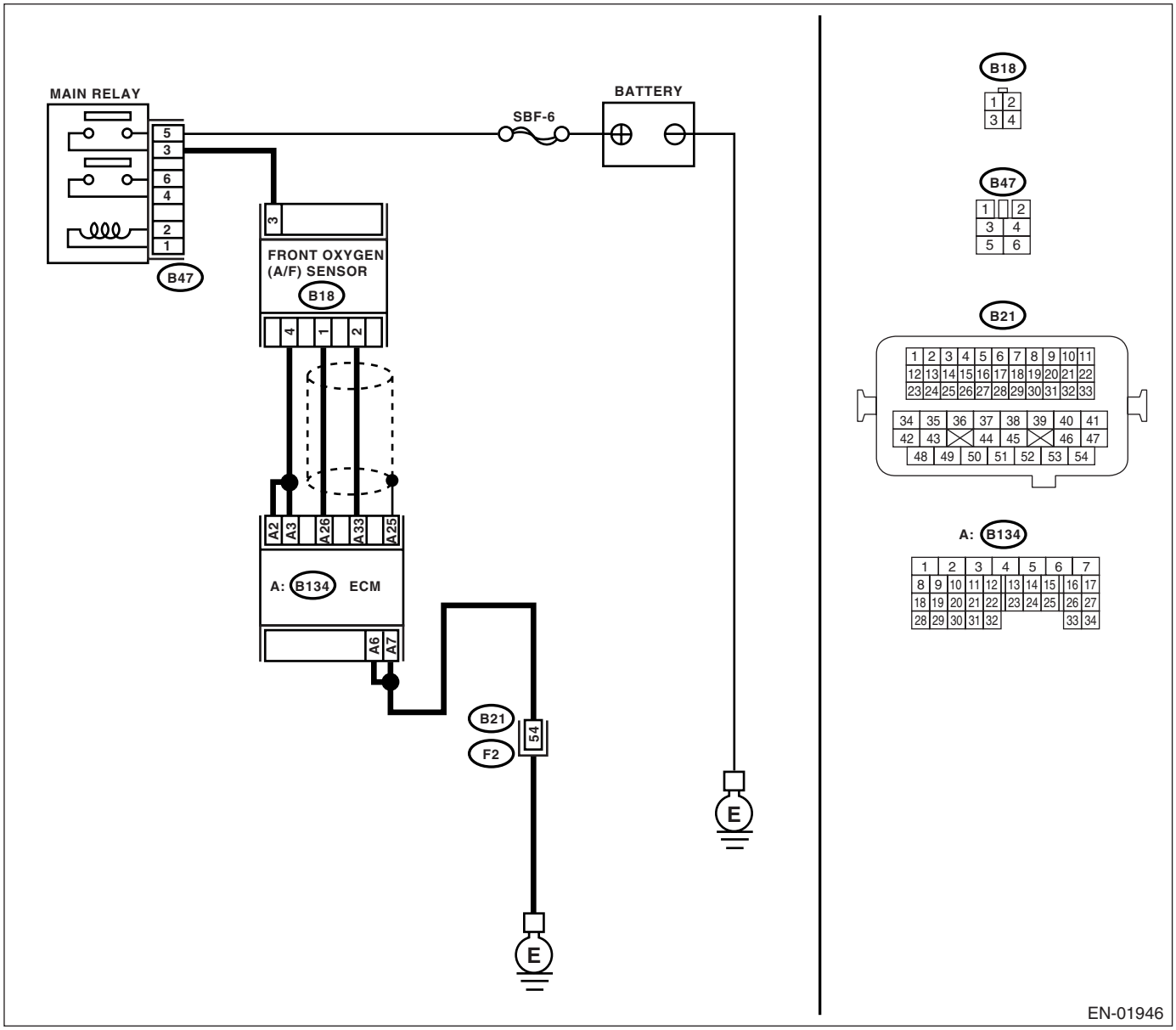
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 6 — Chassis ground:*** ***(B136) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM connector and chassis ground.
2	**CHECK VOLTAGE BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 2 (+) — Chassis ground (−):*** ***(B137) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	Repair the poor contact in ECM connector.

C: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

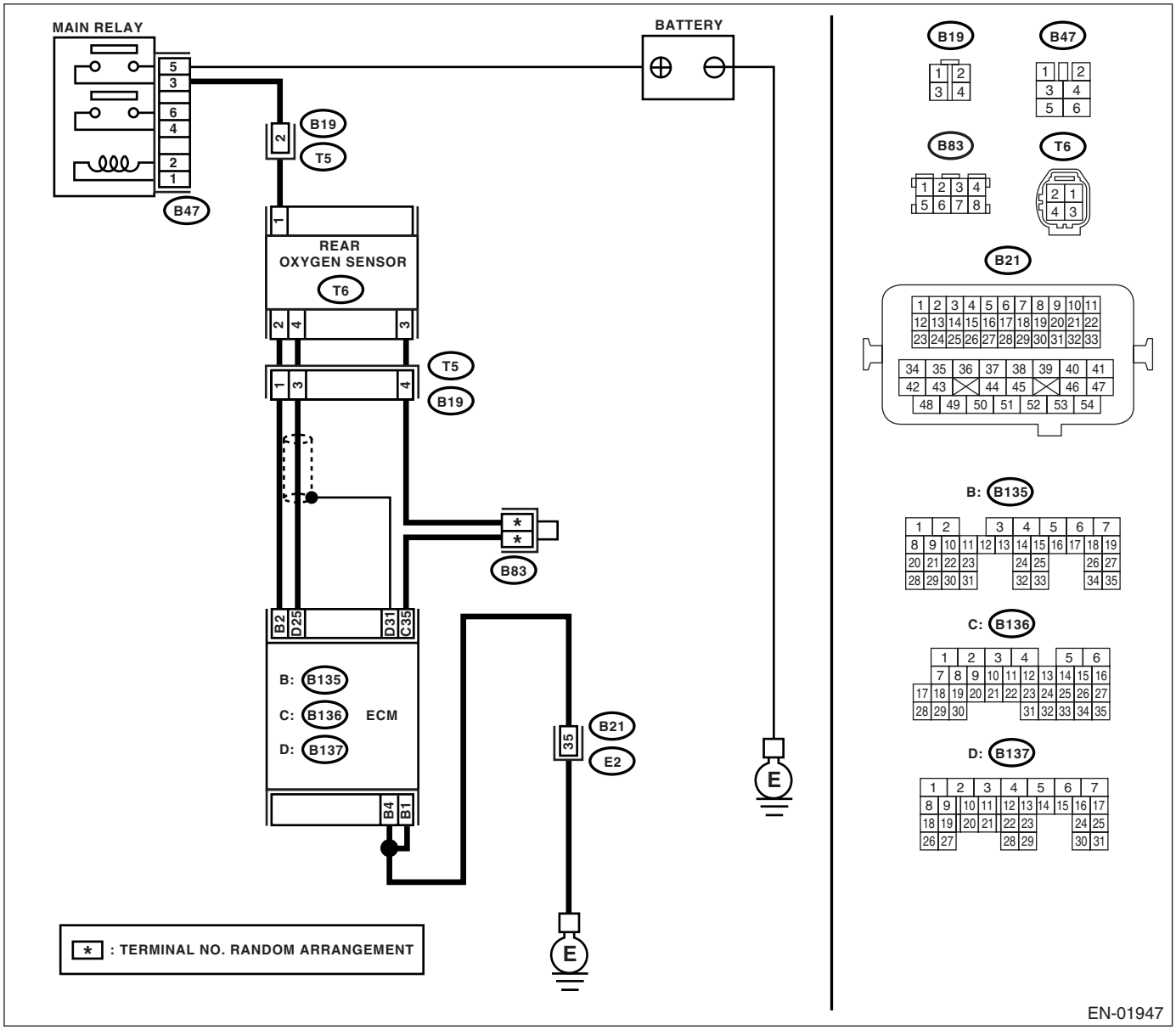
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 — Chassis ground:***	Is the voltage more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and rear oxygen sensor connector.
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 — Chassis ground:***	Does the resistance change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **4.**
4	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(T6) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the power supply line. NOTE: In this case, repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector

	Step	Check	Yes	No
5	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>

D: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

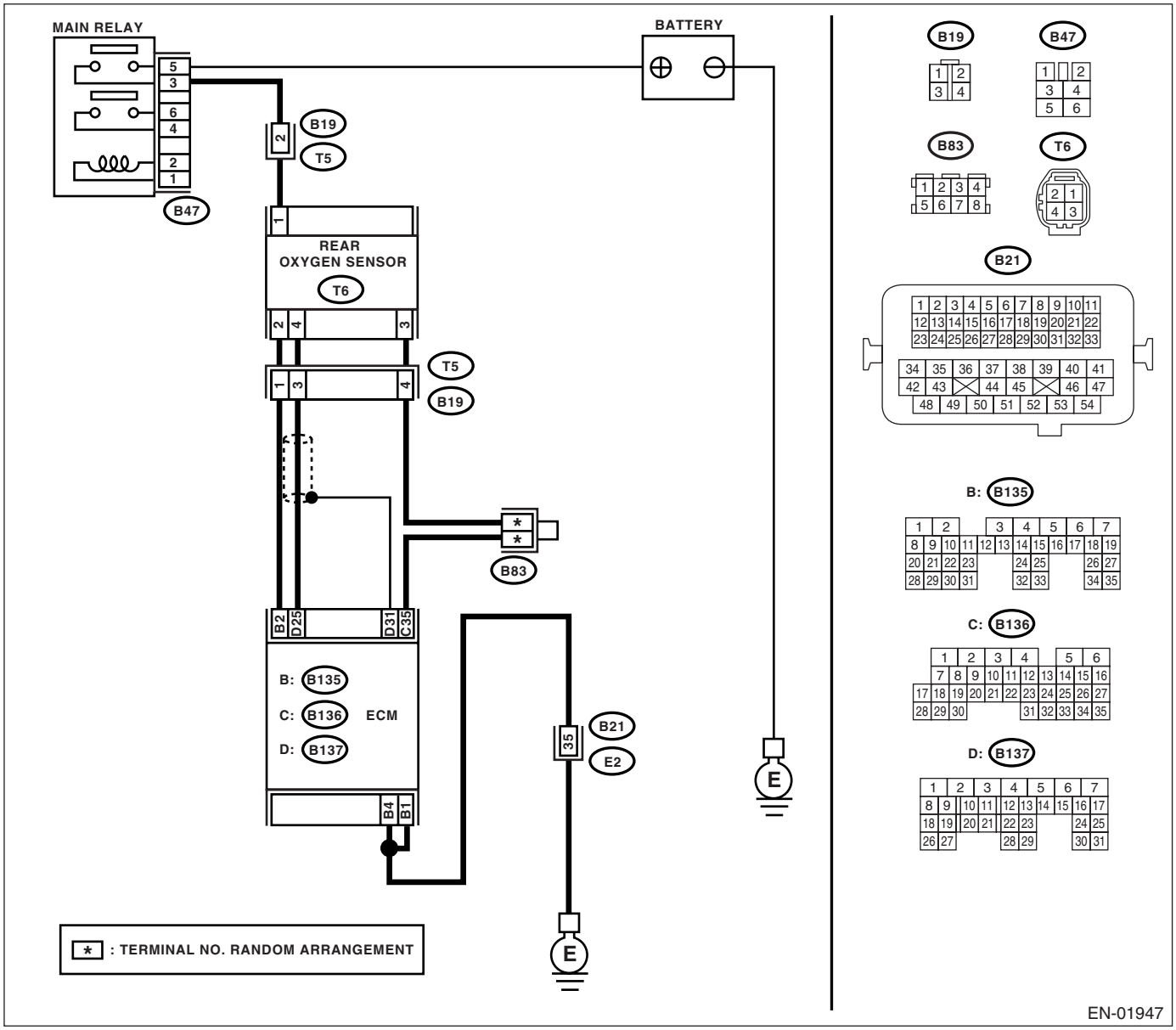
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 4 — Chassis ground:*** ***(B135) No. 1 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine ground cable • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and rear oxygen sensor.	Repair the poor connection in ECM connector.

E: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

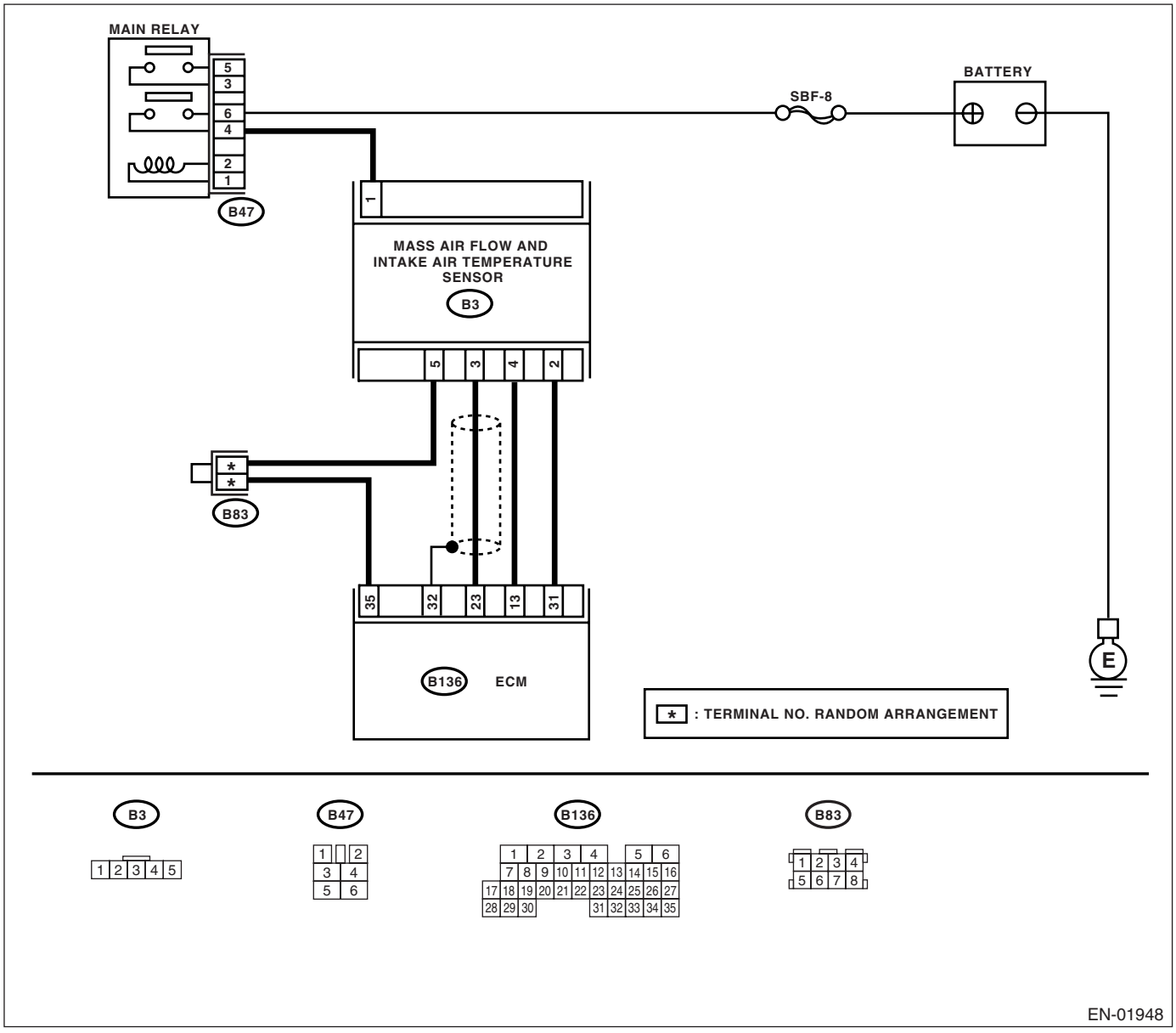
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start and idle the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact of the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor. NOTE: In this case, repair the following: • Open or ground short circuit in harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **2.**
2	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Replace and check it again because of ECM malfunction possibility.
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open circuit between mass air flow sensor and main relay.
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B136) No. 23 — (B3) No. 3:*** ***(B136) No. 31 — (B3) No. 2:*** ***(B136) No. 35 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit between ECM and mass air flow sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:*** ***(B136) No. 31 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact in mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>

F: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

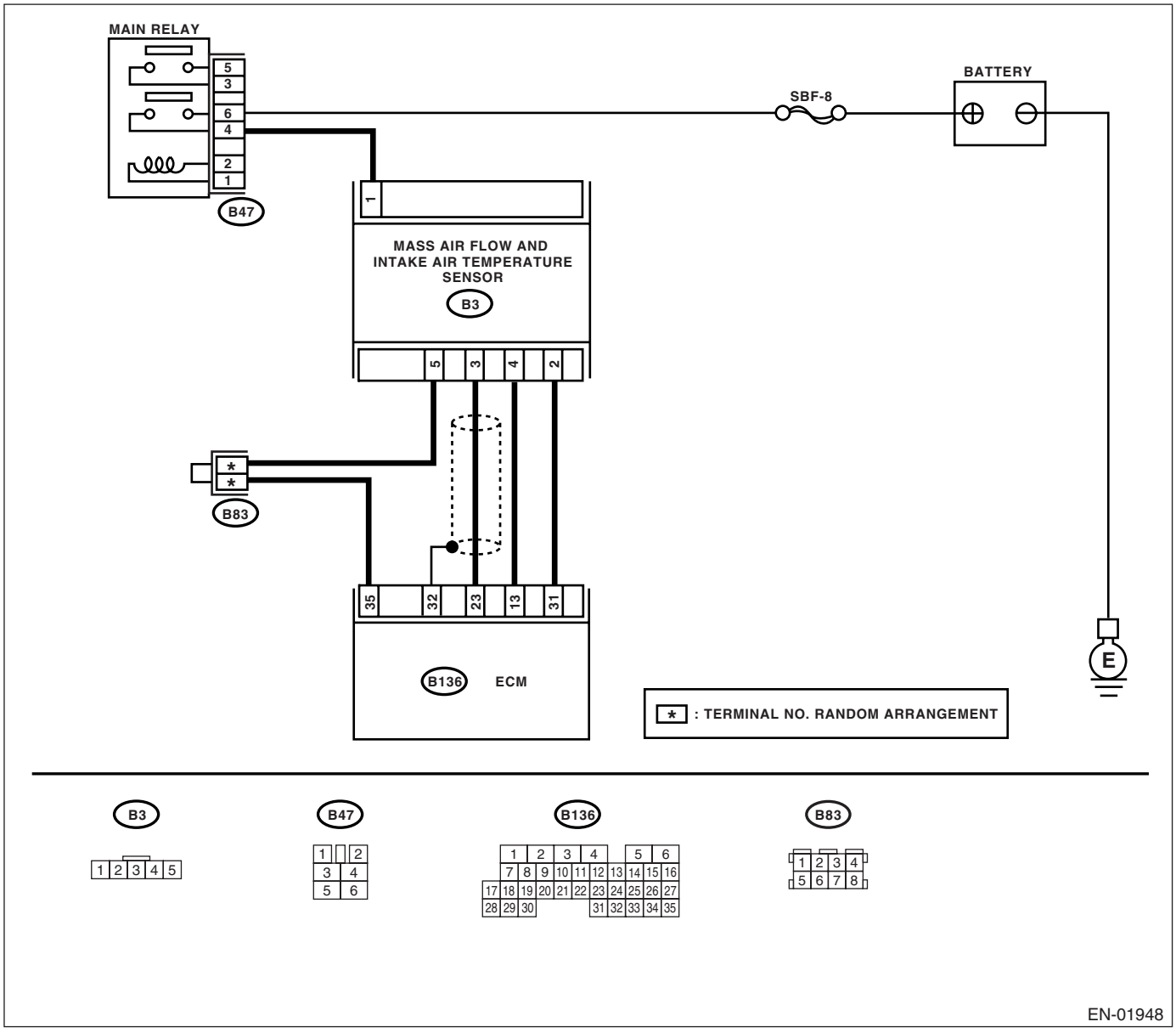
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start and idle the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass airflow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Repair the battery short circuit in harness between mass air flow sensor connector and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B136) No. 31:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open circuit in harness between mass air flow sensor connector and ECM connector.

G: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

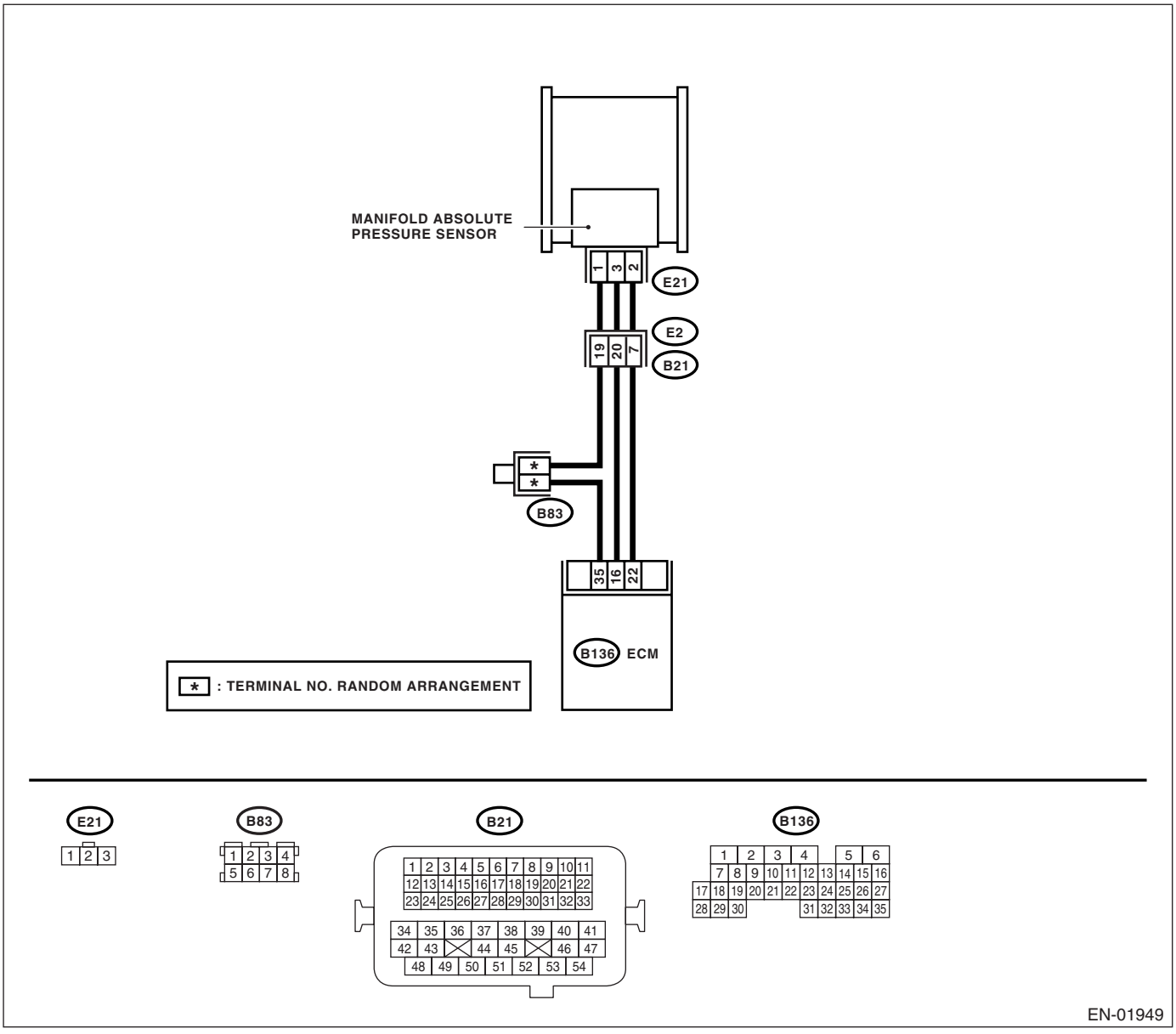
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-01949

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **3.**	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with voltage meter?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
3	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 0.7 V?	Go to step **4.**	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>

H: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

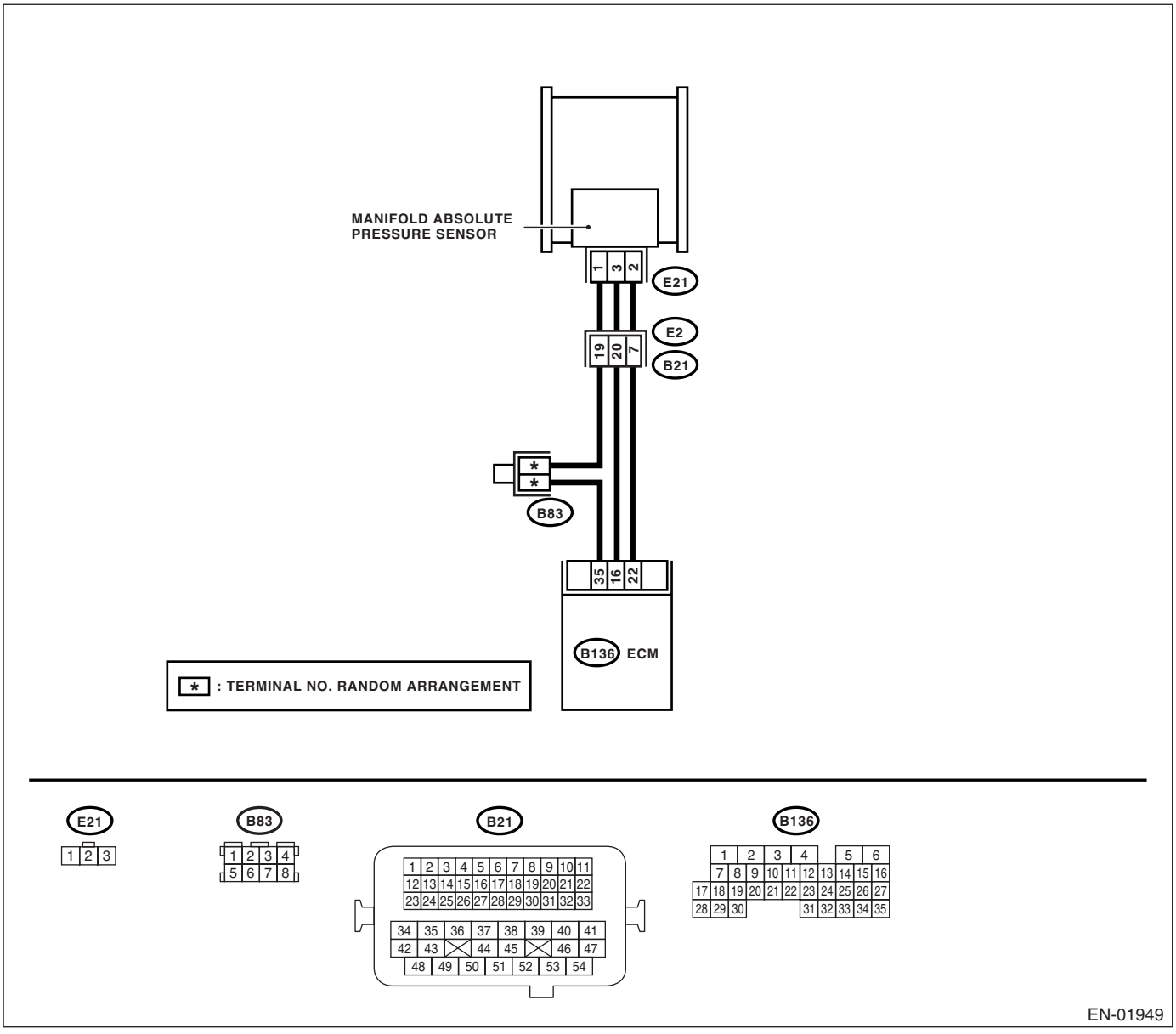
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



EN-01949

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **3.**	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (−):***	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with voltage meter?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
3	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 4.5 V?	Go to step **4.**	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E21) No. 3 (+) — Engine ground (−):***	Is the voltage more than 4.5 V?	Go to step **5.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
5	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 22 — (E21) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E21) No. 1:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H4DOTC)-29, Manifold Absolute Pressure Sensor.>

I: DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

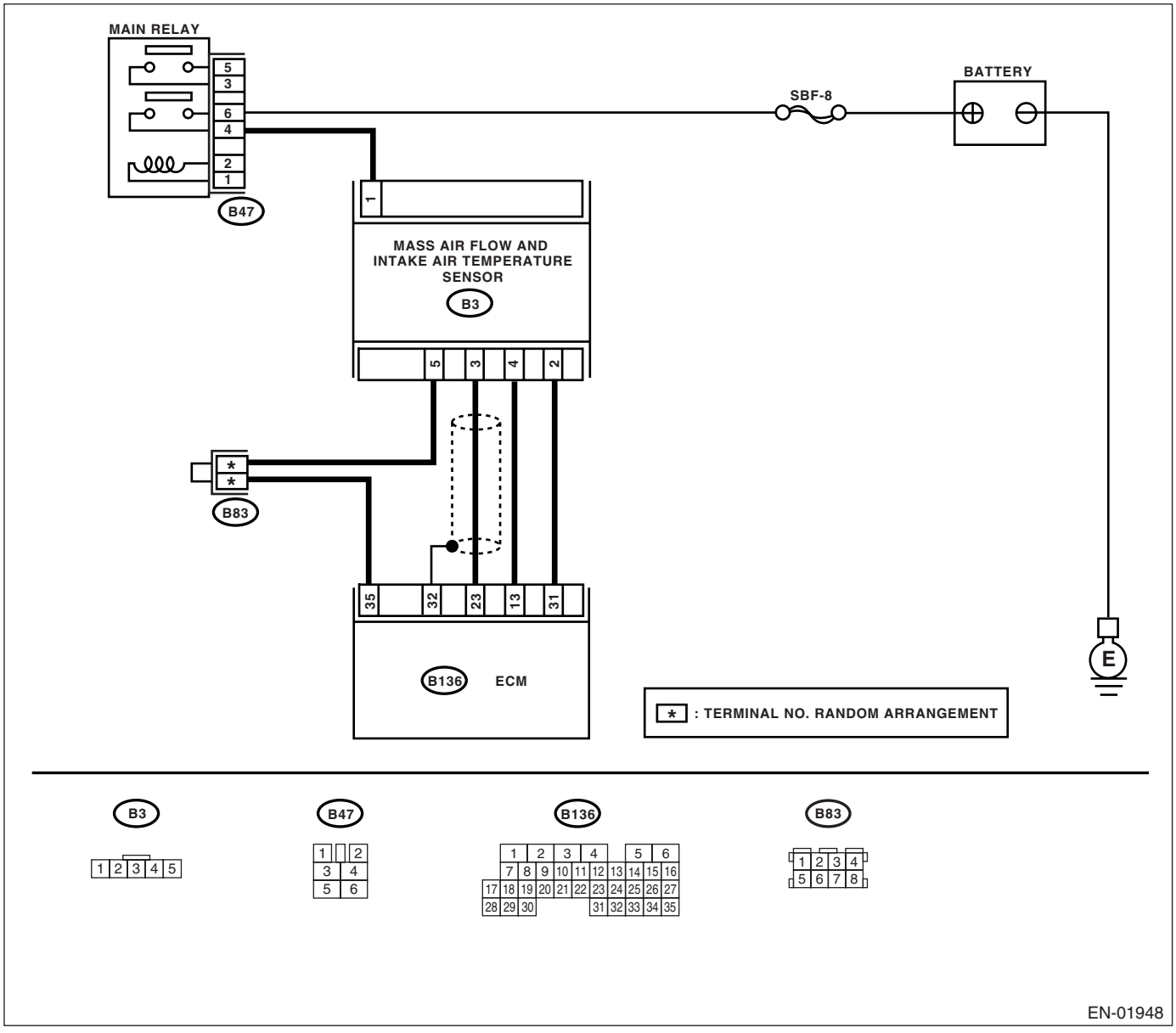
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is engine coolant temperature more than 55°C (131°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is the value less than −36°C (−33°F)?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.

J: DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

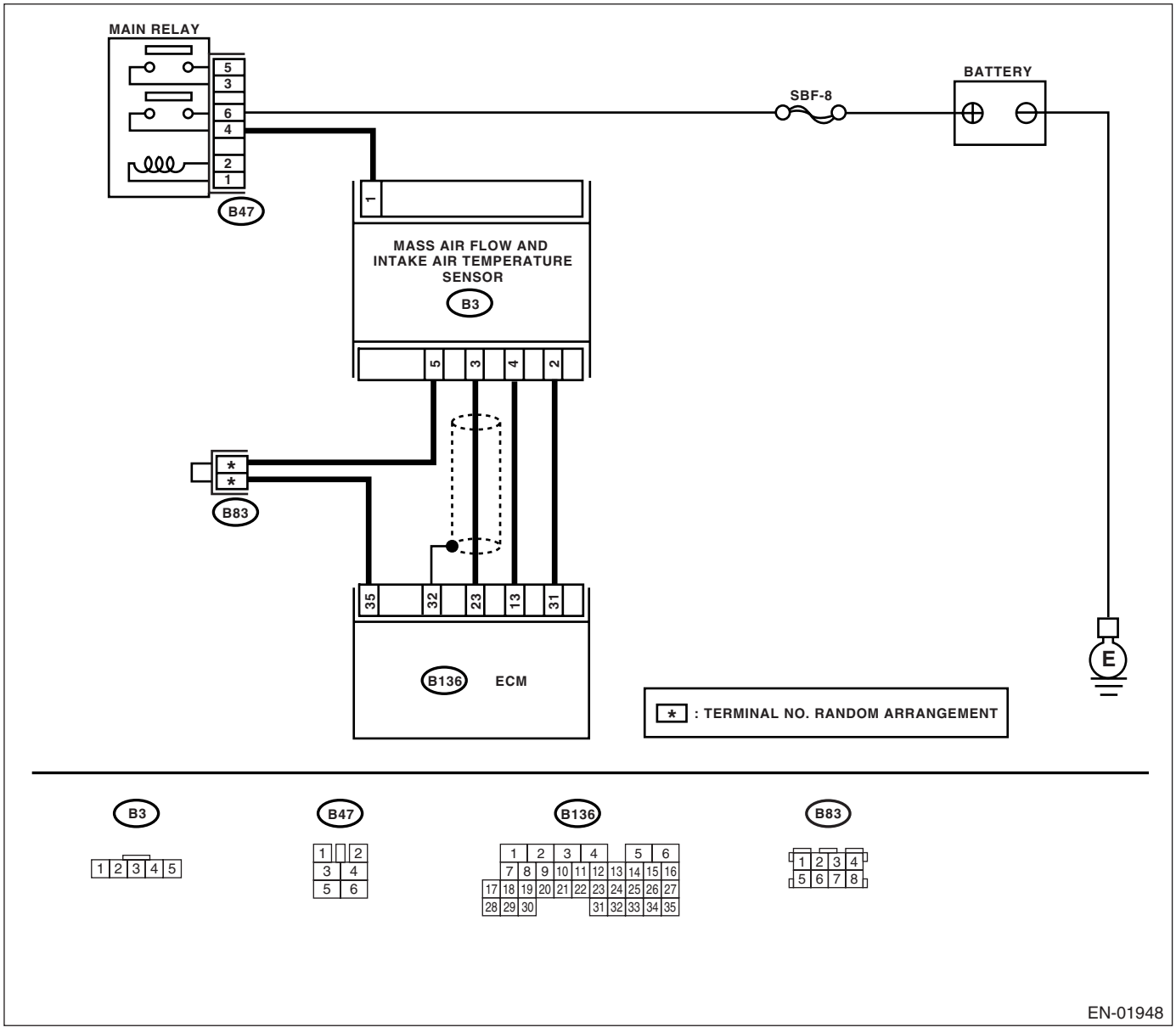
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is the value less than −36°C (−33°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in ness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in ness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

K: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

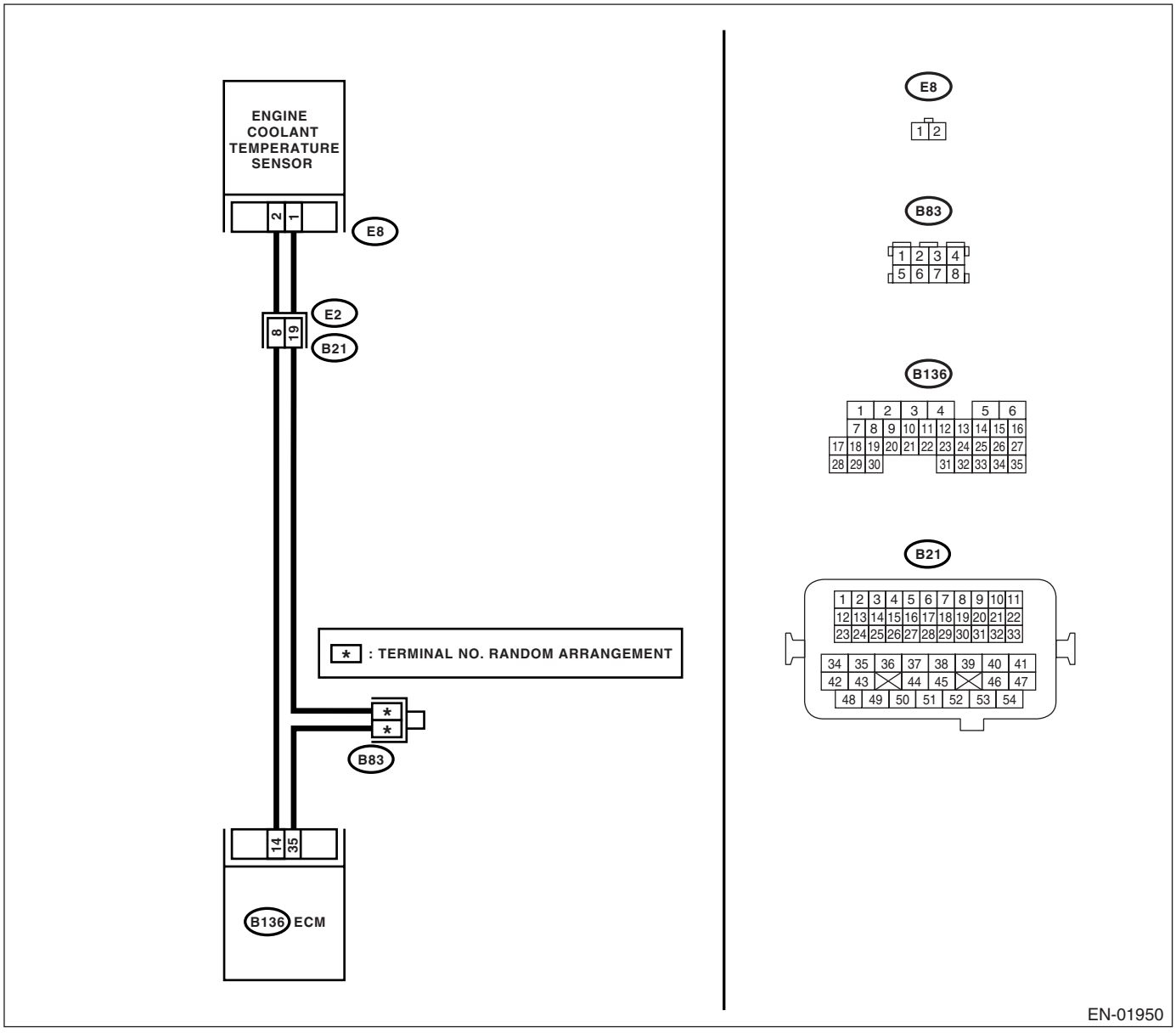
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is engine coolant temperature more than 120°C (248°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is engine coolant temperature more than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-23, Engine Coolant Temperature Sensor.>	Repair the ground short circuit in harness between engine coolant temperature sensor and ECM connector.

L: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

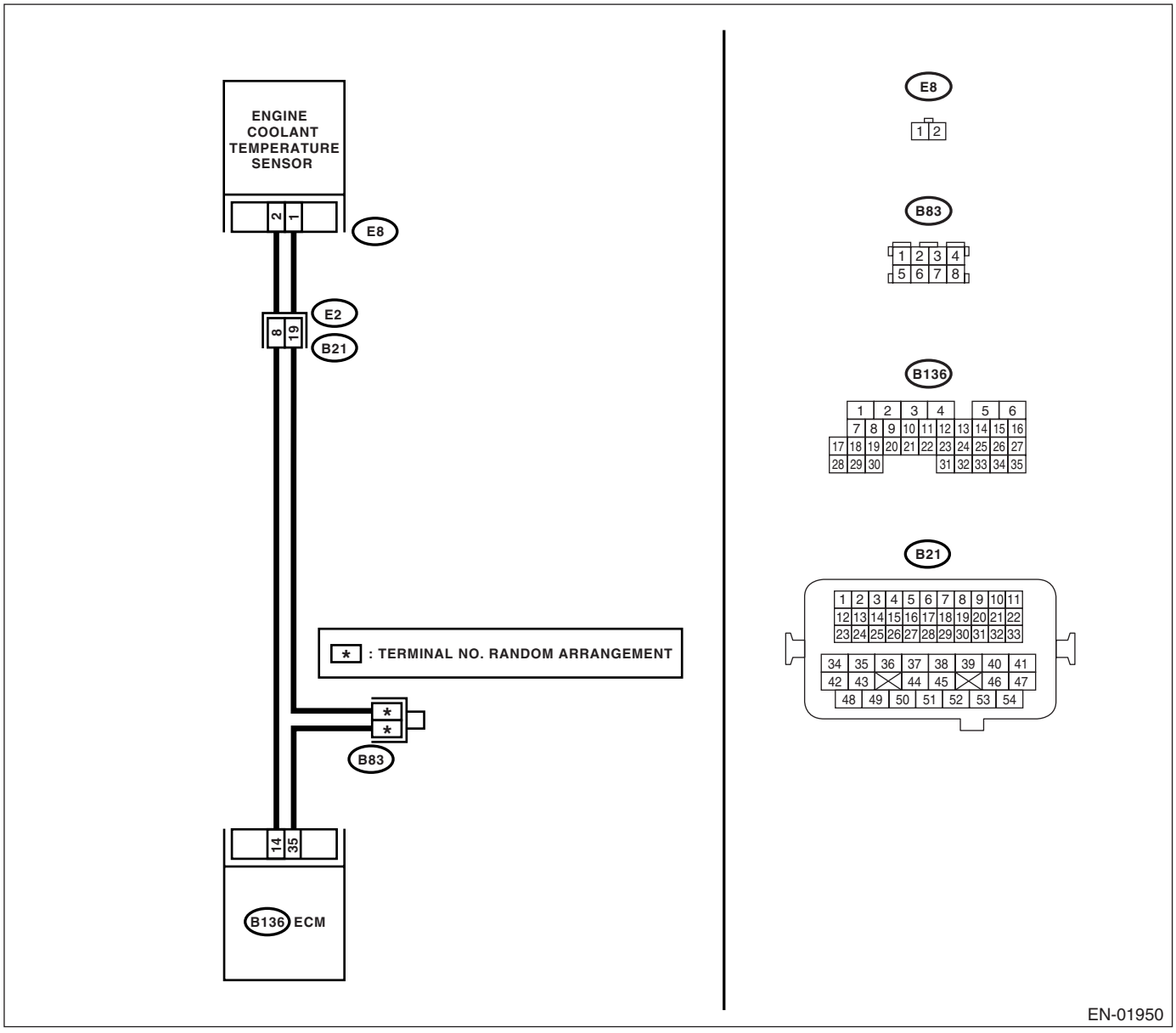
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is engine coolant temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case, repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-23, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

M: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

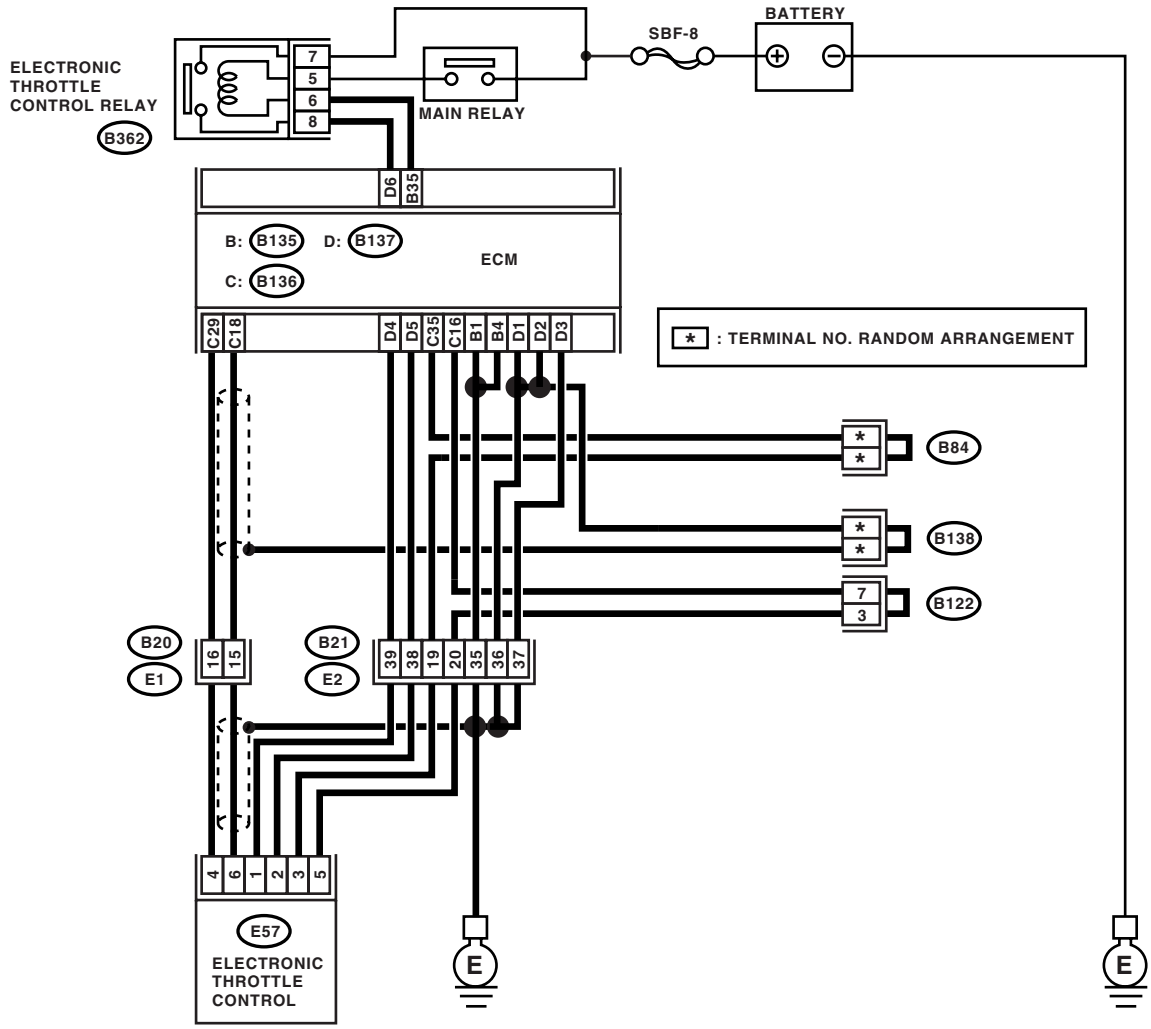
DTC DETECTING CONDITION:

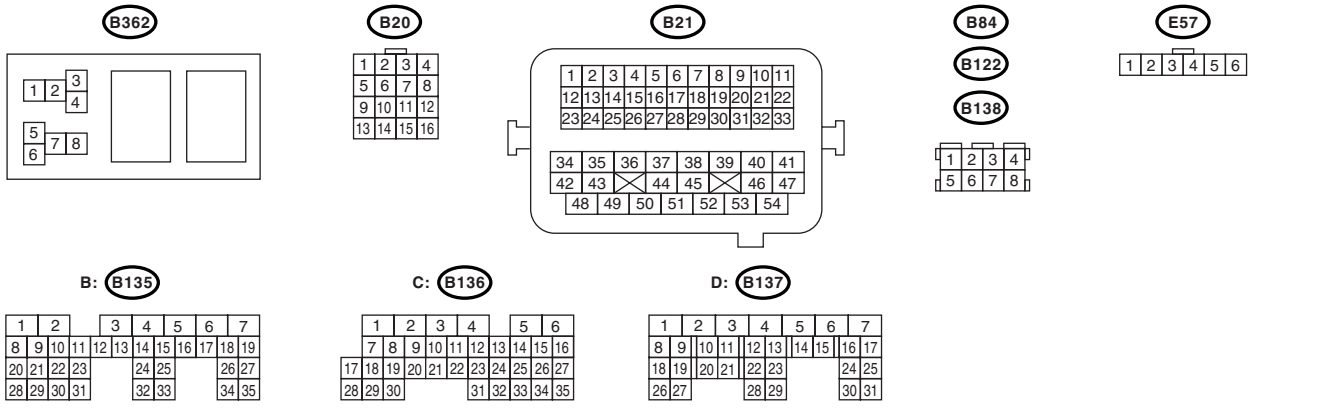
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 16 — (E57) No. 5:*** ***(B136) No. 18 — (E57) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

N: DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT

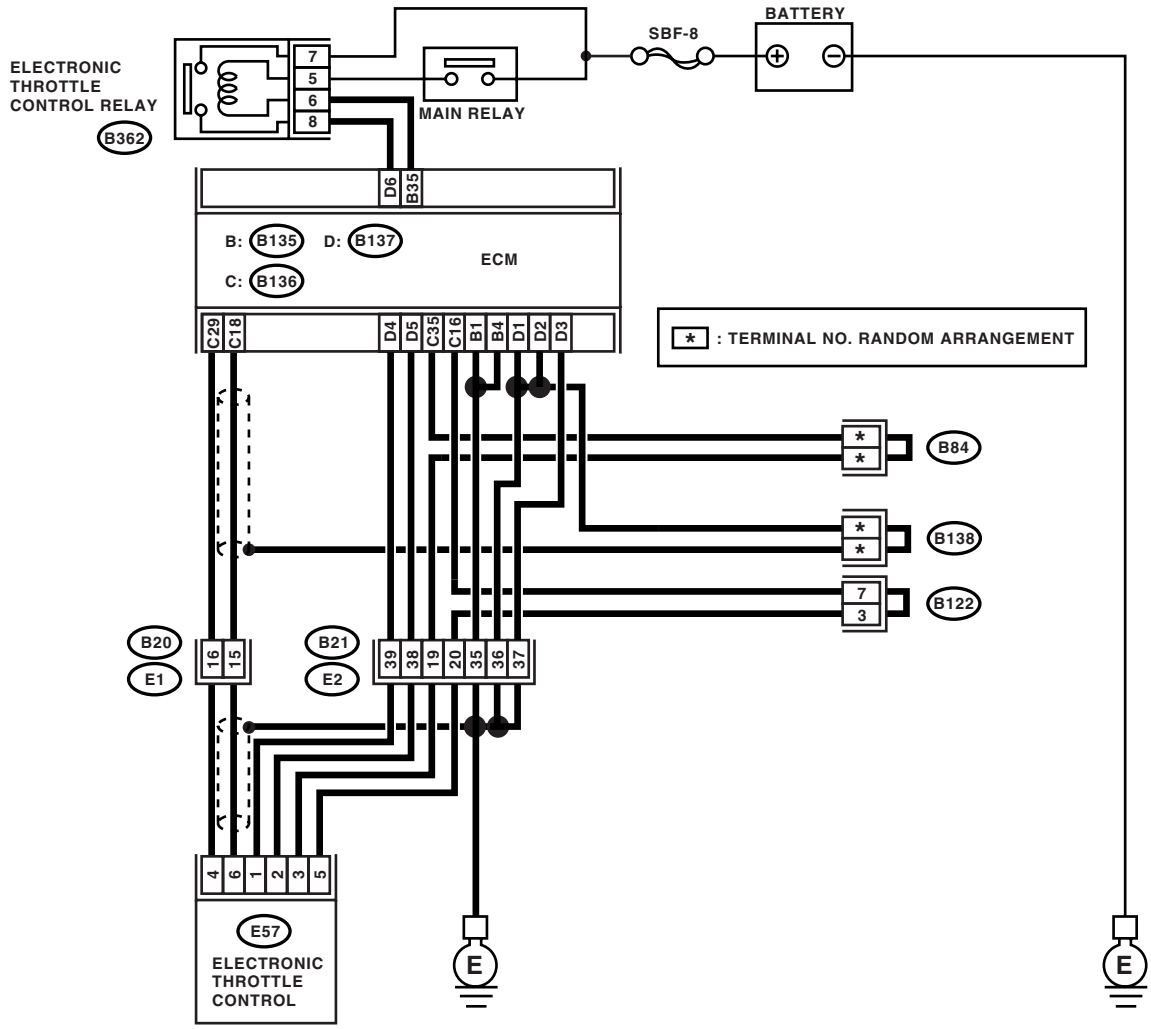
DTC DETECTING CONDITION:

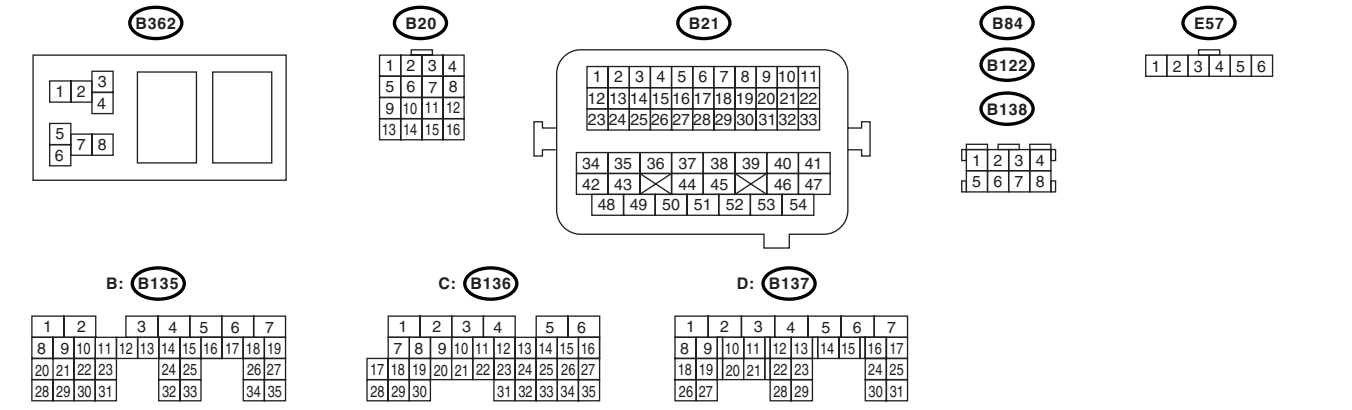
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 35 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):*** 3) Check the voltage change by shaking the harness and connector of ECM and engine harness connector while monitoring the value with voltage meter.	Is the voltage less than 10 V?	Go to step **5.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Repair the electronic throttle control.	Repair the short circuit to sensor power supply.

O: DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

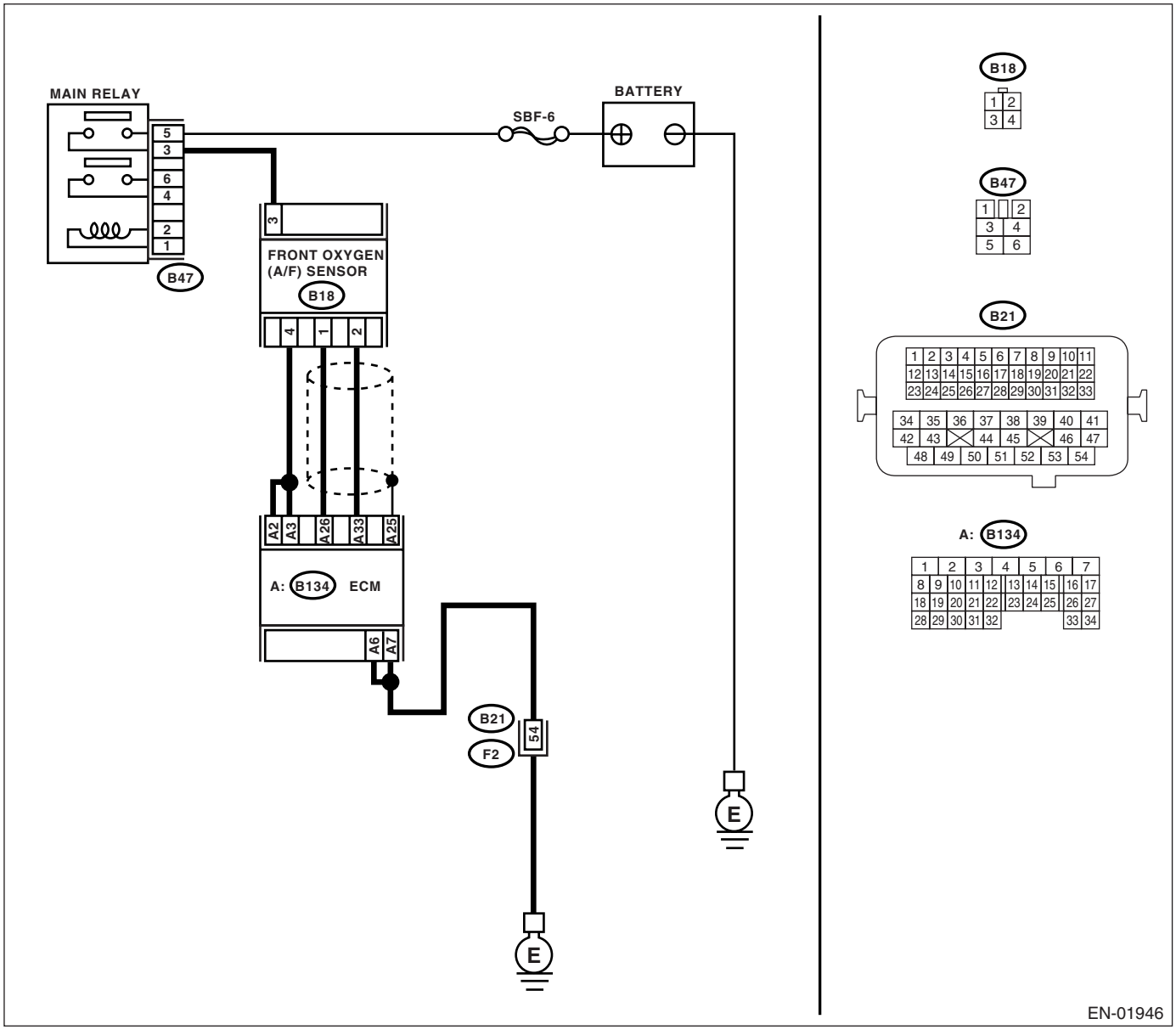
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM connectors. ***Connector & terminal*** ***(B134) No. 26 — (B134) No. 33:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-33, Front Oxygen (A/F) Sensor.>	Repair harness short in harness between ECM and front oxygen (A/F) sensor connector.

P: DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

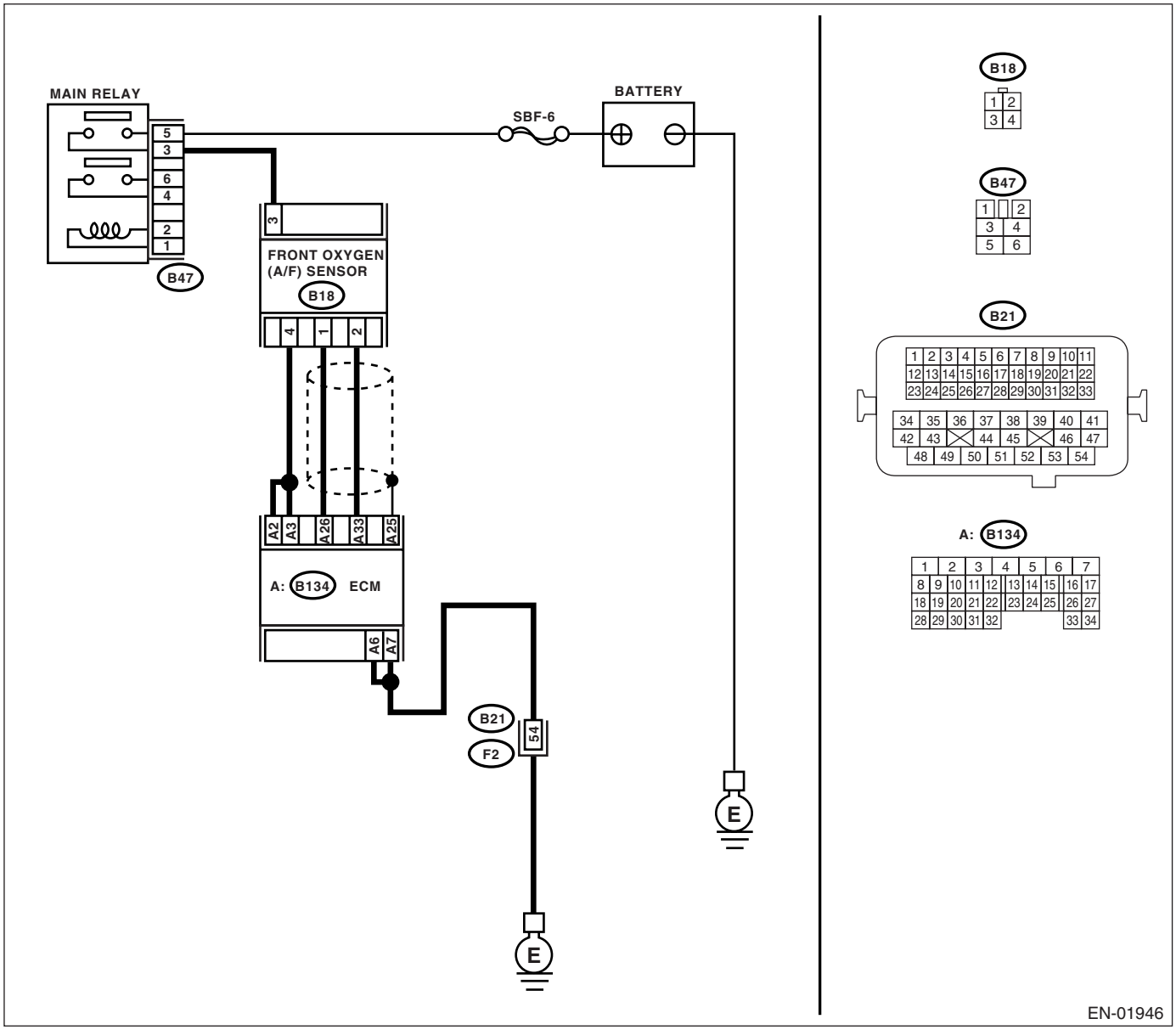
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-33, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

Q: DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

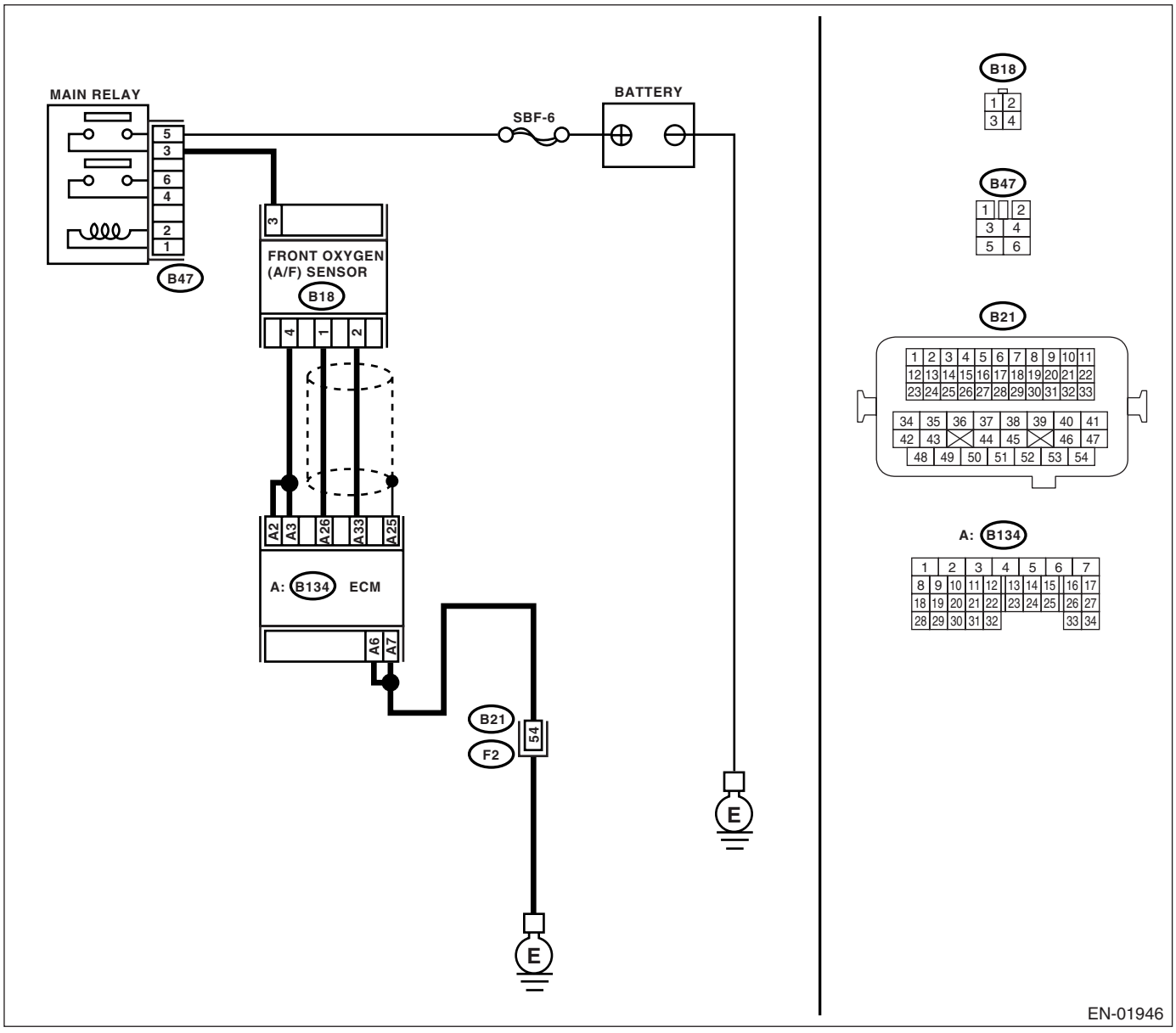
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and front oxygen (A/F) sensor. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (B18) No. 1:*** ***(B134) No. 33 — (B18) No. 2:***	Is the resistance less than 1 Ω?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H4DOTC)-33, Front Oxygen (A/F) Sensor.>	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.

R: DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

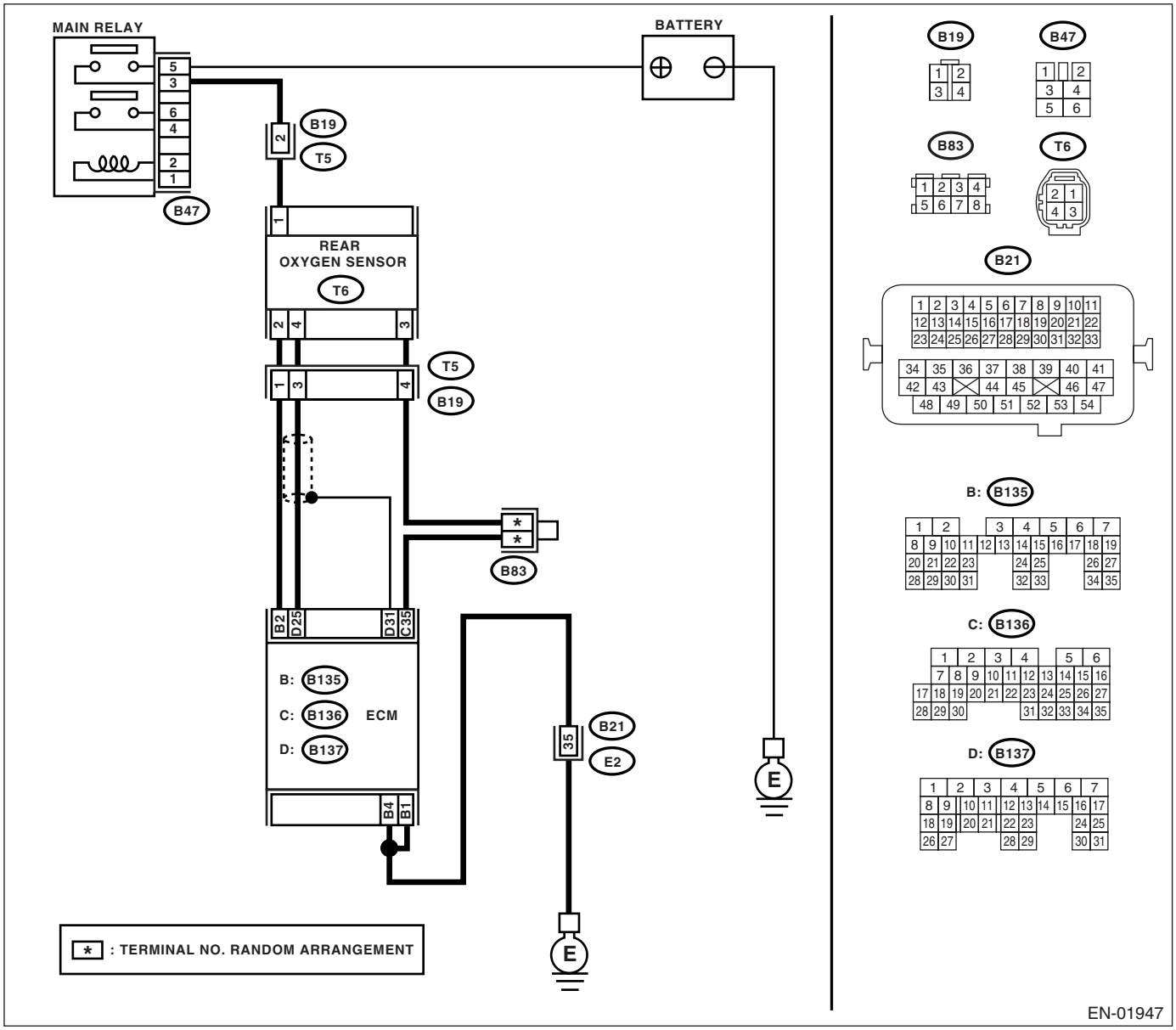
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for 2 minutes. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Does the value fluctuate?	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor.	Is the voltage 0.2 — 0.4 V?	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 25 — (T6) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(T6) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>

S: DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

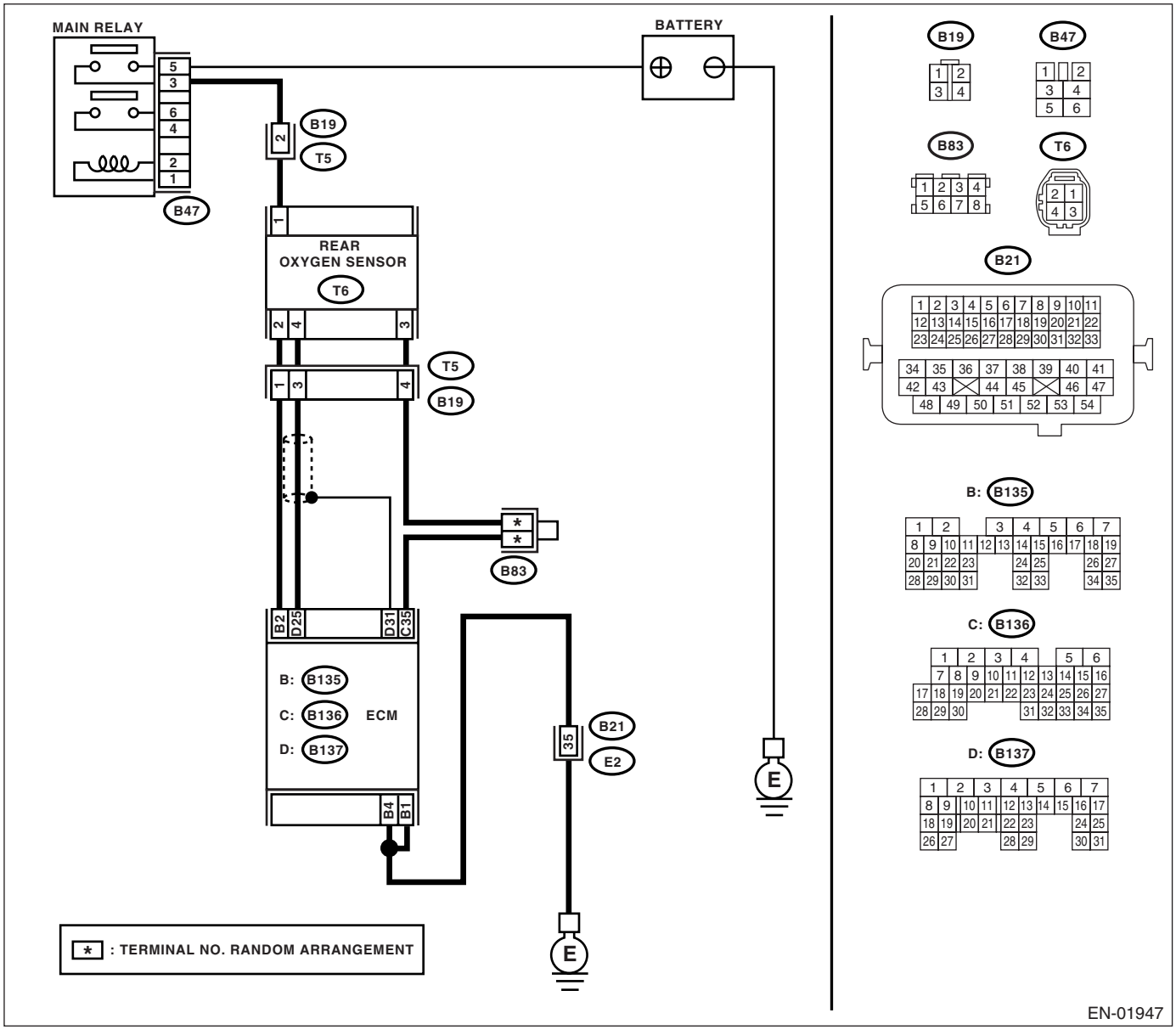
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 2,000 rpm to 3,000 rpm for two minutes. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Does the value fluctuate?	Go to step **6.**	Go to step **3.**
3	**CHECK REAR OXYGEN SENSOR DATA.** Read the data of rear oxygen sensor signal using Subaru Select Monitor.	Is the voltage 0.2 — 0.4 V?	Go to step **4.**	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>
4	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 25 — (T6) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(T6) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
6	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there a fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H4DOTC)-34, Rear Oxygen Sensor.>

T: DTC P0171 SYSTEM TOO LEAN (BANK 1)

NOTE:
For diagnostic procedure, refer to DTC P0172. <Ref. to EN(H4DOTC)(diag)-104, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

U: DTC P0172 SYSTEM TOO RICH (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hoses on air intake system?	Repair air intake system.	Go to step **3.**
3	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for 5 more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose from fuel filter, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 284 — 314 kPa (2.9 — 3.2 kg/cm^2, 41 — 46 psi)?	Go to step **4.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line

	Step	Check	Yes	No
4	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.	Is measured value 206 — 235 kPa (2.1 — 2.4 kg/cm^2, 30 — 34 psi)?	Go to step **5.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
5	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is engine coolant temperature more than 60°C (140°F)?	Go to step **6.**	Replace the engine coolant temperature sensor. <Ref. to FU(H4DOTC)-23, Engine Coolant Temperature Sensor.>
6	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start and warm-up the engine until engine coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Is the measured value within the following? Ignition ON: 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg) Idling: 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg)	Go to step **7.**	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>

	Step	Check	Yes	No
7	**CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.** 1) Start and warm-up the engine until engine coolant temperature is greater than 60°C (140°F). 2) Place the shift lever in neutral position. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Open the hood. 6) Measure the ambient temperature. 7) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedure, refer to "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H4DOTC)(diag)-21, Subaru Select Monitor.>	Subtract the ambient temperature from intake air temperature, and is the value from −10°C (14°F) to 50°C (122°F)?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Check mass air flow and intake air temperature sensor. <Ref. to FU(H4DOTC)-28, Mass Air Flow and Intake Air Temperature Sensor.>

V: DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW INPUT

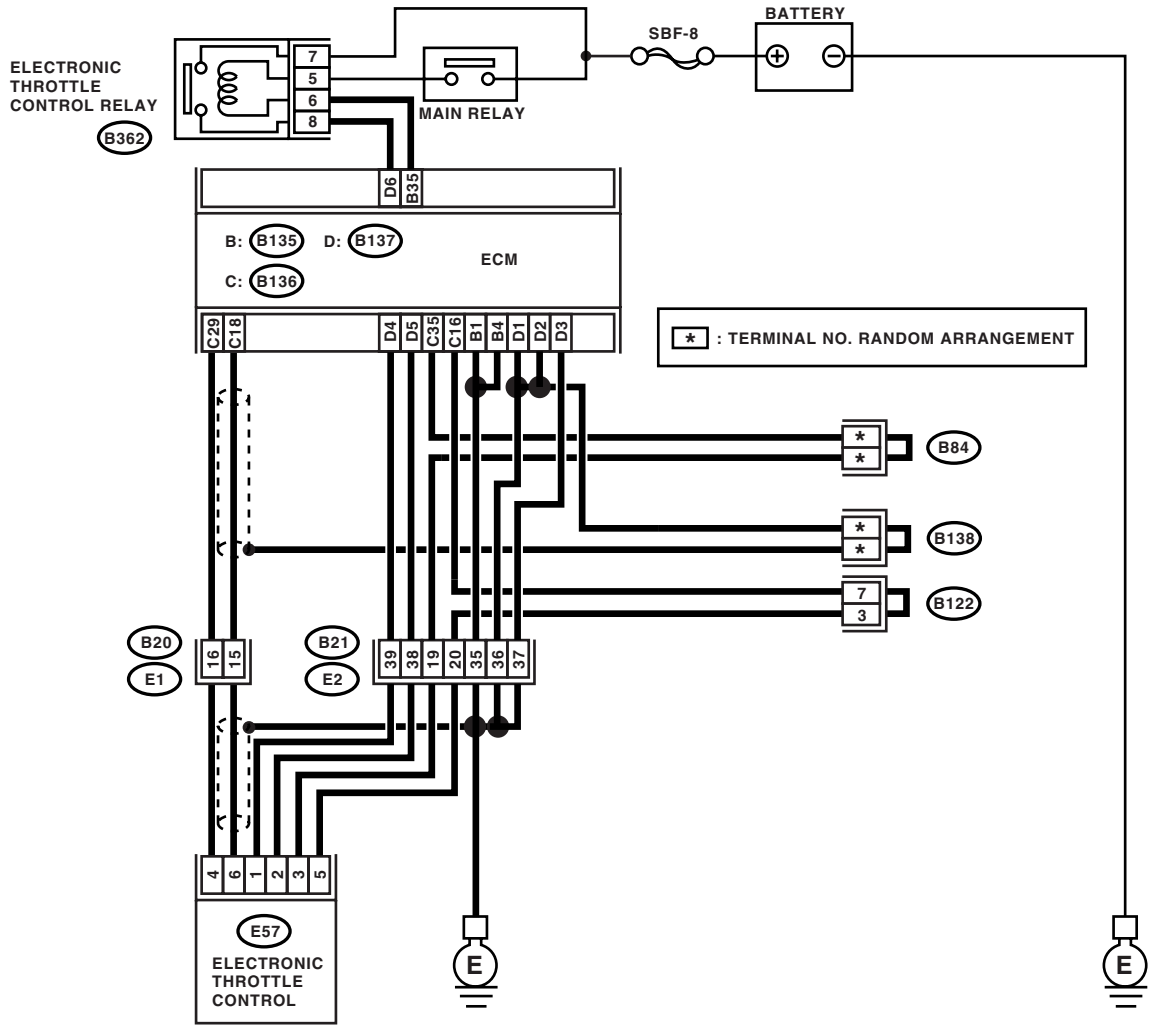
DTC DETECTING CONDITION:

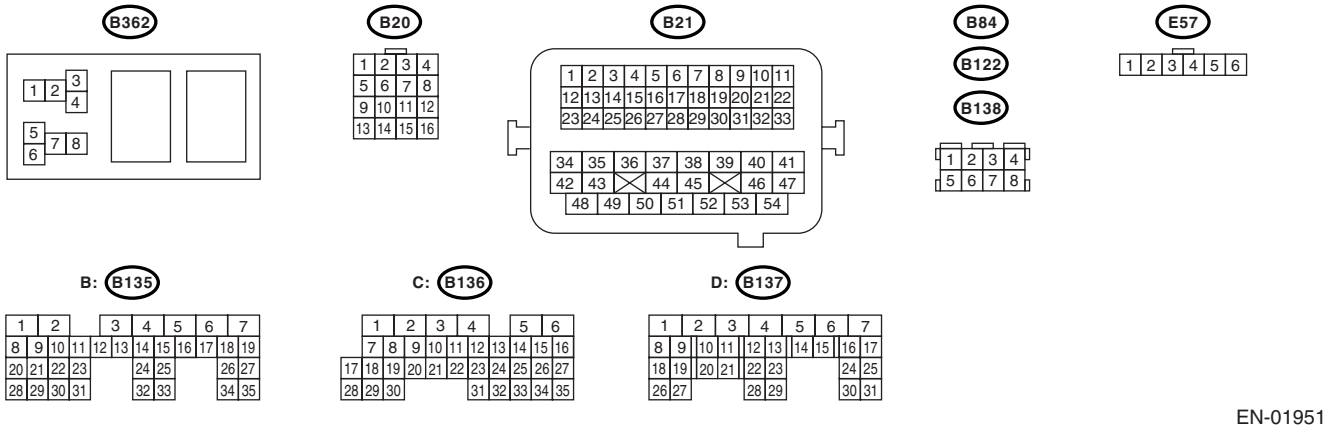
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 16 — (E57) No. 5:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT INSIDE THE ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

W: DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH INPUT

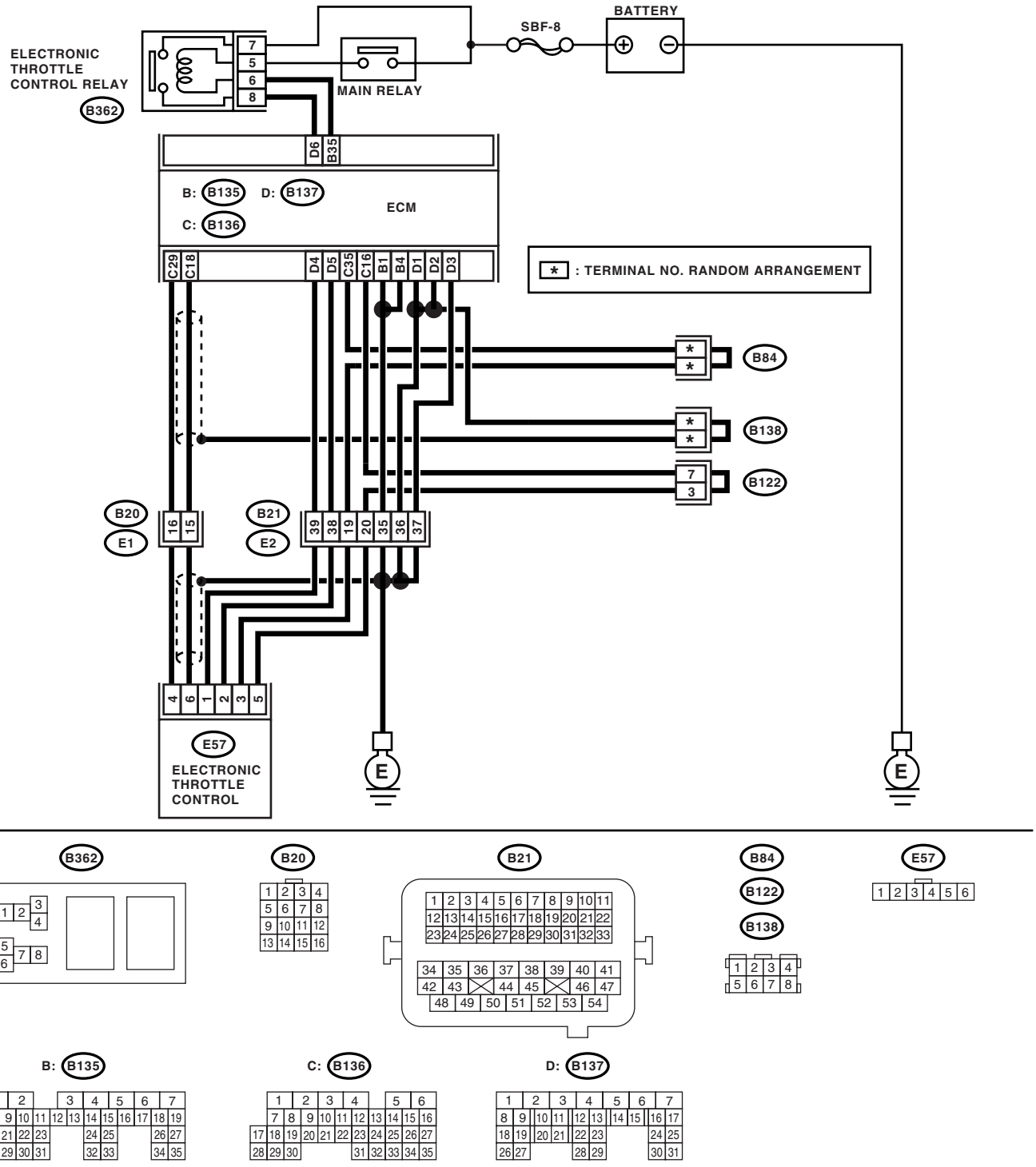
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:



EN-01951

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **5.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Repair the electronic throttle control.	Sensor power supply circuit may be shorted.

X: DTC P0230 FUEL PUMP PRIMARY CIRCUIT

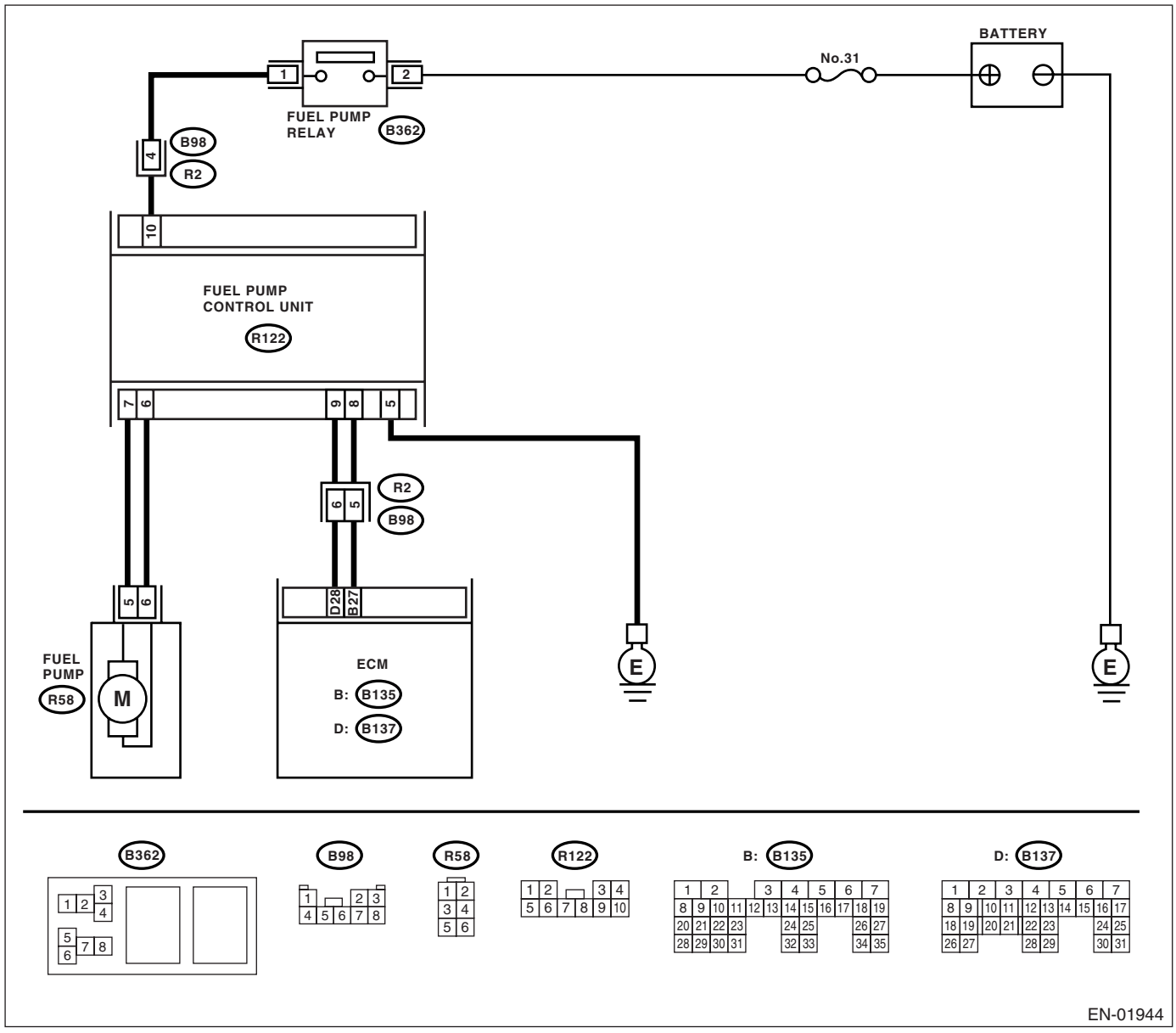
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel pump control unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply circuit. NOTE: In this case, repair the following: • Open or ground short circuit in harness between fuel pump relay and fuel pump control unit • Poor contact in fuel pump control unit connector • Poor contact in fuel pump relay connector
2	**CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit between fuel pump control unit and chassis ground • Poor contact in fuel pump control unit connector
3	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** 1) Disconnect the connector from fuel pump. 2) Measure the resistance of harness between fuel pump control unit and fuel pump connector. ***Connector & terminal*** ***(R122) No. 7 — (R58) No. 5:*** ***(R122) No. 6 — (R58) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit between fuel pump control unit and fuel pump.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 7 — Chassis ground:*** ***(R122) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit between fuel pump control unit and fuel pump.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance in harness between fuel pump control unit and ECM connector. ***Connector & terminal*** ***(R122) No. 9 — (B137) No. 28:*** ***(R122) No. 8 — (B135) No. 27:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit between fuel pump control unit and ECM • Poor contact in fuel pump control unit and ECM connector
6	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 9 — Chassis ground:*** ***(R122) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between fuel pump control unit and ECM.
7	**CHECK POOR CONTACT.** Check poor contact in ECM and fuel pump control unit connector.	Is there poor contact in ECM and fuel pump control unit connector?	Repair the poor contact in ECM and fuel pump control unit.	Go to step **8.**
8	**CHECK EXPERIENCE OF RUNNING OUT OF FUEL.**	Did the vehicle experience running out of fuel?	Finish the diagnosis. NOTE: DTC record may be conducted as a result of fuel pump idling while running out of fuel.	Replace the fuel pump control unit. <Ref. to FU(H4DOTC)-39, Fuel Pump Control Unit.>

Y: DTC P0245 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” LOW

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

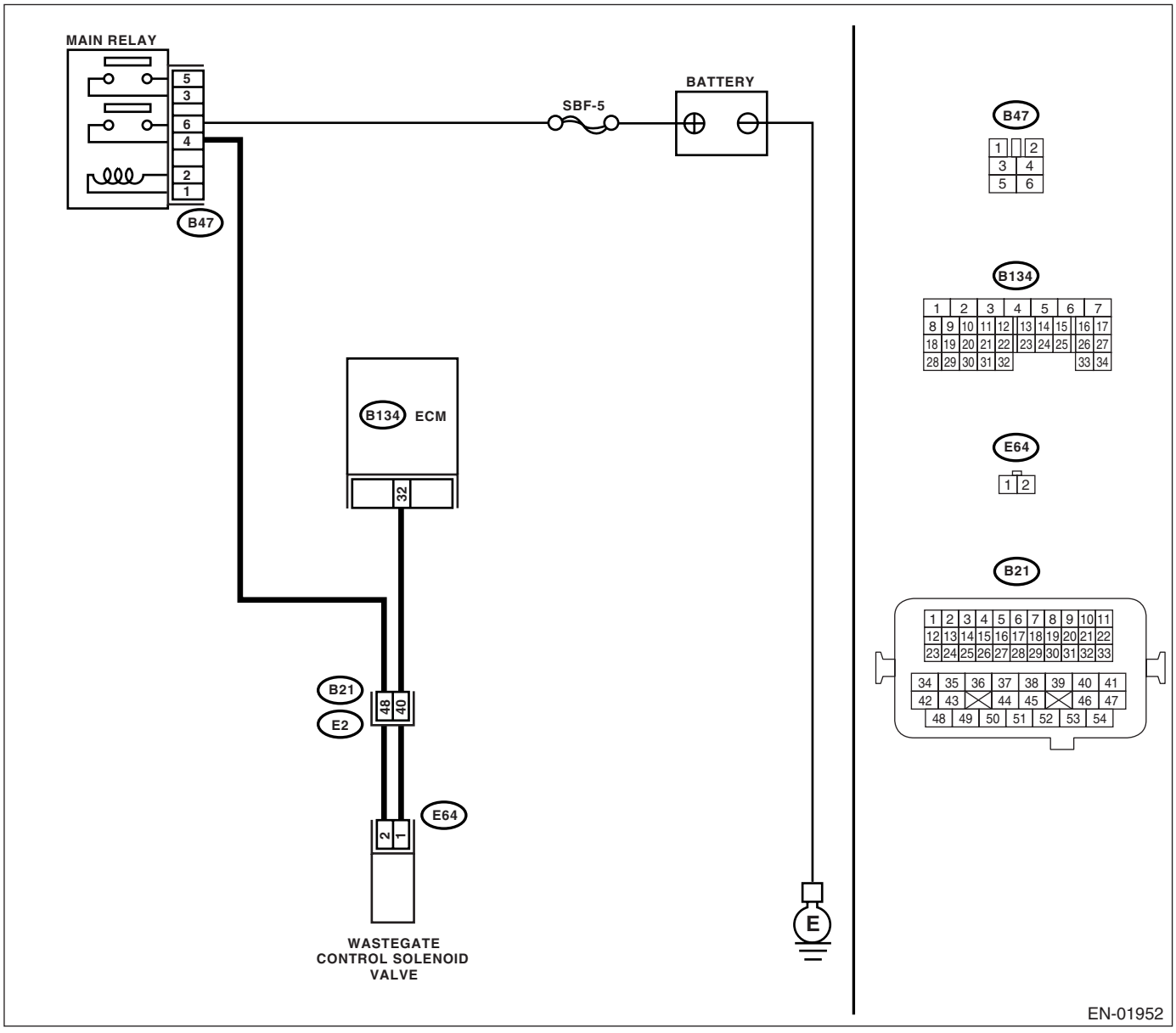
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 32 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from wastegate control solenoid valve and ECM. 3) Measure the resistance in harness between wastegate control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E64) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and wastegate control solenoid valve connector.
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between wastegate control solenoid valve of harness connector and ECM. ***Connector & terminal*** ***(B134) No. 32 — (E64) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and wastegate control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and wastegate control solenoid valve connector
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Remove the wastegate control solenoid valve. 2) Measure the resistance between wastegate control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 30 — 34 Ω?	Go to step **5.**	Replace the wastegate control solenoid valve. <Ref. to FU(H4DOTC)-32, Wastegate Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between wastegate control solenoid valve and engine ground. ***Connector & terminal*** ***(E64) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and wastegate control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in wastegate control solenoid valve connector.	Is there poor contact in wastegate control solenoid valve connector?	Repair the poor contact in wastegate control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

Z: DTC P0246 TURBO/SUPER CHARGER WASTEGATE SOLENOID “A” HIGH

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

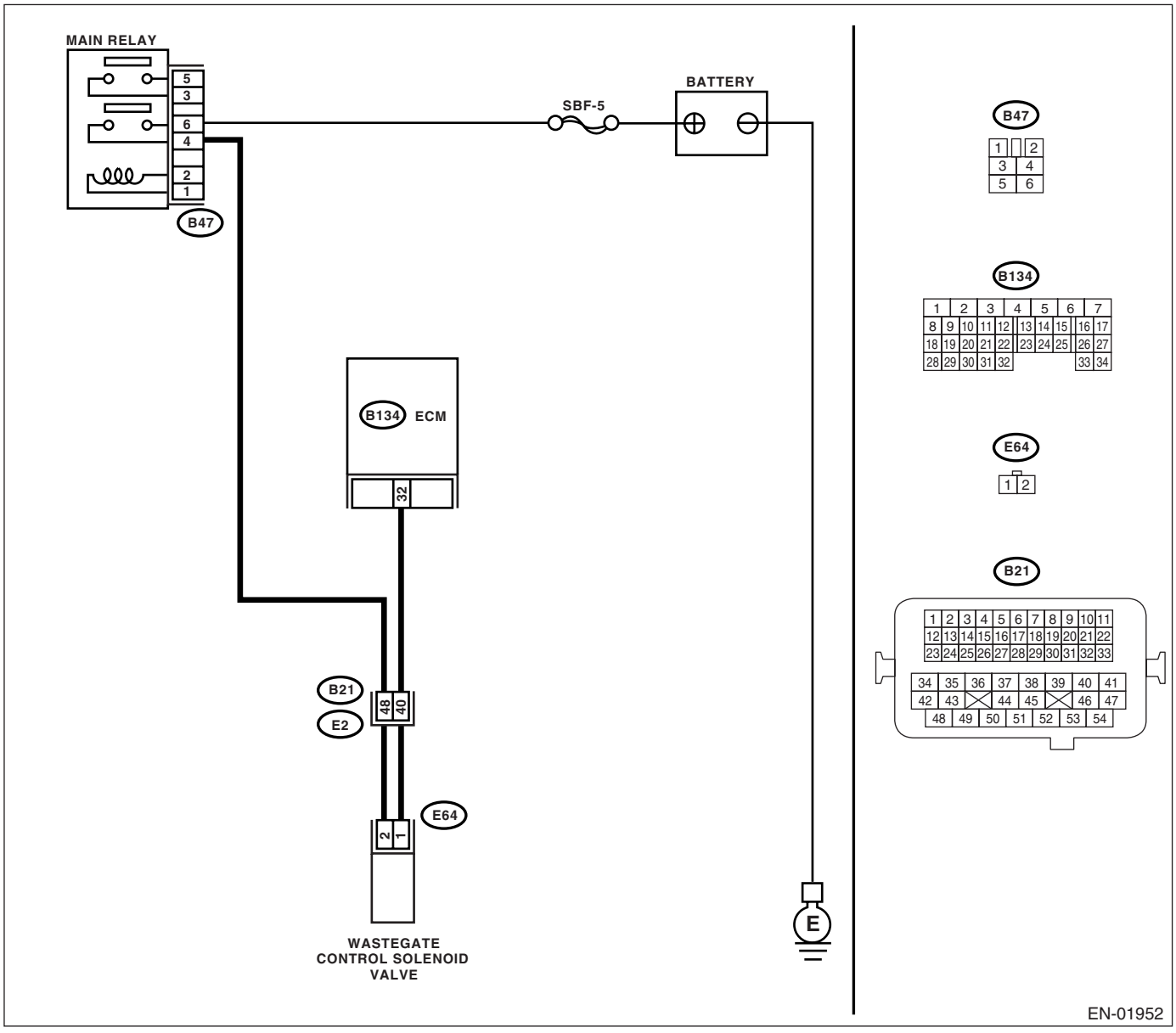
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 32 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
3	**CHECK HARNESS BETWEEN WASTEGATE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from wastegate control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 32 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and wastegate control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Go to step **4.**
4	**CHECK WASTEGATE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between wastegate control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the wastegate control solenoid valve and ECM. <Ref. to FU(H4DOTC)-32, Wastegate Control Solenoid Valve.> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

AA:DTC P0261 CYLINDER 1 INJECTOR CIRCUIT LOW

NOTE:
For the diagnostic procedure, refer to DTC P0270. <Ref. to EN(H4DOTC)(diag)-119, DTC P0270 CYLINDER 4 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AB:DTC P0264 CYLINDER 2 INJECTOR CIRCUIT LOW

NOTE:
For the diagnostic procedure, refer to DTC P0270. <Ref. to EN(H4DOTC)(diag)-119, DTC P0270 CYLINDER 4 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC P0267 CYLINDER 3 INJECTOR CIRCUIT LOW

NOTE:
For the diagnostic procedure, refer to DTC P0270. <Ref. to EN(H4DOTC)(diag)-119, DTC P0270 CYLINDER 4 INJECTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AD:DTC P0270 CYLINDER 4 INJECTOR CIRCUIT LOW

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

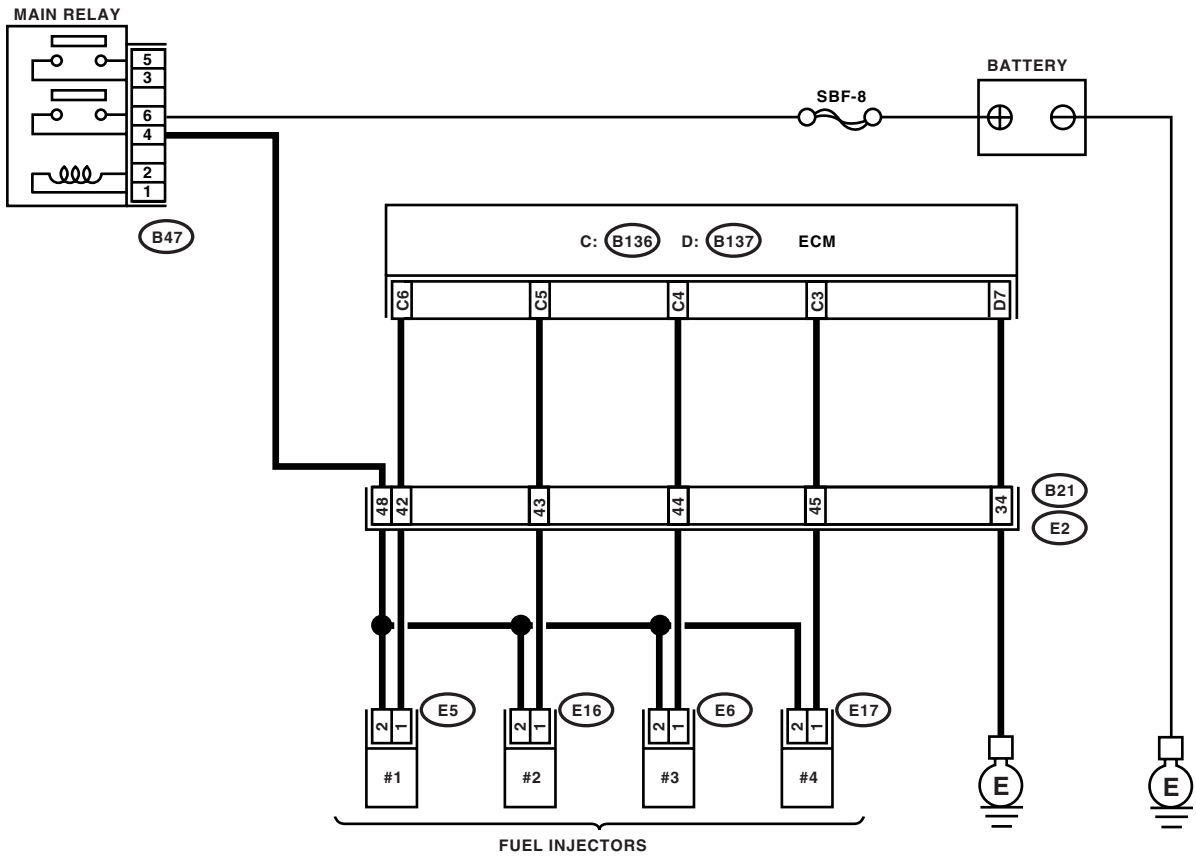
TROUBLE SYMPTOM:

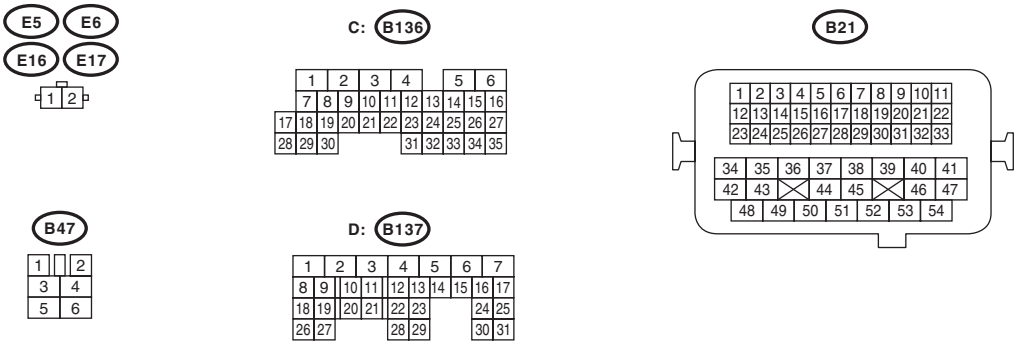
- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-01945

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between main relay and fuel injector connector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
2	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 11 — 12 Ω?	Go to step **3.**	Replace the faulty fuel injector and ECM. <Ref. to FU(H4DOTC)-30, Fuel Injector.>
3	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Connect the connector to the fuel injector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the poor contact in fuel injector and ECM connector.	Repair ground open circuit in ECM.

AE:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

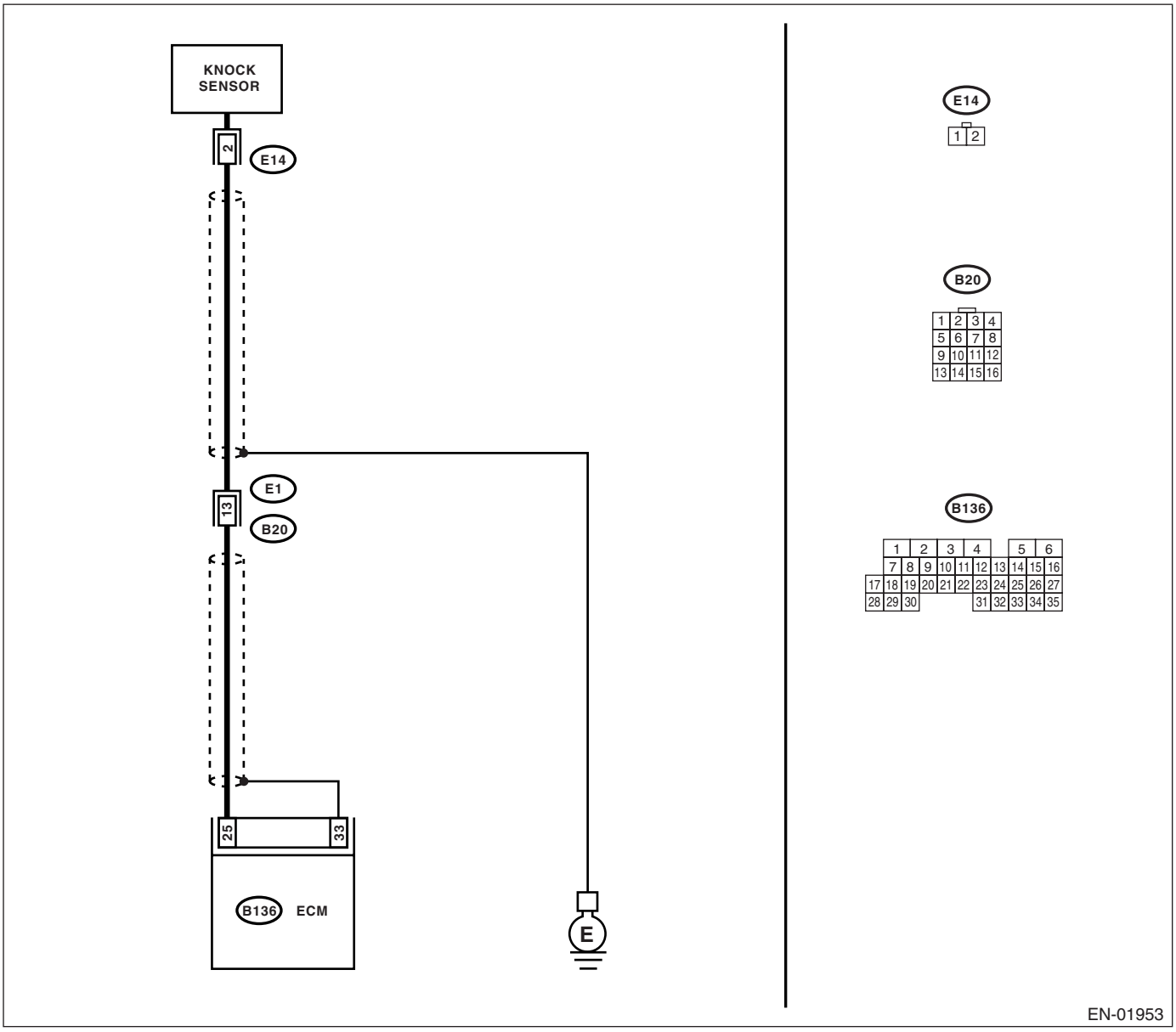
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the followingin this case, repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the followingin this case, repair the following: • Poor contact in knock sensor connector • Poor contact in coupling connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H4DOTC)-26, Knock Sensor.>	Tighten knock sensor installation bolt securely.

AF:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

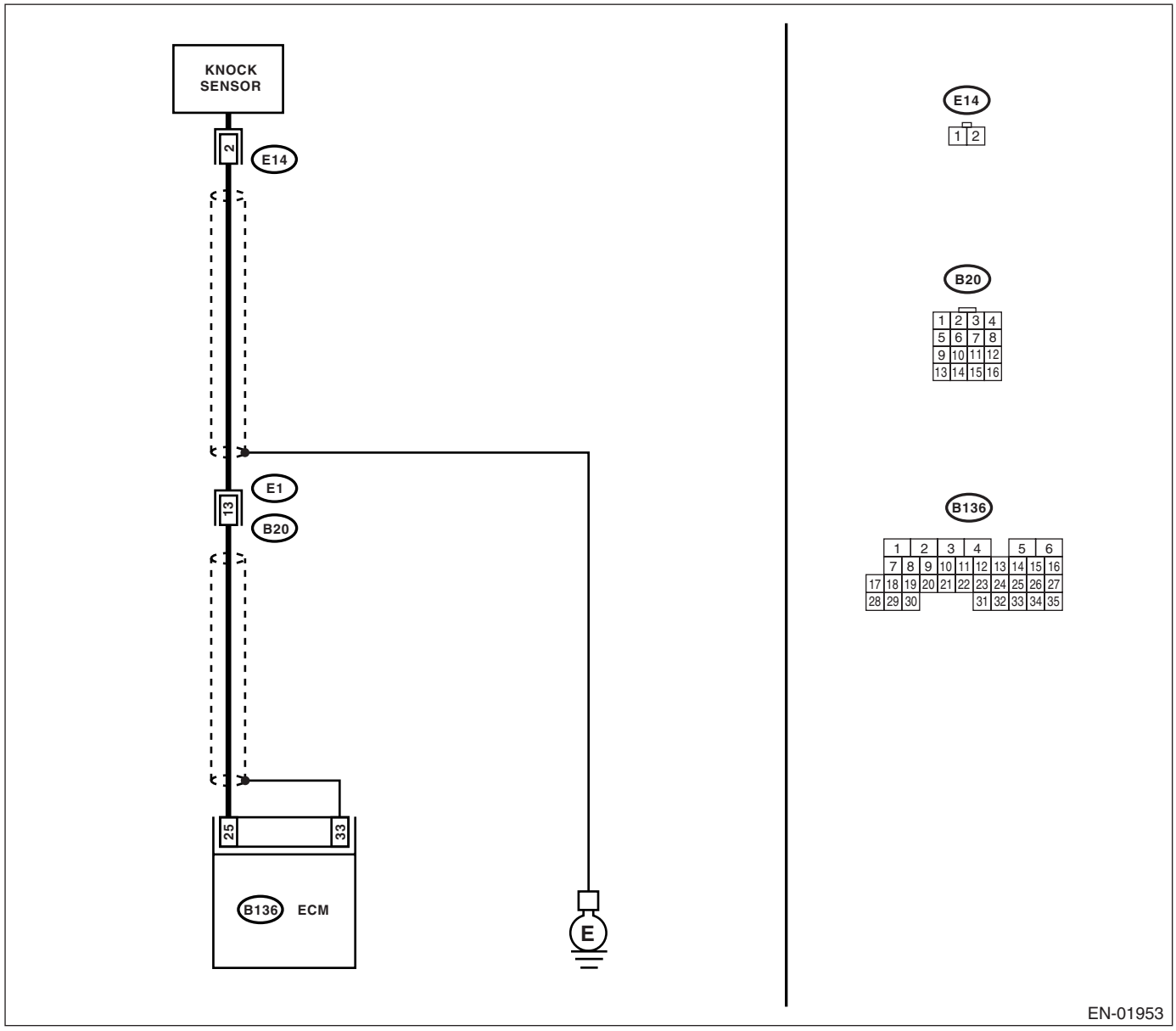
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H4DOTC)-26, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit in harness covered with shield.
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case, repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

AG:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

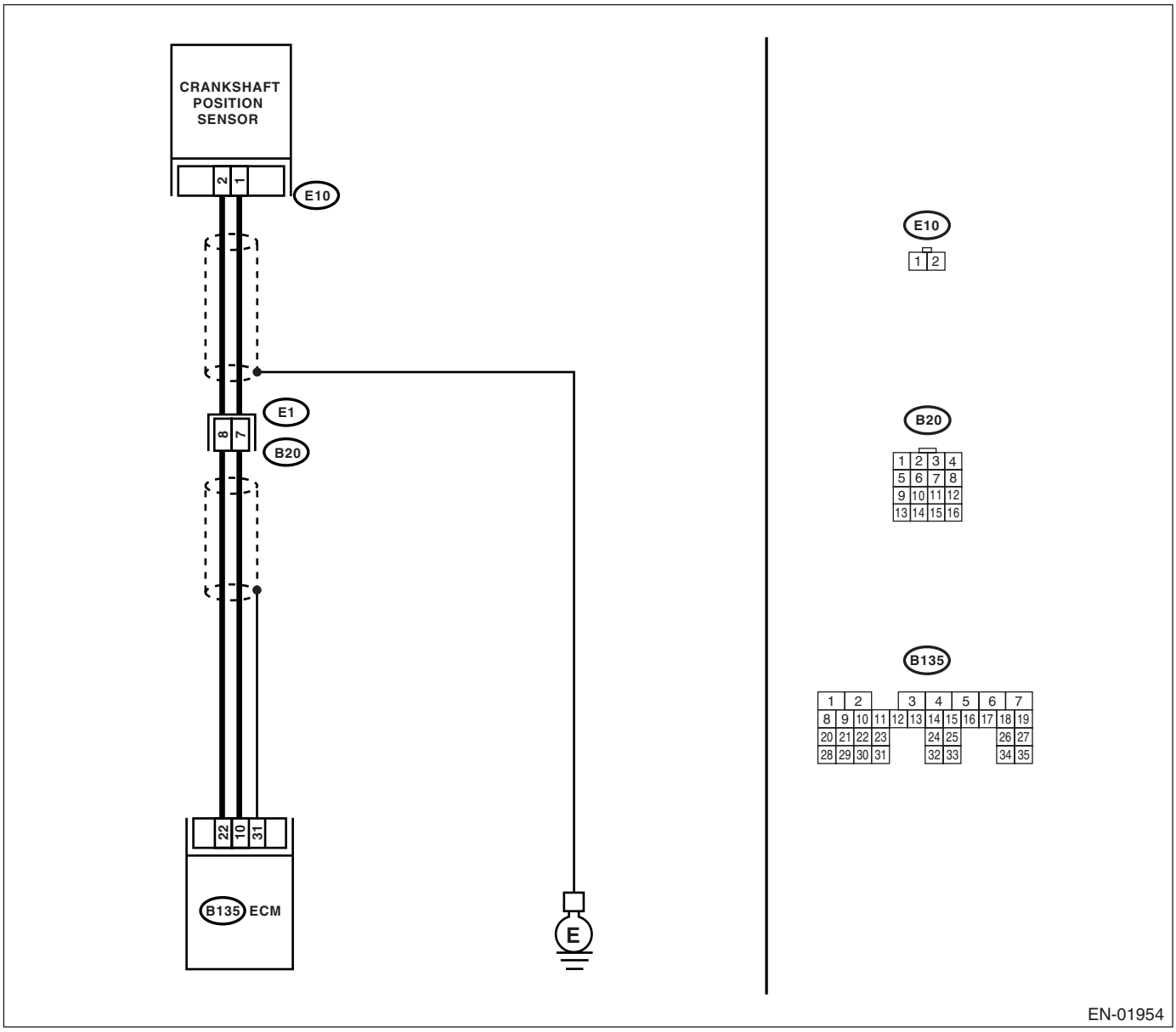
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — (B135) No. 10:*** ***(E10) No. 2 — (B135) No. 22:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:*** ***(E10) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H4DOTC)-24, Crankshaft Position Sensor.>

AH:DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

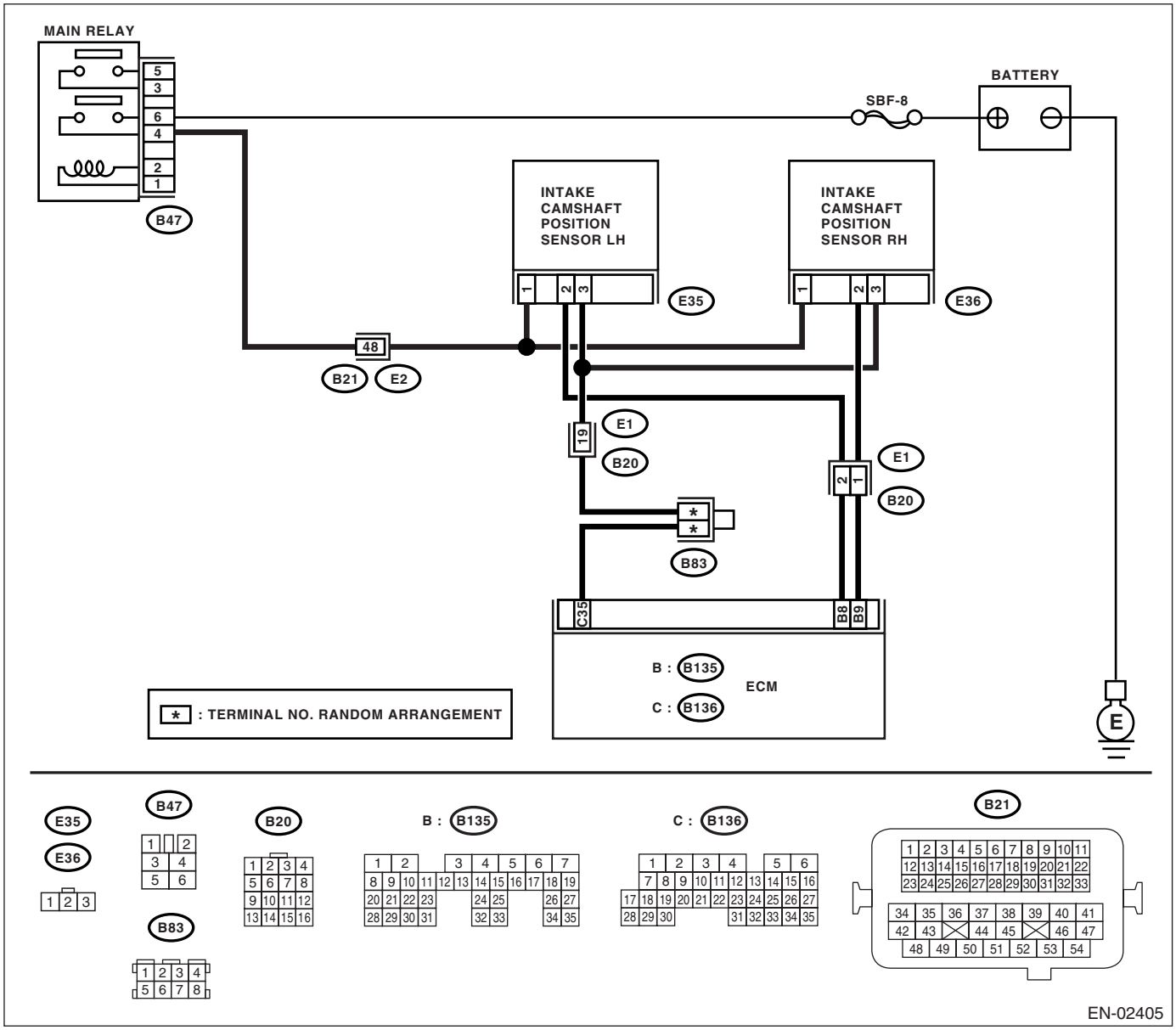
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3.**
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E36) No. 2 — (B135) No. 9:*** ***(E36) No. 3 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E36) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7.**	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H4DOTC)(diag)-15, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-24, Crankshaft Position Sensor.>	Go to step **8.**
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

AI: DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

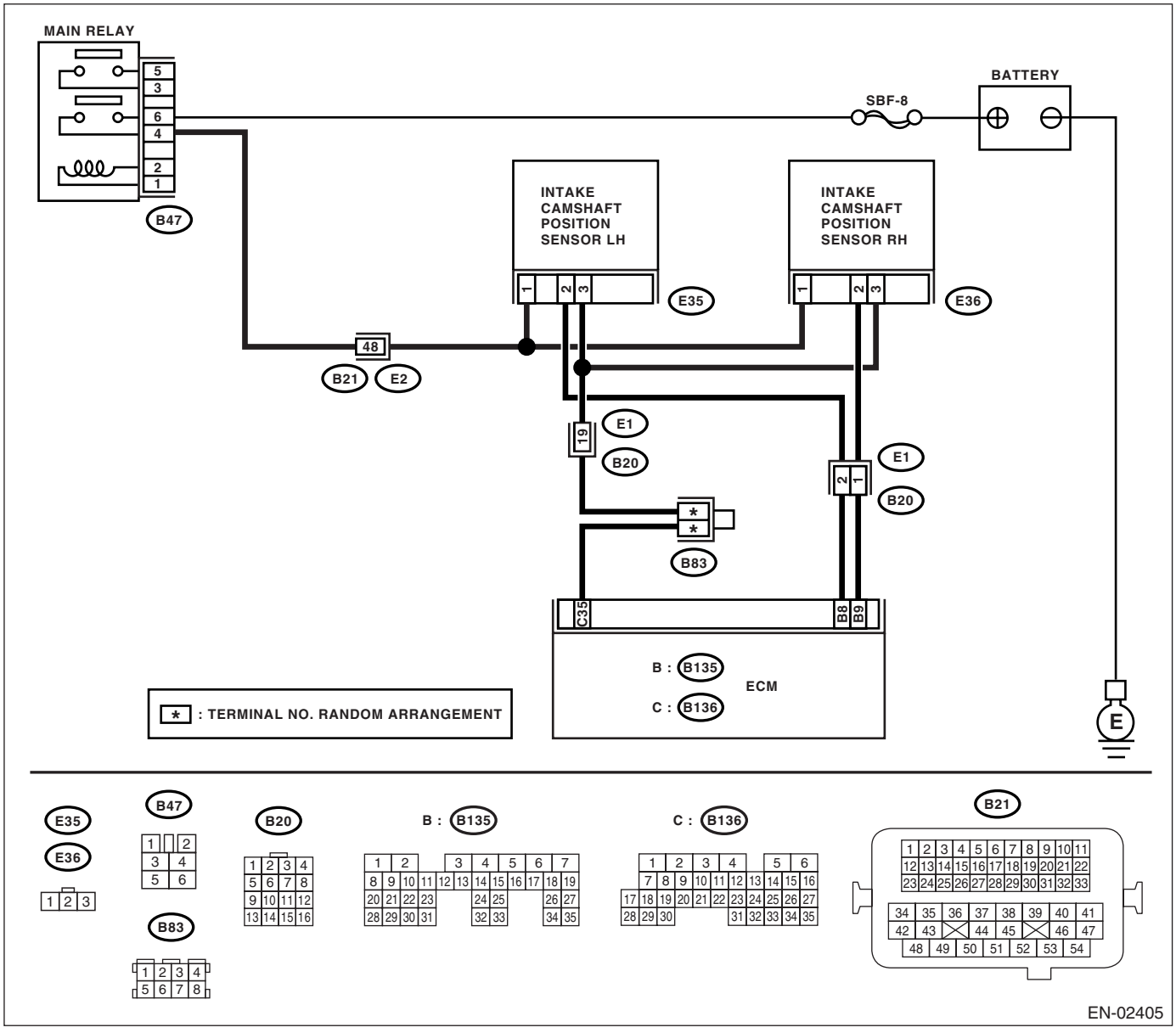
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3.**
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E35) No. 2 — (B135) No. 8:*** ***(E35) No. 3 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E35) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7.**	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H4DOTC)(diag)-15, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-25, Camshaft Position Sensor.>	Go to step **8.**
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

AJ:DTC P0350 IGNITION COIL PRIMARY/SECONDARY CIRCUIT

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

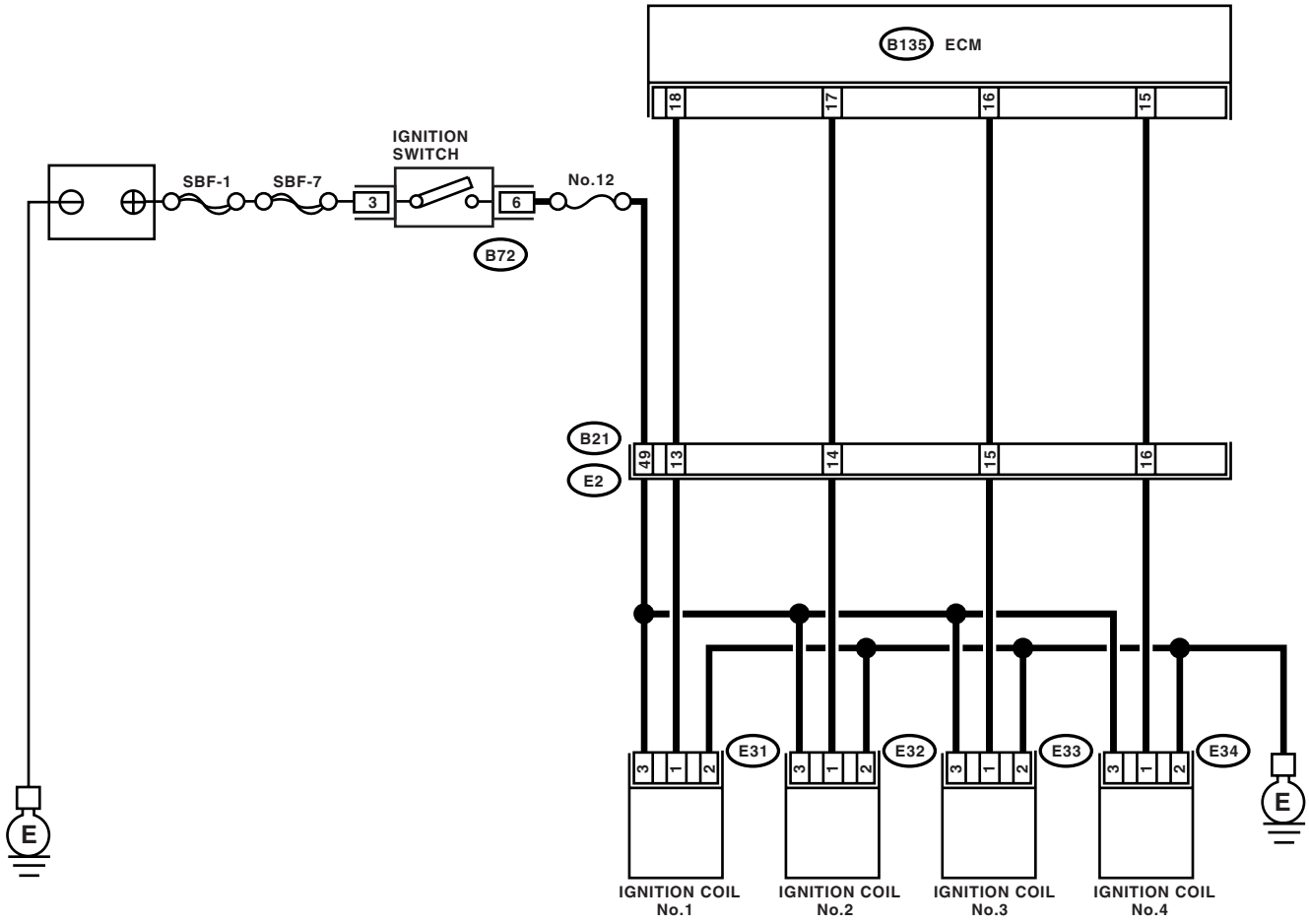
TROUBLE SYMPTOM:

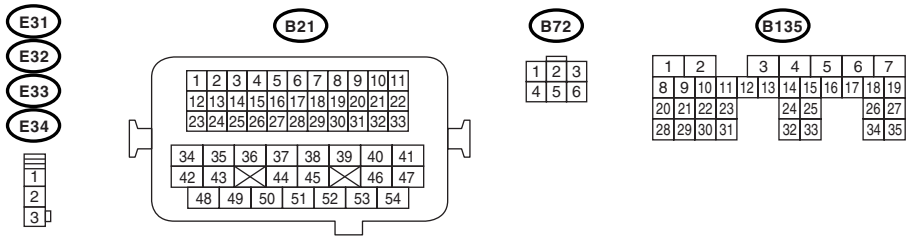
- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02404

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY and ignition switch connector • Poor contact in coupling connector
2	**CHECK HARNESS OF ECM AND IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Disconnect the connector from ignition coil & ignitor ASSY. 2) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***(B135) No. 18 — (E31) No. 1:*** ***(B135) No. 17 — (E32) No. 1:*** ***(B135) No. 16 — (E33) No. 1:*** ***(B135) No. 15 — (E34) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connectorrepair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal:*** ***(E31) No. 1 — Engine ground:*** ***(E32) No. 1 — Engine ground:*** ***(E32) No. 1 — Engine ground:*** ***(E34) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in terminal.	Repair the harness and connectorrepair the harness and connector.

AK:DTC P0365 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 1)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

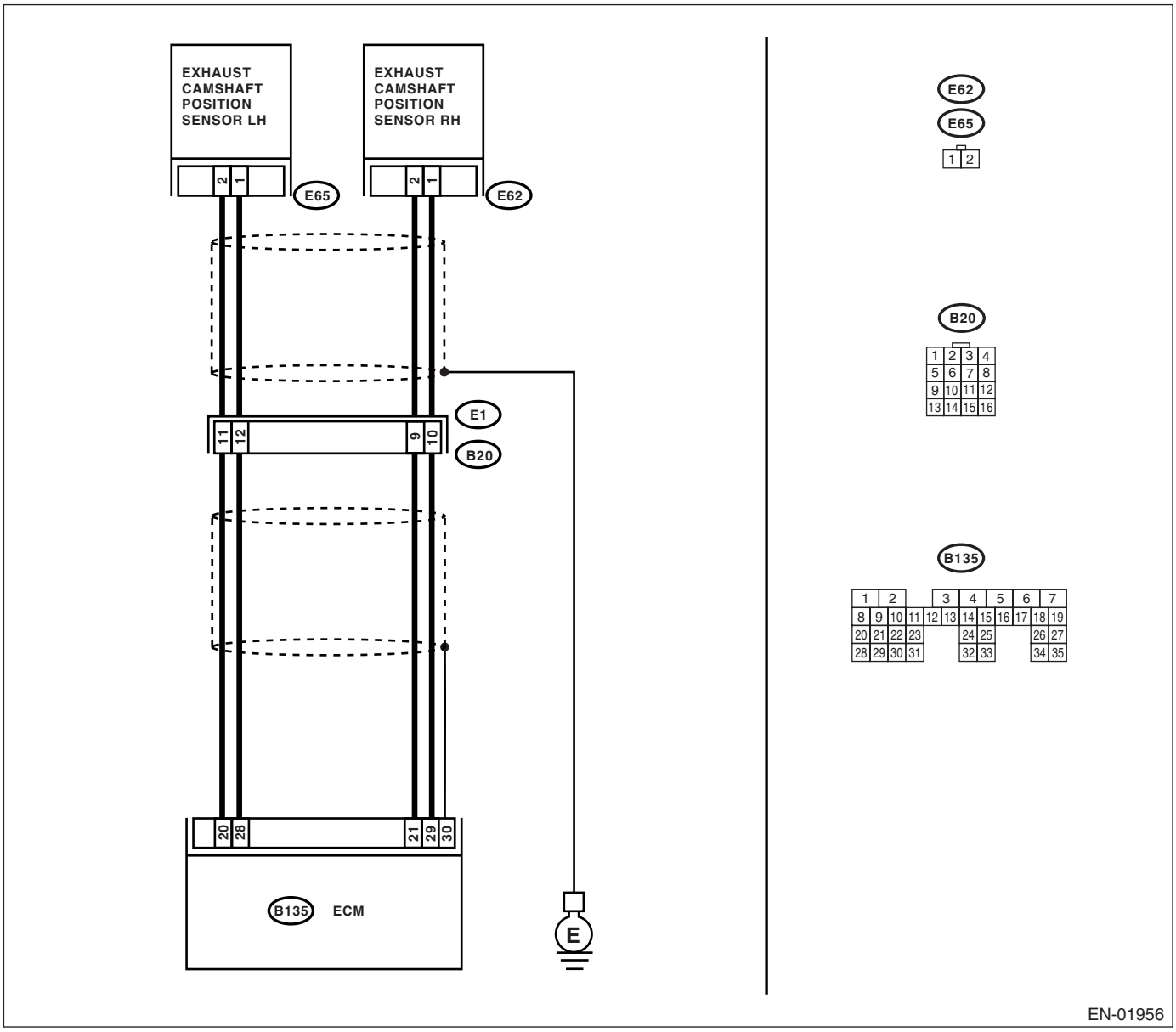
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E62) No. 1 — (B135) No. 29:*** ***(E62) No. 2 — (B135) No. 21:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E62) No. 1 — Engine ground:*** ***(E62) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.
3	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **4.**	Tighten the crankshaft position sensor installation bolt securely.
4	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-25, Camshaft Position Sensor.>

AL:DTC P0390 CAMSHAFT POSITION SENSOR “B” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

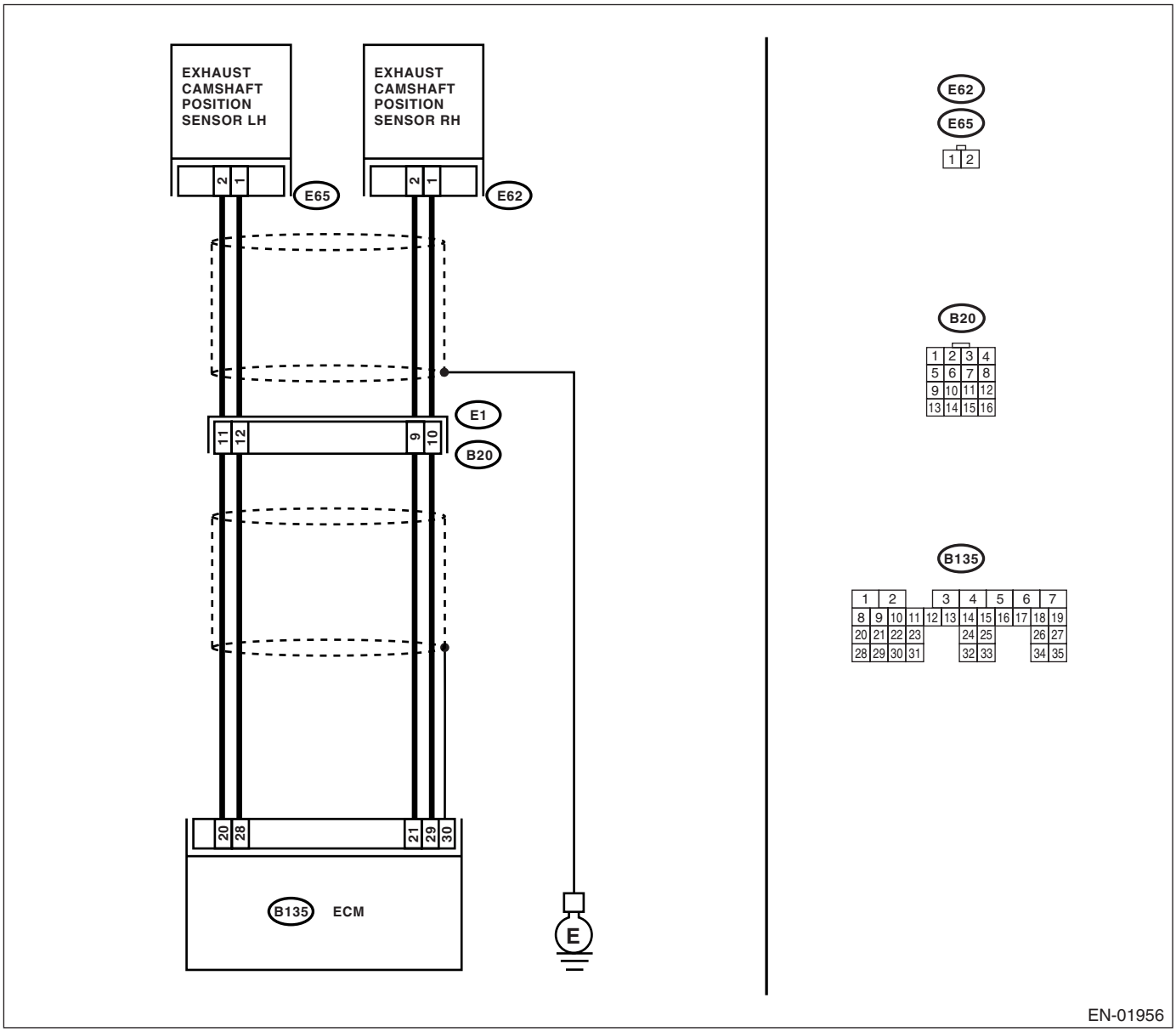
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the resistance of harness between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E65) No. 1 — (B135) No. 28:*** ***(E65) No. 2 — (B135) No. 20:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between camshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E65) No. 1 — Engine ground:*** ***(E65) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between camshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.
3	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **4.**	Tighten the crankshaft position sensor installation bolt securely.
4	**CHECK CAMSHAFT POSITION SENSOR.** 1) Remove the camshaft position sensor. 2) Measure the resistance between connector terminals of camshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in camshaft position sensor connector.	Replace the camshaft position sensor. <Ref. to FU(H4DOTC)-25, Camshaft Position Sensor.>

AM:DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

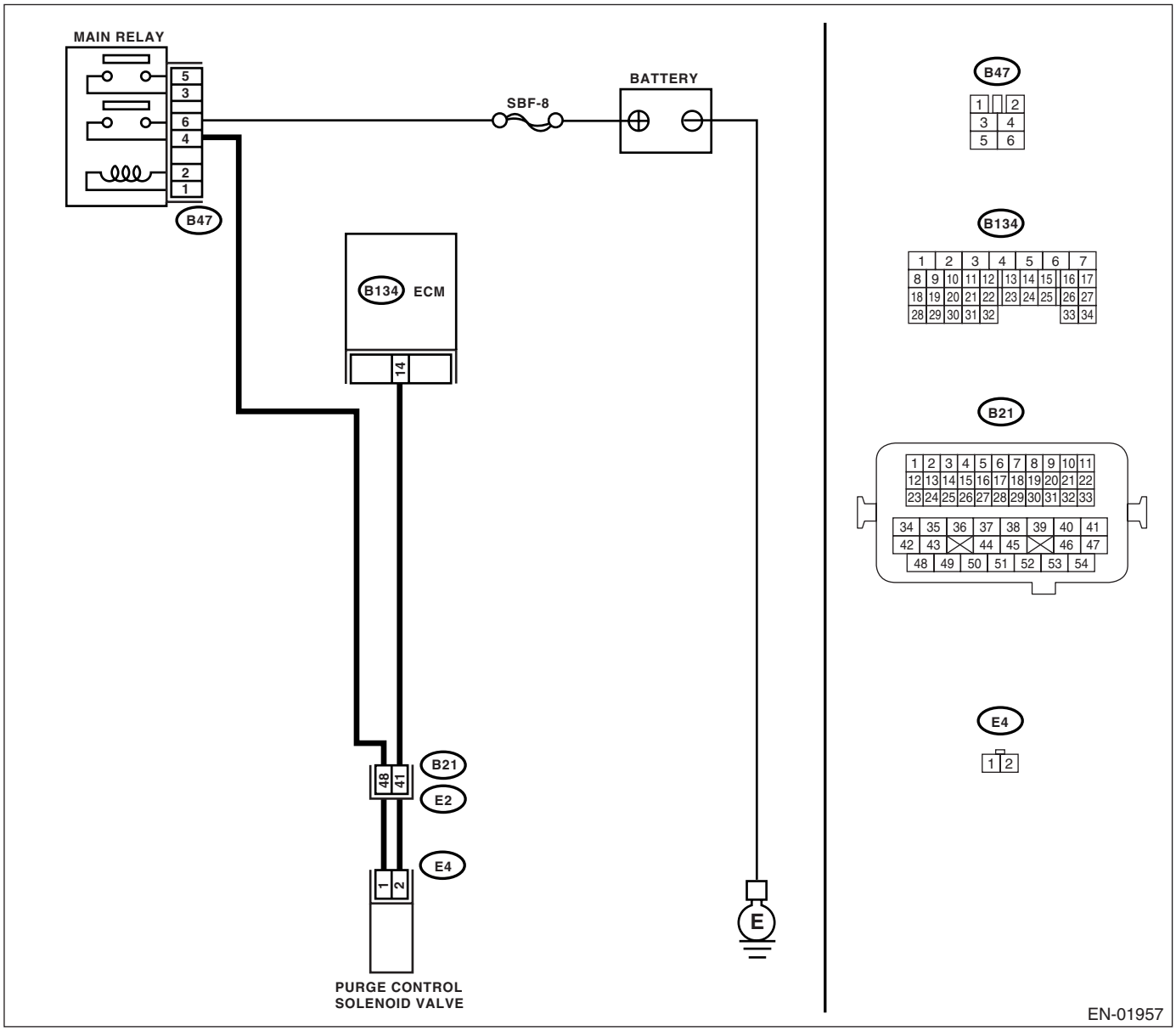
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B134) No. 14 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 29 — 35 Ω?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-6, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

AN:DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

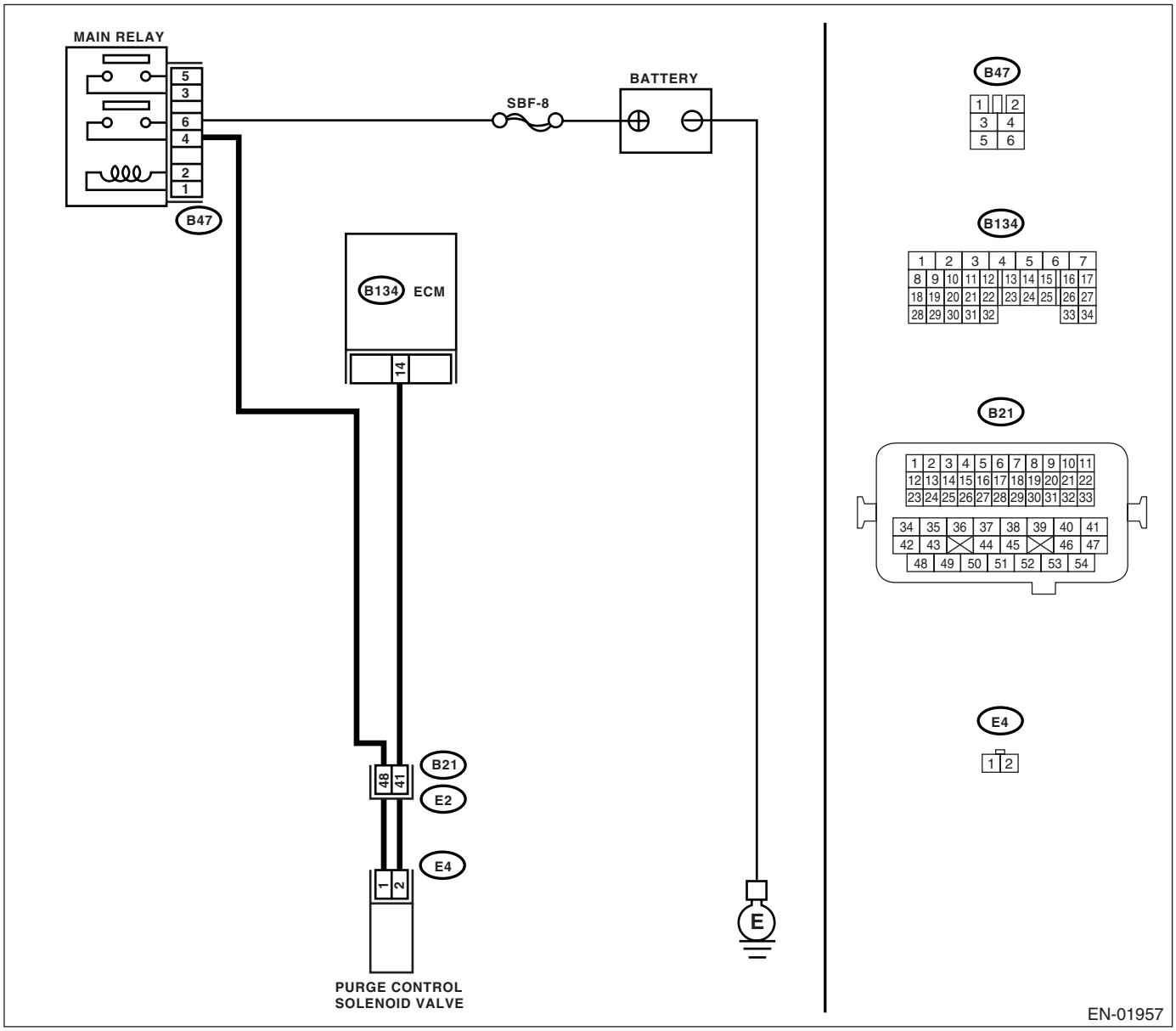
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON.	Does the purge control solenoid valve operate?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case, repair the poor contact in ECM connector.
2	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 29 — 35 Ω?	Go to step **3.**	Replace the purge control solenoid valve. <Ref. to EC(H4DOTC)-6, Purge Control Solenoid Valve.>
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is there poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>

AO:DTC P0500 VEHICLE SPEED SENSOR

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to the DTC. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

AP:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

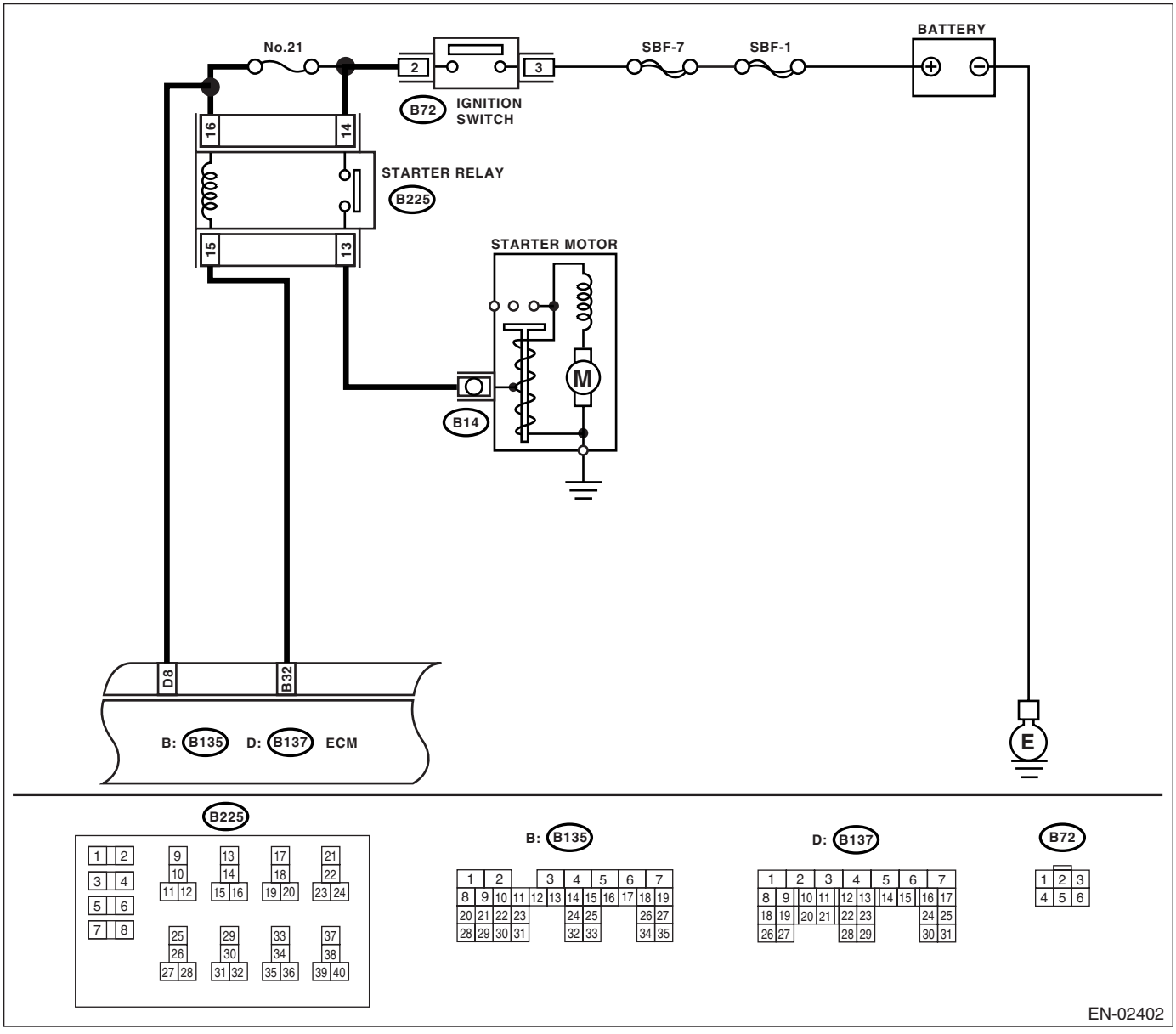
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN IGNITION SWITCH AND ECM.** 1) Disconnect the connectors from ECM. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 32 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ignition switch and ECM.	Repair the poor contact in ECM.

AQ:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Engine keeps running at higher revolution than specified idling revolution.
- Fuel is cut according to fail-safe function.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items: • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3.**
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

AR:DTC P0562 SYSTEM VOLTAGE LOW

DTC DETECTING CONDITION:

Detect in case of low power supply voltage of ECM.

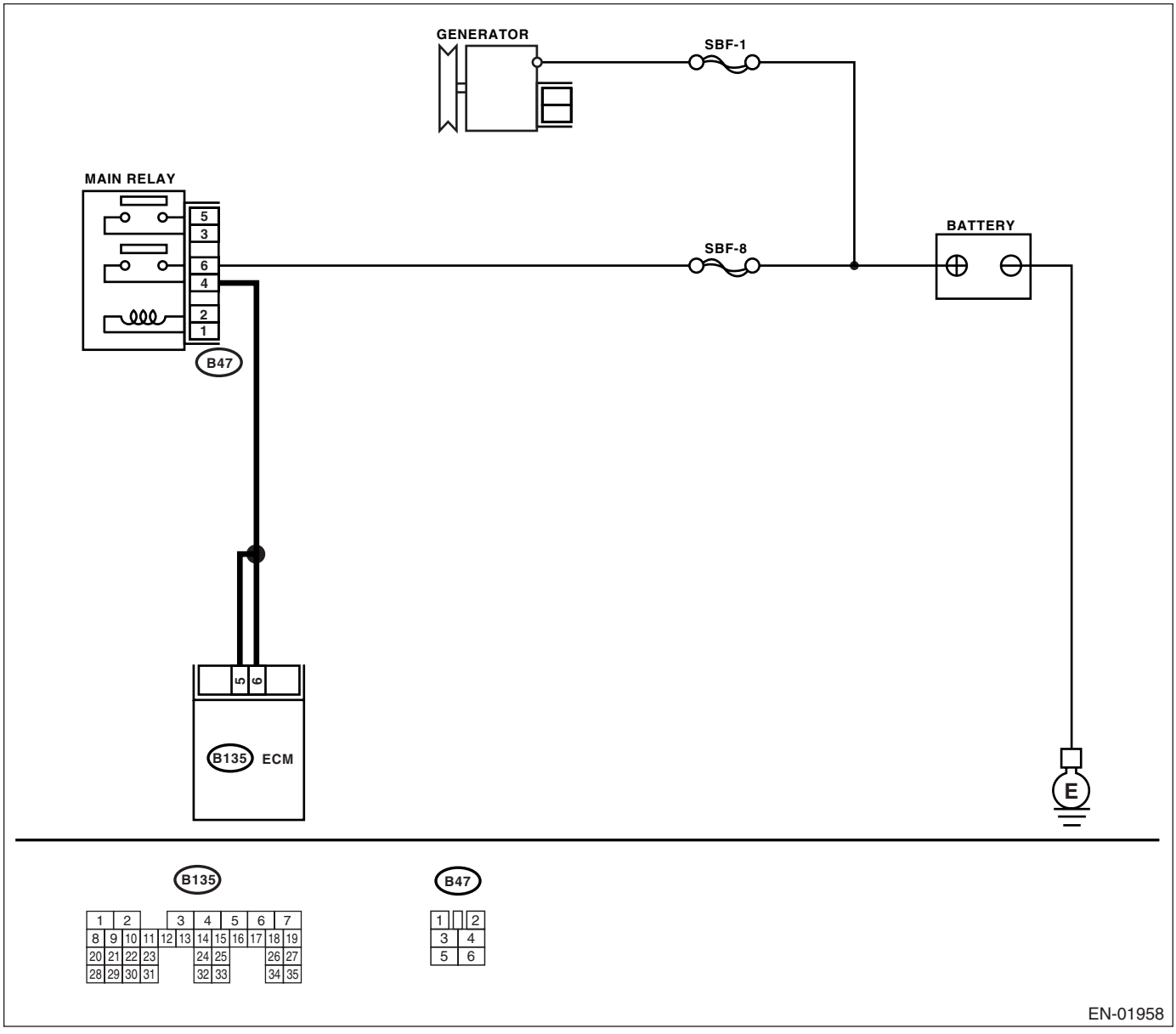
TROUBLE SYMPTOM:

Charge indicator light illuminates.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure battery voltage and specific gravity of electrolyte.	Is the voltage more than 12 V and the gravity more than 1.26?	Go to step **2.**	Charge or replace the battery.
2	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage less than 10.8 V?	Go to step **3.**	Repair the generator. <Ref. to SC(H4SO 2.0)-14, Generator.>
3	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage less than 10.8 V?	Go to step **4.**	Repair the generator. <Ref. to SC(H4SO 2.0)-14, Generator.>
4	**CHECK BATTERY TERMINAL.** 1) Turn the ignition switch to OFF. 2) Check the installation of positive and negative terminals of battery.	Are the positive and negative battery terminals clamped tightly?	Go to step **5.**	Tighten the clamp of terminal.
5	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 10.8 V?	Go to step **6.**	Repair the harness connectors between battery, main relay and ECM.
6	**CHECK POOR CONTACT IN CONNECTORS.** Check the poor contact in connectors between generator, battery and ECM.	Is there poor contact in connectors between generator, battery and ECM?	Repair the poor contact.	Go to step **7.**
7	**CHECK ECM.** 1) Connect all the connectors. 2) Erase the memory. <Ref. to EN(H4DOTC)(diag)-30, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to EN(H4DOTC)(diag)-28, Inspection Mode.> 4) Read the DTC. <Ref. to EN(H4DOTC)(diag)-27, Read Diagnostic Trouble Code (DTC).> Check if the same DTC is displayed.	Is the same DTC displayed?	Replace the generator.	Go to step **8.**
8	**CHECK ANY OTHER DTC IS DISPLAYED.** Check if any other DTC is displayed.	Is any other DTC displayed?	Perform the diagnosis of DTC displayed.	Temporary poor contact occurs.

AS:DTC P0563 SYSTEM VOLTAGE HIGH

DTC DETECTING CONDITION:

Detect in case of high power supply voltage of ECM.

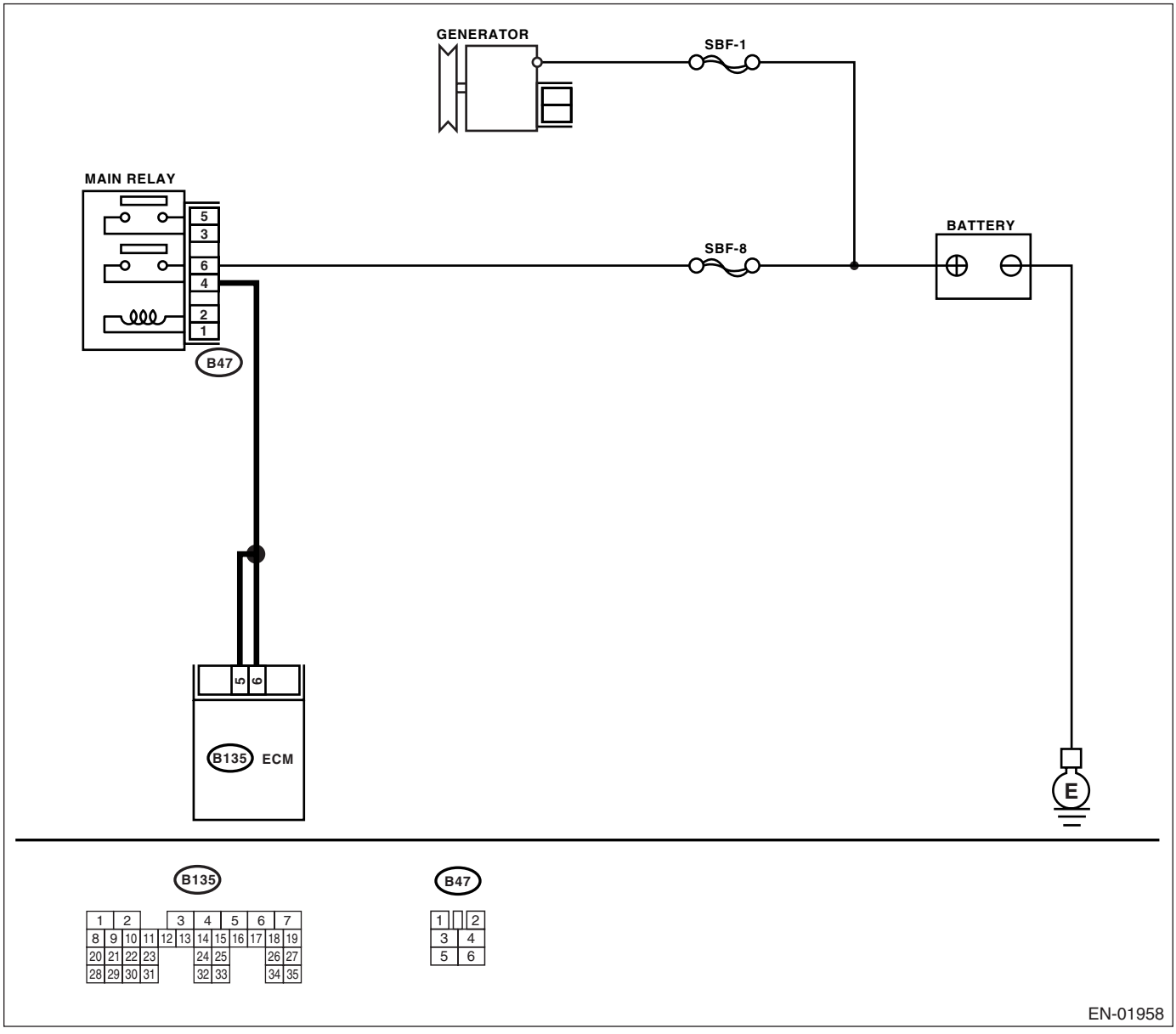
TROUBLE SYMPTOM:

Charge indicator light illuminates.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure battery voltage and specific gravity of electrolyte.	Is the voltage more than 12 V and the gravity more than 1.26?	Go to step **2.**	Replace the battery.
2	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage more than 16.2 V?	Go to step **3.**	Repair the generator. <Ref. to SC(H4SO 2.0)-14, Generator.>
3	**CHECK GENERATOR.** 1) Run the engine at 5,000 rpm. 2) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage more than 16.2 V?	Go to step **4.**	Repair the generator. <Ref. to SC(H4SO 2.0)-14, Generator.>
4	**CHECK BATTERY TERMINAL.** 1) Turn the ignition switch to OFF. 2) Check the installation of positive and negative terminals of battery.	Are the positive and negative battery terminals clamped tightly?	Go to step **5.**	Tighten the clamp of terminal.
5	**CHECK INPUT VOLTAGE OF ECM.** 1) Run the engine at idle. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 16.2 V?	Go to step **6.**	Repair the harness connectors between battery, main relay and ECM.
6	**CHECK POOR CONTACT IN CONNECTORS.** Check the poor contact in connectors between generator, battery and ECM.	Is there poor contact in connectors between generator, battery and ECM?	Repair the poor contact.	Go to step **7.**
7	**CHECK ECM.** 1) Connect all the connectors. 2) Erase the memory. <Ref. to EN(H4DOTC)(diag)-30, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to EN(H4DOTC)(diag)-28, Inspection Mode.> 4) Read the DTC. <Ref. to EN(H4DOTC)(diag)-27, Read Diagnostic Trouble Code (DTC).> Check if the same DTC is displayed.	Is the same DTC displayed?	Replace the generator.	Go to step **8.**
8	**CHECK ANY OTHER DTC IS DISPLAYED.** Check if any other DTC is displayed.	Is any other DTC displayed?	Perform the diagnosis of DTC displayed.	Temporary poor contact occurs.

AT:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN system.

AU:DTC P0604 INTERNAL CONTROL MODULE READ ACCESS MEMORY (RAM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4DOTC)(diag)-152, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AV:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H4DOTC)(diag)-152, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

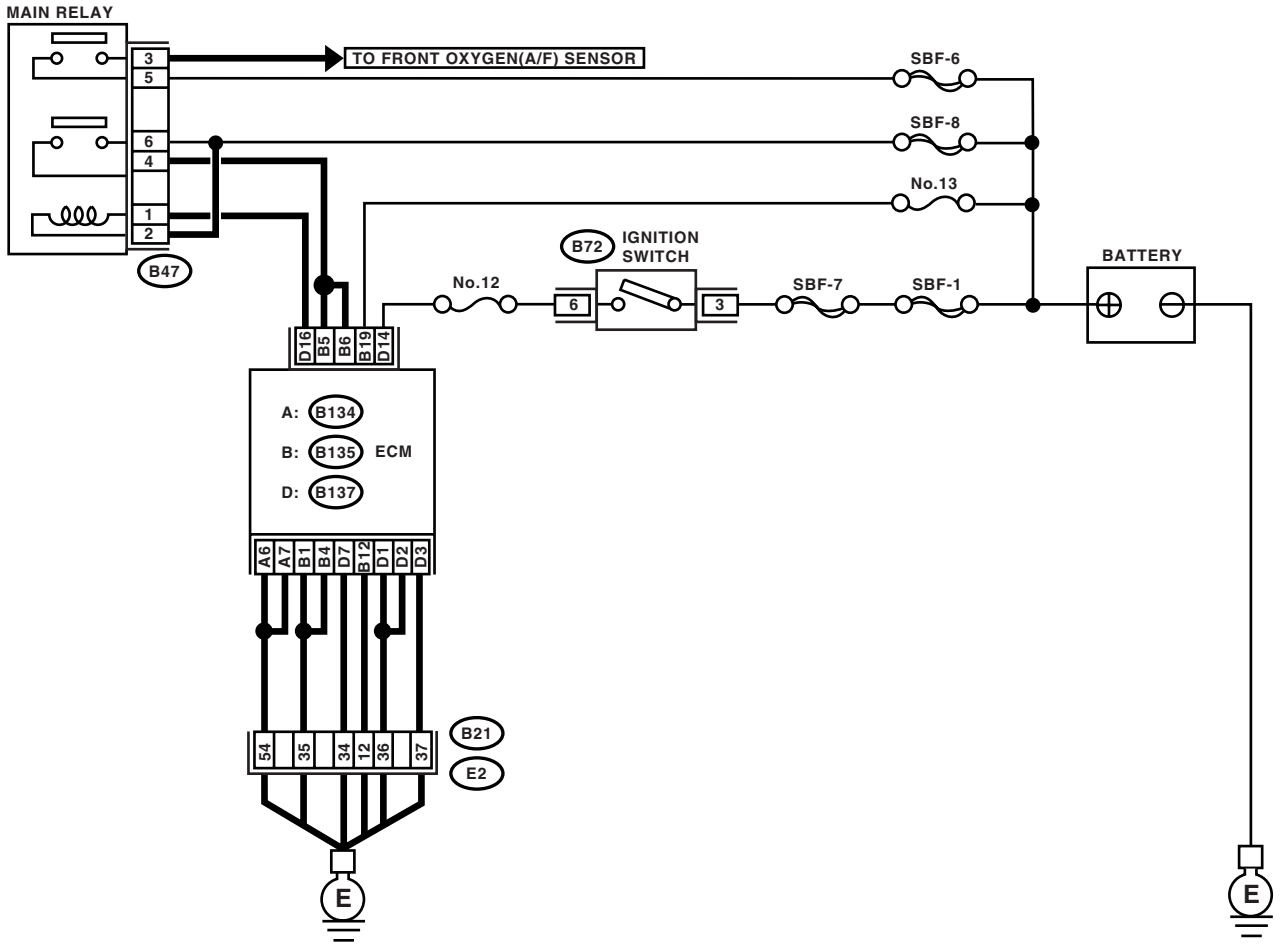
TROUBLE SYMPTOM:

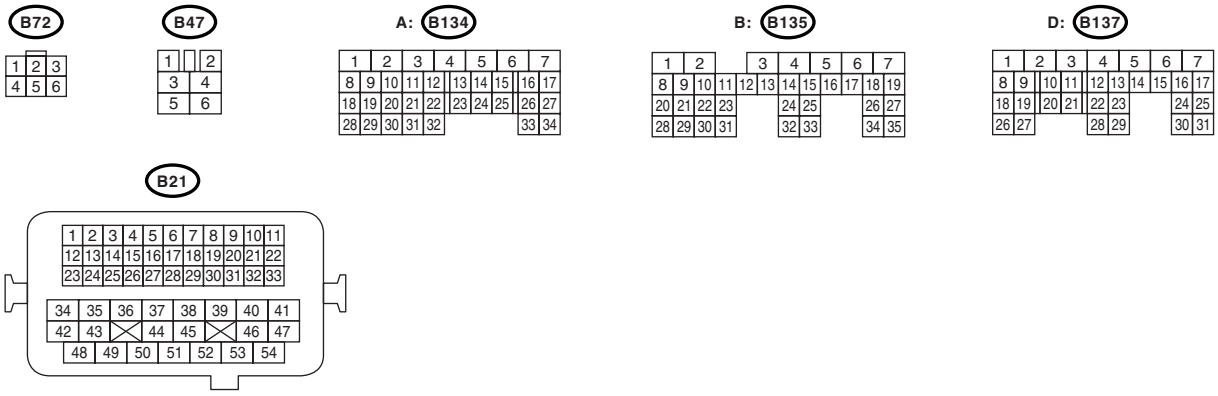
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02403

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **2.**	Repair the open or ground short circuit of power supply circuit.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 13 — 15 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 1 (+) — Chassis ground (−):*** ***(B137) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

AX:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DOTC)(diag)-176, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AY:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 5AT(diag)-2, Basic Diagnostics Procedure.>

AZ:DTC P0851 NEUTRAL SWITCH INPUT CIRCUIT LOW

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 5AT(diag)-2, Basic Diagnostics Procedure.>

BA:DTC P0852 NEUTRAL SWITCH INPUT CIRCUIT HIGH

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 5AT(diag)-2, Basic Diagnostics Procedure.>

BB:DTC P1110 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:
Detect as soon as the malfunction occurs.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P1110 displayed on the Subaru Select Monitor?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> NOTE: Atmospheric pressure sensor is built in ECM.	Temporary poor contact occurs.

BC:DTC P1111 ATMOSPHERIC PRESSURE SENSOR CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:
Detect as soon as the malfunction occurs.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P1111 displayed on the Subaru Select Monitor?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> NOTE: Atmospheric pressure sensor is built in ECM.	Temporary poor contact occurs.

BD:DTC P1160 RETURN SPRING FAILURE

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DOTC)(diag)-176, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BE:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

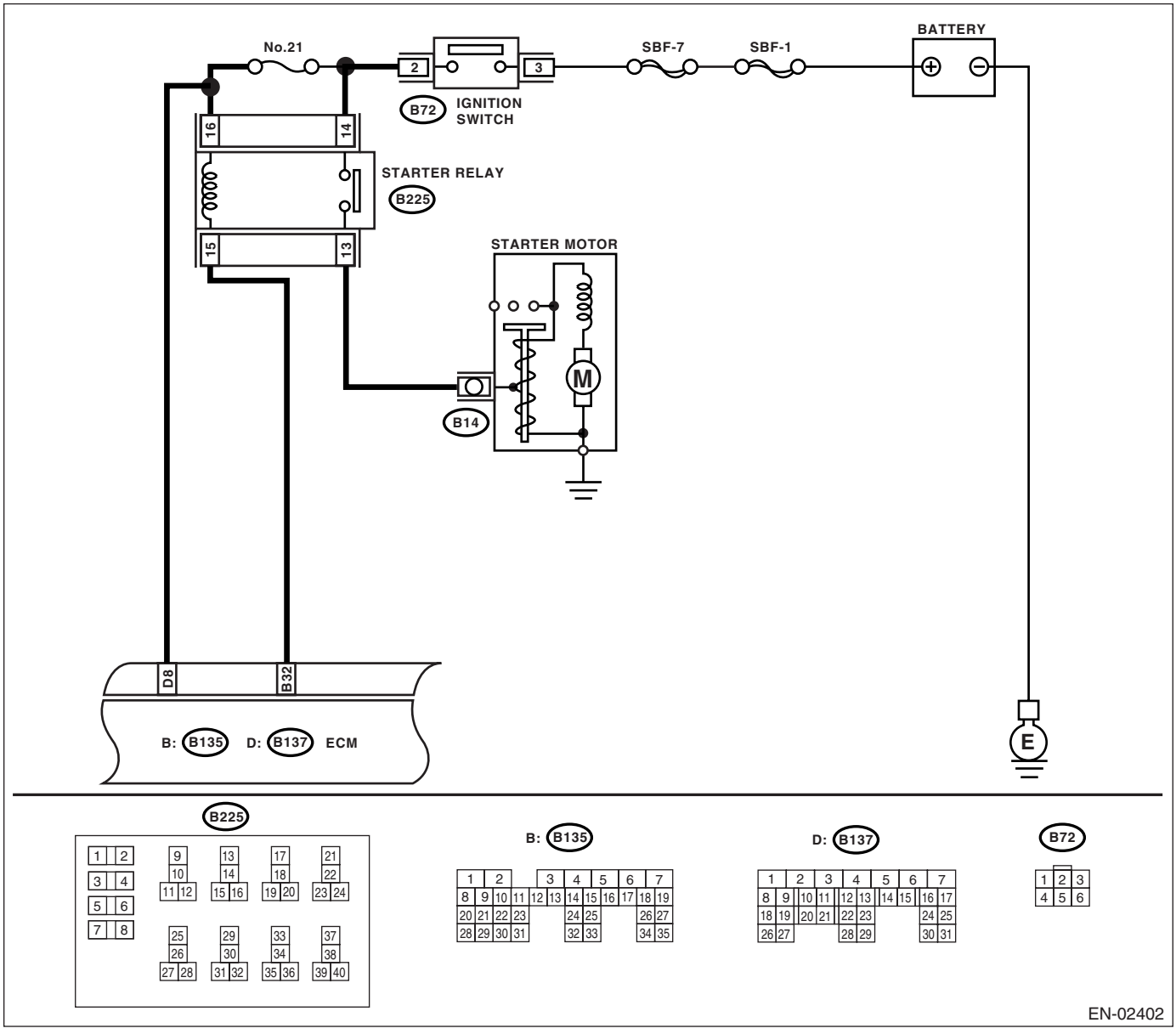
TROUBLE SYMPTOM:

Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN STARTER RELAY AND ECM.** 1) Disconnect the connectors from starter relay and ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the ground short circuit between starter motor and ECM.	Repair the poor contact in ECM connector.

BF:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

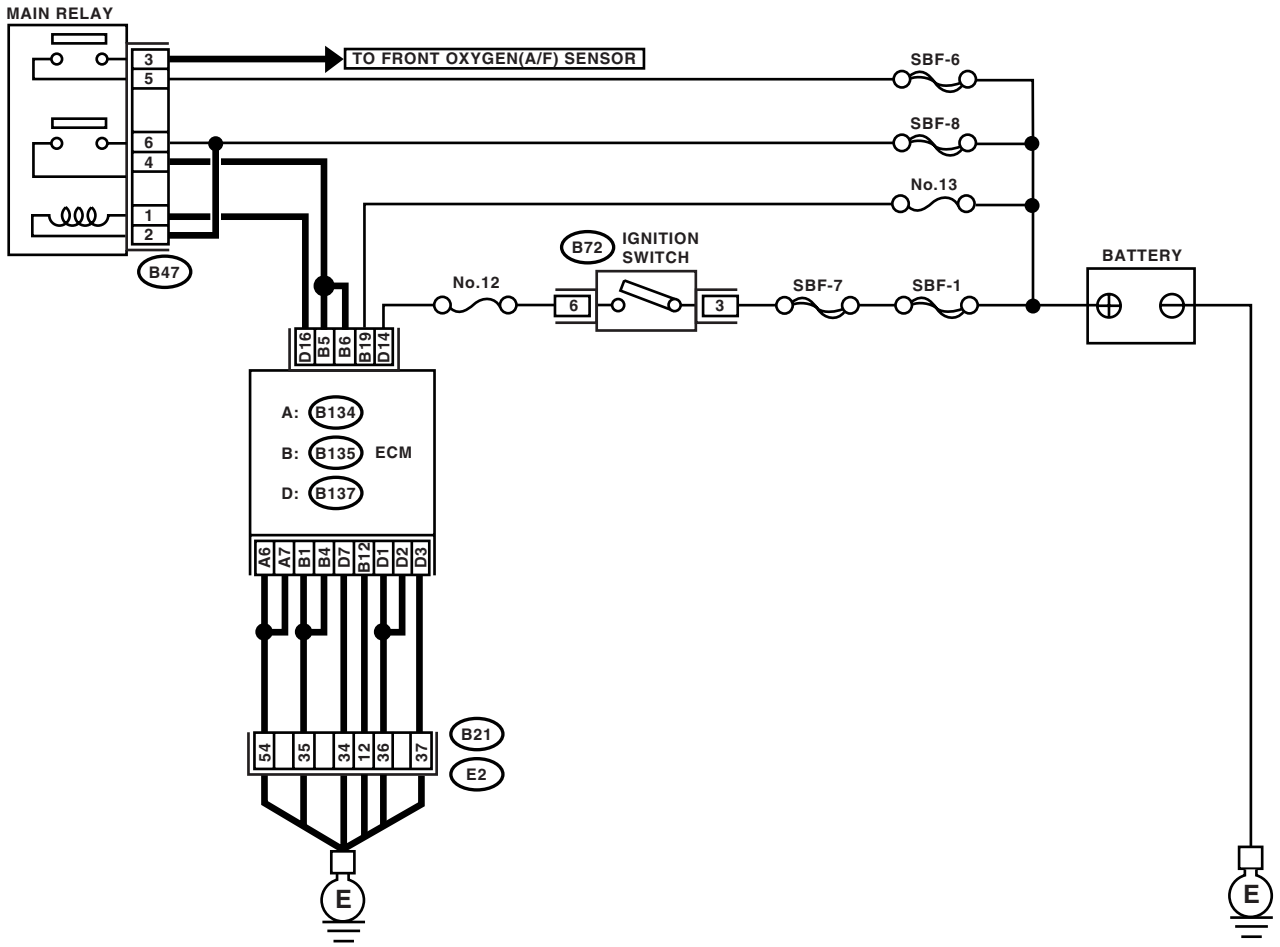
DTC DETECTING CONDITION:

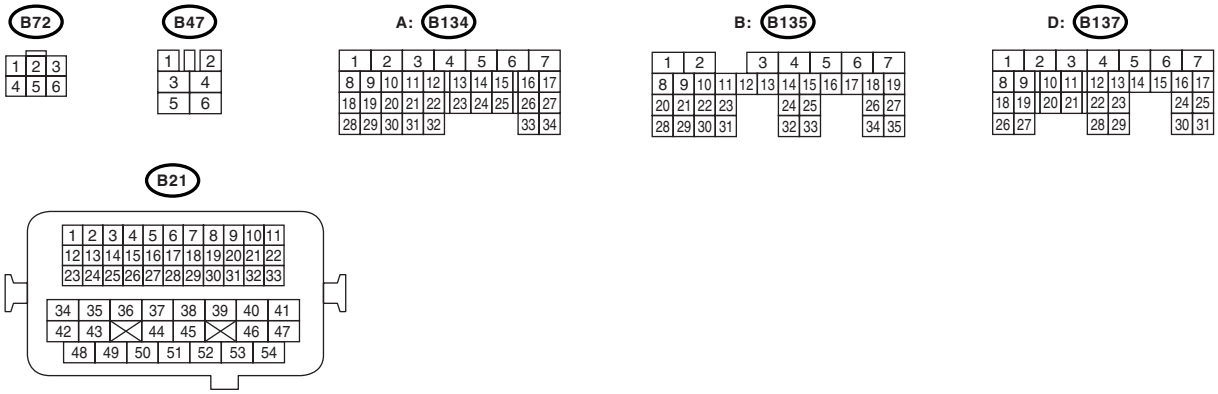
Detect as soon as the malfunction occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02403

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE No. 13**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

BG:DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

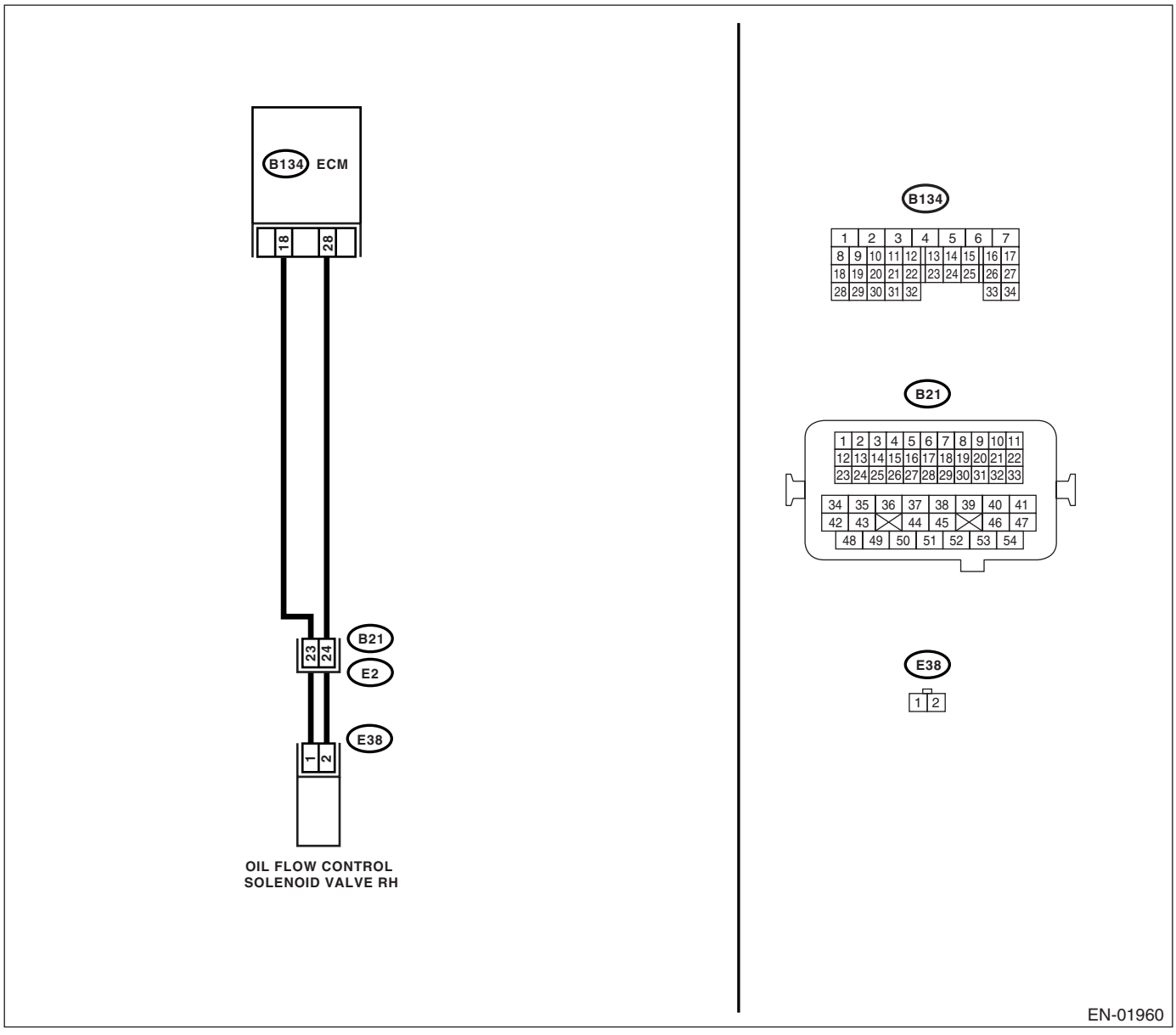
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 18 — (E38) No. 1:*** ***(B134) No. 28 — (E38) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BH:DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

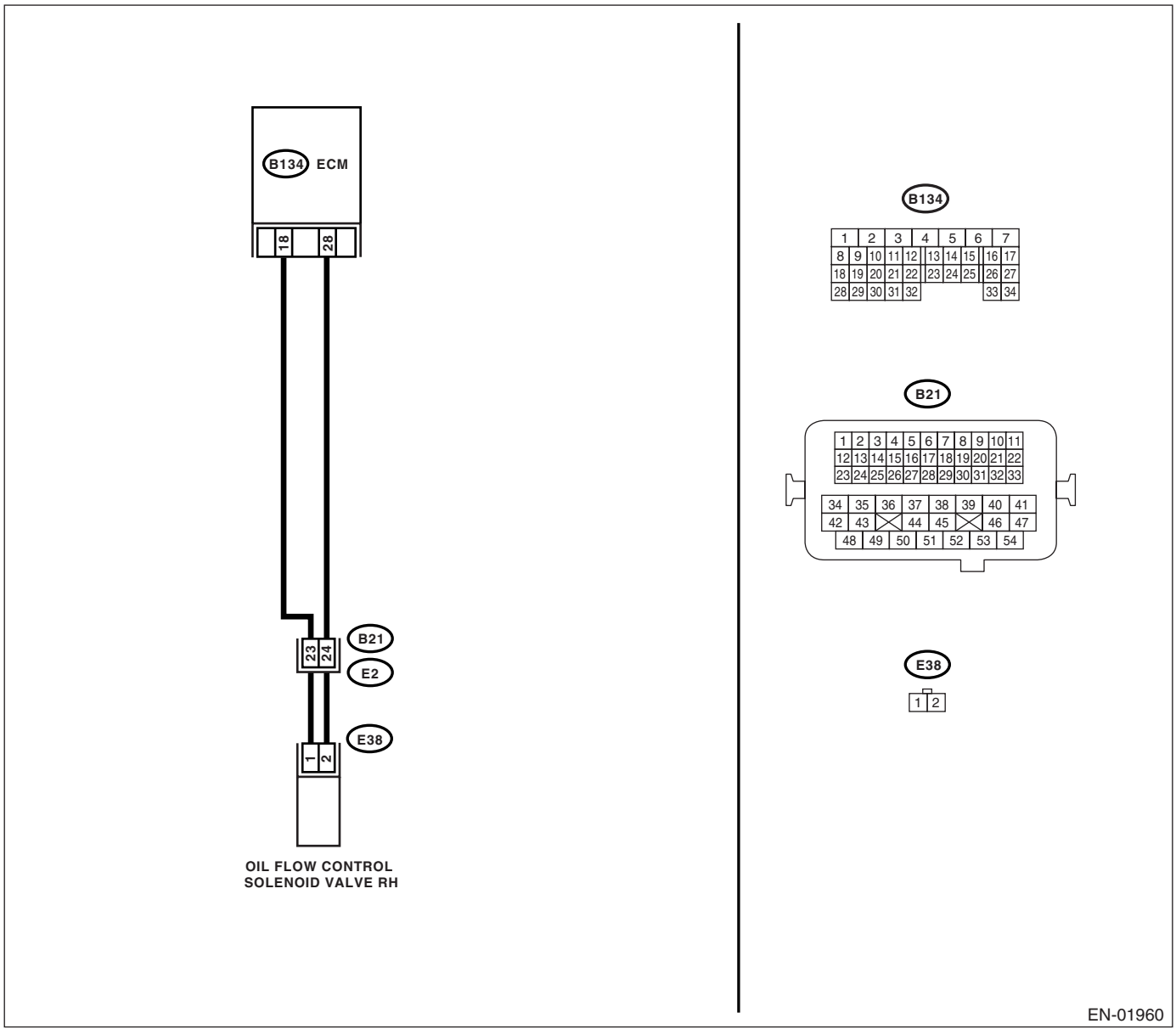
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E38) No. 1 — Engine ground:*** ***(E38) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BI: DTC P2090 OCV SOLENOID VALVE SIGNAL B CIRCUIT OPEN (BANK 1)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

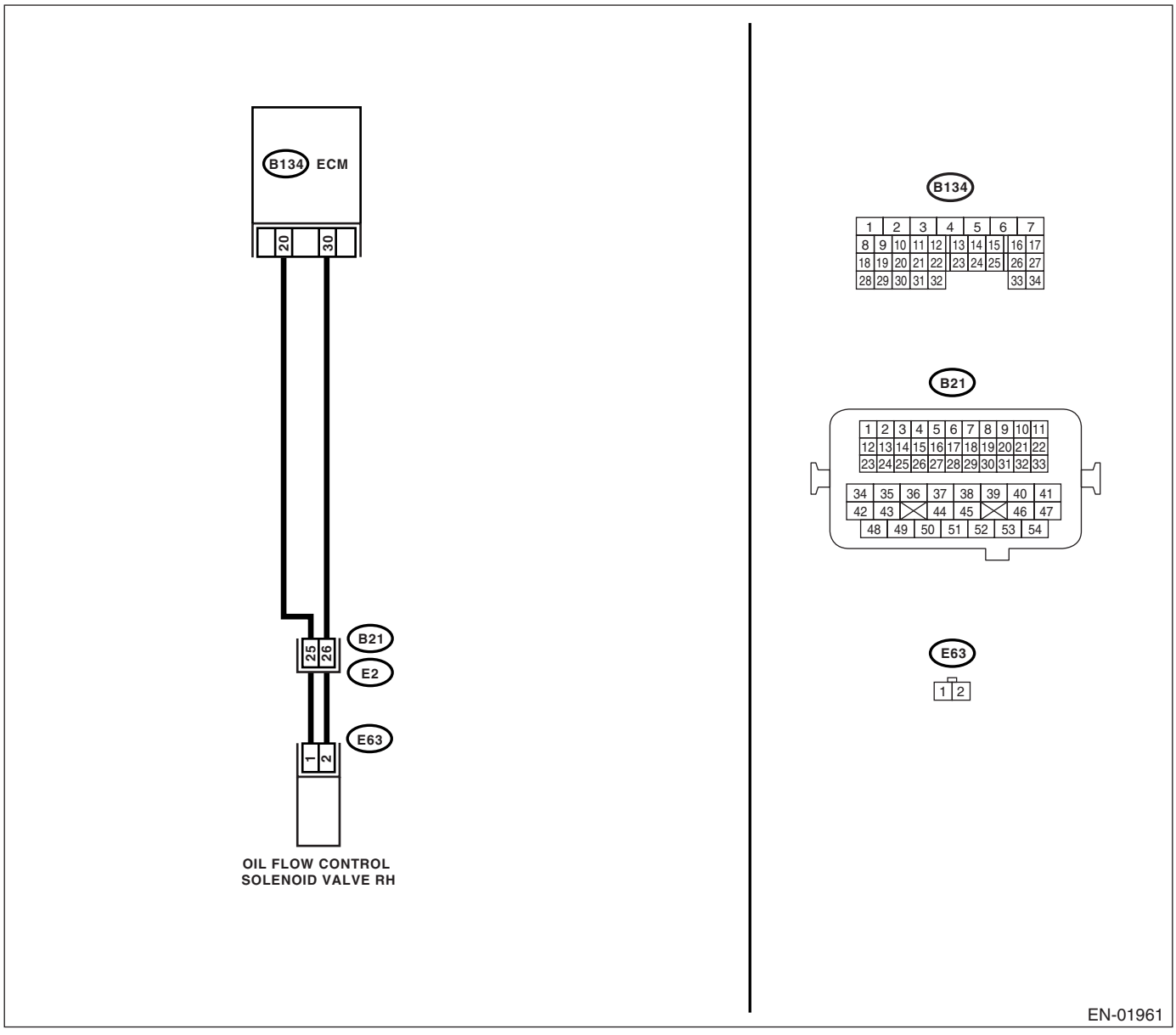
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 20 — (E63) No. 1:*** ***(B134) No. 30 — (E63) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BJ:DTC P2091 OCV SOLENOID VALVE SIGNAL B CIRCUIT SHORT (BANK 1)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

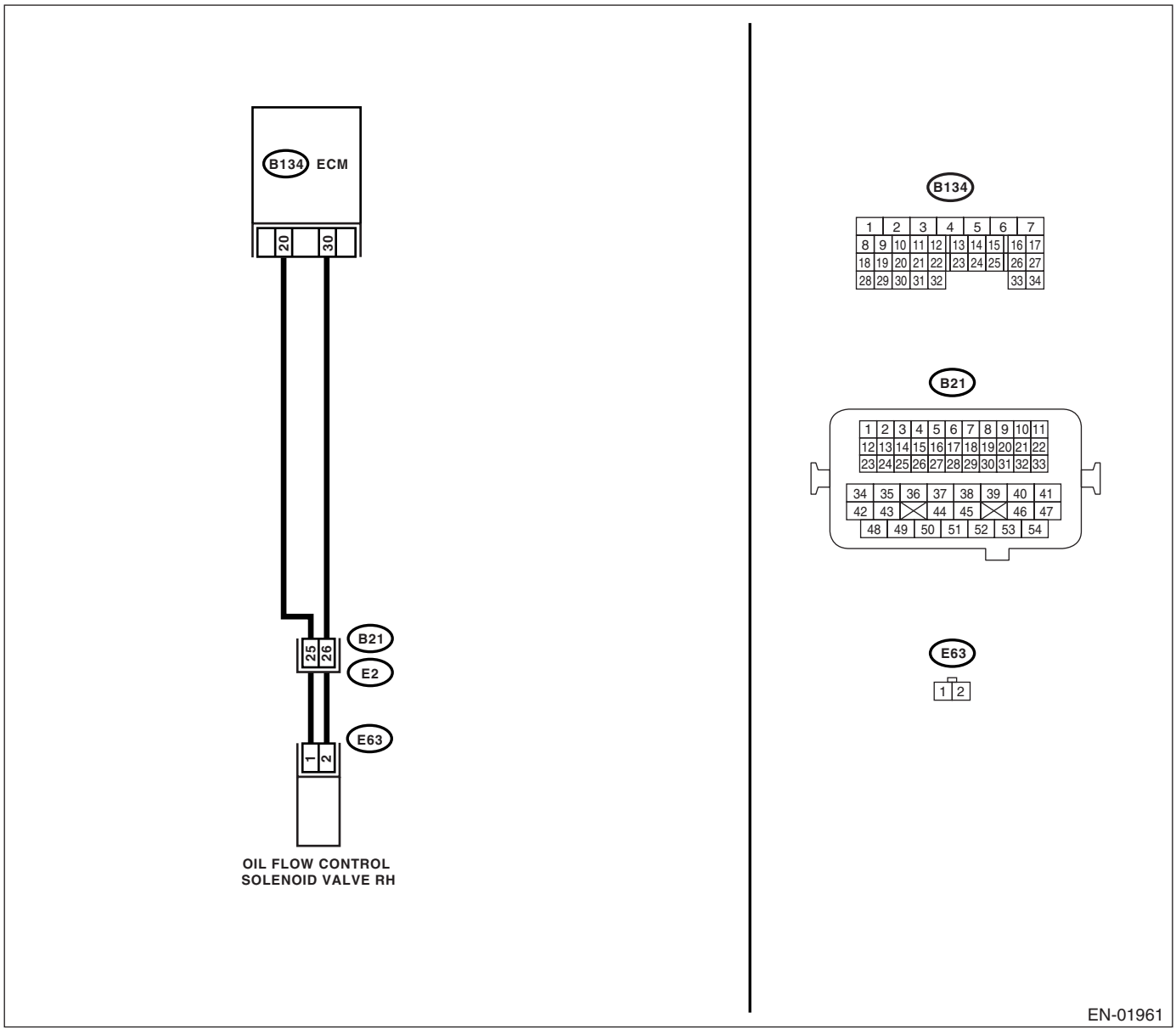
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E63) No. 1 — Engine ground:*** ***(E63) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BK:DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

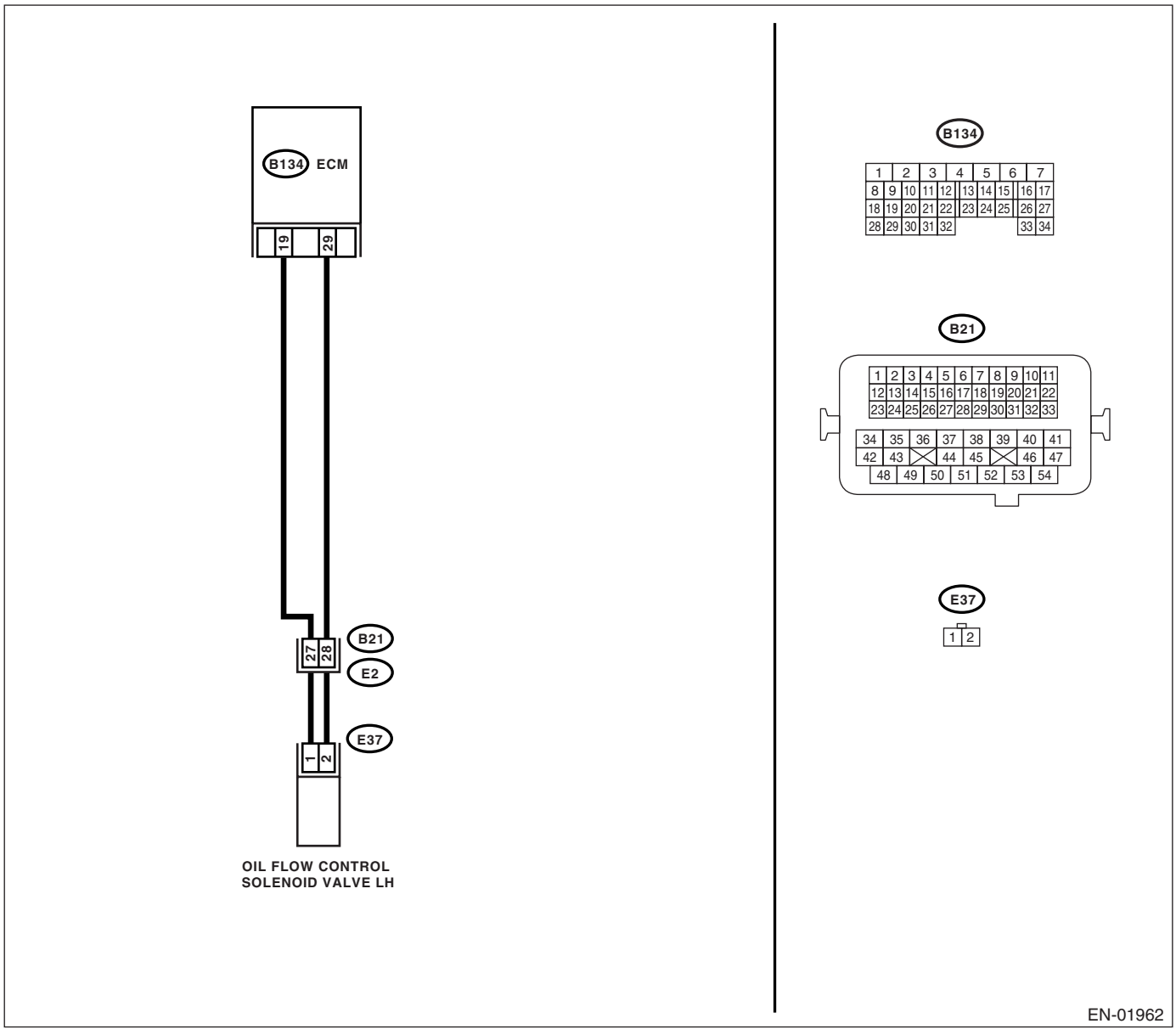
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 19 — (E37) No. 1:*** ***(B134) No. 29 — (E37) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BL:DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

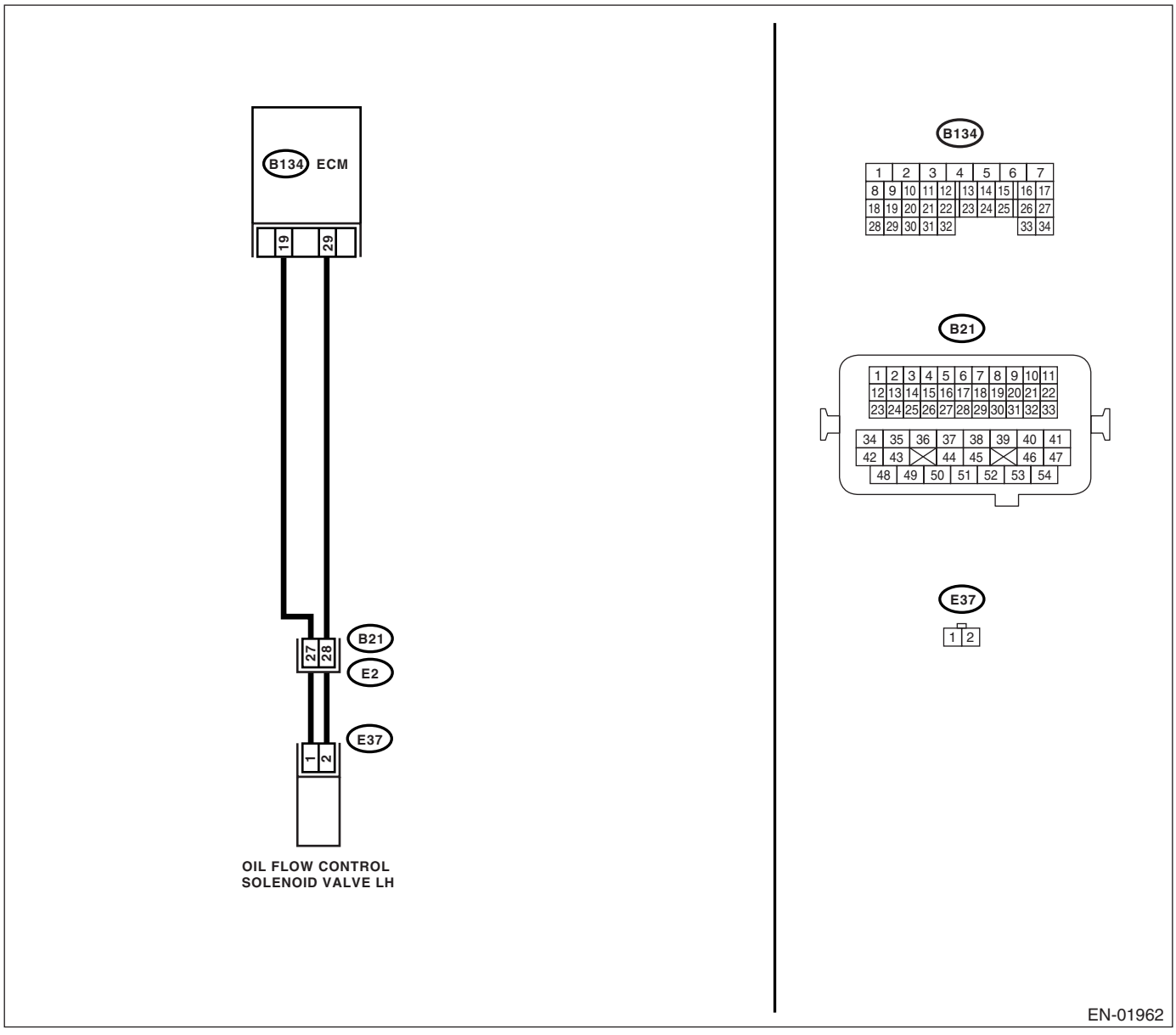
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E37) No. 1 — Engine ground:*** ***(E37) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BM:DTC P2094 OCV SOLENOID VALVE SIGNAL B CIRCUIT OPEN (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

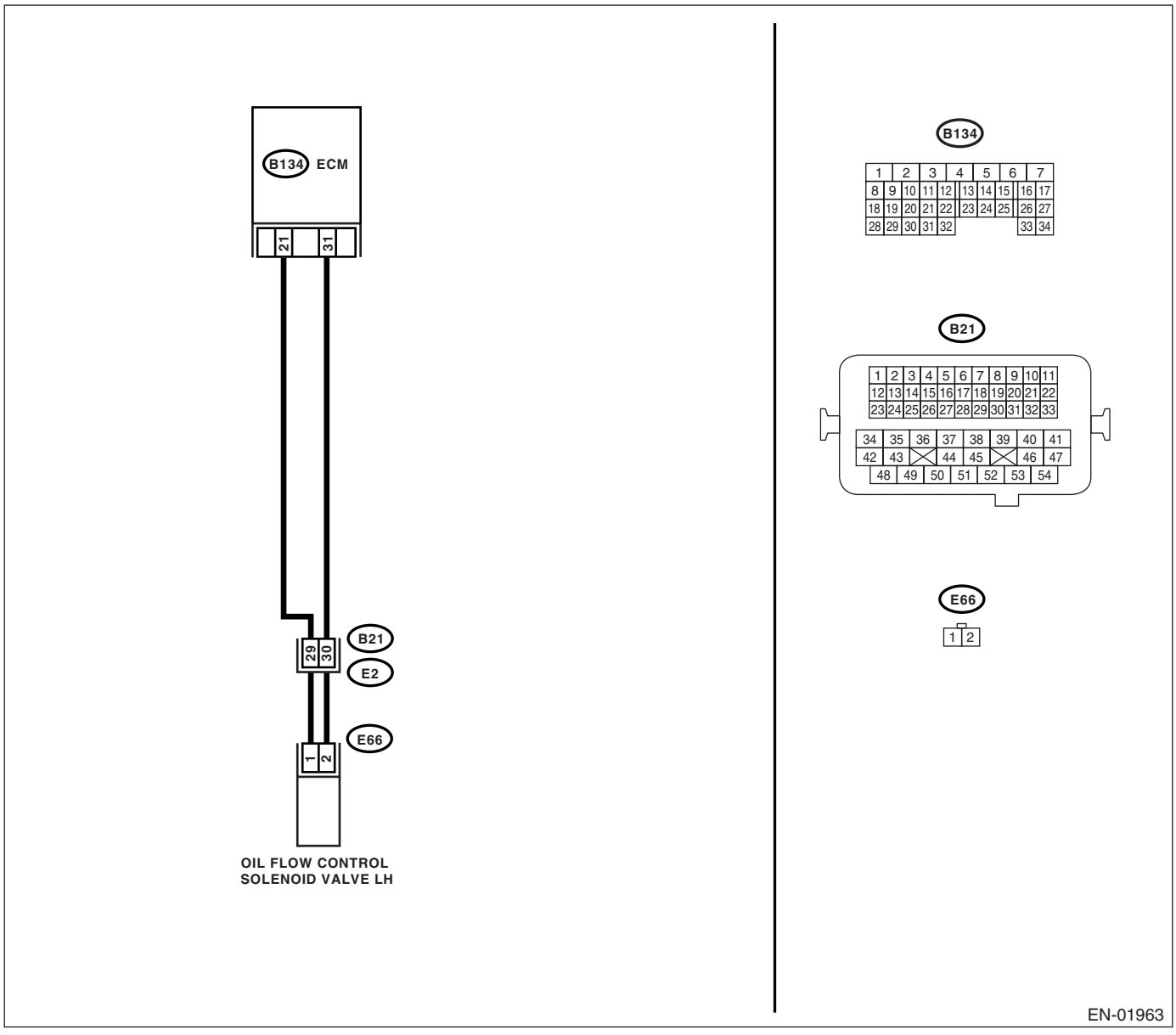
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 21 — (E66) No. 1:*** ***(B134) No. 31 — (E66) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case, repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BN:DTC P2095 OCV SOLENOID VALVE SIGNAL B CIRCUIT SHORT (BANK 2)

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

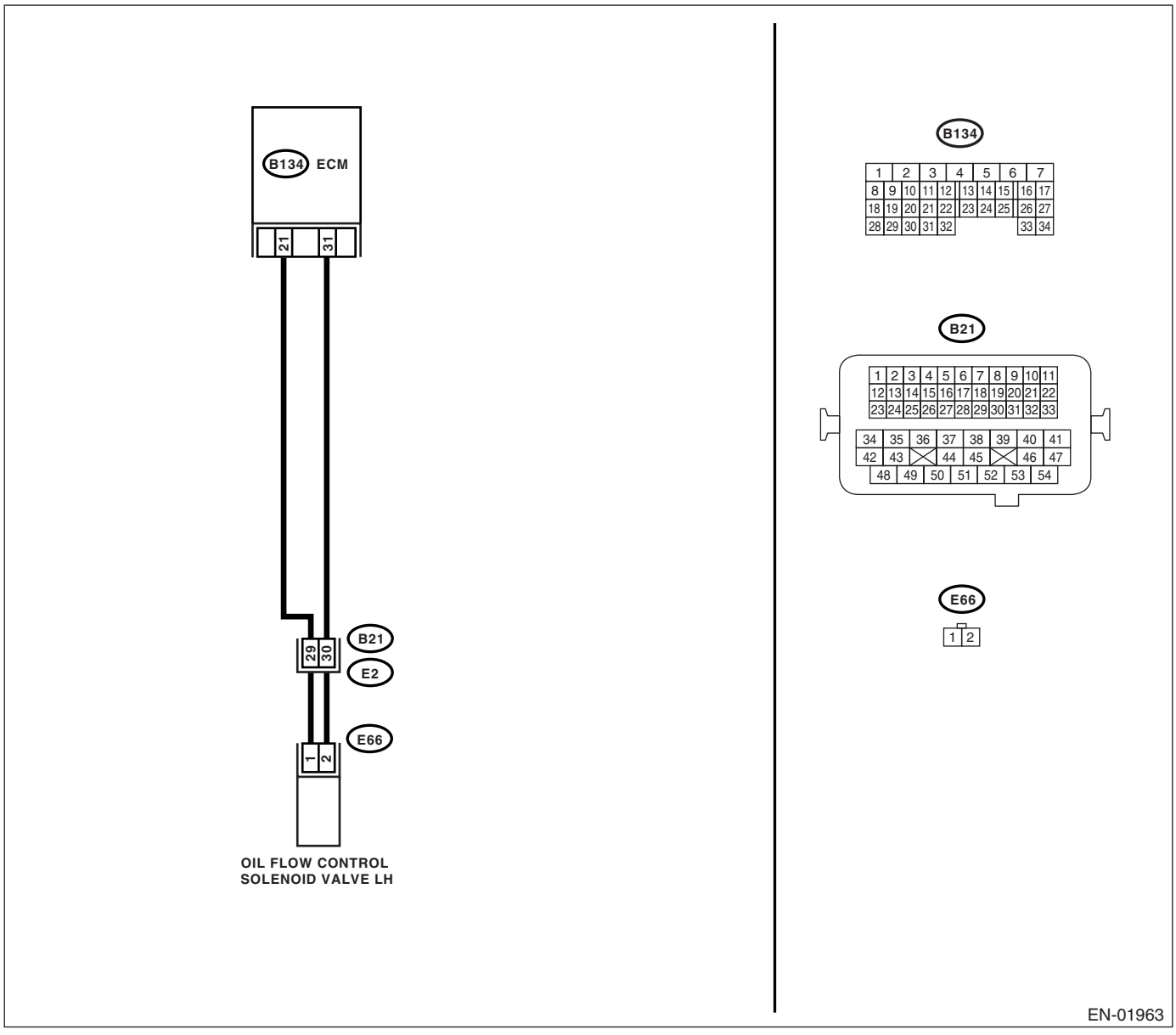
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H4DOTC)(diag)-30, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H4DOTC)(diag)-28, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E66) No. 1 — Engine ground:*** ***(E66) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Disconnect the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H4DOTC)-53, Camshaft.>

BO:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

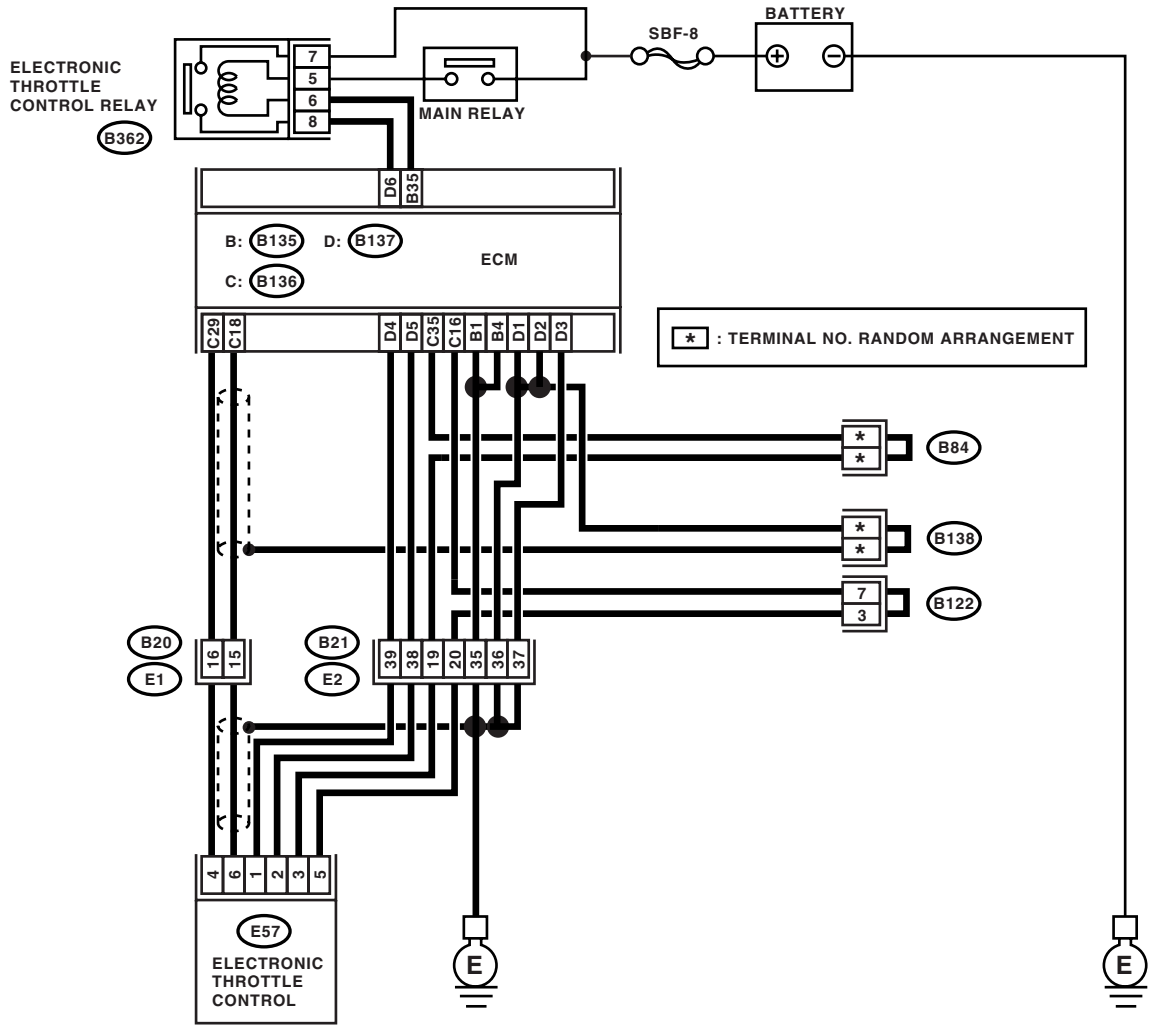
DTC DETECTING CONDITION:

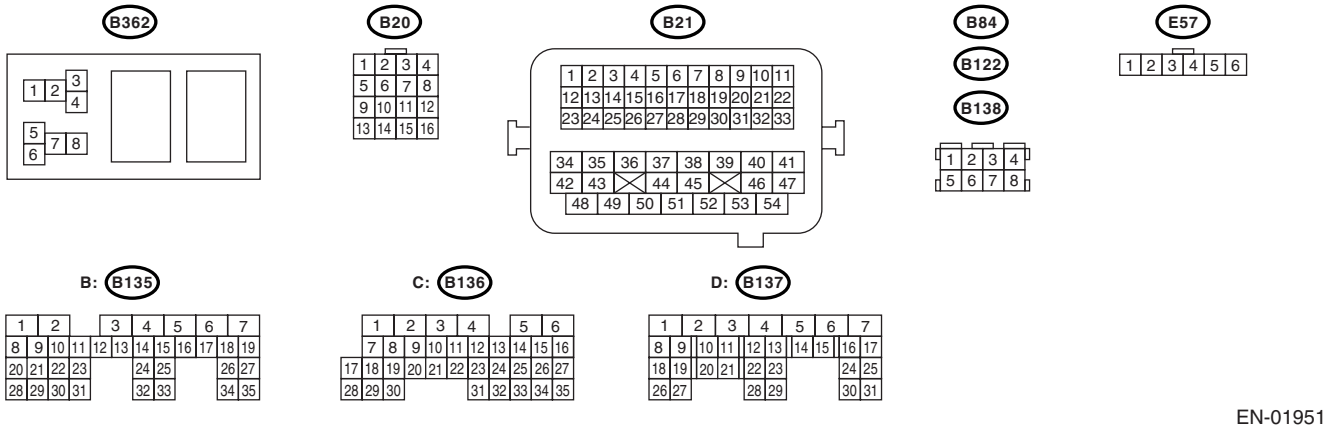
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **4.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and electronic throttle control relay.
6	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 18 (+) — (B136) No. 35 (−):***	Is the voltage more than 0.4 V?	Go to step **7.**	Go to step **9.**
7	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 29 (+) — (B136) No. 35 (−):***	Is the voltage more than 0.8 V?	Go to step **8.**	Go to step **9.**

	Step	Check	Yes	No
8	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **13.**
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness connector.
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the ground short circuit of harness.
11	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **12.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
12	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
13	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.63 V?	Go to step **14.**	Go to step **16.**
14	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.73 V?	Go to step **15.**	Go to step **16.**
15	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **20.**

	Step	Check	Yes	No
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **17.**	Repair the open circuit of harness connector.
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **18.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **19.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 35:*** ***(B136) No. 29 — (B136) No. 35:***	Is the resistance more than 1 MΩ?	Go to step **20.**	Repair the short circuit to sensor power supply.
20	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except of the electric control throttle relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.81 — 0.87 V?	Go to step **21.**	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective.
21	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 1.64 — 1.70 V?	Go to step **22.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.

	Step	Check	Yes	No
22	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 5 — (E57) No. 2:*** ***(B137) No. 4 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **23.**	Repair the open circuit of harness connector.
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (−):*** ***(E57) No. 1 (+) — Engine ground (−):***	Is the voltage less than 5 V?	Go to step **24.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **25.**	Repair the short circuit of harness.
25	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Repair the short circuit of harness.
26	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **27.**	Repair the open circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **28.**	Replace the electronic throttle control.
28	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers. Check the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Replace the electronic throttle control.

BP:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

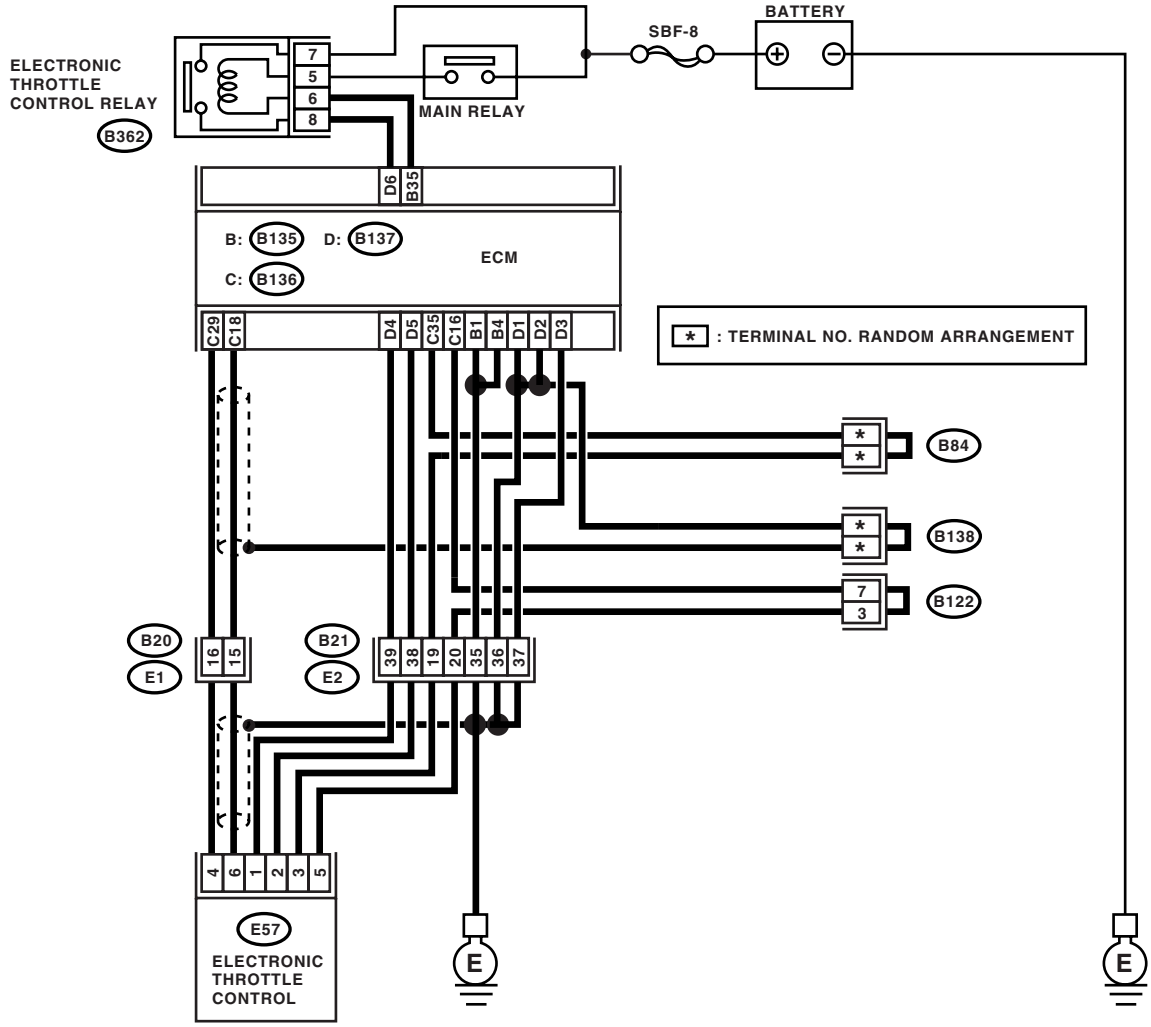
DTC DETECTING CONDITION:

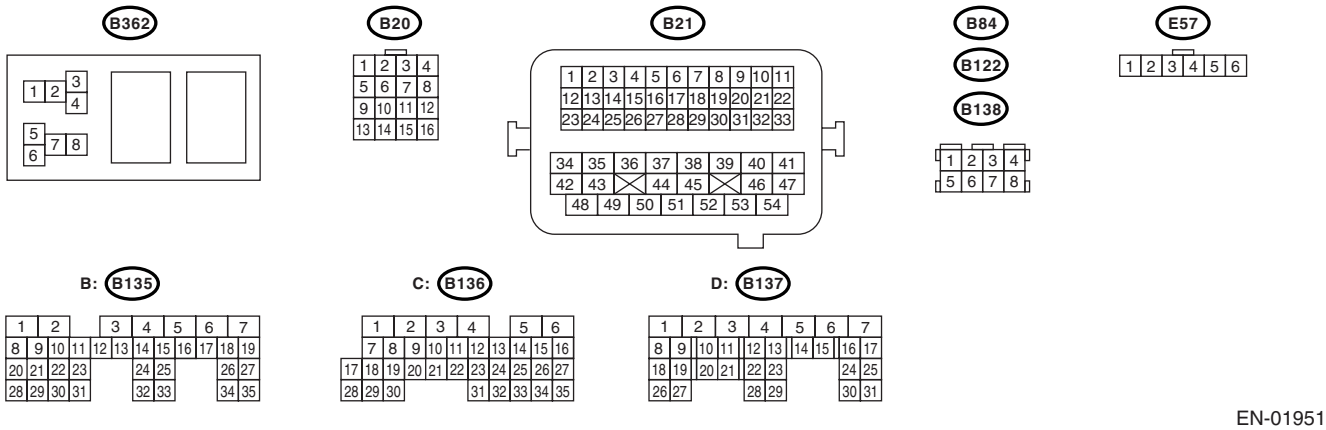
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





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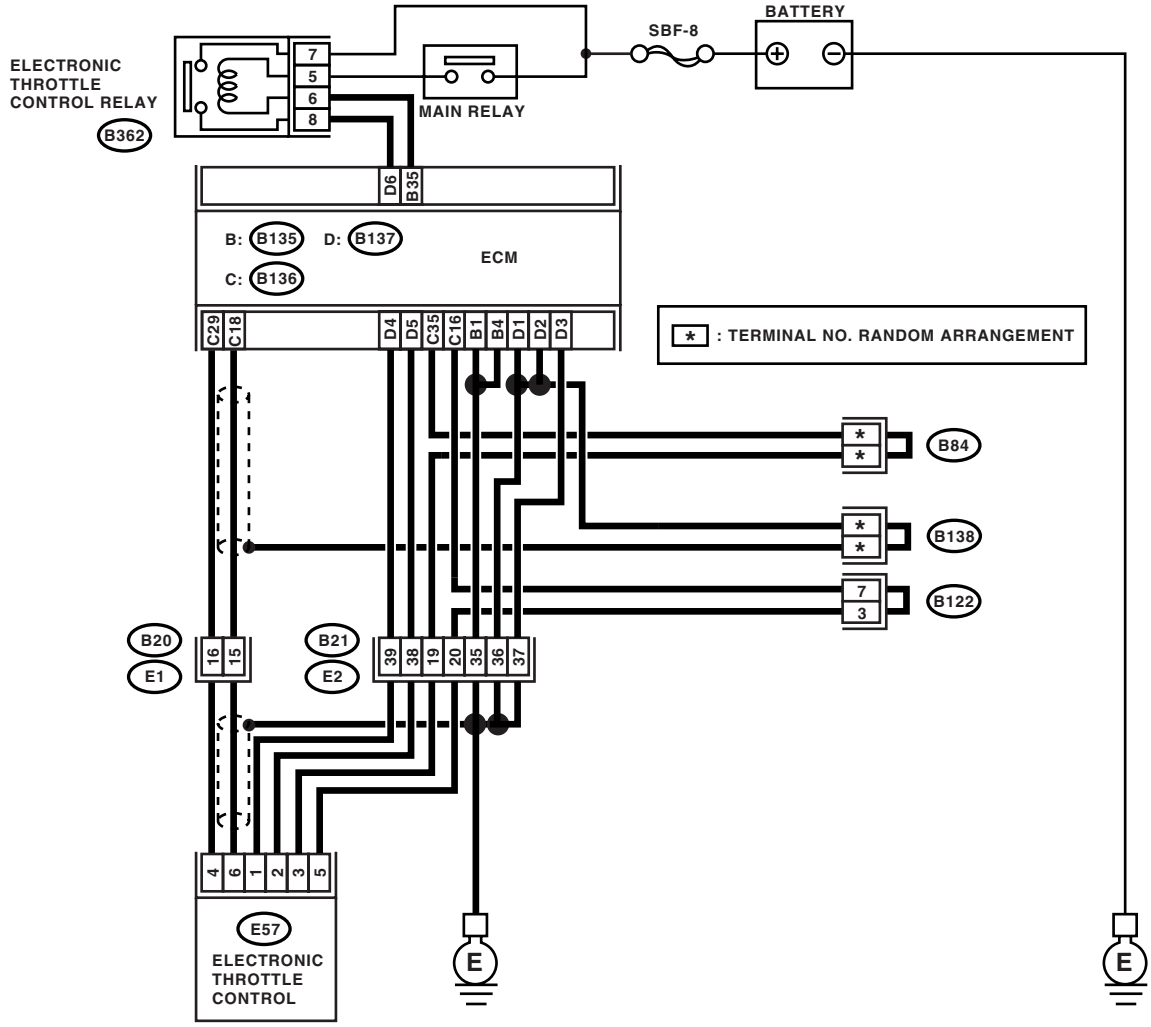
	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to terminals No. 5 and No. 6 of electronic throttle control relay. 4) Measure the resistance between electronic throttle control terminals. ***Terminals*** ***(B362) No. 7 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **4.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Repair the open circuit in harness between ECM and electronic throttle control relay.

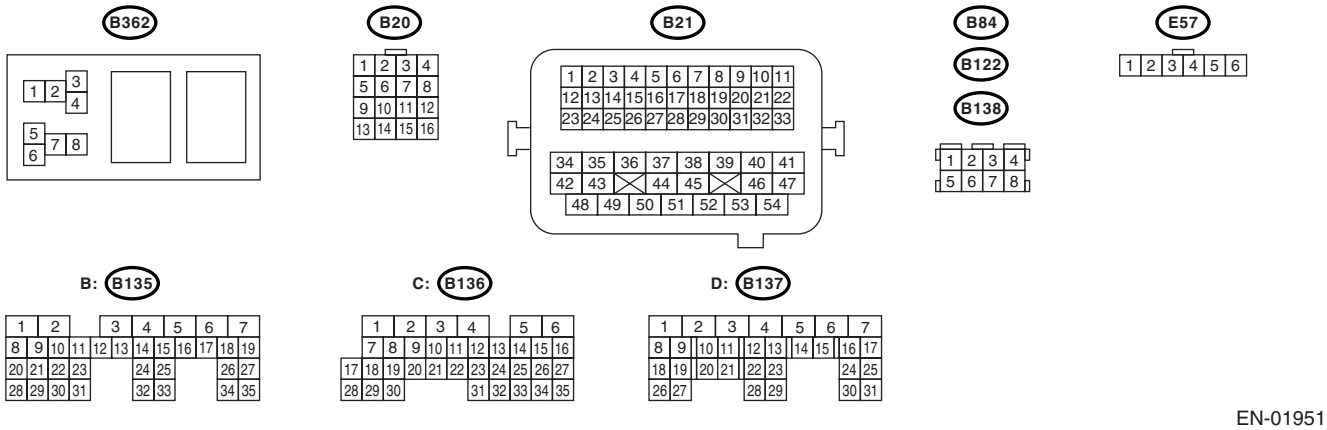
BQ:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Repair the ground short circuit in harness between ECM and electronic throttle control relay.

BR:DTC P2109 THROTTLE ANGLE CLOSED POSITION ERROR

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H4DOTC)(diag)-176, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BS:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

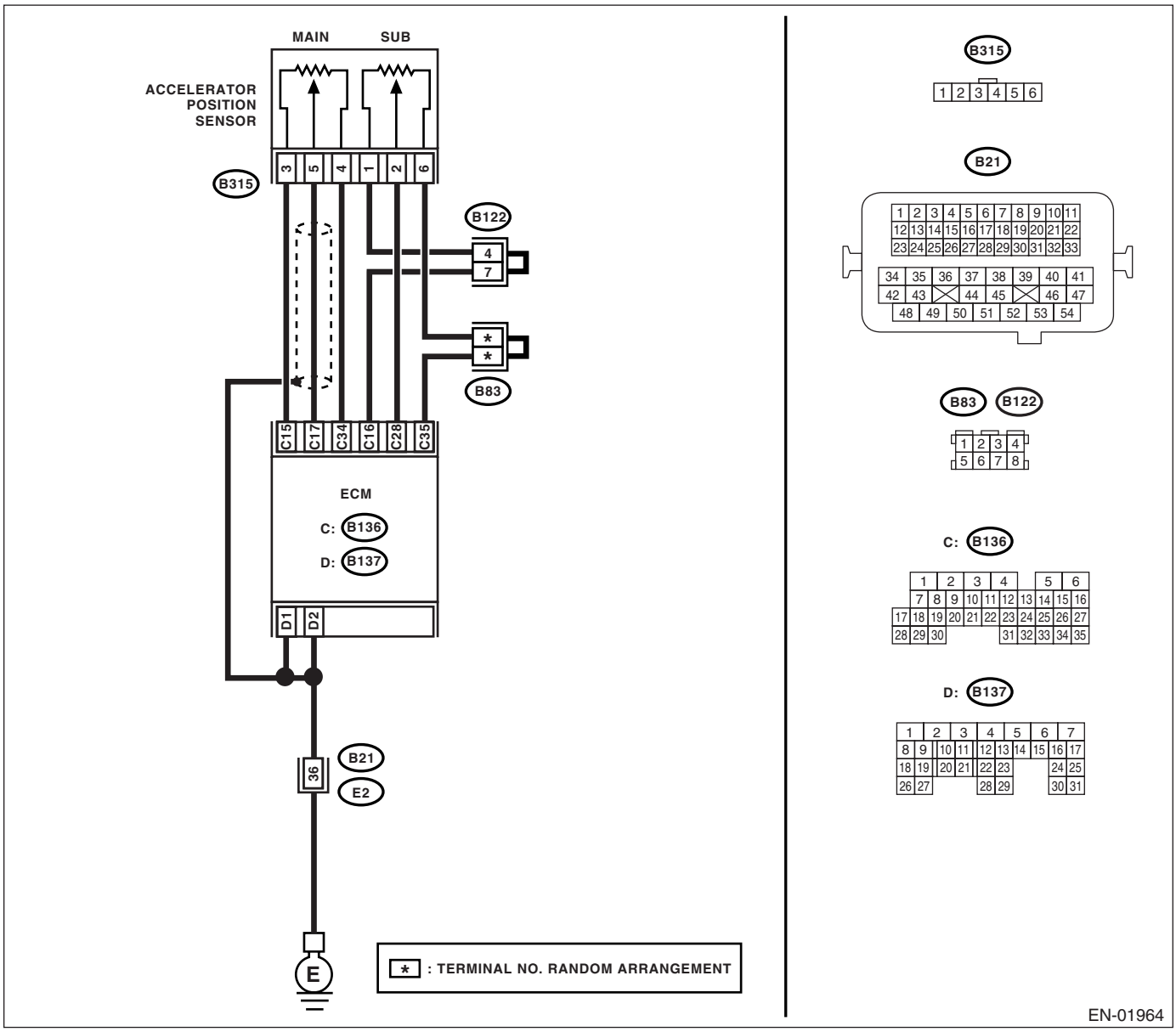
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Replace the accelerator position sensor.

BT:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

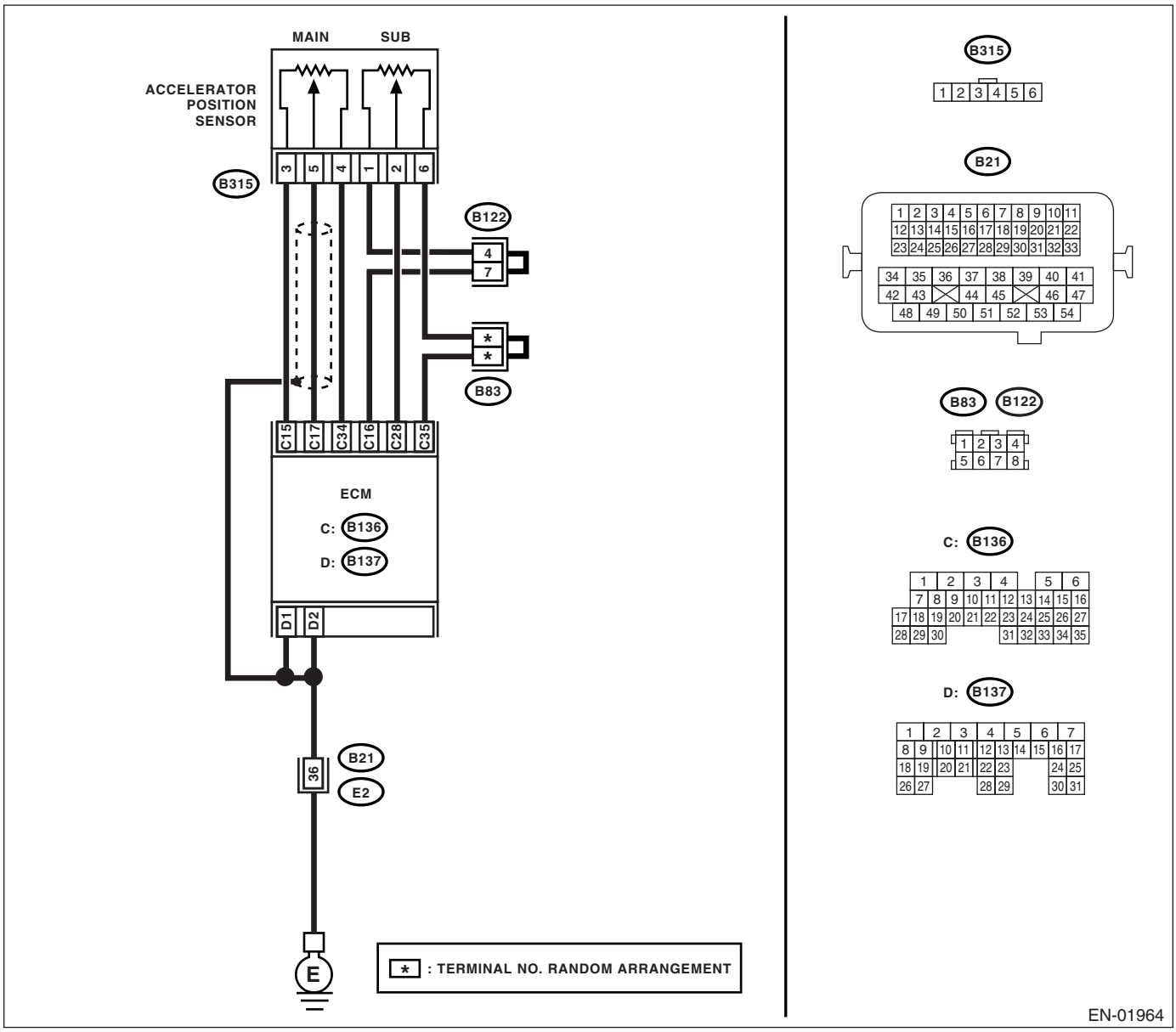
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** Turn the ignition switch to ON.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 4 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Chassis ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

BU:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT

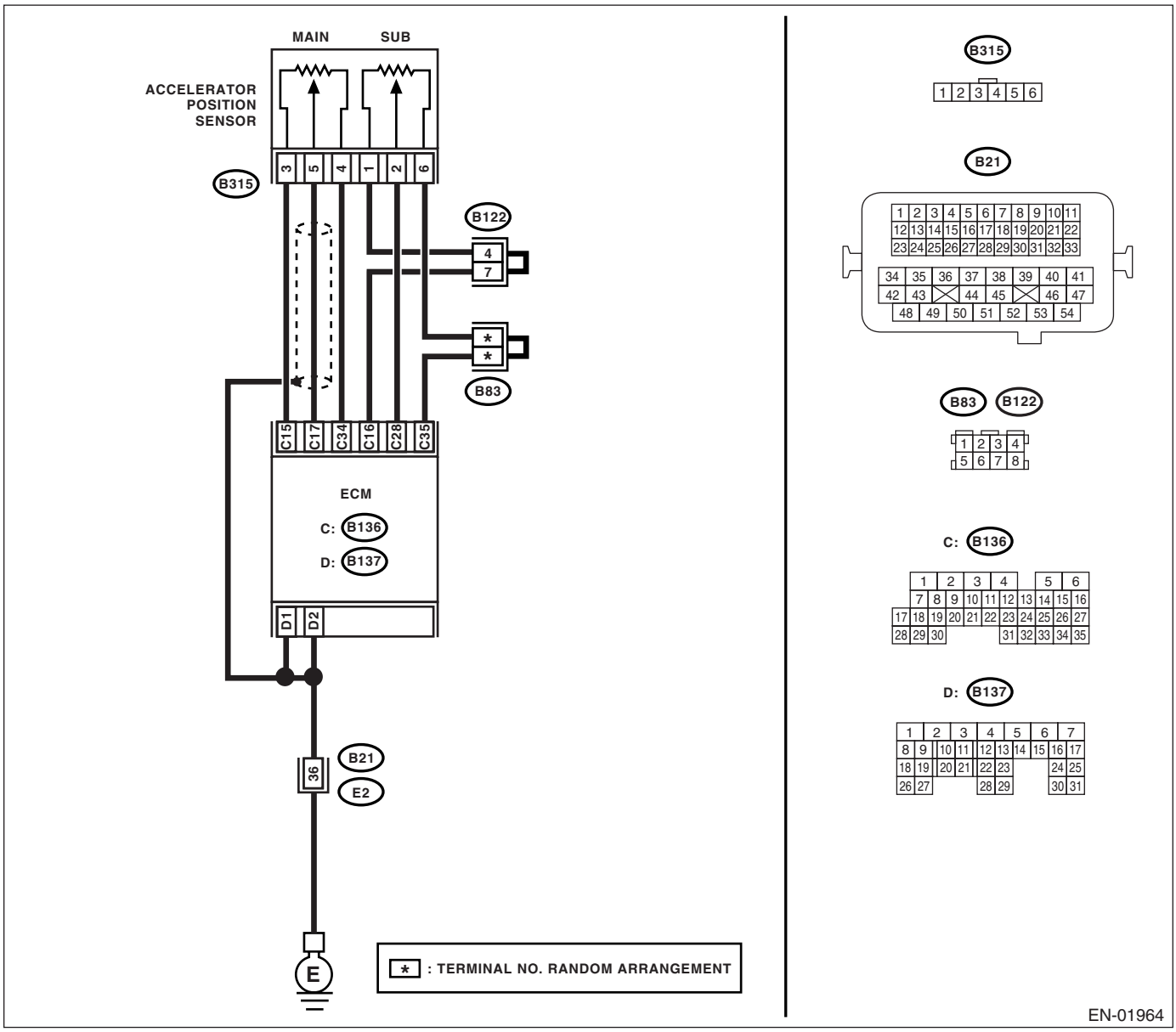
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **8.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
8	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Replace the accelerator position sensor.

BV:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

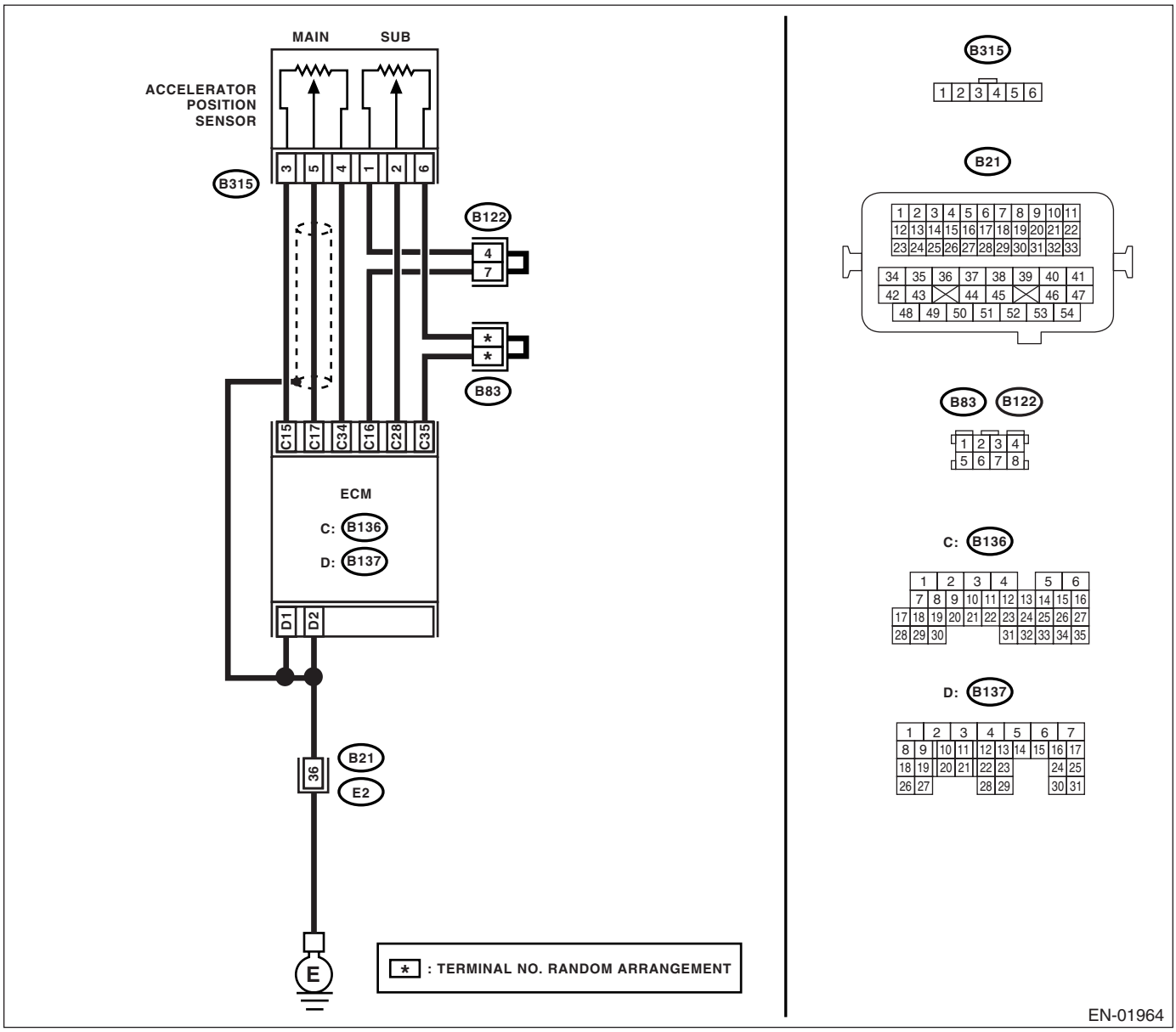
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ***(B137) No. 28 — (B137) No. 15:*** ***(B137) No. 28 — (B137) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

BW:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" / "B" VOLTAGE RATIONALITY

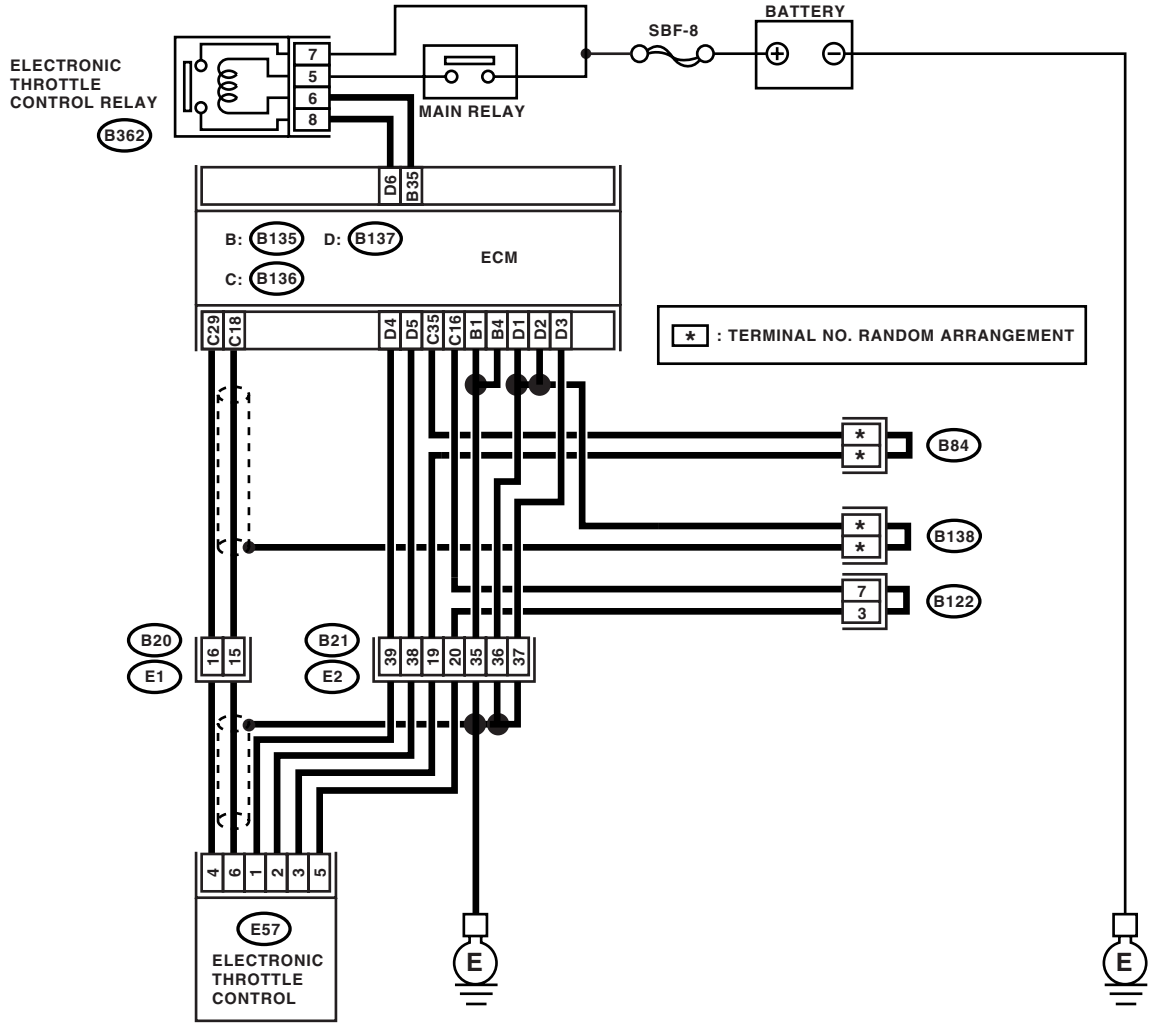
DTC DETECTING CONDITION:

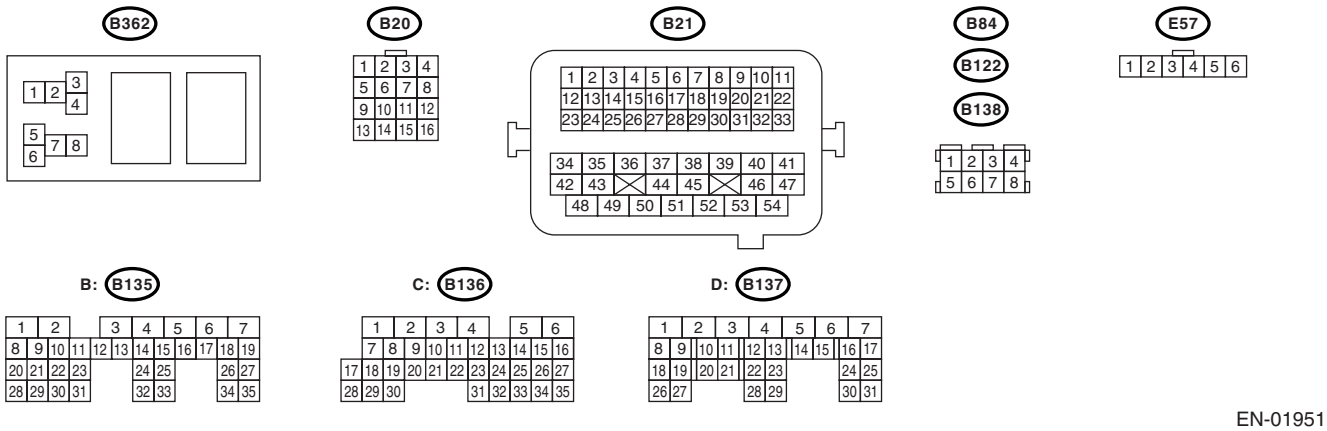
Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:





EN-01951

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 18 (+) — (B136) No. 35 (–):***	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **4.**
2	**CHECK SENSOR OUTPUT.** Measure the voltage between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 29 (+) — (B136) No. 35 (–):***	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
8	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **9.**	Go to step **11.**
9	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **10.**	Go to step **11.**

	Step	Check	Yes	No
10	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connectors from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit of harness connector.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **14.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (–):*** ***(E57) No. 4 (+) — Engine ground (–):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 35:*** ***(B136) No. 29 — (B136) No. 35:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Repair the short circuit to sensor power supply.
16	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connectors from the electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 6 — (E57) No. 4:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Repair the short circuit of harness.

BX:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY

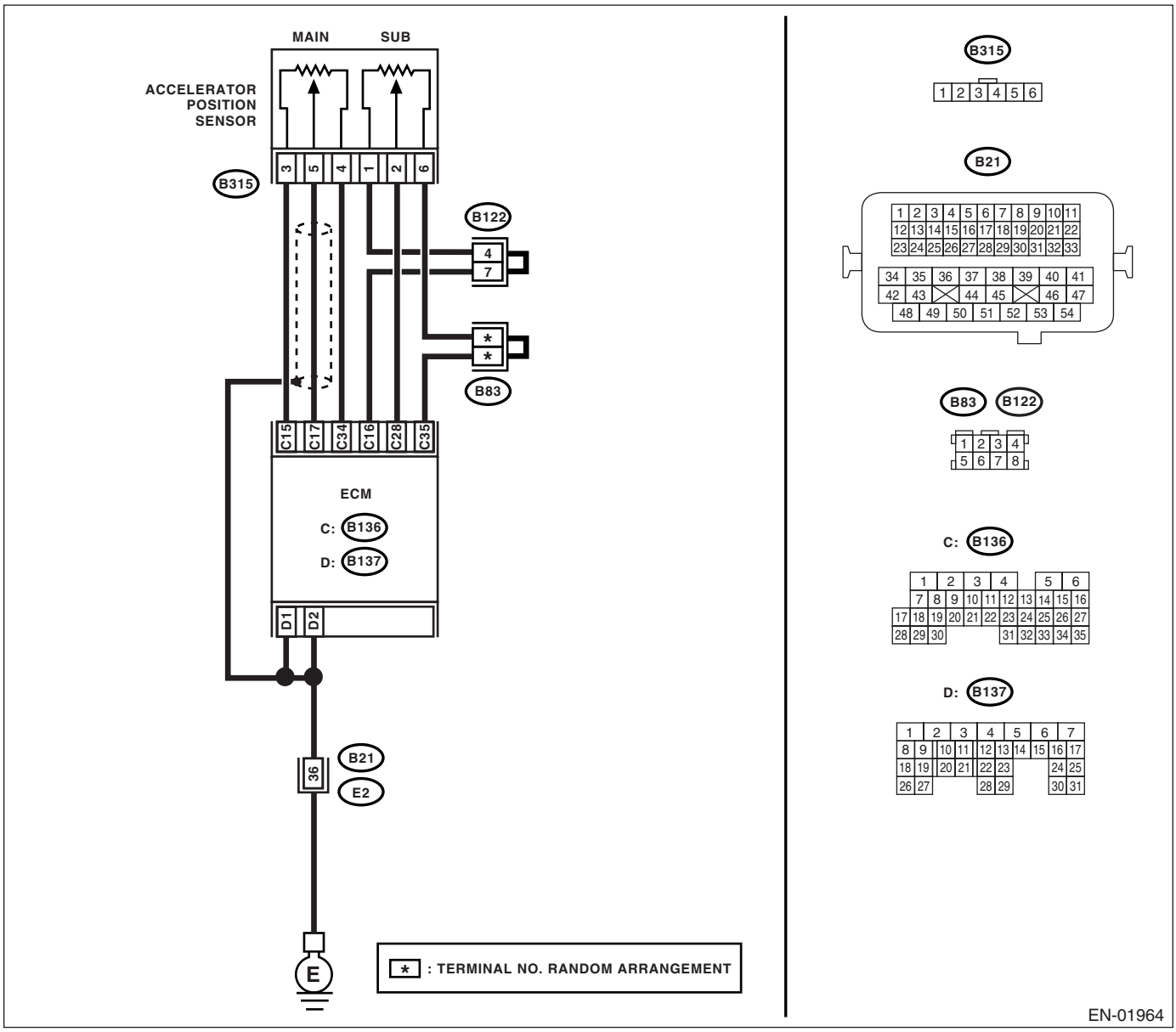
DTC DETECTING CONDITION:

Detect as soon as the malfunction occurs.

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **12.**
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Chassis ground (−):*** ***(B315) No. 1 (+) — Chassis ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator position sensor.
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **9.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
9	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **10.**	Replace the accelerator position sensor.
10	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **11.**	Replace the accelerator position sensor.
11	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **12.**	Replace the accelerator position sensor.
12	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **13.**	Go to step **14.**
13	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **18.**
14	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness connector.
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 4 — Chassis ground:*** ***(B315) No. 6 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Chassis ground (−):*** ***(B315) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 6 V?	Go to step **17.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.

	Step	Check	Yes	No
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the short circuit to sensor power supply.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between connector terminals of accelerator position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).>	Repair the short circuit in harness between ECM connector and accelerator position sensor connector.

17.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H4DOTC)-90, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Electronic throttle control 2) Manifold absolute pressure sensor 3) Mass air flow and intake air temperature sensor 4) Ignition parts (*1) 5) Engine coolant temperature sensor (*2) 6) Crankshaft position sensor (*3) 7) Camshaft position sensor (*3) 8) Fuel injection parts (*4)
2. Rough idling	1) Electronic throttle control 2) Manifold absolute pressure sensor 3) Mass air flow and intake air temperature sensor 4) Engine coolant temperature sensor (*2) 5) Ignition parts (*1) 6) Air intake system (*5) 7) Fuel injection parts (*4) 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Electronic throttle control 2) Engine coolant temperature sensor 3) Manifold absolute pressure sensor 4) Mass air flow sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1)
5. Engine stalls or engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Fuel pump and fuel pump relay
6.Surge	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Throttle position sensor 8) Fuel pump and fuel pump relay

Symptom	Problem parts
7. Spark knock	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check fuel injector, fuel pressure regulator and fuel filter.
*5: Inspect air leak in air intake system.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

FUEL INJECTION (FUEL SYSTEMS)

FU(H6DO)

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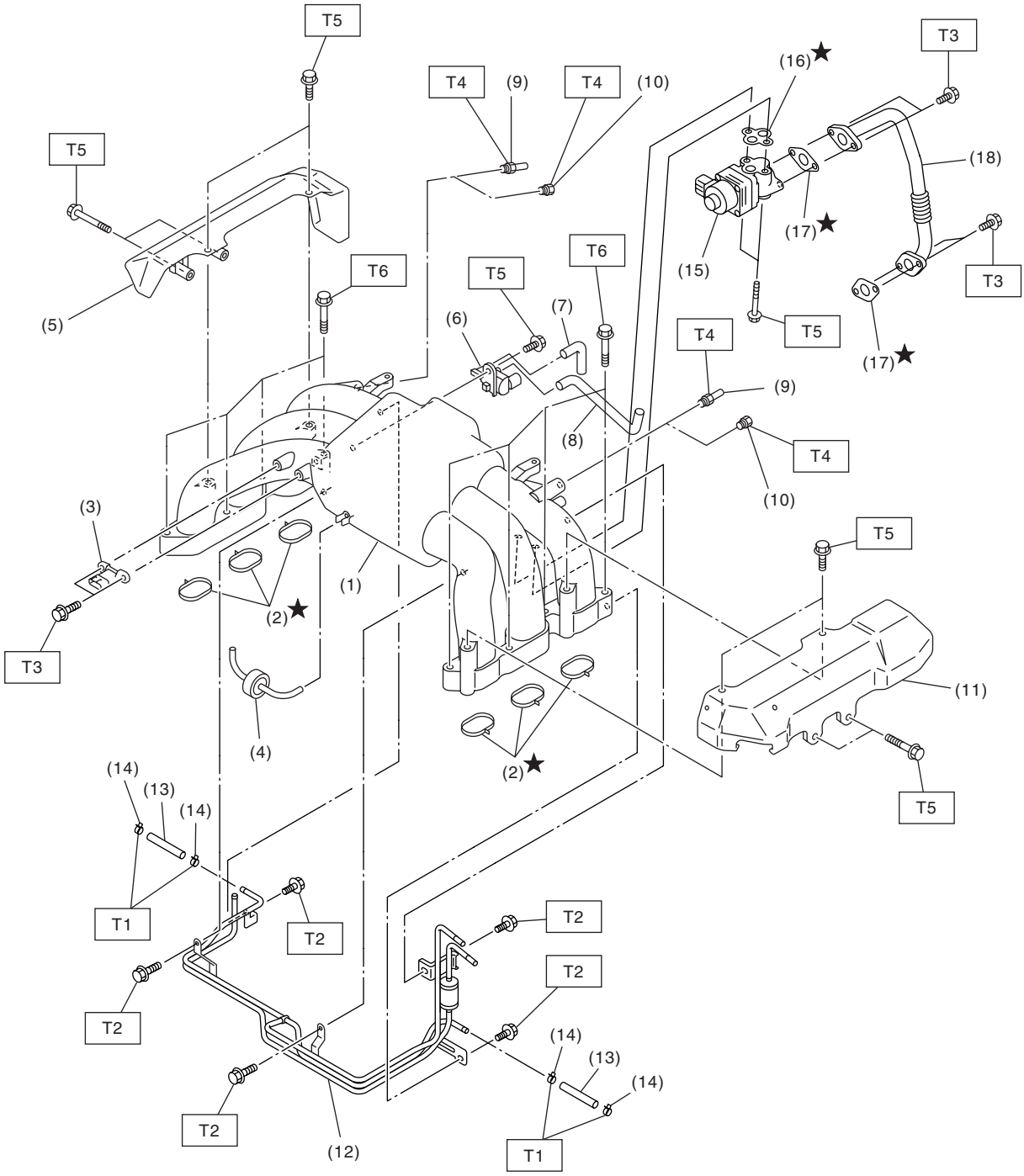
1. General Description

A: SPECIFICATION

Fuel tank	Capacity	64 ℓ (16.9 US gal, 14.1 Imp gal)
	Location	Under rear seat
Fuel pump	Type	Impeller
	Shutoff discharge pressure	550 — 850 kPa (5.61 — 8.67 kg/cm^2, 79.8 — 123.3 psi)
	Discharge	125 ℓ (33 US gal, 27.5 Imp gal)/h or more [12 V at 300 kPa (3.06 kg/cm^2, 43.5 psi)]
Fuel filter		In-tank type

B: COMPONENT

1. INTAKE MANIFOLD

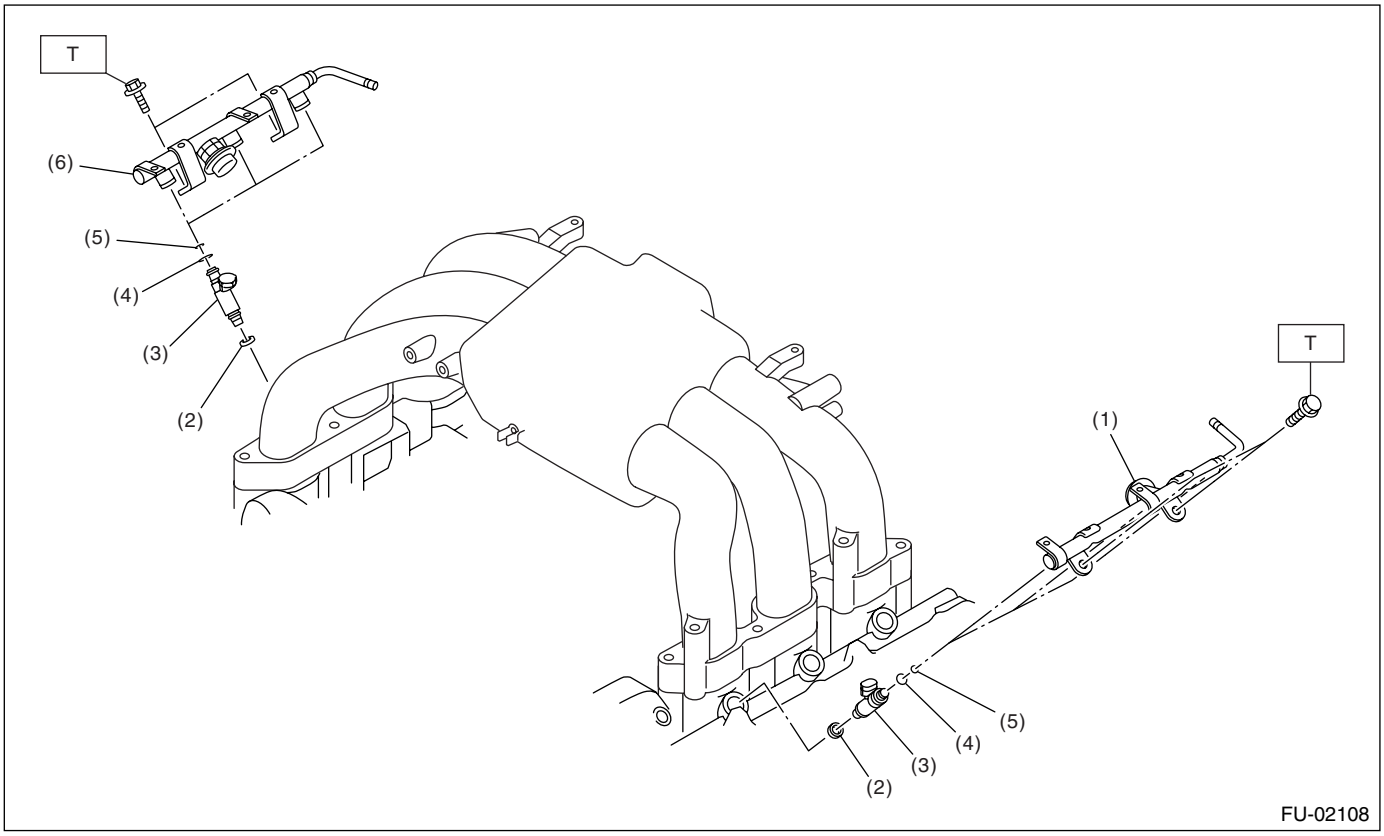


FU-02107

(1) Intake manifold
(2) O-ring
(3) Manifold pressure sensor
(4) Filter
(5) Fuel pipe protector RH
(6) Purge control solenoid valve
(7) Hose
(8) Hose
(9) Nipple
(10) Plug
(11) Fuel pipe protector LH
(12) Fuel pipe ASSY
(13) Hose
(14) Clamp
(15) EGR valve (Except for KA model)
(16) Gasket (Except for KA model)
(17) Gasket (Except for KA model)
(18) EGR pipe (Except for KA model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 1.5 (0.15, 1.1)
T2: 5 (0.5, 3.6)
T3: 6.4 (0.65, 4.7)
T4: 17 (1.7, 12.5)
T5: 19 (1.9, 13.7)
T6: 25 (2.5, 18.1)

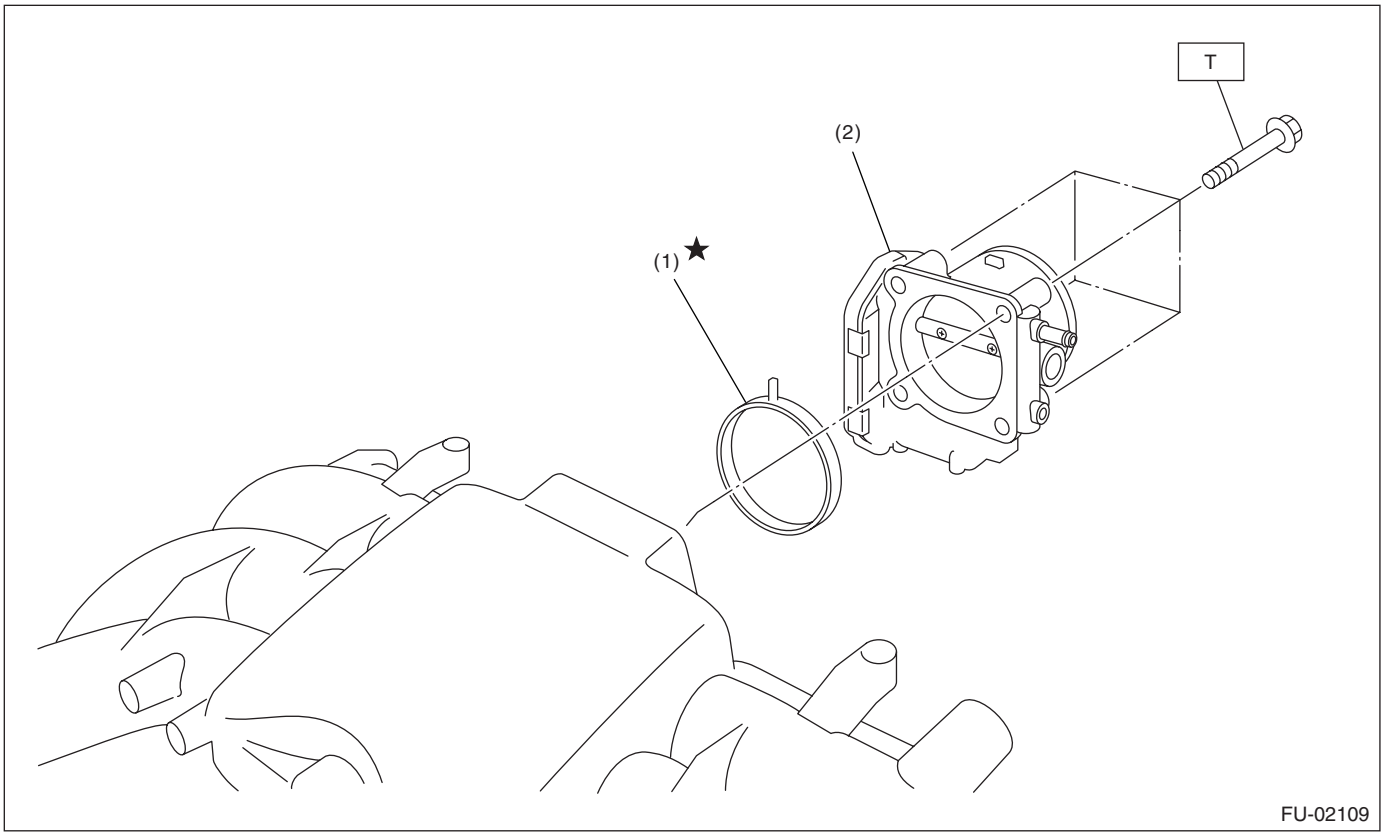
2. FUEL INJECTOR



(1) Fuel injector pipe LH
(2) Insulator
(3) Fuel injector
(4) Injection rubber
(5) O-ring
(6) Fuel injector pipe RH

Tightening torque: N·m (kgf-m, ft-lb)
T: 19 (1.9, 14)

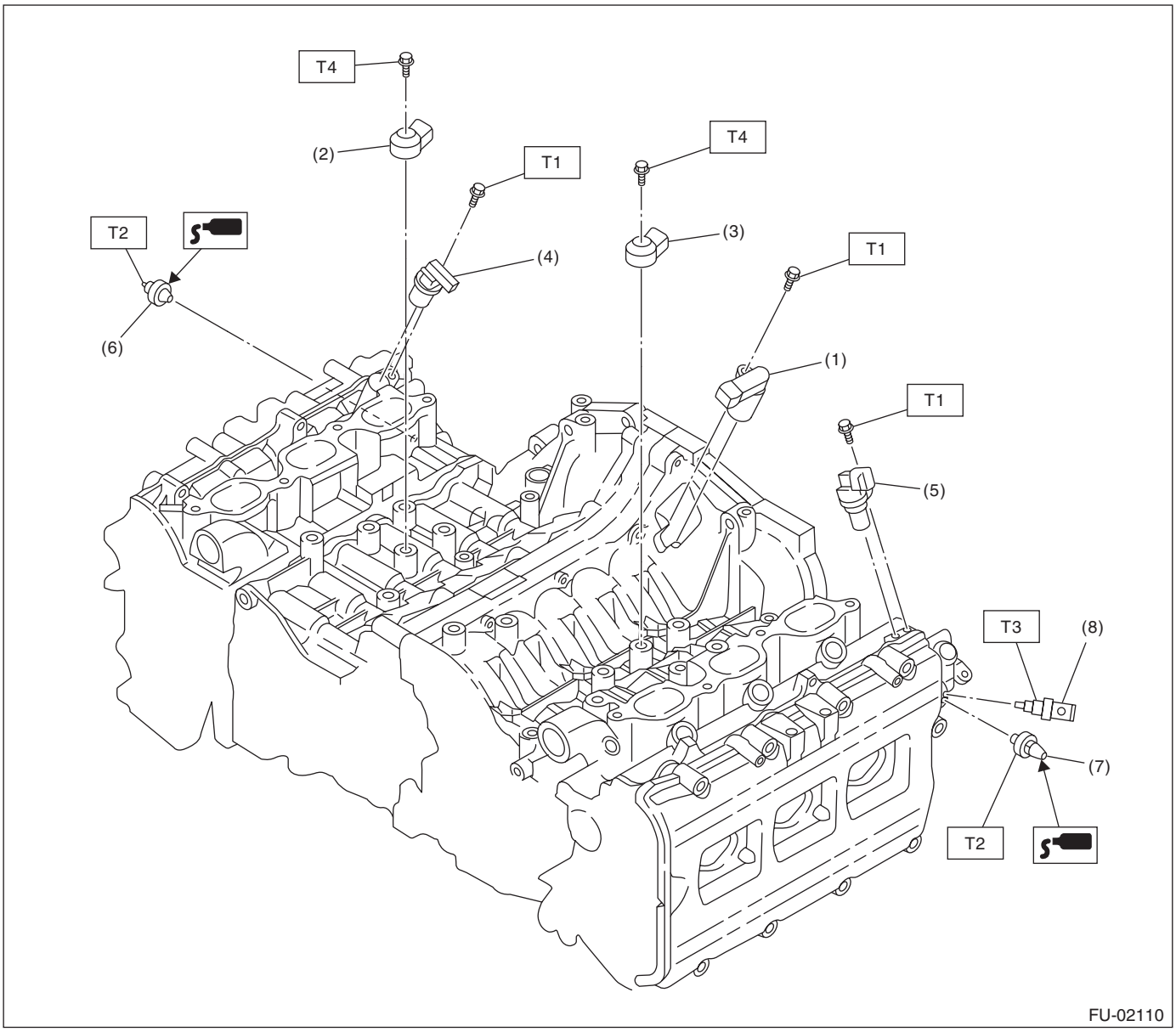
3. AIR INTAKE SYSTEM



(1) O-ring
(2) Throttle body

Tightening torque: N·m (kgf-m, ft-lb)
T: 8 (0.8, 5.8)

4. CRANKSHAFT POSITION, CAMSHAFT POSITION AND KNOCK SENSORS

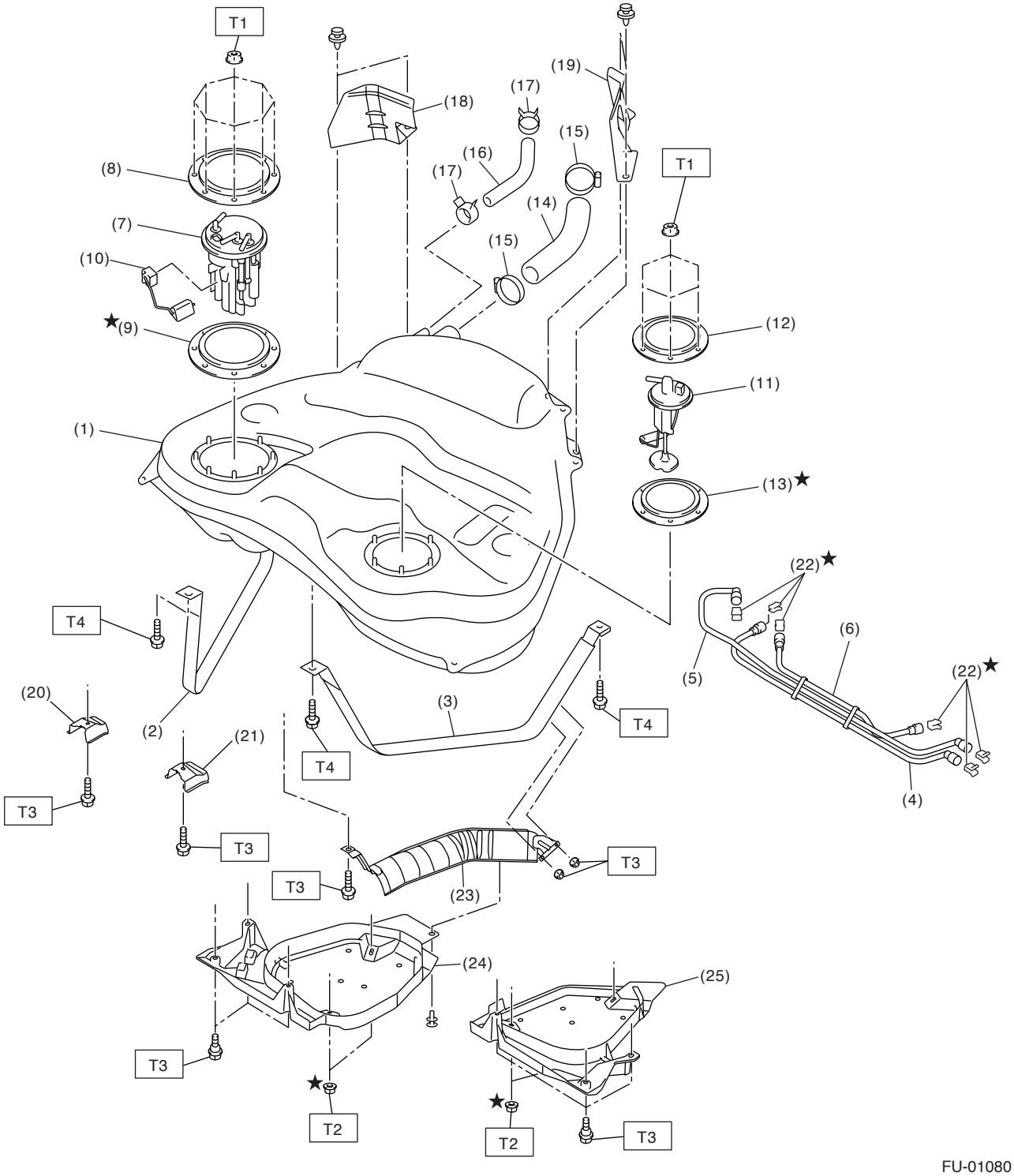


FU-02110

(1) Crankshaft position sensor
(2) Knock sensor RH
(3) Knock sensor LH
(4) Camshaft position sensor RH
(5) Camshaft position sensor LH
(6) Variable valve lift diagnosis oil pressure switch RH
(7) Variable valve lift diagnosis oil pressure switch LH
(8) Oil temperature sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 17 (1.7, 12.5)
T3: 18 (1.8, 13.3)
T4: 25 (2.5, 18)

5. FUEL TANK

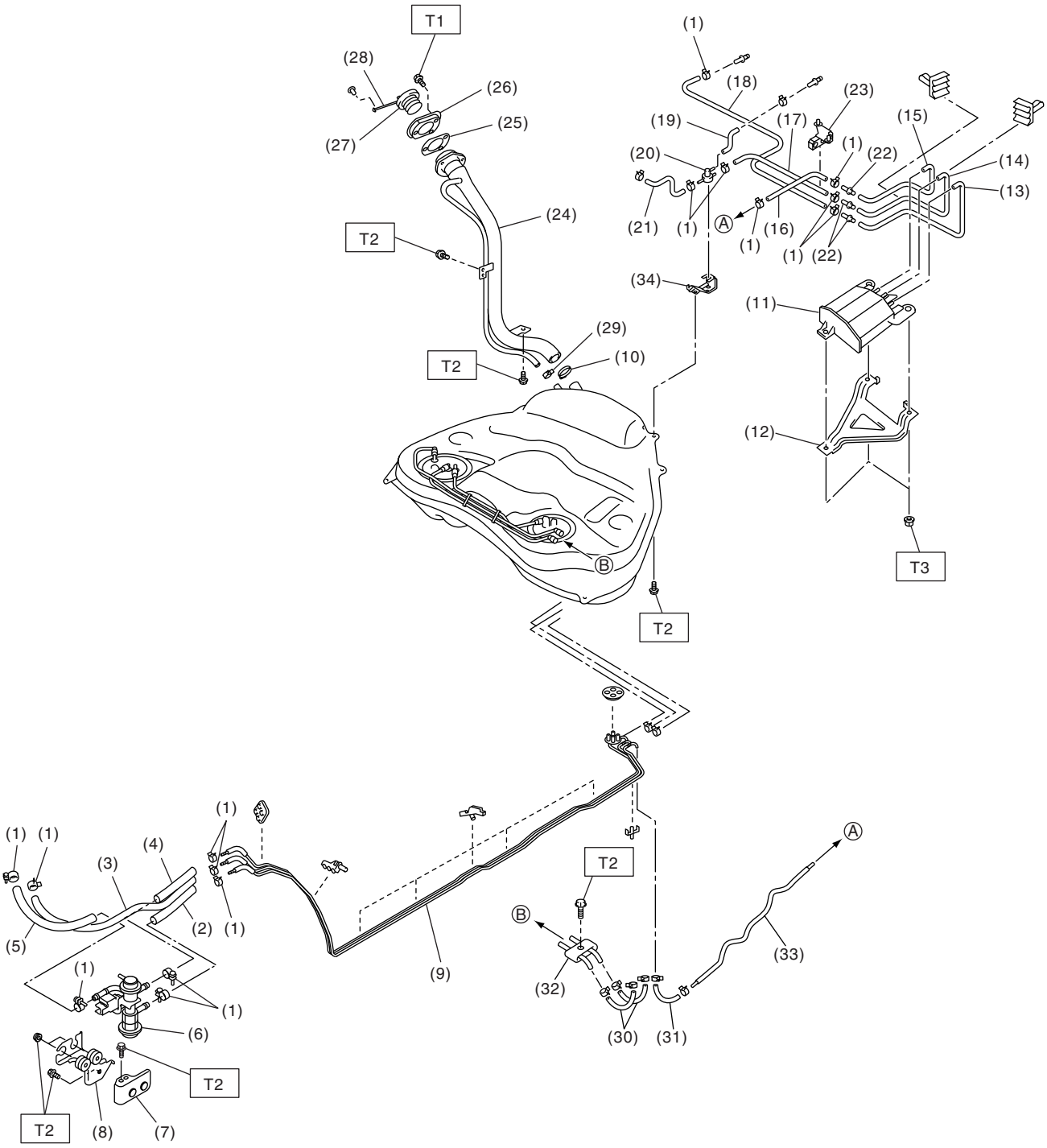


FU-01080

(1) Fuel tank
(2) Fuel tank band RH
(3) Fuel tank band LH
(4) Delivery tube
(5) Return tube
(6) Jet pump tube
(7) Fuel pump ASSY
(8) Fuel pump upper plate
(9) Fuel pump gasket
(10) Fuel level sensor
(11) Fuel sub level sensor
(12) Fuel sub level sensor upper plate
(13) Fuel sub level sensor gasket
(14) Fuel filler hose
(15) Clamp
(16) Vent hose
(17) Clip
(18) Fuel tank protector RH (Rear)
(19) Fuel tank protector LH (Rear)
(20) Stopper RH
(21) Stopper LH
(22) Retainer
(23) Heat shield cover
(24) Fuel tank protector RH (Front)
(25) Fuel tank protector LH (Front)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.3)
T2: 9.0 (0.92, 6.6)
T3: 17.5 (1.78, 12.9)
T4: 33 (3.4, 25)

6. FUEL LINE


T1
(28)
(26)
(27)
(25)
(24)
T2
(29)
(10)
T2
(1)
(18)
(23)
(19)
(17)
(15)
(20)
(1)
(22)
(14)
(13)
(21)
(1)
A
(16)
(1)
(1)
(22)
(34)
(11)
(12)
T3
B
T2
(1)
(1)
(1)
(4)
(3)
(5)
(2)
(1)
(1)
(1)
(6)
T2
T2
(8)
(7)
(9)
T2
B
(32)
(30)
(31)
(33)
A
FU-02182

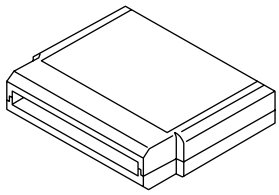
(1) Clip
(2) Fuel return hose
(3) Evaporation hose
(4) Fuel delivery hose A
(5) Fuel delivery hose B
(6) Fuel bypass valve
(7) Bracket
(8) Bracket
(9) Fuel pipe ASSY
(10) Clamp
(11) Canister
(12) Canister protector (Sedan model)
(13) Canister drain hose A
(14) Two-way valve hose A
(15) Purge hose A
(16) Purge hose B
(17) Two-way valve hose B
(18) Canister drain hose B
(19) Two-way valve drain hose
(20) Two-way valve
(21) Two-way valve hose C
(22) Connector
(23) Evaporation hose holder
(24) Fuel filler pipe ASSY
(25) Filler pipe packing
(26) Filler ring
(27) Filler cap
(28) Tether
(29) Clip
(30) Fuel hose
(31) Purge hose C
(32) Connector
(33) Purge pipe
(34) Two-way valve bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.4 (0.45, 3.2)
T2: 7.5 (0.76, 5.53)
T3: 8.3 (0.85, 6.1)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Place “NO FIRE” signs near the working area.
• Be careful not to spill fuel on the floor.

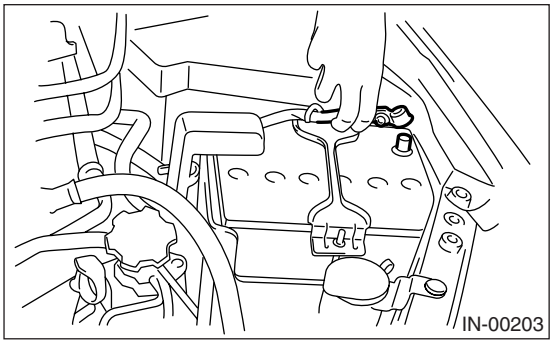
D: PREPARATION TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

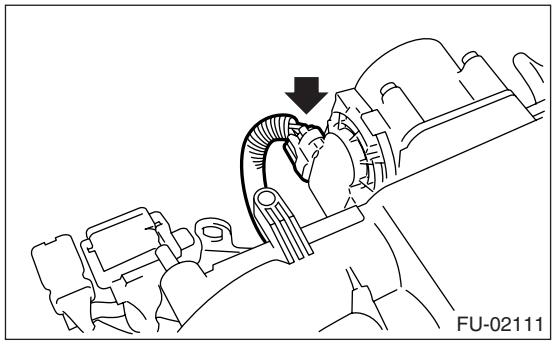
2. Throttle Body

A: REMOVAL

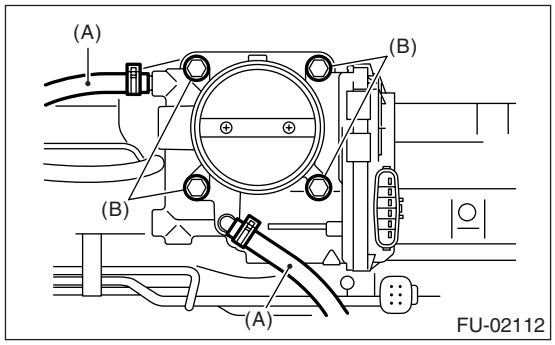
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the connectors from throttle position sensor.



5) Disconnect the engine coolant hoses (A) from throttle body.
6) Remove the bolts (B) which secure throttle body to intake manifold.



B: INSTALLATION

Install in the reverse order of removal.

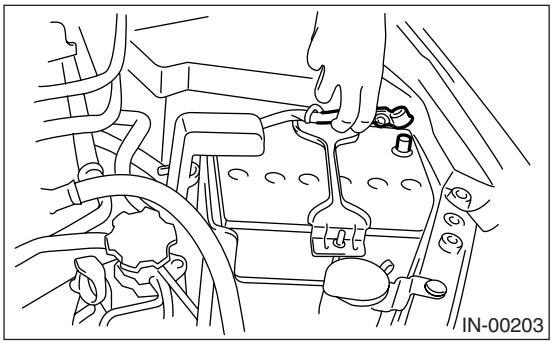
NOTE:
Use a new O-ring.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

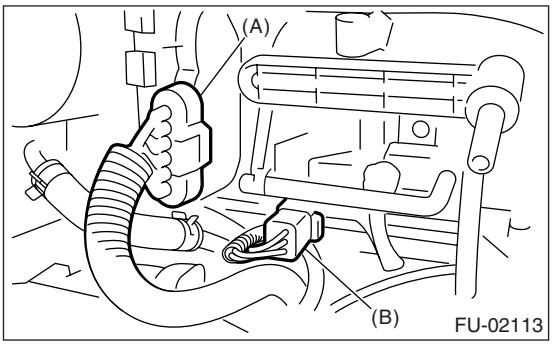
3. Intake Manifold

A: REMOVAL

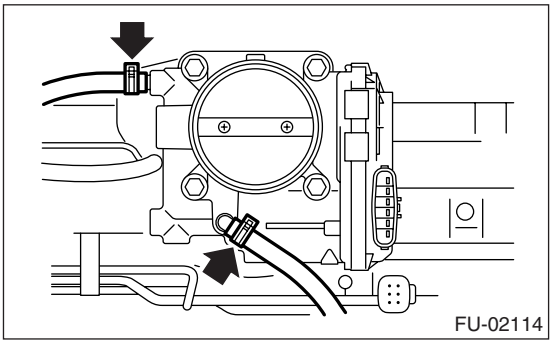
1) Remove the collector cover.
2) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Disconnect the ground cable from battery.



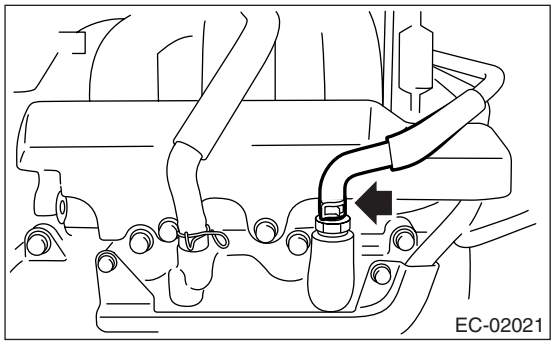
5) Remove the air cleaner case and air intake chamber. <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
6) Disconnect the connector (A) and (B).



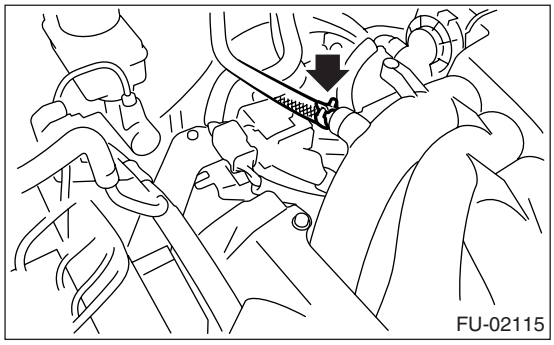
7) Disconnect the engine coolant hoses from throttle body.



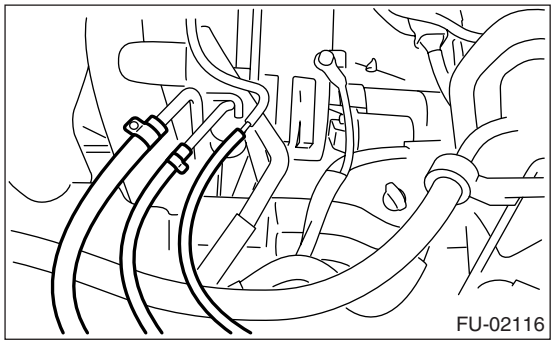
8) Disconnect the PCV hose.



9) Disconnect the brake booster hose.

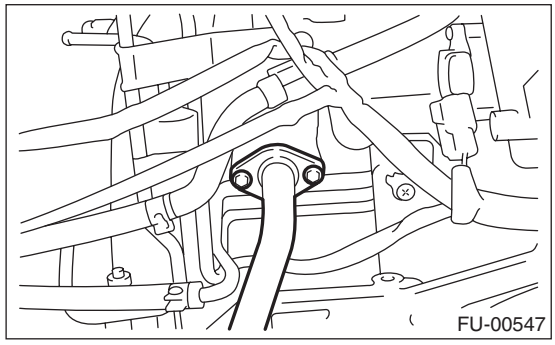


10) Disconnect the fuel hoses from fuel pipe.



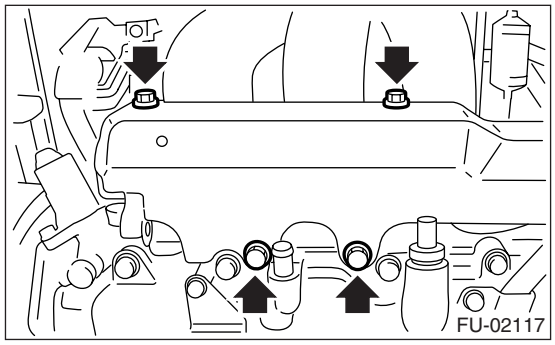
11) Remove the EGR pipe from EGR valve. (Except for KA model)

CAUTION:
Be careful not to drop gaskets.

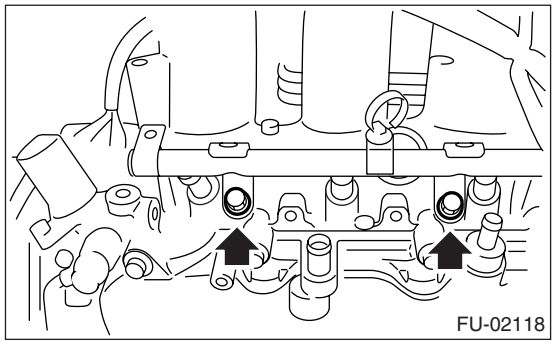


12) Disconnect the connector from EGR valve. (Except for KA model)

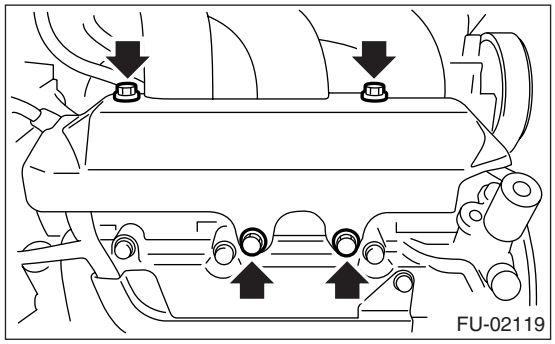
13) Remove the fuel pipe protector LH.



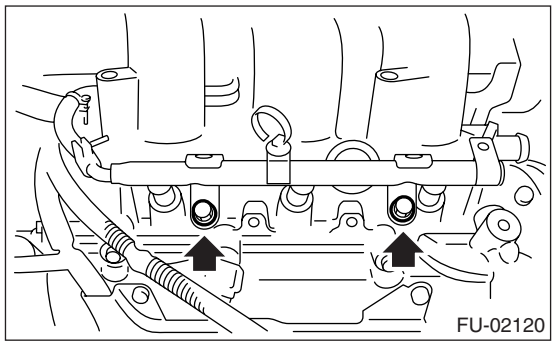
14) Remove the bolts, which hold fuel injector pipe LH onto cylinder head.



15) Remove the fuel pipe protector RH.

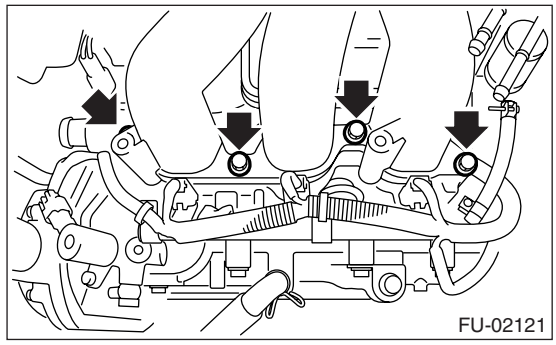


16) Remove the bolts, which hold fuel injector pipe RH onto cylinder head.

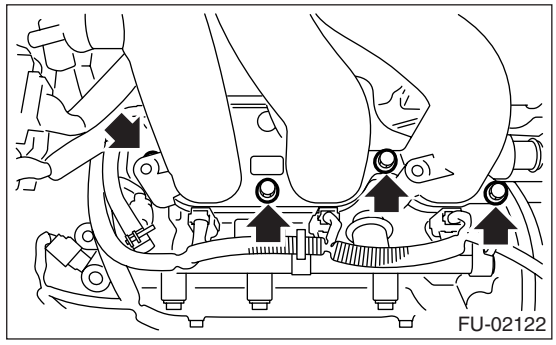


17) Remove bolts which hold intake manifold onto cylinder heads.

- LH side



- RH side



18) Remove the intake manifold.

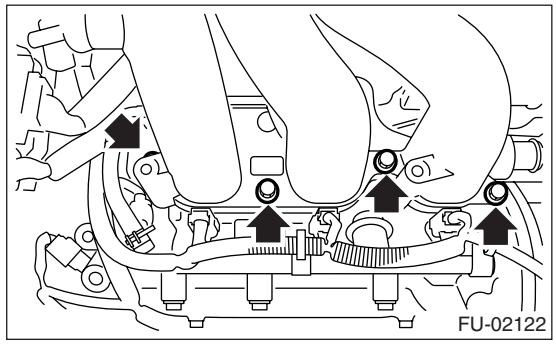
B: INSTALLATION

1) Install the intake manifold onto cylinder heads.

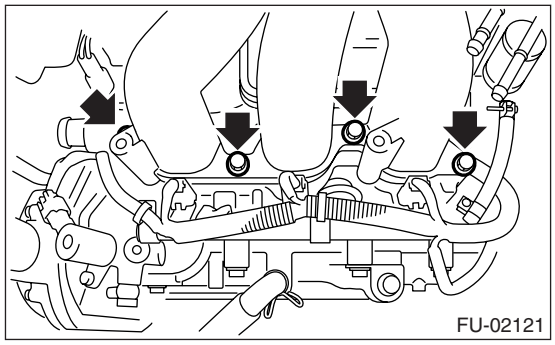
NOTE:
Use a new O-ring.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

- RH side

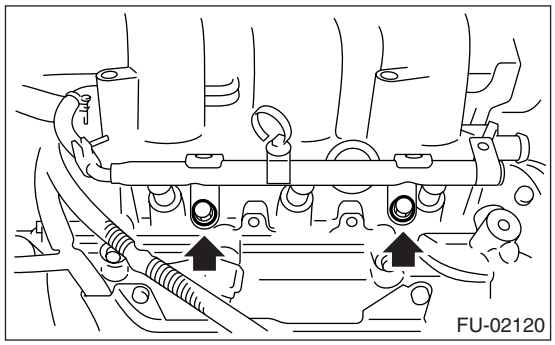


• LH side



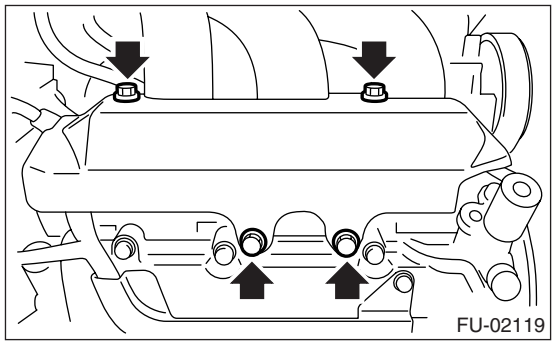
2) Install the bolts, which hold fuel injector pipe RH onto cylinder head.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



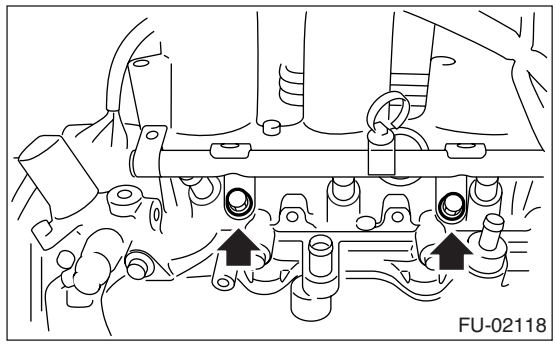
3) Install the fuel pipe protector RH.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



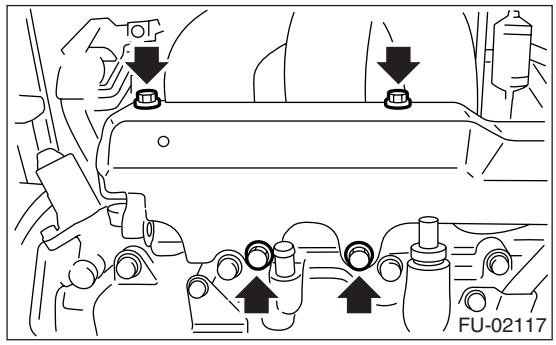
4) Install the bolts which hold fuel injector pipe LH onto cylinder head.

Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



5) Install the fuel pipe protector LH.

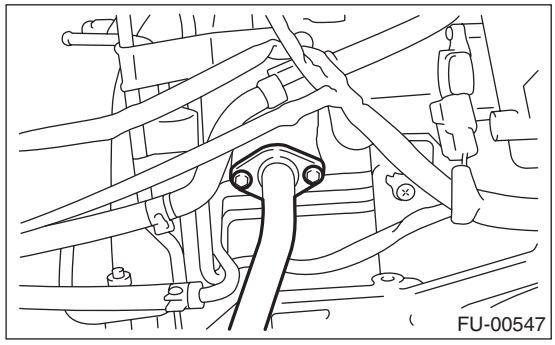
Tightening torque:
19 N·m (1.9 kgf-m, 14 ft-lb)



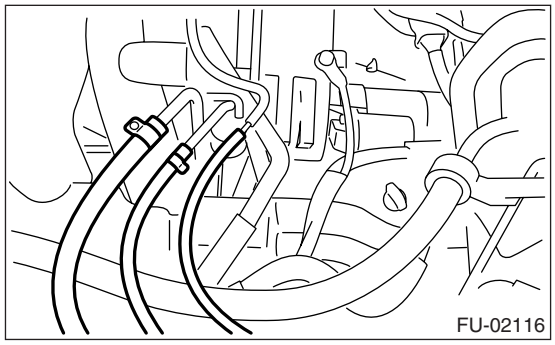
6) Connect the connector to EGR valve. (Except for KA model)
7) Install the EGR pipe to EGR valve. (Except for KA model)

NOTE:
Always use new gasket.

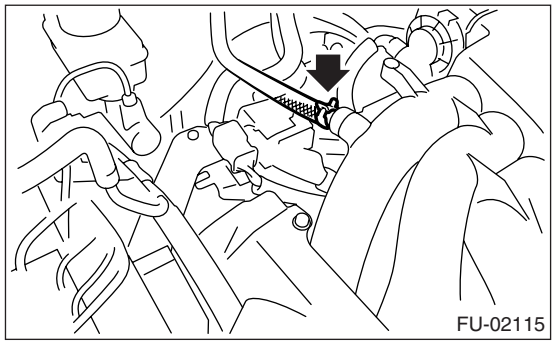
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



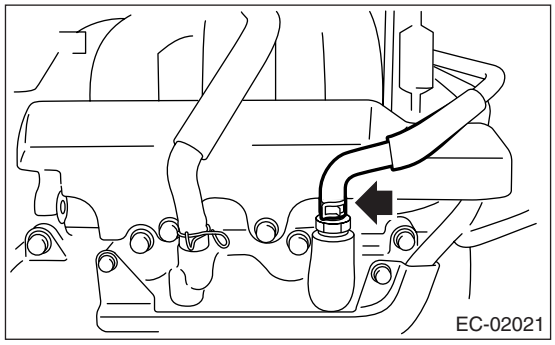
8) Connect the fuel hoses to fuel pipe.



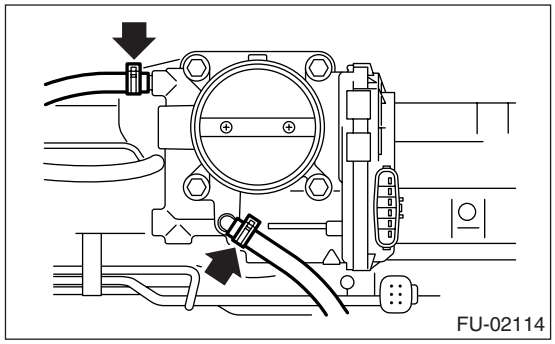
9) Connect the brake booster hose.



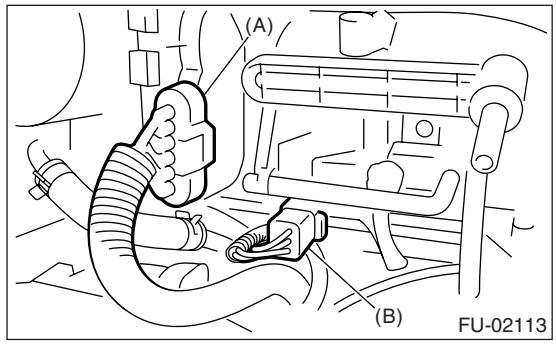
10) Connect the PCV hose.



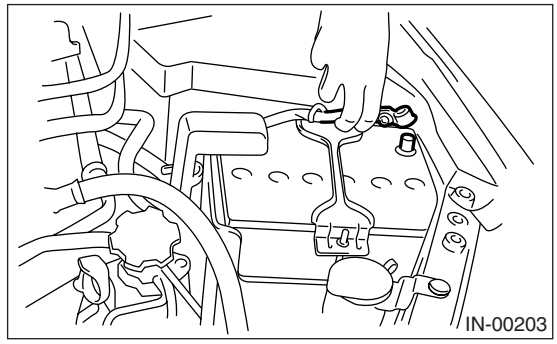
11) Connect the engine coolant hoses to throttle body.



12) Connect the connector (A) and (B).



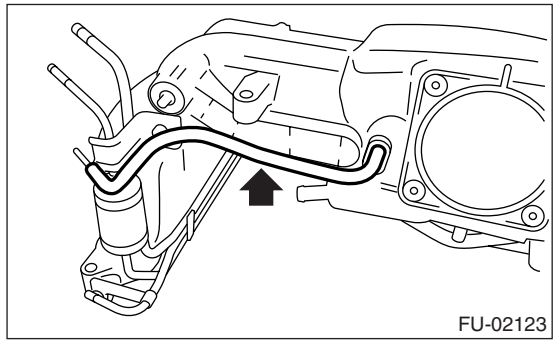
13) Install the air cleaner case and air intake chamber. <Ref. to IN(H6DO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
14) Install the fuse of fuel pump to main fuse box.
15) Connect the battery ground cable to battery.



16) Install the collector cover.

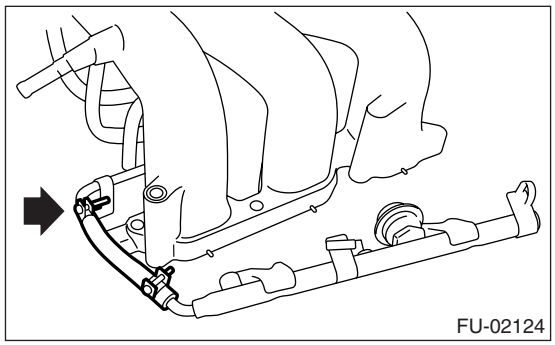
C: DISASSEMBLY

1) Remove the throttle body. **<Ref. to FU(H6DO)-11,** REMOVAL**, Throttle Body.>**
2) Remove the EGR valve. **<Ref. to FU(H6DO)-25,** REMOVAL**, EGR Valve.>**
3) Disconnect the pressure regulator vacuum hose from intake manifold.

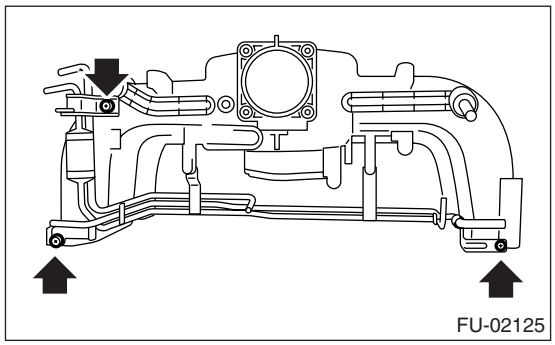


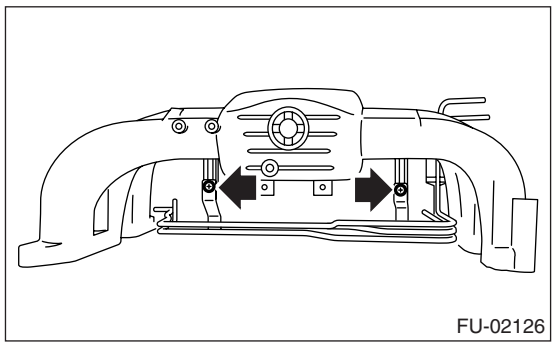
4) Remove the manifold absolute pressure sensor. **<Ref. to FU(H6DO)-23,** REMOVAL**, Manifold Absolute Pressure Sensor.>**
5) Remove the purge control solenoid valve. <Ref. to EC(H6DO)-7, REMOVAL, Purge Control Solenoid Valve.>

6) Loosen the clamp which holds fuel injector pipe to fuel hose, and then disconnect the pipe from fuel hose.


FU-02124

7) Remove the bolts which install fuel pipes on intake manifold.


FU-02125


FU-02126

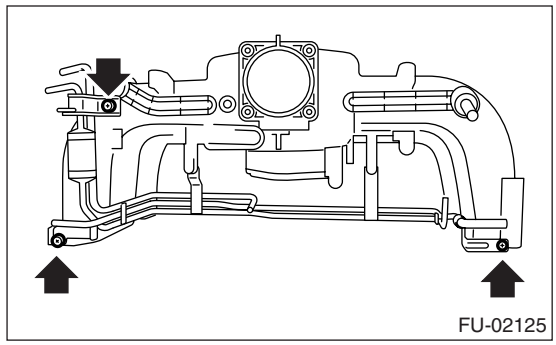
D: ASSEMBLY

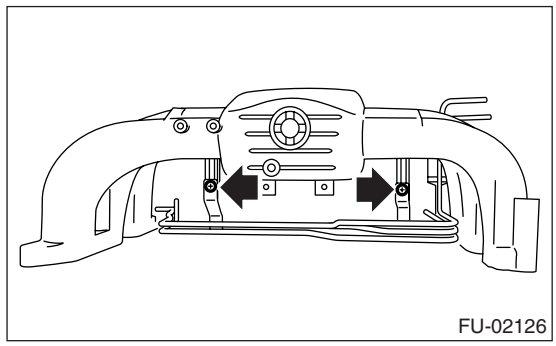
NOTE:
When assembling the nipple, apply liquid gasket.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

1) Tighten the bolts which install fuel pipes on intake manifold.

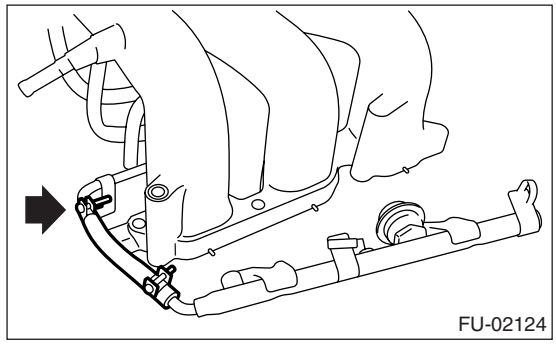
Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)


FU-02125


FU-02126

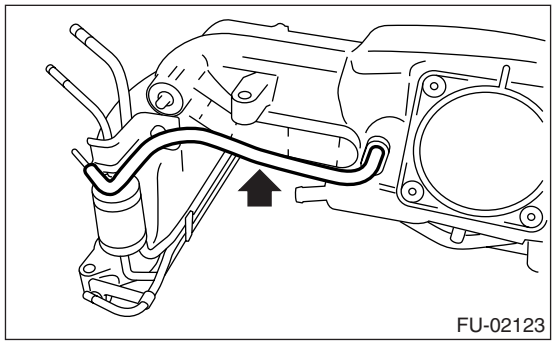
2) Connect the fuel injector pipe to fuel hose, and tighten the clamp screw.

Tightening torque:
1.5 N·m (0.15 kgf-m, 1.1 ft-lb)


FU-02124

3) Install the purge control solenoid valve. <Ref. to EC(H6DO)-7, INSTALLATION, Purge Control Solenoid Valve.>
4) Install the manifold absolute pressure sensor. **<Ref. to FU(H6DO)-23,** INSTALLATION**, Manifold Absolute Pressure Sensor.>**

5) Connect the pressure regulator vacuum hose to intake manifold.



6) Install the EGR valve. **<Ref. to FU(H6DO)-25,** INSTALLATION**, EGR Valve.>**
7) Install the throttle body to intake manifold. **<Ref. to FU(H6DO)-11,** INSTALLATION**, Throttle Body.>**

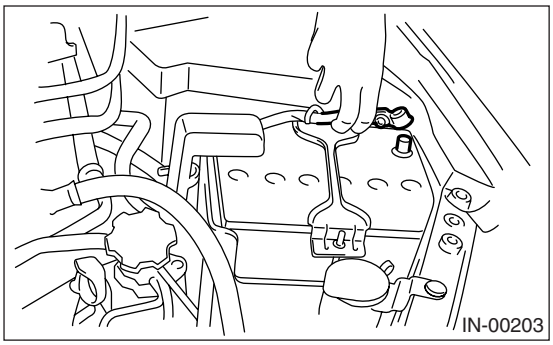
E: INSPECTION

Make sure the fuel pipe and fuel hoses are not damaged and the connections are tightened firmly.

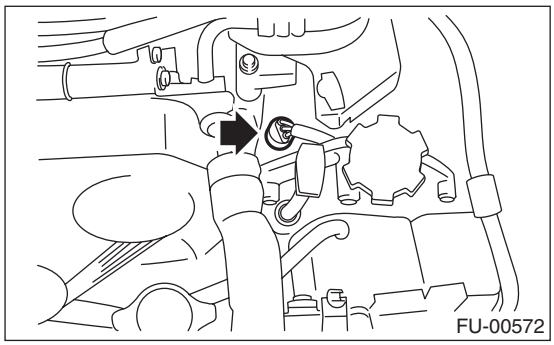
4. Engine Coolant Temperature Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



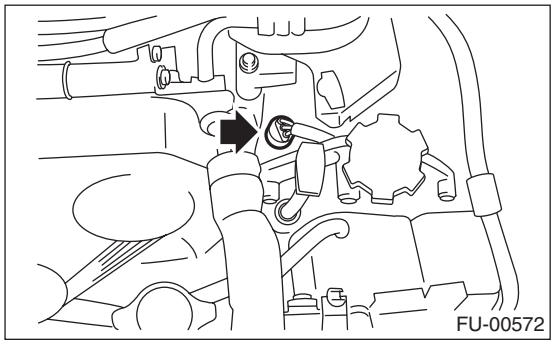
3) Disconnect the connector from engine coolant temperature sensor.
4) Remove the engine coolant temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

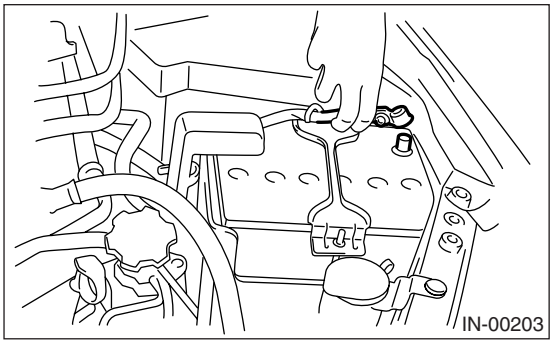
Tightening torque:
16 N·m (1.6 kgf-m, 12 ft-lb)



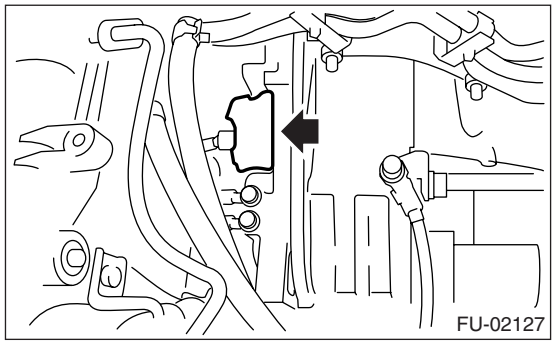
5. Crankshaft Position Sensor

A: REMOVAL

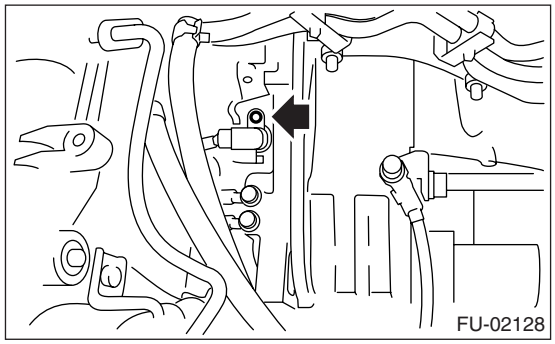
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Remove the service hole cover.



5) Remove the crankshaft position sensor.

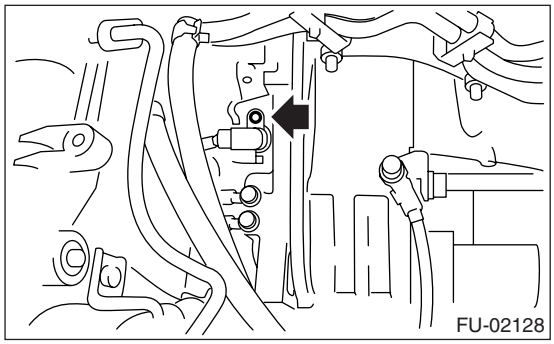


6) Disconnect the connector from crankshaft position sensor.

B: INSTALLATION

Install in the reverse order of removal.

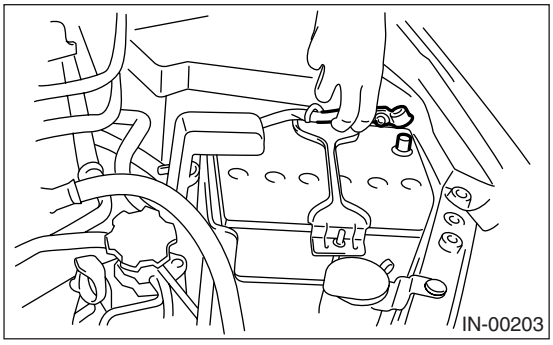
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



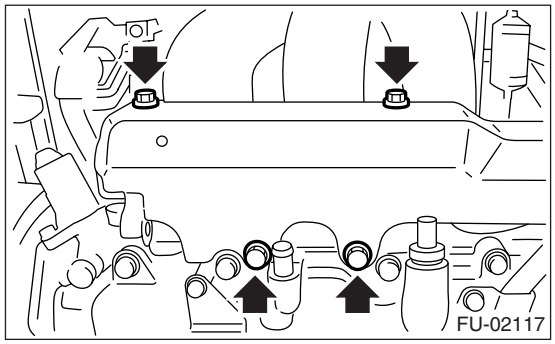
6. Camshaft Position Sensor

A: REMOVAL

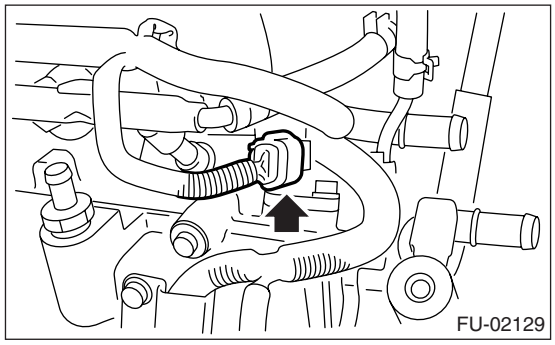
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



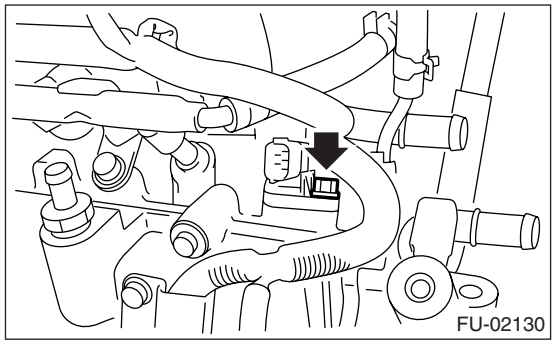
3) Remove the generator harness from fuel pipe protector LH.
4) Remove the fuel pipe protector LH.



5) Disconnect the connector from camshaft position sensor LH.



6) Remove the camshaft position sensor LH.



7) Remove the camshaft position sensor RH in the same procedure as LH.

B: INSTALLATION

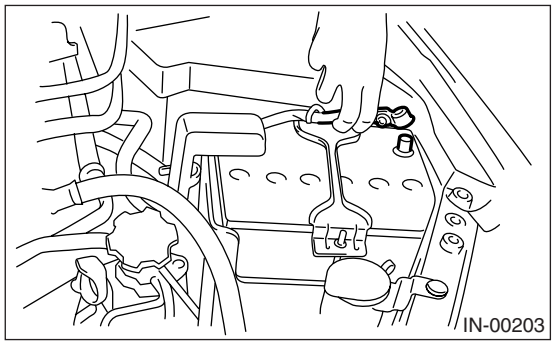
Install in the reverse order of removal.

Tightening torque:
Camshaft position sensor
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
Fuel pipe protector
19 N·m (1.9 kgf-m, 14 ft-lb)

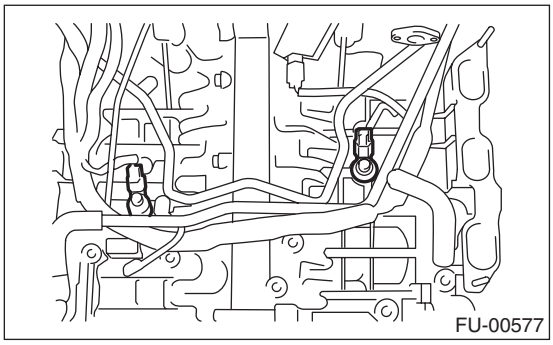
7. Knock Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the intake manifold.
<Ref. to FU(H6DO)-12, REMOVAL**, Intake Manifold.>**
4) Disconnect the knock sensor connector.
5) Remove the knock sensor from cylinder block.

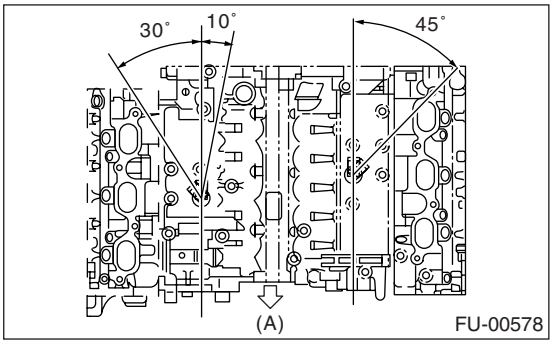


B: INSTALLATION

1) Install the knock sensor to cylinder block.

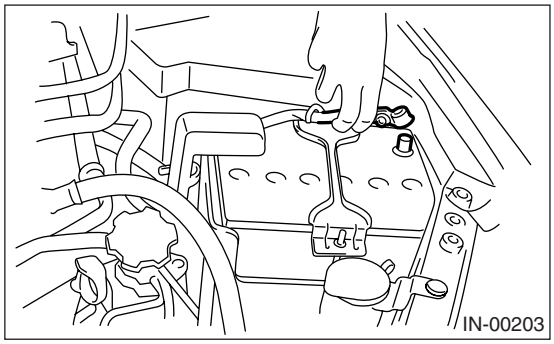
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

NOTE:
For the knock sensor's installation angle, refer to the figure below.



(A) Front side

2) Connect the knock sensor connector.
3) Install the intake manifold. **<Ref. to FU(H6DO)-13,** INSTALLATION**, Intake Manifold.>**
4) Connect the battery ground cable to battery.



5) Install the collector cover.

8. Throttle Position Sensor

A: SPECIFICATION

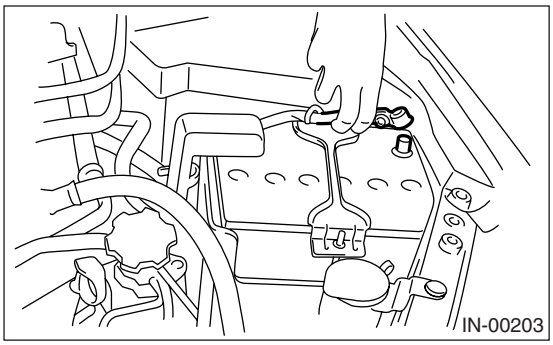
Throttle body is a non-disassembled part, so do not remove the throttle position sensor from throttle body.

Refer to “Throttle Body” for removal and installation procedure. **<Ref. to FU(H6DO)-11,** REMOVAL**, Throttle Body.> <Ref. to FU(H6DO)-11,** INSTALLATION**, Throttle Body.>**

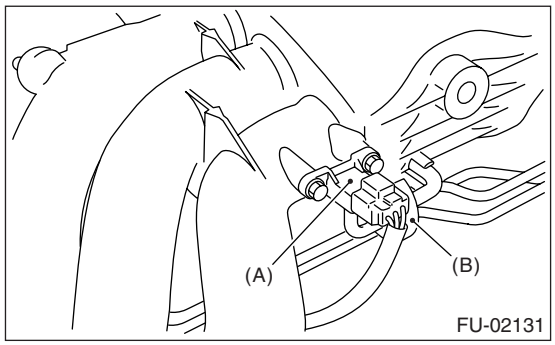
9. Manifold Absolute Pressure Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Disconnect the connector from manifold absolute pressure sensor (A), and remove the filter assembly (B) from intake manifold.



4) Remove the manifold absolute pressure sensor from intake manifold.

B: INSTALLATION

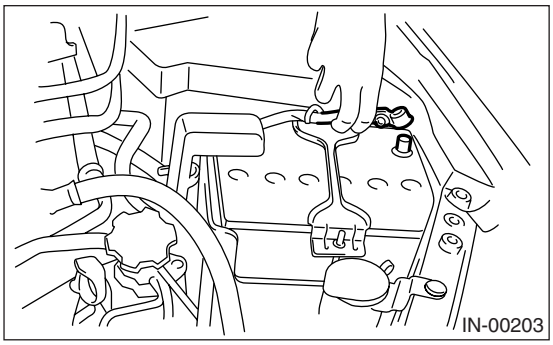
Install in the reverse order of removal.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

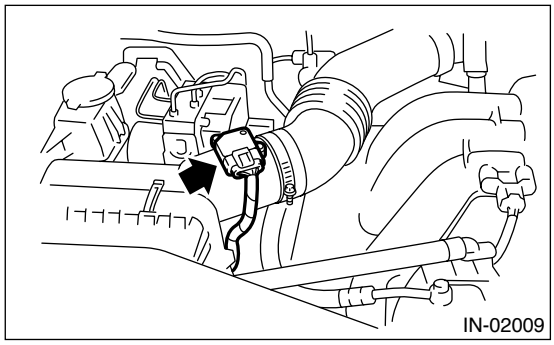
10.Mass Air Flow and Intake Air Temperature Sensor

A: REMOVAL

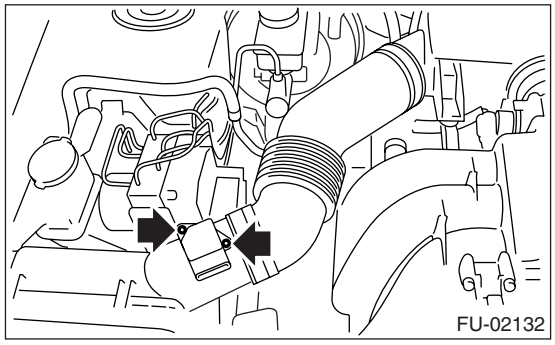
1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.



3) Remove the mass air flow and intake air temperature sensor.



B: INSTALLATION

Install in the reverse order of removal.

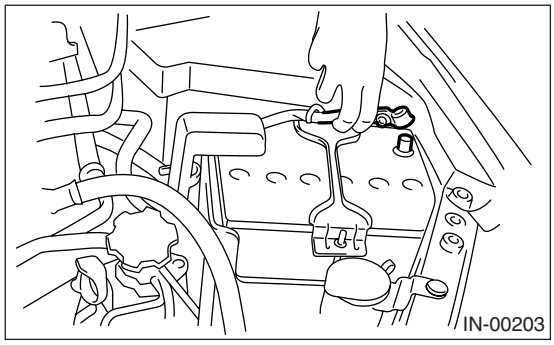
Tightening torque:
1.0 N·m (0.10 kgf-m, 0.74 ft-lb)

11.EGR Valve

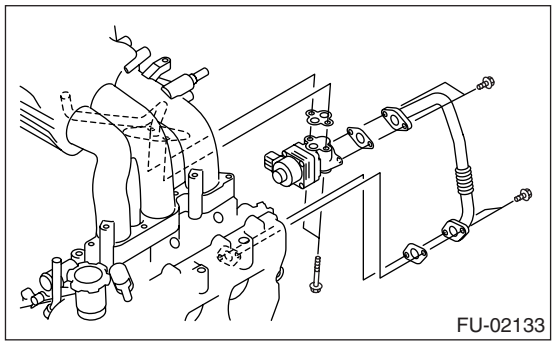
A: REMOVAL

NOTE:
Model except for KA is equipped with EGR valve.

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
5) Remove the EGR pipe from the EGR valve and cylinder head.
6) Remove the EGR valve from intake manifold.



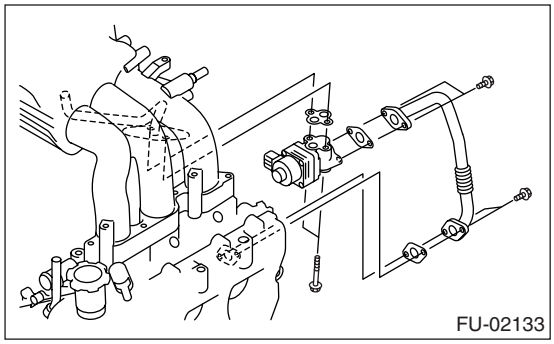
7) Disconnect the connector from EGR valve.

B: INSTALLATION

Install in the reverse of removal.

NOTE:
Replace the old gaskets with new ones.

Tightening torque:
EGR valve
19 N·m (1.9 kgf-m, 14 ft-lb)
EGR pipe
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

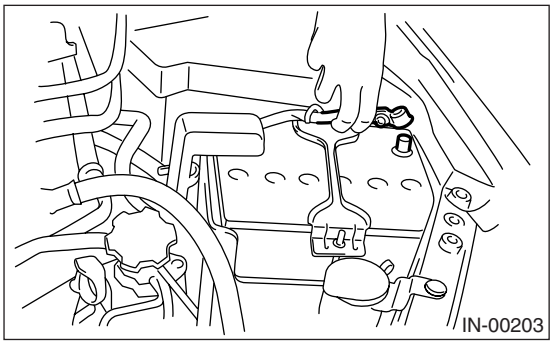


12.Fuel Injector

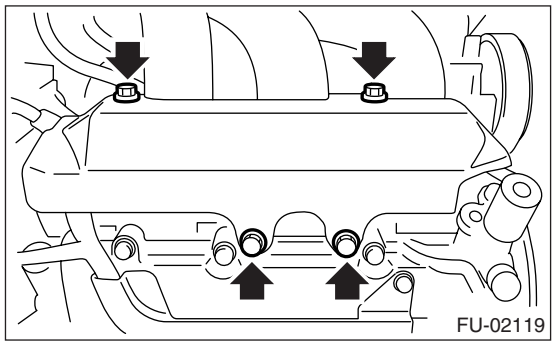
A: REMOVAL

1. RH SIDE

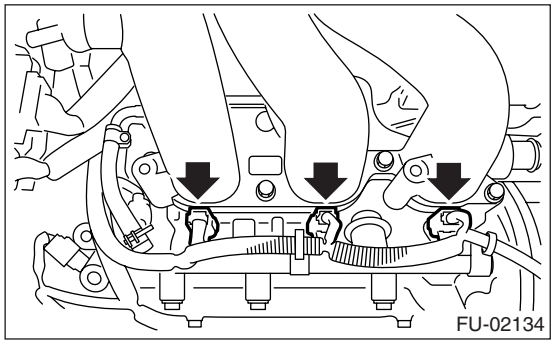
1) Remove the collector cover.
2) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Disconnect the ground cable from battery.



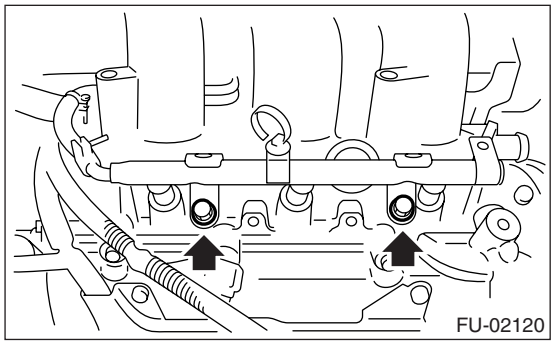
5) Remove the air cleaner case. <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
6) Remove the fuel pipe protector RH.



7) Disconnect the connectors from fuel injector.



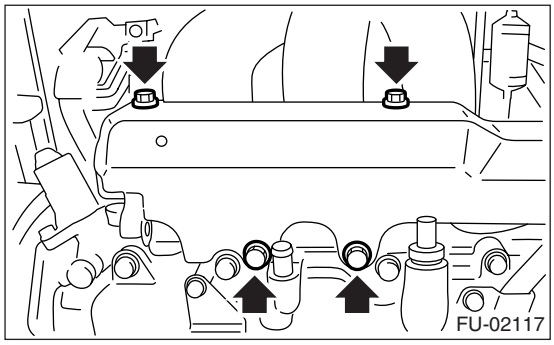
8) Remove the engine harness from fuel injector pipe RH.
9) Remove the bolts which hold fuel injector pipe onto intake manifold.



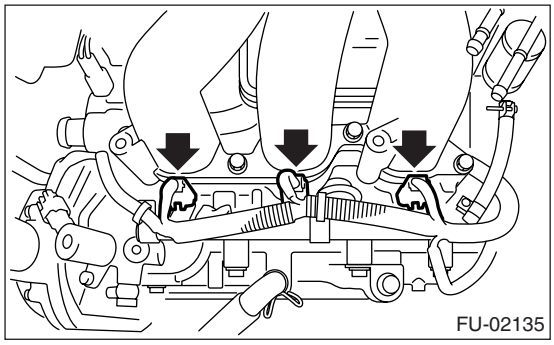
10) Remove the fuel injector while lifting up the fuel injector pipe.

2. LH SIDE

1) Remove the collector cover.
2) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the battery.
5) Remove the generator harness from fuel pipe protector LH.
6) Remove the fuel pipe protector LH.

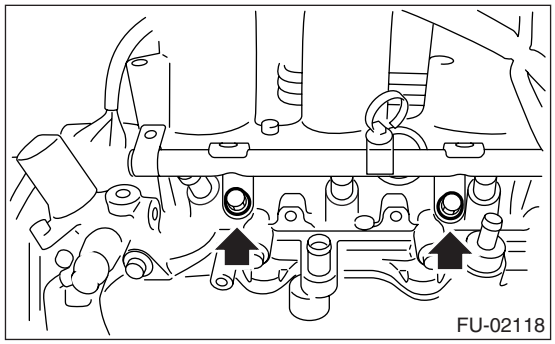


7) Disconnect the connectors from fuel injector.



8) Remove the engine harness from fuel injector pipe LH.

9) Remove the bolts which hold fuel injector pipe onto intake manifold.



10) Remove the fuel injector while lifting up the fuel injector pipe.

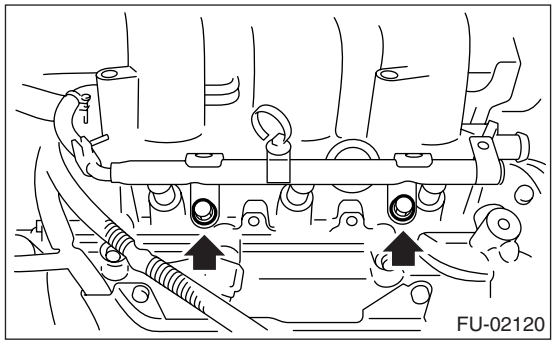
B: INSTALLATION

1. RH SIDE

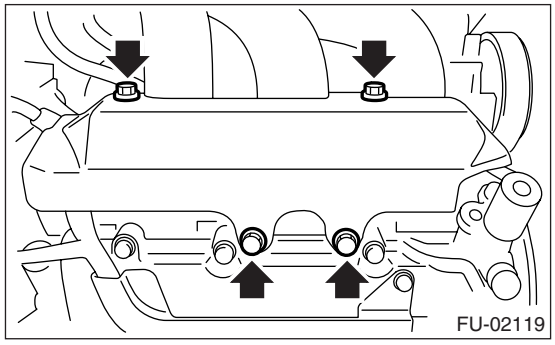
Install in the reverse order of removal.

NOTE:
Use new O-rings.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)

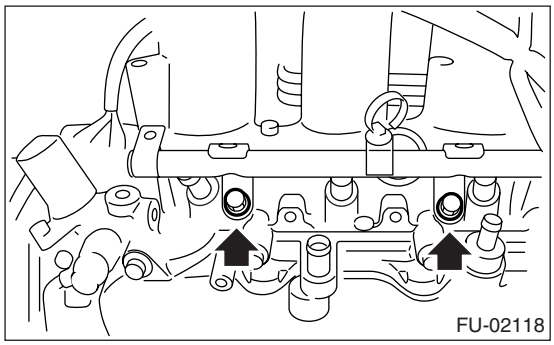


2. LH SIDE

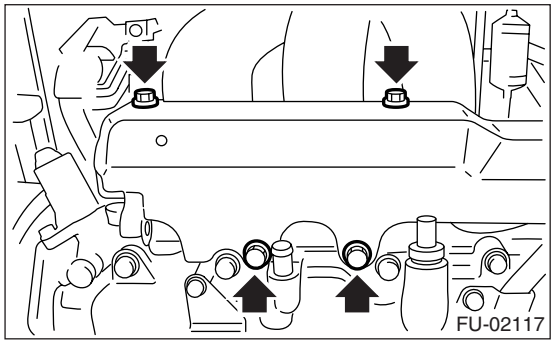
Install in the reverse order of removal.

NOTE:
Use new O-rings.

Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



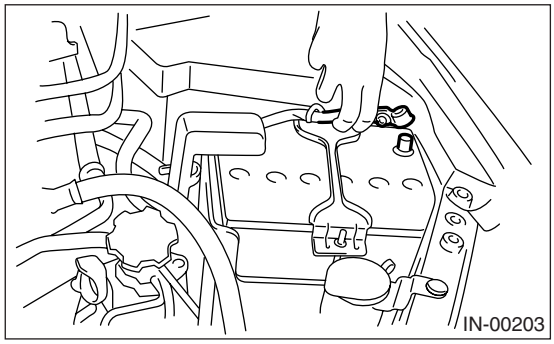
Tightening torque:
19 N·m (1.9 kgf-m, 13.7 ft-lb)



13. Variable Valve Lift Diagnosis Oil Pressure Switch

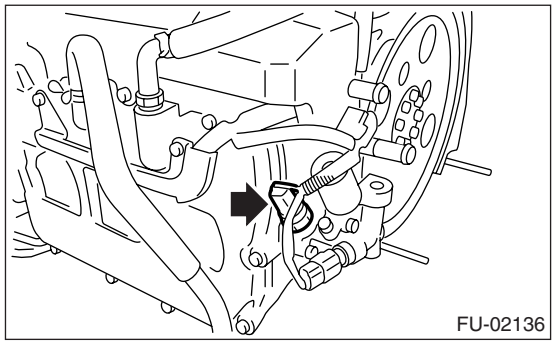
A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.

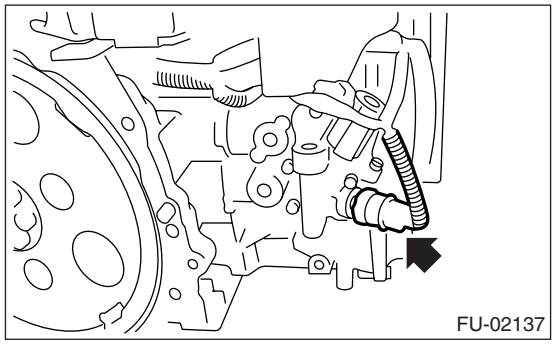


3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector from variable valve lift diagnosis oil pressure switch.
5) Remove the variable valve lift diagnosis oil pressure switch.

- LH side



- RH side



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the thread of variable valve lift diagnosis oil pressure switch.

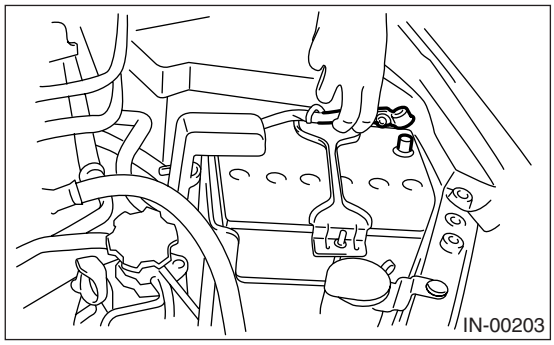
Liquid gasket:
THREE BOND 1324 (Part No. 004403042) or equivalent

Tightening torque:
17 N·m (1.7 kgf-m, 12.5 ft-lb)

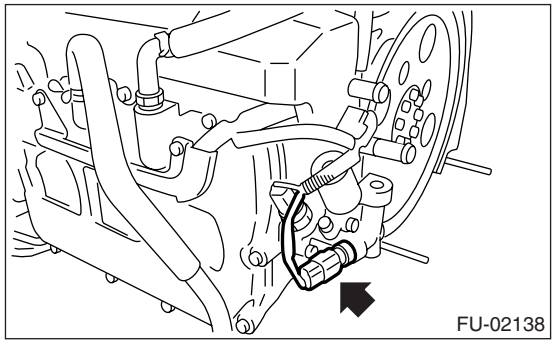
14.Oil Temperature Sensor

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector from oil temperature sensor.
5) Remove the oil temperature sensor.



B: INSTALLATION

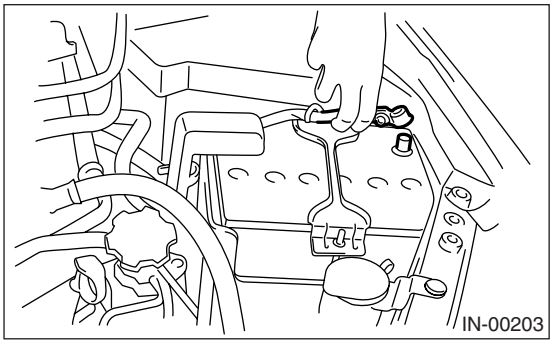
Install in the reverse order of removal.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

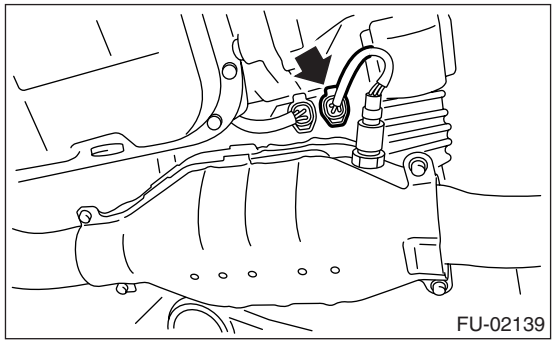
15.Front Oxygen (A/F) Sensor

A: REMOVAL

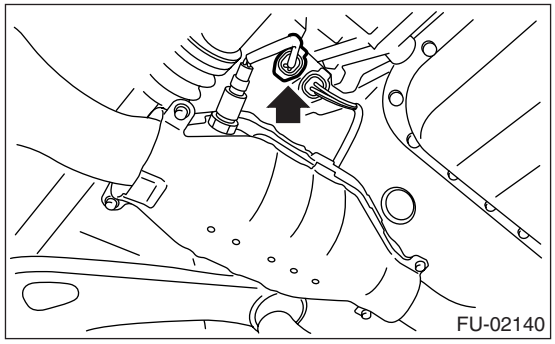
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Disconnect the connector of front oxygen (A/F) sensor.
• LH side



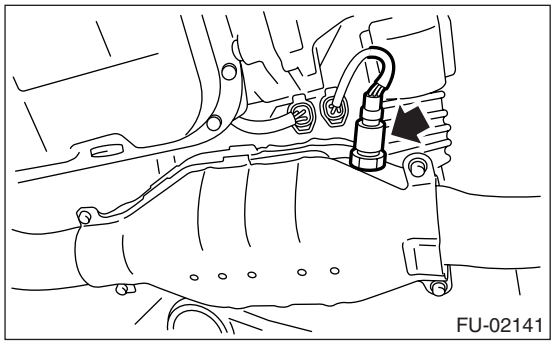
• RH side



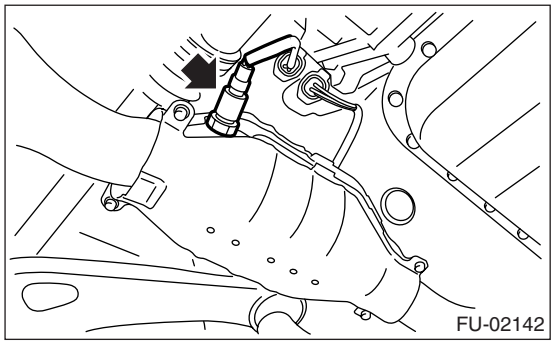
5) Apply spray-type lubricant to the threaded portion of front oxygen (A/F) sensor, and leave it for one minute or more.
6) Remove the front oxygen (A/F) sensor.

CAUTION:
When removing the front oxygen (A/F) sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.

• LH side



• RH side



B: INSTALLATION

1) Before installing front oxygen (A/F) sensor, apply anti-seize compound only to the threaded portion of front oxygen (A/F) sensor to make the next removal easier.

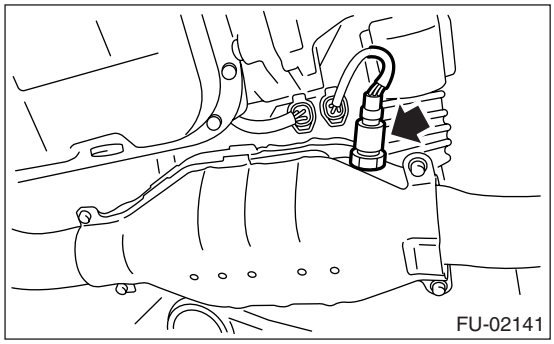
Anti-seize compound:
SS-30 JET LUBE

CAUTION:
Never apply anti-seize compound to the protector of front oxygen (A/F) sensor.

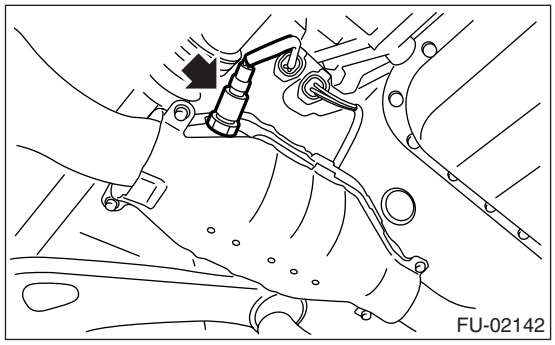
2) Install the front oxygen (A/F) sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

• LH side

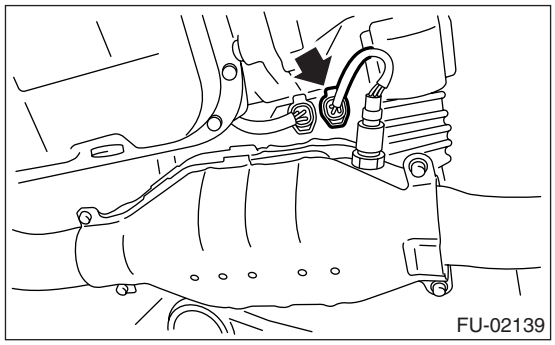


• RH side

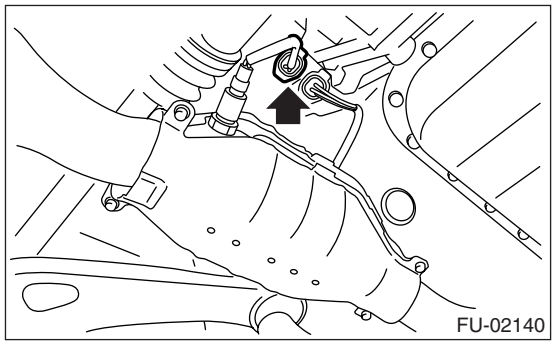


3) Connect the connector of front oxygen (A/F) sensor.

• LH side

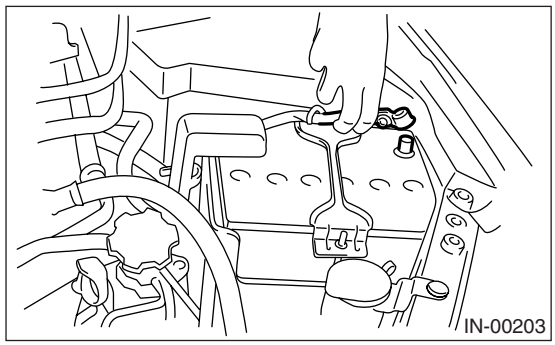


• RH side



4) Lower the vehicle.

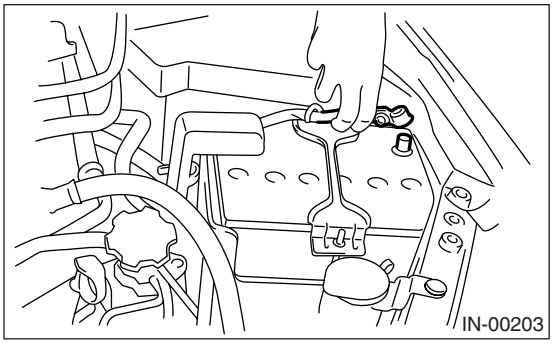
5) Connect the battery ground cable to battery.



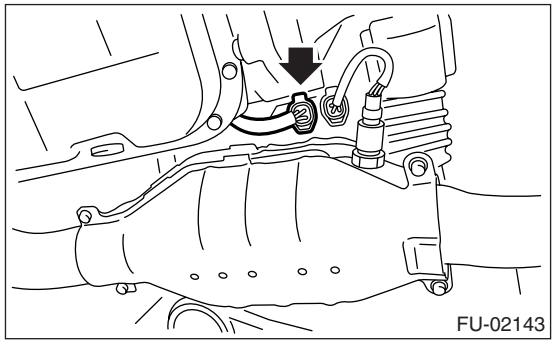
16.Rear Oxygen Sensor

A: REMOVAL

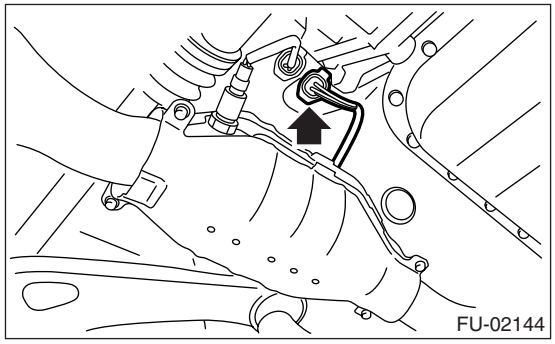
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Disconnect the connector from rear oxygen sensor.
• LH side



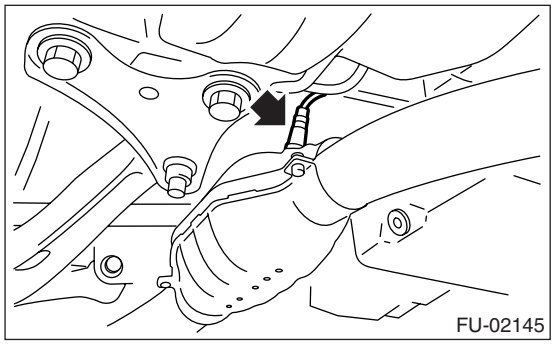
• RH side



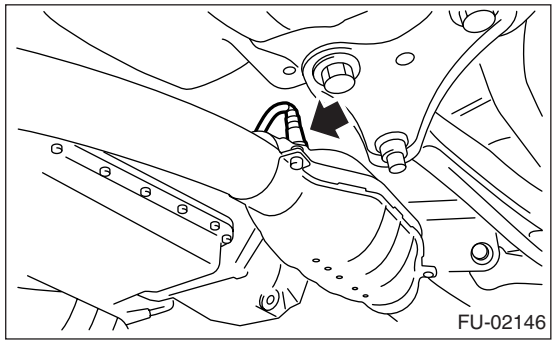
5) Remove the clip holding harness.
6) Apply spray-type lubricant to the threaded portion of rear oxygen sensor, and leave it for one minute or more.
7) Remove the rear oxygen sensor.

CAUTION:
When removing the rear oxygen sensor, wait until exhaust pipe cools, otherwise it will damage the exhaust pipe.

• LH side



• RH side



B: INSTALLATION

1) Before installing rear oxygen sensor, apply anti-seize compound only to the threaded portion of rear oxygen sensor to make the next removal easier.

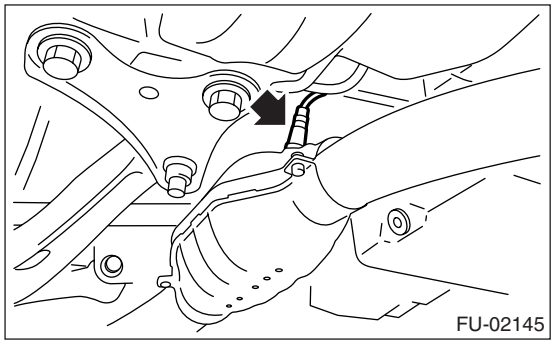
Anti-seize compound:
SS-30 JET LUBE

CAUTION:
Never apply anti-seize compound to the protector of rear oxygen sensor.

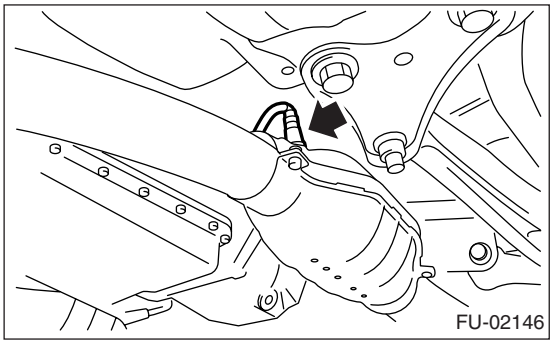
2) Install the rear oxygen sensor.

Tightening torque:
21 N·m (2.1 kgf-m, 15.2 ft-lb)

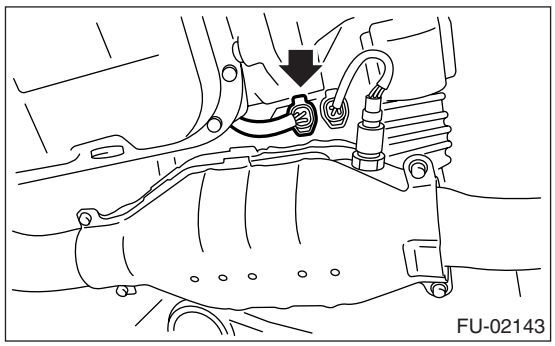
• LH side



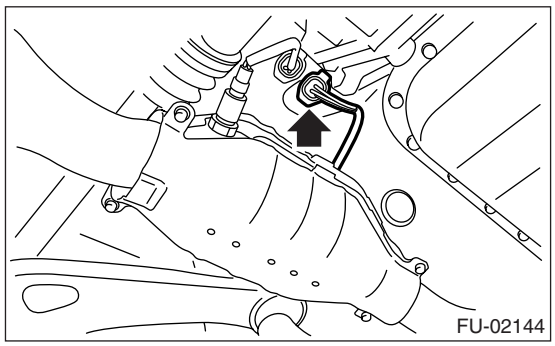
• RH side



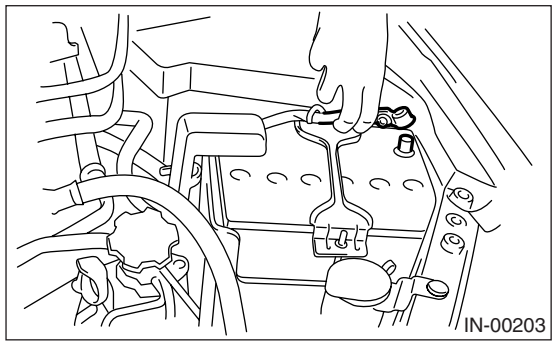
3) Hold the harness with clip.
4) Connect the connector to rear oxygen sensor.
• LH side



• RH side



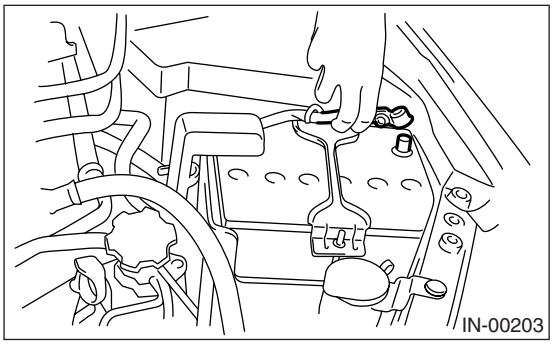
5) Lower the vehicle.
6) Connect the battery ground cable to battery.



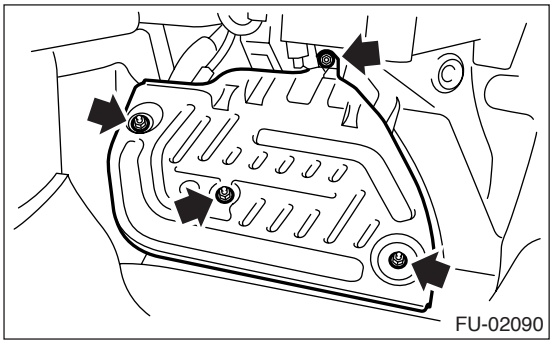
17.Engine Control Module (ECM)

A: REMOVAL

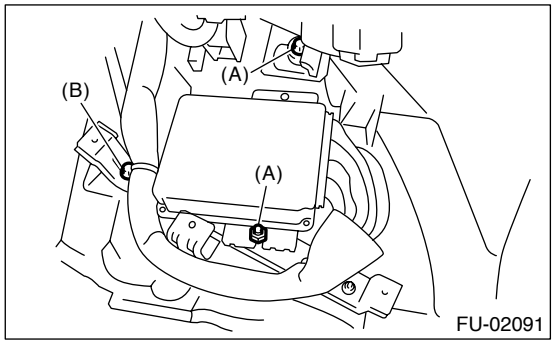
1) Disconnect the ground cable from battery.



2) Remove the lower inner trim of passenger's side. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Detach the floor mat of front passenger seat.
4) Remove the protect cover.



5) Remove the nuts (A) which hold ECM to bracket.
6) Remove the clip (B) from bracket.



7) Disconnect the ECM connectors, and take out the ECM.

B: INSTALLATION

Install in the reverse order of removal.

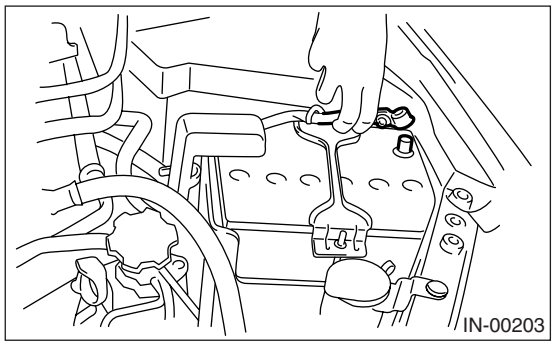
CAUTION:
• When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage to fuel injection system.
• When replacing the ECM, be careful not to damage the harnesses and connectors.
• When replacing the ECM, immobilizer system must be registered. For doing so, all ignition keys and ID cards should be prepared. Refer to "REGISTRATION MANUAL FOR IMMOBILIZER".

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

18.Main Relay

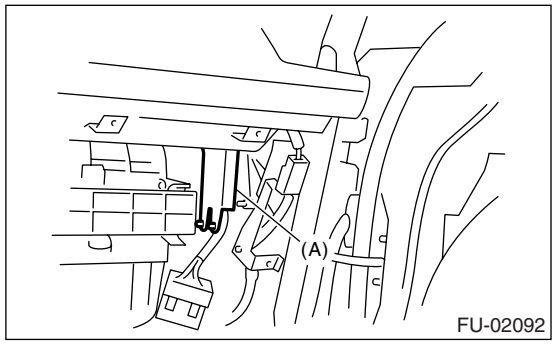
A: REMOVAL

1) Disconnect the ground cable from battery.

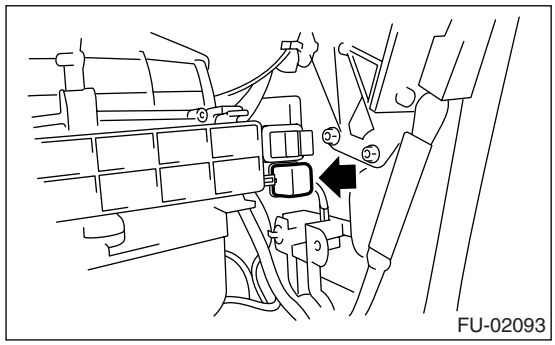


2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>

3) Remove the harness cover (A).



4) Disconnect the connector from main relay.



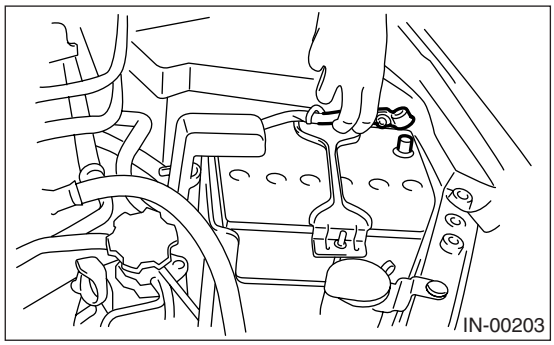
B: INSTALLATION

Install in the reverse order of removal.

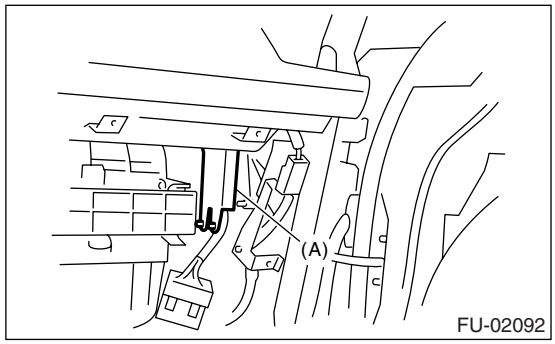
19.Fuel Pump Relay

A: REMOVAL

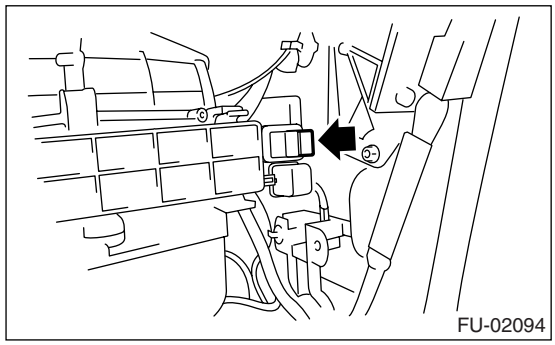
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from fuel pump relay.



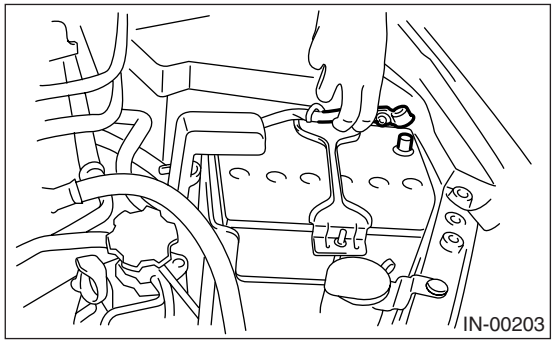
B: INSTALLATION

Install in the reverse order of removal.

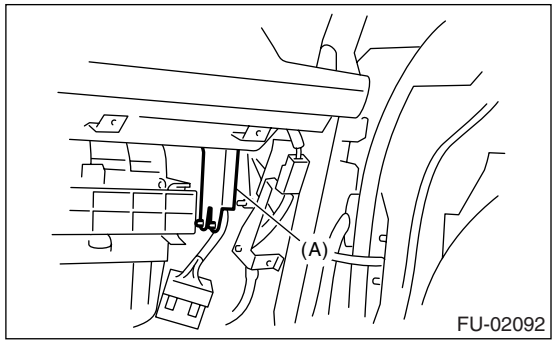
20. Electronic Throttle Control Relay

A: REMOVAL

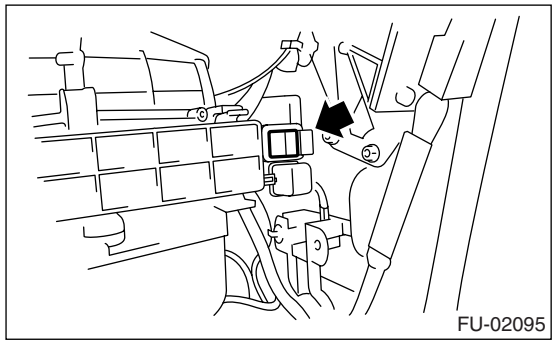
1) Disconnect the ground cable from battery.



2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the harness cover (A).



4) Disconnect the connector from electronic throttle control relay.



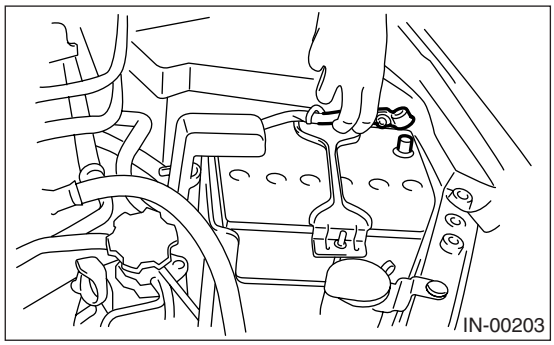
B: INSTALLATION

Install in the reverse order of removal.

21.Fuel Pump Control Unit

A: REMOVAL

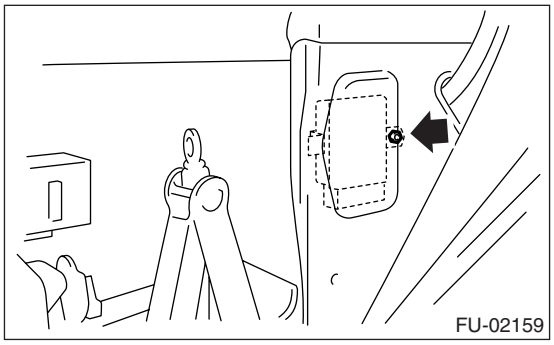
1) Disconnect the ground cable from battery.



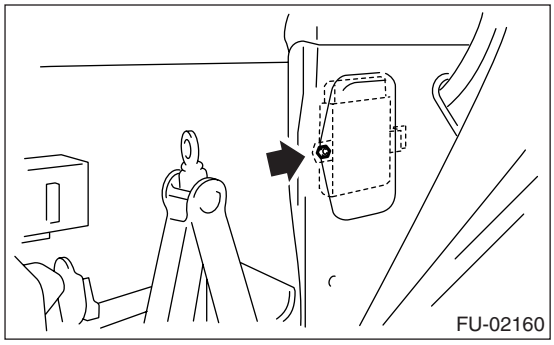
2) Remove the rear quarter trim. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>

3) Remove the fuel pump control unit.

- Wagon model



- Sedan model



4) Disconnect the connector from fuel pump control unit.

B: INSTALLATION

Install in the reverse order of removal.

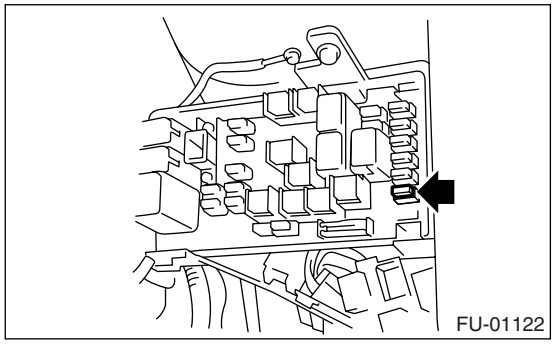
22.Fuel

A: PROCEDURE

1. RELEASING OF FUEL PRESSURE

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Remove the fuse of fuel pump from main fuse box.

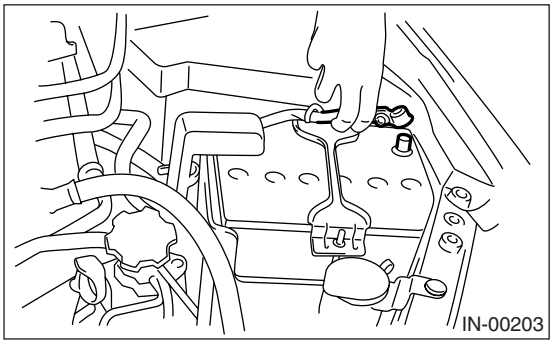


2) Start the engine and run until it stalls.
3) After the engine stalls, crank it for five more seconds.
4) Turn the ignition switch to OFF.

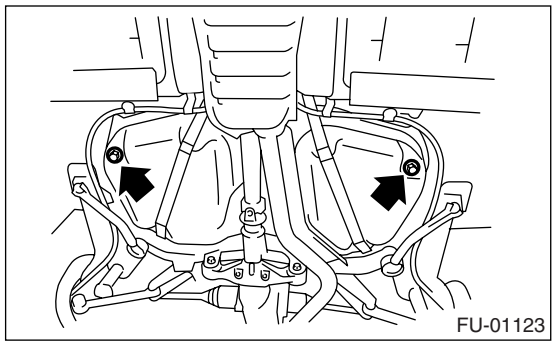
2. DRAINING FUEL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Lift-up the vehicle.
5) Remove the fuel tank protector.
6) Set a container under the vehicle, and remove the drain plugs from fuel tank to drain the fuel from fuel tank.



7) Tighten the fuel drain plug.

NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

8) Install the fuel tank protector.

NOTE:
Use a new nut.

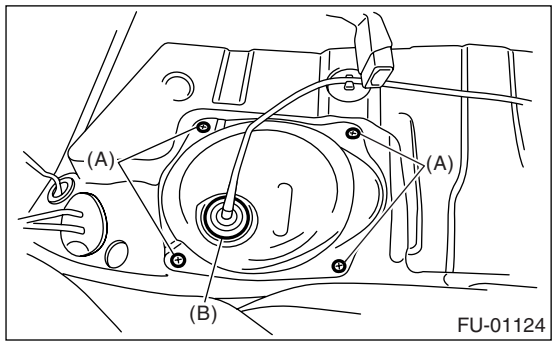
Tightening torque:
Nut
9.0 N·m (0.92 kgf-m, 6.6 ft-lb)
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

23.Fuel Tank

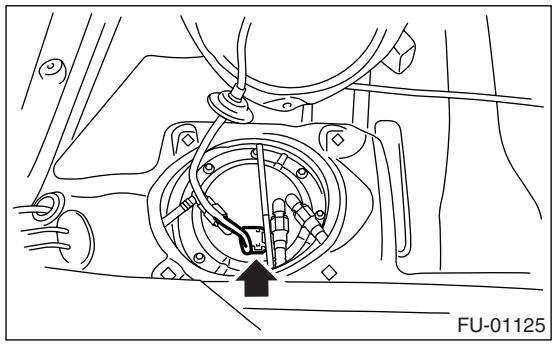
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

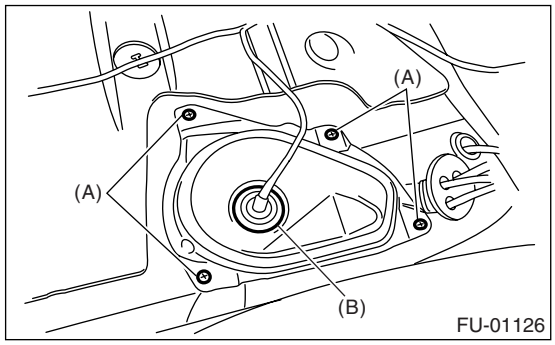
1) Set the vehicle on a lift.
2) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
3) Drain fuel from fuel tank.
<Ref. to FU(H6DO)-39, DRAINING FUEL, PROCEDURE**, Fuel.>**
4) Remove the rear seat.
5) Remove the service hole cover from fuel pump.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



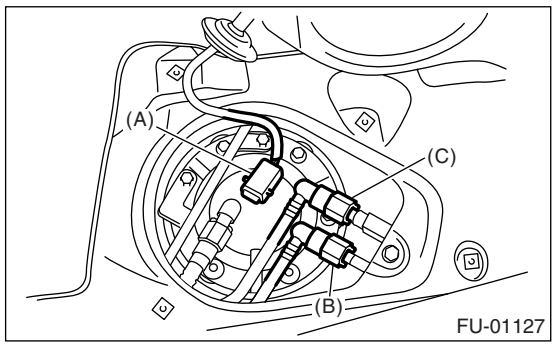
6) Disconnect the connector from fuel pump.



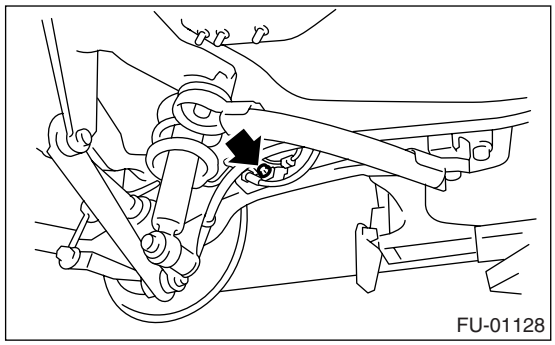
7) Remove the service hole cover from fuel sub level sensor.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove the service hole cover.



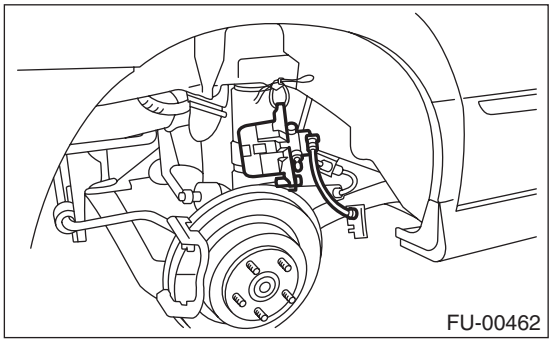
8) Disconnect the connector (A) from fuel sub level sensor.
9) Disconnect the quick connector from the fuel delivery (B) and return hose (C). **<Ref. to FU(H6DO)-54,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**



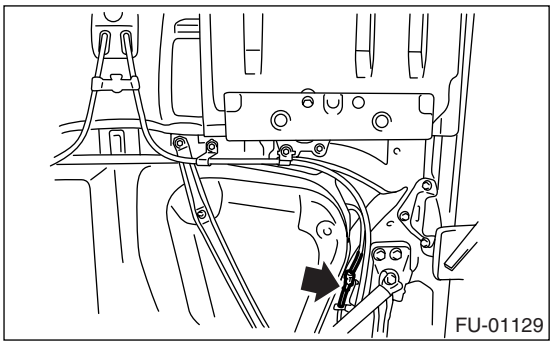
10) Remove the rear wheels.
11) Remove the bolts which secure the rear brake hose installation bracket.



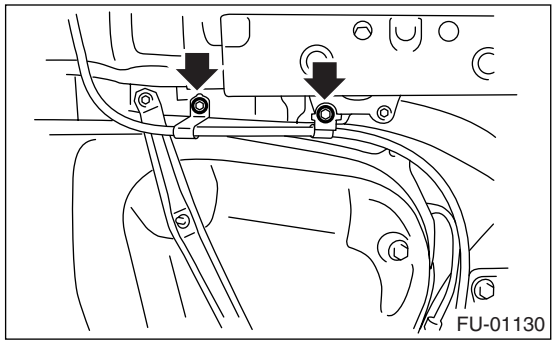
12) Remove the rear brake caliper and tie it to the side of vehicle body.

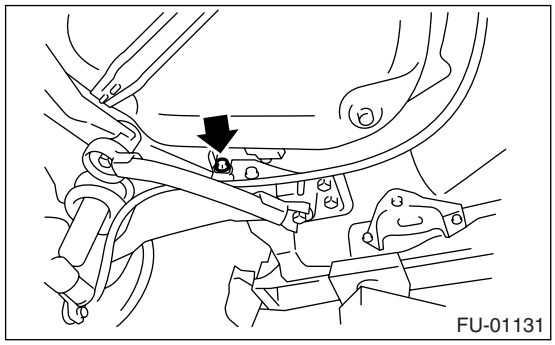


13) Remove the parking brake cable from parking brake assembly. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
14) Lift-up the vehicle.
15) Remove the rear exhaust pipe.
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.>
16) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
17) Remove the heat shield cover.
18) Disconnect the connector from rear ABS wheel speed sensor.



19) Remove the bolts which install parking brake cable clamp.

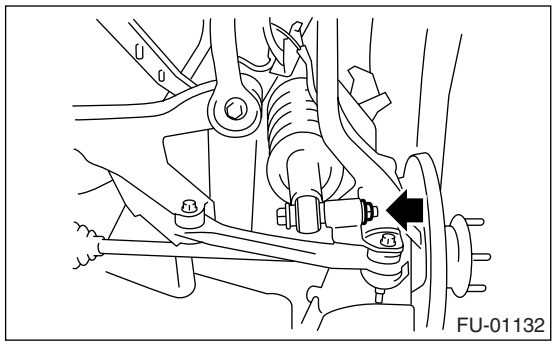




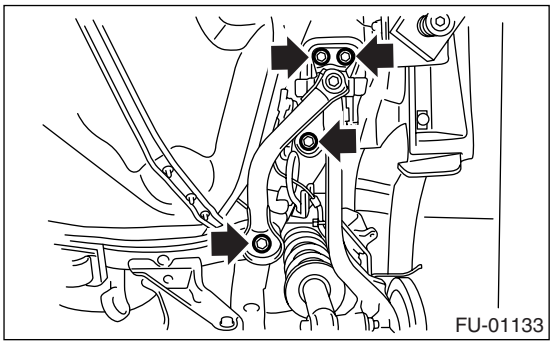
20) Remove the rear suspension assembly.

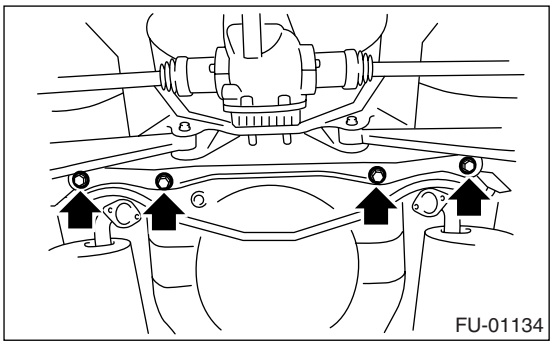
CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Remove the bolt which installs rear shock absorber to rear suspension arm.



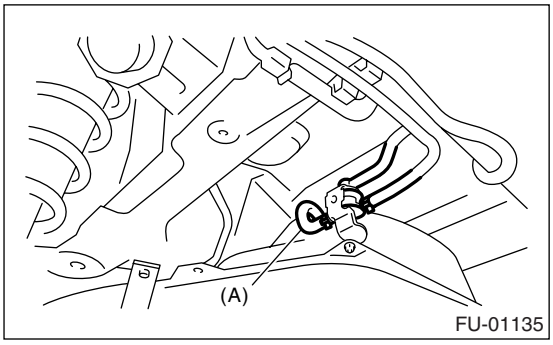
(3) Remove the bolts which secure rear suspension assembly to body.



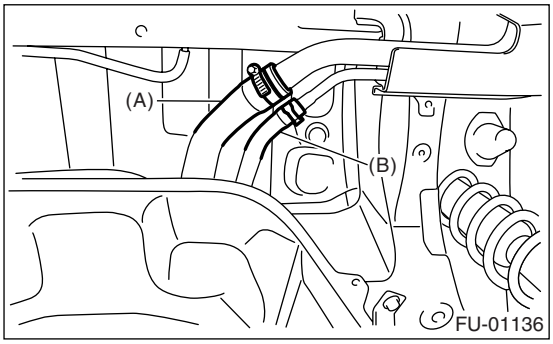


(4) Remove the rear suspension assembly.

21) Disconnect the two-way valve hose (A) from two-way valve, and then remove the two-way valve from bracket.

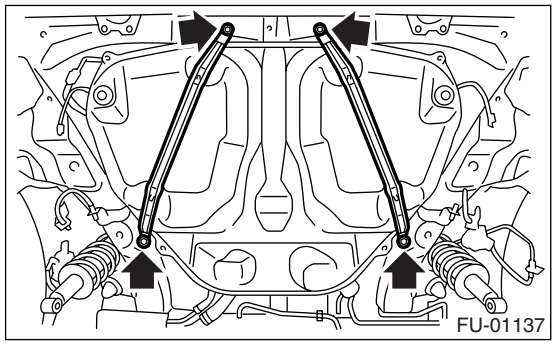


22) Loosen the clamp, and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.



23) Support the fuel tank with transmission jack, remove the bolts from fuel tank bands, and dismount the fuel tank from vehicle.

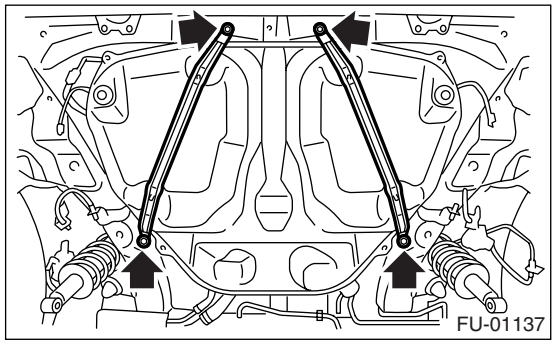
WARNING:
A helper is required to perform this work.



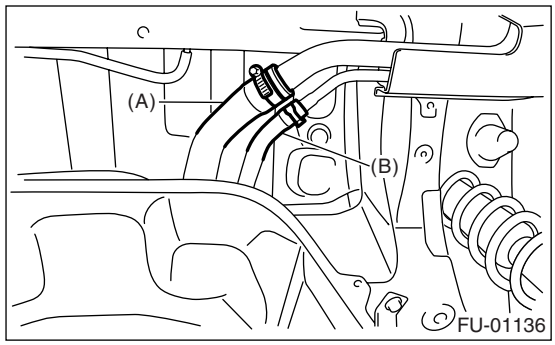
B: INSTALLATION

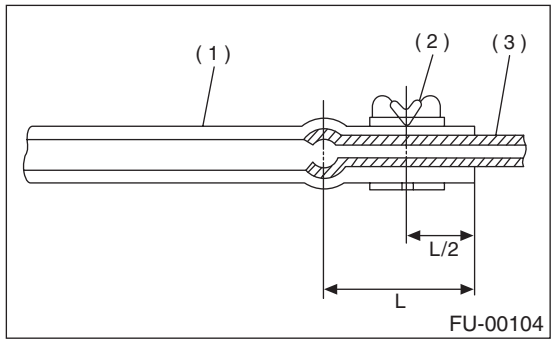
1) Support the fuel tank with transmission jack, set the fuel tank, and then temporarily tighten the bolts of fuel tank band.

WARNING:
A helper is required to perform this work.



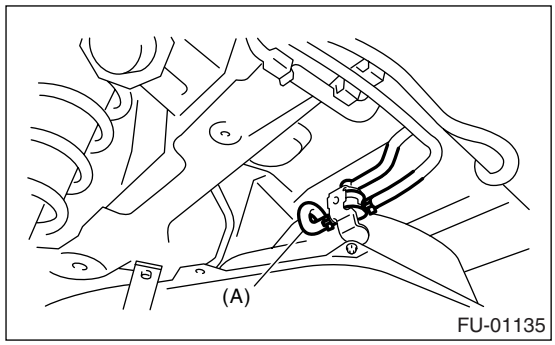
2) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.





(1) Hose
(2) Clip or clamp
(3) Pipe

3) Install the two-way valve to bracket, and connect the two-way valve hose (A) to two-way valve.



4) Tighten the bolts of fuel tank band.

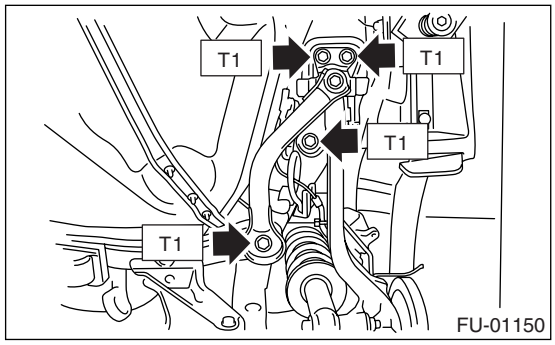
Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

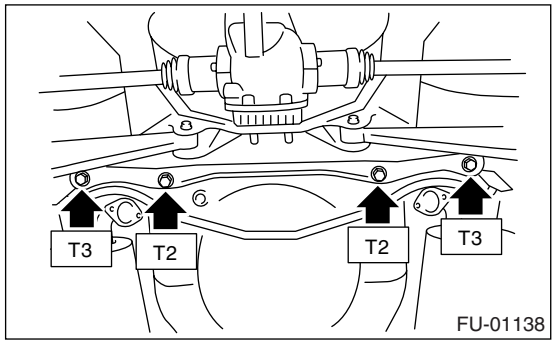
5) Install the rear suspension assembly.

CAUTION:
A helper is required to perform this work.

(1) Support the rear differential with transmission jack.
(2) Support the rear suspension assembly, and then tighten the bolts which secure rear suspension assembly to body.

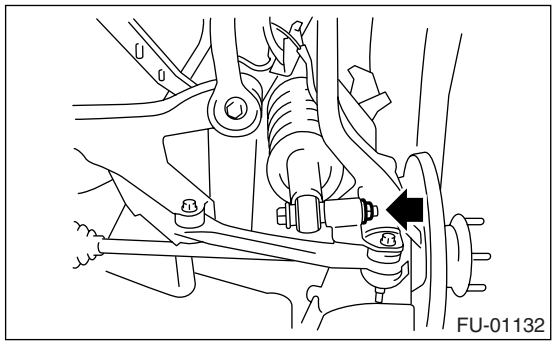
Tightening torque:
T1: 125 N·m (12.7 kgf-m, 92.2 ft-lb)
T2: 65 N·m (6.2 kgf-m, 48 ft-lb)
T3: 175 N·m (17.8 kgf-m, 129 ft-lb)





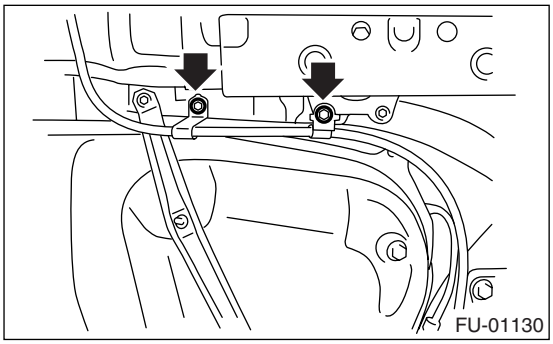
(3) Tighten the bolts which install rear shock absorber to rear suspension arm. <Ref. to RS-11, INSTALLATION, Rear Arm.>

Tightening torque:
62 N·m (6.3 kgf-m, 46 ft-lb)

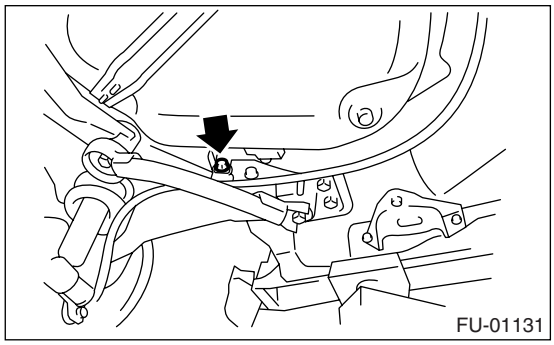


6) Tighten the bolts which install parking brake cable clamp.

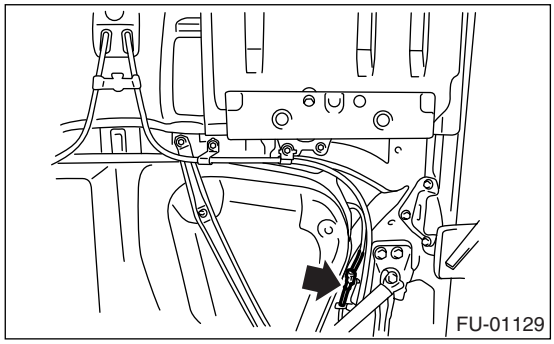
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

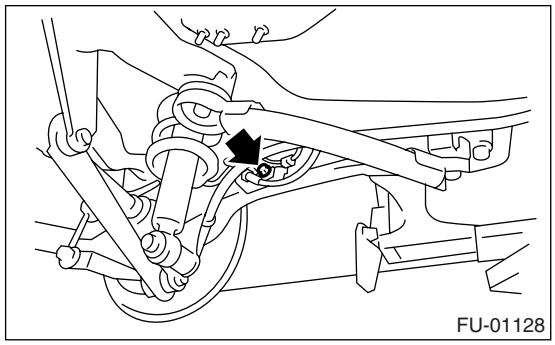


7) Connect the connector to ABS wheel speed sensor.



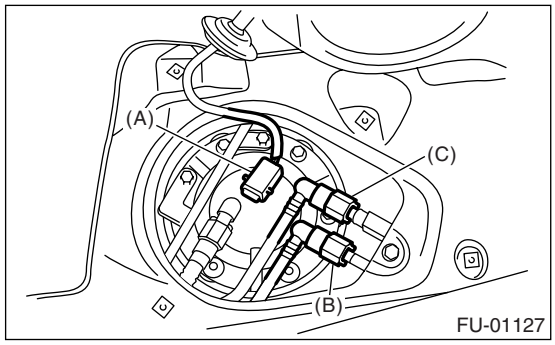
8) Install the heat shield cover.
9) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
10) Install the rear exhaust pipe. <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.>
11) Lower the vehicle.
12) Connect the parking brake cable to parking brake assembly. <Ref. to PB-8, INSTALLATION, Parking Brake Assembly (Rear Disc Brake).>
13) Install the rear brake caliper.
14) Tighten the bolt which secures rear brake hose installation bracket.

Tightening torque:
33 N·m (3.4 kgf-m, 25 ft-lb)

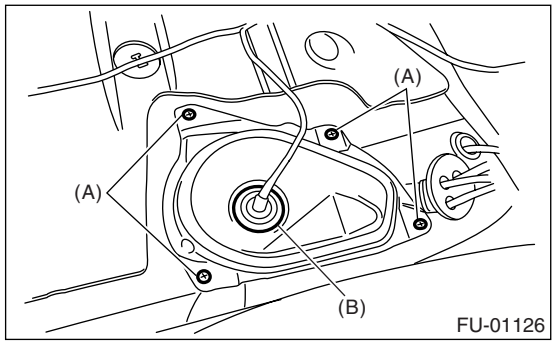


15) Install the rear wheels.
16) Lower the vehicle.
17) Connect the connector (A) to fuel sub level sensor.
18) Connect the quick connector of the fuel delivery (B) and return hose (C). **<Ref. to FU(H6DO)-55,** INSTALLATION**, Fuel Delivery, Return and Evaporation Lines.>**

NOTE:
Be careful not to misconnect the delivery side and return side.

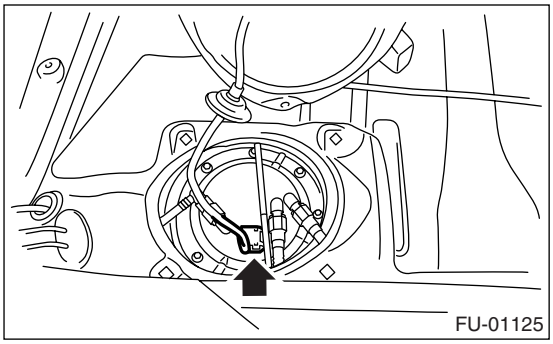


19) Install the service hole cover of fuel sub level sensor.

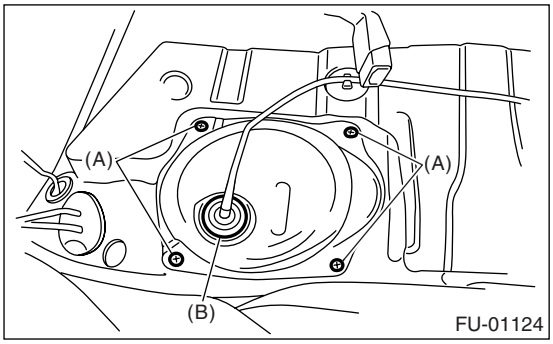


(A) Bolt
(B) Grommet

20) Connect the connector to fuel pump.



21) Install the service hole cover of fuel pump.



(A) Bolt
(B) Grommet

22) Install the rear seat.
23) Install the fuse of fuel pump to main fuse box.

C: INSPECTION

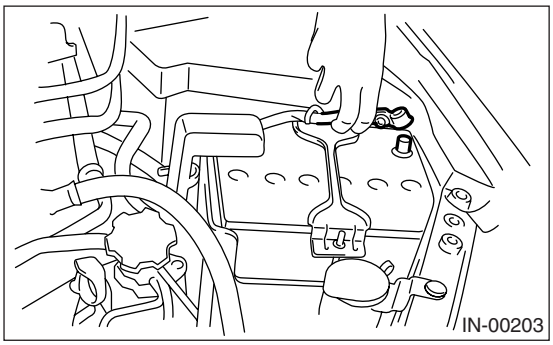
1) Check that the fuel tank is not holed, cracked, or otherwise damaged.
2) Make sure that the fuel hoses and fuel pipes are not cracked and those connections are tight.

24.Fuel Filler Pipe

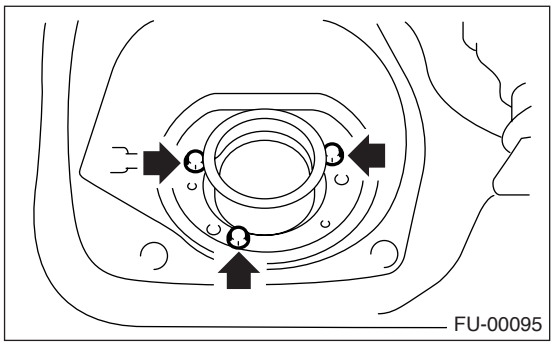
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

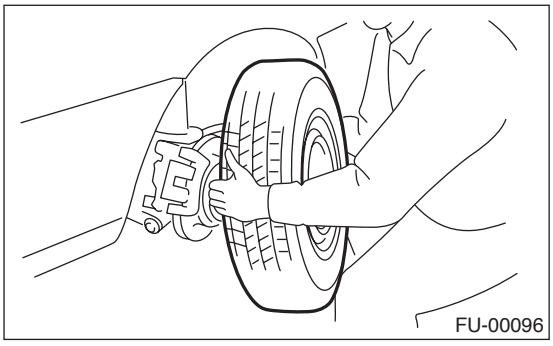
1) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
2) Open the fuel filler flap lid, and remove the filler cap.
3) Disconnect the ground cable from battery.



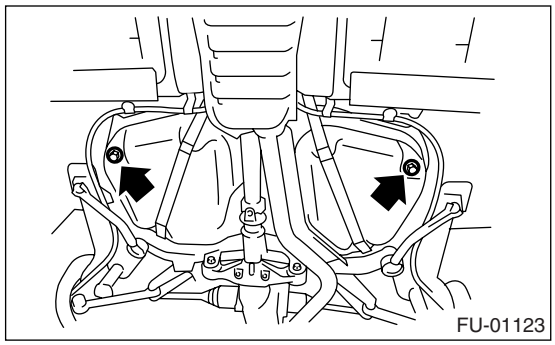
4) Remove the screws which secure packing.



5) Lift-up the vehicle.
6) Remove the rear wheel RH.



7) Set a container under the vehicle, and remove the drain plug from fuel tank to drain the fuel from fuel tank.

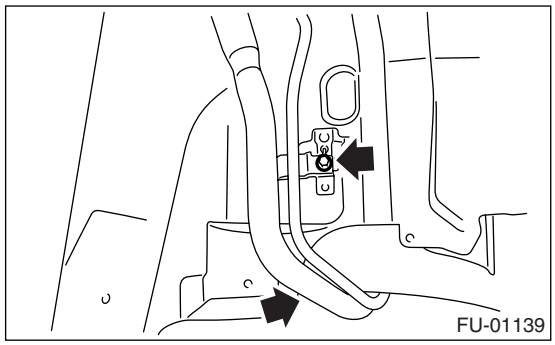


8) Tighten the fuel drain plug.

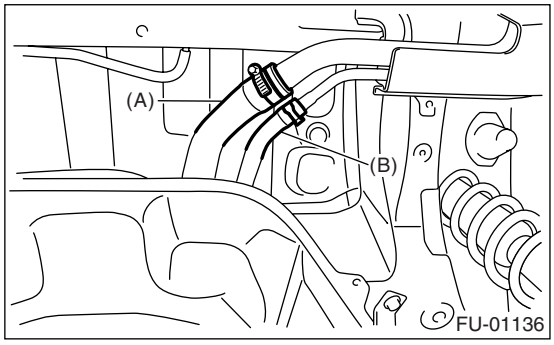
NOTE:
Use a new gasket.

Tightening torque:
26 N·m (2.65 kgf-m, 19.2 ft-lb)

9) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
10) Remove the rear sub frame. <Ref. to RS-23, REMOVAL, Rear Sub Frame.>
11) Remove the bolts which hold fuel filler pipe bracket on the body.



12) Loosen the clamp and disconnect the fuel filler hose (A) and vent hose (B) from fuel filler pipe.

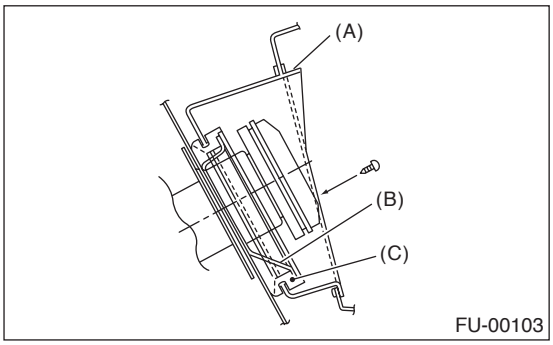


13) Remove the fuel filler pipe to under side of the vehicle.

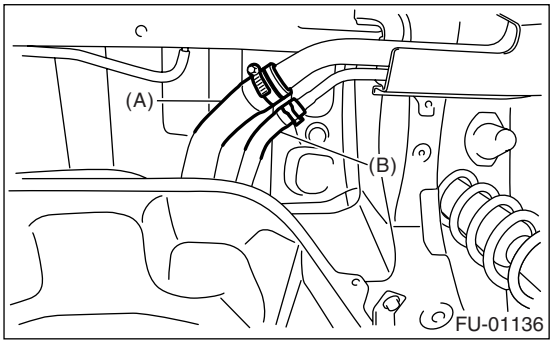
B: INSTALLATION

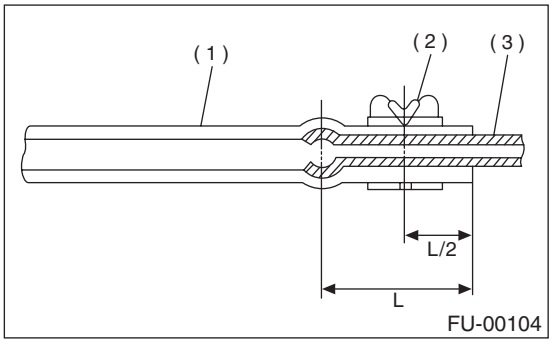
1) Open the fuel filler flap lid.
2) Set the fuel saucer (A) with rubber packing (C), and insert the fuel filler pipe into hole from the inner side of apron.
3) Align the holes in fuel filler pipe neck and set the cup (B), and tighten the screws.

NOTE:
If the edges of rubber packing are folded toward the inside, straighten it with a flat tip screwdriver.



4) Correctly insert the fuel filler hose (A) and vent hose (B) to specified position, and then tighten the clamp.

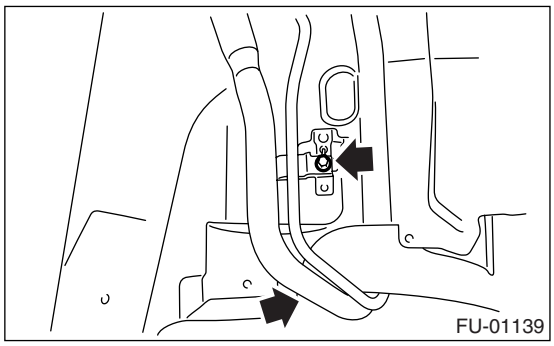




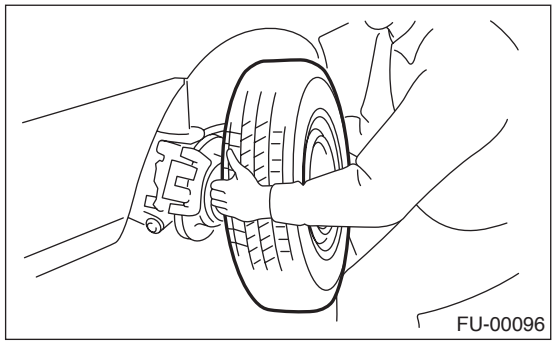
(1) Hose
(2) Clip or clamp
(3) Pipe

5) Tighten the bolts which hold fuel filler pipe bracket on the body.

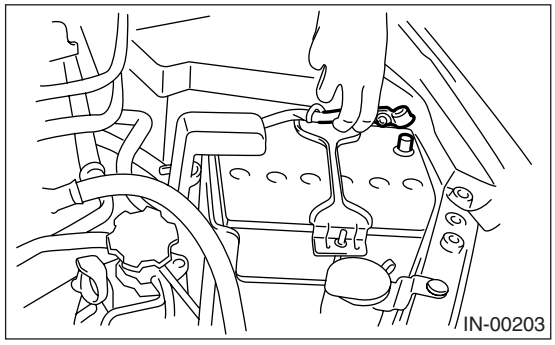
Tightening torque:
7.5 N·m (0.75 kgf-m, 5.4 ft-lb)



6) Install the rear sub frame. <Ref. to RS-23, INSTALLATION, Rear Sub Frame.>
7) Install the mud guard. <Ref. to EI-29, INSTALLATION, Mud Guard.>
8) Install the rear wheel RH.



9) Lower the vehicle.
10) Install the fuse of fuel pump to main fuse box.
11) Connect the battery ground cable to battery.



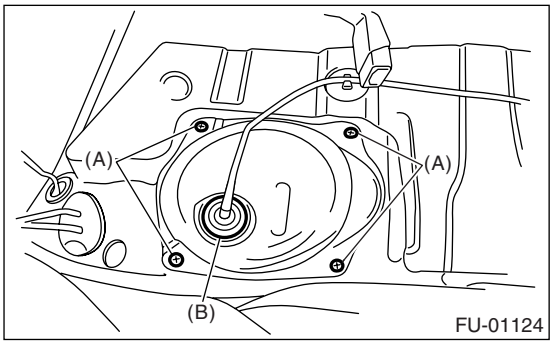
25.Fuel Pump

A: REMOVAL

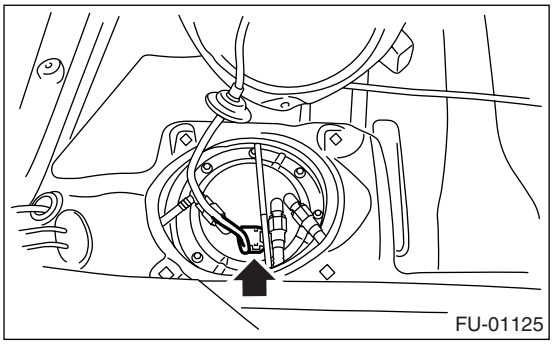
WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

NOTE:
Fuel pump assembly consists of fuel pump and fuel level sensor.

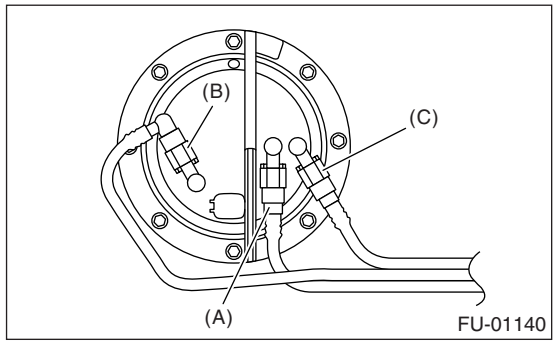
1) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
2) Drain the fuel. **<Ref. to FU(H6DO)-39,** DRAINING FUEL, PROCEDURE**, Fuel.>**
3) Remove the rear seat.
4) Remove the service hole cover.
(1) Remove the bolts (A).
(2) Push the grommet (B) down under the body and remove service hole cover.



5) Disconnect the connector from fuel pump.



6) Disconnect the quick connector, and then disconnect the fuel delivery hose, return hose and jet pump hose. **<Ref. to FU(H6DO)-54,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**
7) Remove the nuts which install fuel pump assembly onto fuel tank.



(A) Delivery hose
(B) Return hose
(C) Jet pump hose

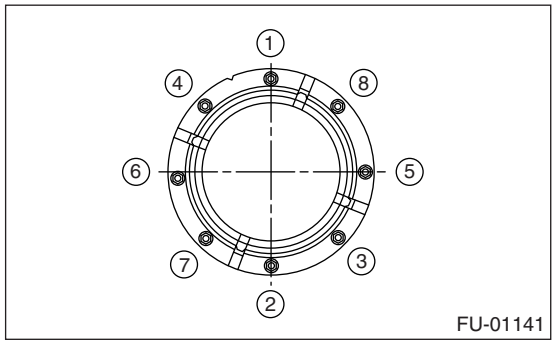
8) Take off the fuel pump assembly from fuel tank.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)

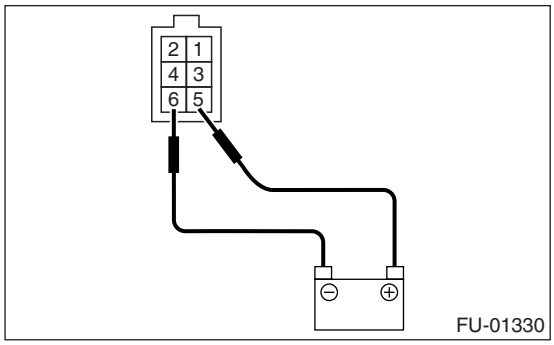


C: INSPECTION

Connect the lead harness to the connector terminal of fuel pump, and apply the battery power supply to check whether the pump operates.

WARNING:
- **Wipe off the fuel completely.**
- **Keep battery as far apart from fuel pump as possible.**
- **Be sure to turn the battery supply to ON and OFF on the battery side.**

• Do not run fuel pump for a long time under non-load condition.



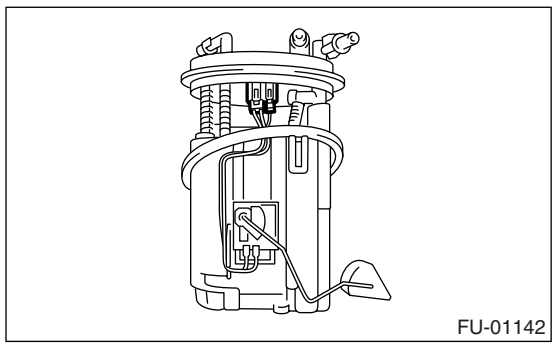
26.Fuel Level Sensor

A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**

NOTE:
Fuel level sensor is built in fuel pump assembly.

1) Remove the fuel pump assembly. **<Ref. to FU(H6DO)-48,** REMOVAL**, Fuel Pump.>**
2) Disconnect the connector from fuel pump bracket.



3) Remove the fuel level sensor.

B: INSTALLATION

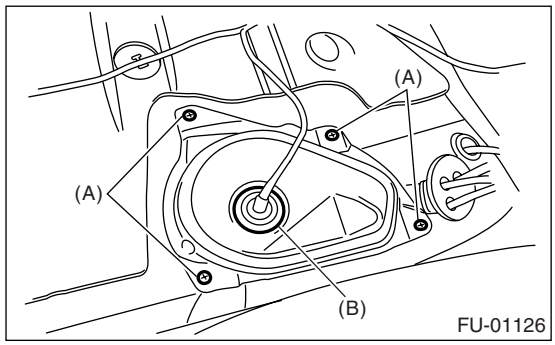
Install in the reverse order of removal.

27.Fuel Sub Level Sensor

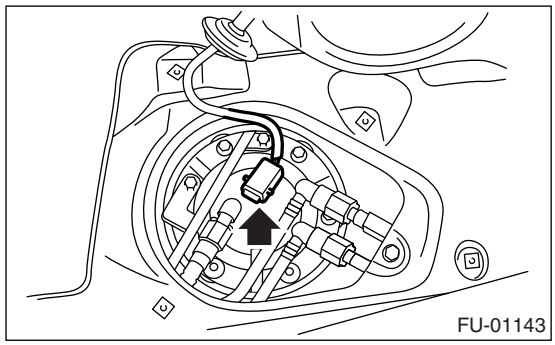
A: REMOVAL

WARNING:
- **Place "NO FIRE" signs near the working area.**
- **Be careful not to spill fuel on the floor.**
- **Reduce the fuel in the fuel tank to less than 3/4 beforehand. Be careful that fuel may spill when the fuel is more than 3/4.**

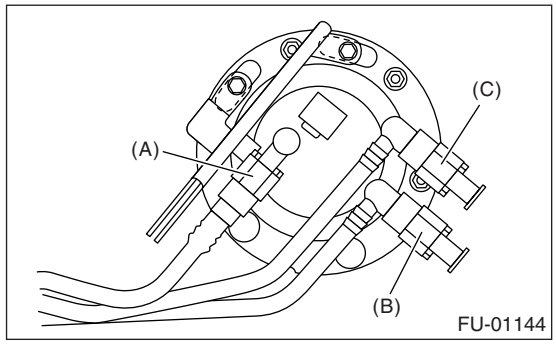
1) Drain the fuel. **<Ref. to FU(H6DO)-39,** DRAINING FUEL, PROCEDURE**, Fuel.>**
2) Remove the rear seat.
3) Remove the service hole cover.
   (1) Remove the bolts (A).
   (2) Push the grommet (B) down under the body and remove the service hole cover.



4) Disconnect the connector from fuel sub level sensor.



5) Disconnect the quick connector, and then disconnect the fuel delivery hose, return hose and jet pump hose. **<Ref. to FU(H6DO)-54,** REMOVAL**, Fuel Delivery, Return and Evaporation Lines.>**
6) Remove the nuts and bolts which install fuel sub level sensor on fuel tank.



(A) Jet pump hose
(B) Delivery hose
(C) Return hose

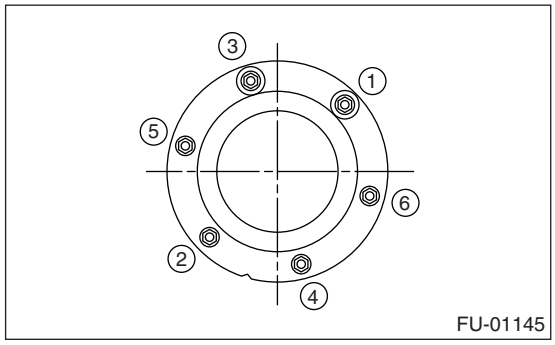
7) Remove the fuel sub level sensor.

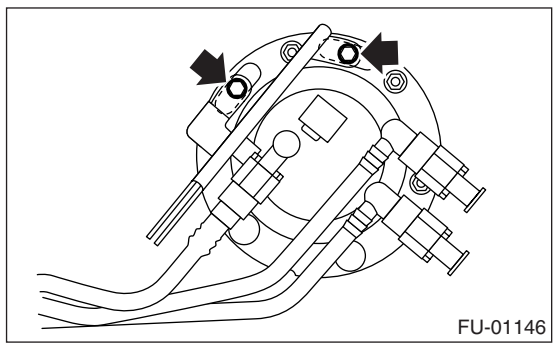
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Use a new gasket.
(1) Ensure the sealing portion is free from fuel or foreign particles before installation.
(2) Tighten the nuts and bolts to specified torque in the order as shown in the figure.

Tightening torque:
4.4 N·m (0.45 kgf-m, 3.3 ft-lb)





28.Fuel Filter

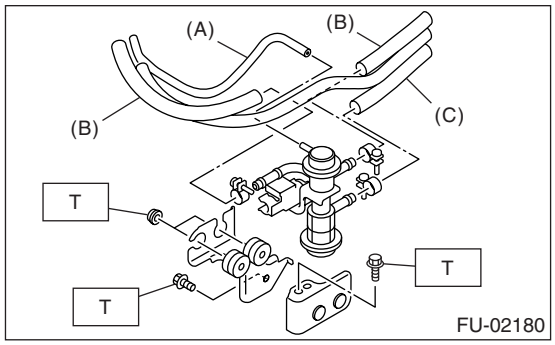
A: SPECIFICATION

Fuel filter forms a unit with fuel pump.
Refer to “Fuel Pump” for removal and installation.
<Ref. to FU(H6DO)-48, REMOVAL**, Fuel Pump.>**
<Ref. to FU(H6DO)-48, INSTALLATION**, Fuel Pump.>**

29.Fuel Bypass Valve

A: REMOVAL

1) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
2) Disconnect the pressure regulator vacuum hose.
3) Disconnect the fuel delivery line and return line from fuel bypass valve.
4) Remove the fuel bypass valve from vehicle body.



(A) Pressure regulator vacuum hose
(B) Fuel delivery line
(C) Fuel return line

B: INSTALLATION

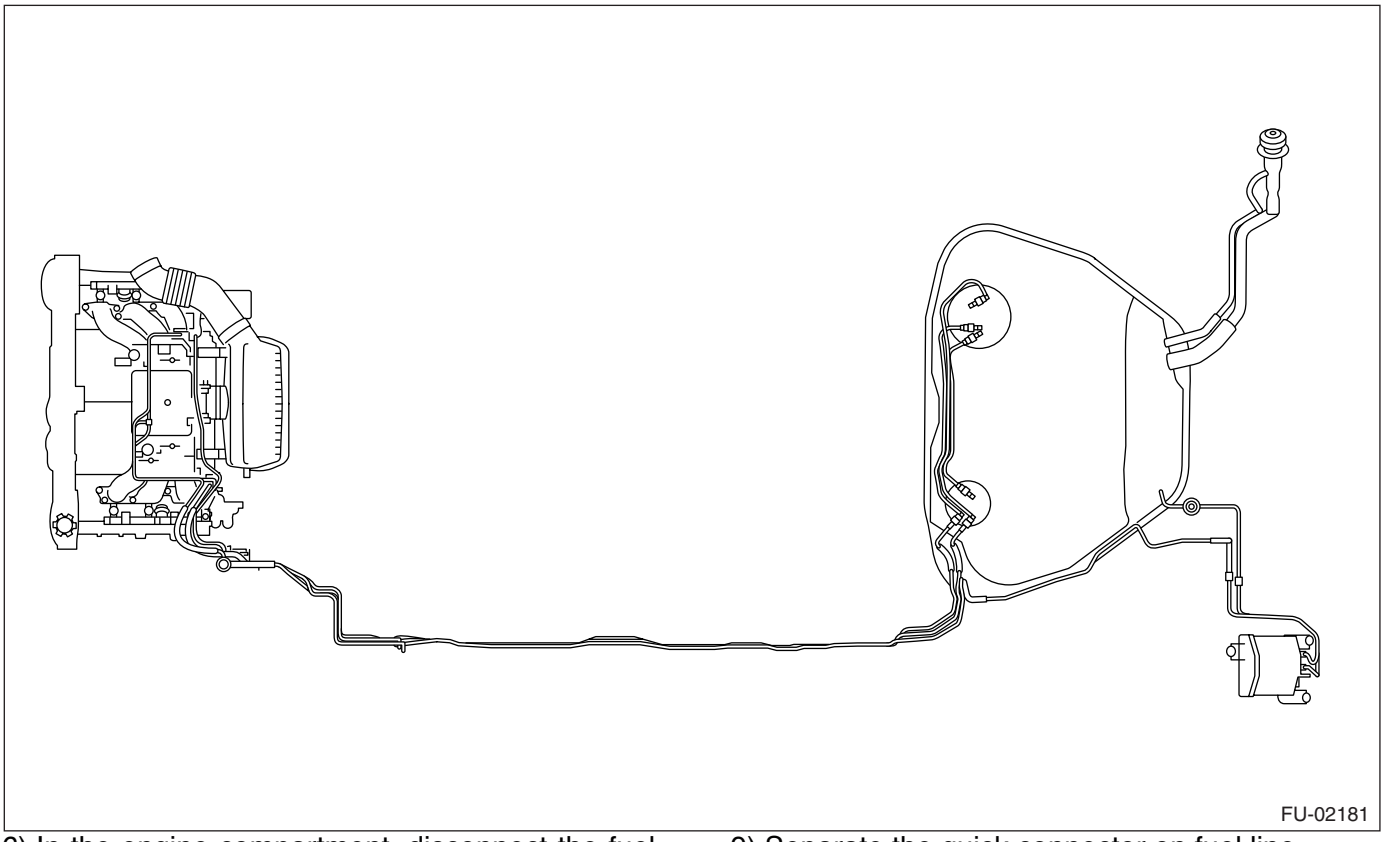
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.53 ft-lb)

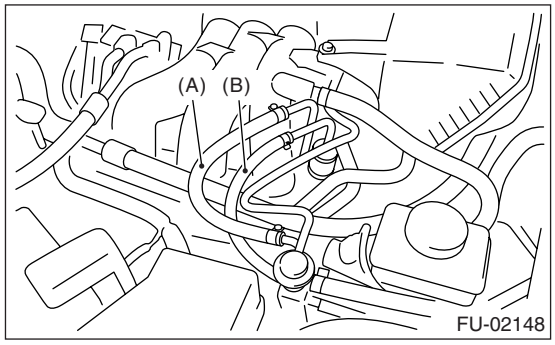
30.Fuel Delivery, Return and Evaporation Lines

A: REMOVAL

1) Set the vehicle on a lift.
2) Release the fuel pressure. **<Ref. to FU(H6DO)-39,** RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
3) Open the fuel filler flap lid, and remove the fuel filler cap.
4) Remove the floor mat. <Ref. to EI-73, REMOVAL, Floor Mat.>
5) Disconnect the fuel delivery pipes and hoses, and then disconnect the fuel return pipes and hoses, evaporation pipes and hoses.

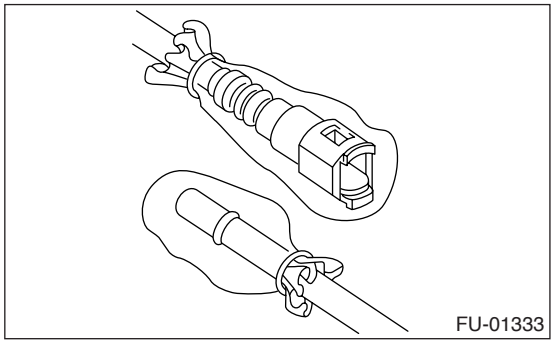


6) In the engine compartment, disconnect the fuel delivery hoses, return hoses and evaporation hose.



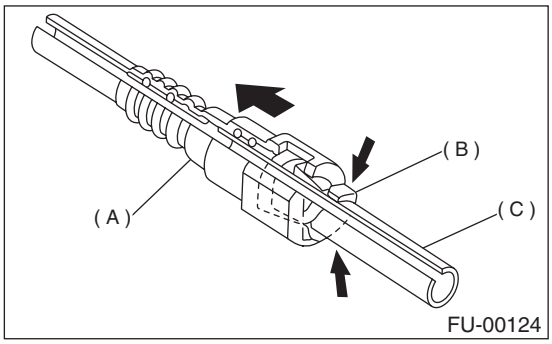
(A) Fuel delivery hose
(B) Evaporation hose

7) Lift-up the vehicle.
8) Remove the fuel tank. **<Ref. to FU(H6DO)-40,** REMOVAL**, Fuel Tank.>**
9) Separate the quick connector on fuel line.
(1) Clean the pipe and connector, if they are covered with dust.
(2) To prevent from damaging or entering foreign matter, wrap the pipes and connectors with plastic bag, etc.



(3) Hold the connector and push retainer down.
(4) Pull out the connector from retainer.

CAUTION:
Always use a new retainer.

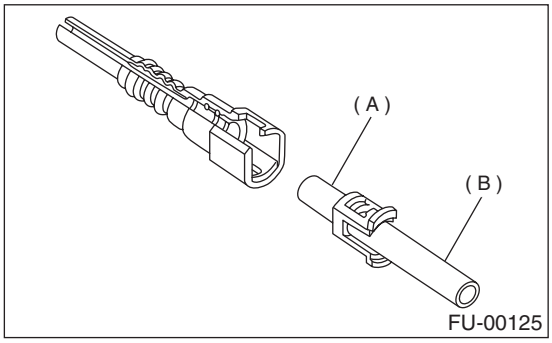


(A) Connector
(B) Retainer
(C) Pipe

B: INSTALLATION

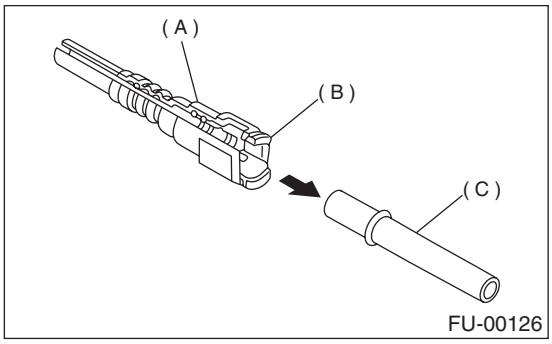
1) Connect the quick connector on fuel line.

CAUTION:
• Always use a new retainer.
• Make sure that the connected portion is not damaged or has dust. If necessary, clean the seal surface of pipe.



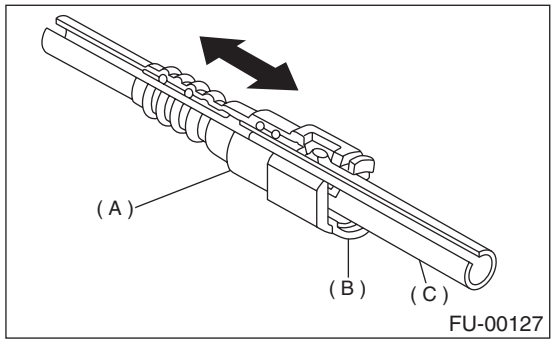
(A) Seal surface
(B) Pipe

(1) Set the new retainer to connector.
(2) Push the pipe into the connector completely.



(A) Connector
(B) Retainer
(C) Pipe

CAUTION:
• Pull the connector to ensure it is connected securely.
• Ensure the two retainer pawls are engaged in their mating positions in the connector.
• Be sure to inspect the hoses and their connections for fuel leakage.

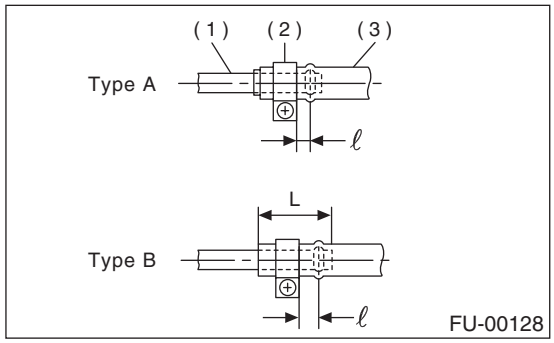


(A) Connector
(B) Retainer
(C) Pipe

2) Connect the fuel delivery hose to the pipe with an overlap of 20 to 25 mm (0.79 to 0.98 in).
Type A: When the amount of inserting is specified.
Type B: When the amount of inserting is not specified.

ℓ : 2.5±1.5 mm (0.098±0.059 in)

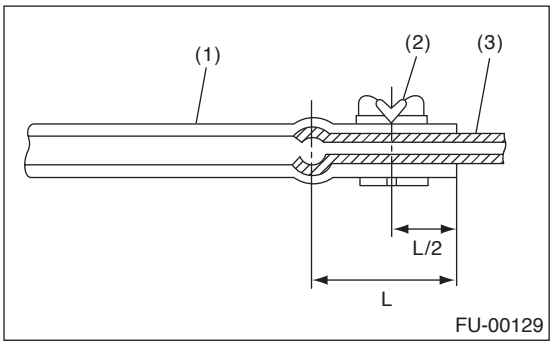
L: 22.5±2.5 mm (0.886±0.098 in)



(1) Pipe
(2) Clamp
(3) Hose

3) Connect the return hose and evaporation hose to the pipe by approx. 15 mm (0.59 in) from the hose end.
Fuel return hose:
L = 22.5±2.5 mm (0.885±0.098 in)
Fuel evaporation hose:
L = 17.5±2.5 mm (0.689±0.098 in)

CAUTION:
Be sure to inspect the hoses and their connections for fuel leakage.



(1) Hose
(2) Clip
(3) Pipe

C: INSPECTION

1) Make sure that there are no crack on the fuel pipes and fuel hoses.
2) Make sure that the fuel pipe and fuel hose connections are tightened firmly.

31.Fuel System Trouble in General

A: INSPECTION

Trouble and possible cause		Corrective action
1. Insufficient fuel supply to injector		
1)	Fuel pump does not operate.	
	❍ Defective terminal contact	Inspect contact, especially ground, and tighten it securely.
	❍ Trouble in electromagnetic or electronic circuit parts	Replace the fuel pump.
2)	Decline of fuel pump function	Replace the fuel pump.
3)	Clogged dust or water in the fuel filter	Replace fuel filter, clean or replace fuel tank.
4)	Clogged or bent fuel pipe or hose	Clean, correct or replace the fuel pipe or hose.
5)	Air mixed in the fuel system	Inspect or retighten each connection part.
6)	Clogged or bent air breather tube or pipe	Clean, correct or replace air breather tube or pipe.
7)	Damaged diaphragm of pressure regulator	Replace.
2. Leakage or blow out of fuel		
1)	Loosened joints of the fuel pipe	Retighten.
2)	Cracked fuel pipe, hose and fuel tank	Replace.
3)	Defective welding part on the fuel tank	Replace.
4)	Defective drain packing of the fuel tank	Replace.
5)	Clogged or bent air breather tube or air vent tube	Clean, correct or replace air breather tube or air vent tube.
3. Gasoline smell inside of compartment		
1)	Loose joints at air breather tube, air vent tube and fuel filler pipe	Retighten.
2)	Defective packing air tightness on the fuel saucer	Correct or replace the packing.
3)	Cracked fuel separator	Replace separator.
4)	Inoperative fuel pump modulator or circuit	Replace.
4. Defective fuel meter indicator		
1)	Defective operation of fuel level sensor	Replace.
2)	Defective operation of fuel meter	Replace.
3)	Defective body integrated unit	Replace.
5. Noise		
1)	Large operation noise or vibration of fuel pump	Replace.

NOTE:
• When the vehicle is left unattended for an extended period of time, water may accumulate in the fuel tank. Fill fuel fully to prevent those problem. And also drain the water condensation from fuel filter.
• In snow-covered areas, mountainous areas, skiing areas, etc. where ambient temperatures drop below 0°C (32°F) throughout the winter season, use water removing agent in the fuel system to prevent freezing fuel system and accumulating water. Fill the water removing agent at the time when the fuel reduced at half to maintain the advantage.
• When water condensation is noticed in the fuel filter, drain water from both the fuel filter and fuel tank or use a water removing agent in the fuel tank.
• Before using water removing agent, follow the cautions noted on the bottle.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

EMISSION CONTROL
(AUX. EMISSION CONTROL DEVICES)
EC(H6DO)

		Page
1.	General Description	2
2.	Front Catalytic Converter	3
3.	Rear Catalytic Converter	4
4.	EGR Valve	5
5.	Canister	6
6.	Purge Control Solenoid Valve	7
7.	Two-way Valve	8
8.	PCV Valve	9

1. General Description

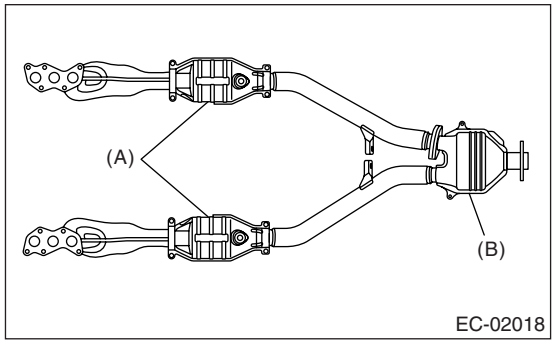
A: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Front Catalytic Converter

A: REMOVAL

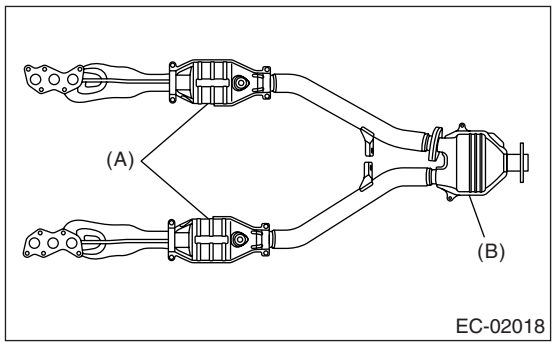
The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to “Front Exhaust Pipe” for removal procedure. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>



(A) Front catalytic converter
(B) Rear catalytic converter

B: INSTALLATION

The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to “Front Exhaust Pipe” for installation procedure. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>



(A) Front catalytic converter
(B) Rear catalytic converter

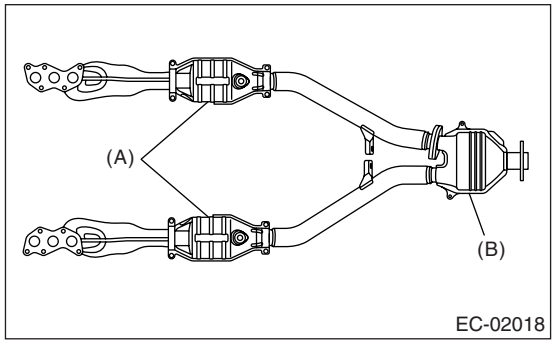
C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Catalytic Converter

A: REMOVAL

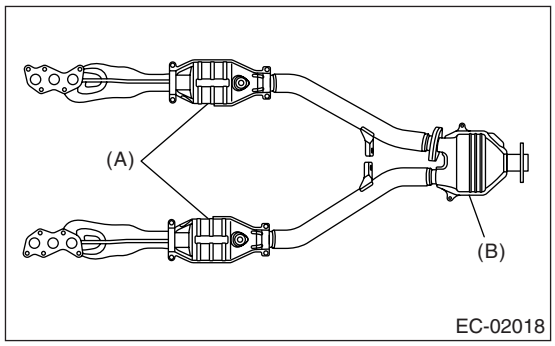
The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to “Front Exhaust Pipe” for removal procedure. <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>



(A) Front catalytic converter
(B) Rear catalytic converter

B: INSTALLATION

The front and rear catalytic converters are integrated into front exhaust pipe as one unit; therefore, refer to “Front Exhaust Pipe” for installation procedure. <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>



(A) Front catalytic converter
(B) Rear catalytic converter

C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

4. EGR Valve

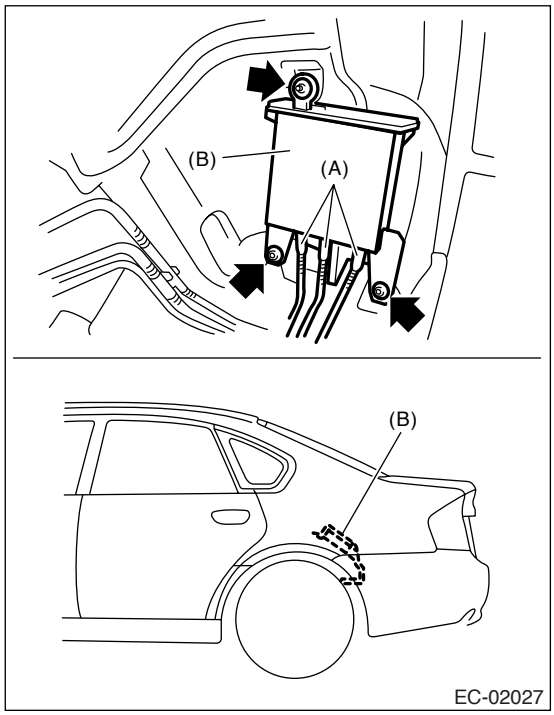
A: SPECIFICATION

Refer to “EGR valve” for removal and installation.
<Ref. to FU(H6DO)-25, EGR Valve.>

5. Canister

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the rear wheel LH.
3) Remove the mud guard LH.
4) Remove the protector. (Sedan model)
5) Disconnect the quick connector (A).
6) Remove the canister (B) from body.

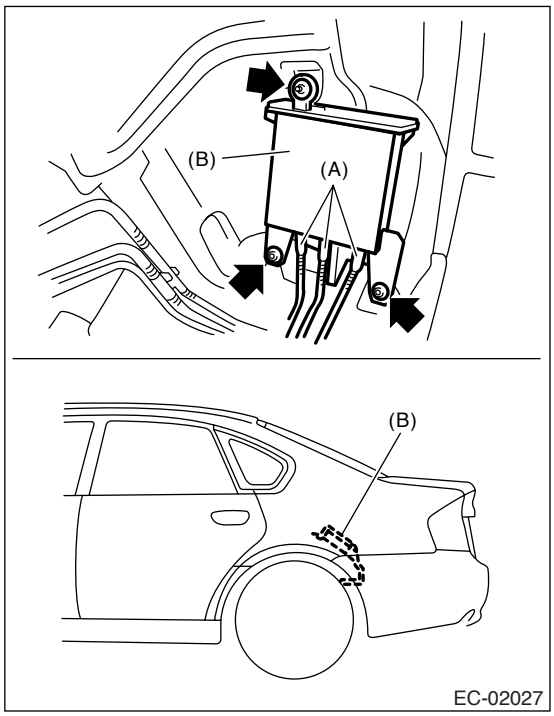


B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure there are no damage or dust on the connection of quick connector. If necessary, clean the seal surface of pipe.

Tightening torque:
8.3 N·m (0.85 kgf-m, 6.1 ft-lb)



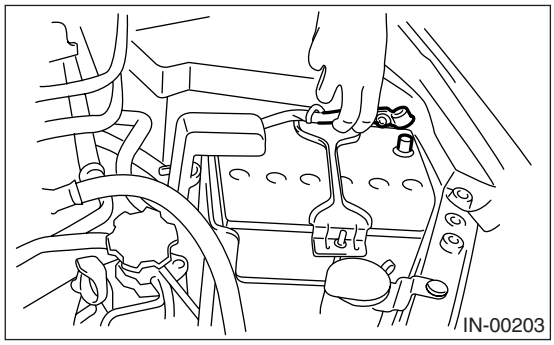
C: INSPECTION

Make sure the canister and canister hoses are not cracked or loose.

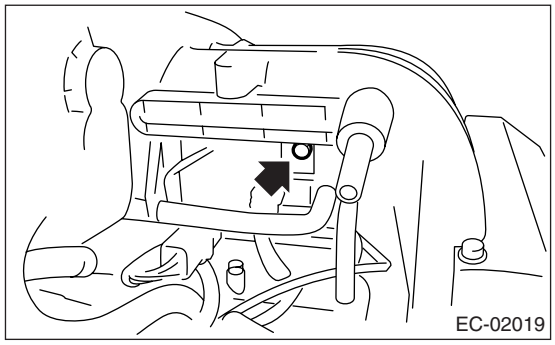
6. Purge Control Solenoid Valve

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



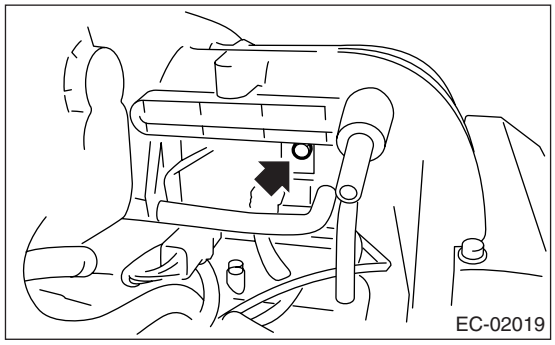
3) Remove the air intake chamber. <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector and hoses of purge control solenoid valve, and then remove the purge control solenoid valve.



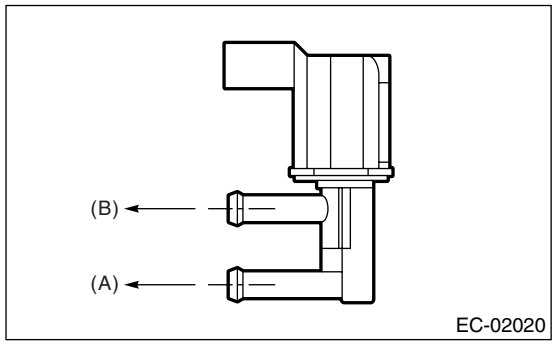
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
19 N·m (1.9 kgf-m, 14.0 ft-lb)



NOTE:
Connect the evaporation hose as shown in the figure.



(A) To fuel pipe (Evaporation line)
(B) To intake manifold

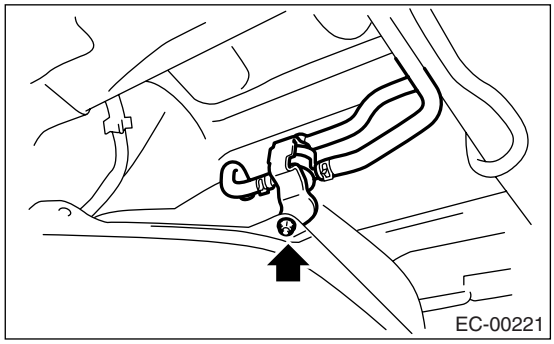
C: INSPECTION

Make sure the hoses are not cracked or loose.

7. Two-way Valve

A: REMOVAL

1) Lift-up the vehicle.
2) Disconnect the evaporation hoses from two-way valve.
3) Remove the two-way valve as a unit with bracket from body.



4) Remove the two-way valve from bracket.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

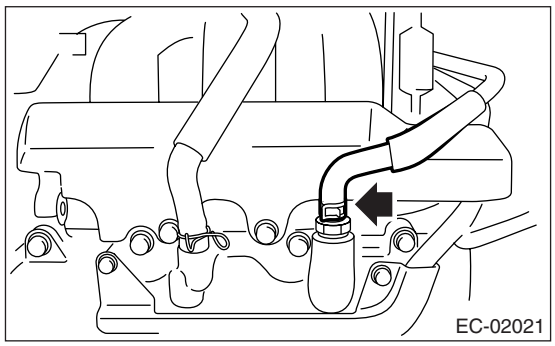
C: INSPECTION

Make sure the hoses are not cracked or loose.

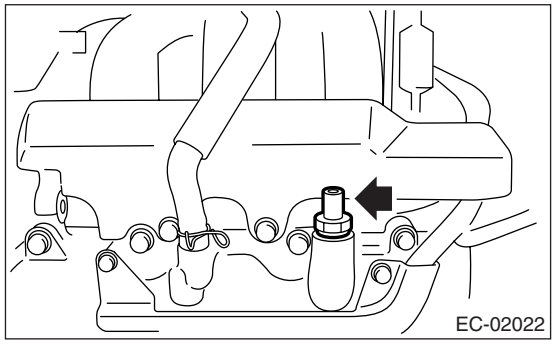
8. PCV Valve

A: REMOVAL

1) Disconnect the PCV hose.



2) Remove the PCV valve from rocker cover.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Apply liquid gasket to the bolt threads of PCV valve.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010)

Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

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This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

INTAKE (INDUCTION)

IN(H6DO)

Page

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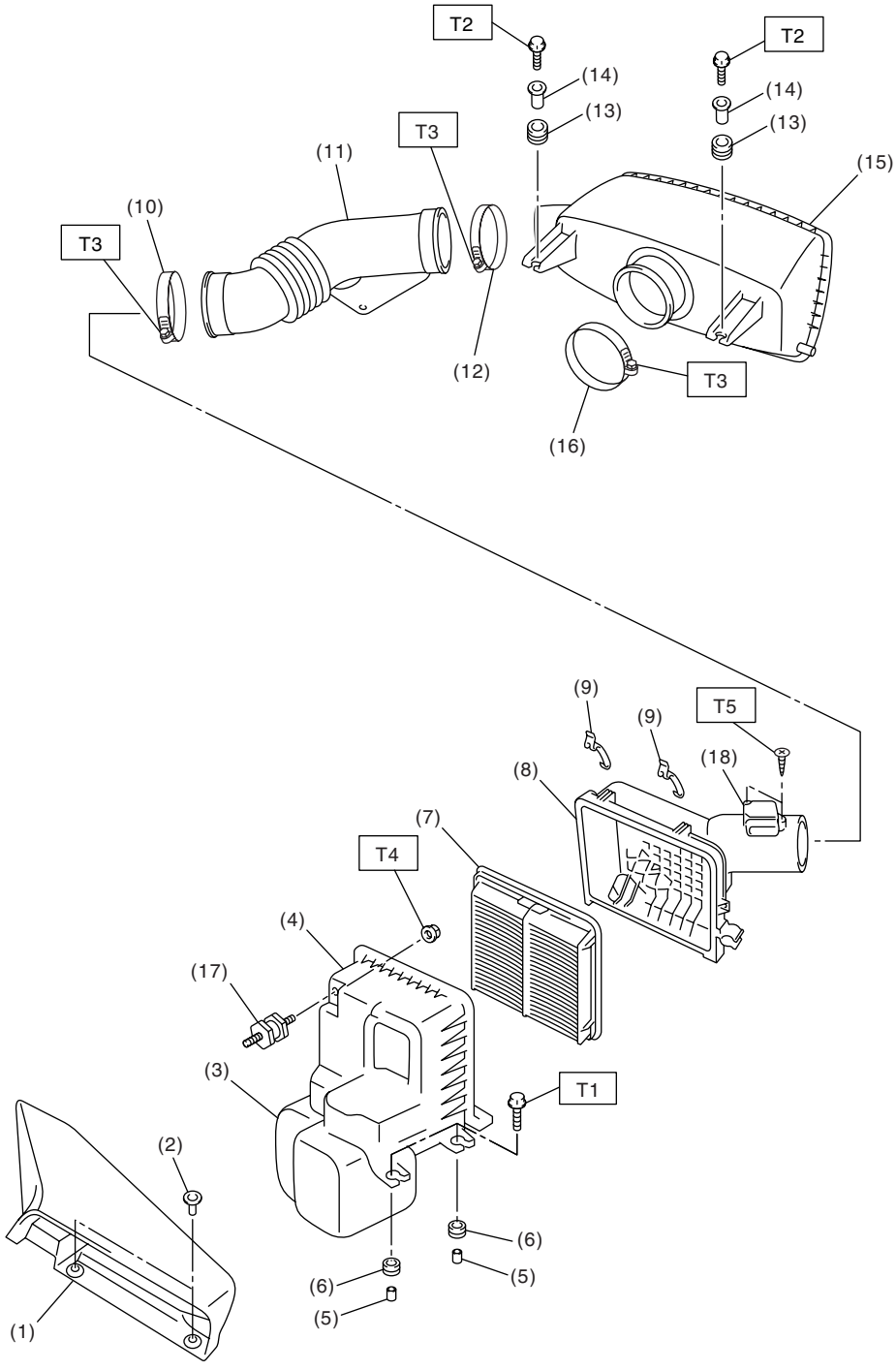
2. Air Cleaner Element 4
3. Air Cleaner Case 5
4. Air Intake Chamber 7
5. Air Intake Duct 8
6. Resonator Chamber 9

1. General Description

A: COMPONENT



IN-02008

(1) Air intake duct
(2) Clip
(3) Resonator chamber
(4) Air cleaner case (front)
(5) Spacer
(6) Cushion
(7) Air cleaner element
(8) Air cleaner case (rear)
(9) Clip
(10) Clamp
(11) Intake duct
(12) Clamp
(13) Cushion
(14) Spacer
(15) Air intake chamber
(16) Clamp
(17) Cushion
(18) Mass air flow and intake air temperature sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.6, 4.4)
T2: 6.4 (0.65, 4.7)
T3: 3.0 (0.3, 2.2)
T4: 7.5 (0.76, 5.5)
T5: 1.0 (0.10, 0.7)

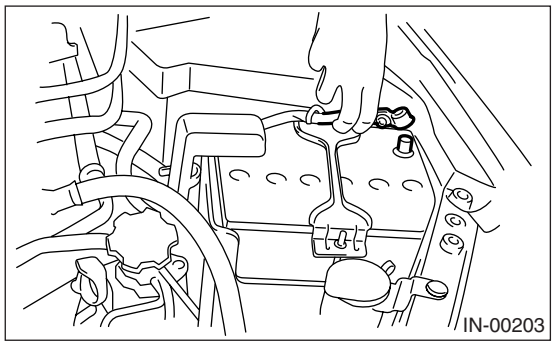
B: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

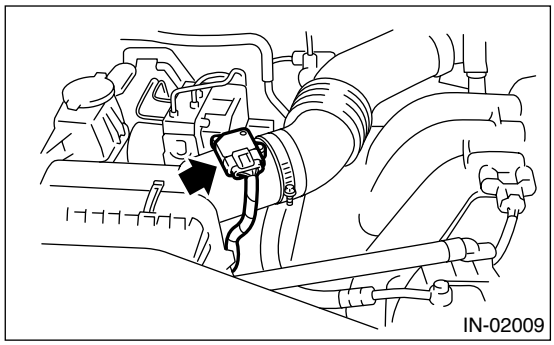
2. Air Cleaner Element

A: REMOVAL

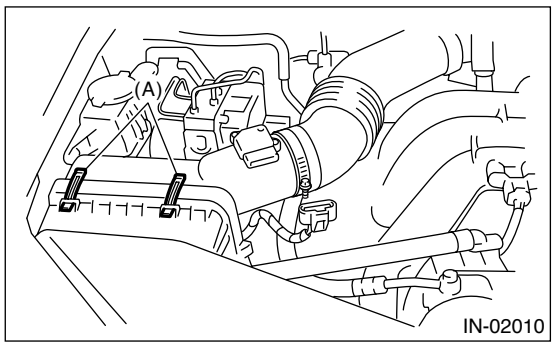
1) Disconnect the ground cable from battery.



2) Disconnect the connector from mass air flow and intake air temperature sensor.



3) Remove the clip (A) from the upper side of air cleaner case.



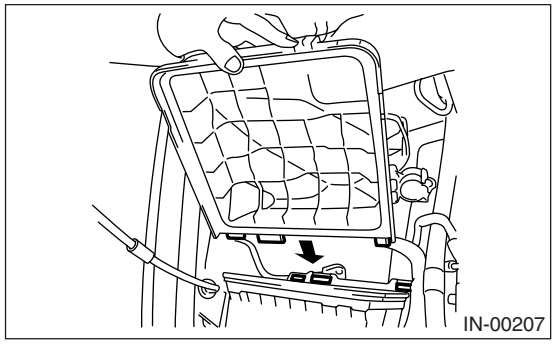
4) Pull the air cleaner case (rear) to the rearward of vehicle, and then remove the air cleaner element.

NOTE:
Be careful that the power steering hose is secured to the under side of air cleaner case (rear).

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Fasten with a clip after inserting the lower tab of the case.



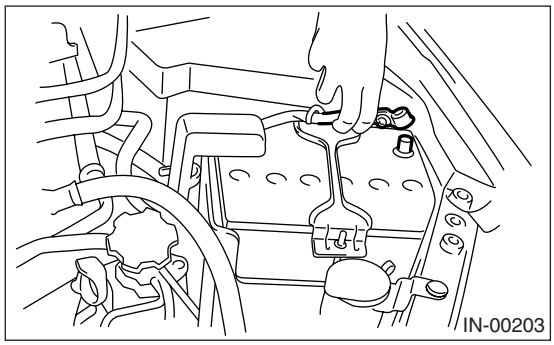
C: INSPECTION

Replace if excessively damaged or dirty.

3. Air Cleaner Case

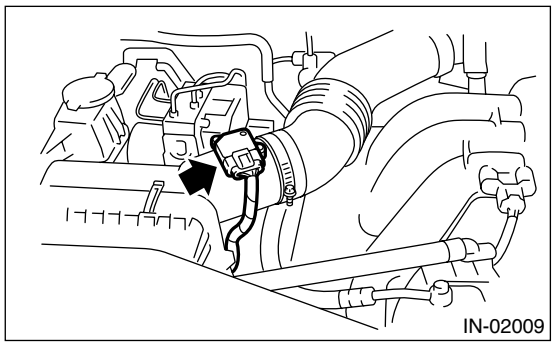
A: REMOVAL

1) Disconnect the ground cable from battery.



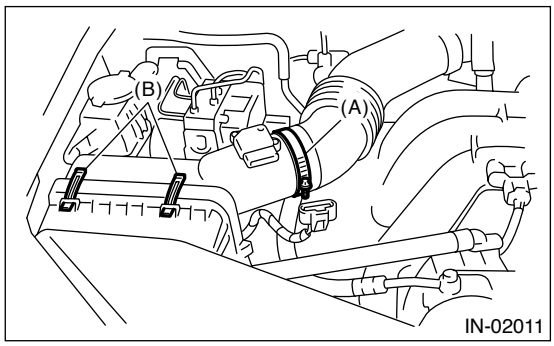
2) Remove the air intake duct. **<Ref. to IN(H6DO)-8,** REMOVAL**, Air Intake Duct.>**

3) Disconnect the connector from mass air flow and intake air temperature sensor.

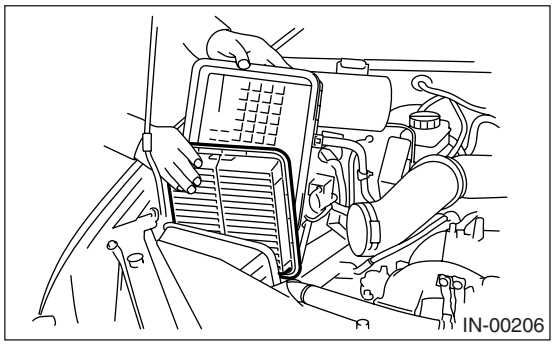


4) Loosen the clamp (A) which connects air cleaner case to intake duct.

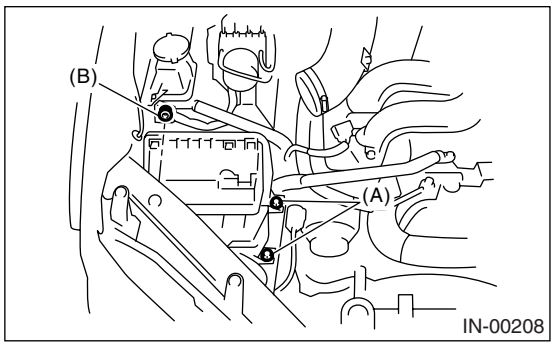
5) Remove the clip (B) from the upper side of air cleaner case.



6) Remove the air cleaner case (rear) and air cleaner element.



7) Remove the bolt (A) and nut (B) which hold air cleaner case on the body.

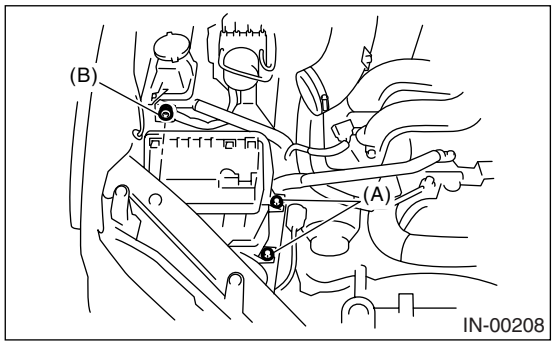


8) Remove the air cleaner case (front).

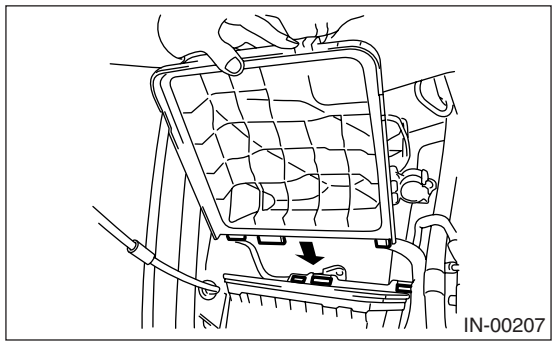
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Bolt (A): 6.0 N·m (0.6 kgf-m, 4.4 ft-lb)
Nut (B): 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



NOTE:
Fasten with a clip after inserting the lower tab of the case.



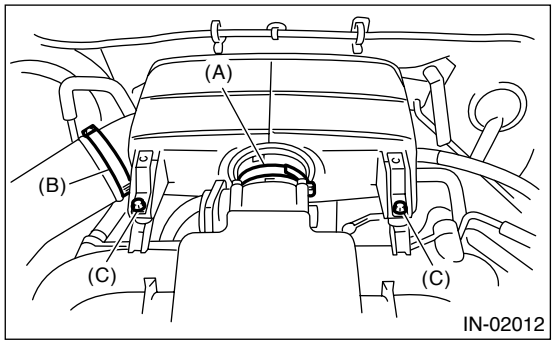
C: INSPECTION

Check for cracks or loose connection.

4. Air Intake Chamber

A: REMOVAL

1) Remove the collector cover.
2) Loosen the clamp (A) which connects air intake chamber to throttle body.
3) Loosen the clamp (B) which connects intake duct to air intake chamber.
4) Remove the bolt (C) which secures air intake chamber to the stay.

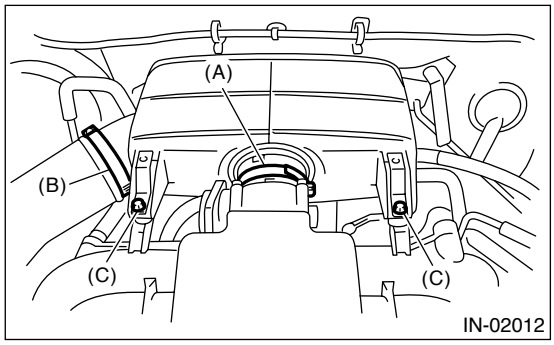


5) Disconnect one part of blow-by hose, and remove the air intake chamber.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Clamp (A), (B)
3.0 N·m (0.3 kgf-m, 2.2 ft-lb)
Bolt (C)
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



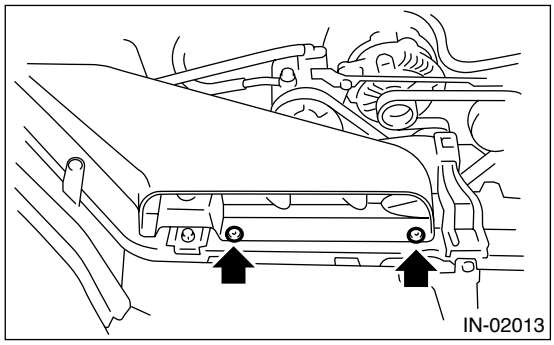
C: INSPECTION

1) Check for cracks or loose connections.
2) Inspect that no foreign objects in the air intake chamber.

5. Air Intake Duct

A: REMOVAL

1) Remove the clips which install air intake duct on the front side of body.
2) Remove the air intake duct.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Check for cracks or loose connections.
2) Inspect that no foreign objects in the air intake duct.

6. Resonator Chamber

A: REMOVAL

Refer to “Air Cleaner Case” for removal procedure because the resonator chamber forms a single unit with air cleaner case. **<Ref. to IN(H6DO)-5,** REMOVAL, Air Cleaner Case.>

B: INSTALLATION

Refer to “Air Cleaner Case” for installation procedure because the resonator chamber forms a single unit with air cleaner case. **<Ref. to IN(H6DO)-6,** INSTALLATION, Air Cleaner Case.>

C: INSPECTION

Check for cracks or loose connections.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

MECHANICAL

ME(H6DO)

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1. General Description

A: SPECIFICATION

Engine	Cylinder arrangement			Horizontally opposed, liquid cooled, 6-cylinder, 4-stroke gasoline engine
	Valve system mechanism			Chain driven, double overhead camshaft, 4-valve/cylinder
	Bore × Stroke mm (in)			89.2 × 80 (3.512 × 3.150)
	Displacement cm^3 (cu in)			2,999 (183)
	Compression ratio			10.7
	Compression pressure (350 rpm and fully open throttle): kPa (kg/cm^2, psi)			1,275 — 1,471 (13.0 — 15.0, 185 — 213)
	Number of piston rings			Pressure ring: 2, Oil ring: 1
	Intake valve timing	Min. advance	Open	BTDC 47°
			Close	ABDC 23°
		Max. retard	Open	ATDC 3°
			Close	ABDC 73°
	Exhaust valve timing		Open	BBDC 60°
			Close	ATDC 6°
	Valve clearance mm (in)	Intake		$0.20^{+0.04}_{-0.06}$ ($0.0079^{+0.0016}_{-0.0024}$)
		Exhaust		0.35±0.05 (0.0138±0.020)
	Idling speed [“P” or “N” range] rpm		No load	650±50
			A/C ON	770±50
	Ignition order			1 → 6 →3 → 2 → 5 → 4
	Ignition timing BTDC/rpm			15°±8°/650

NOTE:
OS: Oversize US: undersize

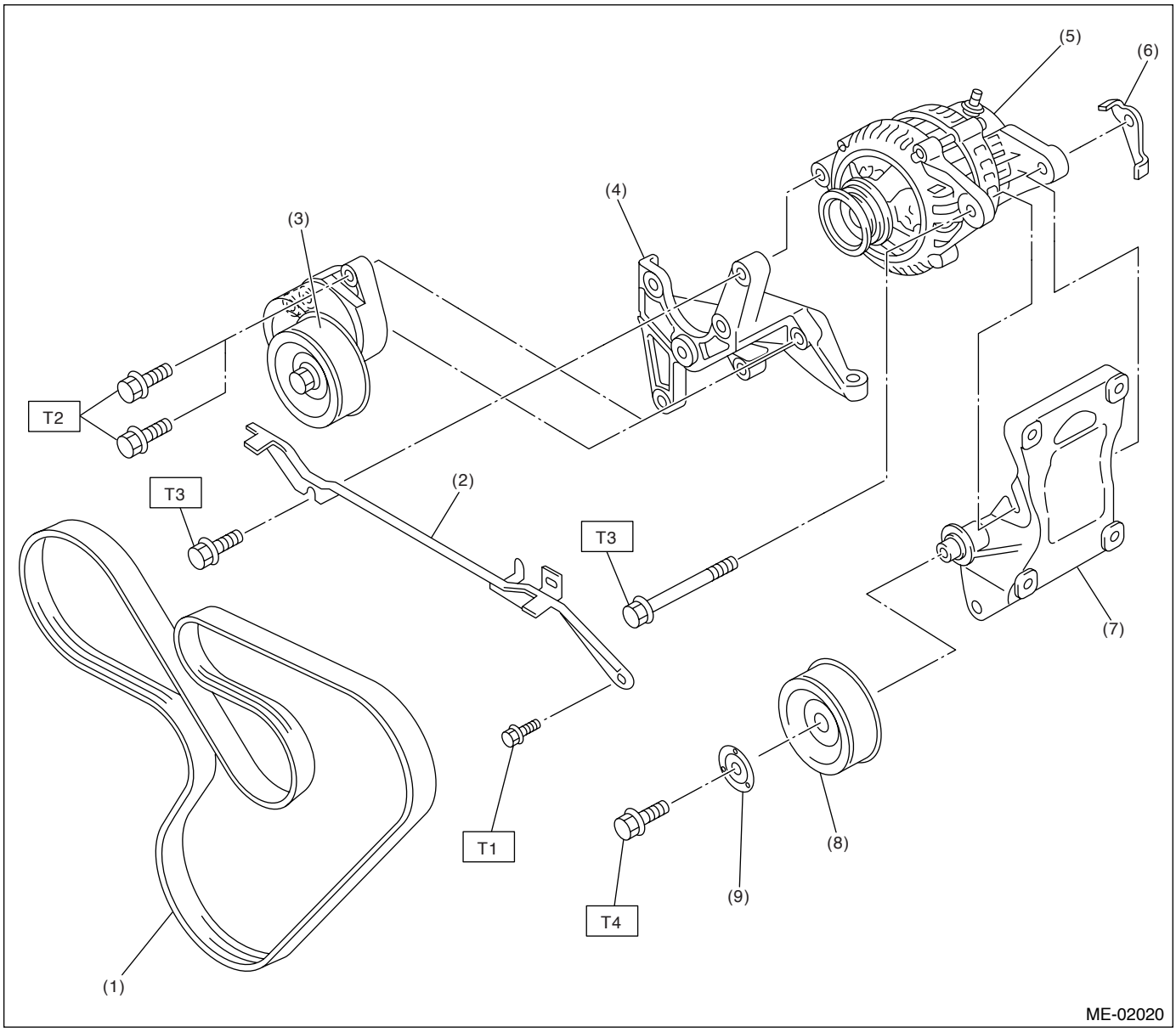
Camshaft	Side clearance mm (in)	Intake		Standard	0.075 — 0.135 (0.0030 — 0.0053)
		Exhaust		Standard	0.030 — 0.090 (0.0012 — 0.0035)
	Cam lobe height mm (in)	Intake	HIGH	Standard	42.09 — 42.19 (1.6571 — 1.6610)
			LOW1	Standard	38.14 — 38.24 (1.5016 — 1.5055)
			LOW2	Standard	34.94 — 35.04 (1.3756 — 1.3795)
		Exhaust		Standard	41.65 — 41.75 (1.6398 — 1.6437)
	Cam base circle diameter mm (in)	Intake	HIGH	Standard	32.00 (1.2598)
			LOW1	Standard	31.84 (1.2535)
			LOW2	Standard	31.84 (1.2535)
		Exhaust		Standard	32.00 (1.2598)
	Journal O.D. mm (in)	Front:		Standard	37.946 — 37.963 (1.4939 — 1.4946)
		Except for front		Standard	25.946 — 25.963 (1.0215 — 1.0222)
	Oil clearance mm (in)			Standard	0.037 — 0.072 (0.0015 — 0.0028)
Cylinder head	Flatness mm (in)			Standard	0.02 (0.0008)
	Inner diameter of valve lifter hole mm (in)				32.994 — 33.016 (1.2990 — 1.2998)
	Standard height mm (in)				124±0.05 (4.88±0.0020)
Valve seat	Refacing angle				90°
	Contacting width mm (in)	Intake		Standard	1.0 (0.039)
		Exhaust		Standard	1.5 (0.059)
Valve guide	Inside diameter mm (in)				5.500 — 5.512 (0.2165 — 0.2170)
	Protrusion above head mm (in)				11.4 — 11.8 (0.449 — 0.465)

Valve	Head edge thickness mm (in)	Intake		Standard	1.0 (0.039)
		Exhaust		Standard	1.2 (0.047)
	Stem outer diameter mm (in)	Intake			5.455 — 5.470 (0.2148 — 0.2145)
		Exhaust			5.455 — 5.460 (0.2148 — 0.2150)
	Stem oil clearance	Intake		Standard	0.030 — 0.057 (0.0012 — 0.0022)
		Exhaust		Standard	0.040 — 0.067 (0.0016 — 0.0026)
	Overall length mm (in)	Intake			99.7 (3.925)
		Exhaust			105.2 (4.142)
	Outer diameter of valve lifter mm (in)				32.959 — 32.975 (1.2976 — 1.2982)
Valve spring	Free length mm (in)	Intake		Inner	39.55 (1.5571)
				Outer	41.18 (1.6213)
		Exhaust			46.32 (1.8236)
	Squareness	Intake		Inner	2.5°, 1.7 mm (0.067 in)
				Outer	2.5°, 1.8 mm (0.071 in)
		Exhaust			2.5°, 2.0 mm (0.079 in)
Cylinder block	Standard height mm (in)				202 (7.95)
	Cylinder inner diameter mm (in)	Stan-dard		A	89.205 — 89.215 (3.5120 — 3.5124)
				B	89.195 — 89.205 (3.5116 — 3.5120)
	Cylindricality mm (in)			Standard	0.030 (0.0012)
	Out-of-roundness mm (in)			Standard	0.010 (0.0004)
	Piston clearance mm (in)			Standard	−0.010 — 0.010 (−0.0004 — 0.0004)
Piston	Outer diameter mm (in)	Standard		A	89.205 — 89.215 (3.5120 — 3.5124)
				B	89.195 — 89.205 (3.5116 — 3.5120)
		0.25 (0.0098) OS			89.445 — 89.465 (3.5215 — 3.5222)
		0.50 (0.0197) OS			89.695 — 89.715 (3.5313 — 3.5321)
	Inner diameter of piston pin hole			Standard	22.000 — 22.006 (0.8661 — 0.8664)
Piston pin	Outer diameter mm (in)			Standard	21.994 — 22.000 (0.8659 — 0.8661)
	Standard clearance between piston and piston pin mm (in)			Standard	0.004 — 0.008 (0.0002 — 0.0003)
Piston ring	Ring closed gap mm (in)	Top ring		Standard	0.20 — 0.35 (0.0079 — 0.0138)
		Second ring		Standard	0.35 — 0.50 (0.0138 — 0.0197)
		Oil ring		Standard	0.20 — 0.60 (0.0079 — 0.0236)
	Ring groove gap mm (in)	Top ring		Standard	0.040 — 0.080 (0.0016 — 0.0031)
		Second ring		Standard	0.030 — 0.070 (0.0012 — 0.0028)
		Oil ring		Standard	0.045 — 0.125 (0.0018 — 0.0049)
Connecting rod	Side clearance of large end mm (in)			Standard	0.070 — 0.330 (0.0028 — 0.0130)
Bearing of large end	Oil clearance mm (in)			Standard	0.016 — 0.043 (0.0006 — 0.0017)
	Bearing size (Thickness at center) mm (in)	Standard			1.490 — 1.506 (0.0587 — 0.0593)
		0.03 (0.0012) US			1.509 — 1.513 (0.0594 — 0.0596)
		0.05 (0.0020) US			1.519 — 1.523 (0.0598 — 0.0600)
		0.25 (0.0098) US			1.619 — 1.623 (0.0637 — 0.0639)
Bushing of small end	Clearance between piston pin and bushing mm (in)			Standard	0 — 0.022 (0 — 0.0009)

Crankshaft	Crank pin and crank journal	Out-of-roundness mm (in)		0.005 (0.0002)
		Cylindricality mm (in)		0.006 (0.0002)
	Crank pin outer diameter mm (in)		Standard	51.984 — 52.000 (2.0466 — 2.0472)
			0.03 (0.0012) US	51.954 — 51.970 (2.0454 — 2.0461)
			0.05 (0.0020) US	51.934 — 51.950 (2.0446 — 2.0453)
			0.25 (0.0098) US	51.734 — 51.750 (2.0368 — 2.0374)
	Crank journal outer diameter mm (in)	#1, #3, #5, #7	Standard	63.992 — 64.008 (2.5194 — 2.5200)
			0.03 (0.0012) US	63.962 — 63.978 (2.5182 — 2.5188)
			0.05 (0.0020) US	63.942 — 63.958 (2.5174 — 2.5180)
			0.25 (0.0098) US	63.742 — 63.758 (2.5095 — 2.5102)
		#2, #4, #6	Standard	63.992 — 64.008 (2.5194 — 2.5200)
			0.03 (0.0012) US	63.962 — 63.978 (2.5182 — 2.5188)
			0.05 (0.0020) US	63.942 — 63.958 (2.5174 — 2.5180)
			0.25 (0.0098) US	63.742 — 63.758 (2.5095 — 2.5102)
	Thrust clearance mm (in)		Standard	0.030 — 0.115 (0.0012 — 0.0045)
	Oil clearance mm (in)		Standard	0.010 — 0.030 (0.0004 — 0.0012)
Main bearing	Bearing size (Thickness at center) mm (in)	#1, #3, #5, #7	Standard	1.992 — 2.005 (0.0784 — 0.0789)
			0.03 (0.0012) US	2.011 — 2.014 (0.0792 — 0.0793)
			0.05 (0.0020) US	2.021 — 2.024 (0.0796 — 0.0797)
			0.25 (0.0098) US	2.121 — 2.124 (0.0835 — 0.0836)
		#2, #4, #6	Standard	1.996 — 2.009 (0.0786 — 0.0791)
			0.03 (0.0012) US	2.015 — 2.018 (0.0793 — 0.0794)
			0.05 (0.0020) US	2.025 — 2.028 (0.0797 — 0.0798)
			0.25 (0.0098) US	2.125 — 2.128 (0.0837 — 0.0838)

B: COMPONENT

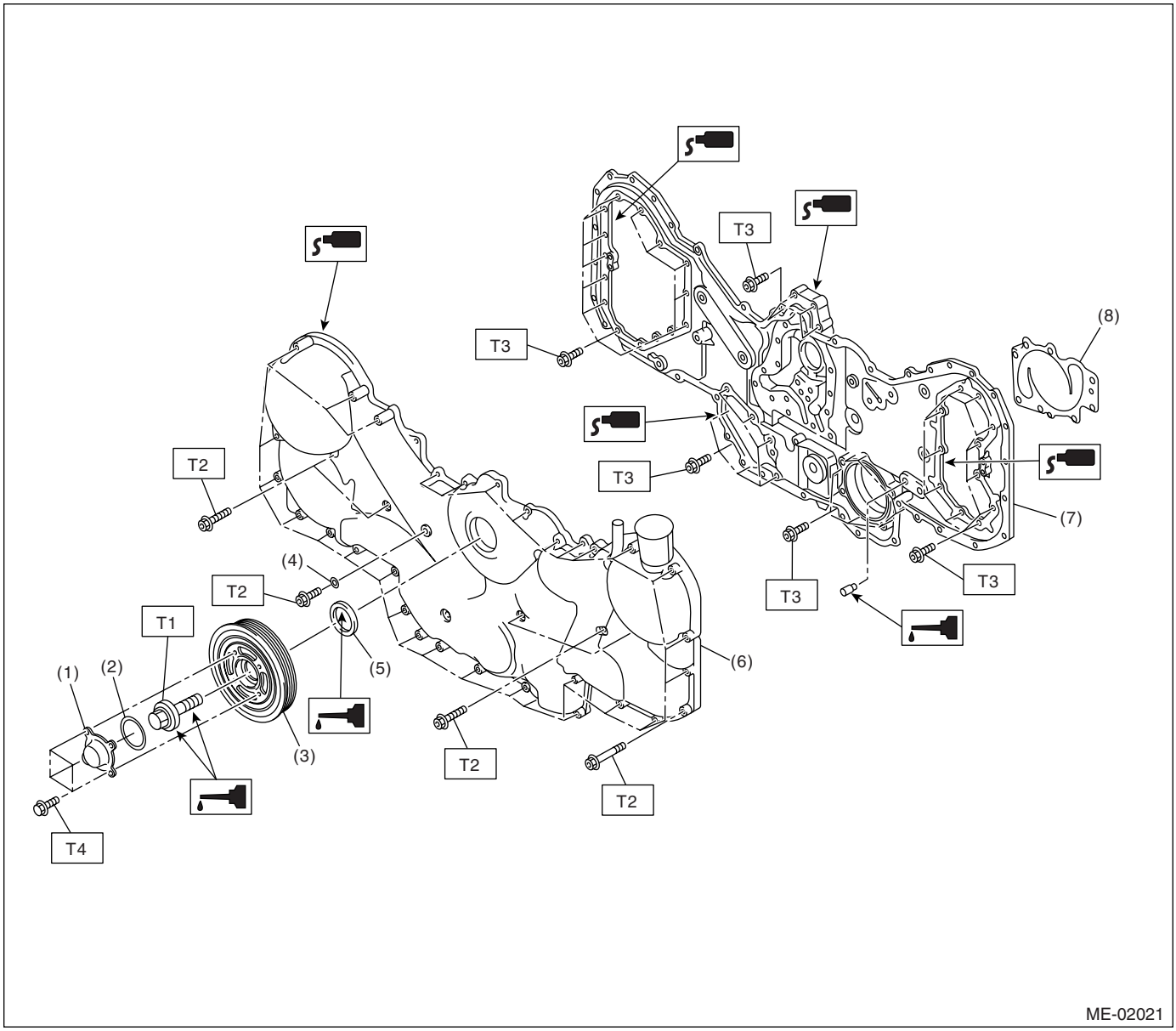
1. V-BELT



(1)	V-belt	(6)	Generator plate
(2)	Collector cover bracket	(7)	A/C compressor stay
(3)	Belt tension adjuster ASSY	(8)	Idler pulley
(4)	Power steering pump bracket	(9)	Idler pulley cover
(5)	Generator		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 20 (2.0, 14)
T3: 25 (2.5, 18)
T4: 33 (3.4, 25)

2. TIMING CHAIN COVER



(1) Crank pulley cover
(2) O-ring
(3) Crank pulley
(4) Sealing washer
(5) Oil seal
(6) Front chain cover
(7) Rear chain cover
(8) Water pump gasket

Tightening torque: N·m (kgf-m, ft-lb)

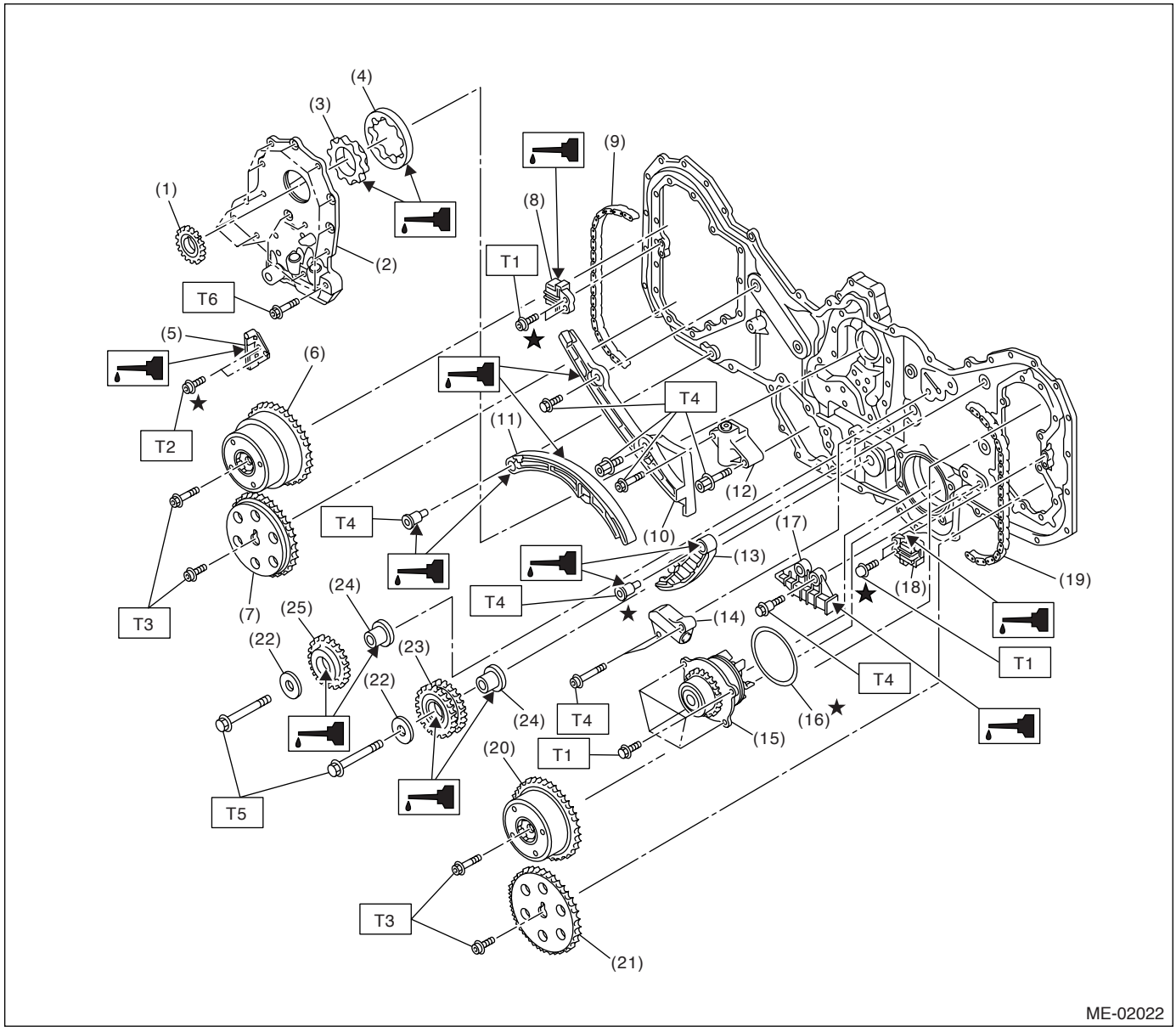
T1: <Ref. to ME(H6DO)-42, Crank Pulley.>

T2: <Ref. to ME(H6DO)-43, Front Chain Cover.>

T3: <Ref. to ME(H6DO)-52, Rear Chain Cover.>

T4: 6.4 (0.65, 4.7)

3. TIMING CHAIN



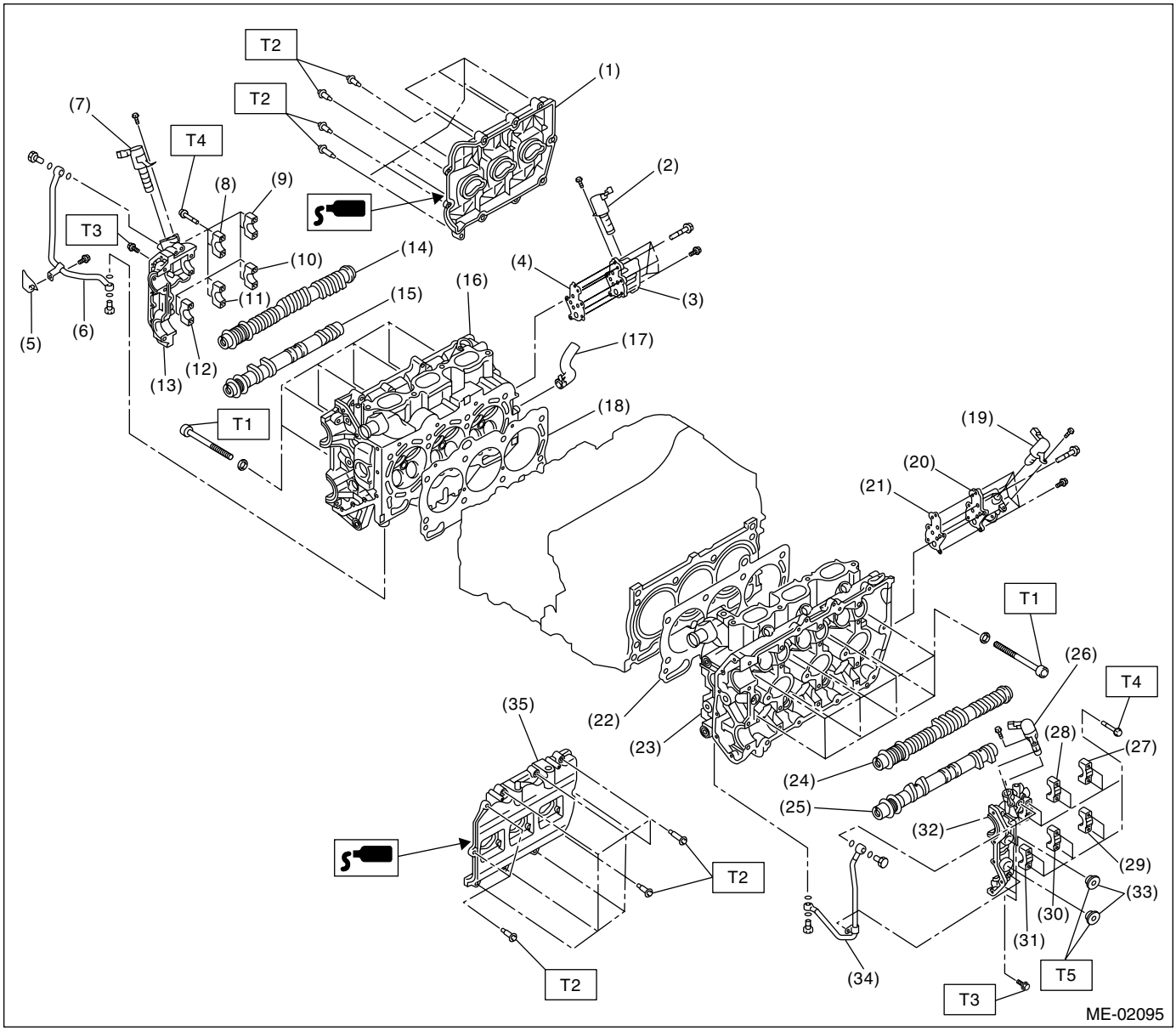
ME-02022

(1) Crank sprocket
(2) Oil relief case
(3) Inner rotor
(4) Outer rotor
(5) Chain guide (CTR)
(6) Intake cam sprocket (RH)
(7) Exhaust cam sprocket (RH)
(8) Chain guide (RH: between cams)
(9) Timing chain (RH)
(10) Chain guide (RH)
(11) Chain tensioner lever (RH)
(12) Chain tensioner (RH)
(13) Chain tensioner lever (LH)
(14) Chain tensioner (LH)
(15) Water pump
(16) O-ring
(17) Chain guide (LH)
(18) Chain guide (LH: between cams)
(19) Timing chain (LH)
(20) Intake cam sprocket (LH)
(21) Exhaust cam sprocket (LH)
(22) Idler sprocket plate
(23) Idler sprocket (lower)
(24) Idler sprocket collar
(25) Idler sprocket (upper)

Tightening torque: N·m (kgf-m, ft-lb)

T1: ***6.4 (0.64, 4.7)***
T2: ***7.8 (0.80, 5.8)***
T3: ***<Ref. to ME(H6DO)-50, Cam Sprocket.>***
T4: ***16 (1.6, 11.6)***
T5: ***69 (7.0, 50.6)***
T6: <Ref. to LU(H6DO)-8, Oil Pump.>

4. CYLINDER HEAD AND CAMSHAFT

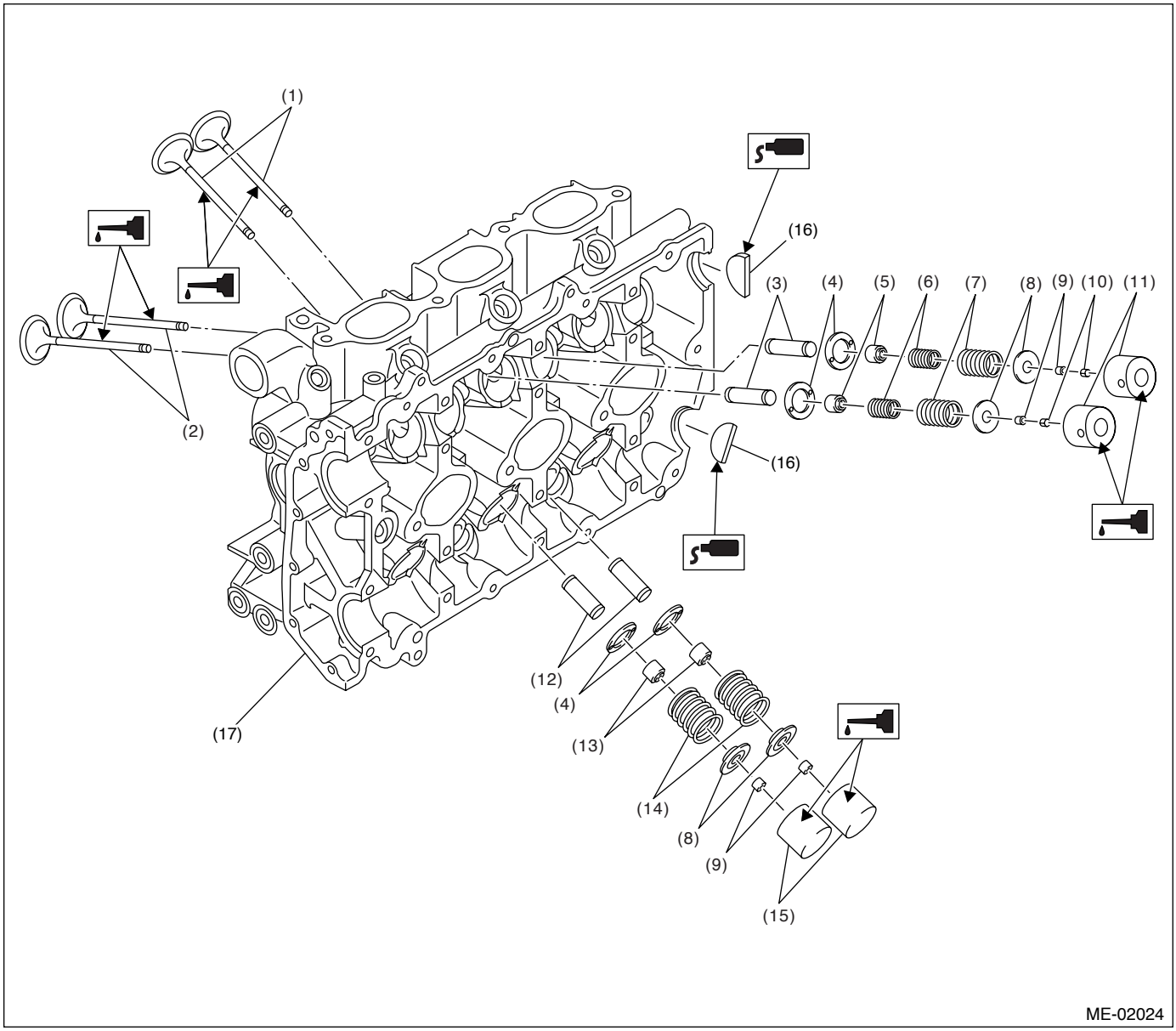


(1) Rocker cover (RH)
(2) Oil switching solenoid valve (RH)
(3) Oil switching solenoid valve holder (RH)
(4) Oil switching solenoid valve gasket
(5) Rear chain cover
(6) Oil pipe (RH)
(7) Oil flow control solenoid valve (RH)
(8) Intake camshaft cap (Center RH)
(9) Intake camshaft cap (Rear RH)
(10) Exhaust camshaft cap (Rear RH)
(11) Exhaust camshaft cap (Center RH)
(12) Exhaust camshaft cap (Front RH)
(13) Front camshaft cap (RH)
(14) Intake camshaft (RH)
(15) Exhaust camshaft (RH)
(16) Cylinder head (RH)
(17) Water hose
(18) Cylinder head gasket (RH)
(19) Oil switching solenoid valve (LH)
(20) Oil switching solenoid valve holder (LH)
(21) Oil switching solenoid valve gasket
(22) Cylinder head gasket (LH)
(23) Cylinder head (LH)
(24) Intake camshaft (LH)
(25) Exhaust camshaft (LH)
(26) Oil flow control solenoid valve (LH)
(27) Intake camshaft cap (Rear LH)
(28) Intake camshaft cap (Center LH)
(29) Exhaust camshaft cap (Rear LH)
(30) Exhaust camshaft cap (Center LH)
(31) Exhaust camshaft cap (Front LH)
(32) Front camshaft cap (LH)
(33) Plug
(34) Oil pipe (LH)
(35) Rocker cover (LH)

Tightening torque:N·m (kgf-m, ft-lb)

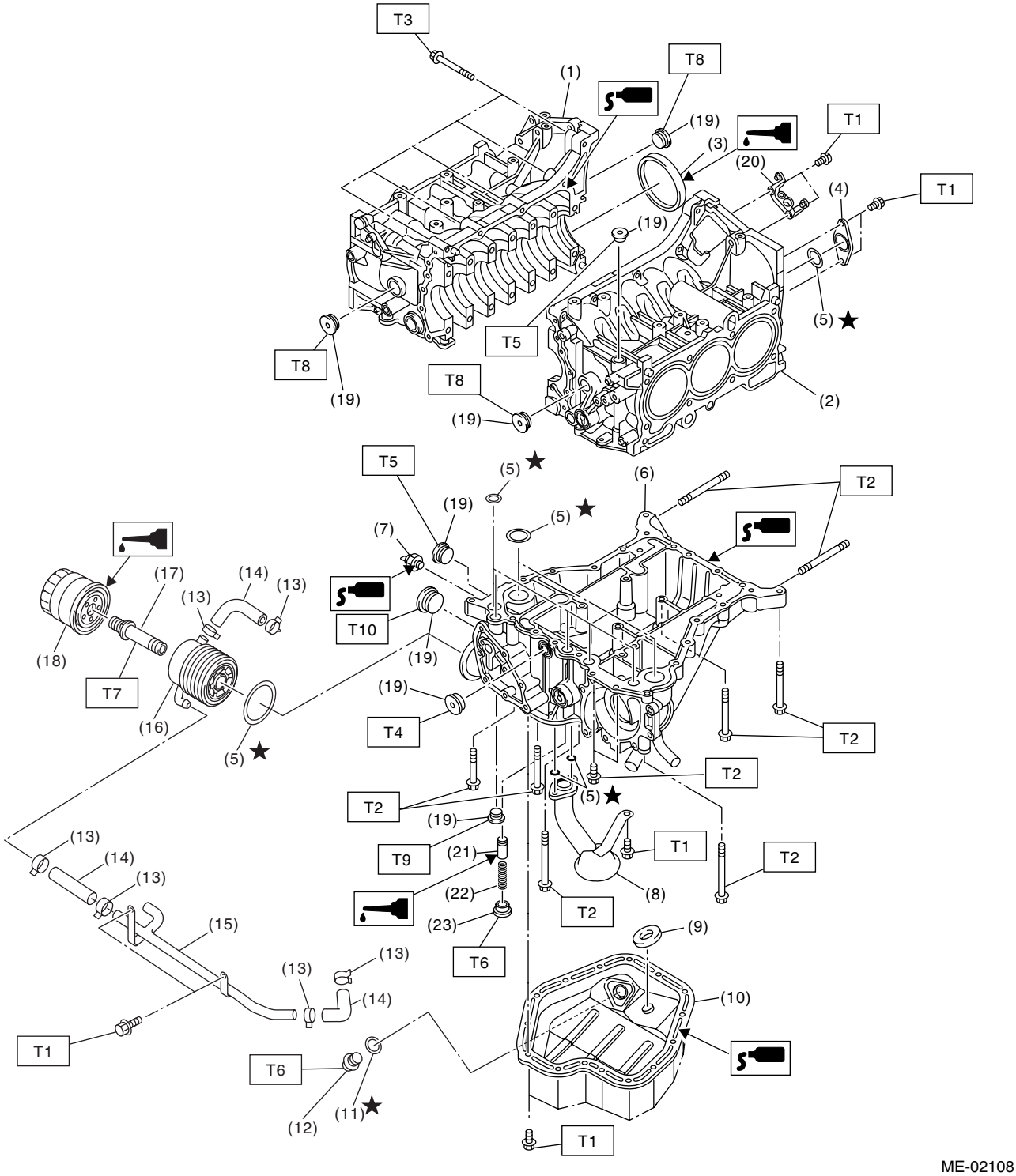
T1: ***<Ref. to ME(H6DO)-58, Cylinder Head.>***
T2: ***<Ref. to ME(H6DO)-54, Camshaft.>***
T3: ***9.75 (1.0, 7.2)***
T4: ***16 (1.6, 12)***
T5: ***60 (6.1, 44)***

5. CYLINDER HEAD AND VALVE ASSEMBLY



(1) Exhaust valve
(2) Intake valve
(3) Intake valve guide
(4) Valve spring seat
(5) Intake valve stem seal
(6) Valve spring (Inner)
(7) Valve spring (Outer)
(8) Retainer
(9) Retainer key
(10) Shim
(11) Valve lifter (Intake)
(12) Exhaust valve guide
(13) Exhaust valve stem seal
(14) Valve spring
(15) Valve lifter (Exhaust)
(16) Cylinder head plug
(17) Cylinder head

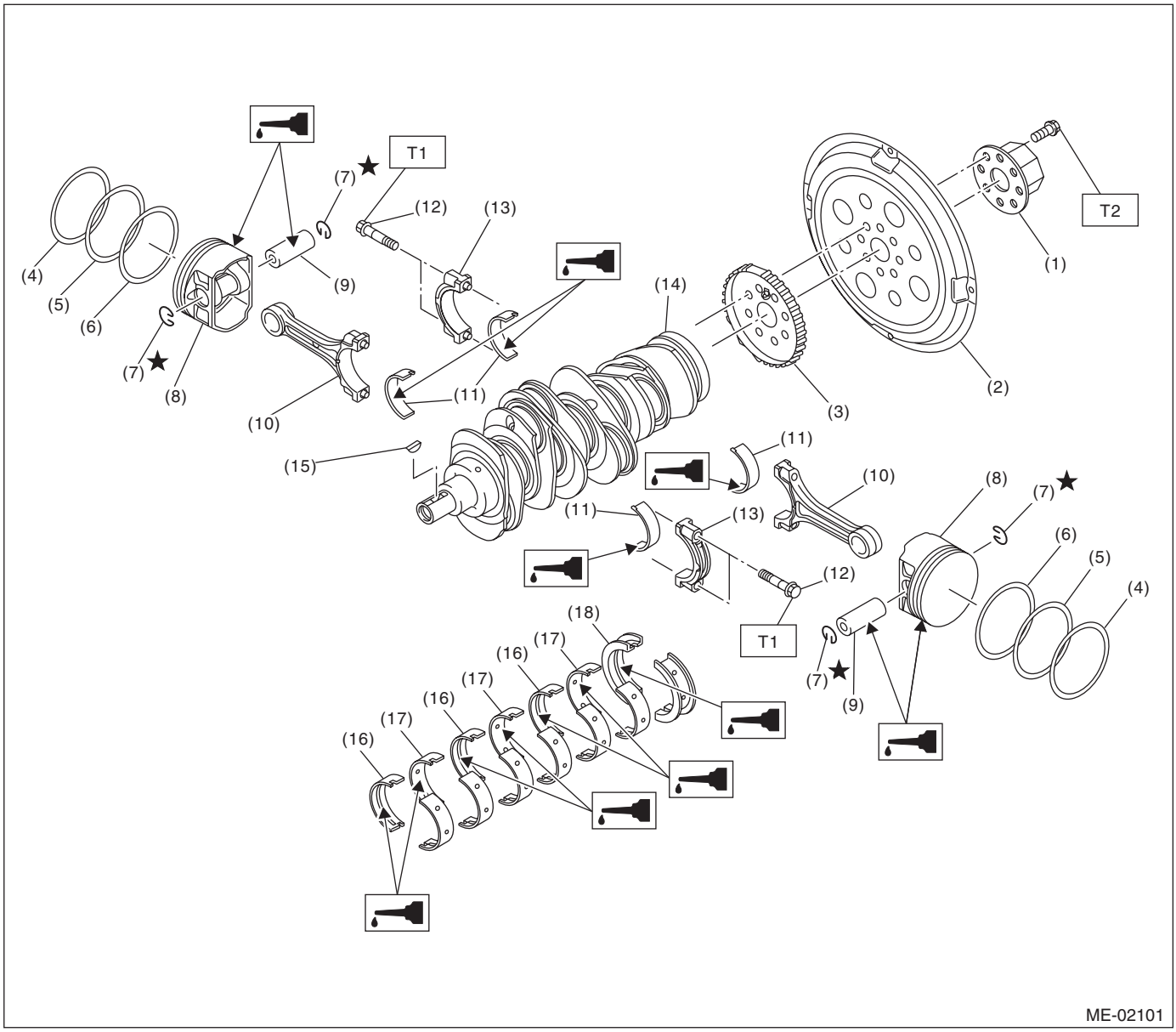
6. CYLINDER BLOCK



(1) Cylinder block (RH)
(2) Cylinder block (LH)
(3) Rear oil seal
(4) Service hole cover
(5) O-ring
(6) Oil pan upper
(7) Oil pressure switch
(8) Oil strainer
(9) Magnet
(10) Oil pan lower
(11) Metal gasket
(12) Drain plug
(13) Clamp
(14) Hose
(15) Oil cooler pipe
(16) Oil cooler
(17) Connector
(18) Oil filter
(19) Plug
(20) Crankshaft position sensor holder
(21) Relief valve
(22) Relief valve spring
(23) Plug

Tightening torque:N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 18 (1.8, 13.0)
T3: 25 (2.5, 18)
T4: 16 (1.6, 12)
T5: 37 (3.8, 27)
T6: 44 (4.5, 33)
T7: 54 (5.5, 40)
T8: 70 (7.1, 52)
T9: 23 (2.3, 17)
T10: 90 (9.2, 67)

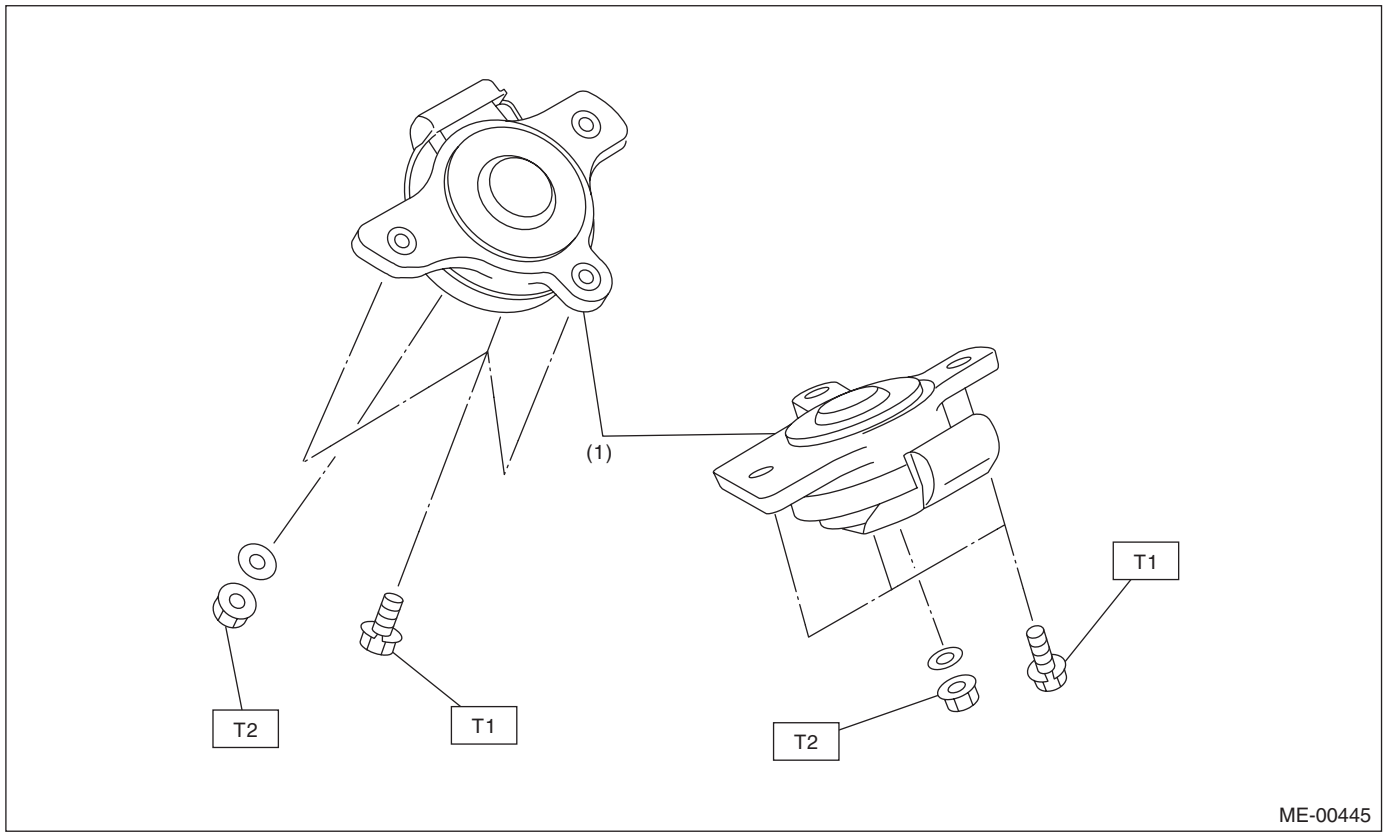
7. CRANKSHAFT AND PISTON



(1) Reinforcement
(2) Drive plate
(3) Crankshaft sensor plate
(4) Top ring
(5) Second ring
(6) Oil ring
(7) Snap ring
(8) Piston
(9) Piston pin
(10) Connecting Rod
(11) Connecting rod bearing
(12) Connecting rod bolt
(13) Connecting rod cap
(14) Crankshaft
(15) Woodruff key
(16) Crankshaft bearing #1, #3, #5
(17) Crankshaft bearing #2, #4, #6
(18) Crankshaft bearing #7

Tightening torque: N·m (kgf-m, ft-lb)
T1: 53 (5.4, 39)
T2: 81 (8.3, 60)

8. ENGINE MOUNTING



(1) Front cushion rubber

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 25.8)
T2: 85 (8.7, 63)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• All parts should be thoroughly cleaned, paying special attention to the engine oil passages, pistons and bearings.
• Rotating parts and sliding parts such as piston, bearing and gear should be coated with oil prior to assembly.
• Be careful not to let oil, grease or coolant contact the timing belt, clutch disc and flywheel.
• All removed parts, if to be reused, should be reinstalled in the original positions and directions.
• Bolts, nuts and washers should be replaced with new ones as required.
• Even if necessary inspections have been made in advance, proceed with assembly work while making rechecks.
• Remove or install the engine in an area where chain hoists, lifting devices, etc. are available for ready use.
• Be sure not to damage coated surfaces of body panels with tools, or not to stain seats and windows with coolant or oil. Place a cover over fenders, as required, for protection.
• Prior to starting work, prepare the following:
Service tools, clean cloth, containers to catch coolant and oil, wire ropes, chain hoist, transmission jacks, etc.
• Lift-up or lower the vehicle when necessary. Make sure to support the correct positions.

D: PREPARATION TOOL

1. SPECIAL TOOL

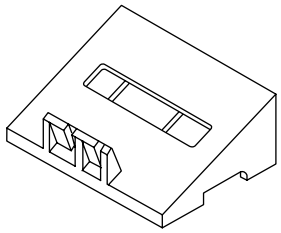
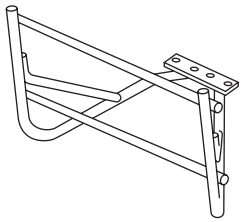
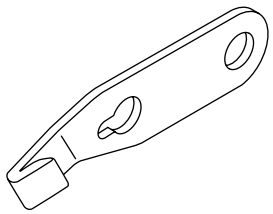
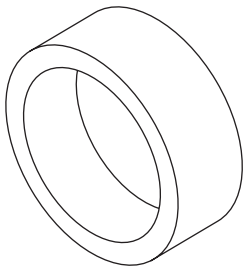
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18250AA010	18250AA010	CYLINDER HEAD TABLE	• Used for replacing valve guides. • Used for removing and installing valve spring.
 ST18232AA000	18232AA000	ENGINE STAND	Used for disassembling and assembling engine.
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel or drive plate when loosening/tightening crank pulley bolt.
 ST18254AA000	18254AA000	PISTON PIN GUIDE	Used for installing piston in cylinder.

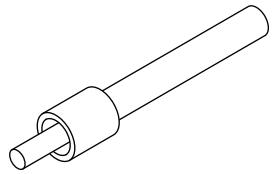
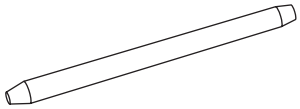
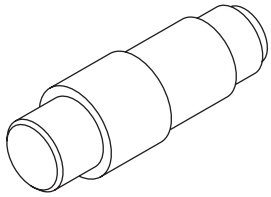
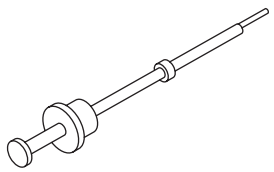
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499585500	499585500	VALVE OIL SEAL GUIDE	Used for press-fitting of intake and exhaust valve guide oil seals.
 ST18253AA000	18253AA000	PISTON PIN GUIDE	Used for installing piston pin, piston and connecting rod.
 ST18350AA000	18350AA000	CONNECTING ROD BUSHING REMOVER AND INSTALLER	Used for removing and installing connecting rod bushing.
 ST-499097500	499097500	PISTON PIN REMOVER ASSY	Used for removing piston pin.

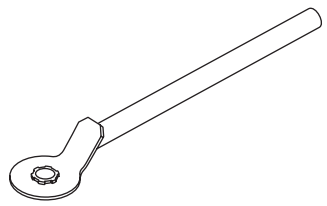
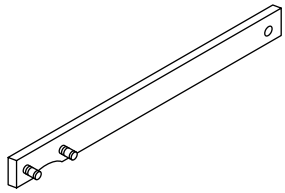
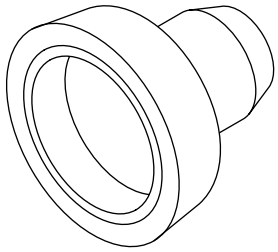
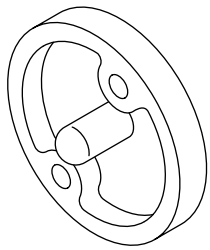
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket.
 ST18231AA020	18231AA020	CAM SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket.
 ST-499587200	499587200	CRANKSHAFT OIL SEAL INSTALLER	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL GUIDE (499597100).
 ST-499597100	499597100	CRANKSHAFT OIL SEAL GUIDE	• Used for installing crankshaft oil seal. • Used with CRANKSHAFT OIL SEAL INSTALLER (499587200).

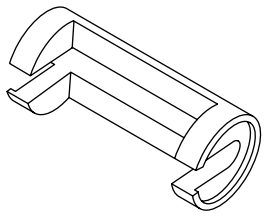
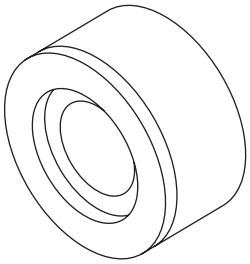
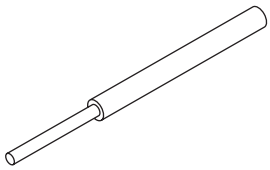
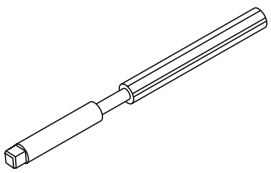
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499718000	499718000	VALVE SPRING REMOVER	Used for removing and installing valve spring.
 ST18251AA040	18251AA040	VALVE GUIDE ADJUSTER	Used for installing valve guides.
 ST-499765700	499765700	VALVE GUIDE REMOVER	Used for removing valve guides.
 ST-499765900	499765900	VALVE GUIDE REAMER	Used for reaming valve guides.

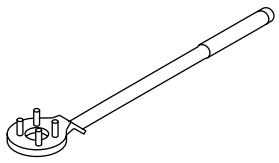
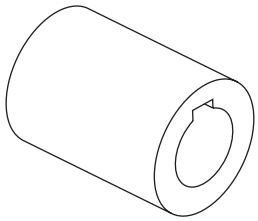
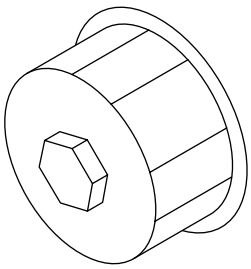
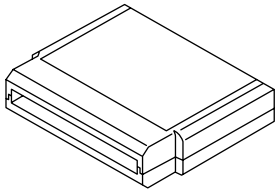
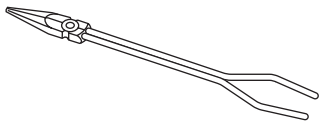
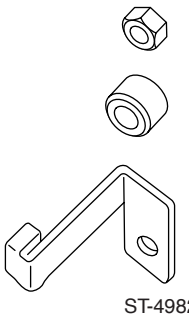
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when loosening/tightening crank pulley bolt.
 ST18252AA000	18252AA000	CRANKSHAFT SOCKET	Used for rotating crankshaft.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST18233AA000	18233AA000	PISTON PIN SNAP RING PLIERS	Used for removing and installing snap ring of piston pin.
 ST-498277200	498277200	STOPPER SET	Used for installing automatic transmission assembly to engine.

2. GENERAL TOOL

TOOL NAME	REMARKS
Compression gauge	Used for measuring compression.

E: PROCEDURE

It is possible to conduct the following service procedures with engine on the vehicle, however, the procedures described in this section are based on the condition that the engine is removed from the vehicle.

- Camshaft
- Cylinder head

2. Compression

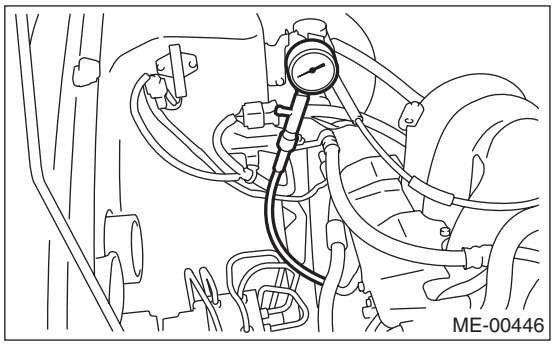
A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself during measurement.

1) After warming-up the engine, turn the ignition switch to OFF.
2) Make sure that the battery is fully charged.
3) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
4) Remove all the spark plugs. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
5) Check the starter motor for satisfactory performance and operation.
6) Hold the compression gauge tight against the spark plug hole.

NOTE:
When using a screw-in type compression gauge, the screw (put into cylinder head spark plug hole) should be less than 18 mm (0.71 in) long.

7) Fully open the throttle valve.
8) Crank the engine by means of the starter motor, and read the maximum value on the gauge when the pointer is steady.



9) Perform at least two measurements per cylinder, and make sure that the values are correct.

Compression (350 rpm and fully open throttle):
Standard:
1,275 — 1,471 kPa (13.0 — 15.0 kg/cm^2, 185 — 213 psi)
Service limit:
1, 128 kPa (11.5 kgf/cm^2, 164 psi)

3. Idle Speed

A: INSPECTION

1) Before checking the idle speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, ignition timing is correct, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine, and read engine idle speed.
12) Check the idle speed when no-loaded. (Headlight, heater fan, rear defroster, radiator fan, A/C, etc. are OFF.)

Idle speed [No load and gears in neutral]: 650±50 rpm

13) Check the idle speed when loaded. (Turn the air conditioning switch to “ON” and operate the compressor for at least one minute before measurement.)

Idle speed [A/C “ON”, and gears in neutral]: 770±50 rpm

NOTE:
Idle speed cannot be adjusted manually, because the idle speed is automatically adjusted. If the idle speed is out of specifications, refer to General Diagnosis Table under “Engine Control System”. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

4. Ignition Timing

A: INSPECTION

CAUTION:
After warming-up, engine becomes very hot. Be careful not to burn yourself at measurement.

1. WITH SUBARU SELECT MONITOR

1) Before checking the ignition timing speed, check the following:
   (1) Ensure the air cleaner element is free from clogging, spark plugs are in good condition, and hoses are connected properly.
   (2) Ensure the malfunction indicator light does not illuminate.
2) Idle the engine.
3) Stop the engine, and turn the ignition switch to OFF.
4) Insert the cartridge to the Subaru Select Monitor.
5) Connect the Subaru Select Monitor to data link connector.
6) Turn the ignition switch to ON and Subaru Select Monitor switch to ON.
7) Select {Each System Check} in Main Menu.
8) Select {Engine} in Selection Menu.
9) Select {Current Data Display & Save} in Engine Control System Diagnosis.
10) Select {Data Display} in Data Display Menu.
11) Start the engine and check the ignition timing at the idle speed.

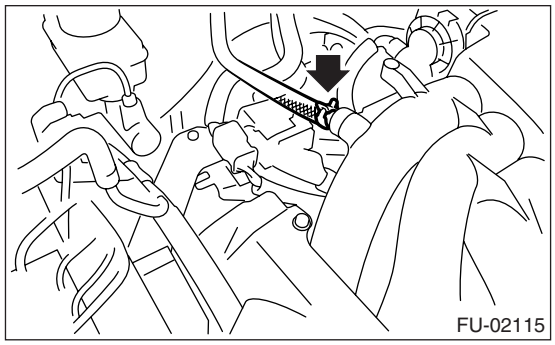
Ignition timing [BTDC/rpm]:
15°±8°/650

If the timing is not correct, check the ignition control system. Refer to “Engine Control System”. <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>

5. Intake Manifold Vacuum

A: INSPECTION

1) Idle the engine.
2) Disconnect the brake vacuum hose from the intake manifold, and then install the vacuum gauge.
3) Keep the engine at the idle speed and read the vacuum gauge indication.
By observing the gauge needle movement, the internal condition of the engine can be diagnosed as described below.



Vacuum pressure (at idling, A/C "OFF"):
−60.0 kPa (−450 mmHg, −17.72 inHg) or less

Diagnosis of engine condition by measurement of intake manifold vacuum	
Vacuum gauge indication	Possible engine condition
1. Needle is steady but lower than normal position. This tendency becomes more evident as engine temperature rises.	Leakage around intake manifold gasket, disconnection or damaged vacuum hose
2. When engine speed is reduced slowly from higher speed, needle stops temporarily when it is lowering or becomes steady above normal position.	Exhaust pressure is too high, or exhaust system is clogged.
3. Needle intermittently drops to position lower than normal position.	Leakage around cylinder
4. Needle drops suddenly and intermittently from normal position.	Valve anchoring
5. When engine speed is gradually increased, needle begins to vibrate rapidly at certain speed, and then vibration increases as engine speed increases.	Weak or broken valve springs
6. Needle vibrates above and below normal position in narrow range.	Defective ignition system or throttle chamber idle adjustment

6. Engine Oil Pressure

A: INSPECTION

1) Remove the oil pressure switch from cylinder block. <Ref. to LU(H6DO)-12, REMOVAL, Oil Pressure Switch.>
2) Connect the oil pressure gauge hose to cylinder block.
3) Connect the battery ground cable to battery.
4) Start the engine, and measure oil pressure.

OIL PRESSURE (at oil temperature of 80°C (176°F)):
Standard:
135 kPa (1.4 kg/cm^2, 20 psi) or more (at 600 rpm)
500 kPa (5.1 kg/cm^2, 73 psi) or more (at 5,000 rpm)

CAUTION:
• If the oil pressure is out of specification, check oil pump, oil filter and lubrication line. <Ref. to LU(H6DO)-16, INSPECTION, General Diagnostic Table.>
• If the oil pressure warning light come on and oil pressure is in specification, replace the oil pressure switch. <Ref. to LU(H6DO)-16, INSPECTION, General Diagnostic Table.>

5) After measuring the oil pressure, install the oil pressure switch. <Ref. to LU(H6DO)-12, INSTALLATION, Oil Pressure Switch.>

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

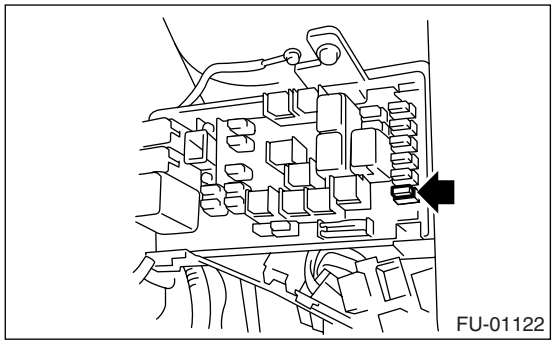
7. Fuel Pressure

A: INSPECTION

WARNING:
Before removing the fuel pressure gauge, release fuel pressure.

NOTE:
When the fuel pressure is out of specification, check or replace the pressure regulator and pressure regulator vacuum hose.

1) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
2) Open the fuel filler flap lid, and remove the fuel filler cap.
3) Disconnect the fuel delivery hose and connect fuel pressure gauge.
4) Remove the fuse of fuel pump from main fuse box.



5) Start the engine.
6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.

Fuel pressure:
Standard: 333 — 363 kPa (3.4 — 3.7 kgf/cm^2, 48 — 53 psi)

7) After connecting the pressure regulator vacuum hose, measure the fuel pressure.

Fuel pressure:
Standard: 279 — 309 kPa (2.85 — 3.15 kgf/cm^2, 40 — 45 psi)

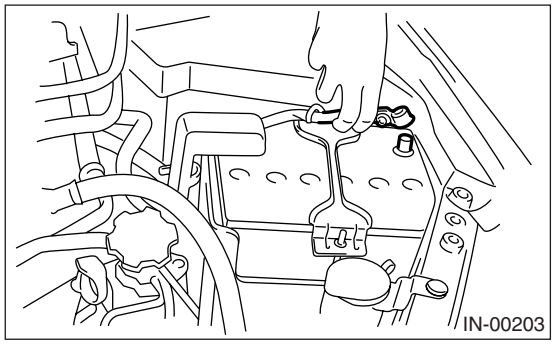
NOTE:
The fuel pressure gauge registers 10 to 20 kPa (0.1 to 0.2 kgf/cm^2, 1 to 3 psi) higher than standard values during high-altitude operations.

8. Valve Clearance

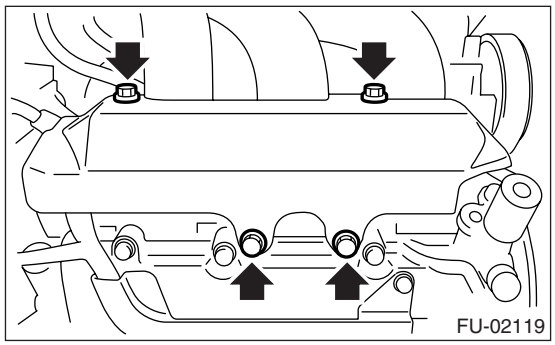
A: INSPECTION

Inspection and adjustment of valve clearance should be performed while engine is cold.

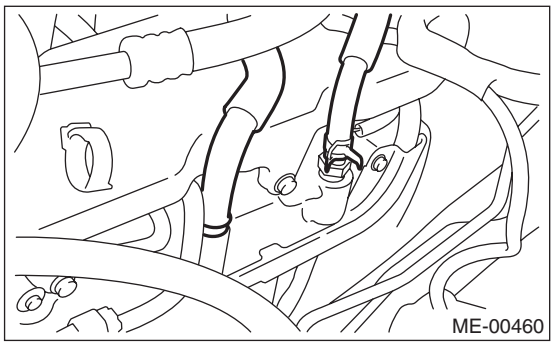
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



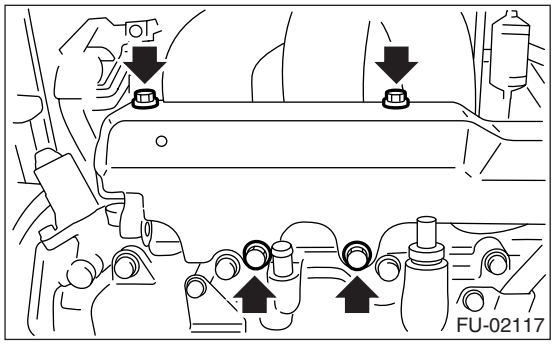
4) Lift-up the vehicle.
5) Remove the under cover.
6) Lower the vehicle.
7) When inspecting RH side cylinders:
   (1) Remove the air intake duct and air cleaner case. <Ref. to IN(H6DO)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
   (2) Remove the fuel tank protector (RH).



   (3) Remove the fuel injectors. <Ref. to FU(H6DO)-26, REMOVAL, Fuel Injector.>
   (4) Disconnect the connector of oil pressure switch.
   (5) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor ASSY.>
   (6) Remove the rocker cover (RH).
8) When inspecting LH side cylinders:
   (1) Disconnect the battery cable, and then remove the battery and battery carrier.
   (2) Disconnect the PCV hose and blow-by hose from rocker cover (LH).

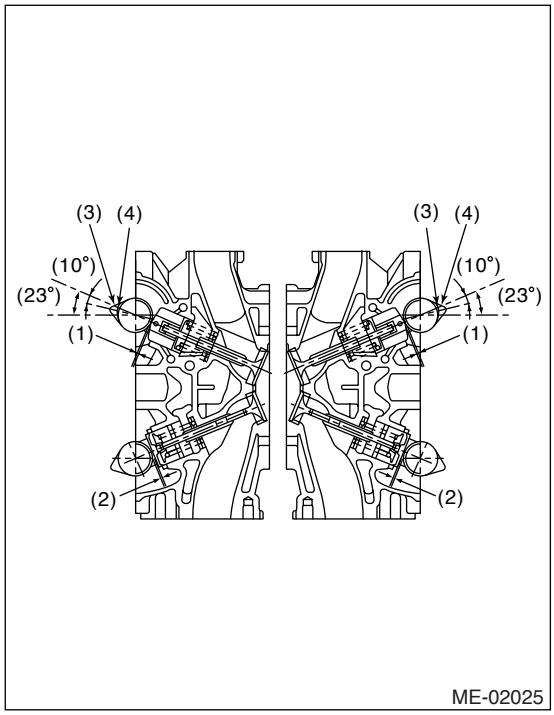


   (3) Remove the fuel pipe protector (LH).



   (4) Remove the fuel injectors. <Ref. to FU(H6DO)-26, REMOVAL, Fuel Injector.>
   (5) Remove the ignition coil. <Ref. to IG(H6DO)-7, REMOVAL, Ignition Coil & Ignitor ASSY.>
   (6) Remove the rocker cover (LH).

9) Turn the crankshaft clockwise until the cam is set to position shown in the figure.



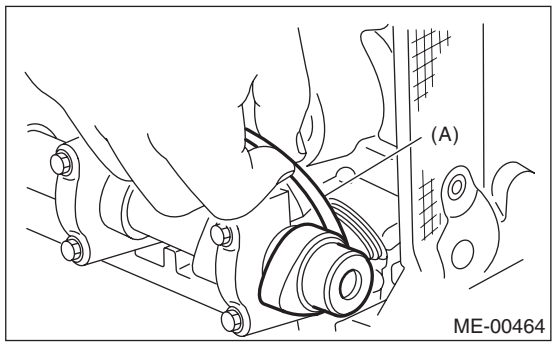
(1) Valve clearance (Intake side)
(2) Valve clearance (Exhaust side)
(3) High lift cam
(4) Low lift cam

10) Measure the clearance of intake valve and exhaust valve using thickness gauge (A).

NOTE:
• Measure it within the range of ±30° that shown in the figure.
• Measure it in low lift cam for intake side.
• Insert the thickness gauge in as horizontal a direction as possible with respect to the valve lifter.

Valve clearance
Intake:
$0.20^{+0.04}_{-0.06}$ mm ($0.0079^{+0.0016}_{-0.0024}$ in)
Exhaust:
0.35±0.05 mm (0.0138±0.0020 in)

• If the measured value is not within specification, take notes of the value in order to adjust the valve clearance later on.



11) If necessary, adjust the valve clearance. <Ref. to ME(H6DO)-29, ADJUSTMENT, VALVE CLEARANCE.>
12) Further turn the crank pulley clockwise and then measure the valve clearances again.
13) After inspection, install the related parts in the reverse order of removal.

B: ADJUSTMENT

1. INTAKE SIDE

CAUTION:
• Adjustment of valve clearance should be performed while engine is cold.
• Do not wear gloves during removal and installation of valve lifter.
• Do not use a valve lifter which got high impact due to drop, etc.
• When installing the valve lifter, align the anti-rotation of valve lifter with groove on cylinder head, and then insert the valve lifter.

1) Measure all valve clearances.
<Ref. to ME(H6DO)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.

2) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of shim with a micrometer.
5) Select a shim of suitable thickness using measured valve clearance and shim thickness, by referring to the following table.

Unit: (mm)
S = (V + T) − 0.20
S: Required shim thickness V: Measured valve clearance T: Shim thickness to be used

Part No.	Thickness mm (in)
13218AK890	1.92 (0.0756)
13218AK900	1.94 (0.0764)
13218AK910	1.96 (0.0772)
13218AK920	1.98 (0.0780)
13218AK930	2.00 (0.0787)
13218AK940	2.02 (0.0795)
13218AK950	2.04 (0.0803)
13218AK960	2.06 (0.0811)
13218AK970	2.07 (0.0815)
13218AK980	2.08 (0.0819)
13218AK990	2.09 (0.0823)
13218AL000	2.10 (0.0827)
13218AL010	2.11 (0.0831)
13218AL020	2.12 (0.0835)
13218AL030	2.13 (0.0839)
13218AL040	2.14 (0.0843)
13218AL050	2.15 (0.0846)
13218AL060	2.16 (0.0850)
13218AL070	2.17 (0.0854)
13218AL080	2.18 (0.0858)
13218AL090	2.19 (0.0862)
13218AL100	2.20 (0.0866)
13218AL110	2.21 (0.0870)
13218AL120	2.22 (0.0874)
13218AL130	2.23 (0.0878)
13218AL140	2.24 (0.0882)
13218AL150	2.25 (0.0886)
13218AL160	2.26 (0.0890)
13218AL170	2.27 (0.0894)
13218AL180	2.28 (0.0898)
13218AL190	2.29 (0.0902)
13218AL200	2.30 (0.0906)
13218AL210	2.31 (0.0909)
13218AL220	2.32 (0.0913)
13218AL230	2.33 (0.0917)
13218AL240	2.34 (0.0921)
13218AL250	2.35 (0.0925)
13218AL260	2.36 (0.0929)
13218AL270	2.37 (0.0933)
13218AL280	2.38 (0.0937)
13218AL290	2.39 (0.0941)
13218AL300	2.40 (0.0945)
13218AL310	2.41 (0.0949)
13218AL320	2.42 (0.0953)
13218AL330	2.43 (0.0957)
13218AL340	2.44 (0.0961)
13218AL350	2.45 (0.0965)
13218AL360	2.46 (0.0969)
13218AL370	2.47 (0.0972)
13218AL380	2.48 (0.0976)
13218AL390	2.49 (0.0980)

Part No.	Thickness mm (in)
13218AL400	2.50 (0.0984)
13218AL410	2.51 (0.0988)
13218AL420	2.52 (0.0992)
13218AL430	2.53 (0.0996)
13218AL440	2.54 (0.1000)
13218AL450	2.55 (0.1004)
13218AL460	2.56 (0.1008)
13218AL470	2.57 (0.1012)
13218AL480	2.58 (0.1016)
13218AL490	2.59 (0.1020)
13218AL500	2.60 (0.1024)
13218AL510	2.61 (0.1028)
13218AL520	2.62 (0.1032)
13218AL530	2.64 (0.1039)
13218AL540	2.66 (0.1047)
13218AL550	2.68 (0.1055)
13218AL560	2.70 (0.1063)
13218AL570	2.72 (0.1071)
13218AL580	2.74 (0.1079)
13218AL590	2.76 (0.1087)

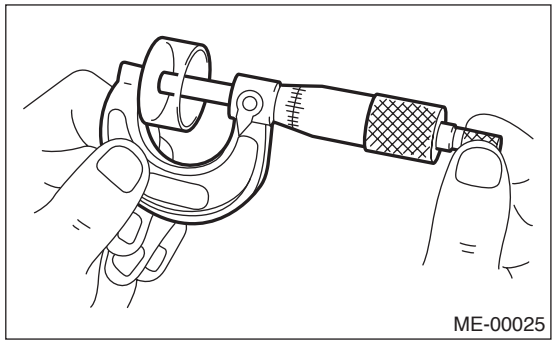
2. EXHAUST SIDE

CAUTION:
Adjustment of valve clearance should be performed while engine is cold.

1) Measure all valve clearances.
<Ref. to ME(H6DO)-28, INSPECTION, Valve Clearance.>

NOTE:
Record each valve clearance after it has been measured.

2) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
3) Remove the valve lifter.
4) Measure the thickness of valve lifter with a micrometer.



5) Select a valve lifter of suitable thickness using measured valve clearance and valve lifter thickness, by referring to the following table.

Unit: (mm)
S = (V + T) − 0.35
S: Valve lifter thickness required V: Measured valve clearance T: Valve lifter thickness to be used

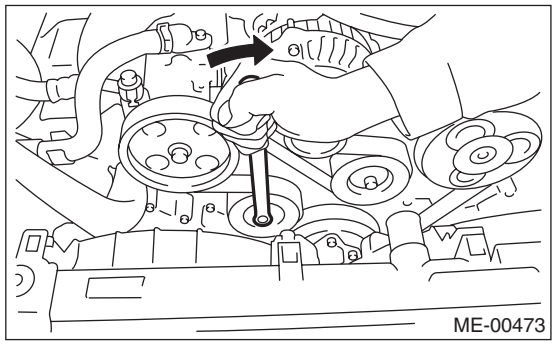
Part No.	Thickness mm (in)
13228AD180	4.32 (0.1701)
13228AD190	4.34 (0.1709)
13228AD200	4.36 (0.1717)
13228AD210	4.38 (0.1724)
13228AD220	4.40 (0.1732)
13228AD230	4.42 (0.1740)
13228AD240	4.44 (0.1748)
13228AD250	4.46 (0.1756)
13228AD260	4.48 (0.1764)
13228AD270	4.50 (0.1772)
13228AD280	4.52 (0.1780)
13228AD290	4.54 (0.1787)
13228AD300	4.56 (0.1795)
13228AD310	4.58 (0.1803)
13228AD320	4.60 (0.1811)
13228AC580	4.62 (0.1819)
13228AC590	4.63 (0.1823)
13228AC600	4.64 (0.1827)
13228AC610	4.65 (0.1831)
13228AC620	4.66 (0.1835)
13228AC630	4.67 (0.1839)
13228AC640	4.68 (0.1843)
13228AC650	4.69 (0.1846)
13228AC660	4.70 (0.1850)
13228AC670	4.71 (0.1854)
13228AC680	4.72 (0.1858)
13228AC690	4.73 (0.1862)
13228AC700	4.74 (0.1866)
13228AC710	4.75 (0.1870)
13228AC720	4.76 (0.1874)
13228AC730	4.77 (0.1878)
13228AC740	4.78 (0.1882)
13228AC750	4.79 (0.1886)
13228AC760	4.80 (0.1890)
13228AC770	4.81 (0.1894)
13228AC780	4.82 (0.1898)
13228AC790	4.83 (0.1902)
13228AC800	4.84 (0.1906)
13228AC810	4.85 (0.1909)
13228AC820	4.86 (0.1913)
13228AC830	4.87 (0.1917)
13228AC840	4.88 (0.1921)
13228AC850	4.89 (0.1925)
13228AC860	4.90 (0.1929)
13228AC870	4.91 (0.1933)
13228AC880	4.92 (0.1937)
13228AC890	4.93 (0.1941)
13228AC900	4.94 (0.1945)
13228AC910	4.95 (0.1949)
13228AC920	4.96 (0.1953)
13228AC930	4.97 (0.1957)
13228AC940	4.98 (0.1961)
13228AC950	4.99 (0.1965)
13228AC960	5.00 (0.1969)
13228AC970	5.01 (0.1972)
13228AC980	5.02 (0.1976)
13228AC990	5.03 (0.1980)
13228AC000	5.04 (0.1984)
13228AC010	5.05 (0.1988)
13228AC020	5.06 (0.1992)
13228AC030	5.07 (0.1996)
13228AC040	5.08 (0.2000)
13228AC050	5.09 (0.2004)
13228AC060	5.10 (0.2008)
13228AC070	5.11 (0.2012)
13228AC080	5.12 (0.2016)
13228AC090	5.13 (0.2020)
13228AC100	5.14 (0.2024)
13228AC110	5.15 (0.2028)
13228AC120	5.16 (0.2032)
13228AC130	5.17 (0.2035)
13228AC140	5.18 (0.2039)
13228AC150	5.19 (0.2043)
13228AC160	5.20 (0.2047)
13228AC170	5.21 (0.2051)
13228AD330	5.23 (0.2059)
13228AD340	5.25 (0.2067)
13228AD350	5.27 (0.2075)
13228AD360	5.29 (0.2083)
13228AD370	5.31 (0.2091)
13228AD380	5.33 (0.2098)
13228AD390	5.35 (0.2106)
13228AD400	5.37 (0.2114)
13228AD410	5.39 (0.2122)
13228AD420	5.41 (0.2130)
13228AD430	5.43 (0.2138)
13228AD440	5.45 (0.2146)
13228AD450	5.47 (0.2154)
13228AD460	5.49 (0.2161)
13228AD470	5.51 (0.2169)
13228AD480	5.53 (0.2177)
13228AD490	5.55 (0.2185)
13228AD500	5.57 (0.2193)

Part No.	Thickness mm (in)
13228AD510	5.59 (0.2201)

9. V-belt

A: REMOVAL

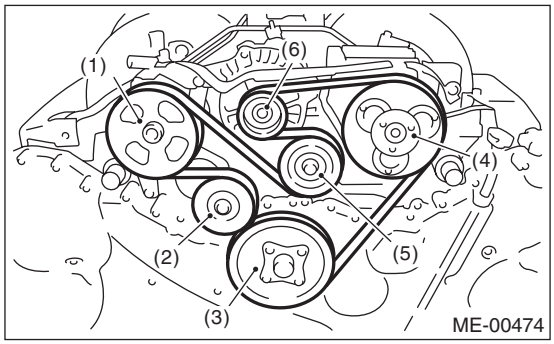
1) Install the tool to belt tension adjuster assembly installation bolt.
2) Rotate the tool clockwise and loosen the V-belt to remove.



3) Remove the V-belt covers.

B: INSTALLATION

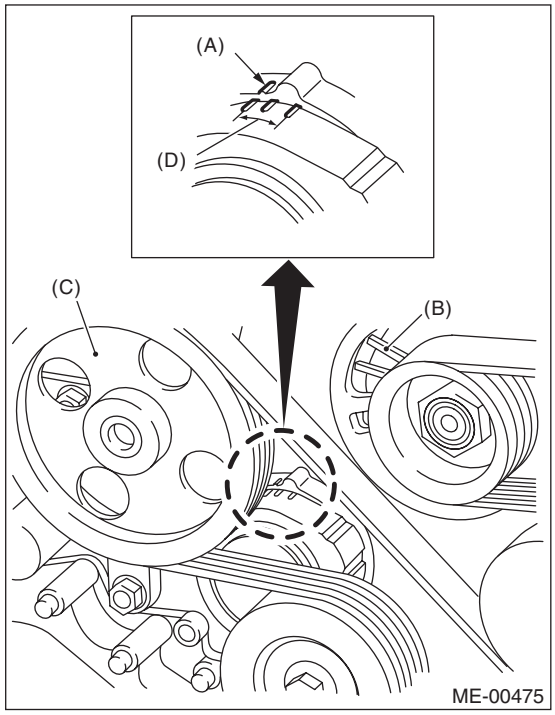
Install in the reverse order of removal.



(1) Power steering oil pump pulley
(2) Belt tension adjuster ASSY
(3) Crank pulley
(4) A/C compressor
(5) Belt idler
(6) Generator

C: INSPECTION

1) Replace the V-belt, if cracks, fraying or wear is found.
2) Check that the V-belt automatic belt tension indicator (A) is within the range (D).

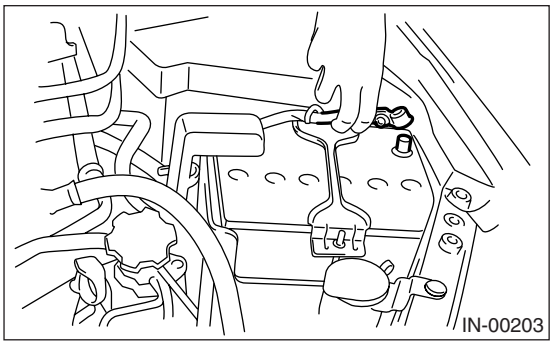


(A) Indicator
(B) Generator
(C) Power steering oil pump pulley
(D) Service limit

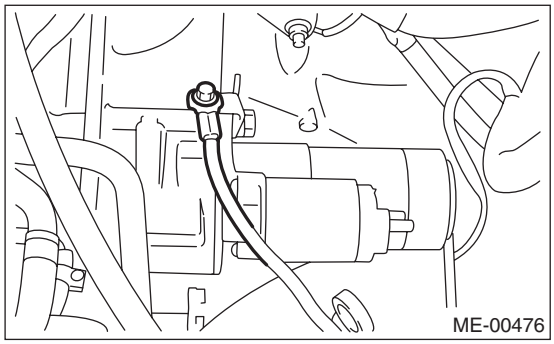
10.Engine Assembly

A: REMOVAL

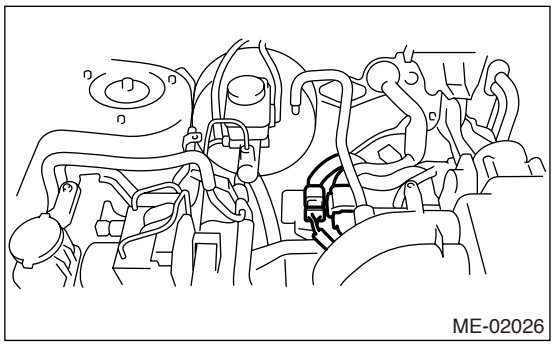
1) Set the vehicle on a lift.
2) Open the front hood fully and support with the front food stay.
3) Remove the collector cover.
4) Collect the refrigerant from A/C system. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
5) Release the fuel pressure.
<Ref. to FU(H6DO)-39, RELEASING OF FUEL PRESSURE, PROCEDURE**, Fuel.>**
6) Remove the fuel filler cap.
7) Disconnect the ground cable from battery.


IN-00203

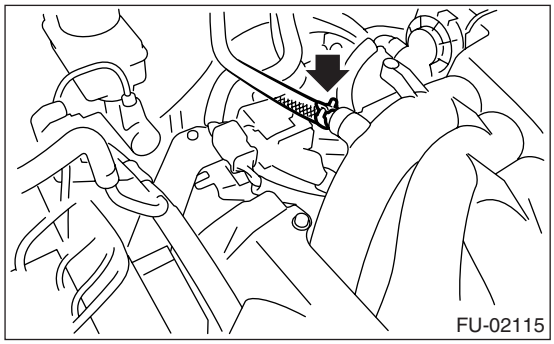
8) Remove the air intake duct, air cleaner case and air intake chamber.
<Ref. to IN(H6DO)-8, REMOVAL, Air Intake Duct.> <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.> <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
9) Remove the radiator from vehicle. <Ref. to CO(H6DO)-13, REMOVAL, Radiator.>
10) Remove the V-belts. <Ref. to ME(H6DO)-33, REMOVAL, V-BELT.>
11) Disconnect the A/C pressure hoses from A/C compressor. <Ref. to AC-38, REMOVAL, Hose and Tube.>
12) Disconnect the following connectors:
(1) Engine ground terminals


ME-00476

(2) Engine harness connectors

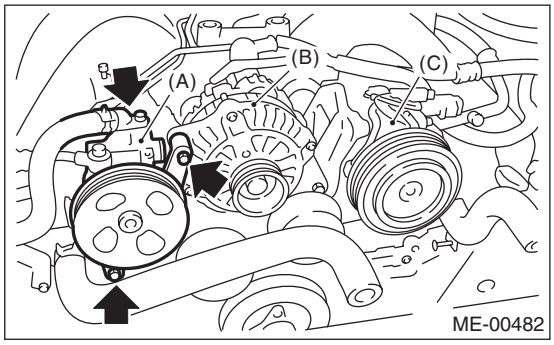

ME-02026

(3) Generator connector, terminal and A/C compressor connector
(4) Power steering switch connector
13) Disconnect the following hoses.
(1) Brake booster vacuum hose


FU-02115

(2) Heater inlet and outlet hoses
(3) Pressure regulator vacuum hose
14) Remove the power steering pump from bracket.

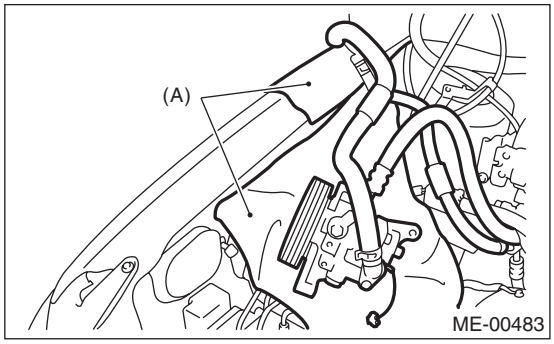
NOTE:
Do not disconnect the hose and pipe from pump body.



ME-00482

(A) Power steering pump
(B) Generator
(C) A/C compressor

(1) Place the power steering pump on the right side wheel apron.

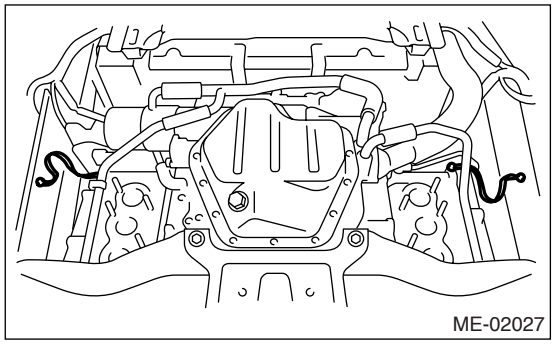


(A) Cloth

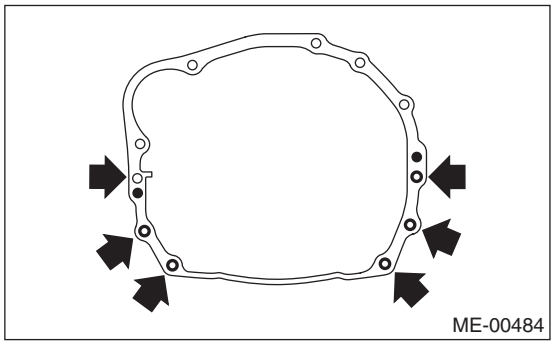
15) Lift-up the vehicle.
16) Remove the under cover.
17) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>

NOTE:
Be careful not to let the front exhaust pipe interfere with water pipes on engine side.

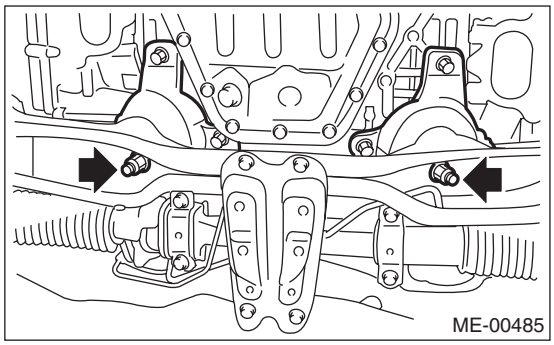
18) Remove the ground cable.



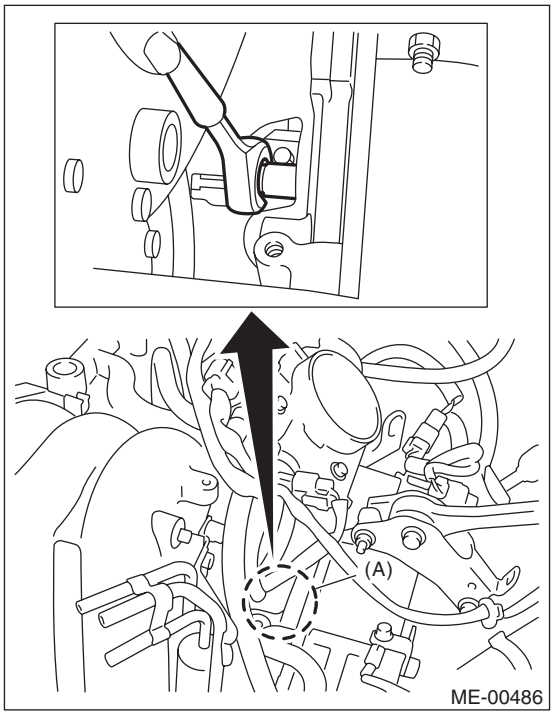
19) Remove the nuts which hold lower side of transmission to engine.



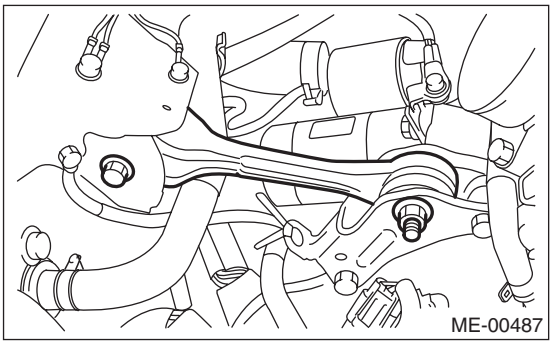
20) Remove the nuts which install front cushion rubber onto front crossmember.



21) Separate the torque converter clutch from drive plate.
(1) Lower the vehicle.
(2) Remove the service hole plug (A).
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Remove other bolts while rotating the engine using a socket wrench.

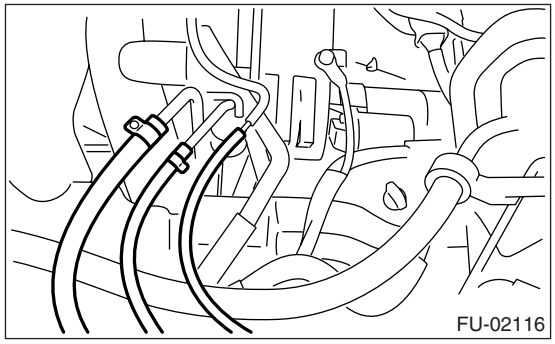


22) Remove the pitching stopper.

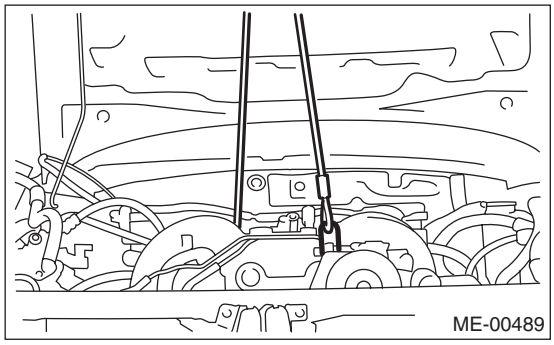


23) Disconnect the fuel delivery hose and evaporation hose.

CAUTION:
• Catch fuel from the hose into container.
• Disconnect the hose with its end wrapped with cloth to prevent fuel from splashing.

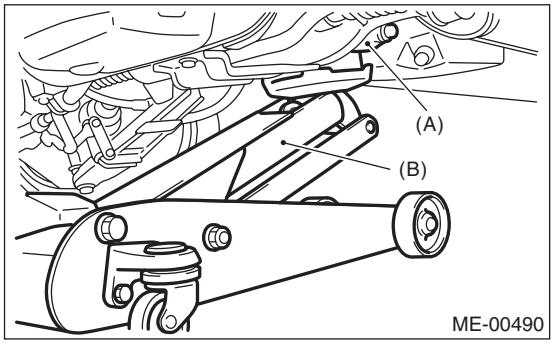


24) Support the engine with a lifting device and wire ropes.



25) Support the transmission with a garage jack.

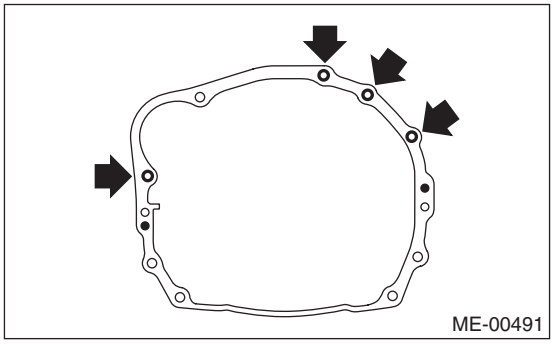
CAUTION:
Doing this is very important because the transmission lowers for its own weight. This work is also of great importance for facilitating reinstallation.



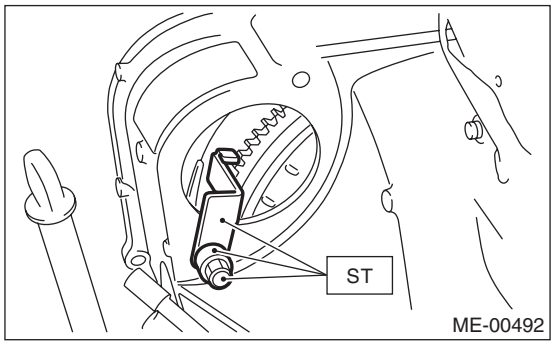
(A) Transmission
(B) Garage jack

CAUTION:
Before removing the engine away from transmission, check to be sure no work has been overlooked.

26) Separation of engine and transmission:
(1) Remove the starter. <Ref. to SC(H6DO)-6, REMOVAL, Starter.>
(2) Remove the bolts which hold upper side of transmission to engine.

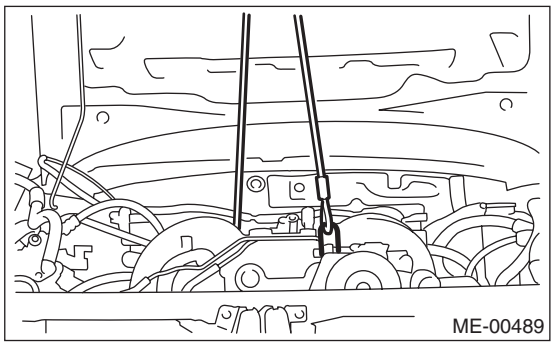


27) Set the ST to torque converter clutch case.
ST 498277200 STOPPER SET



28) Remove the engine from vehicle.
(1) Slightly raise the engine.
(2) Raise the transmission with garage jack.
(3) Move the engine horizontally until main shaft is withdrawn from clutch cover.
(4) Slowly move the engine away from engine compartment.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.



29) Remove the front cushion rubbers.

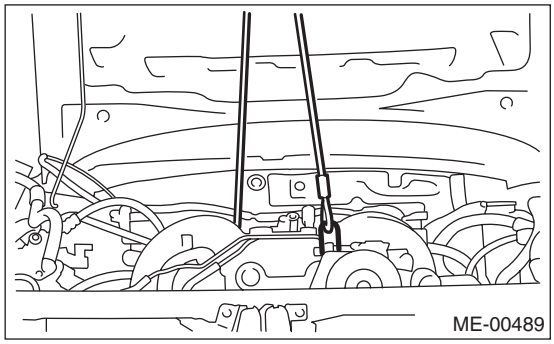
B: INSTALLATION

1) Install the front cushion rubbers.

Tightening torque:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

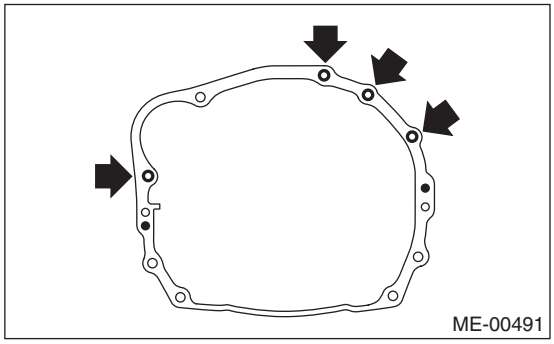
2) Position the engine in engine compartment and align it with transmission.

NOTE:
Be careful not to damage adjacent parts or body panels with crank pulley, oil level gauge, etc.

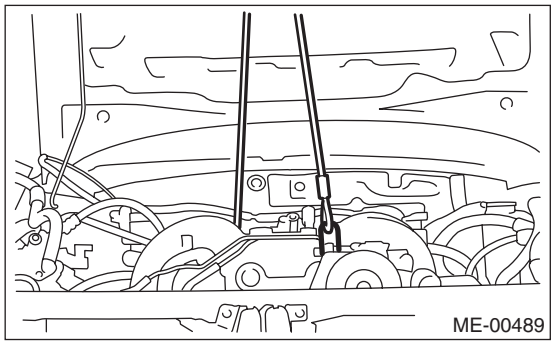


3) Tighten the bolts which hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

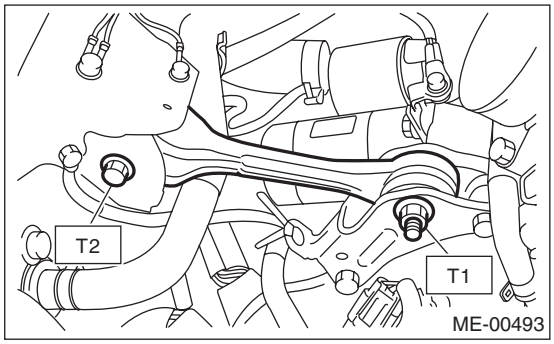


4) Remove the lifting device and wire ropes.



5) Remove the garage jack.
6) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



7) Remove the ST from torque converter clutch case.

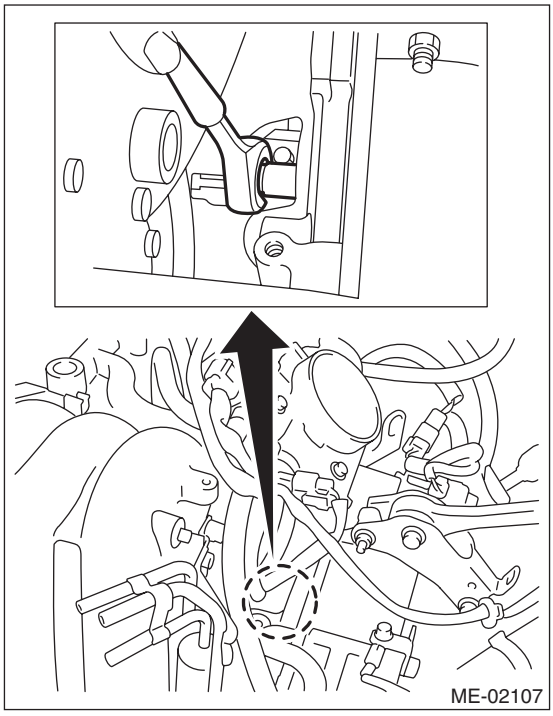
NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing the ST.

ST 498277200 STOPPER SET

8) Install the starter. <Ref. to SC(H6DO)-6, INSTALLATION, Starter.>
9) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Tighten other bolts while rotating the engine using a socket wrench.

NOTE:
Be careful not to drop the ST into the torque converter clutch case when removing the ST.

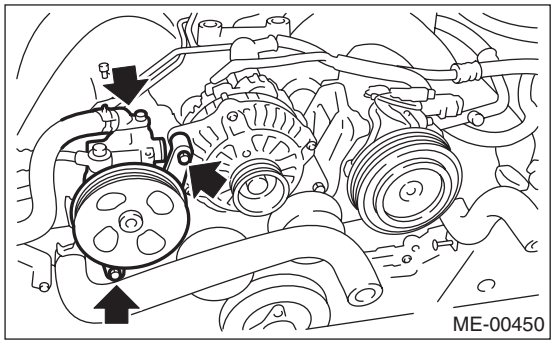
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(3) Install the service hole plug to prevent foreign matters from being mixed.

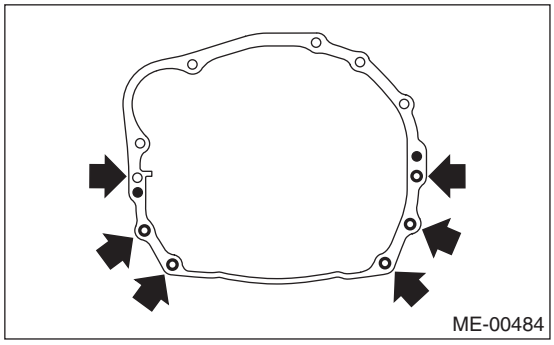
10) Install the power steering pump on bracket.

Tightening torque:
20.1 N·m (2.05 kgf-m, 14.8 ft-lb)



11) Lift-up the vehicle.
12) Tighten the nuts which hold lower side of transmission to the engine.

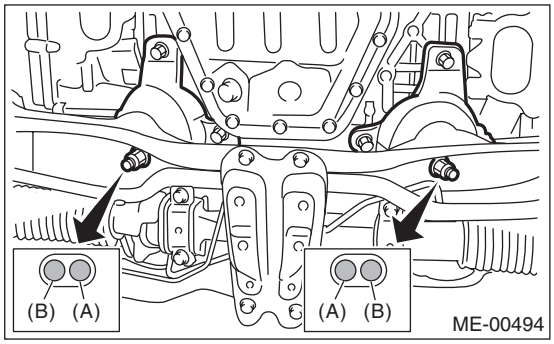
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



13) Tighten the nuts which install the front cushion rubber onto crossmember.

Tightening torque:
85 N·m (8.7 kgf-m, 63 ft-lb)

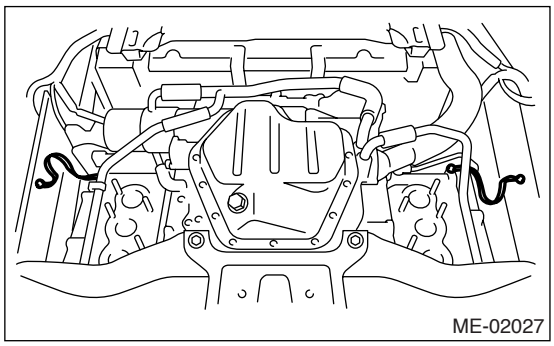
NOTE:
Make sure the front cushion rubber mounting bolts (A) and locator (B) are securely installed.



14) Install the front exhaust pipe.
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

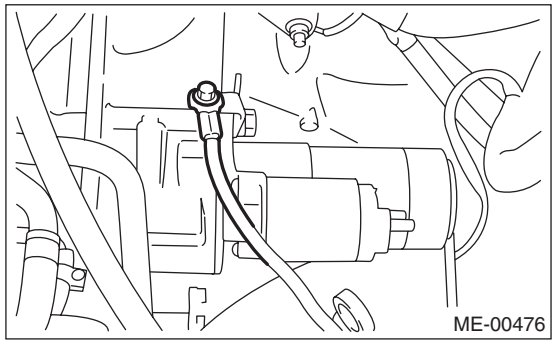
NOTE:
• Be care not to let the front exhaust pipe interfere with water pipes and crossmember on engine side.
• Be care not to scratch the flange surface of front exhaust pipe with stud bolt on engine.

15) Connect the ground cable.

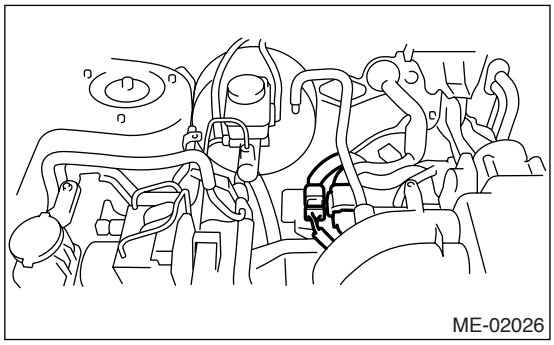


16) Install the under cover.
17) Lower the vehicle.
18) Connect the following hoses.
(1) Fuel delivery hose and evaporation hose
(2) Heater inlet and outlet hoses
(3) Brake booster vacuum hose
(4) Pressure regulator vacuum hose
19) Connect the following connectors:
(1) Engine ground terminals

Tightening torque:
14 N·m (1.4 kgf-m, 10.1 ft-lb)



(2) Engine harness connectors



(3) Generator connector and terminal
(4) A/C compressor connector
(5) Power steering switch connector

20) Install the A/C pressure hoses.
<Ref. to AC-38, INSTALLATION, Hose and Tube.>
21) Install the V-belts. <Ref. to ME(H6DO)-33, INSTALLATION, V-BELT.>
22) Install the radiator to vehicle. <Ref. to CO(H6DO)-14, INSTALLATION, Radiator.>
23) Install the air intake duct, air cleaner case and air intake chamber. <Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Duct.> <Ref. to IN(H6DO)-6, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
24) Install the battery in the vehicle, and connect cables.
25) Fill engine coolant.
<Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
26) Check the ATF level and replenish it if necessary.
<Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>
27) Charge the A/C system with refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>
28) Install the collector cover.
29) Remove the front hood stay, and close the front hood.
30) Take off the vehicle from a lift.

C: INSPECTION

1) Check pipes and hoses are installed firmly.
2) Check the engine coolant and ATF are at specified levels.

11.Engine Mounting

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H6DO)-34, REMOVAL, Engine Assembly.>
2) Remove the engine mounting from engine assembly.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Engine mounting:
35 N·m (3.6 kgf-m, 25.8 ft-lb)

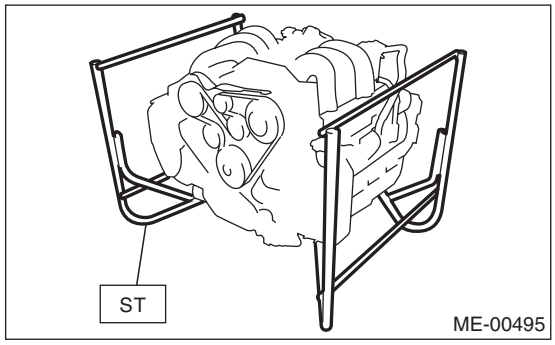
C: INSPECTION

Make sure that there are no cracks or other damages.

12.Preparation for Overhaul

A: REMOVAL

1) Remove the engine assembly. <Ref. to ME(H6DO)-34, REMOVAL, ENGINE ASSEMBLY.>
2) Set the engine on ST1.
ST 18232AA000 ENGINE STAND

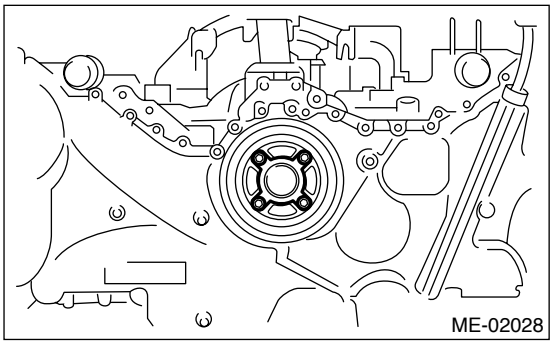


3) Before servicing overhaul, remove the sensor, pipe and hose that installed to engine.
(1) Remove the intake manifold.
<Ref. to FU(H6DO)-12, REMOVAL, Intake Manifold.>
(2) Remove the generator. <Ref. to SC(H6DO)-14, REMOVAL, Generator.>
(3) Remove the A/C compressor. <Ref. to AC-33, REMOVAL, Compressor.>
(4) Remove the EGR pipe. <Ref. to FU(H6DO)-25, REMOVAL, EGR Valve.>
(5) Disconnect the water pipe and hose.
(6) Disconnect the engine harness.
(7) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.>
(8) Remove the camshaft position sensor. <Ref. to FU(H6DO)-20, REMOVAL, Camshaft Position Sensor.>
(9) Remove the crankshaft position sensor. <Ref. to FU(H6DO)-19, REMOVAL, Crankshaft Position Sensor.>
(10)Remove the knock sensor. <Ref. to FU(H6DO)-21, REMOVAL, Knock Sensor.>
(11)Remove the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, REMOVAL, Engine Coolant Temperature Sensor.>
(12)Remove the oil pressure switch. <Ref. to LU(H6DO)-12, REMOVAL, Oil Pressure Switch.>
(13)Remove the oil filter. <Ref. to LU(H6DO)-13, REMOVAL, Engine Oil Filter.>
(14)Remove the oil cooler. <Ref. to LU(H6DO)-14, REMOVAL, Oil Cooler.>

13.Crank Pulley

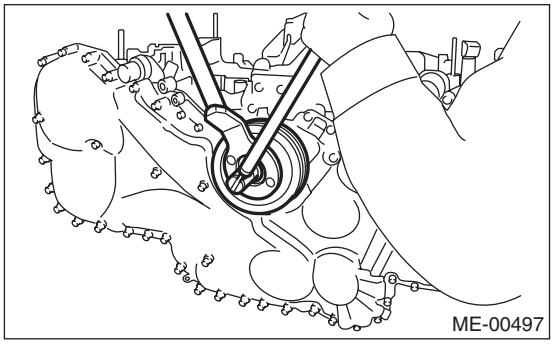
A: REMOVAL

1) Remove the crank pulley cover.



2) Remove the crank pulley bolt. To lock the crankshaft, use ST.

ST 499977100 CRANK PULLEY WRENCH



3) Remove the crank pulley.

B: INSTALLATION

1) Install the crank pulley.

2) Install the crank pulley bolt. To lock the crankshaft, use ST.

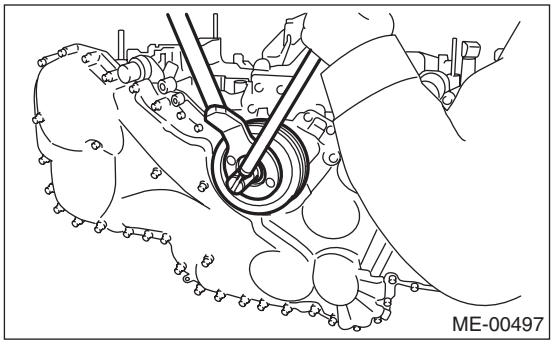
ST 499977100 CRANK PULLEY WRENCH

(1) Clean the crank pulley thread using compressed air.

(2) Apply engine oil to the crank pulley bolt seat and thread.

(3) Tighten the crank pulley bolts.

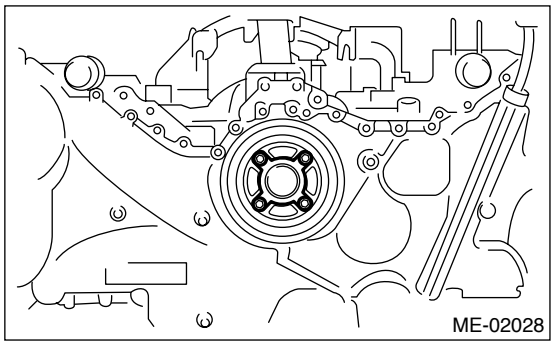
Tightening torque:
178 N·m (18.1 kgf-m, 131 ft-lb)



3) Install the crank pulley cover.

NOTE:
Attach the O-ring to crank pulley cover.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



C: INSPECTION

1) Check the crank pulley cover for oil and air leakage.

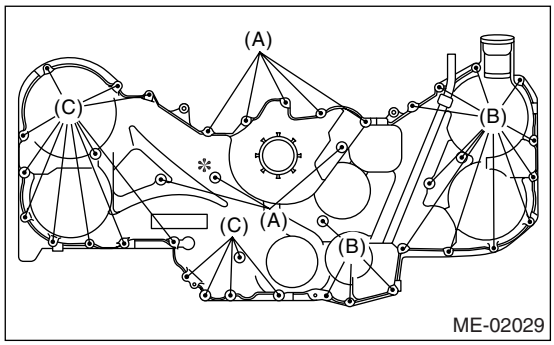
2) Check crank pulley for looseness.

14.Front Chain Cover

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover.

NOTE:
Chain cover installation bolt has three different sizes. To prevent the confusion in installation, keep these bolts on container individually.



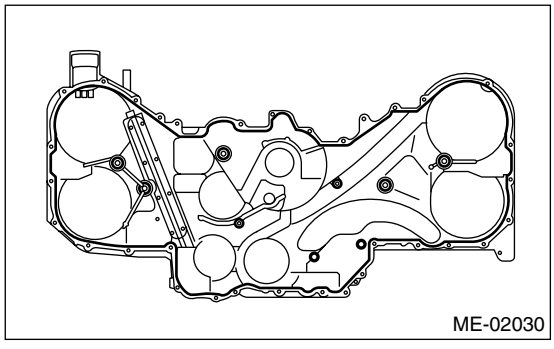
(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

B: INSTALLATION

1) Remove the used liquid gasket from mating surface, and degrease it.
2) Apply liquid gasket to the matching surface of front chain cover.

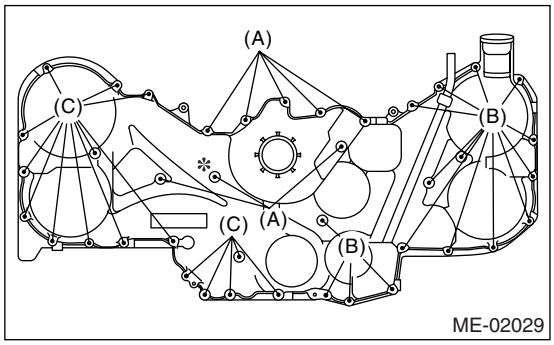
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter
2.5±0.5 mm (0.098±0.020 in)



3) Install the front chain cover. Temporarily tighten the bolts.

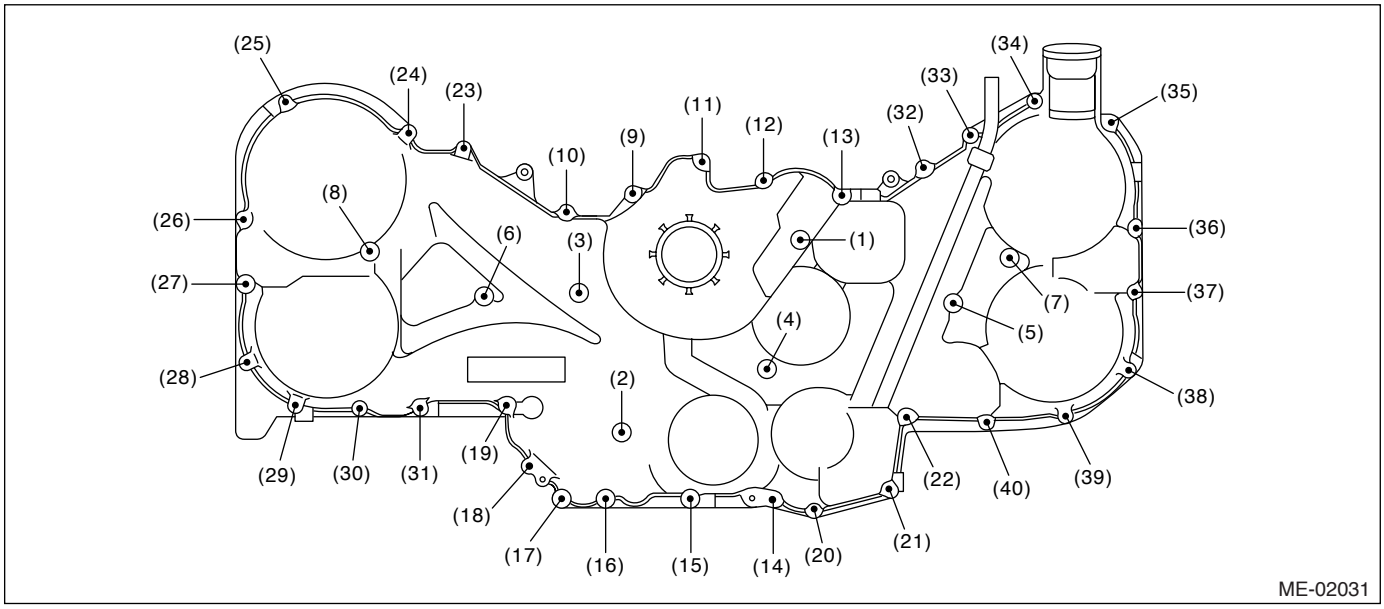
CAUTION:
Do not install the bolts in wrong place.



(A) M6 × 16
(B) M6 × 30
(C) M6 × 45
*: Sealing washer

4) Tighten the bolts in the numerical order as shown in the figure.

Tightening torque:
6.6 N·m (0.67 kgf-m, 4.8 ft-lb)



5) Install the crank pulley. <Ref. to ME(H6DO)-42, INSTALLATION, CRANK PULLEY.>

C: INSPECTION

Check the cover surface for scratch and damage.
Check for oil leakage on cover mating surface and installation part of crank pulley.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

MECHANICAL

ME(H6DO)

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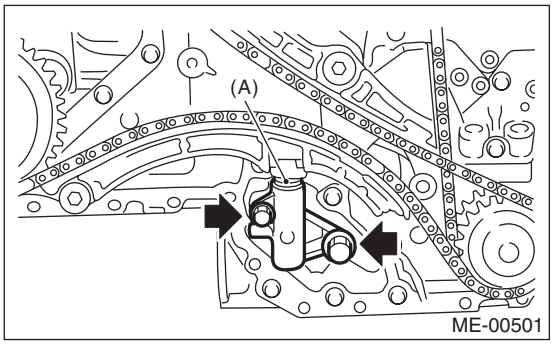
15.Timing Chain Assembly

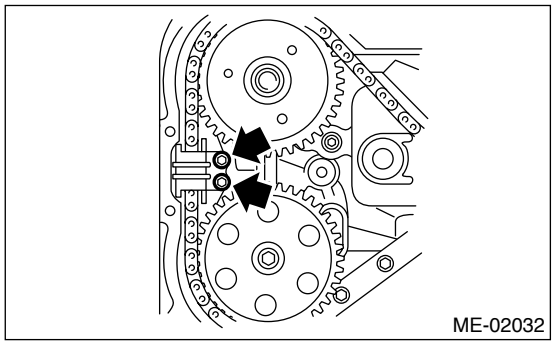
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the chain tensioner (RH).

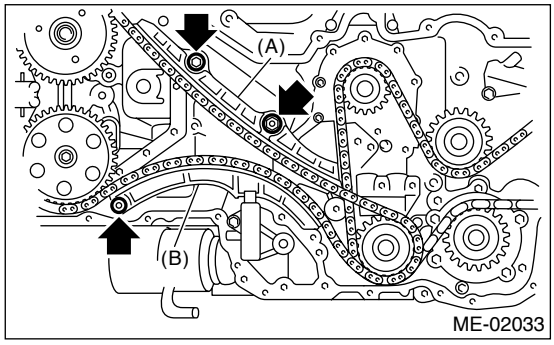
NOTE:
Be careful not to come out the plunger (A).



4) Remove the chain guide (RH: between cams).



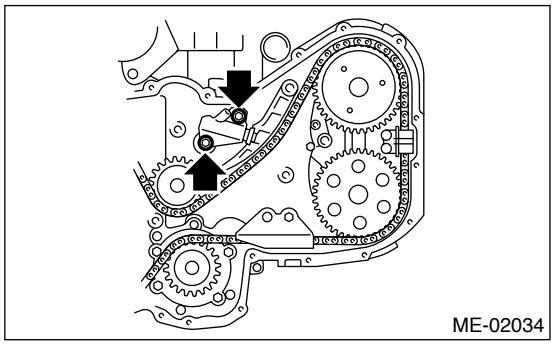
5) Remove the chain guide (RH).
6) Remove the chain tensioner lever (RH).



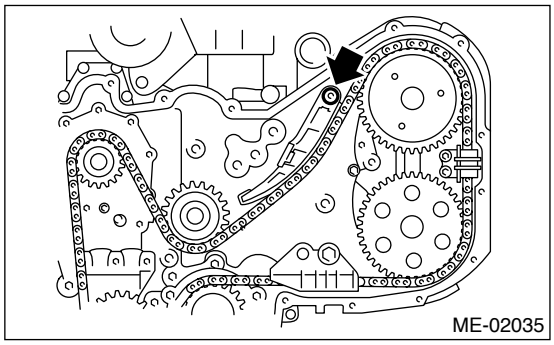
(A) Chain guide (RH)
(B) Chain tensioner lever (RH)

7) Remove the timing chain (RH).
8) Remove the chain tensioner (LH).

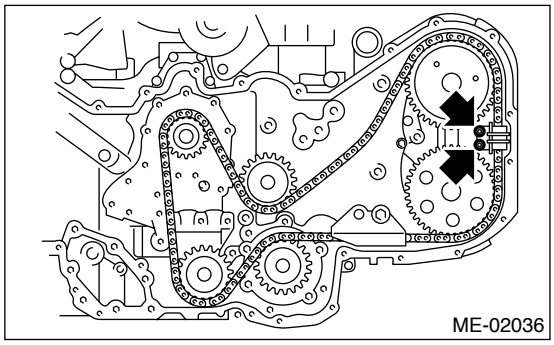
NOTE:
Be careful not to come out the plunger.



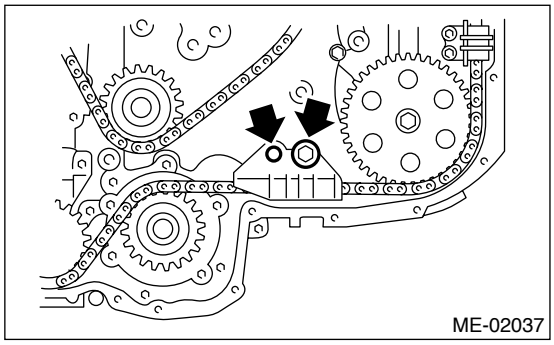
9) Remove the chain tensioner lever (LH).



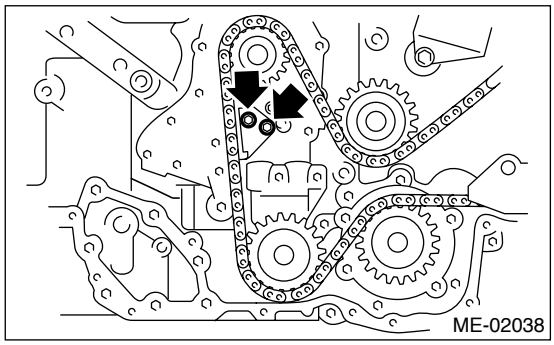
10) Remove the chain guide (LH: between cams).



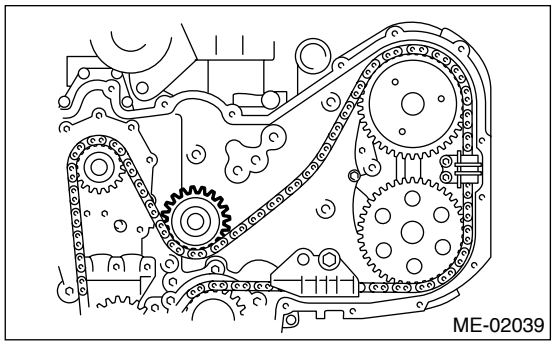
11) Remove the chain guide (LH).



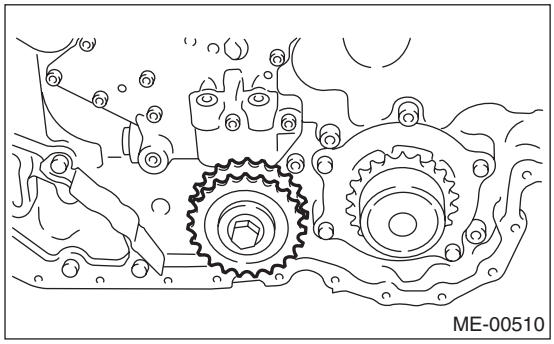
12) Remove the chain guide (CTR).



13) Remove the idler sprocket (upper).



14) Remove the timing chain (LH).
15) Remove the idler sprocket (lower).

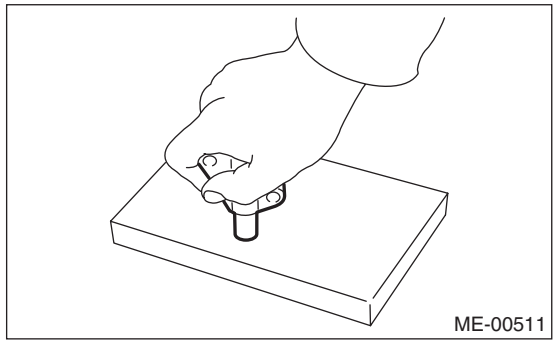


B: INSTALLATION

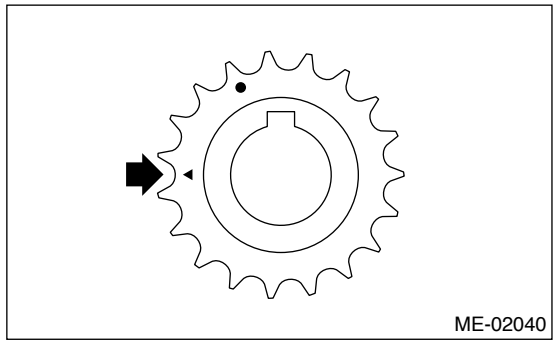
NOTE:
• Be careful that the foreign matter is not into or onto assembled component during installation.
• Apply engine oil to the chain guide, chain tensioner lever and idler sprocket when installing.

1) Preparation for chain tensioner installation
   (1) Insert the screw, spring pin and tension rod into tensioner body.
   (2) While depressing the tensioner onto rubber mat, twist it to shorten tension rod. Then insert the thin pin into the hole between tension rod and tension body to keep shortened.

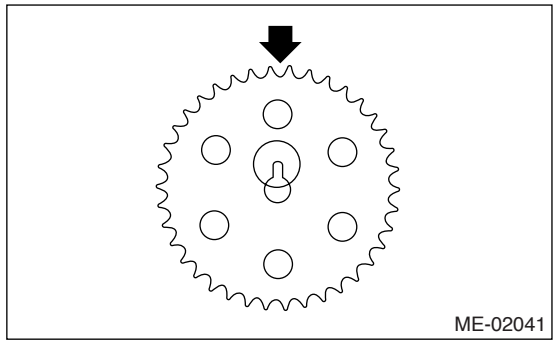
NOTE:
Work on the rubber mat or other anti-skid materials.



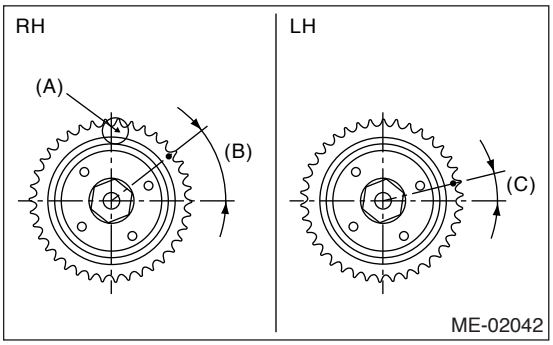
2) Using ST, align the “Top mark” on crank sprocket to 9 o’clock position as shown in the figure
ST 18252AA000 CRANKSHAFT SOCKET



3) Using ST, align the key groove on exhaust cam sprocket to 12 o’clock position as shown in the figure



4) Align the intake cam sprocket as shown in the figure.



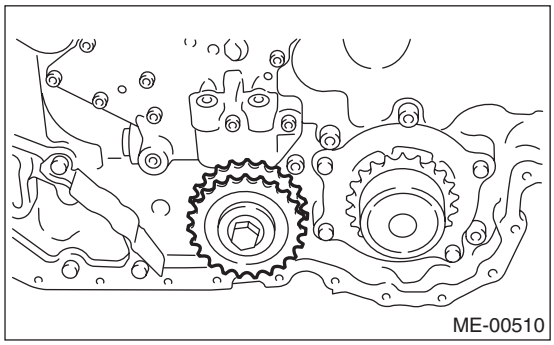
(A) Top mark
(B) 40°
(C) 15°

5) Turn the crank sprocket clockwise, align the "Top mark" to 12 o'clock position (Piston #1 is in TDC position)

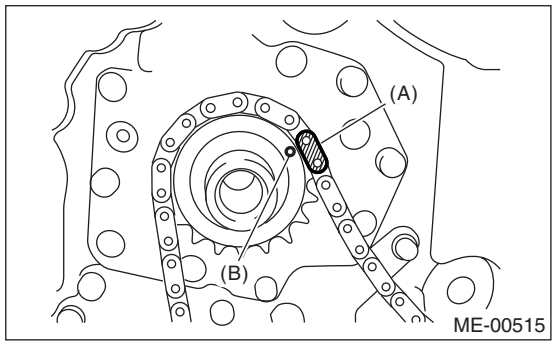
NOTE:
Do not rotate the crank shaft and cam sprocket until the timing chain routing was completed.

6) Install the idler sprocket (lower).

Tightening torque:
69 N·m (7.0 kgf-m, 50.6 ft-lb)



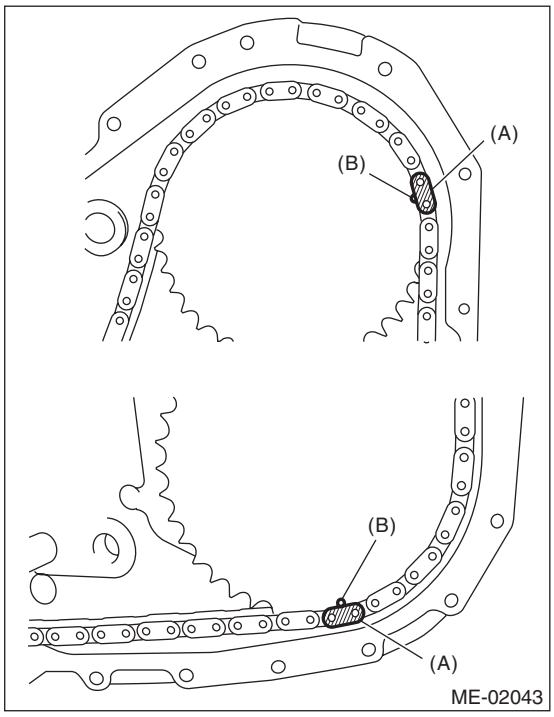
7) Install the timing chain (LH).
(1) Align the timing mark (B) on the crank sprocket with mark (A) on the timing chain (LH).



(A) Gold
(B) Mark

(2) Set the routing of timing chain (LH) on idler sprocket (lower), water pump, exhaust cam sprocket (LH) and intake cam sprocket (LH).

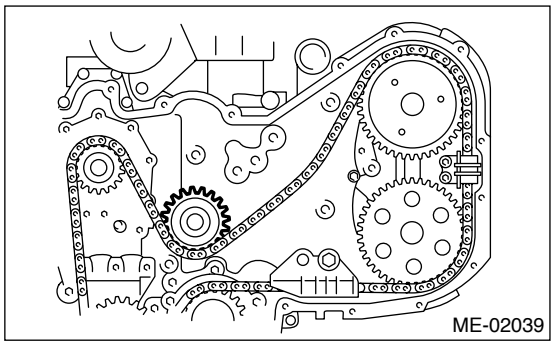
NOTE:
Check that the mark on timing chain (A) and cam sprocket (B) is aligned as same as aligned on crank sprocket.



(A) Dark blue
(B) Mark

(3) Install the chain idler (upper).

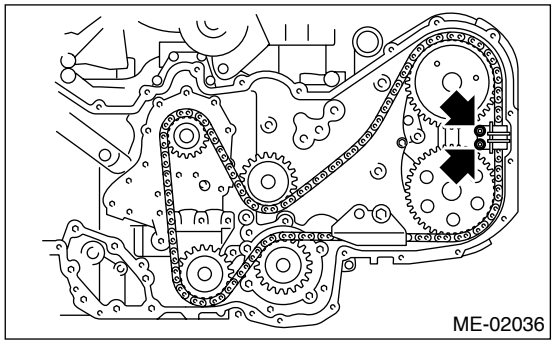
Tightening torque:
69 N·m (7.0 kgf-m, 50.6 ft-lb)



(4) Install the chain guide (LH: between cams).

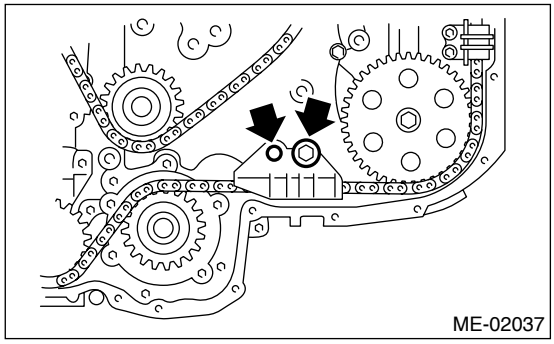
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
Use a new installing bolt.



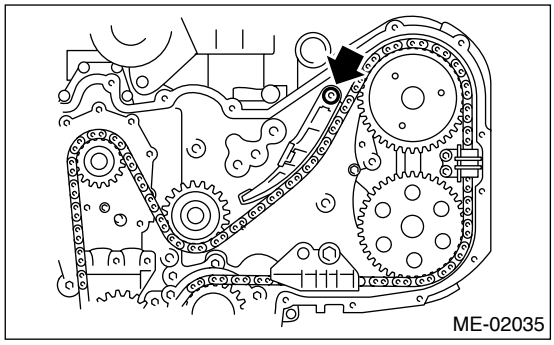
(5) Install the chain guide (LH).

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)



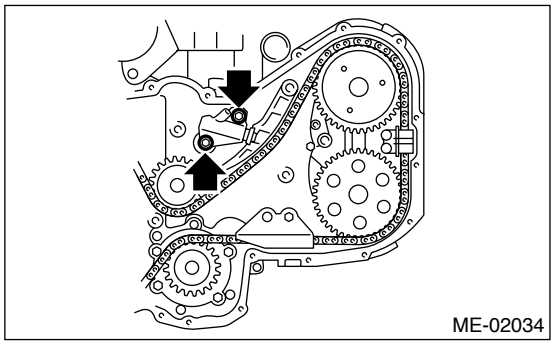
(6) Install the chain tensioner lever (LH).

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

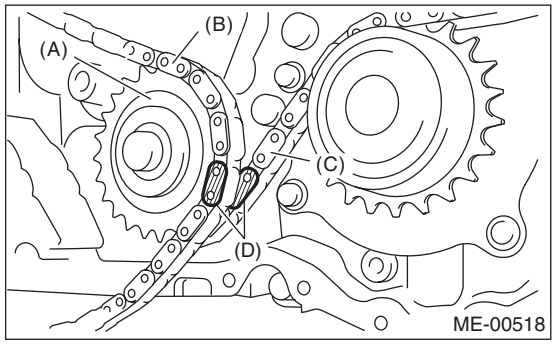


(7) Install the chain tensioner (LH).

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)



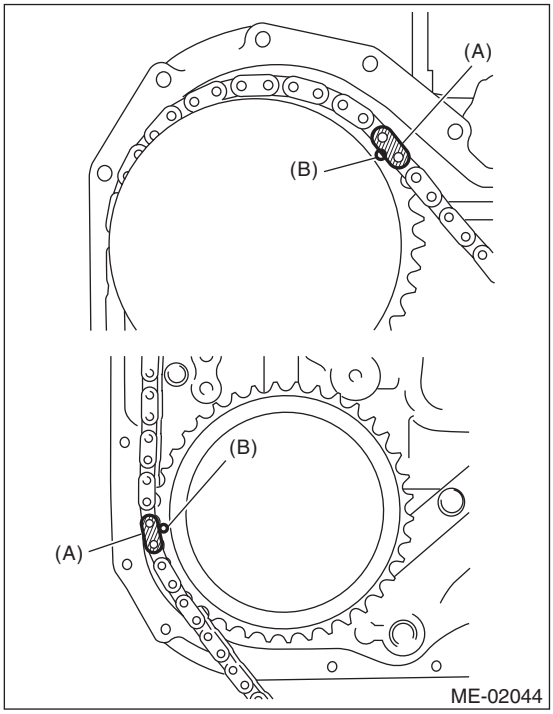
8) Install the timing chain (RH).
(1) Align the marks of timing chain LH and RH on the idler sprocket (lower).



(A) Idler sprocket (lower)
(B) Timing chain (RH)
(C) Timing chain (LH)
(D) Dark blue

(2) Set the routing of timing chain (RH) on intake cam sprocket, and then set the routing on exhaust cam sprocket.

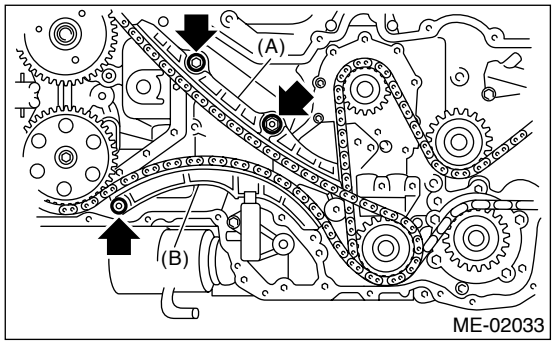
NOTE:
Check that the mark on timing chain (A) and cam sprocket (B) is aligned as same as aligned on crank sprocket.



(A) Gold
(B) Mark

(3) Install the chain guide (RH).
(4) Install the chain tensioner lever (RH).

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

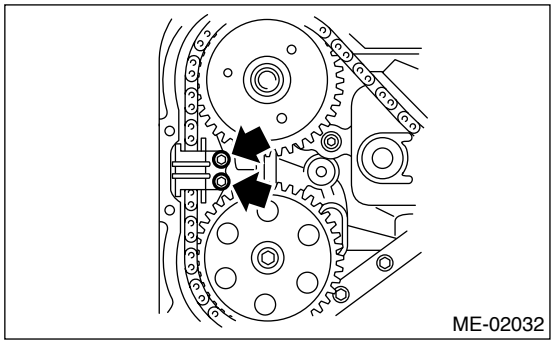


(A) Chain guide (RH)
(B) Chain tensioner lever (RH)

(5) Install the chain guide (RH: between cams).

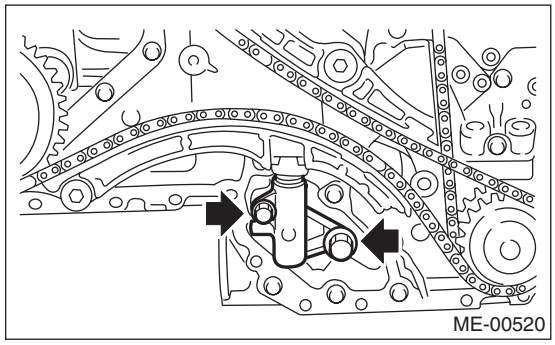
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
Use a new installing bolt.



(6) Install the chain tensioner (RH).

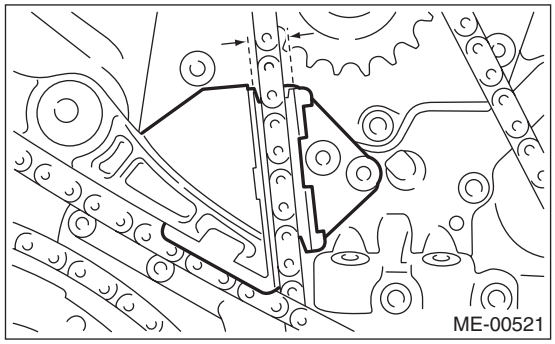
Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)



(7) Adjust the clearance between chain guide (RH) and chain guide (CTR) within 8.4 — 8.6 mm (0.331 — 0.339 in). Install the chain guide (CTR).

Tightening torque:
7.8 N·m (0.8 kgf-m, 5.8 ft-lb)

NOTE:
Use a new installing bolt.



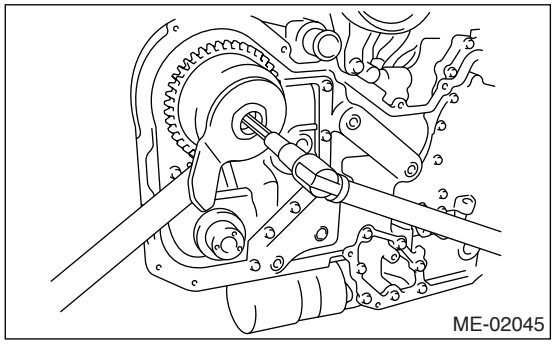
(8) Check that each mark on the sprocket and timing chain is matched, and then draw out the stopper pin from chain tensioner.

16.Cam Sprocket

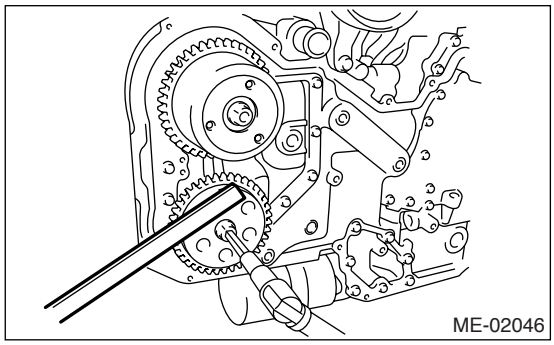
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket. To lock the crankshaft, use the ST.

ST 499977500 CAM SPROCKET WRENCH



ST 18231AA020 CAM SPROCKET WRENCH



B: INSTALLATION

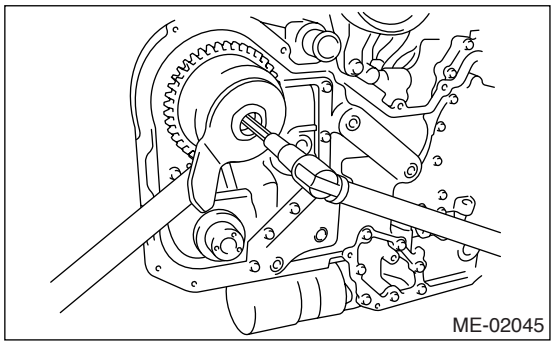
1) Install the cam sprocket. To lock the crankshaft, use the ST.

Tightening torque:
29.5 N·m (3.0 kgf-m, 21.8 ft-lb)

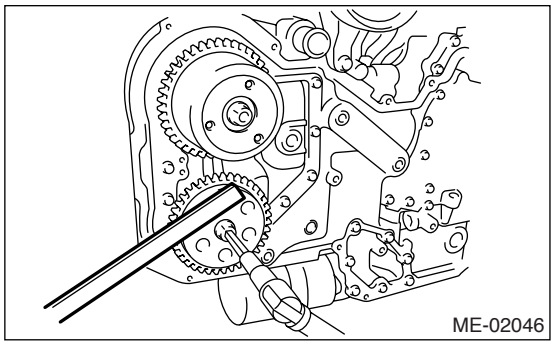
2) Further tighten the bolt.

Tightening angle:
Intake
45°±5°
Exhaust
25°±5°

ST 499977500 CAM SPROCKET WRENCH



ST 18231AA020 CAM SPROCKET WRENCH



3) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
4) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
5) Install the crank pulley. <Ref. to ME(H6DO)-42, INSTALLATION, CRANK PULLEY.>

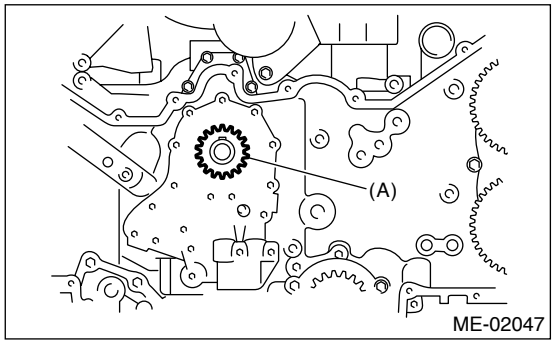
C: INSPECTION

1) Check the cam sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between cam sprocket and key.

17.Crank Sprocket

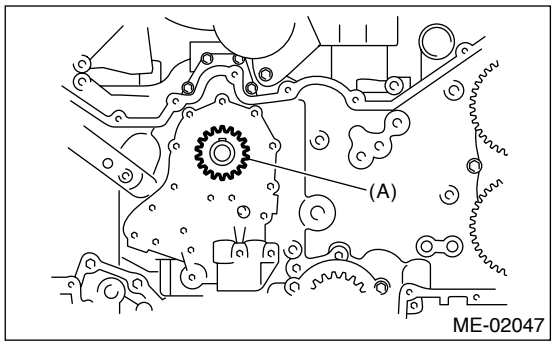
A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket. <Ref. to ME(H6DO)-50, REMOVAL, CAM SPROCKET.>
5) Remove the crank sprocket (A).



B: INSTALLATION

1) Install the crank sprocket (A).



2) Install the cam sprocket. <Ref. to ME(H6DO)-50, INSTALLATION, CAM SPROCKET.>
3) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
4) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
5) Install the crank pulley. <Ref. to ME(H6DO)-42, INSTALLATION, CRANK PULLEY.>

C: INSPECTION

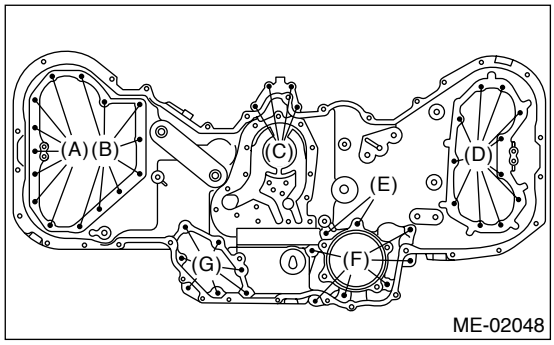
1) Check the crank sprocket teeth for abnormal wear and scratches.
2) Make sure there is no free play between crank sprocket and key.

18.Rear Chain Cover

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, CRANK PULLEY.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain. <Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket. <Ref. to ME(H6DO)-50, REMOVAL, CAM SPROCKET.>
5) Remove the crank sprocket.
6) Remove the oil pump. <Ref. to LU(H6DO)-8, REMOVAL, Oil Pump.>
7) Remove the water pump. <Ref. to CO(H6DO)-11, REMOVAL, Water Pump.>
8) Remove the rear chain cover.

NOTE:
Installation bolt has seven different sizes. To prevent the confusion in installation, keep these bolts on container individually.



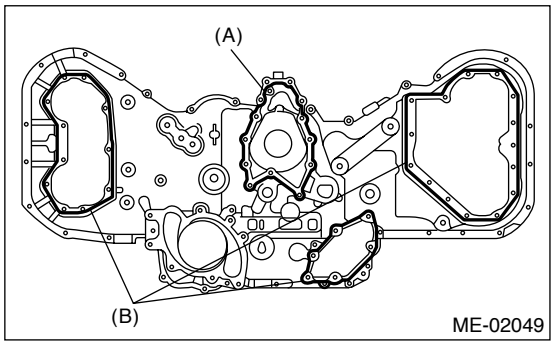
(A) M6 × 14
(B) M6 × 18 (Silver)
(C) M6 × 30
(D) M6 × 18
(E) M8 × 40
(F) M8 × 30
(G) M6 × 22

B: INSTALLATION

1) Remove the used liquid gasket from mating surface, and degrease it.
2) Apply liquid gasket to the matching surface of rear chain cover.

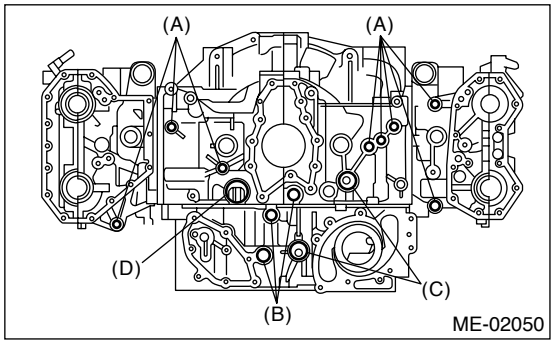
Liquid gasket
THREE BOND 1280B (Part No. K0877A018)

Applying liquid gasket diameter
(A) 1.0±0.5 mm (0.039±0.020 in)
(B) 3.0±1.0 mm (0.118±0.039 in)



3) Install the O-ring.

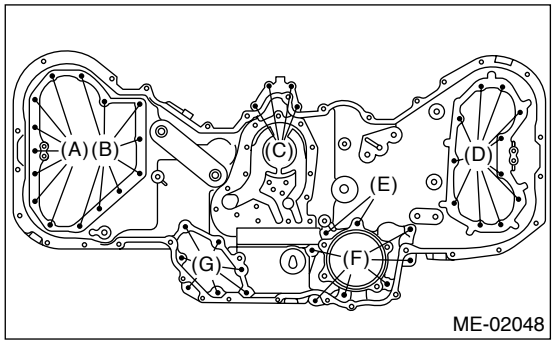
NOTE:
- Do not reuse the O-ring.
- Do not install the O-ring in wrong place.



(A) 14.2 × 1.9
(B) 19.2 × 2.4
(C) 25 × 2
(D) 31.2 × 1.9

4) Temporarily tighten the rear chain cover.

NOTE:
Do not install the bolts in wrong place.

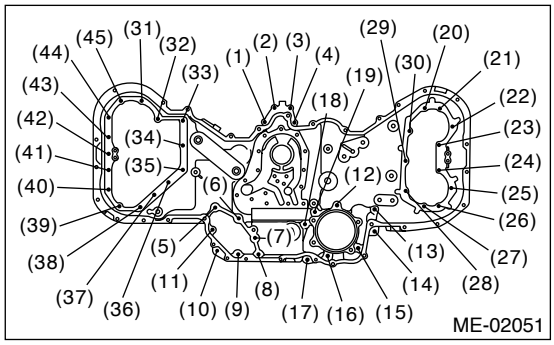


(A) M6 × 14
(B) M6 × 18 (Silver)
(C) M6 × 30
(D) M6 × 18
(E) M8 × 40
(F) M8 × 30
(G) M6 × 22

5) Tighten the bolts in the numerical order as shown in the figure.

Tightening torque:

(1) — (11)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(12) — (19)	20 N·m (2.0 kgf-m, 14 ft-lb)
(20) — (30)	9 N·m (0.9 kgf-m, 6.5 ft-lb)
(31) — (38)	12 N·m (1.2 kgf-m, 8.7 ft-lb)
(39) — (45)	9 N·m (0.9 kgf-m, 6.5 ft-lb)

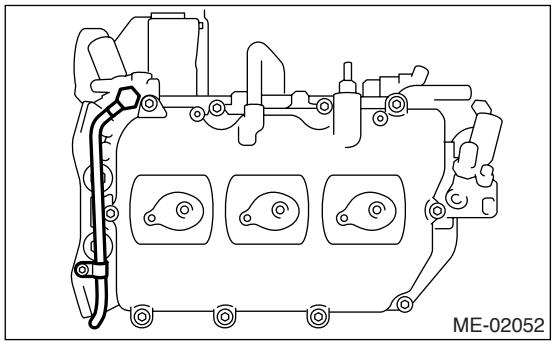


6) Install the water pump. <Ref. to CO(H6DO)-11, INSTALLATION, Water Pump.>
7) Install the oil pump. <Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>
8) Install the crank sprocket.
9) Install the cam sprocket. <Ref. to ME(H6DO)-50, INSTALLATION, CAM SPROCKET.>
10) Install the timing chain. <Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
11) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
12) Install the crank pulley. <Ref. to ME(H6DO)-42, INSTALLATION, CRANK PULLEY.>

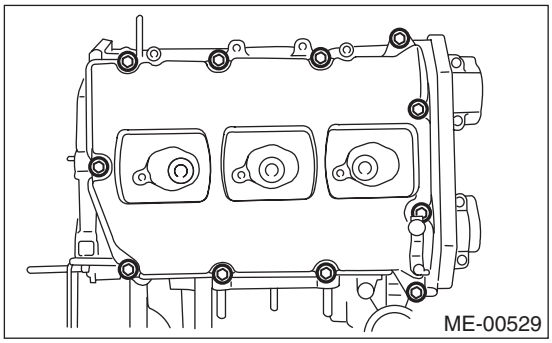
19.Camshaft

A: REMOVAL

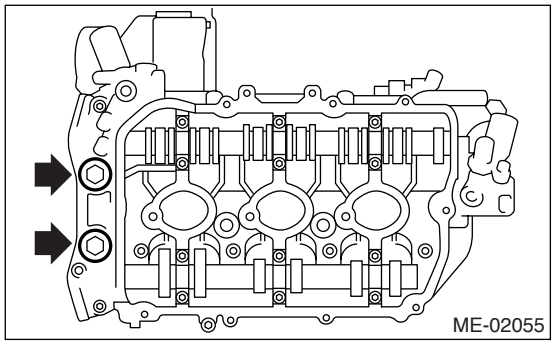
1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-51, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-52, REMOVAL, Rear Chain Cover.>
7) Disconnect the oil valve.



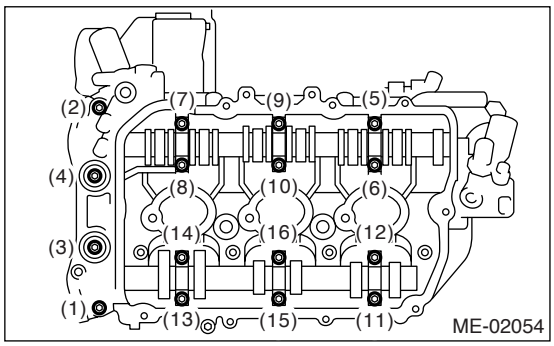
8) Remove the rocker cover (LH).



9) Remove the plugs (LH).



10) Loosen the camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



11) Remove the camshaft caps and camshaft (LH).

NOTE:
Arrange camshaft caps in order so that they can be installed in their original positions.

12) Similarly, remove the camshafts (RH) and related parts.

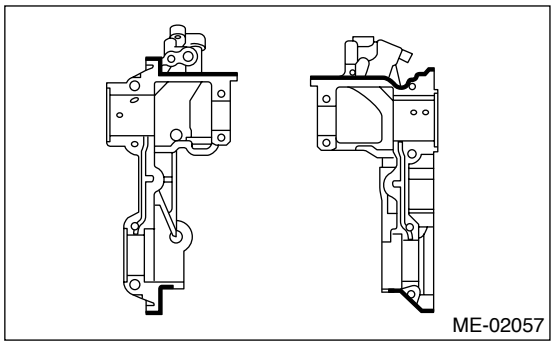
B: INSTALLATION

1) Apply engine oil to camshaft journals, and install the camshaft.
2) Install the camshaft cap.
(1) Apply liquid gasket sparingly to back side of front camshaft cap as shown in the figure.

CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess gasket to come out and flow toward cam journal, resulting in engine burnt.

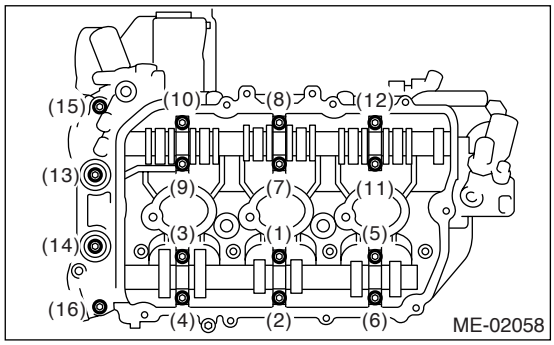
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
2.0±0.5 mm (0.079±0.020 in)



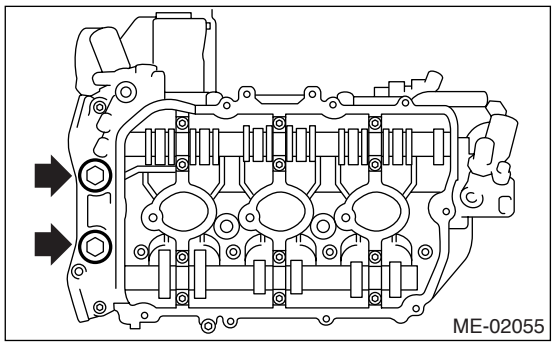
(2) Apply engine oil to cap bearing surface, and install the cap to camshaft.
(3) Tighten the rocker cover bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (12): 16 N·m (1.6 kgf-m, 11.6 ft-lb)
(13) — (16): 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)



3) Install the plugs.

Tightening torque:
6.0 N·m (6.1 kgf-m, 44.3 ft-lb)

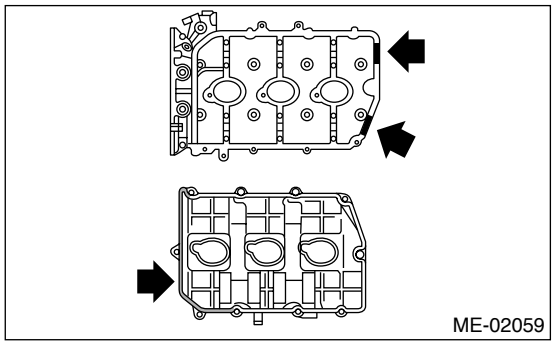


4) Install the rocker cover.
(1) Apply liquid gasket sparingly to the mating surface of cylinder head and rocker cover as shown in the figure.

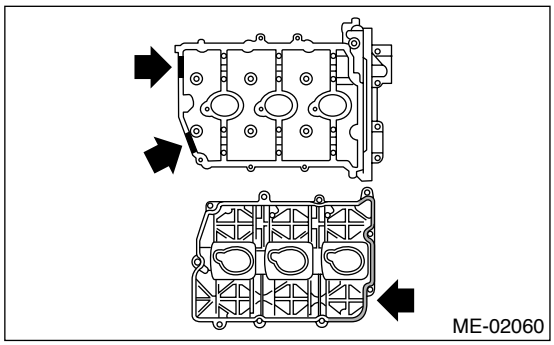
CAUTION:
Do not apply fluid packing excessively. Failure to do so may cause excess gasket to come out and flow toward cam journal, resulting in engine burnt.

Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

• LH side



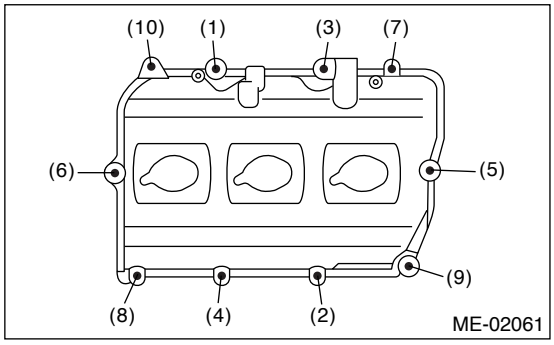
• RH side



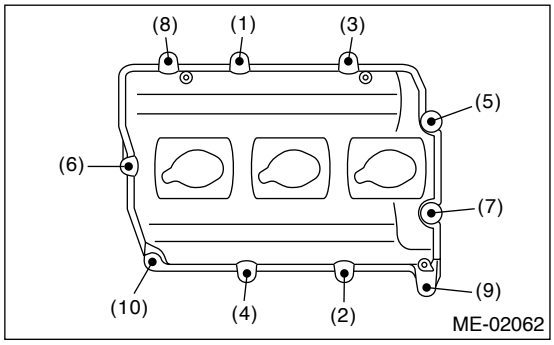
(2) Tighten the rocker cover bolts in the numerical order as shown in the figure.

Tightening torque:
6.4 N·m (0.64 kgf-m, 4.6 ft-lb)

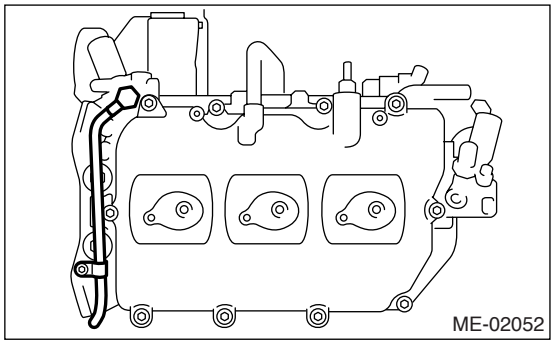
• LH side



• RH side



5) Connect the oil pipe.

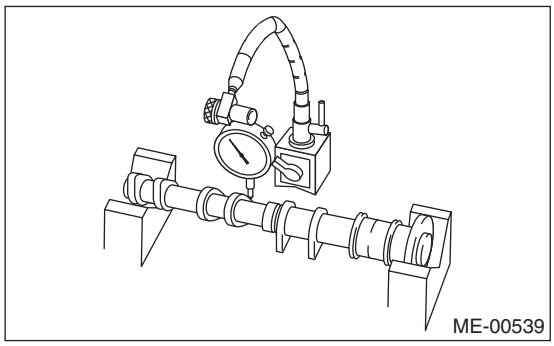


6) Install the rear chain cover. <Ref. to ME(H6DO)-52, INSTALLATION, Rear Chain Cover.>

7) Install the crank sprocket.
<Ref. to ME(H6DO)-51, INSTALLATION, Crank Sprocket.>
8) Install the cam sprocket.
<Ref. to ME(H6DO)-50, INSTALLATION, Cam Sprocket.>
9) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
10) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
11) Install the crank pulley.
<Ref. to ME(H6DO)-42, INSTALLATION, Crank Pulley.>

C: INSPECTION

1) Check the camshaft for bend, and repair or replace if necessary.



2) Check the journal for damage and wear. Replace if faulty.
3) Measure the outside diameter of camshaft journal. If the journal diameter is not within specifications, check the oil clearance.

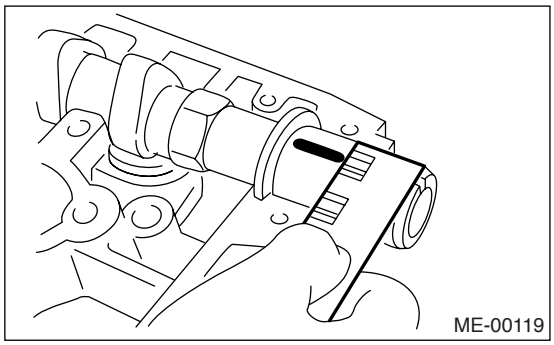
	Camshaft journal	
	Front	Except for front
Standard value mm (in)	37.946 — 37.963 (1.4939 — 1.4946)	25.946 — 25.963 (1.0215 — 1.0222)

4) Measurement of the camshaft journal oil clearance:
(1) Clean the bearing caps and camshaft journals.
(2) Place the camshafts on the cylinder head. (Without installing the valve rocker.)
(3) Place a plastigauge across each of the camshaft journals.
(4) Install the bearing cap.

NOTE:
Do not turn the camshaft.

(5) Remove the bearing caps.
(6) Measure the widest point of the plastigauge on each journal. If oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:
0.037 — 0.072 mm (0.0015 — 0.0028 in)

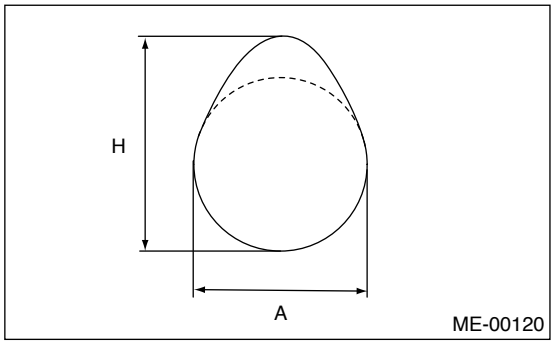


(7) Completely remove the plastigauge.
5) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds the limit, replace it.

Cam height: H:

Standard:
Intake
HIGH: 42.09 — 42.19 mm (1.6571 — 1.6610 in)
LOW1: 38.14 — 38.24 mm (1.5016 — 1.5055 in)
LOW2: 34.94 — 35.04 mm (1.3756 — 1.3795 in)
Exhaust
41.65 — 41.75 mm (1.6398 — 1.6437 in)

Cam base circle diameter A:
Intake
HIGH: 32.0 mm (1.2598 in)
LOW1: 31.84 mm (1.2535 in)
LOW2: 31.84 mm (1.2535 in)
Exhaust
32.0 mm (1.2598 in)



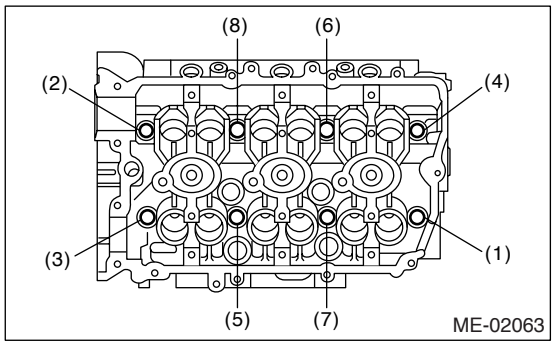
6) Measure the side clearance of camshaft with dial gauge. If the side clearance exceeds the limit or offset wearing is emitted, replace the caps and cylinder head as a set. If necessary, replace the camshaft.

Standard:
Intake
0.075 — 0.135 mm (0.0030 — 0.0053 in)
Exhaust
0.030 — 0.090 mm (0.0012 — 0.0035 in)

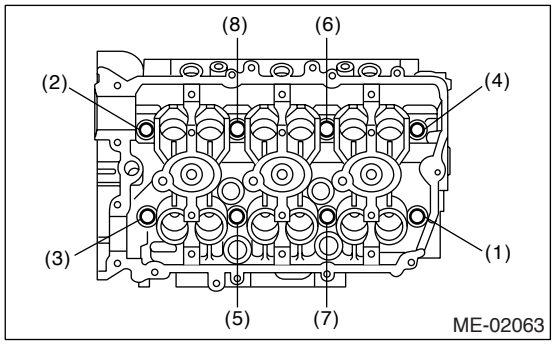
20.Cylinder Head

A: REMOVAL

1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-51, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-52, REMOVAL, Rear Chain Cover.>
7) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
8) Tighten the cylinder head bolts in the numerical order as shown in the figure.
Leave bolts (2) and (4) engaged by three or four threads to prevent the cylinder head from falling.



9) While tapping the cylinder head with a plastic hammer, separate it from cylinder block.
10) Remove the bolts (2) and (4) to remove the cylinder head.



11) Remove the cylinder head gasket.

CAUTION:
Be careful not to scratch the mating surface of cylinder head and cylinder block.

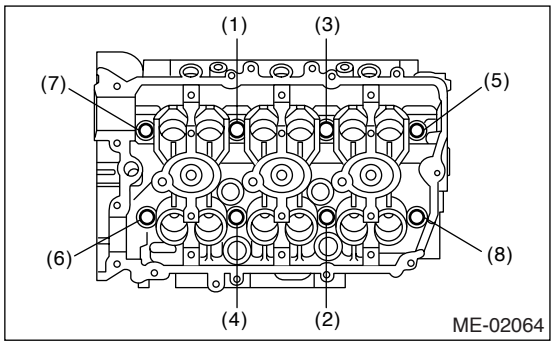
12) Similarly, remove the cylinder head (RH).

B: INSTALLATION

1) Install the cylinder head and gaskets on cylinder block.

CAUTION:
• Use new cylinder head gaskets.
• Be careful not to scratch the mating surface of cylinder head and cylinder block.

2) Tighten the cylinder head bolts.
(1) Apply a coat of engine oil to washers and cylinder head bolt threads.
(2) Install the cylinder head to cylinder block, and then tighten the bolts with torque of 20 N·m (2.0 kgf-m, 14 ft-lb) in numerical sequence as shown in the figure.
(3) Tighten the bolts with torque of 50 N·m (3.0 kgf-m, 37 ft-lb) in numerical sequence as shown in the figure.
(4) Back off all bolts by 180° in reverse order of installation, and back them off again by 180°.
(5) Tighten the bolts with torque of 20 N·m (2.0 kgf-m, 14 ft-lb) in numerical sequence as shown in the figure.
(6) Tighten the bolts (1) and (4) with torque of 48 N·m (3.5 kgf-m, 35.4 ft-lb) in numerical sequence.
(7) Tighten the bolts (5) and (8) with torque of 44 N·m (4.5 kgf-m, 32.5 ft-lb) in numerical sequence.
(8) Tighten the bolts 90° in the numerical order as shown in the figure.
(9) Tighten the bolt (1) — (4) 45° in the numerical order.



3) Install the camshaft. <Ref. to ME(H6DO)-54, INSTALLATION, CAMSHAFT.>
4) Install the rear chain cover. <Ref. to ME(H6DO)-52, INSTALLATION, Rear Chain Cover.>
5) Install the crank sprocket.
<Ref. to ME(H6DO)-51, INSTALLATION, Crank Sprocket.>
6) Install the cam sprocket.
<Ref. to ME(H6DO)-50, INSTALLATION, Cam Sprocket.>

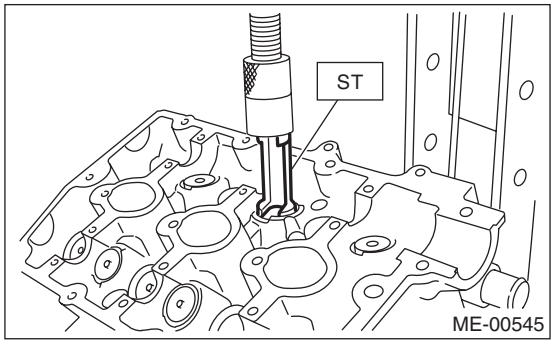
7) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
8) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
9) Install the crank pulley.
<Ref. to ME(H6DO)-42, INSTALLATION, Crank Pulley.>

C: DISASSEMBLY

1) Set the cylinder head on ST.
ST 18250AA010 CYLINDER HEAD TABLE
2) Remove the valve lifter.
3) Set the ST on valve spring retainer. Compress the valve spring and remove the valve spring retainer key. Remove each valve and valve spring.
ST 499718000 VALVE SPRING REMOVER

NOTE:
Keep all the removed parts in order for re-installing in their original positions.

CAUTION:
• Mark each valve to prevent confusion.
• Use extreme care not to damage the lips of the intake valve oil seals and exhaust valve oil seals.



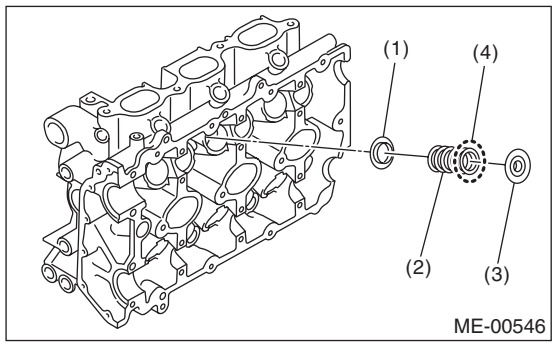
D: ASSEMBLY

1) Installation of valve spring and valve:
(1) Set the cylinder head on ST.
ST 18250AA010 CYLINDER HEAD TABLE
(2) Coat the stem of each valve with engine oil and insert the valve into valve guide.

NOTE:
When inserting the valve into valve guide, use special care not to damage the oil seal lip.

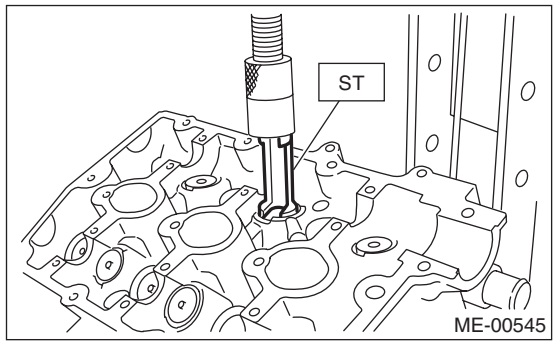
(3) Install the valve spring and retainer.

NOTE:
• Be sure to install the valve springs with their close-coiled end facing the seat on the cylinder head.
• Install the valve spring with the painted side facing to retainer.



(1) Seat
(2) Valve spring
(3) Retainer
(4) Painted face

(4) Set the ST on valve spring.
ST 499718000 VALVE SPRING REMOVER



(5) Compress the valve spring and fit the valve spring retainer key.
(6) After installing, tap the valve spring retainers lightly with a wooden hammer for better seating.
2) Apply oil to the surface of the valve lifter and valve shim.
3) Install the valve lifter and valve shim.

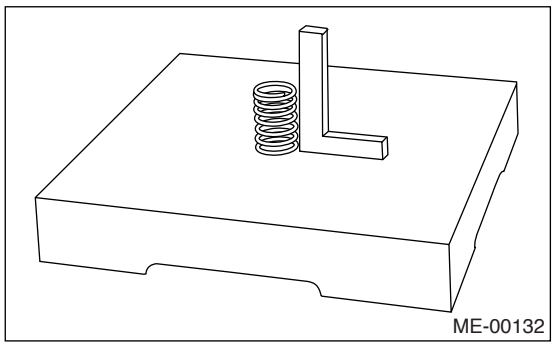
E: INSPECTION

1. VALVE SPRING

1) Check the valve springs for damage, free length, and tension. Replace the valve spring if it is not within the standard value presented in the table.

Free length mm (in)	Intake	Inner	39.55 (1.5571)
		Outer	41.18 (1.6213)
	Exhaust		46.32 (1.8236)
Squareness	Intake	Inner	2.5°, 1.7 mm (0.067 in)
		Outer	2.5°, 1.8 mm (0.071 in)
	Exhaust		2.5°, 2.0 mm (0.079 in)

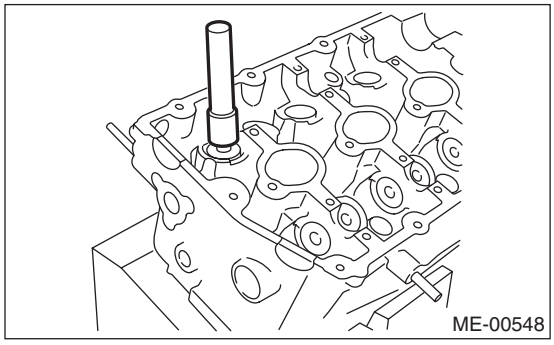
2) To measure the squareness of the valve spring, stand the spring on a surface plate and measure its deflection at the top of spring using a try square.


ME-00132

2. INTAKE AND EXHAUST VALVE OIL SEAL

Replace the oil seal with a new one, if the lip is damaged or spring is out of place, or when the surfaces of intake valve and valve seat are reconditioned or intake valve guide is replaced.
1) Set the cylinder head on ST1.
2) Press-fit the oil seal to the specified dimension indicated in the figure using ST2.
ST1 18250AA010 CYLINDER HEAD TABLE
ST2 499585500 VALVE OIL SEAL GUIDE

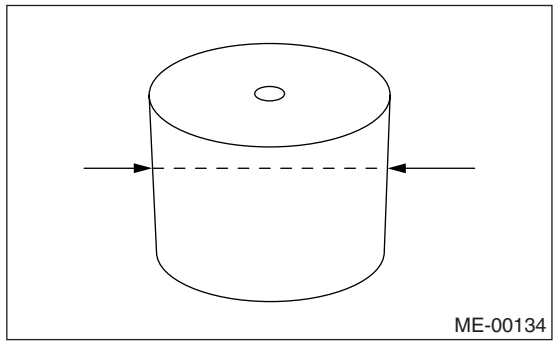
NOTE:
• Apply engine oil to oil seal before force-fitting.
• When press-fitting the oil seal, do not use a hammer or strike in.


ME-00548

3. VALVE LIFTER

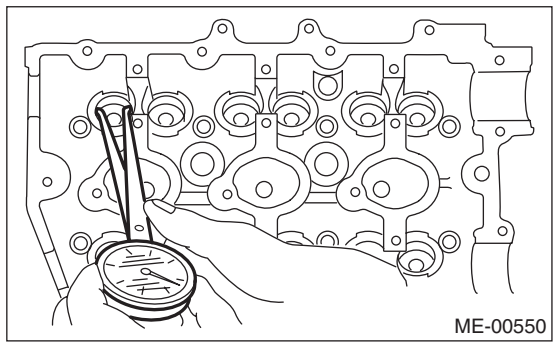
1) Check the valve lifter visually.
2) Measure the outer diameter of valve lifter.

Outer diameter:
32.959 — 32.975 mm (1.2976 — 1.2982 in)


ME-00134

3) Measure the inner diameter of valve lifter hole of cylinder head.

Inner diameter:
32.994 — 33.016 mm (1.2990 — 1.2998 in)


ME-00550

NOTE:
If difference between outer diameter of valve lifter and inner diameter of valve lifter hole is out of the standard or offset wearing is emitted, replace the cylinder head.

Standard:
0.019 — 0.057 mm (0.0007 — 0.0022 in)

F: ADJUSTMENT

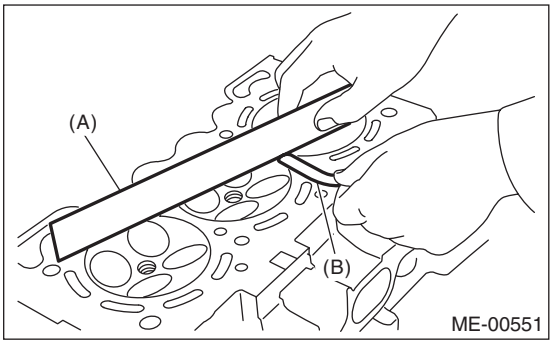
1. CYLINDER HEAD

1) Make sure that no crack or other damages do not exist. In addition to visual inspection, inspect important areas by means of red lead check. Check that there are no marks of gas leaking or water leaking on gasket installing surface.
2) Set the cylinder head on ST.
ST 18250AA010 CYLINDER HEAD TABLE
3) Measure the flatness of the cylinder head surface that mates with crankcase using a straight edge (A) and thickness gauge (B).

Flatness:
Standard
0.02 mm (0.0008 in)

Standard height of cylinder head:
124±0.05 mm (4.88±0.0020 in)

NOTE:
Uneven torque for the cylinder head nuts can cause warping. When reinstalling, pay special attention to the torque so as to tighten evenly.



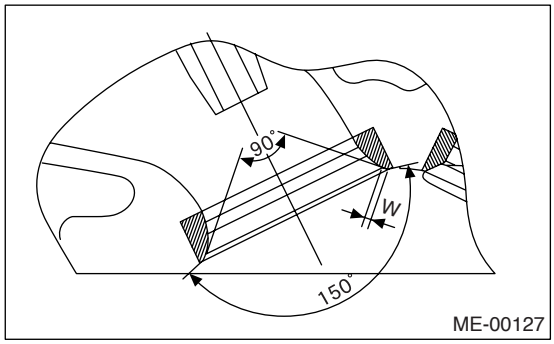
2. VALVE SEAT

Inspect the intake and exhaust valve seats, and correct the contact surfaces with a valve seat cutter if they are defective or when valve guides are replaced.

Valve seat width W:

Intake
Standard
1.0 mm (0.039 in)

Exhaust
Standard
1.5 mm (0.059 in)



3. VALVE GUIDE

1) Check the clearance between valve guide and stem. The clearance can be checked by measuring respectively the outer diameter of valve stem and inner diameter of valve guide with a micrometer.

Clearance between the valve guide and valve stem:

Standard
Intake
0.030 — 0.057 mm (0.0012 — 0.0022 in)
Exhaust
0.040 — 0.067 mm (0.0016 — 0.0026 in)

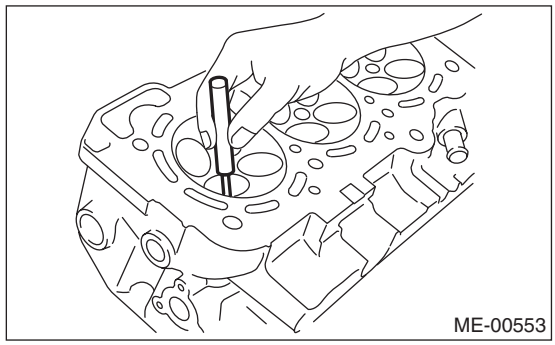
2) If the clearance between valve guide and stem is out of standard, replace the valve guide or valve itself whichever shows greater amount of wear or damaged and etc. See the following procedure for valve guide replacement.

Valve guide inner diameter:
5.500 — 5.512 mm (0.2165 — 0.2170 in)

Valve stem outer diameters:
Intake
5.445 — 5.470 mm (0.2144 — 0.2154 in)
Exhaust
5.455 — 5.460 mm (0.2148 — 0.2150 in)

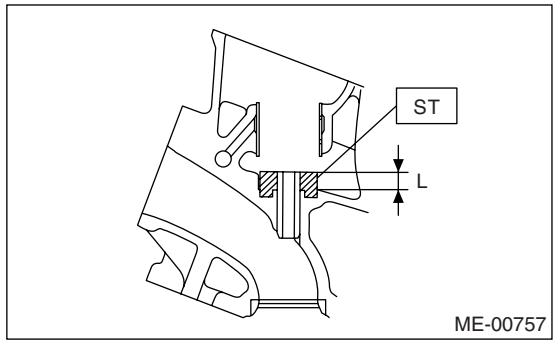
(1) Place the cylinder head on ST1 with the combustion chamber upward so that valve guides enter the holes in ST1.
(2) Insert ST2 into the valve guide and press it down to remove the valve guide.

ST1 18250AA010 CYLINDER HEAD TABLE
ST2 499765700 VALVE GUIDE REMOVER



(3) Turn the cylinder head upside down and place the ST as shown in the figure.

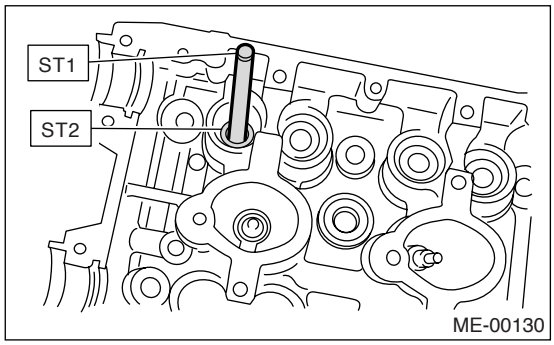
ST 18251AA040 VALVE GUIDE ADJUSTER



(4) Before installing a new valve guide, make sure that neither scratches nor damages exist on the inside surface of the valve guide holes in cylinder head.
(5) Put a new valve guide, coated with sufficient oil, in cylinder, and insert the ST1 into valve guide. Press in until the valve guide upper end is flush with the upper surface of ST2.

ST1 499765700 VALVE GUIDE REMOVER

ST2 18251AA040 VALVE GUIDE ADJUSTER



(6) Check the valve guide protrusion.

Valve guide protrusion L:
11.4 — 11.8 mm (0.449 — 0.465 in)

(7) Ream the inside of valve guide using ST. Put the reamer in valve guide, and rotate the reamer slowly clockwise while pushing it lightly. Bring the reamer back while rotating it clockwise. After reaming, clean the valve guide to remove chips.

ST 499765900 VALVE GUIDE REAMER

NOTE:
• Apply engine oil to the reamer when reaming.
• If the inner surface of the valve guide is torn, the edge of the reamer should be slightly ground with an oil stone.
• If the inner surface of the valve guide becomes lustrous and the reamer does not chip, use a new reamer or remedy the reamer.

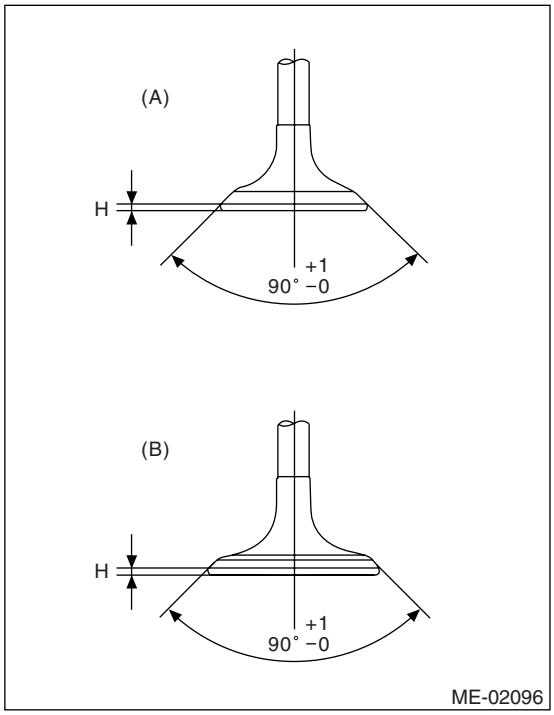
(8) Recheck the contact condition between valve and valve seat after replacing the valve guide.

4. INTAKE AND EXHAUST VALVE

1) Inspect the flange and stem of valve, and replace if damaged, worn or deformed, or if “H” is exceed the standard value or offset wearing is emitted.

H:
Intake (A)
Standard
1.0 mm (0.039 in)
Exhaust (B)
Standard
1.2 mm (0.047 in)

Valve overall length:
Intake (A)
99.7 mm (3.925 in)
Exhaust (B)
105.2 mm (4.142 in)



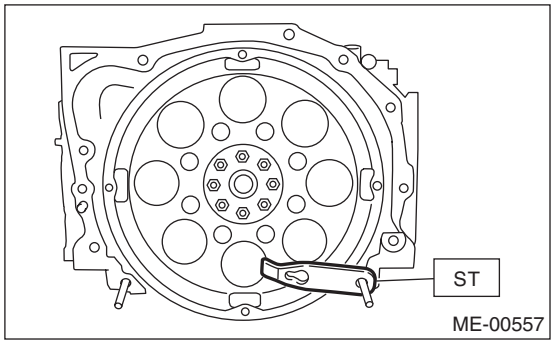
2) Put a small amount of grinding compound on the seat surface and lap the valve and seat surface. Install a new intake valve oil seal after lapping.

21.Cylinder Block

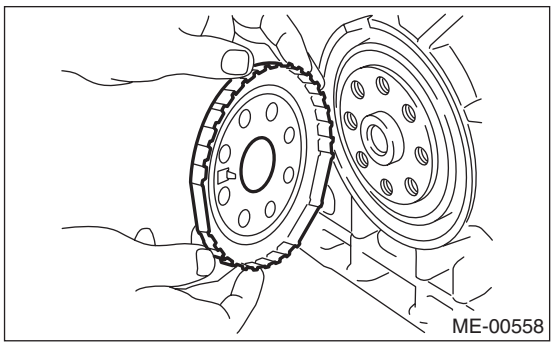
A: REMOVAL

NOTE:
Before conducting this procedure, drain the engine oil completely.

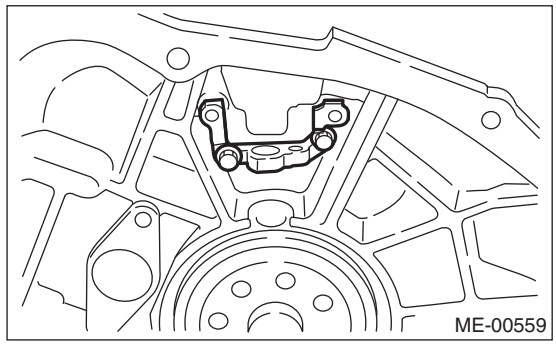
1) Remove the crank pulley. <Ref. to ME(H6DO)-42, REMOVAL, Crank Pulley.>
2) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, FRONT CHAIN COVER.>
3) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, TIMING CHAIN ASSEMBLY.>
4) Remove the cam sprocket.
<Ref. to ME(H6DO)-50, REMOVAL, Cam Sprocket.>
5) Remove the crank sprocket.
<Ref. to ME(H6DO)-51, REMOVAL, Crank Sprocket.>
6) Remove the rear chain cover.
<Ref. to ME(H6DO)-52, REMOVAL, Rear Chain Cover.>
7) Remove the camshaft. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>
8) Remove the cylinder head. <Ref. to ME(H6DO)-58, REMOVAL, CYLINDER HEAD.>
9) Remove the drive plate.
Lock the crankshaft using ST.
ST 498497100 CRANKSHAFT STOPPER



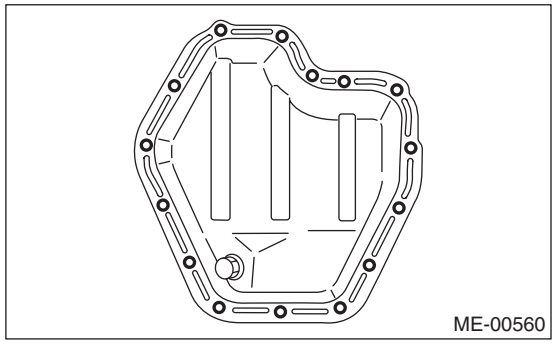
10) Remove the crankshaft position sensor plate.



11) Remove the crankshaft position sensor bracket.



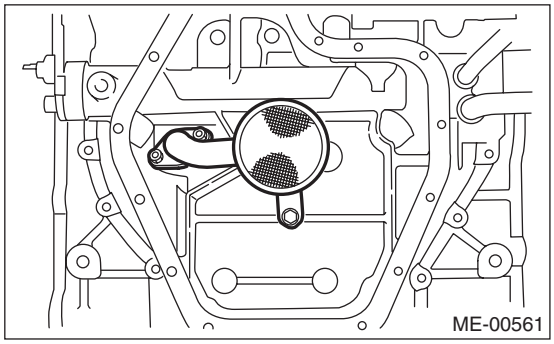
12) Rotate the engine to set oil pan upper.
13) Remove the bolts which secure oil pan lower to oil pan upper.



14) Insert a oil pan cutter blade between cylinder block-to-oil pan clearance and remove the oil pan.

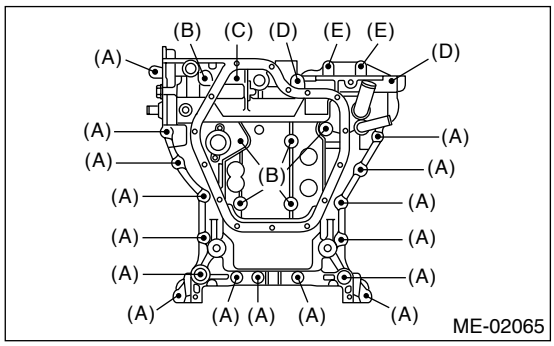
CAUTION:
Do not use a screwdriver or similar tools in place of oil pan cutter.

15) Remove the oil strainer.



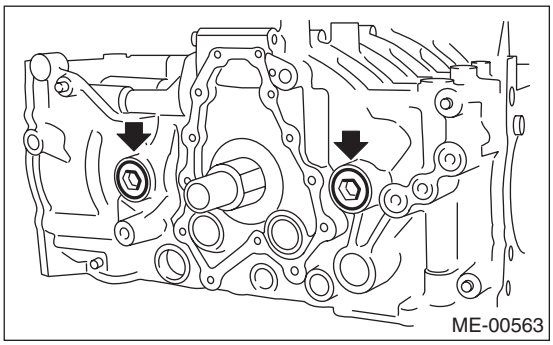
16) Remove the bolts which install oil pan upper onto cylinder block.

NOTE:
Installation bolts have five different sizes. To prevent the confusion in installation, keep these bolts on container individually.

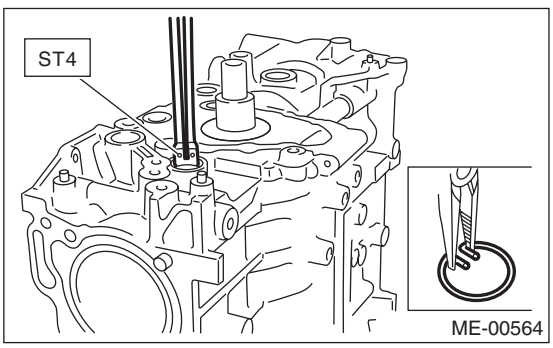


(A) M8 × 40
(B) M8 × 65
(C) M8 × 85
(D) M8 × 130
(E) M8 × 24

17) Remove the service hole cover and service hole plugs using a hexagon wrench.

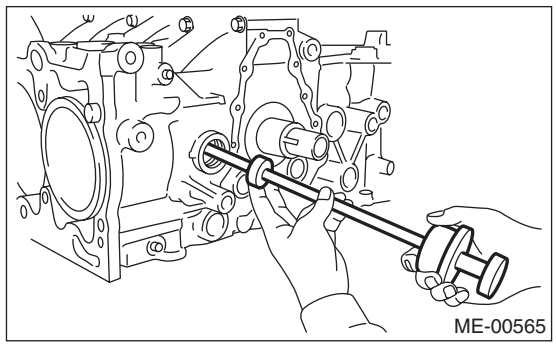


18) Rotate the crankshaft to bring #1 and #2 pistons to bottom dead center position, then remove the piston snap ring through service hole of #1 and #2 cylinders using ST.
ST 18233AA000 PISTON PIN SNAP RING PRIERS

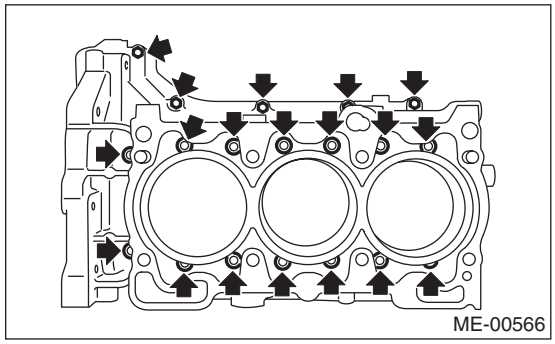


19) Draw out the piston pin from #1 and #2 pistons using ST.
ST 499097500 PISTON PIN REMOVER

NOTE:
Be careful not to confuse the original combination of piston, piston pin and cylinder.



20) Similarly remove the piston pins from #3, #4, #5 and #6 pistons.
21) Remove the bolts which secure the cylinder block.



22) Separate the cylinder block (LH) and (RH).

NOTE:
When separating the cylinder block, do not allow the connecting rod to fall and damage the cylinder block.

23) Remove the rear oil seal.
24) Remove the crankshaft together with connecting rod.
25) Remove the crankshaft bearings from cylinder block using a hammer handle.

NOTE:
• Do not confuse the combination of crankshaft bearings.
• Press the bearing at the end opposite to locking lip.

26) Draw out each piston from cylinder block using a wooden bar or hammer handle.

NOTE:
Be careful not to confuse the original combination of piston and cylinder.

B: INSTALLATION

1) After setting the cylinder block to ST, install the crankshaft bearing.
ST 18232AA000 ENGINE STAND

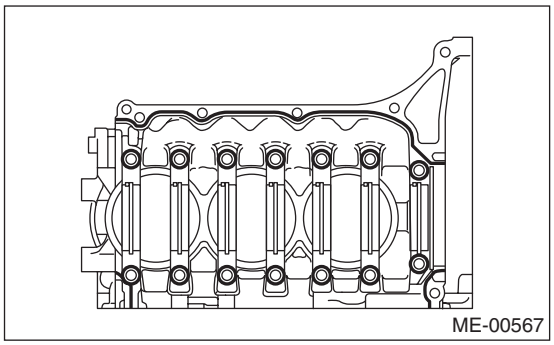
NOTE:
Remove oil on the mating surface of bearing and cylinder block before installation. Apply a coat of engine oil to crankshaft pins.

2) Position the crankshaft and connecting rod on the #2, #4 and #6 cylinder block.
3) Apply liquid gasket to the mating surface of #1, #3 and #5 cylinder block, and position it on #2, #4 and #6 cylinder block.

Liquid gasket
THREE BOND 1215B (Part No. 004403007)

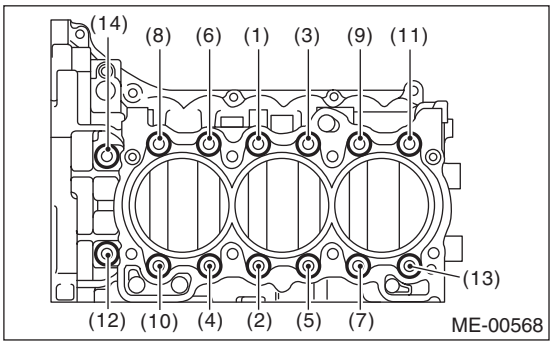
NOTE:
Do not allow liquid gasket to jut into O-ring grooves, oil passages, bearing grooves, etc.

Applying liquid gasket diameter:
1.0±0.2 mm (0.039±0.008 in)



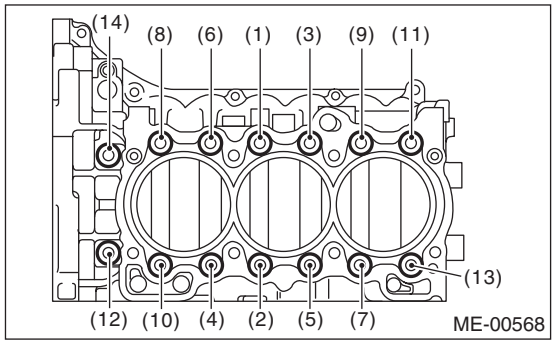
4) Apply a coat of engine oil to washers and bolt threads.
5) Tighten all bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (11), (13): 25 N·m (2.5 kgf-m, 18 ft-lb)
(12), (14): 20 N·m (2.0 kgf-m, 14 ft-lb)

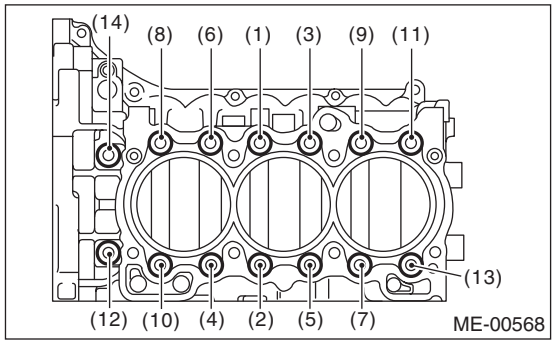


6) Retighten all bolts in the numerical order as shown in the figure.

Tightening torque:
(1) — (11), (13): 25 N·m (2.5 kgf-m, 18 ft-lb)
(12), (14): 20 N·m (2.0 kgf-m, 14 ft-lb)



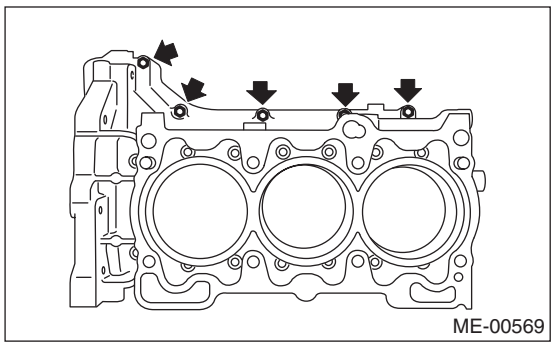
7) Tighten all bolts 90° in the numerical order as shown in the figure.



8) Install the upper bolt to cylinder block.

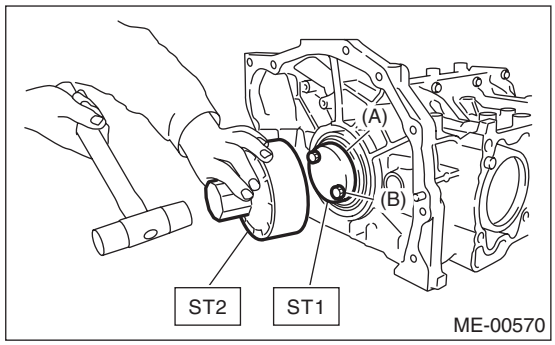
Tightening torque:
25 N·m (2.5 kgf-m, 18 ft-lb)

NOTE:
Remove the liquid gasket which is running over to sealing surface between cylinder block and rear chain cover, cylinder block and oil pan upper, after tightening the bolts which combine the cylinder block.



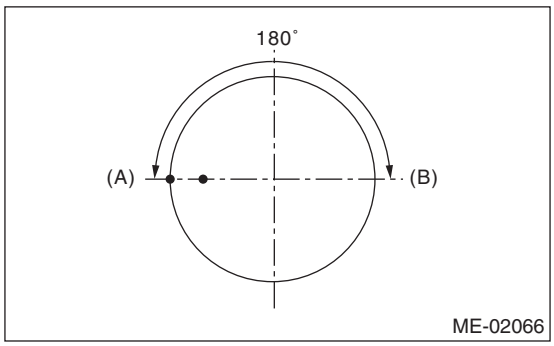
9) Install the rear oil seal using ST1 and ST2.
ST1 499597100 CRANKSHAFT OIL SEAL GUIDE
ST2 499587200 CRANKSHAFT OIL SEAL INSTALLER

NOTE:
Apply engine oil to the pressing-in portion.

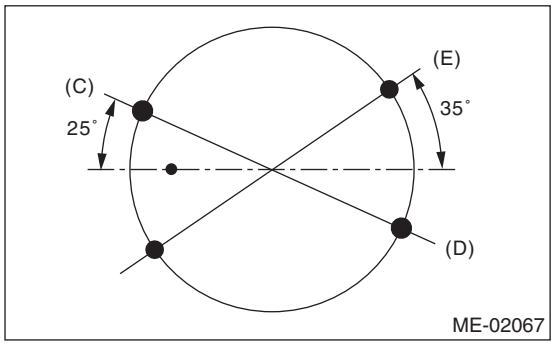


(A) Rear oil seal
(B) Drive plate installation bolt

10) Position the top ring gap at (A) in the figure.
11) Position the second ring gap at (B).



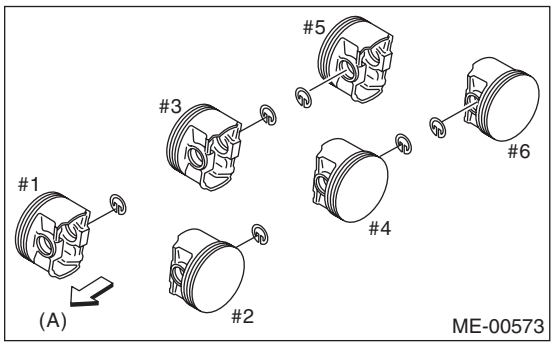
12) Position the upper rail gap at (C) in the figure.
13) Position the expander gap at (D) in the figure.
14) Position the lower rail gap at (E) in the figure.



CAUTION:
• Ensure ring gaps do not face the same direction.
• Ensure ring gaps are not within the piston skirt area.
• Ensure R mark faces to top side of piston.

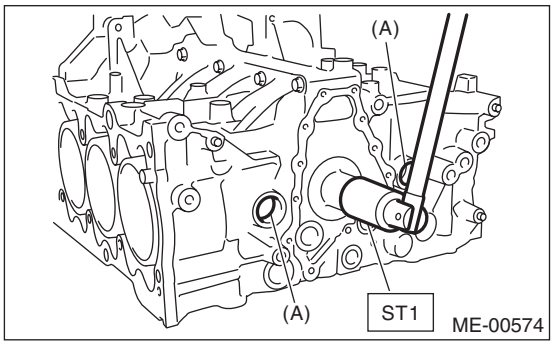
15) Install the snap ring.
Install snap rings in the piston holes located opposite to the service holes in cylinder block, when positioning all pistons in the corresponding cylinders.

NOTE:
Use new snap rings.

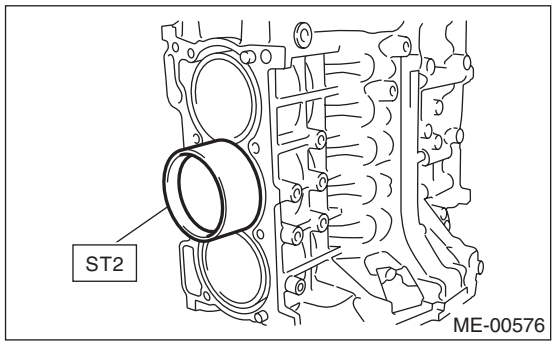


(A) Front side of vehicle

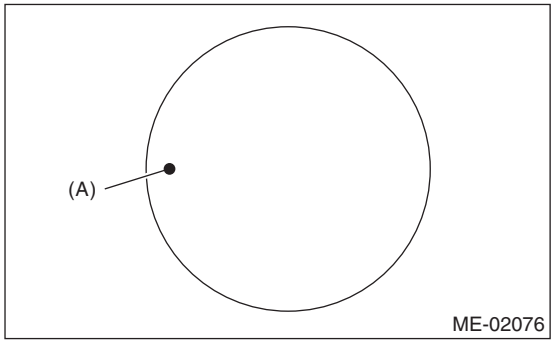
16) Installing the piston:
(1) Using ST1, turn the crankshaft so that #3 and #4 connecting rods small end are set on the service hole (A).
ST1 18252AA000 CRANKSHAFT SOCKET



(2) Apply a thin coat of engine oil to piston and cylinder.
(3) Using ST2, press-fit the piston into cylinder.
ST2 18254AA000 PISTON GUIDE

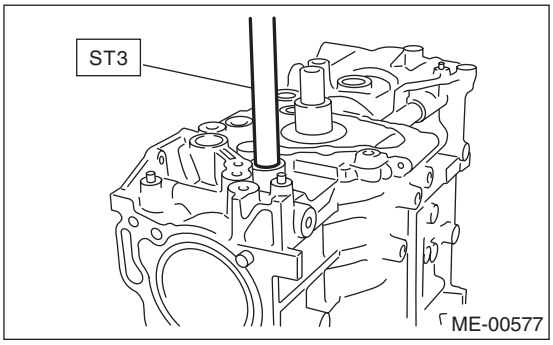


NOTE:
Piston front mark (A) faces towards the front of engine.



17) Installing piston pin:
(1) Apply a coat of engine oil to ST3 before insertion, and then insert it into the service hole to align piston pin hole with connecting rod small end.

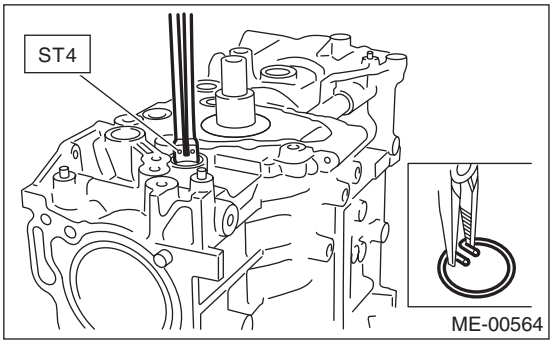
ST3 18253AA000 PISTON GUIDE



(2) Apply a coat of engine oil to piston pin, and insert the piston pin into piston and connecting rod through service hole.
(3) Using the ST4, install the snap ring.

ST4 18233AA000 PISTON PIN SNAP RING PRIERS

NOTE:
Use new snap rings.



(4) Similarly install the #1, #2, #5 and #6 pistons.

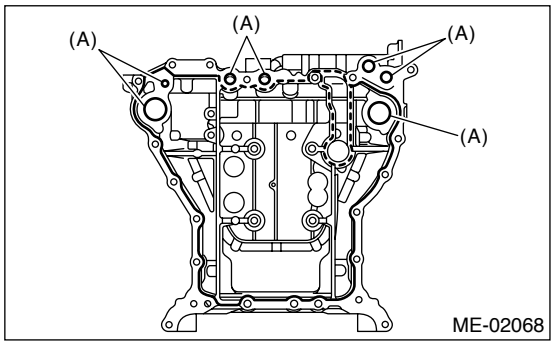
18) Install the service hole plug and O-ring.

NOTE:
Use a new O-ring.

19) Apply liquid gasket to the matching surface of oil pan upper.

Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
Full line part
3.0±1.0 mm (0.12±0.04 in)
Broken line part
1.0 mm (0.04 in)

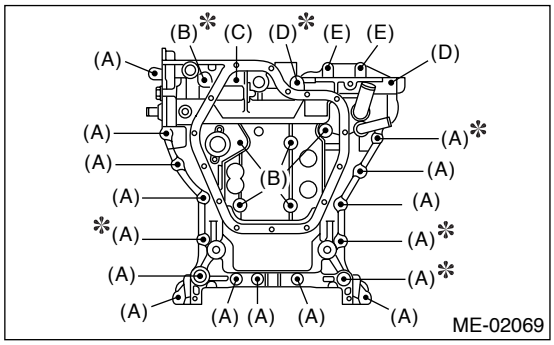


(A) O-ring

NOTE:
Use new O-rings.

20) Temporarily tighten the oil pan upper.

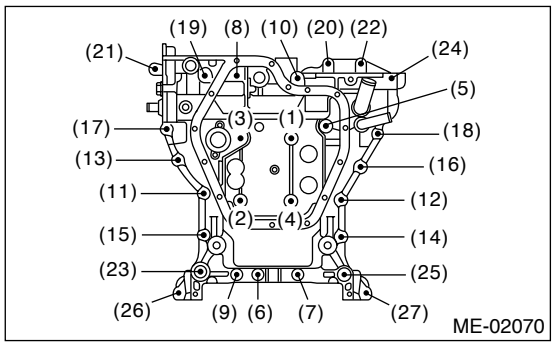
NOTE:
Do not install the bolts in wrong place.



(A) M8 × 40
(B) M8 × 65
(C) M8 × 85
(D) M8 × 130
(E) M8 × 24
*: Coating

21) Tighten the oil pan upper installing bolts in the numerical order as shown in the figure.

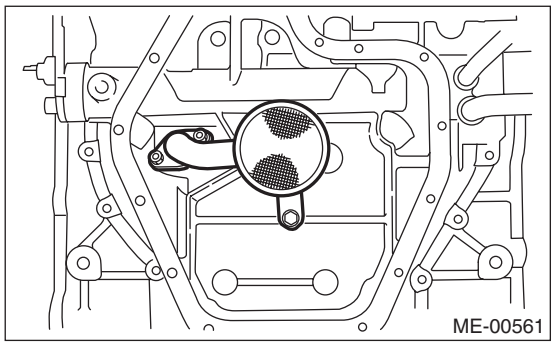
Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



22) Install the oil strainer.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

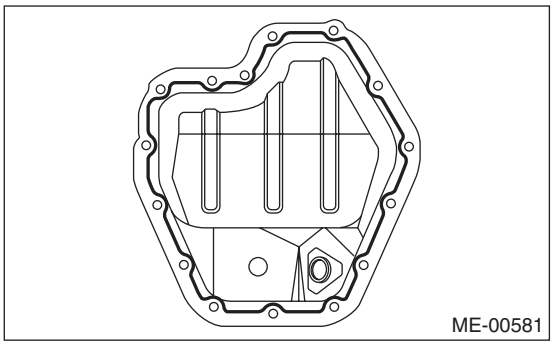
NOTE:
Use new O-rings.



23) Apply liquid gasket to the matching surface of oil pan lower.

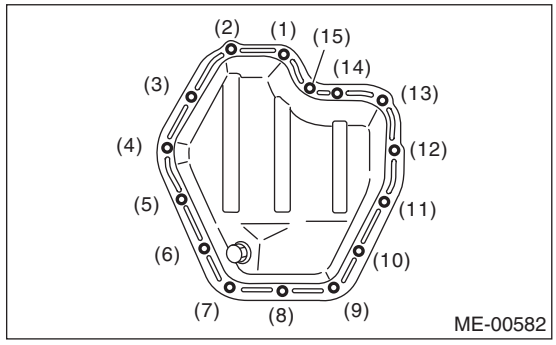
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Applying liquid gasket diameter:
5.0±1.0 mm (0.20±0.04 in)



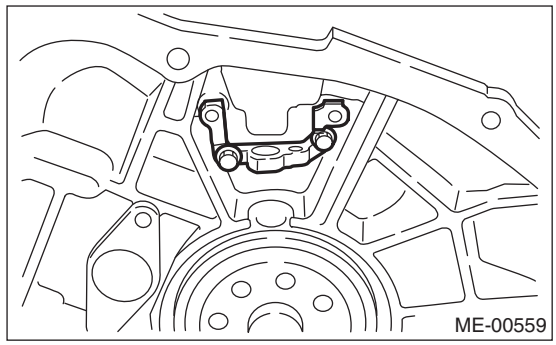
24) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

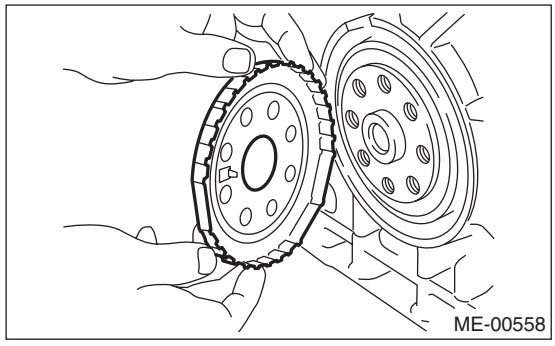


25) Install the crankshaft sensor bracket.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

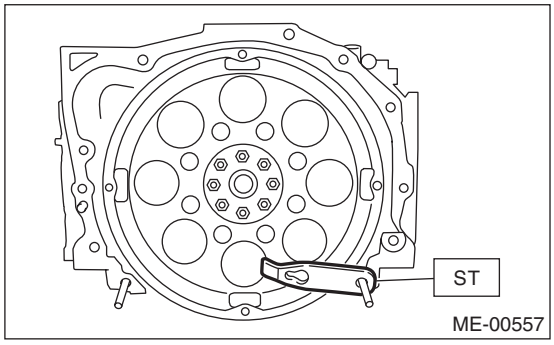


26) Install the crankshaft sensor plate.



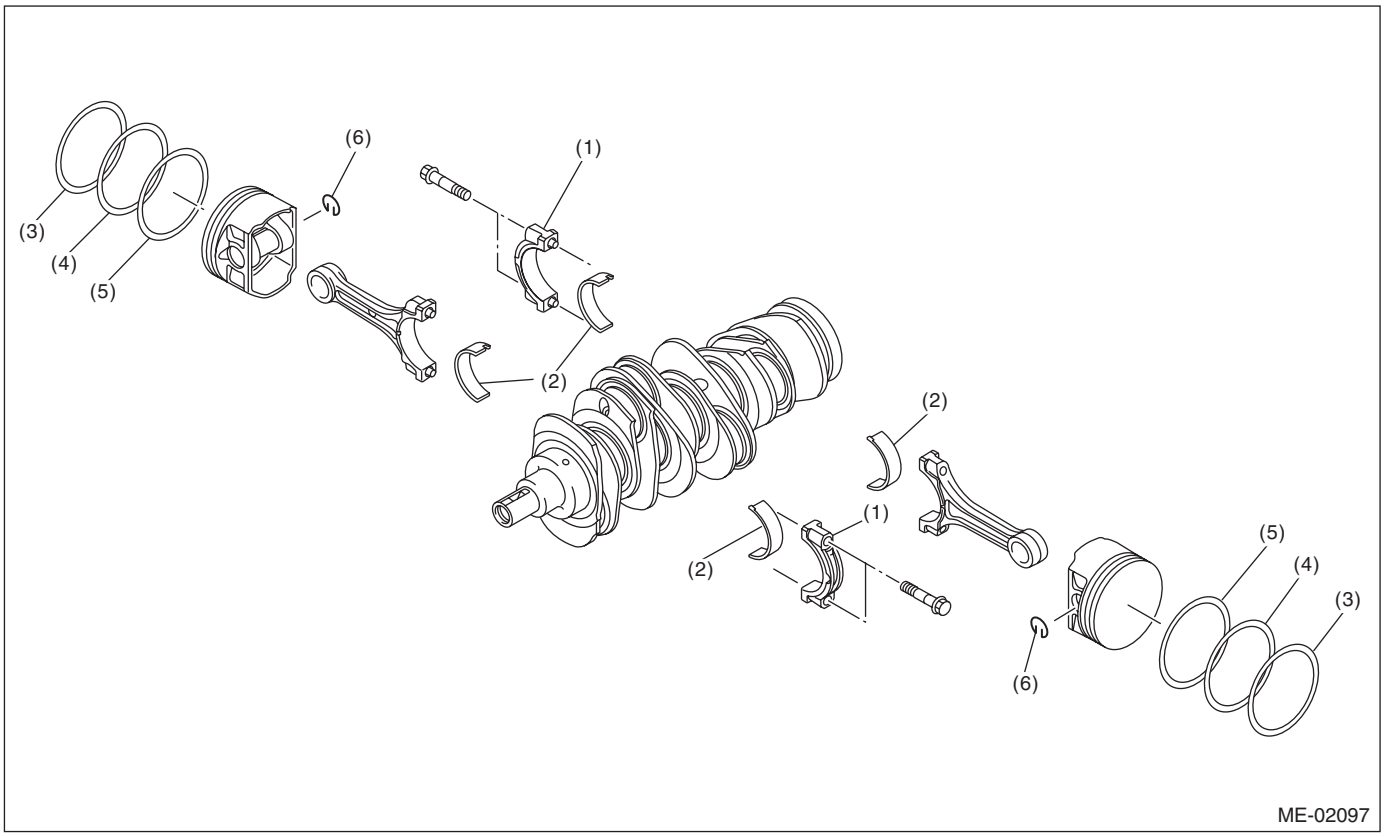
27) Install the drive plate.
To lock the crankshaft, use ST.
ST 498497100 CRANKSHAFT STOPPER

Tightening torque:
81 N·m (8.3 kgf-m, 60 ft-lb)



28) Install the cylinder head. <Ref. to ME(H6DO)-58, INSTALLATION, CYLINDER HEAD.>
29) Install the camshaft. <Ref. to ME(H6DO)-54, INSTALLATION, CAMSHAFT.>
30) Install the rear chain cover. <Ref. to ME(H6DO)-52, INSTALLATION, Rear Chain Cover.>
31) Install the crank sprocket.
<Ref. to ME(H6DO)-51, INSTALLATION, Crank Sprocket.>
32) Install the cam sprocket. <Ref. to ME(H6DO)-50, INSTALLATION, Cam Sprocket.>
33) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, TIMING CHAIN ASSEMBLY.>
34) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, FRONT CHAIN COVER.>
35) Install the crank pulley.
<Ref. to ME(H6DO)-42, INSTALLATION, Crank Pulley.>

C: DISASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Snap ring

1) Remove the connecting rod cap.
2) Remove the connecting rod bearing.

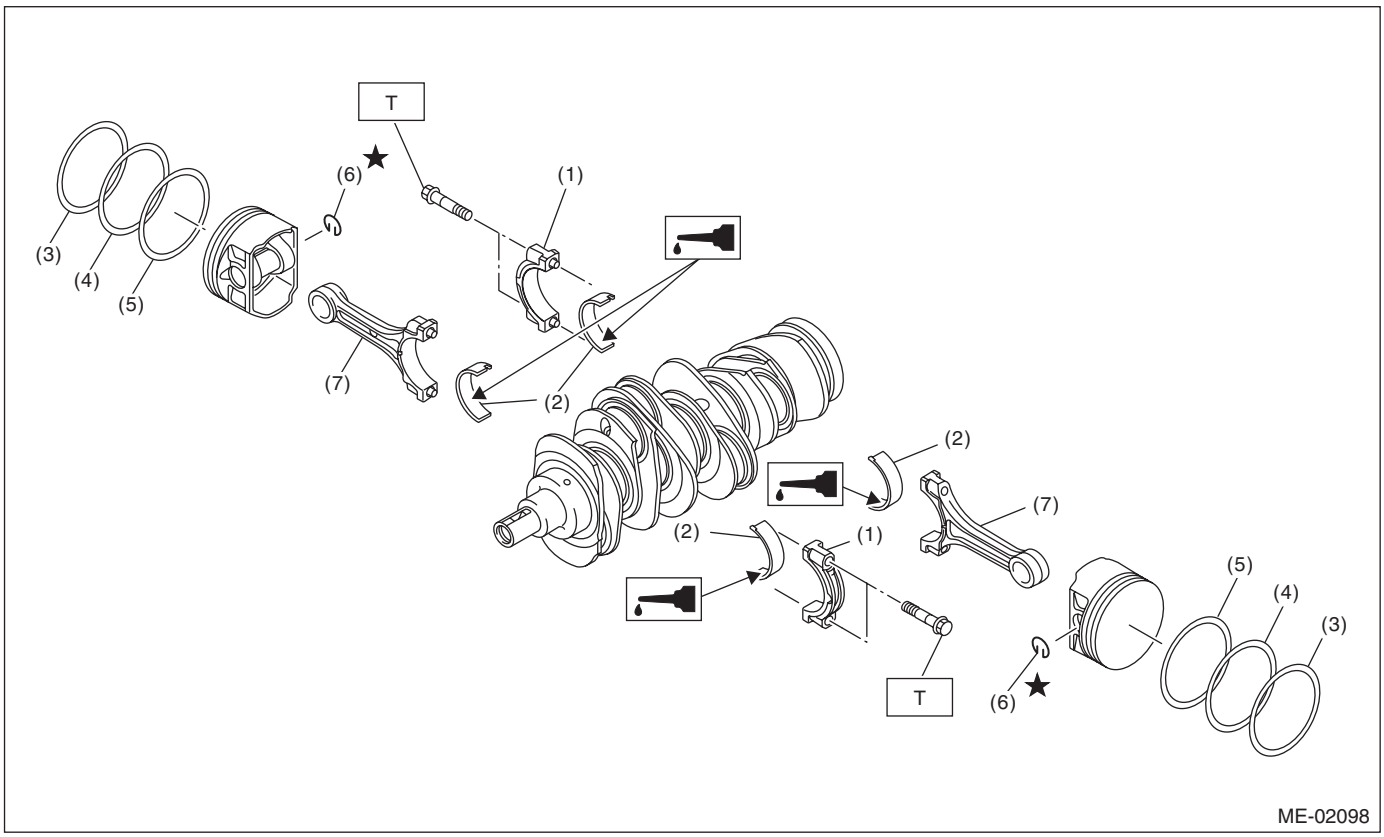
NOTE:
Arrange the removed connecting rod, connecting rod cap and bearing in order, to prevent confusion.

3) Remove the piston rings using the piston ring expander.
4) Remove the oil ring by hand.

NOTE:
Arrange the removed piston rings in proper order, to prevent confusion.

5) Remove the snap ring.

D: ASSEMBLY



(1) Connecting rod cap
(2) Connecting rod bearing
(3) Top ring
(4) Second ring
(5) Oil ring
(6) Snap ring
(7) Connecting rod

Tightening torque: N·m (kgf-m, ft-lb)
T: 53 (5.4, 39)

1) Apply oil to the surfaces of the connecting rod bearings. Install the connecting rod bearings on connecting rods and connecting rod caps.
2) Install the connecting rod on crankshaft.

NOTE:
Position each connecting rod with the side marked facing forward.

3) Install the connecting rod cap.
Ensure the arrow on connecting rod cap faces the front during installation.

CAUTION:
• Each connecting rod has its own mating cap. Make sure that they are assembled correctly by checking their matching number.
• When tightening the connecting rod nuts, apply oil on the threads.

4) Install the oil ring spacer, upper rail and lower rail in this order by hand. Then install the second ring and top ring with a piston ring expander.

E: INSPECTION

1. CYLINDER BLOCK

1) Visually check for cracks and damage. Especially, inspect the important parts by means of red lead check.
2) Check the oil passages for clogging.
3) Inspect the crankcase surface that mates with cylinder head for warping by using a straight edge.

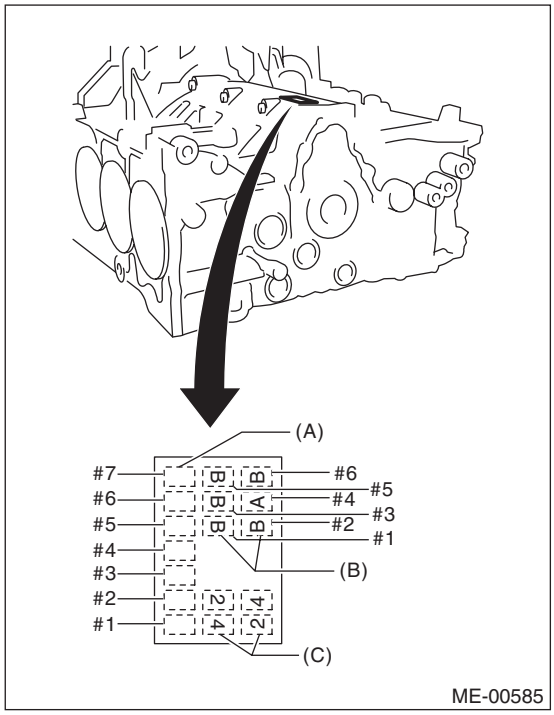
Standard height of cylinder block:
202 mm (7.95 in)

2. CYLINDER AND PISTON

1) The cylinder bore size is stamped on the cylinder block's front upper surface.

NOTE:
• Measurement should be performed at a temperature of 20°C (68°F).
• Standard sized pistons are classified into two grades, "A" and "B". These grades should be used as guide lines in selecting a standard piston.

Standard diameter:
A: 89.205 — 89.215 mm (3.5120 — 3.5124 in)
B: 89.195 — 89.205 mm (3.5116 — 3.5120 in)



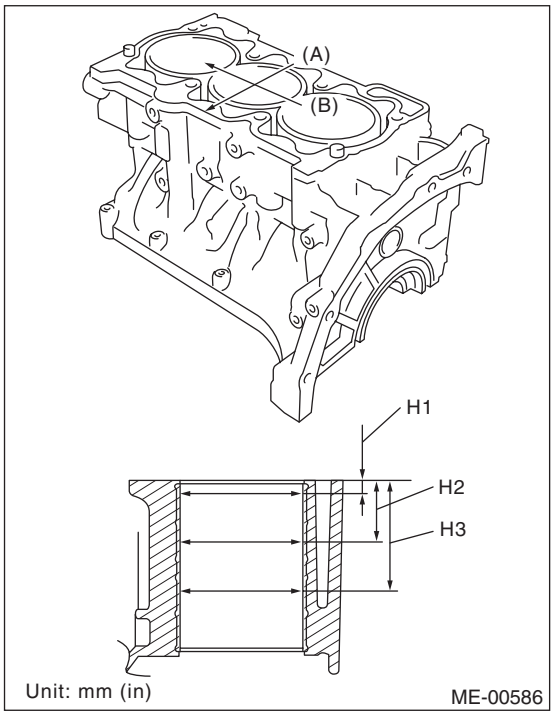
(A) Main journal size mark
(B) Cylinder bore size mark
(C) Cylinder block (RH) – (LH) combination mark

2) How to measure the inner diameter of each cylinder:
Measure the inner diameter of each cylinder in both the thrust and piston pin directions at the heights as shown in the figure, using a cylinder bore gauge.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylindricality:
Standard
0.030 mm (0.0012 in)

Out-of-roundness:
Standard
0.010 mm (0.0004 in)



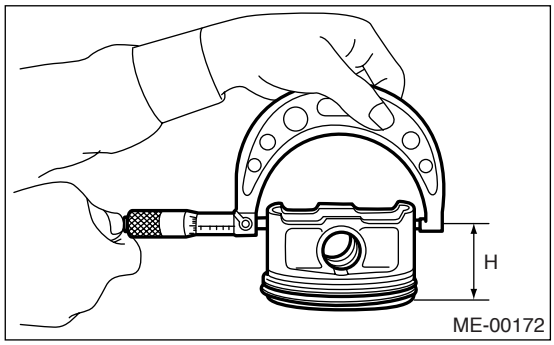
(A) Piston pin direction
(B) Thrust direction
H1: 10 mm (0.39 in)
H2: 45 mm (1.77 in)
H3: 80 mm (3.15 in)

3) When the piston is to be replaced due to general or cylinder wear, determine a suitable sized piston by measuring the piston clearance.
4) How to measure the outer diameter of each piston:
Measure the outer diameter of each piston at the height as shown in the figure. (Thrust direction)

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Piston grade point H:
37.3 mm (1.4685 in)

Piston outer diameter:
Standard
A: 89.205 — 89.215 mm (3.5120 — 3.5124 in)
B: 89.195 — 89.205 mm (3.5116 — 3.5220 in)
0.25 mm (0.0098 in) oversize
89.445 — 89.465 mm (3.5215 — 3.5222 in)
0.50 mm (0.0197 in) oversize
89.695 — 89.715 mm (3.5313 — 3.5321 in)



5) Calculate the clearance between cylinder and piston.

NOTE:
Measurement should be performed at a temperature of 20°C (68°F).

Cylinder to piston clearance at 20°C (68°F):
Standard
–0.010 — 0.010 mm (–0.00039 — 0.00039 in)

6) Boring and honing:
(1) If the value of cylindricality, out-of-roundness, or cylinder-to-piston clearance measured is out of standard or if there is any damage on the cylinder wall, rebore it to use an oversize piston.

CAUTION:
When any of the cylinders needs reboring, all other cylinders must be bored at the same time, and use oversize pistons. Do not perform boring on one cylinder only. Nor use an oversize piston for one cylinder only.

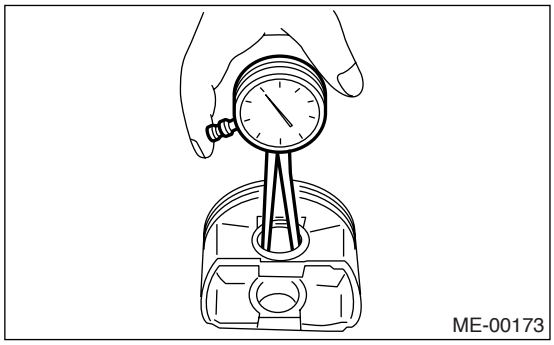
(2) If the cylinder inner diameter exceeds 89.715 mm (3.5321 in) after boring and honing, replace the crankcase.

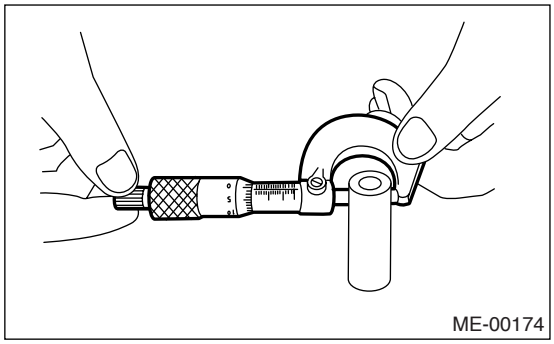
NOTE:
Immediately after reboring, the cylinder diameter may differ from its real diameter due to temperature rise. Thus, pay attention to this when measuring the cylinder diameter.

3. PISTON AND PISTON PIN

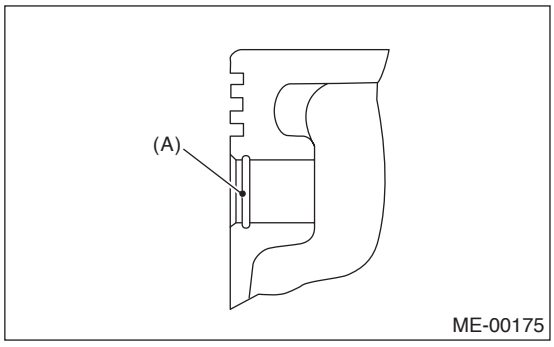
1) Check the pistons and piston pins for damage, cracks and wear, and the piston ring grooves for wear and damage. Replace if defective.
2) Measure the piston-to-cylinder clearance at each cylinder. <Ref. to ME(H6DO)-71, CYLINDER AND PISTON, INSPECTION, CYLINDER BLOCK.> If any of the clearances is not within specification, replace the piston or bore the cylinder to use an oversize piston.
3) Make sure that the piston pin can be inserted into the piston pin hole with a thumb at 20°C (68°F). Replace if defective.

Standard clearance between piston pin and hole in piston:
Standard
0.004 — 0.008 mm (0.0002 — 0.0003 in)





4) Check the snap ring installation groove (A) on the piston for burr. If necessary, remove burr from the groove so that the piston pin can lightly move.

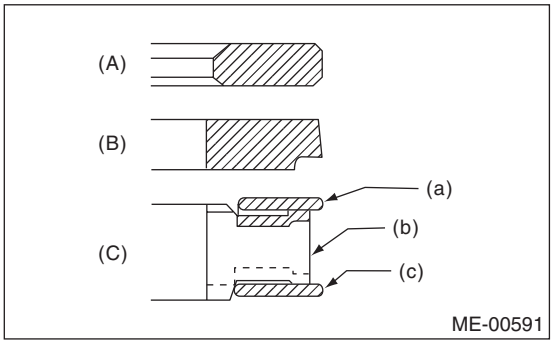


5) Check the piston pin snap ring for distortion, cracks and wear.

4. PISTON RING

1) If the piston ring is broken, damaged, or worn, or if its tension is insufficient, or when the piston is replaced, replace the piston ring with a new one of the same size as the piston.

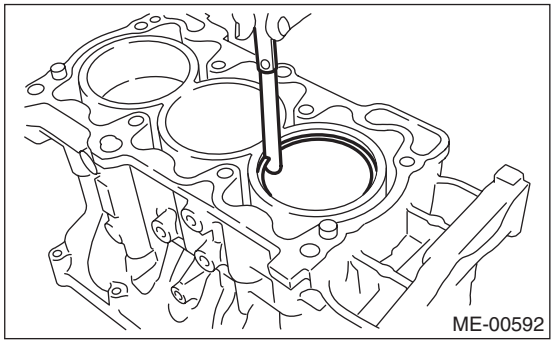
CAUTION:
• Mark is displayed on the end of top and second rings. When installing the rings to the piston, face this mark upward.
• Oil ring consists of the upper rail, expander and lower rail. When installing on piston, be careful of each rail's direction.



(A) Top ring
(B) Second ring
(C) Oil ring
(a) Upper rail
(b) Expander
(c) Lower rail

2) Squarely place the piston ring and oil ring in cylinder, and measure the piston ring gap with a thickness gauge.

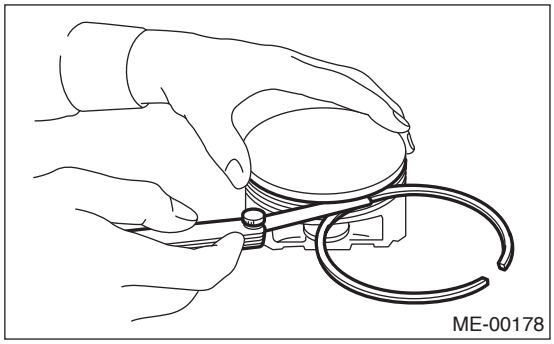
		Standard mm (in)
Piston ring gap	Top ring	0.20 — 0.35 (0.0079 — 0.0138)
	Second ring	0.35 — 0.50 (0.0138 — 0.0197)
	Oil ring	0.20 — 0.60 (0.0079 — 0.0236)



3) Measure the clearance between piston ring and piston ring groove with a thickness gauge.

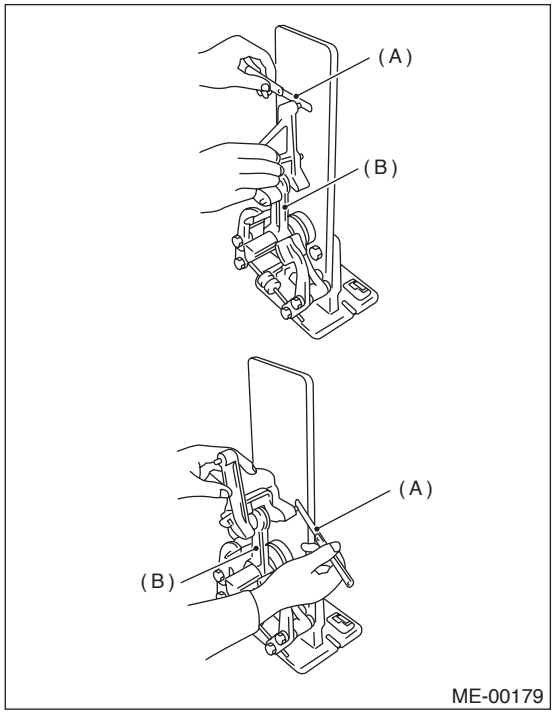
NOTE:
Before measuring the clearance, clean the piston ring groove and piston ring.

		Standard mm (in)
Clearance between piston ring and piston ring groove	Top ring	0.040 — 0.080 (0.0016 — 0.0031)
	Second ring	0.030 — 0.070 (0.0012 — 0.0028)
Clearance between oil ring and oil ring groove		0.045 — 0.125 (0.0018 — 0.0049)



5. CONNECTING ROD

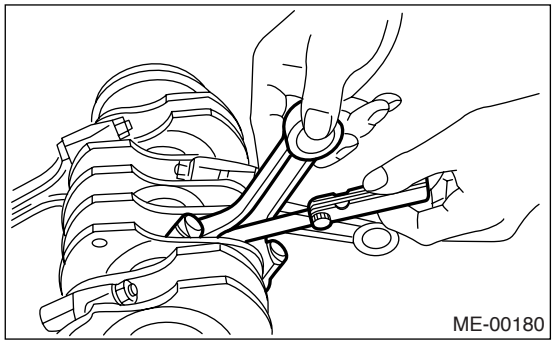
1) Replace the connecting rod, if the large or small end thrust surface is damaged.
2) Check for bend or twist using a connecting rod aligner. Replace the connecting rod if it has the bend or twist.



(A) Thickness gauge
(B) Connecting rod

3) Install the connecting rod fitted with bearing to crankshaft and measure the side clearance (thrust clearance). If side clearance exceeds the limit or offset wearing is emitted, replace the connecting rod.

Connecting rod side clearance:
Standard
0.070 — 0.330 mm (0.0028 — 0.0130 in)



4) Inspect the connecting rod bearing for scar, peeling, seizure, melting, wear, etc.

5) Measure the oil clearance on individual connecting rod bearings by means of plastigauge. If any oil clearance is not within the specification, replace the defective bearing with a new one of standard size or undersize as necessary. (See the table below.)

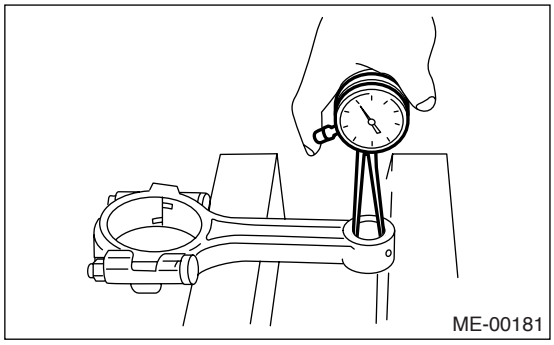
Connecting rod oil clearance:
Standard
0.016 — 0.043 mm (0.0006 — 0.0017 in)

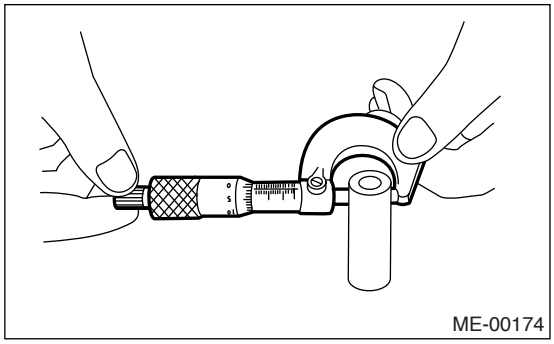
Unit: mm (in)

Bearings	Bearing size (Thickness at center)	Outer diameter of crank pin
Standard	1.490 — 1.506 (0.0587 — 0.0593)	51.984 — 52.000 (2.0466 — 2.0472)
0.03 (0.0012) undersize	1.509 — 1.513 (0.0594 — 0.0596)	51.954 — 51.970 (2.0454 — 2.0461)
0.05 (0.0020) undersize	1.519 — 1.523 (0.0598 — 0.0600)	51.934 — 51.950 (2.0446 — 2.0453)
0.25 (0.0098) undersize	1.619 — 1.623 (0.0637 — 0.0639)	51.734 — 51.750 (2.0368 — 2.0374)

6) Inspect the bushing at connecting rod small end, and replace if worn or damaged. Also measure the piston pin clearance at the connecting rod small end.

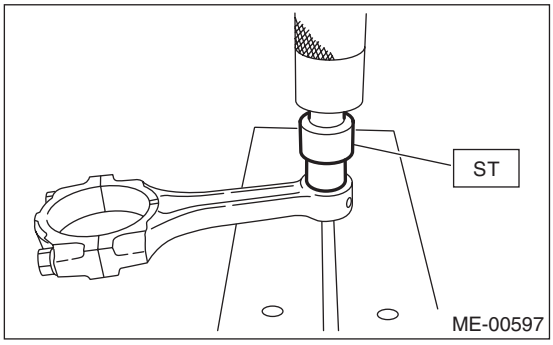
Clearance between piston pin and bushing:
Standard
0 — 0.022 mm (0 — 0.0009 in)





7) Replacement procedure is as follows.
(1) Remove the bushing from connecting rod with ST and press.
(2) Press the bushing with ST after applying oil on the periphery of bushing.

ST 18350AA000 CONNECTING ROD BUSHING REMOVER AND INSTALLER

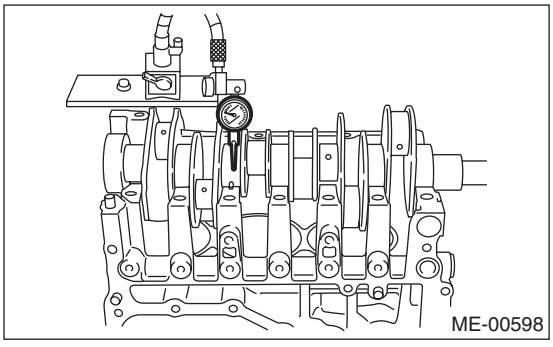


(3) Make two 3 mm (0.12 in) holes in bushing. Ream the inside of bushing.
(4) After completion of reaming, clean the bushing to remove chips.

6. CRANKSHAFT AND CRANKSHAFT BEARING

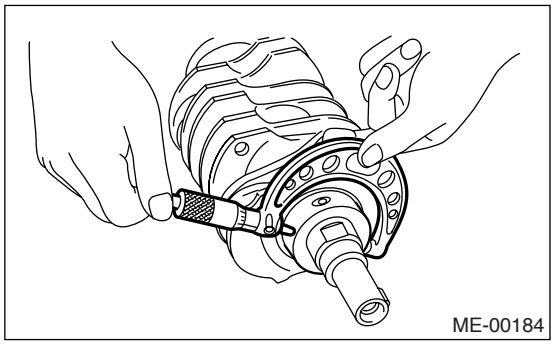
1) Clean the crankshaft completely, and check it for cracks using red lead. Replace if defective.
2) Check the crankshaft for bend, and repair or replace if needed.

NOTE:
If a suitable V-block is not available, install #1 and #5 crankshaft bearing on cylinder block, position the crankshaft on these bearings, and then check the crankshaft for bend using a dial gauge.



3) Inspect the crank journal and crank pin for wear. If they are not within the specifications, replace the bearing with a suitable (undersize) one, and replace or recondition crankshaft as necessary. When grinding the crank journal or crank pin, finish them to the specified dimensions according to the undersize bearing to be used.

Crank pin and crank journal:
Out-of-roundness
0.005 mm (0.0002 in)
Cylindricality
0.006 mm (0.0002 in)

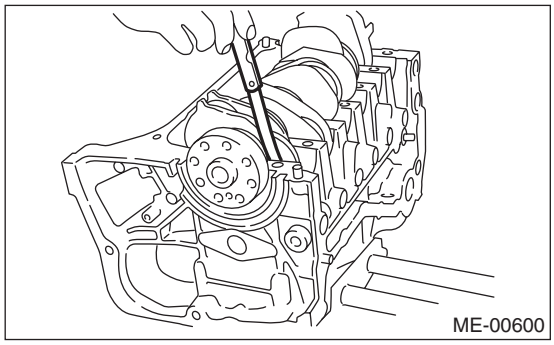


Unit: mm (in)

		Crank journal diameter		Crank pin outer diameter
		#1, #3, #5, #7	#2, #4, #6	
Standard:	Journal O.D.	63.992 — 64.008 (2.5194 — 2.5200)		51.984 — 52.000 (2.0466 — 2.0472)
	Bearing size (Thickness at center)	1.992 — 2.005 (0.0784 — 0.0789)	1.996 — 2.009 (0.0786 — 0.0791)	1.490 — 1.506 (0.0587 — 0.0593)
0.03 (0.0012) undersize	Journal O.D.	63.962 — 63.978 (2.5182 — 2.5188)		51.954 — 51.970 (2.0454 — 2.0461)
	Bearing size (Thickness at center)	2.011 — 2.014 (0.0792 — 0.0793)	2.015 — 2.018 (0.0793 — 0.0794)	1.509 — 1.513 (0.0594 — 0.0596)
0.05 (0.0020) undersize	Journal O.D.	63.942 — 63.958 (2.5174 — 2.5180)		51.934 — 51.950 (2.0446 — 2.0453)
	Bearing size (Thickness at center)	2.021 — 2.024 (0.0796 — 0.0797)	2.025 — 2.028 (0.0797 — 0.0798)	1.519 — 1.523 (0.0598 — 0.0600)
0.25 (0.0098) undersize	Journal O.D.	63.742 — 63.758 (2.5095 — 2.5102)		51.734 — 51.750 (2.0368 — 2.0374)
	Bearing size (Thickness at center)	2.121 — 2.124 (0.0835 — 0.0836)	2.125 — 2.128 (0.0837 — 0.0838)	1.619 — 1.623 (0.0637 — 0.0639)

4) Measure the thrust clearance of crankshaft at center bearing. If clearance exceeds the limit, replace the bearing.

Crankshaft side clearance:
Standard
0.030 — 0.115 mm (0.0012 — 0.0045 in)



5) Inspect individual crankshaft bearings for signs of flaking, seizure, melting, and wear.
6) Measure the oil clearance on each crankshaft bearing by means of plastigauge. If the measurement is not within the specification, replace the defective bearing with an undersize one, and replace or recondition the crankshaft as necessary.

Crankshaft oil clearance:
Standard
0.010 — 0.030 mm (0.0004 — 0.0012 in)

22. Oil Flow Control Solenoid Valve

A: REMOVAL

Oil flow control solenoid valve is a unit with camshaft cap.
Refer to “Camshaft” for removal. <Ref. to ME(H6DO)-54, REMOVAL, Camshaft.>

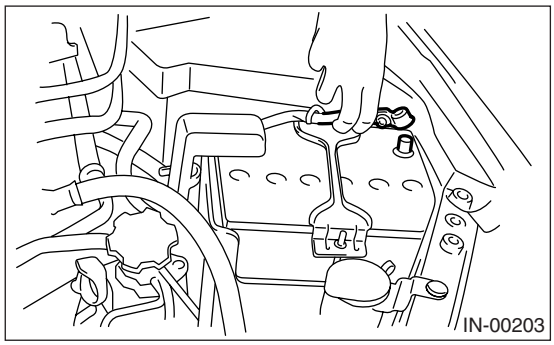
B: INSTALLATION

Install in the reverse order of removal.

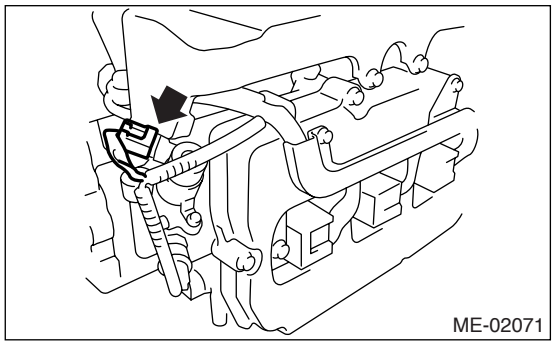
23.Oil Switching Solenoid Valve

A: REMOVAL

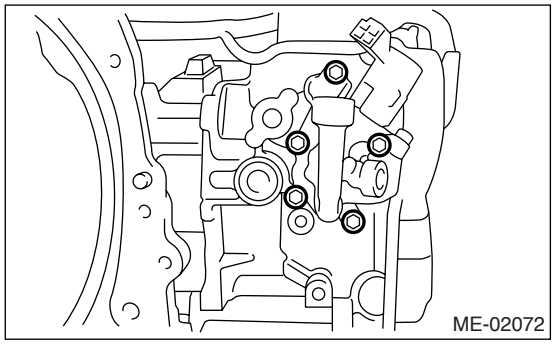
1) Disconnect the ground cable from battery.



2) Remove the air intake chamber.
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
3) Disconnect the connector from oil switching solenoid valve.



4) Remove the oil switching solenoid valve.
5) Remove the variable valve lift diagnosis oil pressure switch.
<Ref. to FU(H6DO)-28, REMOVAL, Variable Valve Lift Diagnosis Oil Pressure Switch.>
6) Remove the oil temperature sensor.
<Ref. to FU(H6DO)-29, REMOVAL, Oil Temperature Sensor.>
7) Remove the oil flow control solenoid valve holder from cylinder head.

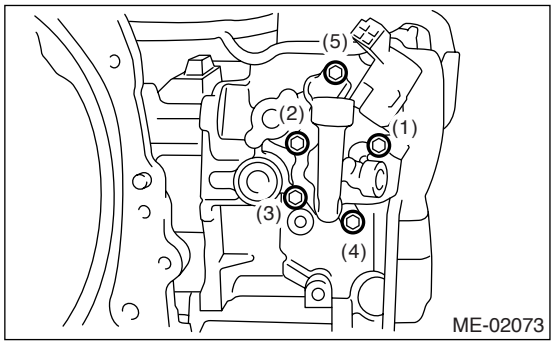


B: INSTALLATION

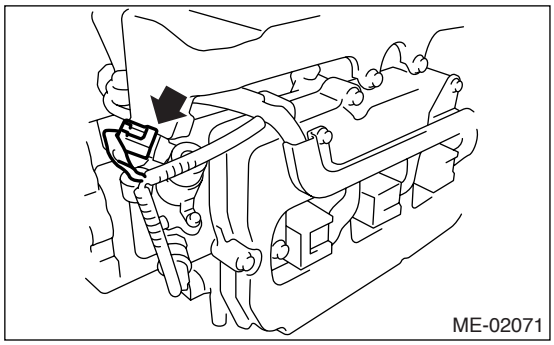
1) Install the oil switching solenoid valve holder.

NOTE:
Always use new gasket.

(1) Temporarily tighten the bolts by tightening torque of 5 — 10 N·m (0.5 — 1.0 kgf-m, 3.7 — 7.4 ft-lb) in order indicated in the figure.
(2) Tighten the bolts by tightening torque of 10±0.5 N·m (1.0±0.05 kgf-m, 7.4±0.37 ft-lb).



2) Install the oil temperature sensor.
<Ref. to FU(H6DO)-29, INSTALLATION, Oil Temperature Sensor.>
3) Install the variable valve lift diagnosis oil pressure switch.
<Ref. to FU(H6DO)-28, INSTALLATION, Variable Valve Lift Diagnosis Oil Pressure Switch.>
4) Install the oil switching solenoid valve.
5) Connect the connector to oil switching solenoid valve.

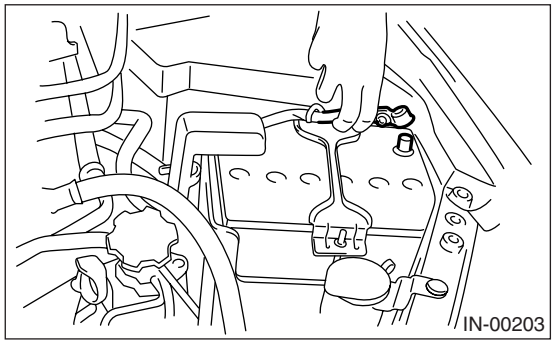


6) Install the air intake chamber.
<Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

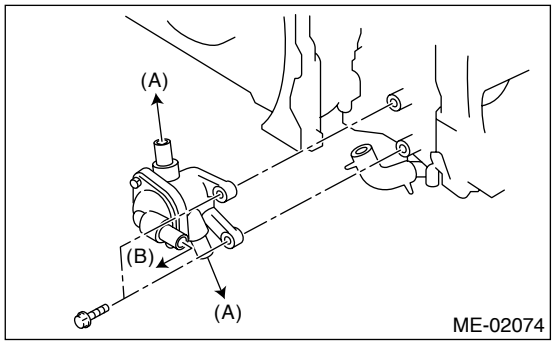
24.ATF Warmer Cock

A: REMOVAL

1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



4) Lift-up the vehicle.
5) Remove the under cover.
6) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
7) Disconnect the water hose from ATF warmer cock.
8) Remove the ATF warmer cock from cylinder head.

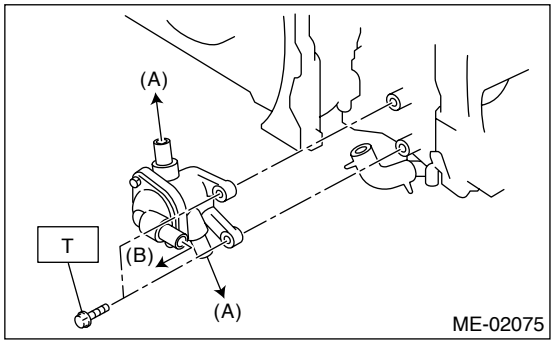


(A) Water pipe
(B) ATF warmer

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) Water pipe
(B) ATF warmer

25.Engine Trouble in General

A: INSPECTION

NOTE:
“RANK” shown in the chart refers to the possibility of reason for the trouble in order (“Very often” to “Rarely”)
A — Very often
B — Sometimes
C — Rarely

Symptom	Problem parts, etc.	Possible cause	RANK
1. Engine does not start.			
1) Starter does not turn.	Starter	Defective battery-to-starter harness	B
		Defective ignition starter switch	C
		Defective inhibitor switch or neutral switch	C
		Defective starter	B
	Battery	Poor terminal connection	A
		Run-down battery	A
		Defective charging system	B
	Friction	Seizure of crankshaft and connecting rod bearing	C
		Seized camshaft	C
		Seized or stuck piston and cylinder	C
2) Initial combustion does not occur.	Starter	Defective starter	C
	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Fuel line	Defective fuel pump and relay	A
		Lack of or insufficient fuel	B
	Chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B

Symptom	Problem parts, etc.	Possible cause	RANK
3) Initial combustion occurs.	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Defective intake manifold gasket	B
		Defective throttle body gasket	B
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
4) Engine stalls after initial combustion.	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	B
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	C
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Dirty air cleaner element	C
	Fuel line	Clogged fuel line	C
		Lack of or insufficient fuel	B
	Chain	Trouble	B
		Defective timing	B
	Compression	Incorrect valve clearance	C
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	B
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B

Symptom	Problem parts, etc.	Possible cause	RANK
2. Rough idle and engine stall	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	C
		Loosened oil filler cap	B
		Dirty air cleaner element	C
	Fuel line	Defective fuel pump and relay	C
		Clogged fuel line	C
		Lack of or insufficient fuel	B
	Chain	Defective timing	C
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Lubrication system	Incorrect oil pressure	B
		Defective rocker cover gasket	C
	Cooling system	Over-heating	C
	Other	Evaporative emission control system malfunction	A
		Stuck or damaged throttle valve	B

Symptom	Problem parts, etc.	Possible cause	RANK
3. Low output, hesitation and poor acceleration	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	B
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	A
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	B
		Loosened cylinder head bolt or defective gasket	B
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	B
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Lubrication system	Incorrect oil pressure	B
	Cooling system	Over-heating	C
		Over-cooling	C
	Other	Evaporative emission control system malfunction	A

Symptom	Problem parts, etc.	Possible cause	RANK
4. Surging	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	A
		Loosened or cracked PCV hose	A
		Loosened or cracked vacuum hose	A
		Defective intake manifold gasket	B
		Defective throttle body gasket	B
		Defective PCV valve	B
		Loosened oil filler cap	B
		Dirty air cleaner element	B
	Fuel line	Defective fuel pump and relay	B
		Clogged fuel line	B
		Lack of or insufficient fuel	C
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	C
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Improper engine oil (low viscosity)	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Cooling system	Over-heating	B
	Other	Evaporative emission control system malfunction	C
5. Engine does not return to idle.	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked vacuum hose	A
	Other	Stuck or damaged throttle valve	A
6. Dieseling (Run-on)	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Cooling system	Over-heating	B
	Other	Evaporative emission control system malfunction	B

Symptom	Problem parts, etc.	Possible cause	RANK
7. After burning in exhaust system	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened or cracked intake duct	C
		Loosened or cracked PCV hose	C
		Loosened or cracked vacuum hose	B
		Defective PCV valve	B
		Loosened oil filler cap	C
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	C
		Incorrect valve timing	A
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C
	Other	Evaporative emission control system malfunction	C
8. Knocking	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Loosened oil filler cap	B
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	C
		Incorrect valve timing	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Cooling system	Over-heating	A
9. Excessive engine oil consumption	Intake system	Loosened or cracked PCV hose	A
		Defective PCV valve	B
		Loosened oil filler cap	C
	Compression	Defective valve stem	A
		Worn or stuck piston rings, cylinder and piston	A
	Lubrication system	Loosened oil pump attaching bolts and defective gasket	B
		Defective oil filter o-ring	B
		Defective crankshaft oil seal	B
		Defective rocker cover gasket	B
		Loosened oil drain plug or defective gasket	B
		Loosened oil pan fitting bolts or defective oil pan	B

Symptom	Problem parts, etc.	Possible cause	RANK
10. Excessive fuel consumption	Engine control system <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>		A
	Intake system	Dirty air cleaner element	A
	Chain	Defective timing	B
	Compression	Incorrect valve clearance	B
		Loosened spark plug or defective gasket	C
		Loosened cylinder head bolt or defective gasket	C
		Improper valve sealing	B
		Defective valve stem	C
		Worn or broken valve spring	C
		Worn or stuck piston rings, cylinder and piston	B
		Incorrect valve timing	B
		Trouble of tappet	C
		Trouble of tappet (In case noise occurs with valve moving or harness trouble involved to variable valve lift occurred in past time.)	B
	Lubrication system	Incorrect oil pressure	C
	Cooling system	Over-cooling	C

26.Engine Noise

A: INSPECTION

Type of sound	Condition	Possible cause
Regular clicking sound	Sound increases as engine speed increases.	• Valve mechanism is defective. • Incorrect valve clearance • Worn valve rocker • Worn camshaft • Broken valve spring
Heavy and dull clank	Oil pressure is low.	• Worn camshaft main bearing • Worn connecting rod bearing (big end)
	Oil pressure is normal.	Damaged engine mounting
High-pitched clank	Sound is noticeable when accelerating with an overload.	• Ignition timing advanced • Accumulation of carbon inside combustion chamber • Wrong spark plug • Improper gasoline
Clank when engine speed is 1,000 to 2,000 rpm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn crankshaft main bearing • Worn bearing at crankshaft end of connecting rod
Knocking sound when engine is operating under idling speed and engine is warm	Sound is reduced when fuel injector connector of noisy cylinder is disconnected. (NOTE*)	• Worn cylinder liner and piston ring • Broken or stuck piston ring • Worn piston pin and hole at piston end of connecting rod
	Sound is not reduced if each fuel injector connector is disconnected in turn. (NOTE*)	• Unusually worn valve lifter • Worn cam gear • Worn camshaft journal bore in crankcase
Squeaky sound	—	• Insufficient generator lubrication
Rubbing sound	—	• Defective generator brush and rotor contact
Gear scream when starting engine	—	• Defective ignition starter switch • Worn gear and starter pinion
Sound like polishing glass with a dry cloth	—	• Loose drive belt • Defective water pump shaft
Hissing sound	—	• Loss of compression • Air leakage in air intake system, hoses, connections or manifolds
Timing belt noise	—	• Loose timing belt • Belt contacting with case/adjacent part
Valve tappet noise	—	• Incorrect valve clearance • Trouble of tappet

NOTE*:
When disconnecting the fuel injector connector, the malfunction indicator light illuminates and DTC is stored in ECM memory. Therefore, carry out the clear memory mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and inspection mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.> after connecting the fuel injector connector.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

EXHAUST

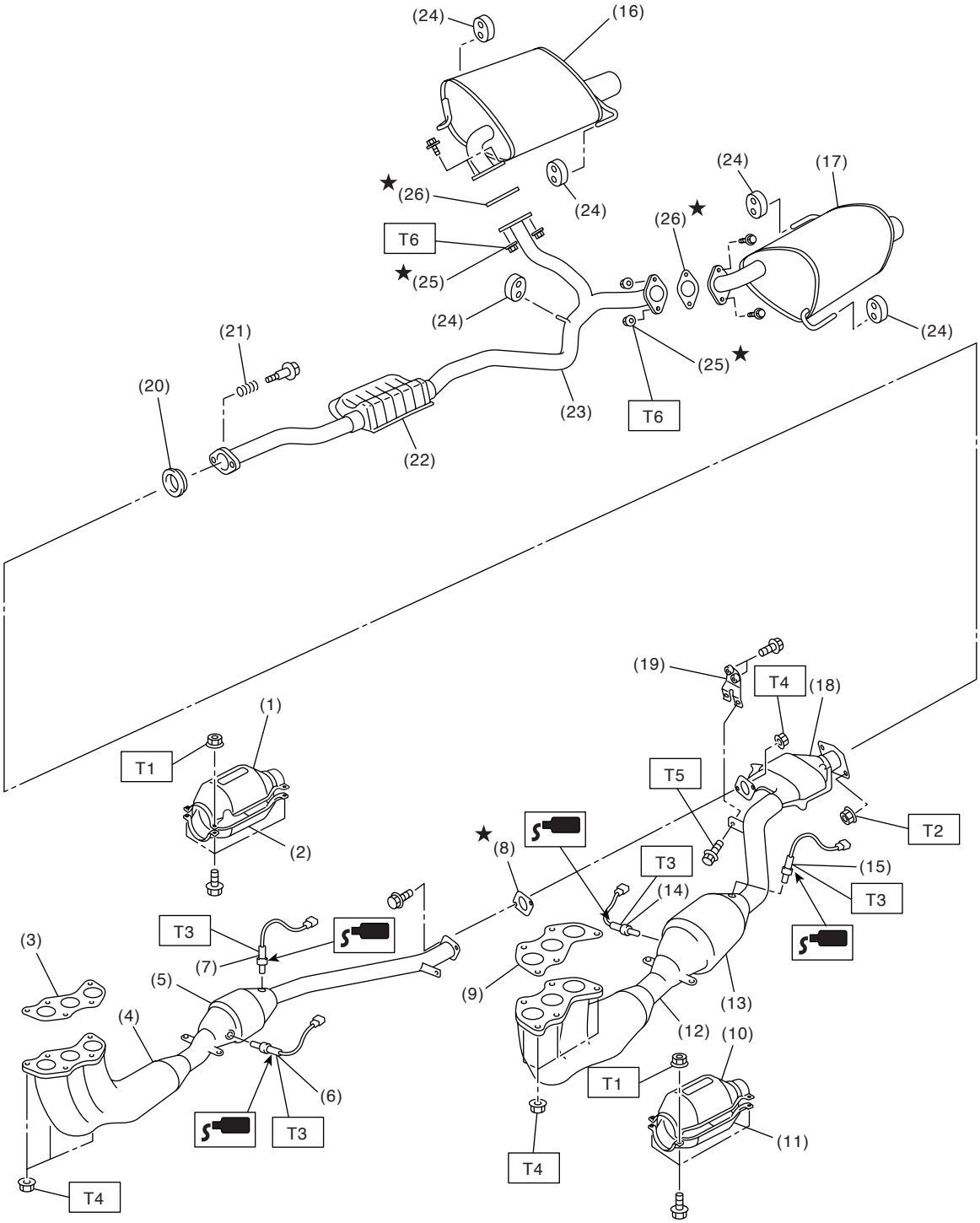
EX(H6DO)

Page

1. General Description 2
2. Front Exhaust Pipe 5
3. Rear Exhaust Pipe 8
4. Muffler 10

1. General Description

A: COMPONENT



EX-02013

(1) Front catalytic converter upper cover (RH)
(2) Front catalytic converter lower cover (RH)
(3) Gasket
(4) Front exhaust pipe (RH)
(5) Front catalytic converter (RH)
(6) Front oxygen (A/F) sensor (RH)
(7) Rear oxygen sensor (RH)
(8) Gasket
(9) Gasket
(10) Front catalytic converter upper cover (LH)
(11) Front catalytic converter lower cover (LH)
(12) Front exhaust pipe (LH)
(13) Front catalytic converter (LH)
(14) Front oxygen (A/F) sensor (LH)
(15) Rear oxygen sensor (LH)
(16) Muffler (RH)
(17) Muffler (LH)
(18) Rear catalytic converter
(19) Bracket
(20) Gasket
(21) Spring
(22) Chamber
(23) Rear exhaust pipe
(24) Cushion rubber
(25) Self-locking nut
(26) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 18 (1.8, 13.0)
T3: 21 (2.1, 15.2)
T4: 30 (3.1, 22.4)
T5: 35 (3.6, 26.0)
T6: 48 (4.9, 35.4)

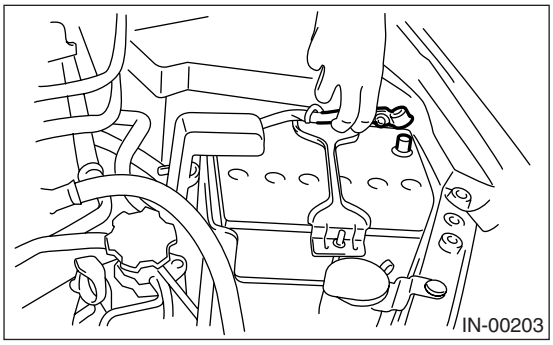
B: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

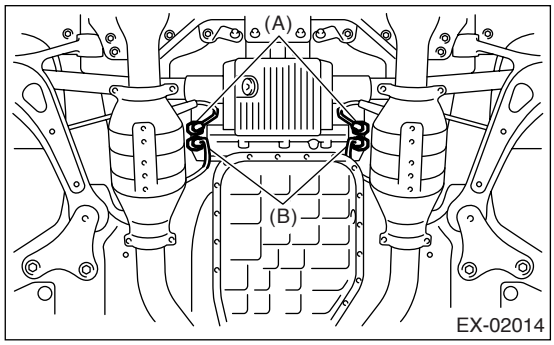
2. Front Exhaust Pipe

A: REMOVAL

1) Disconnect the ground cable from battery.

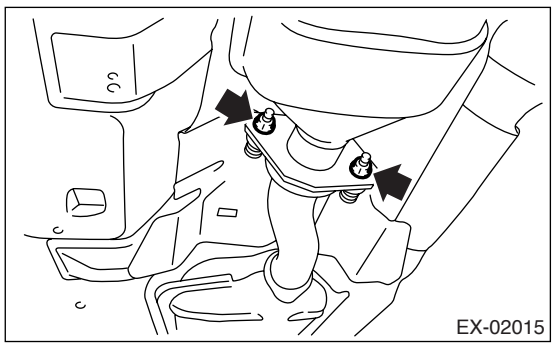


2) Lift-up the vehicle.
3) Remove the under cover.
4) Disconnect the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



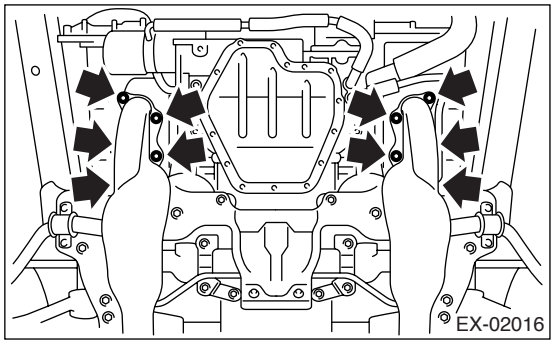
5) Separate the front exhaust pipe from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

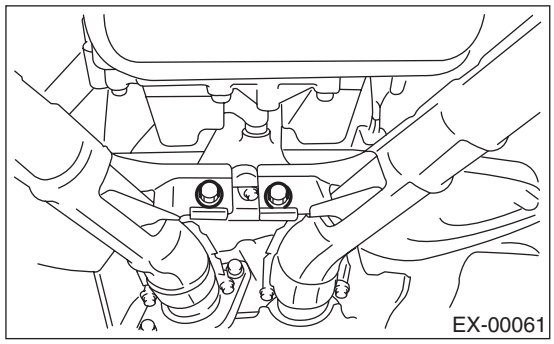


6) Remove the nuts which hold front exhaust pipe onto cylinder heads.

CAUTION:
Be careful not to pull down the front exhaust pipe assembly.



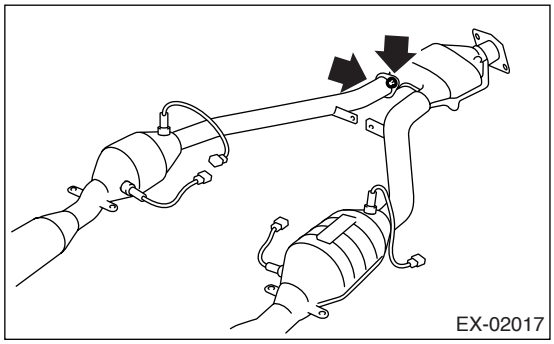
7) Remove the bolts which hold front exhaust pipe assembly to hanger bracket.



8) Remove the front exhaust pipe assembly from vehicle.

CAUTION:
• Be careful not to let the front exhaust pipe assembly fall off when removing, as it is quite heavy.
• After removing the front exhaust pipe assembly, do not apply excessive pulling force on the rear exhaust pipe.

9) Disconnect the front exhaust pipe (RH) from front exhaust pipe assembly.



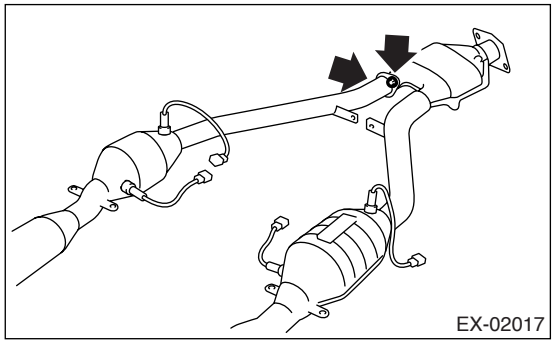
10) Remove the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-30, REMOVAL, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-32, REMOVAL, Rear Oxygen Sensor.>

B: INSTALLATION

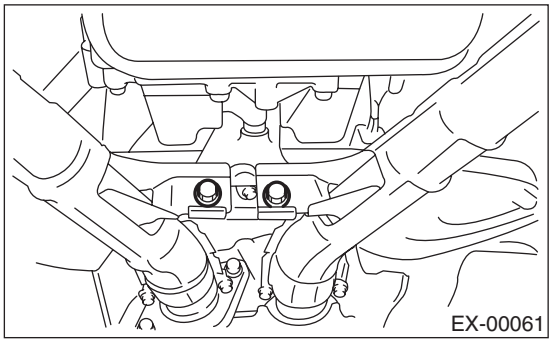
1) Install the front oxygen (A/F) sensor and rear oxygen sensor. <Ref. to FU(H6DO)-30, INSTALLATION, Front Oxygen (A/F) Sensor.> <Ref. to FU(H6DO)-32, INSTALLATION, Rear Oxygen Sensor.>
2) Install the front exhaust pipe (RH) to front exhaust pipe assembly.

NOTE:
Use a new gasket.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)

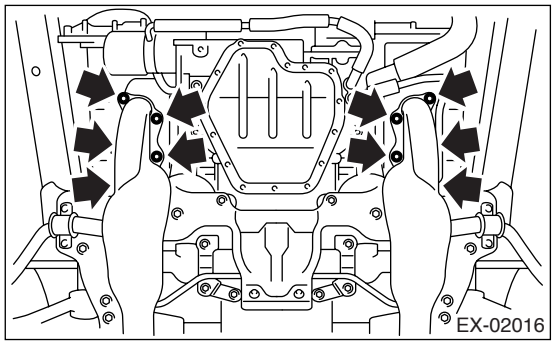


3) Install the front exhaust pipe assembly to vehicle.
4) Temporarily tighten the bolts which hold front exhaust pipe assembly to hanger bracket.



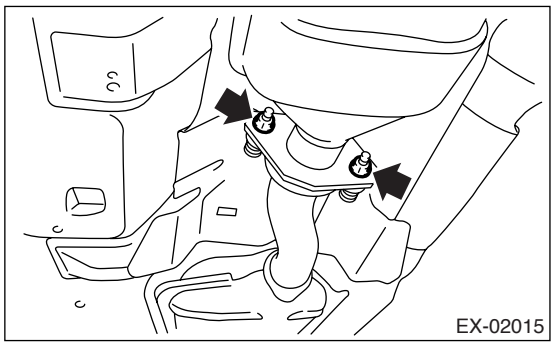
5) Install the nuts to cylinder head which hold front exhaust pipe.

Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)



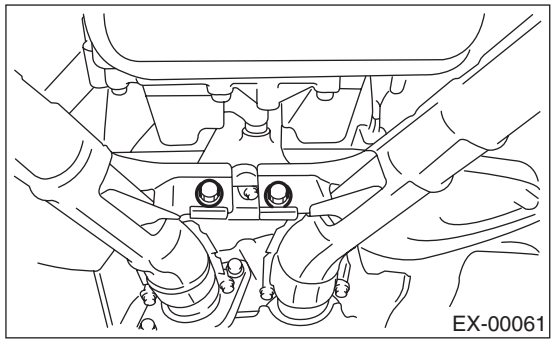
6) Install the under cover.
7) Tighten the bolts which install the front exhaust pipe to rear exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

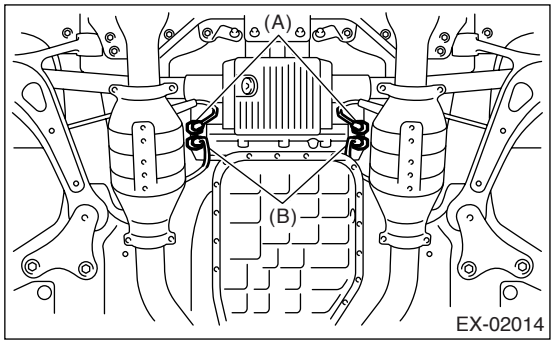


8) Tighten the bolts which hold the front exhaust pipe assembly to hanger bracket.

Tightening torque:
35 N·m (3.6 kgf-m, 26.0 ft-lb)

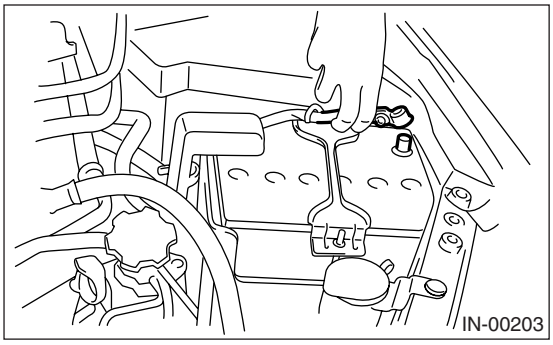


9) Connect the front oxygen (A/F) sensor connector (A) and rear oxygen sensor connector (B).



10) Lower the vehicle.

11) Connect the battery ground cable to battery.



C: INSPECTION

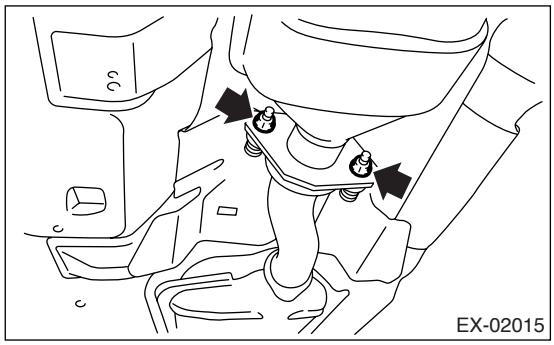
1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.

3. Rear Exhaust Pipe

A: REMOVAL

1) Separate the rear exhaust pipe from front exhaust pipe.

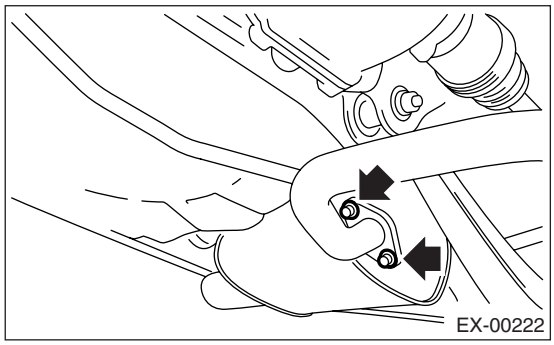
CAUTION:
Be careful, exhaust pipe is hot.



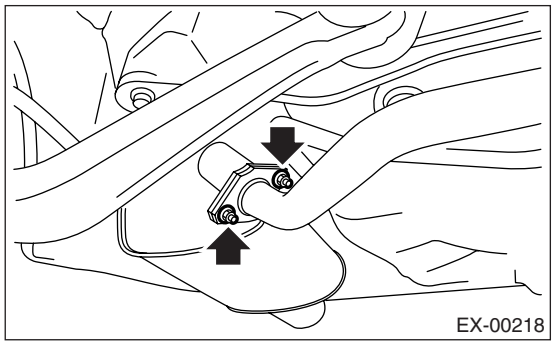
2) Separate the rear exhaust pipe from muffler.

CAUTION:
Be careful not to pull down the rear exhaust pipe.

- LH side

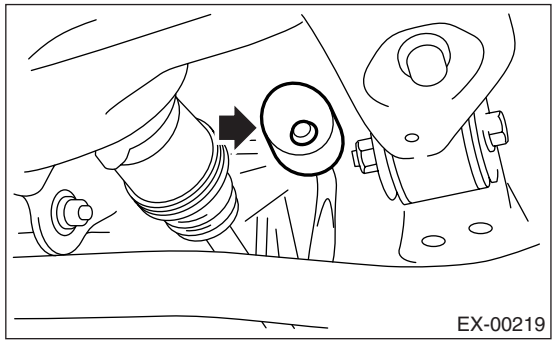


- RH side



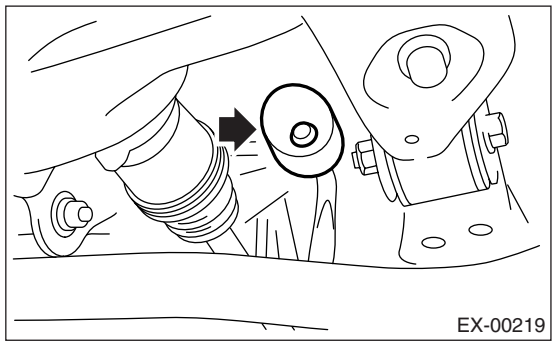
3) Apply a coat of spray type lubricant to the mating area of cushion rubber.

4) Remove the rear exhaust pipe bracket from cushion rubber.



B: INSTALLATION

1) Apply a coat of spray type lubricant to the mating area of cushion rubber.
2) Install the rear exhaust pipe bracket to cushion rubber.

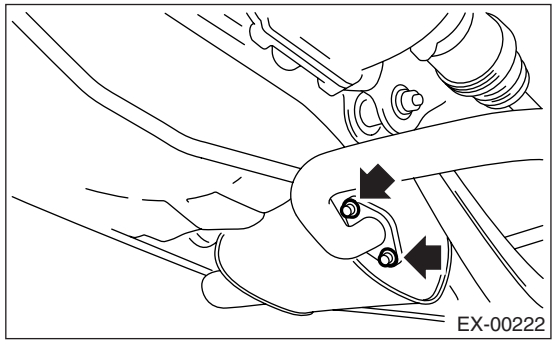


3) Install the rear exhaust pipe to muffler.

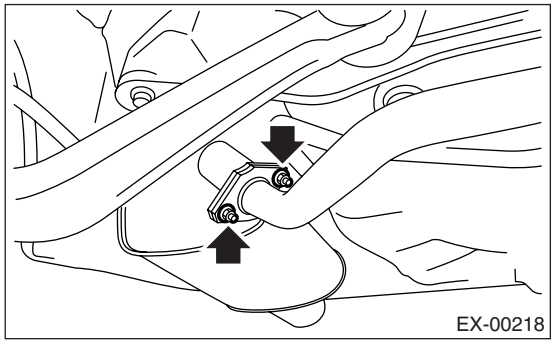
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

- LH side

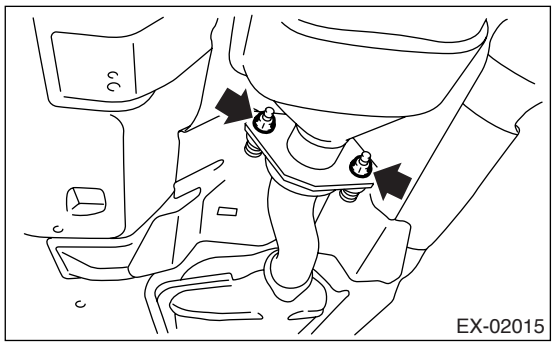


• RH side



4) Install the rear exhaust pipe to center exhaust pipe.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

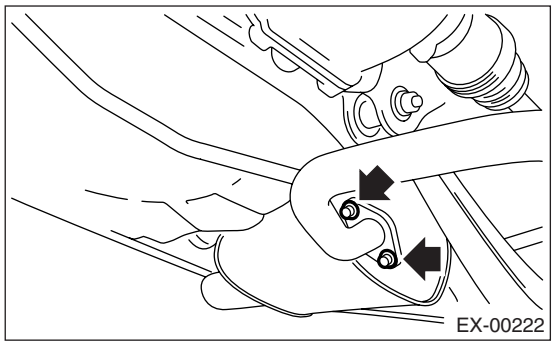
4. Muffler

A: REMOVAL

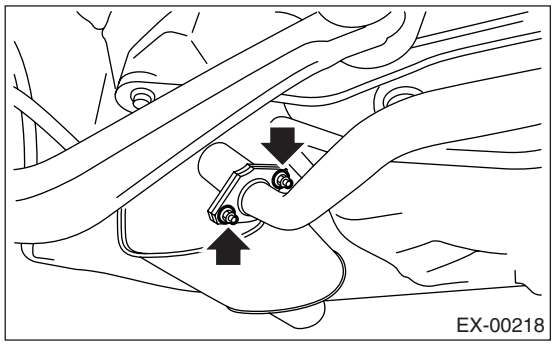
1) Separate the muffler from rear exhaust pipe.

CAUTION:
Be careful, exhaust pipe is hot.

- LH side

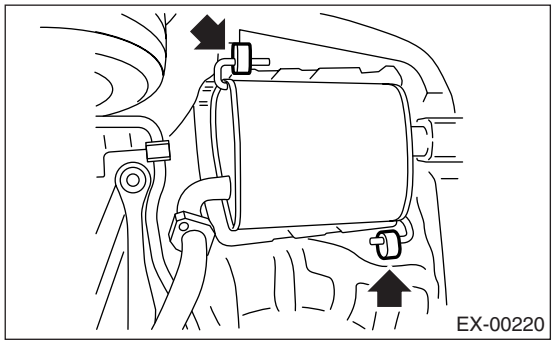


- RH side

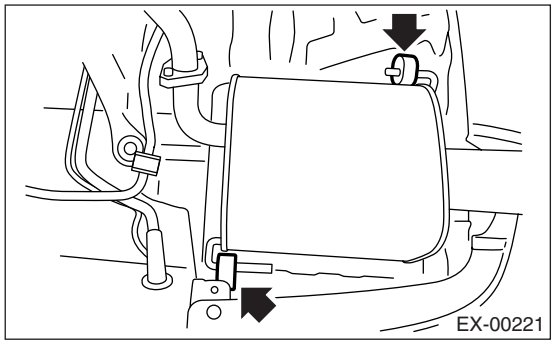


2) Apply a coat of spray type lubricant to the mating area of cushion rubber.

- LH side



- RH side



3) Remove the front and rear cushion rubber, and then remove the muffler.

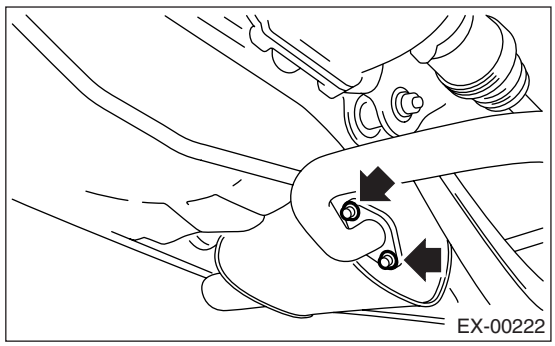
B: INSTALLATION

Install in the reverse order of removal.

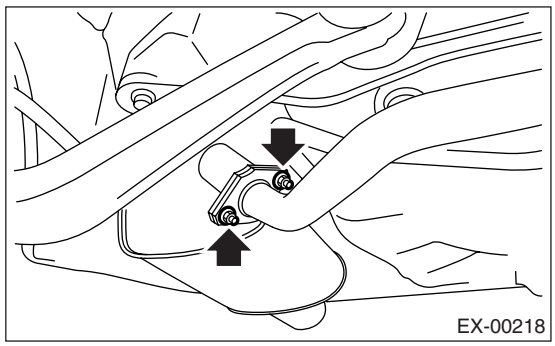
NOTE:
Use a new gasket and self-locking nut.

Tightening torque:
48 N·m (4.9 kgf-m, 35.4 ft-lb)

- LH side



- RH side



C: INSPECTION

1) Make sure there are no exhaust leaks from connections and welds.
2) Make sure there are no holes or rusting.
3) Make sure the cushion rubber is not worn or cracked.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

COOLING

CO(H6DO)

		Page
1.	General Description	2
2.	Radiator Fan System	6
3.	Engine Coolant	9
4.	Water Pump	11
5.	Thermostat	12
6.	Radiator	13
7.	Radiator Cap	16
8.	Radiator Main Fan and Fan Motor	17
9.	Radiator Sub Fan and Fan Motor	20
10.	Reservoir Tank	22
11.	Radiator Fan Control Unit	23
12.	Engine Cooling System Trouble in General	24

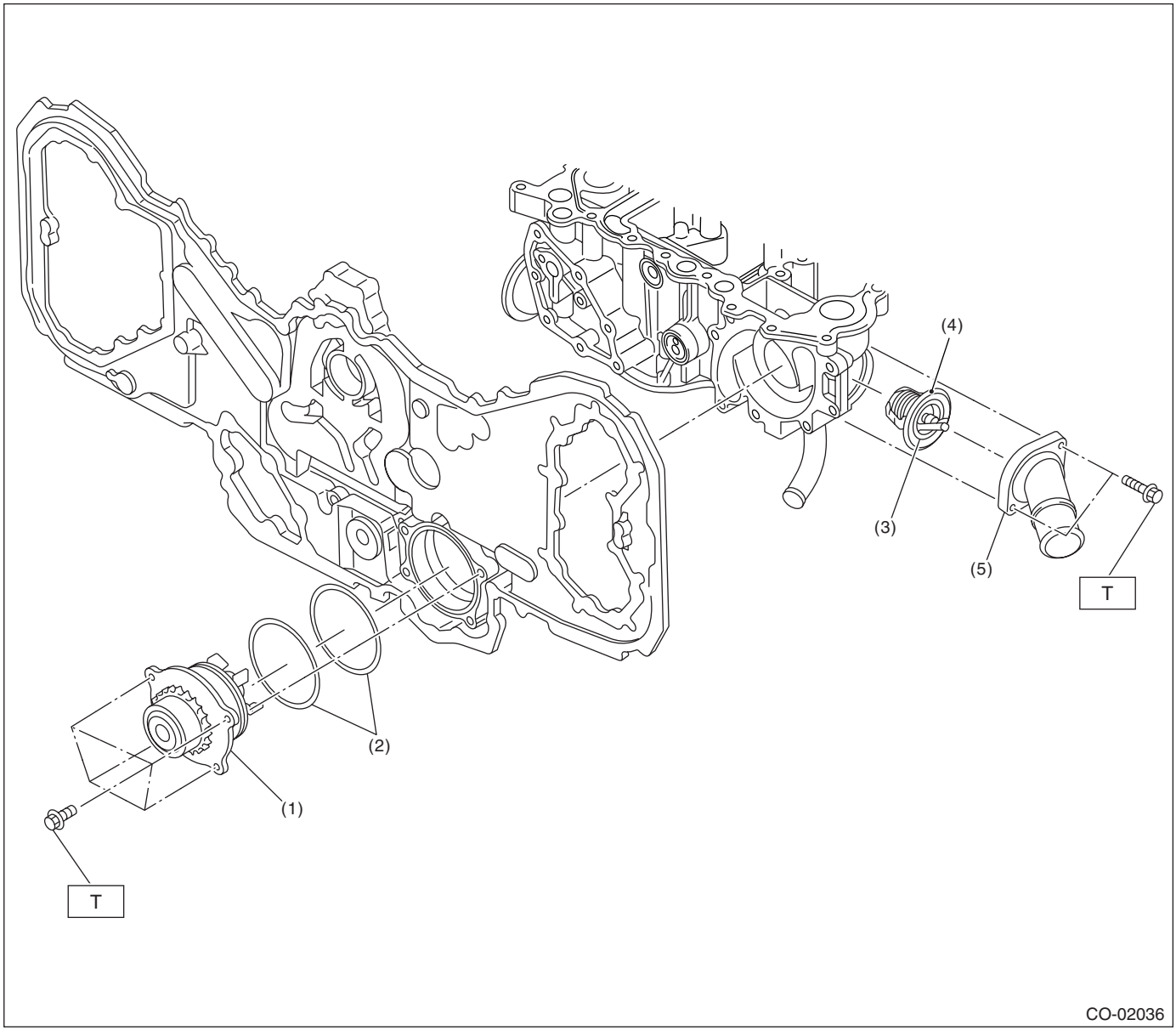
1. General Description

A: SPECIFICATION

Cooling system			Electric fan + Forced engine coolant circulation system
Total engine coolant capacity ℓ (US qt, Imp qt)		Model with ATF warmer (LHD)	Approx. 7.7 (8.1, 6.8)
		Model with ATF warmer (RHD)	Approx. 7.8 (8.2, 6.9)
		Model without ATF warmer	Approx. 7.2 (7.6, 6.3)
Water pump	Type		Centrifugal impeller type
	Discharge performance I	Discharge amount ℓ (US gal, Imp gal)/min	320 (84.5, 70.4)
		Pump speed — Discharge pressure	5,500 rpm — 176.5 kPa (18 mAq)
		Engine coolant temperature	80°C (176°F)
	Impeller diameter mm (in)		73.2 (2.88)
	Number of impeller vanes		6
	Number of pump sprocket teeth		22
Thermostat	Type		Wax pellet type
	Starting temperature to open		80 — 84°C (176 — 183°F)
	Fully opens		95°C (203°F)
	Valve lift mm (in)		9.0 (0.354) or more
	Valve bore mm (in)		35 (1.38)
Radiator fan	Motor input	Main fan W	160
		Sub fan W	160
	Fan diameter / Blades	Main fan	320 mm (12.60 in) /5
		Sub fan	320 mm (12.6 in) /7
Radiator	Type		Down flow, pressure type
	Core dimensions	Width × Height × Thickness mm (in)	690 × 349 × 16 (27.17 × 13.74 × 0.63)
	Pressure range in which cap valve is open	kPa (kg/cm^2, psi)	Above: 108±15 (1.1±0.15, 16±2) Below: −1.0 — −4.9 (−0.01 — −0.05, −0.1 — −0.7)
	Fins		Corrugated fin type
Reservoir tank	Capacity ℓ (US qt, Imp qt)		0.5 (0.5, 0.4)

B: COMPONENT

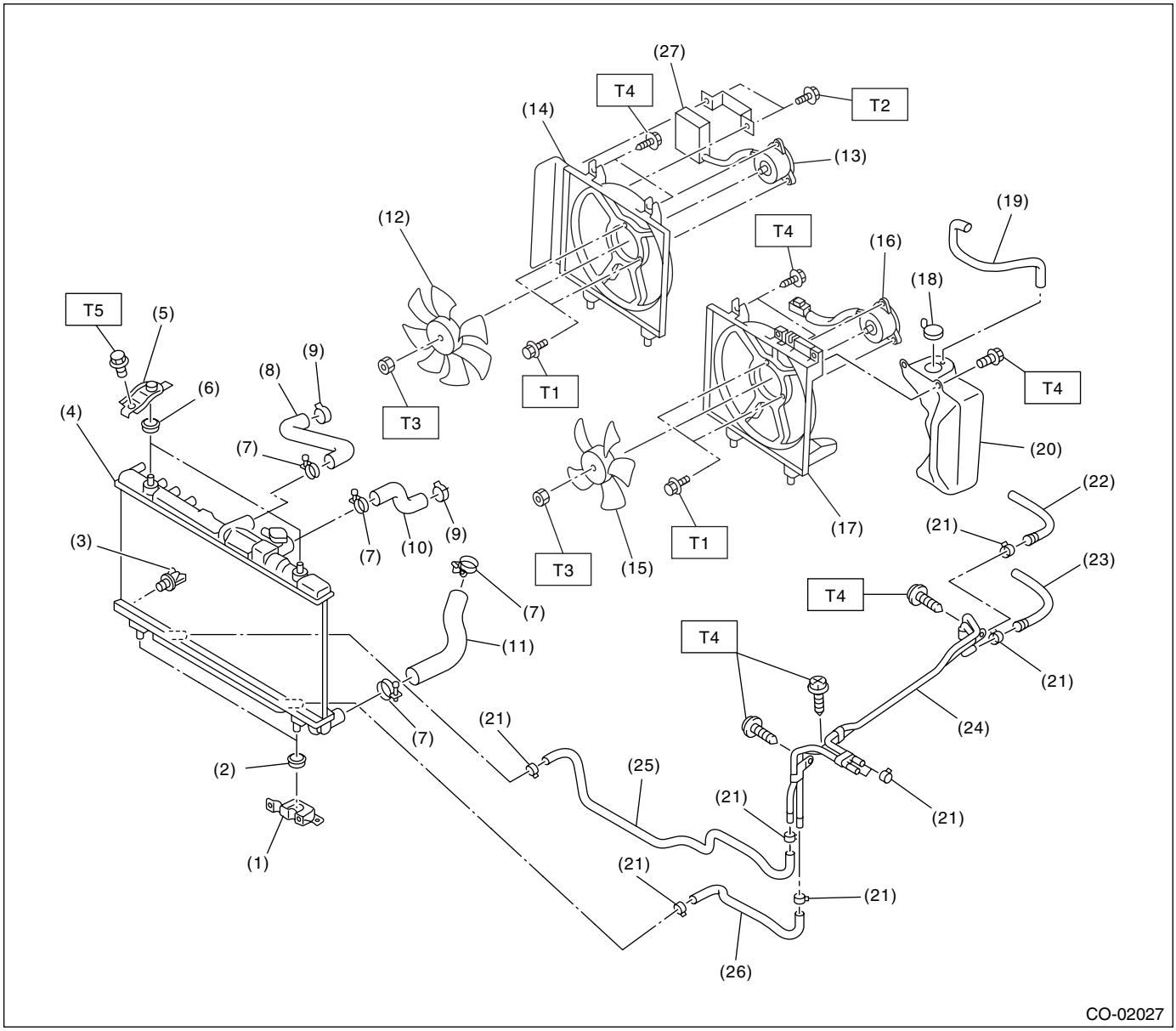
1. WATER PUMP



(1) Water pump ASSY
(2) O-ring
(3) Thermostat
(4) Gasket
(5) Thermostat cover

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.4 (0.65, 4.7)

2. RADIATOR AND RADIATOR FAN



(1) Radiator lower bracket
(2) Radiator lower cushion
(3) Engine coolant drain cock
(4) Radiator
(5) Radiator upper bracket
(6) Radiator upper cushion
(7) Clamp
(8) Radiator inlet hose A
(9) Clamp
(10) Radiator inlet hose B
(11) Radiator outlet hose
(12) Radiator sub fan
(13) Radiator sub fan motor
(14) Radiator sub fan shroud
(15) Radiator main fan
(16) Radiator main fan motor
(17) Radiator main fan shroud
(18) Engine coolant reservoir tank cap
(19) Over flow hose
(20) Engine coolant reservoir tank
(21) ATF hose clamp
(22) ATF inlet hose A
(23) ATF outlet hose A
(24) ATF pipe
(25) ATF inlet hose B
(26) ATF outlet hose B
(27) Radiator fan control unit

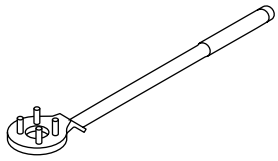
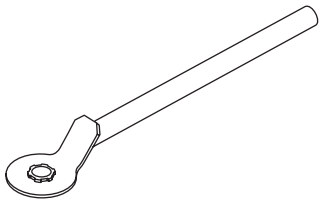
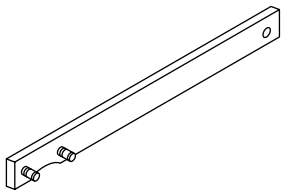
Tightening torque: N·m (kgf-m, ft-lb)
T1: 3.8 (0.39, 2.8)
T2: 5.4 (0.55, 4.0)
T3: 6.2 (0.63, 4.6)
T4: 7.5 (0.76, 5.5)
T5: 12 (1.2, 8.7)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

D: PREPARATION TOOL

1. SPECIAL TOOL

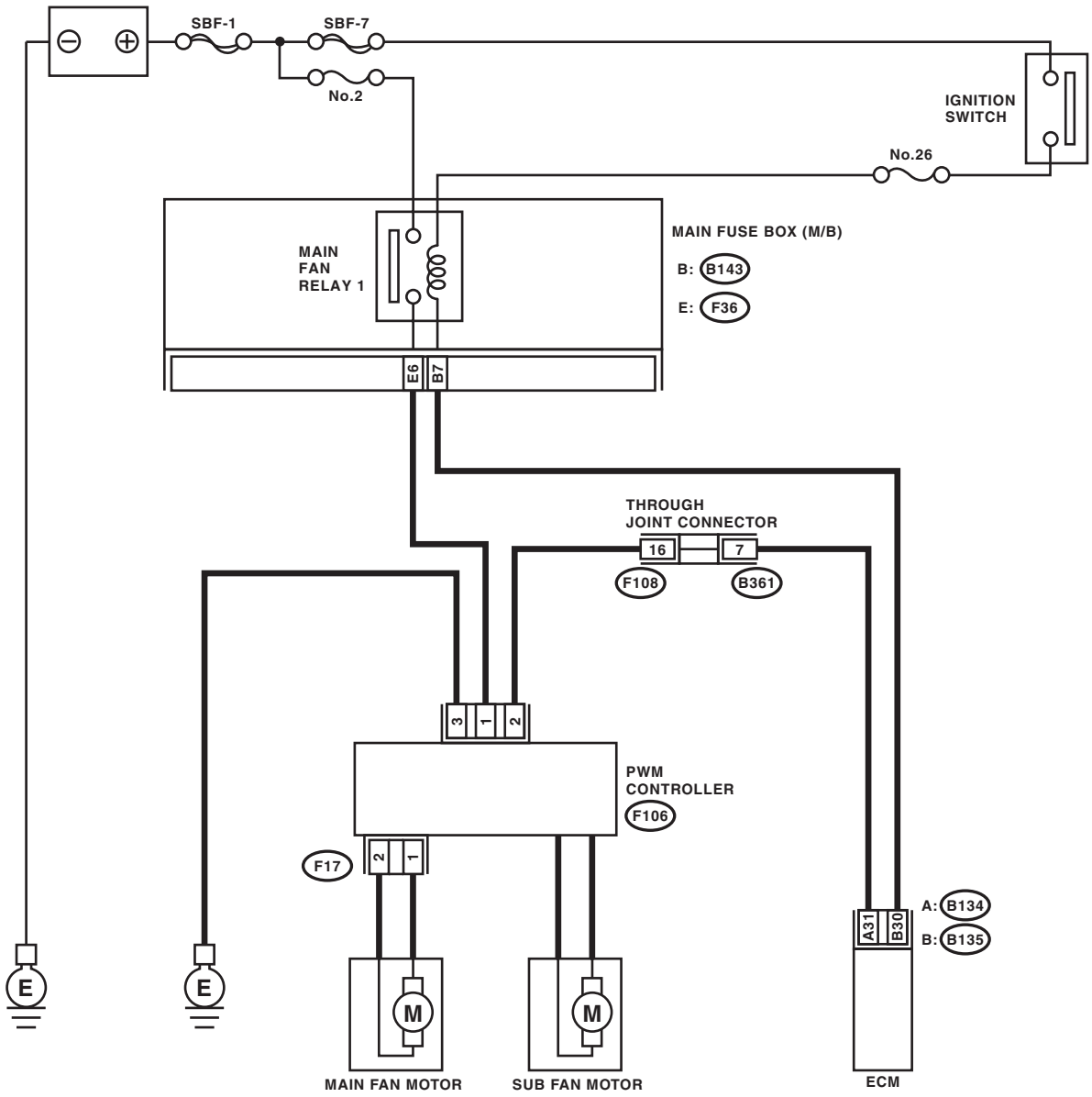
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping crank pulley when loosening and tightening crank pulley bolts.
 ST-499977500	499977500	CAM SPROCKET WRENCH	Used for removing and installing intake cam sprocket.
 ST18231AA020	18231AA020	CAM SPROCKET WRENCH	Used for removing and installing exhaust cam sprocket.

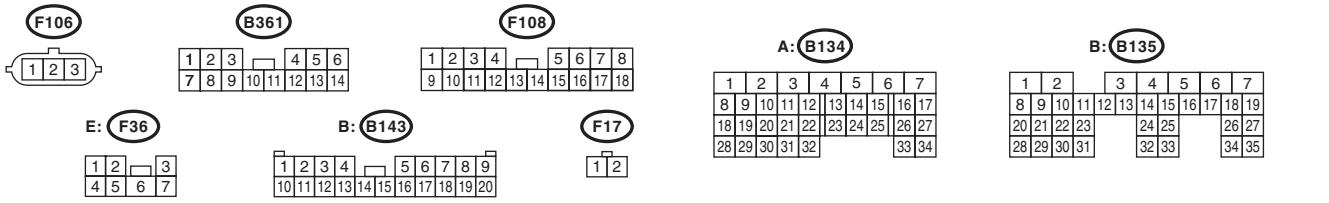
2. GENERAL TOOL

TOOL NAME	REMARKS
Radiator cap tester	Used for measuring pressure.

2. Radiator Fan System

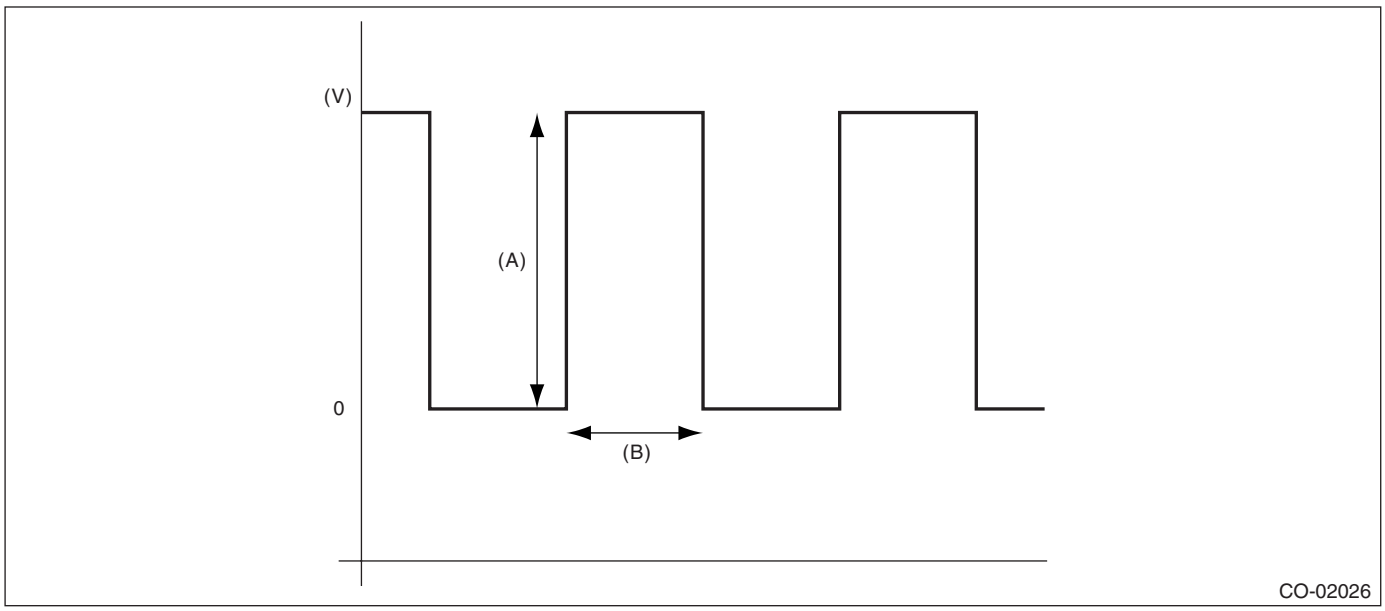
A: WIRING DIAGRAM





CO-02028

B: RADIATOR FAN CONTROL OUTPUT WAVEFORM



(A) 5 V (B) 2 ms

C: INSPECTION

DETECTING CONDITION:

- Engine coolant temperature is more than 93°C (199°F).
- A/C switch is OFF.
- Vehicle speed is below 19 km/h (12 MPH).

TROUBLE SYMPTOMS:

Radiator main fan and sub fan do not rotate under the above conditions.

	Step	Check	Yes	No
1	**CHECK MAIN FAN RELAY 1.** 1) Turn the ignition switch to OFF. 2) Remove the main fan relay 1 from A/C relay holder. 3) Measure the resistance of terminal in main fan relay 1 switch.	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the main fan relay 1.
2	**CHECK MAIN FAN RELAY 1.** 1) Connect the terminal of main fan relay 1 coil to battery. 2) Measure the resistance between terminals of main fan relay 1 switch.	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the main fan relay 1.
3	**CHECK POWER SUPPLY TO ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM terminal and chassis ground. ***Connector & terminal*** ***(B135) No. 30 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the power supply line.

	Step	Check	Yes	No
4	**CHECK POWER SUPPLY TO RADIATOR FAN CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM. 3) Disconnect the connector from radiator fan control unit. 4) Turn the ignition switch to ON. 5) Measure the voltage between radiator fan control unit terminal and chassis ground. ***Connector & terminal*** ***(F106) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the power supply line.
5	**CHECK HARNESS BETWEEN ECM AND RADIATOR FAN CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between radiator fan control unit and ECM connector. ***Connector & terminal*** ***(B134) No. 31 — (F106) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and radiator fan control unit.
6	**CHECK RADIATOR FAN CONTROL UNIT AND GROUND CIRCUIT.** 1) Connect the connector to ECM and radiator fan control unit. 2) Measure the resistance between radiator fan control unit connector and chassis ground. ***Connector & terminal*** ***(F106) No. 3 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **7.**	Repair the open circuit in harness between radiator fan control unit connector and chassis ground.
7	**CHECK FAN MOTOR.** 1) Disconnect the connector from radiator fan control unit. 2) Connect the battery positive (+) terminal to terminal No. 1, and the ground (–) terminal to terminal No. 3 of radiator fan control unit.	Does the fan motor rotate?	Go to step **8.**	Replace the fan motor which does not rotate.
8	**CHECK ECM OUTPUT SIGNAL.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector. 3) Turn the ignition switch to ON. 4) Using the oscilloscope, check the output signal. <Ref. to CO(H6DO)-7, RADIATOR FAN CONTROL OUTPUT WAVEFORM, Radiator Fan System.> ***Connector & terminal*** ***(B134) No. 31 (+) — Chassis ground (–):***	Is the waveform output?	Replace the radiator fan control unit. <Ref. to CO(H6DO)-23, Radiator Fan Control Unit.>	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

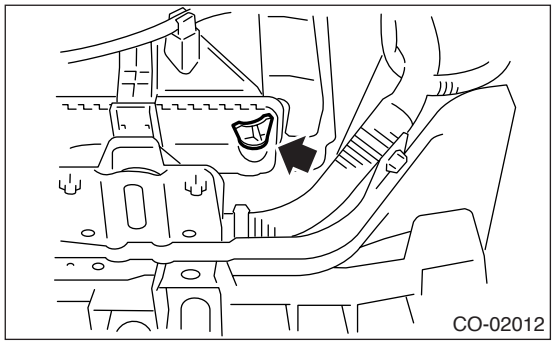
3. Engine Coolant

A: REPLACEMENT

1. DRAINING OF ENGINE COOLANT

1) Lift-up the vehicle.
2) Remove the under cover.
3) Remove the drain plug to drain engine coolant into container.

NOTE:
Remove the coolant filler tank cap so that engine coolant will drain faster.



4) Install the drain plug.

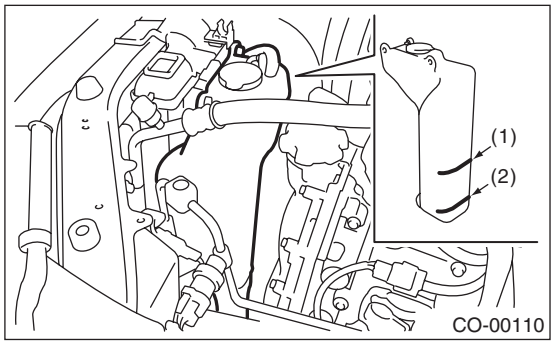
2. FILLING OF ENGINE COOLANT

1) Fill engine coolant into coolant filler tank up to the filler neck position.

Coolant capacity (fill up to "FULL" level):
Model with ATF warmer (LHD)
Approx. 7.7 ℓ (8.1 US qt, 6.8 Imp qt)
Model with ATF warmer (RHD)
Approx. 7.8 ℓ (8.2 US qt, 6.9 Imp qt)
Model without ATF warmer
Approx. 7.2 ℓ (7.6 US qt, 6.3 Imp qt)

NOTE:
SUBARU Genuine Coolant containing anti-freeze and anti-rust agents is especially made for SUBARU engine, which has an aluminum crankcase. Always use SUBARU Genuine Coolant, since other coolant may cause corrosion.

2) Fill engine coolant into the reservoir tank up to "FULL" level.



(1) FULL
(2) LOW

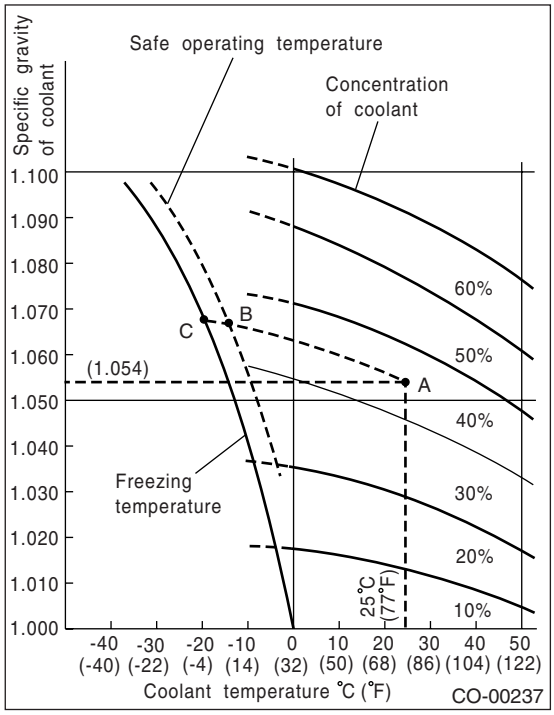
3) Warm-up the engine completely for more than five minutes at 2,000 to 3,000 rpm.
4) If the engine coolant level drops in coolant filler tank, add engine coolant to filler neck position.
5) If the engine coolant level drops from "FULL" level of reservoir tank, add engine coolant to "FULL" level.
6) Attach the coolant filler tank cap and reservoir tank cap properly.

B: INSPECTION

1. RERATIONSHIP OF SUBARU COOLANT CONCENTRATION AND FREEZING TEMPERATURE

Concentration and safe operating temperature of SUBARU coolant is shown in the diagram. Measuring the temperature and specific gravity of the coolant will provide this information.

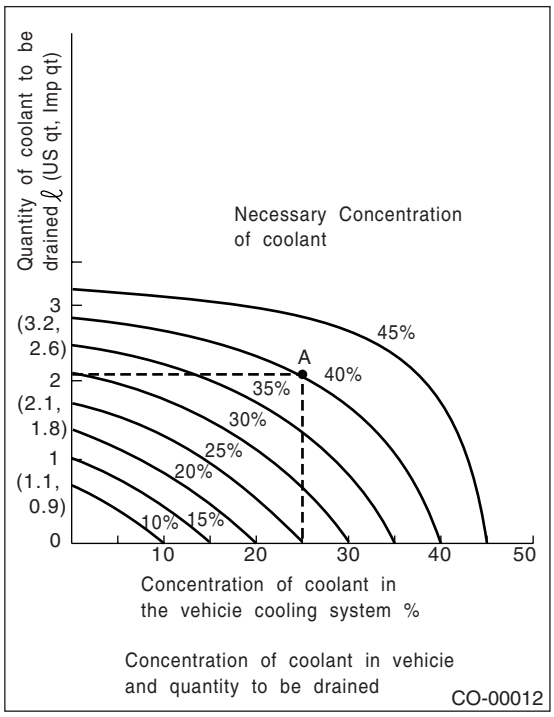
[Example]
If the coolant temperature is 25°C (77°F), its specific gravity is 1.054, the concentration is 45% (point A), the safe operating temperature is −14°C (7°F) (point B), and the freezing temperature is −20°C (−4°F) (point C).



2. PROCEDURE TO ADJUST THE CONCENTRATION OF THE COOLANT

To adjust the concentration of coolant according to temperature, find the proper fluid concentration in the above diagram and replace the necessary amount of coolant with an undiluted solution of SUBARU genuine coolant (concentration 50%).
The amount of coolant that should be replaced can be determined using the diagram.
[Example]
Assume that the coolant concentration must be increased from 25% to 40%. Find point A, where the 25% line of coolant concentration intersects with the 40% curve of the necessary coolant concentration, and read the scale on the vertical axis of the graph at height A. The quantity of coolant to be drained is 2.1 ℓ (2.2 US qt, 1.8 Imp qt). Drain 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of coolant from the cooling system and add 2.1 ℓ (2.2 US qt, 1.8 Imp qt) of the undiluted solution of SUBARU coolant.

If a coolant concentration of 50% is needed, drain all the coolant and refill with the undiluted solution only.

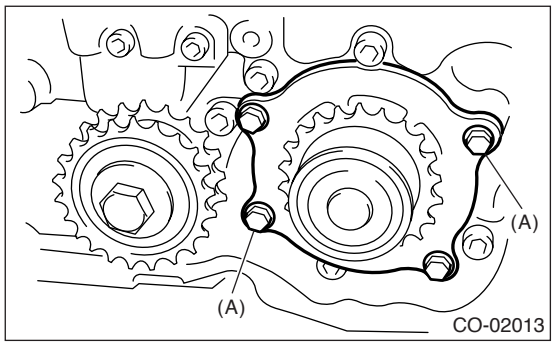


4. Water Pump

A: REMOVAL

1) Remove the radiator. <Ref. to CO(H6DO)-13, REMOVAL, Radiator.>
2) Remove the V-belts.
<Ref. to ME(H6DO)-33, REMOVAL, V-belt.>
3) Remove the front chain cover.
<Ref. to ME(H6DO)-43, REMOVAL, Front Chain Cover.>
4) Remove the timing chain assembly.
<Ref. to ME(H6DO)-45, REMOVAL, Timing Chain Assembly.>
5) Remove the water pump.

NOTE:
When the water pump cannot be removed easier, screw-in the bolts (A) to screw part to remove water pump.



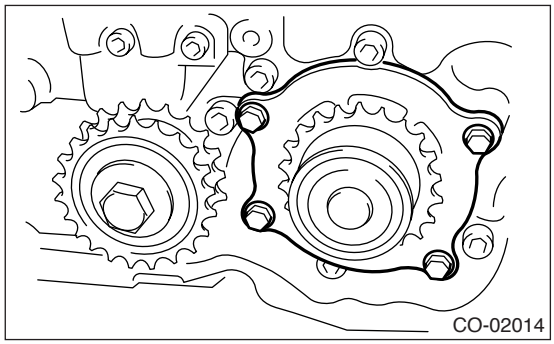
B: INSTALLATION

1) Install the water pump to rear chain cover.

NOTE:
Apply engine coolant to O-ring.

Tightening torque
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

NOTE:
• Use new O-rings.
• Apply engine coolant to O-ring to install water pump easier.



2) Install the timing chain assembly.
<Ref. to ME(H6DO)-46, INSTALLATION, Timing Chain Assembly.>
3) Install the front chain cover.
<Ref. to ME(H6DO)-43, INSTALLATION, Front Chain Cover.>
4) Install the V-belts.
<Ref. to ME(H6DO)-33, INSTALLATION, V-belt.>
5) Install the radiator. <Ref. to CO(H6DO)-14, INSTALLATION, RADIATOR.>
6) Fill with engine coolant. <Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

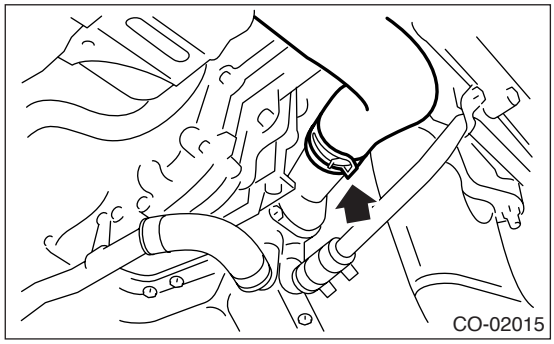
C: INSPECTION

1) Check the water pump bearing for smooth rotation.
2) Check the water pump sprocket for abnormalities.

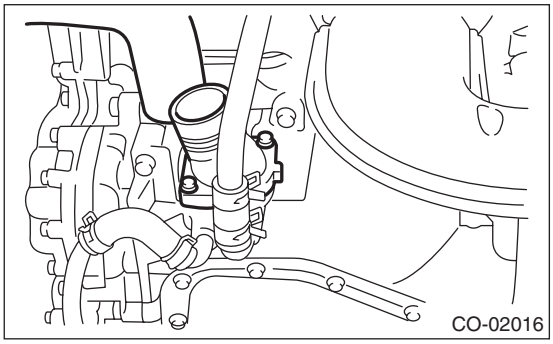
5. Thermostat

A: REMOVAL

1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain engine coolant completely.
<Ref. to CO(H6DO)-9, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
5) Disconnect the radiator outlet hose from thermostat cover.



6) Remove the thermostat cover and then remove the thermostat.



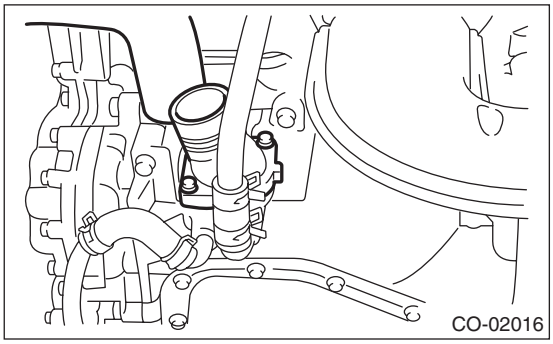
B: INSTALLATION

1) Install the gasket to thermostat.

NOTE:
Use a new gasket.

2) Install the thermostat and thermostat cover.

NOTE:
The thermostat must be installed with the jiggle pin facing upward.



Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

3) Connect the radiator outlet hose to thermostat cover.
4) Install the under cover.
5) Lower the vehicle.
6) Fill with engine coolant. <Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

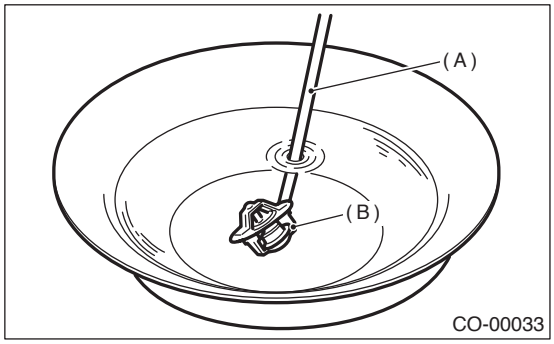
• Inspection method

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should conform to the specification.

Starting temperature to open:
80 — 84°C (176 — 183°F)

Fully opens:
95°C (203°F)

Valve lift:
9.0 mm (0.354 in) or more



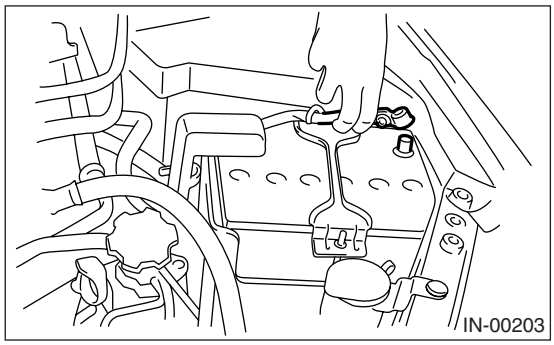
(A) Thermometer
(B) Thermostat

6. Radiator

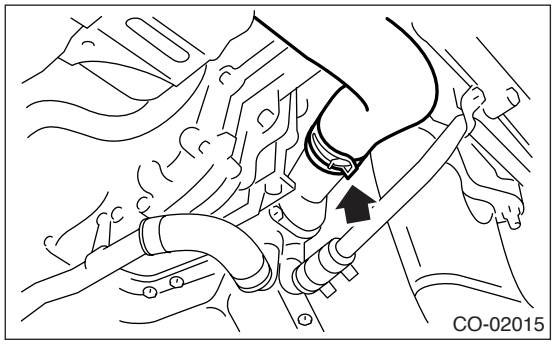
A: REMOVAL

WARNING:
The radiator is pressurized. Wait until engine cools down before working on the radiator.

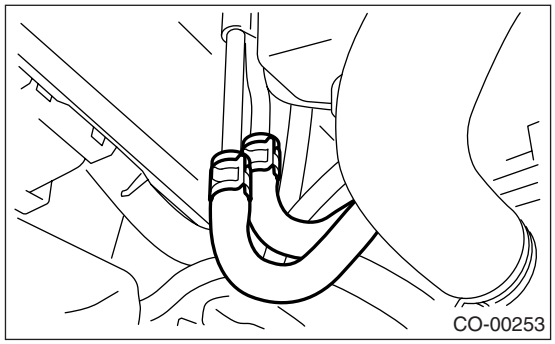
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



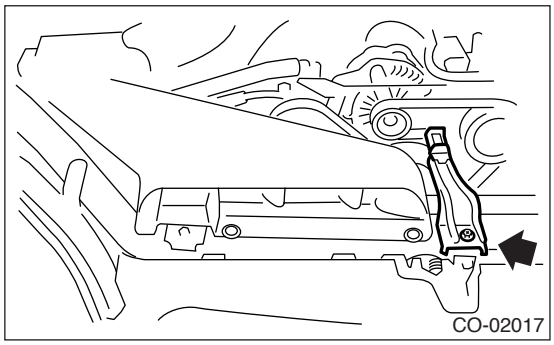
4) Lift-up the vehicle.
5) Remove the under cover.
6) Drain engine coolant completely.
<Ref. to CO(H6DO)-9, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
7) Disconnect the outlet hose from radiator.



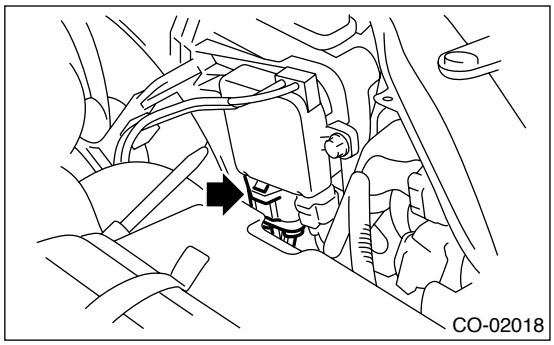
8) Disconnect the ATF cooler hose from radiator. (model without ATF warmer)



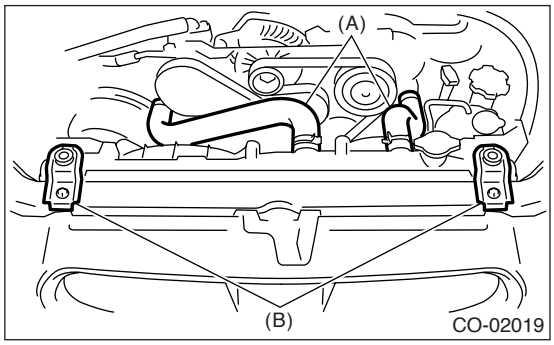
9) Lower the vehicle.
10) Remove the hood stay holder.



11) Remove the air intake duct. **<Ref. to IN(H6DO)-8,** REMOVAL**, Air Intake Duct.>**
12) Disconnect the connector from radiator fan control unit.



13) Remove the reservoir tank. <Ref. to CO(H6DO)-22, REMOVAL, Reservoir Tank.>
14) Disconnect the inlet hose from radiator.
15) Remove the radiator upper brackets.

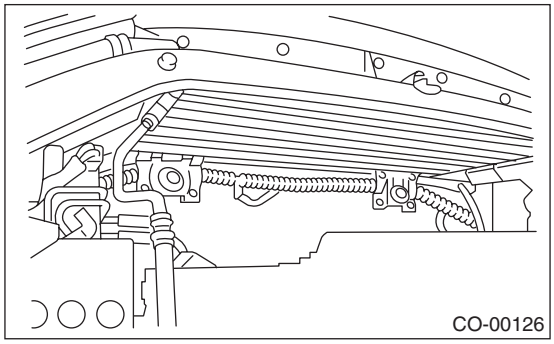


(A) Radiator inlet hose
(B) Radiator upper bracket

16) Lift the radiator up and away from vehicle.

B: INSTALLATION

1) Attach the radiator lower cushions to holes on the vehicle.



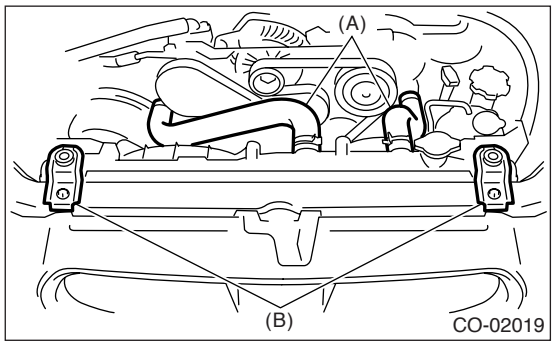
2) Install the radiator to vehicle.

NOTE:
Make pins on the lower side of radiator be fitted into the radiator lower cushions on body side.

3) Install the radiator upper brackets and tighten the bolts.

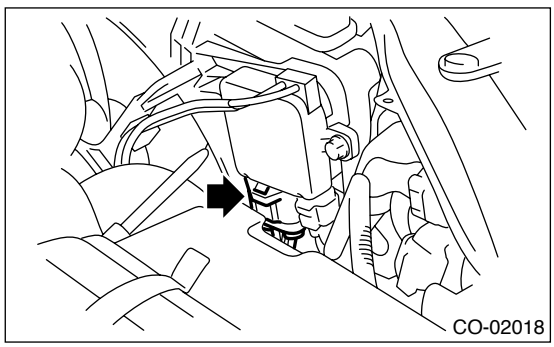
Tightening torque:
12 N·m (1.2 kgf-m, 8.7 ft-lb)

4) Connect the radiator inlet hose.

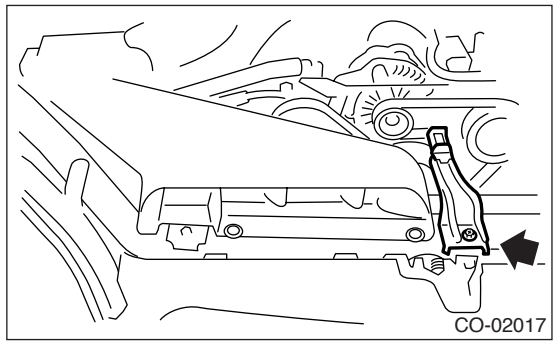


(A) Radiator inlet hose
(B) Radiator upper bracket

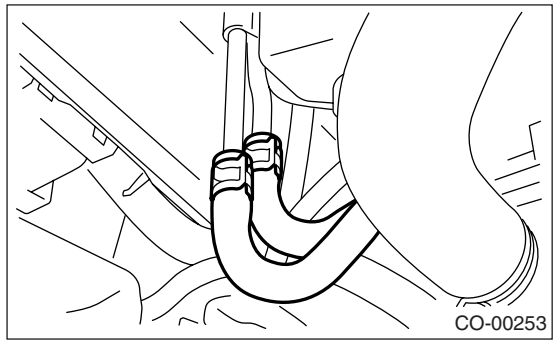
5) Install the reservoir tank. <Ref. to CO(H6DO)-22, INSTALLATION, Reservoir Tank.>
6) Connect the connector to radiator fan control unit.



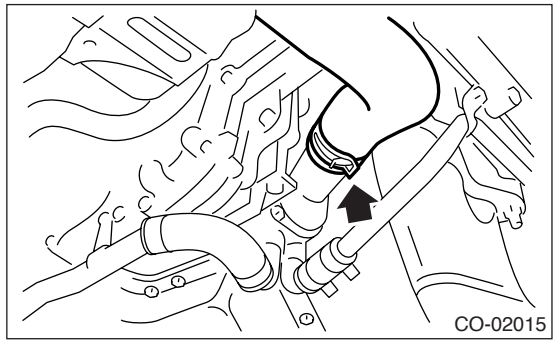
7) Install the air intake duct.
<Ref. to IN(H6DO)-8, INSTALLATION, Air Intake Duct.>
8) Install the hood stay holder.



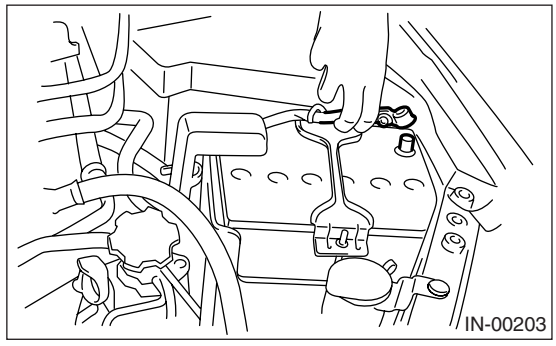
9) Lift-up the vehicle.
10) Connect the ATF cooler hoses. (model without ATF warmer)



11) Connect the radiator outlet hose.



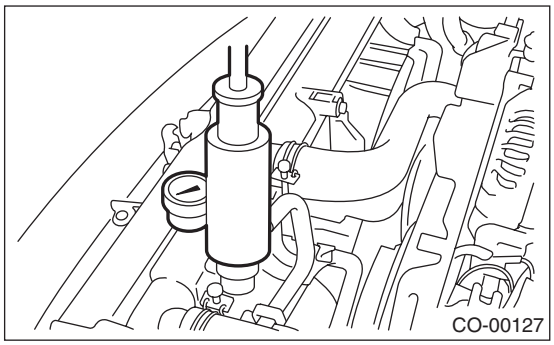
12) Install the under cover.
13) Lower the vehicle.
14) Connect the battery ground cable to battery.



15) Fill with engine coolant.
<Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
16) Check the ATF level.
<Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>
17) Install the collector cover.

C: INSPECTION

1) Remove the radiator cap, top off the radiator with coolant, and then attach the tester in place of cap.



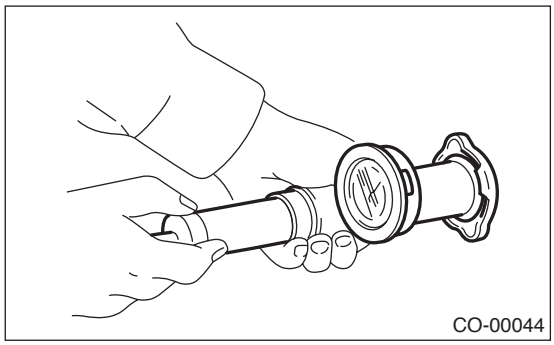
2) Apply a pressure of 157 kPa (1.6 kg/cm^2, 23 psi) to the radiator to check if:
- Engine coolant leaks at/around radiator.
- Engine coolant leaks at/around hoses or connections.

CAUTION:
- **Engine should be turned off.**
- **Wipe engine coolant from check points in advance.**
- **Be careful to prevent engine coolant from spurting out when removing tester.**
- **Be careful not to deform the filler neck of radiator when installing or removing the tester.**

7. Radiator Cap

A: INSPECTION

1) Attach the radiator cap to tester.



2) Increase pressure until the tester gauge pointer stops. Radiator cap is functioning properly if it holds the service limit pressure for five to six seconds.

Standard pressure:
93 — 123 kPa (0.95 — 1.25 kg/cm^2, 14 — 18 psi)

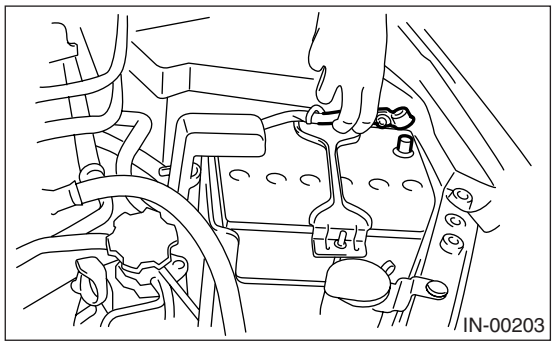
Service limit pressure:
83 kPa (0.85 kg/cm^2, 12 psi)

CAUTION:
• Be sure to remove foreign matter and rust from the cap in advance, otherwise results of pressure test will be incorrect.
• Do not confuse the cap of coolant filler tank with cap of radiator.

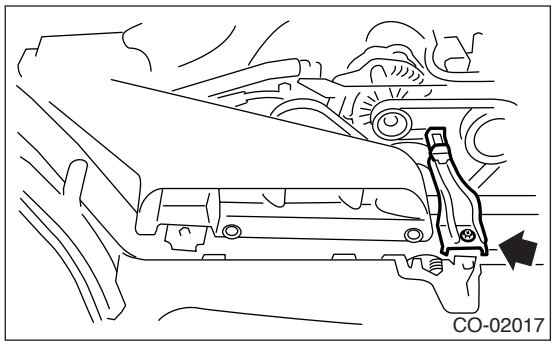
8. Radiator Main Fan and Fan Motor

A: REMOVAL

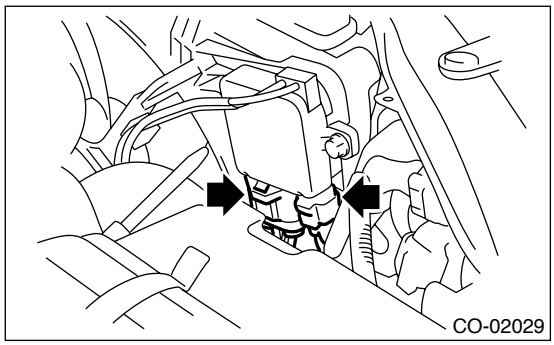
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



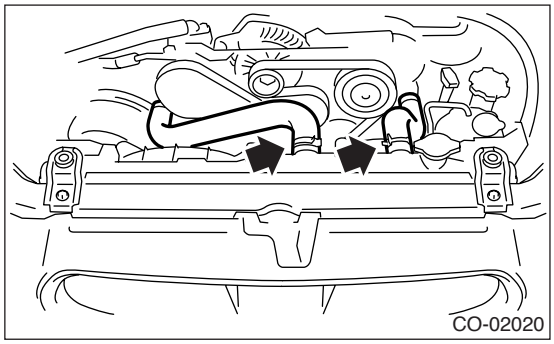
4) Remove the hood stay holder.



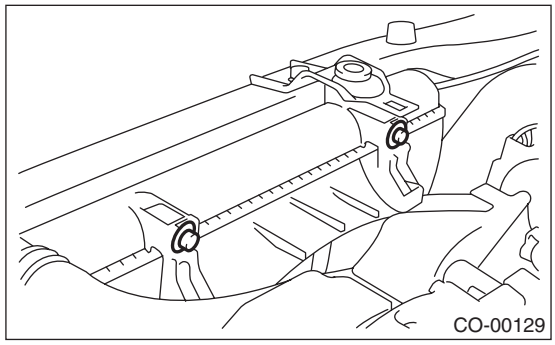
5) Remove the air intake duct. **<Ref. to IN(H6DO)-8,** REMOVAL**, Air Intake Duct.>**
6) Disconnect the connector from radiator fan control unit.



7) Lift-up the vehicle.
8) Remove the under cover.
9) Drain engine coolant completely.
<Ref. to CO(H6DO)-9, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
10) Disconnect the ATF hose from the clip of radiator main fan shroud. (model without ATF warmer)
11) Remove the radiator main fan motor harness from clip.
12) Lower the vehicle.
13) Remove the reservoir tank. <Ref. to CO(H6DO)-22, REMOVAL, Reservoir Tank.>
14) Disconnect the inlet hose from radiator.

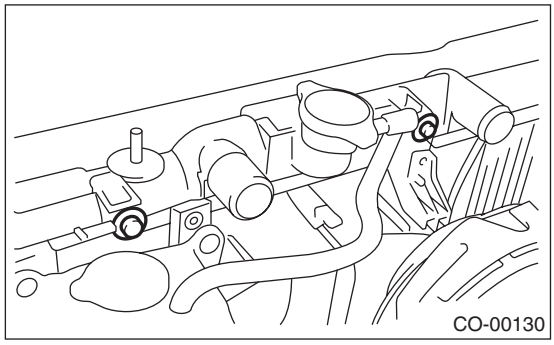


15) Remove the radiator sub fan motor assembly.



16) Remove the radiator main fan motor assembly.

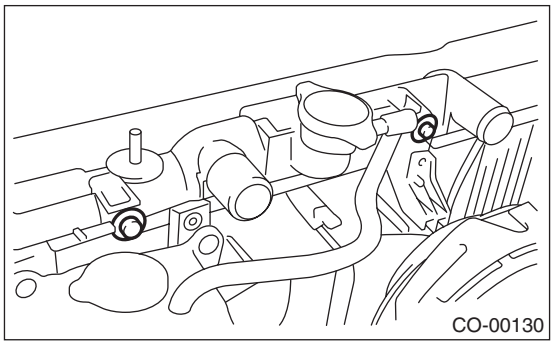
NOTE:
When removing the main fan assembly with lifting it up, the main fan shroud contacts to inlet part of engine coolant. To avoid contacting it, move the main fan assembly to sub fan assembly side before removal.



B: INSTALLATION

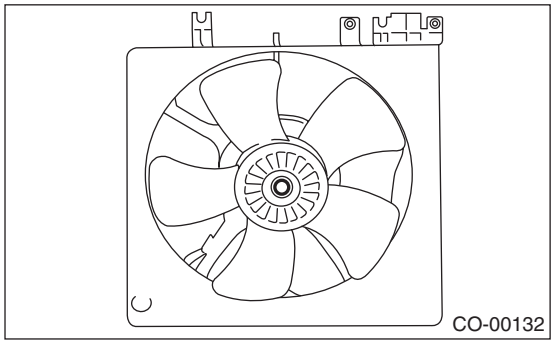
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

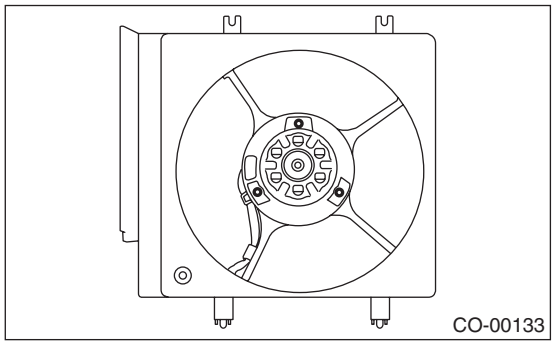


C: DISASSEMBLY

1) Remove the nut which holds fan itself onto fan motor and shroud assembly.



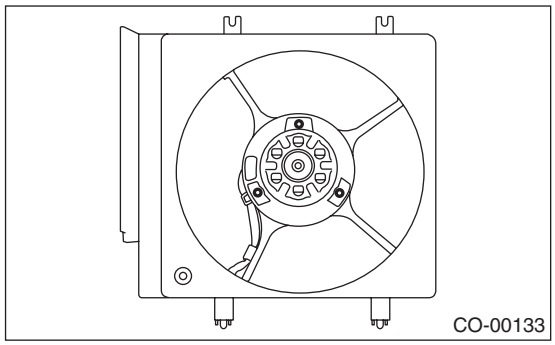
2) Remove the screws which hold the fan motor onto shroud.



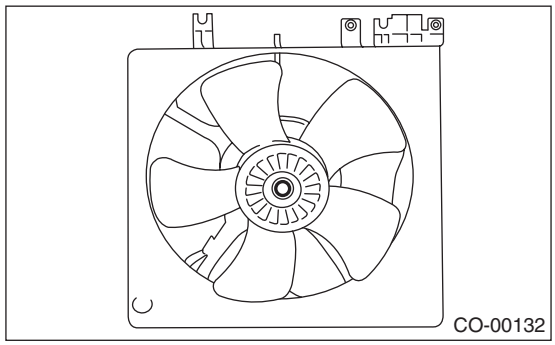
D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
3.8 N·m (0.39 kgf-m, 2.8 ft-lb)



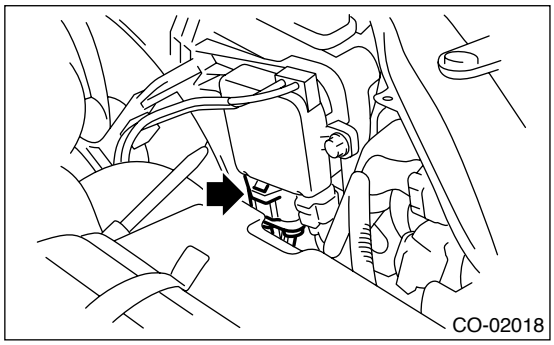
Tightening torque:
6.2 N·m (0.63 kgf-m, 4.6 ft-lb)



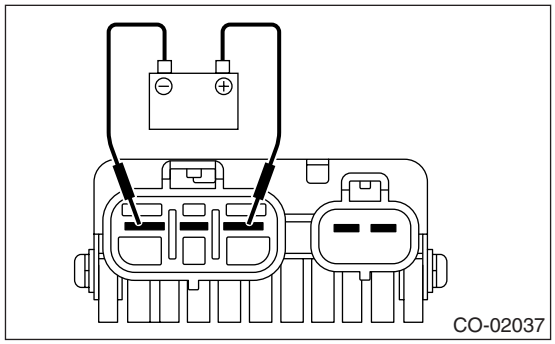
E: INSPECTION

1) Disconnect the connector from radiator fan control unit.

NOTE:
Do not remove the main fan motor harness connector.



2) Connect the battery to radiator fan control unit as shown in the figure.

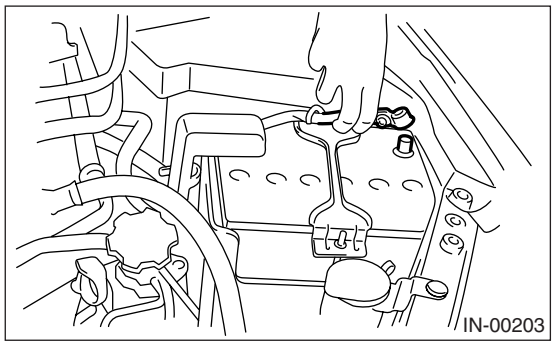


3) Check the fan motor for operations. If it does not operate, replace the fan motor.

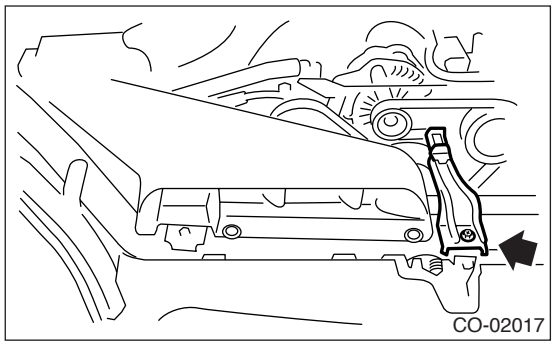
9. Radiator Sub Fan and Fan Motor

A: REMOVAL

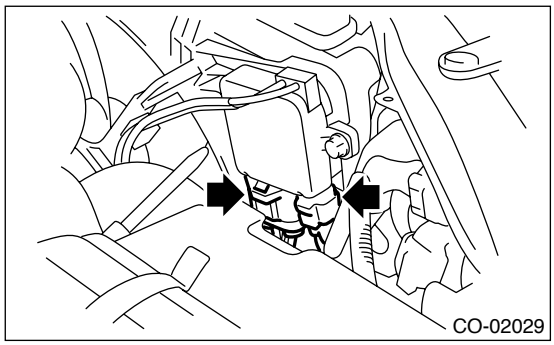
1) Set the vehicle on a lift.
2) Remove the collector cover.
3) Disconnect the ground cable from battery.



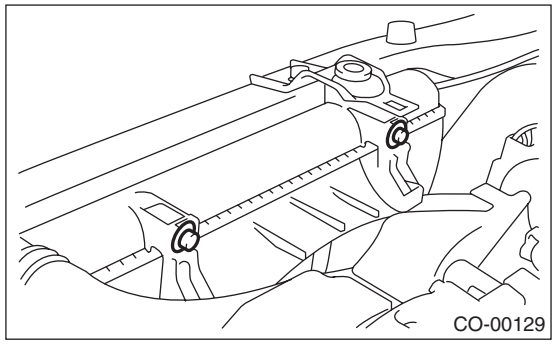
4) Remove the hood stay holder.



5) Remove the air intake duct. **<Ref. to IN(H6DO)-8,** REMOVAL**, Air Intake Duct.>**
6) Disconnect the connector from radiator fan control unit.



7) Remove the bolts which hold sub fan shroud to radiator.

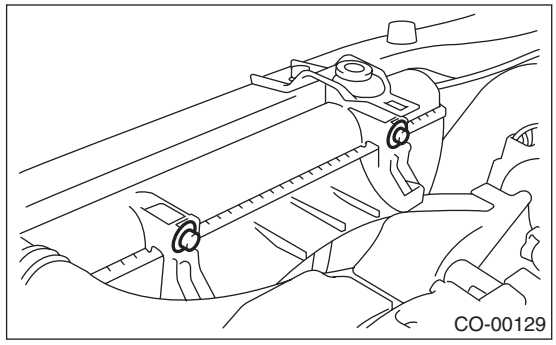


8) Lift-up the vehicle.
9) Remove the under cover.
10) Remove the radiator sub fan shroud through the under side of vehicle.

B: INSTALLATION

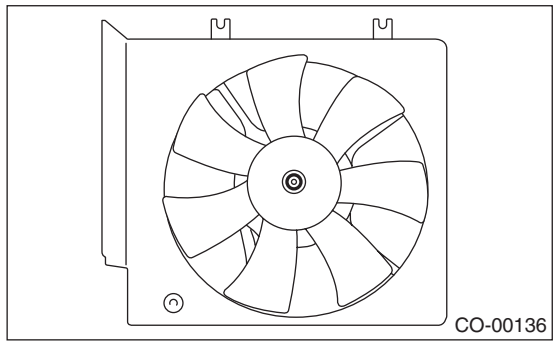
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

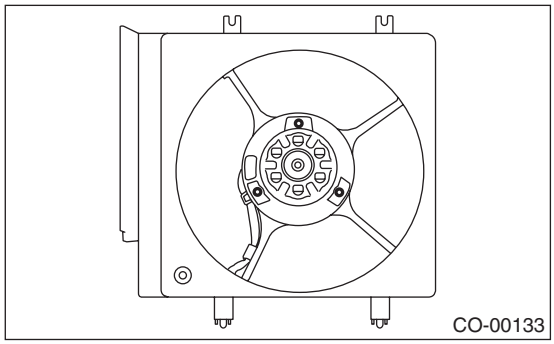


C: DISASSEMBLY

1) Remove the nut which holds fan itself onto fan motor and shroud assembly.



2) Remove the screws which hold the fan motor onto shroud.


CO-00133

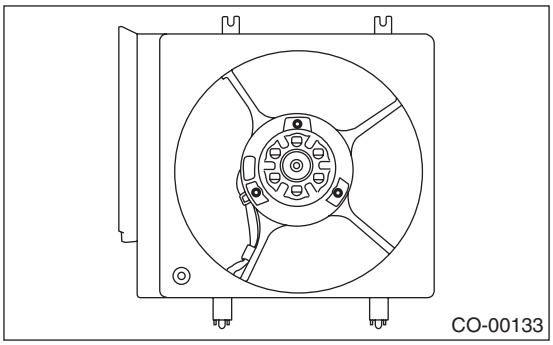
3) Remove the bolts which hold the radiator fan control unit onto shroud.

D: ASSEMBLY

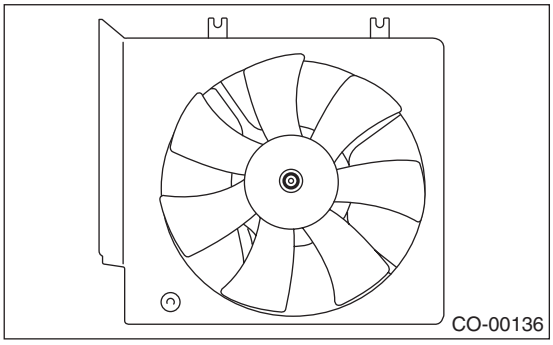
Assemble in the reverse order of disassembly.

Radiator fan control unit bolt tightening torque:
5.4 N·m (0.55 kgf-m, 4.0 ft-lb)

Tightening torque:
3.8 N·m (0.39 kgf-m, 2.8 ft-lb)


CO-00133

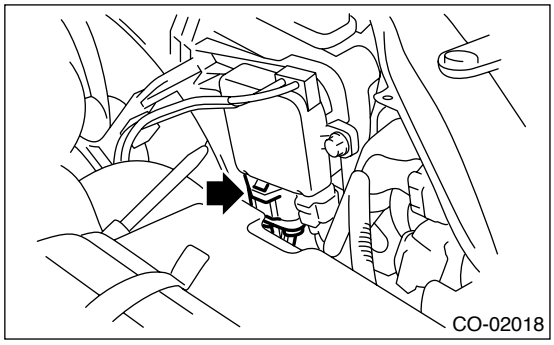
Tightening torque:
6.2 N·m (0.63 kgf-m, 4.6 ft-lb)


CO-00136

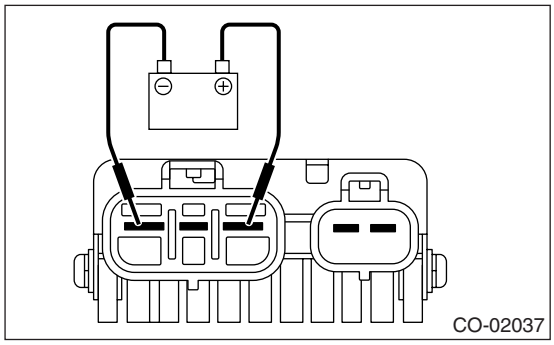
E: INSPECTION

1) Disconnect the connector from radiator fan control unit.

NOTE:
Do not remove the main fan motor harness connector.


CO-02018

2) Connect the battery to radiator fan control unit as shown in the figure.

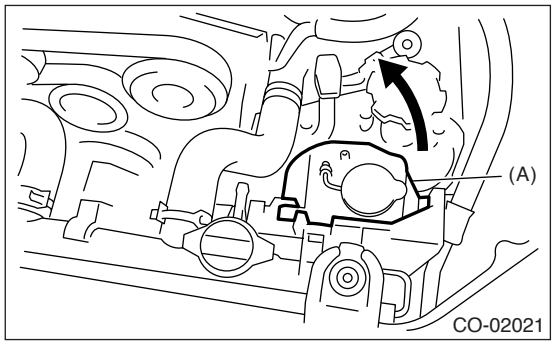

CO-02037

3) Check the fan motor for operations. If it does not operate, replace the fan motor.

10.Reservoir Tank

A: REMOVAL

1) Disconnect the over flow hose.
2) Pull out the reservoir tank to the direction of arrow while pushing the pawl (A).



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Make sure the engine coolant level is between “FULL” and “LOW”.

11.Radiator Fan Control Unit

A: SPECIFICATION

Radiator fan control unit forms a unit with radiator sub fan motor. Refer to “Radiator Sub Fan and Fan Motor” for removal and installation.
<Ref. to CO(H6DO)-20, REMOVAL, Radiator Sub Fan and Fan Motor.> <Ref. to CO(H6DO)-20, INSTALLATION, Radiator Sub Fan and Fan Motor.> <Ref. to CO(H6DO)-20, DISASSEMBLY, Radiator Sub Fan and Fan Motor.> <Ref. to CO(H6DO)-21, ASSEMBLY, Radiator Sub Fan and Fan Motor.>

12.Engine Cooling System Trouble in General

A: INSPECTION

Trouble	Possible cause	Corrective action
Over-heating	a. Insufficient engine coolant	Replenish engine coolant, inspect for leakage, and repair it if necessary.
	b. Defective thermostat	Replace.
	c. Malfunction of water pump	Replace.
	d. Clogged engine coolant passage	Clean.
	e. Improper ignition timing	Inspect and repair ignition control system. <Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	f. Clogged or leaking radiator	Clean, repair or replace.
	g. Improper engine oil in engine coolant	Replace engine coolant.
	h. Air/fuel mixture ratio too lean	Inspect and repair fuel injection system. <Ref. to EN(H6DO)(diag)-2, PROCEDURE, Basic Diagnostic Procedure.>
	i. Excessive back pressure in exhaust system	Clean or replace.
	j. Insufficient clearance between piston and cylinder	Adjust or replace.
	k. Slipping clutch	Correct or replace.
	l. Dragging brake	Adjust.
	m. Faulty transmission gear oil	Replace.
	n. Malfunction of radiator fan	Inspect radiator fan relay, engine coolant temperature sensor or fan motor, and replace them.
Over-cooling	a. Ambient temperature extremely low	Partly cover radiator front area.
	b. Defective thermostat	Replace.
Engine coolant leaks	a. Loosened or damaged connecting units on hoses	Correct or replace.
	b. Leakage from water pump	Replace.
	c. Leakage from water pipe	Correct or replace.
	d. Leakage around cylinder head gasket	Retighten cylinder head bolts or replace gasket.
	e. Damaged or cracked cylinder head and crankcase	Correct or replace.
	f. Damaged or cracked thermostat case	Correct or replace.
	g. Leakage from radiator	Correct or replace.
Noise	a. Defective drive belt	Replace.
	b. Defective radiator fan	Replace.
	c. Defective water pump bearing	Replace water pump.
	d. Defective water pump mechanical seal	Replace water pump.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

LUBRICATION

LU(H6DO)

		Page
1.	General Description	2
2.	Oil Pressure System	5
3.	Engine Oil	7
4.	Oil Pump	8
5.	Oil Pump Relief Valve	10
6.	Oil Pan and Strainer	11
7.	Oil Pressure Switch	12
8.	Engine Oil Filter	13
9.	Oil Cooler	14
10.	General Diagnostic Table	16

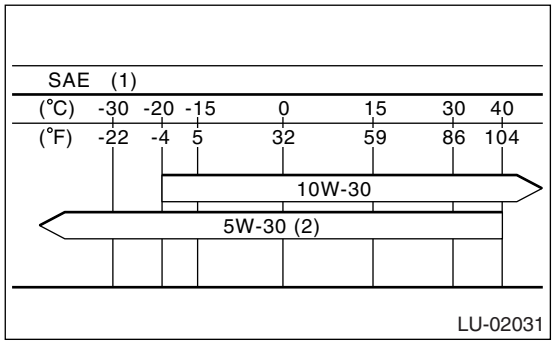
1. General Description

A: SPECIFICATION

Lubrication method				Forced lubrication
Oil pump	Pump type			Trochoid type
	Number of teeth	Inner rotor		7
		Outer rotor		8
	Outer rotor diameter × thickness		mm (in)	86 × 13 (3.39 × 0.51)
	Tip clearance between inner and outer rotors		mm (in)	0.04 — 0.14 (0.0016 — 0.0055)
	Side clearance between inner rotor and pump case		mm (in)	0.020 — 0.046 (0.0008 — 0.0018)
	Case clearance between outer rotor and pump case		mm (in)	0.110 — 0.175 (0.0043 — 0.0069)
Oil filter	Filter type			Full-flow filter type
	Filtration area		cm^2 (sq in)	1,300 (201.5)
	By-pass valve opening pressure		kPa (kg/cm^2, psi)	160 (1.63, 23.2)
	Outer diameter × width		mm (in)	80 × 75 (3.15 × 2.95)
	Installation screw specifications			M 20 × 1.5
Relief valve operation pressure			kPa (kg/cm^2, psi)	708 (7.2, 102.7)
Oil pressure switch	Type			Immersed contact point type
	Operating voltage — Power consumption			12 V — 3.4 W or less
	Warning light activation pressure		kPa (kg/cm^2, psi)	15 (0.15, 2.2)
	Proof pressure		kPa (kg/cm^2, psi)	980 (10.0, 142) or more
Oil capacity (at replacement)			ℓ (US qt, Imp qt)	5.5 (5.8, 4.8)

Recommended oil

For the API specification SL and SJ, use the logo mark with "Energy Conserving" (If the SL, SJ grade is not available, use SH grade).
ACEA specification A1, A2 or A3
CCMC specification G4 or G5
New API specification mark (Star burst mark) label is on the container.

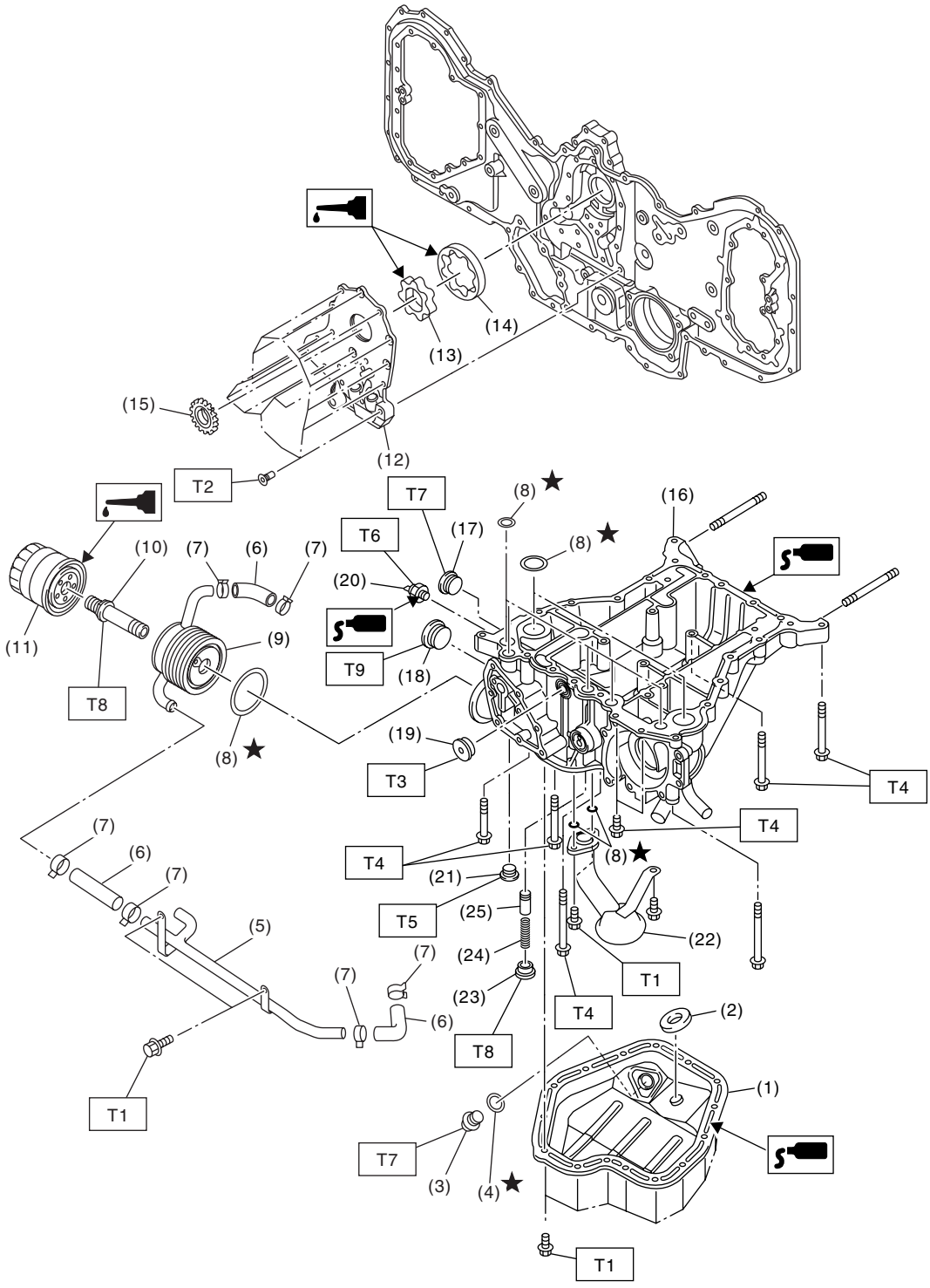


(1) SAE viscosity No. and applicable temperature
(2) Recommended

The proper viscosity helps the vehicle to get good cold and hot starting by reducing viscous friction and thus increasing cranking speed.

CAUTION:
When replenishing oil, it does not matter if the oil to be added is a different brand from that in the engine; however, use oil having the API classification and SAE viscosity No. designated by SUBARU.

B: COMPONENT


(1)
(2)
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(12)
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(21)
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(23)
(24)
(25)
T1
T2
T3
T4
T5
T6
T7
T8
T9
LU-02010

(1) Oil pan lower
(2) Magnet
(3) Drain plug
(4) Gasket
(5) Oil cooler pipe
(6) Hose
(7) Clamp
(8) O-ring
(9) Oil cooler
(10) Connector
(11) Oil filter
(12) Oil pump cover
(13) Inner rotor
(14) Outer rotor
(15) Crank sprocket
(16) Oil pan upper
(17) Plug
(18) Plug
(19) Plug
(20) Oil pressure switch
(21) Plug
(22) Oil strainer
(23) Plug
(24) Relief valve spring
(25) Relief valve

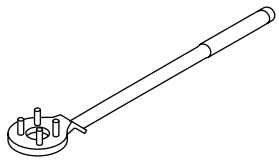
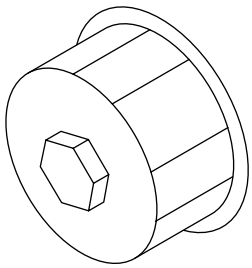
Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*6.4 (0.65, 4.7)*
T2:	*<Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>*
T3:	*16 (1.6, 12)*
T4:	*18 (1.8, 13)*
T5:	*23 (2.3, 17)*
T6:	*25 (2.5, 18)*
T7:	*37 (3.8, 27)*
T8:	*44 (4.5, 33)*
T9:	*90 (9.2, 66)*

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

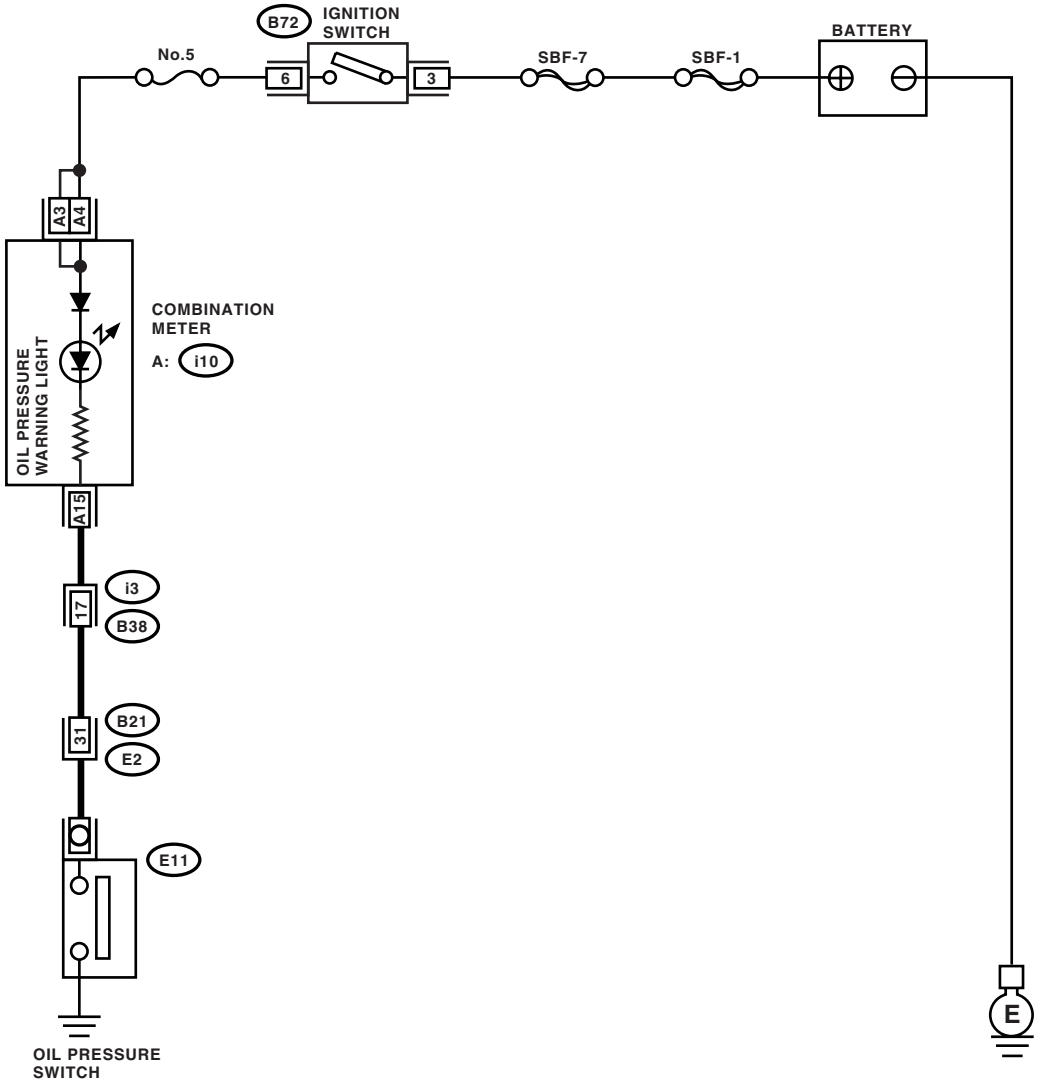
D: PREPARATION TOOL

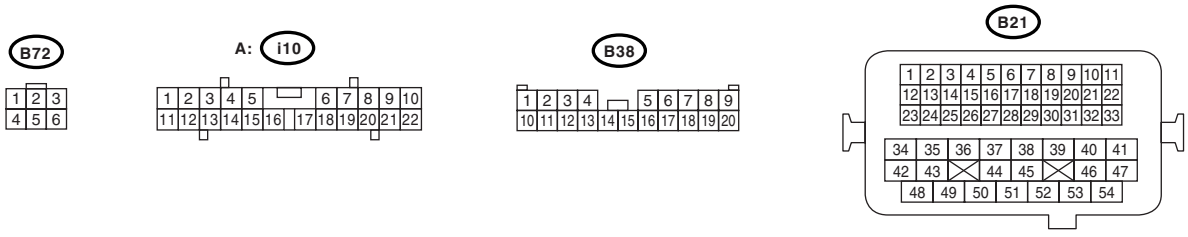
1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499977100	499977100	CRANK PULLEY WRENCH	Used for stopping rotation of crank pulley when removing and tightening crank pulley bolt.
 ST-498547000	498547000	OIL FILTER WRENCH	Used for removing and installing oil filter.

2. Oil Pressure System

A: WIRING DIAGRAM





LU-00241

B: INSPECTION

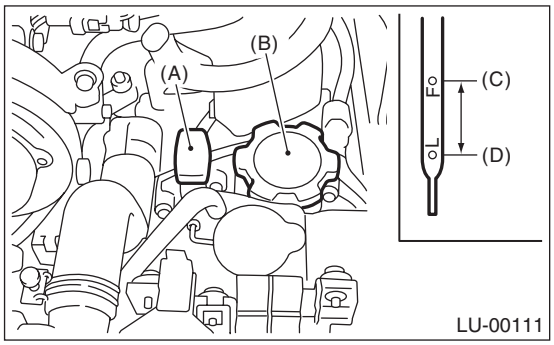
	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** 1) Turn the ignition switch to ON. (engine OFF) 2) Check the warning light of combination meter.	Does the warning light illuminate?	Go to step **2.**	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS CONNECTOR BETWEEN COMBINATION METER AND OIL PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from oil pressure switch. 3) Turn the ignition switch to ON. 4) Measure the voltage of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(E11) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the oil pressure switch.	Go to step **3.**
3	**CHECK COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. 3) Measure the resistance of combination meter. ***Terminals*** ***No. 4 — No. 15:*** ***No. 3 — No. 15:***	Is the resistance less than 10 Ω?	Replace the harness connector between combination meter and oil pressure switch.	Repair or replace the combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

3. Engine Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Extract the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and properly orientated.
4) Remove it again and check the reading. If the engine oil level is below “L” line, add oil to bring the level up to “F” line.
5) After turning off the engine, wait a few minutes for the oil to return to the oil pan before checking the level.
6) Just after driving or while the engine is warm, engine oil level show in the range between “F” line and the notch mark. This is caused by thermal expansion of the engine oil.

NOTE:
To prevent overfilling the engine oil, do not add oil above “F” line when the engine is cold.

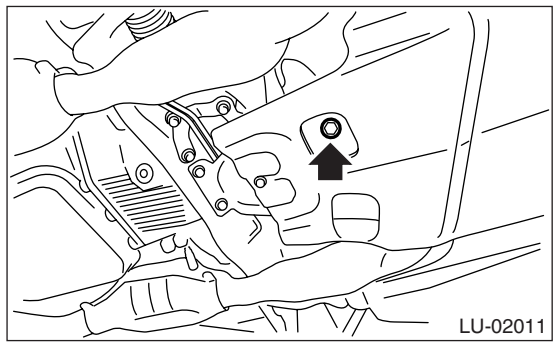


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level

B: REPLACEMENT

1) Open the engine oil filler cap for quick draining of the engine oil.
2) Lift-up the vehicle.
3) Drain engine oil by loosening the engine oil drain plug.

NOTE:
Prepare a container for draining of engine oil.



4) Tighten the engine oil drain plug after draining engine oil.

NOTE:
Use a new drain plug gasket.

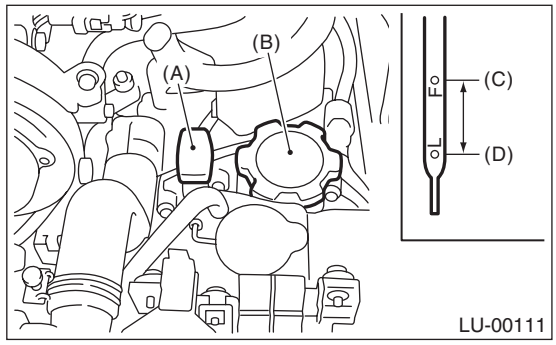
Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

5) Use the engine oil of proper quality and viscosity, fill engine oil through the oil filler duct to upper point on level gauge. Make sure that the vehicle is parked on a level surface when checking oil level.

Recommended oil:
Refer to “SPECIFICATION” for the recommended oil. <Ref. to LU(H6DO)-2, SPECIFICATION, General Description.>

Engine oil capacity (when replacing engine oil):
5.5 ℓ (5.8 US qt, 4.8 Imp qt)

6) Close the engine oil filler cap.
7) Start the engine and warm it up for a time.
8) After the engine stops, recheck the oil level. If necessary, add engine oil up to the upper level on level gauge.

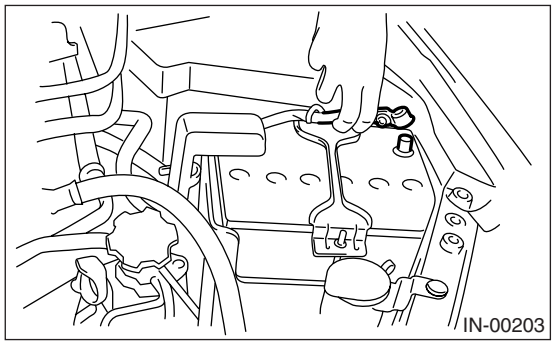


(A) Oil level gauge
(B) Engine oil filler cap
(C) Upper level
(D) Lower level

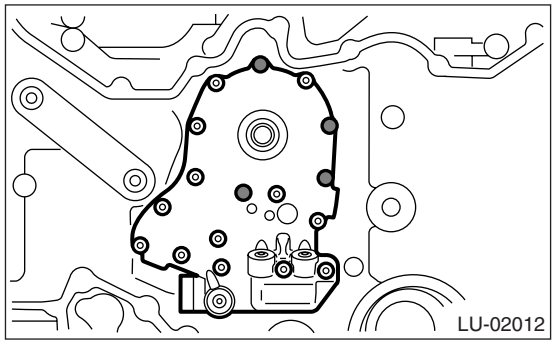
4. Oil Pump

A: REMOVAL

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



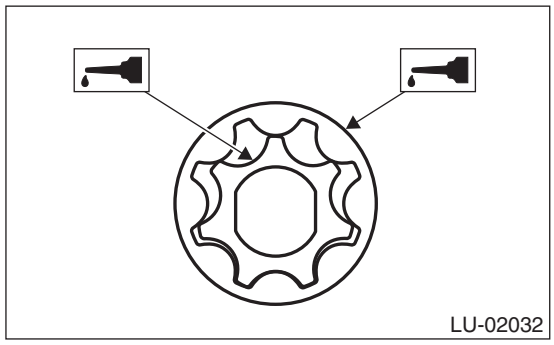
3) Lift-up the vehicle.
4) Remove the under cover.
5) Drain engine coolant. <Ref. to CO(H6DO)-9, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
6) Lower the vehicle.
7) Remove the radiator. <Ref. to CO(H6DO)-13, REMOVAL, Radiator.>
8) Remove the V-belts. <Ref. to ME(H6DO)-33, REMOVAL, V-belt.>
9) Remove the front chain cover. <Ref. to ME(H6DO)-43, REMOVAL, Front Chain Cover.>
10) Remove the timing chain. <Ref. to ME(H6DO)-45, REMOVAL, Timing Chain Assembly.>
11) Remove the crank sprocket.
12) Remove the oil pump cover.



13) Remove the inner rotor and outer rotor.

B: INSTALLATION

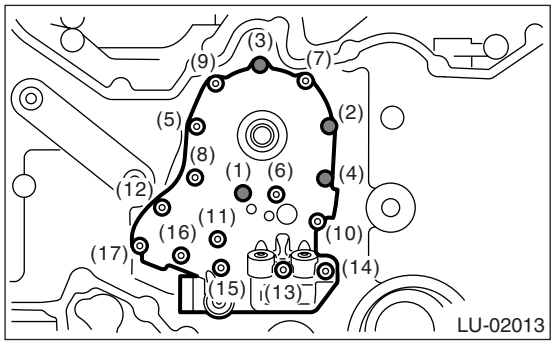
1) Apply a coat of engine oil to the whole area of inner rotor and outer rotor.



2) Set the inner rotor onto opening edge of crank shaft, and install the inner rotor, and then assemble the outer rotor.
3) Install the oil pump cover.
4) Tighten the bolts in the numerical order as shown in the figure.

CAUTION:
Ensure that the bolt is installed in correct position.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



Bolt installing position	Bolt dimension
(1) and (3)	6 × 14 × 14
(2) and (4)	6 × 35 × 18
(5), (6), (7), (8), (9), (10) and (11)	6 × 35 × 15
(12), (15), (16) and (17)	6 × 16 × 16
(13) and (14)	6 × 26 × 15

5) Install the crank sprocket.
6) Install the timing chain. <Ref. to ME(H6DO)-46, INSTALLATION, Timing Chain Assembly.>
7) Install the front chain cover. <Ref. to ME(H6DO)-43, INSTALLATION, Front Chain Cover.>
8) Install the V-belts. <Ref. to ME(H6DO)-33, INSTALLATION, V-belt.>
9) Install the radiator. <Ref. to CO(H6DO)-14, INSTALLATION, Radiator.>
10) Install the under cover.

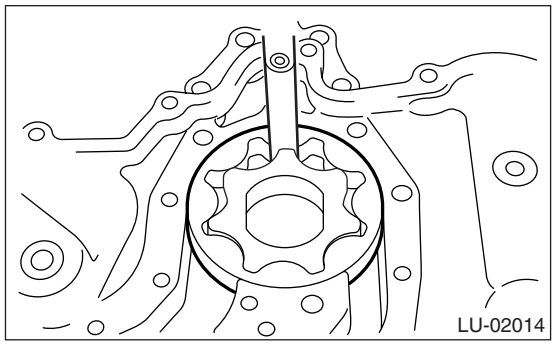
11) Fill engine coolant.
<Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>

C: INSPECTION

1. TIP CLEARANCE

Measure the tip clearance of rotors. If the clearance exceeds the limit, replace the rotors as a matched set.

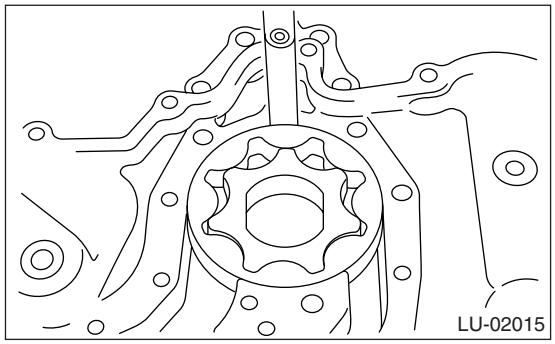
Tip clearance:
Standard value
0.04 — 0.14 mm (0.0016 — 0.0055 in)



2. CASE CLEARANCE

Measure the clearance between the outer rotor and rear chain cover rotor housing. If the clearance exceeds the limit, replace the outer rotor.

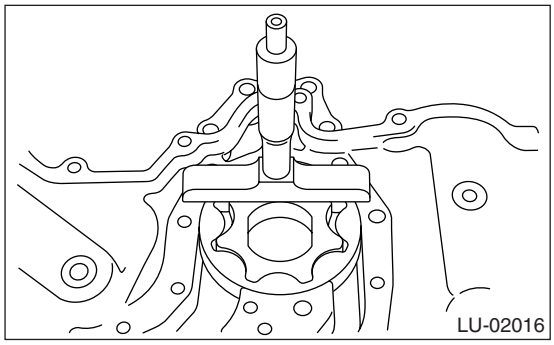
Case clearance:
Standard value
0.110 — 0.175 mm (0.0043 — 0.0069 in)



3. SIDE CLEARANCE

Measure the clearance between oil pump inner rotor and rear chain cover. If the clearance exceeds the limit, replace rotors as a matched set.

Side clearance:
Standard value
0.020 — 0.046 mm (0.0008 — 0.0018 in)



4. OIL PUMP CASE

Check the worn shaft hole, clogged oil passage, crank and other parts for faults.

5. Oil Pump Relief Valve

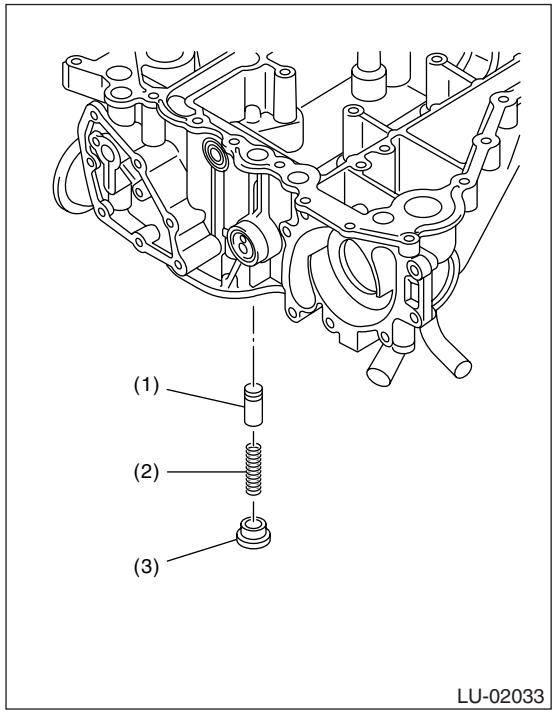
A: REMOVAL

1. REAR CHAIN COVER SIDE

Oil pump relief valve is integrated into oil pump cover as one unit; therefore, refer to “Oil Pump” for removal procedure. <Ref. to LU(H6DO)-8, REMOVAL, Oil Pump.>

2. OIL PAN UPPER SIDE

1) Remove the oil pan. <Ref. to LU(H6DO)-11, REMOVAL, Oil Pan and Strainer.>
2) Remove the plug, relief valve spring and relief valve.



(1) Relief valve
(2) Relief valve spring
(3) Plug

B: INSTALLATION

1. REAR CHAIN COVER SIDE

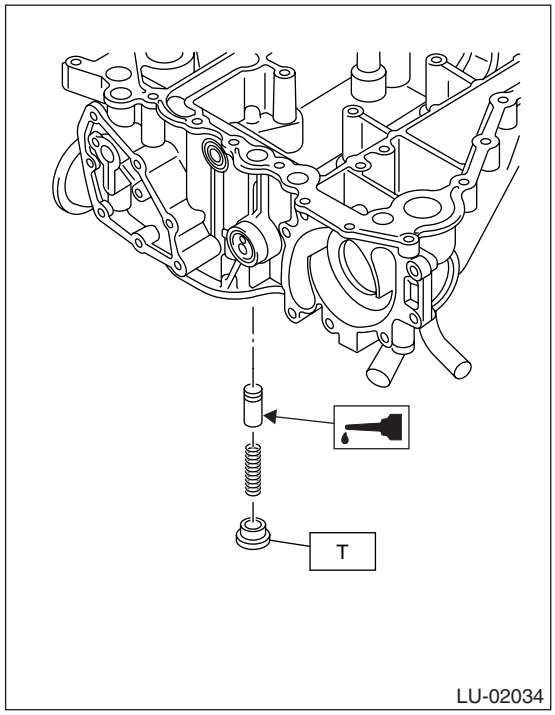
Oil pump relief valve is integrated into oil pump cover as one unit; therefore, refer to “Oil Pump” for installation procedure. <Ref. to LU(H6DO)-8, INSTALLATION, Oil Pump.>

2. OIL PAN UPPER SIDE

1) Install the relief valve, relief valve spring and plug.

NOTE:
Apply the engine oil to relief valve.

Tightening torque:
T: 44 N·m (4.5 kgf-m, 33 ft-lb)



2) Install the oil pan. <Ref. to LU(H6DO)-11, INSTALLATION, Oil Pan and Strainer.>

C: INSPECTION

Check the worn shaft hole of oil pump relief valve case, clogged oil passage, crank and other parts for faults.

6. Oil Pan and Strainer

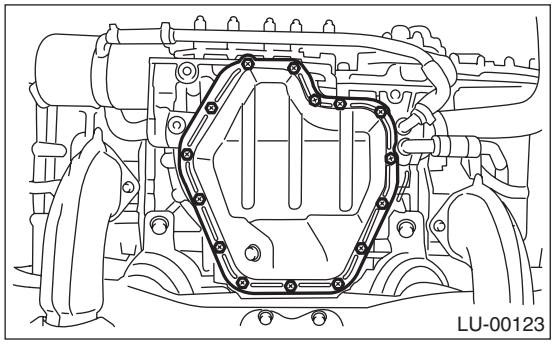
A: REMOVAL

NOTE:
Before removing the oil pan upper, remove the engine from vehicle. <Ref. to ME(H6DO)-34, REMOVAL, Engine Assembly.> <Ref. to ME(H6DO)-63, REMOVAL, Cylinder Block.>

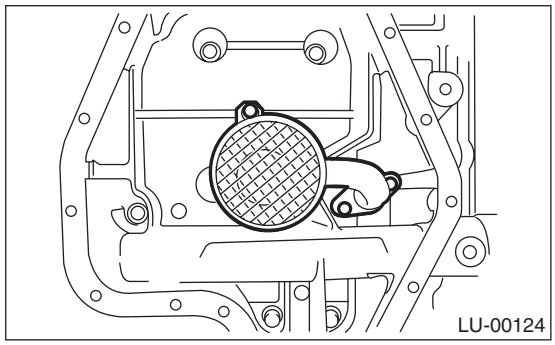
1) Set the vehicle on a lift.
2) Lift-up the vehicle.
3) Remove the under cover.
4) Drain the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
5) Insert the oil pan cutter blade between oil pan upper and oil pan lower.

CAUTION:
Do not use a screwdriver or similar tool in place of oil pan cutter.

6) Remove the oil pan lower.


LU-00123

7) Remove the oil strainer.


LU-00124

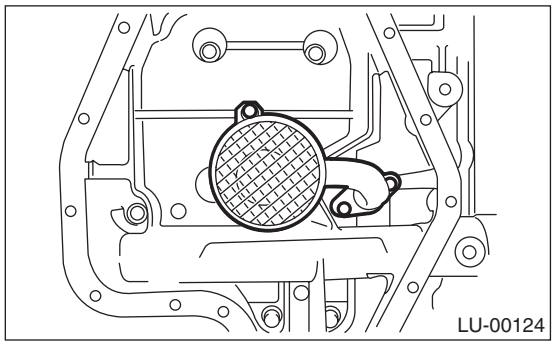
B: INSTALLATION

CAUTION:
Before installing the oil pan, wipe clean the mating surface of oil pan lower and oil pan upper.

1) Install the oil strainer to oil pan upper.

NOTE:
Replace O-ring with new one.

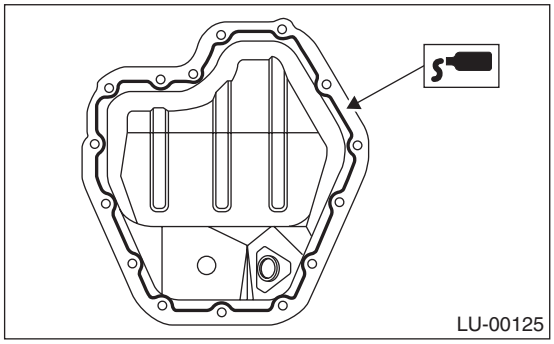
Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


LU-00124

2) Apply liquid gasket to the mating surfaces and install the oil pan.

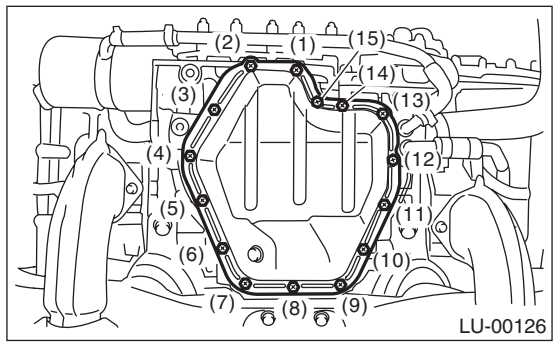
Liquid gasket
THREE BOND 1280B (Part No. K0877YA018)

Liquid gasket applying diameter
5.0±1.0 mm (0.197±0.039 in)


LU-00125

3) Tighten the oil pan lower installing bolts in the numerical order as shown in the figure.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



LU-00126

4) Install the under cover.
5) Fill engine oil. <Ref. to LU(H6DO)-7, INSPECTION, ENGINE OIL.>

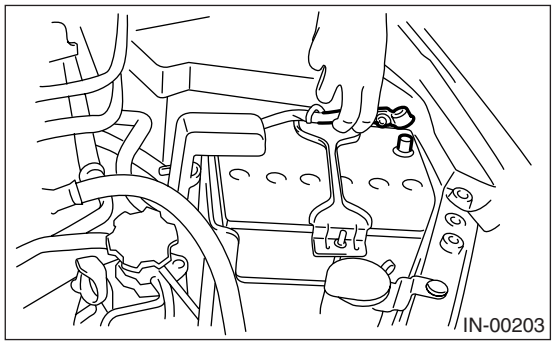
C: INSPECTION

Visually check that the oil pan, oil strainer and oil strainer stay are not damaged.

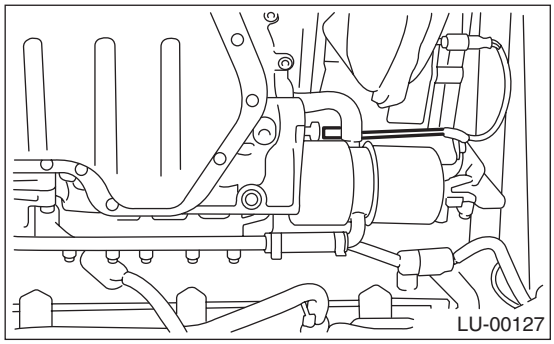
7. Oil Pressure Switch

A: REMOVAL

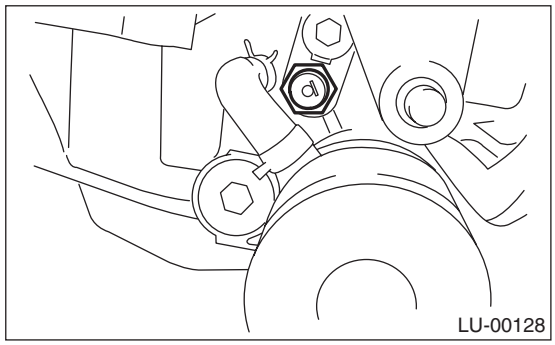
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



3) Lift-up the vehicle.
4) Remove the under cover.
5) Disconnect the terminal from oil pressure switch.



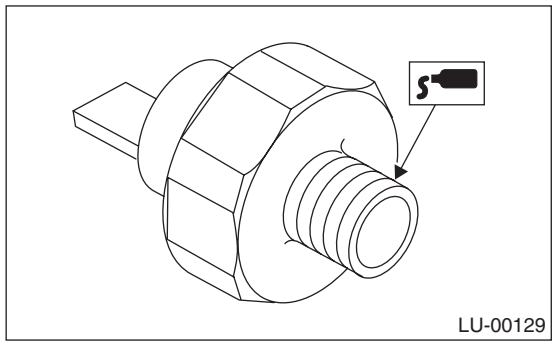
6) Remove the oil pressure switch.



B: INSTALLATION

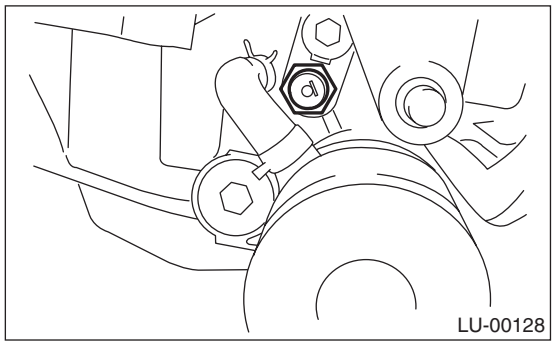
1) Apply liquid gasket to the oil pressure switch threads.

Liquid gasket
THREE BOND 1324 (Part No. 004403042) or equivalent

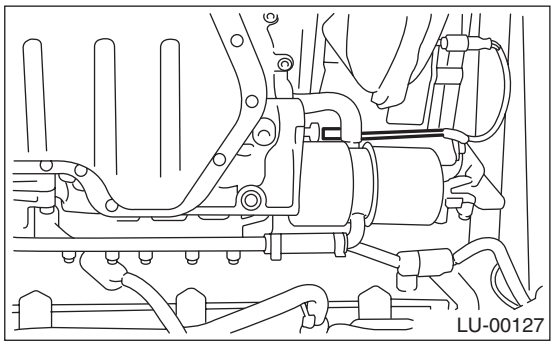


2) Install the oil pressure switch.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



3) Connect the terminal of oil pressure switch.



4) Install the under cover.

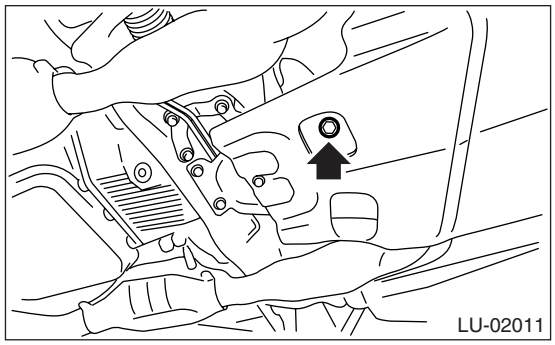
C: INSPECTION

Make sure oil does not leak or seep from where the oil pressure switch is installed.

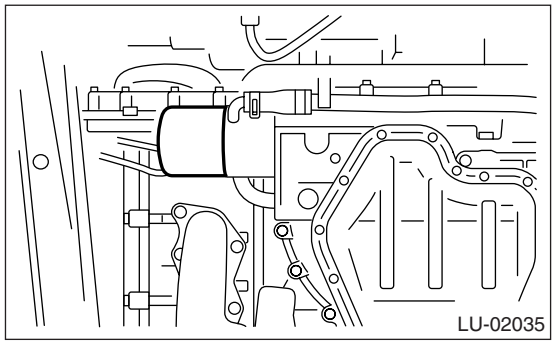
8. Engine Oil Filter

A: REMOVAL

1) Drain the engine oil by removing engine oil drain plug.



2) Remove the under cover.
3) Remove the oil filter using ST.
ST 4985447000 OIL FILTER WRENCH



B: INSTALLATION

1) Clean the oil filter installing surface of oil cooler.
2) Obtain a new oil filter and apply a thin coat of engine oil to the seal rubber.
3) Install the oil filter turning it by hand, being careful not to damage seal rubber.
4) Tighten more (approx. 3/4 turn) after the seal rubber contacts the oil cooler. Do not tighten excessively, or oil may leak.
5) Install the under cover.
6) Lower the vehicle.
7) Fill engine oil. <Ref. to LU(H6DO)-7, INSPECTION, ENGINE OIL.>

C: INSPECTION

1) After installing the oil filter, run engine and make sure that no oil is leaking around seal rubber.

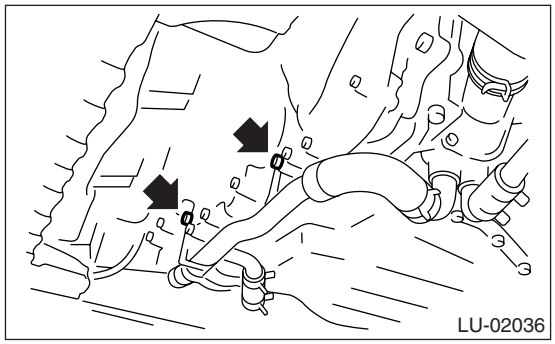
NOTE:
The filter element and filter case are permanently jointed; therefore, interior cleaning is not necessary.

2) Check the engine oil level. <Ref. to LU(H6DO)-7, INSPECTION, ENGINE OIL.>

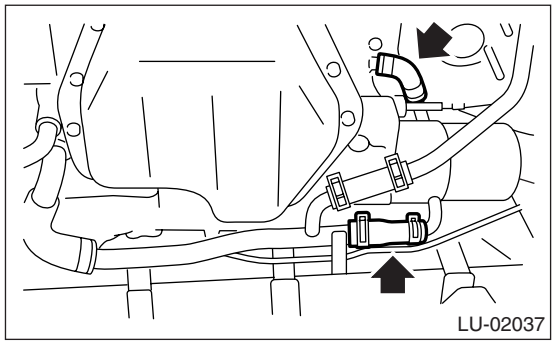
9. Oil Cooler

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the under cover.
3) Drain the engine coolant.
<Ref. to CO(H6DO)-9, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
4) Drain the engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
5) Remove the bolts which hold the water pipe to engine.

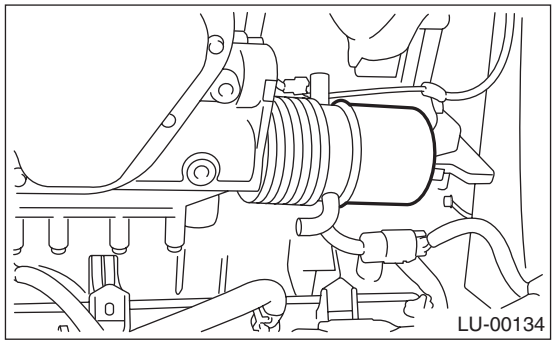


6) Disconnect the water hose from oil cooler.

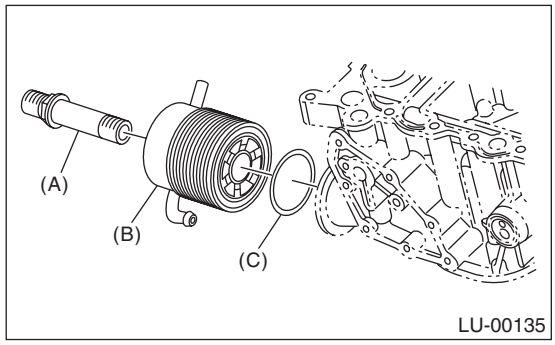


7) Remove the oil filter using ST. <Ref. to LU(H6DO)-13, REMOVAL, Engine Oil Filter.>
ST 498547000 OIL FILTER WRENCH

NOTE:
Set a container under the vehicle.



8) Remove the connector and remove oil cooler.



(A) Connector
(B) Oil cooler
(C) O-ring

B: INSPECTION

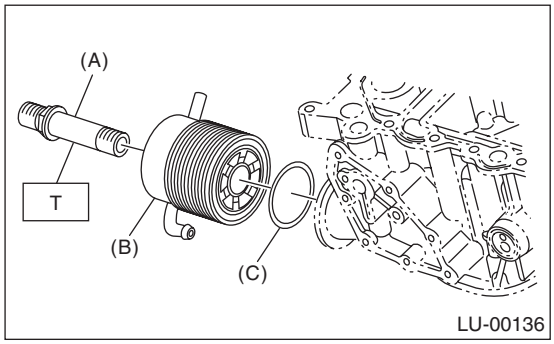
1) Check that engine coolant passages are not clogged using an compressed air.
2) Check that the oil pan upper and O-ring installing surface of oil filter are not damaged.

C: INSTALLATION

1) Install the oil cooler to oil pan upper with connector pipe.

Tightening torque:
T: 54 N·m (5.5 kgf-m, 39.8 ft-lb)

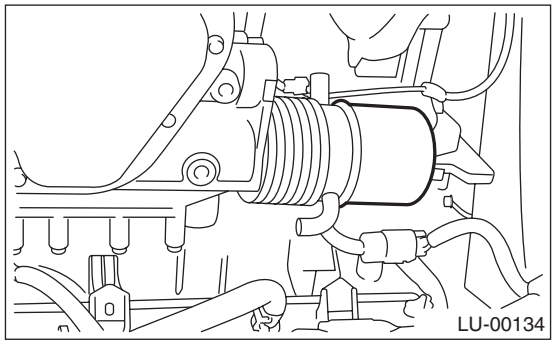
NOTE:
Use new O-rings.



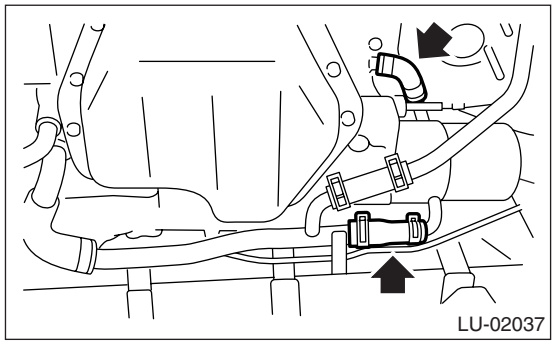
(A) Connector
(B) Oil cooler
(C) O-ring

2) Install the oil filter using ST. <Ref. to LU(H6DO)-13, INSTALLATION, ENGINE OIL FILTER.>

ST 498547000 OIL FILTER WRENCH

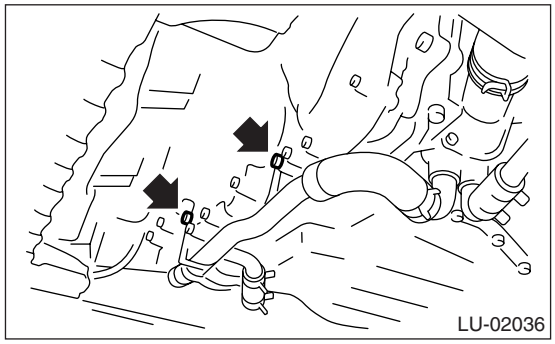


3) Connect the water hose.



4) Install the water pipe to engine.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)



5) Fill engine oil. <Ref. to LU(H6DO)-7, REPLACEMENT, Engine Oil.>
6) Fill engine coolant. <Ref. to CO(H6DO)-9, FILLING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
7) Check the engine oil level. <Ref. to LU(H6DO)-7, INSPECTION, ENGINE OIL.>

10.General Diagnostic Table

A: INSPECTION

Before performing diagnosis, make sure that the engine oil level is correct and no oil leakage exists.

Symptom	Possible cause		Corrective action
1. Warning light remains on.	1) Oil pressure switch failure	Cracked diaphragm or oil leakage within switch	Replace.
		Broken spring or seized contacts	Replace.
	2) Low oil pressure	Clogging of oil filter	Replace.
		Malfunction of oil by-pass valve in oil filter	Clean or replace.
		Malfunction of oil relief valve in oil pump	Clean or replace.
		Clogged oil passage	Clean.
		Excessive tip clearance and side clearance of oil pump rotor and gear	Replace.
		Clogged oil strainer or broken pipe	Clean or replace.
	3) No oil pressure	Insufficient engine oil	Replenish.
		Broken pipe of oil strainer	Replace.
		Stuck oil pump rotor	Replace.
2. Warning light does not come on.	1) Malfunction of combination meter		Replace.
	2) Poor contact of switch contact points		Replace.
	3) Disconnection of wiring		Repair.
3. Warning light flickers momentarily.	1) Poor contact at terminals		Repair.
	2) Defective wiring harness		Repair.
	3) Low oil pressure		Check for the same possible causes as listed in 1) — 2).

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

SPEED CONTROL SYSTEMS

SP(H6DO)

Page

1. General Description 2

1. General Description

A: SPECIFICATION

Specifications for 3.0 L DOHC Non-turbo model is the same as SOHC model. <Ref. to SP(H4SO 2.0)-2, General Description.>

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
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IGNITION

IG(H6DO)

Page

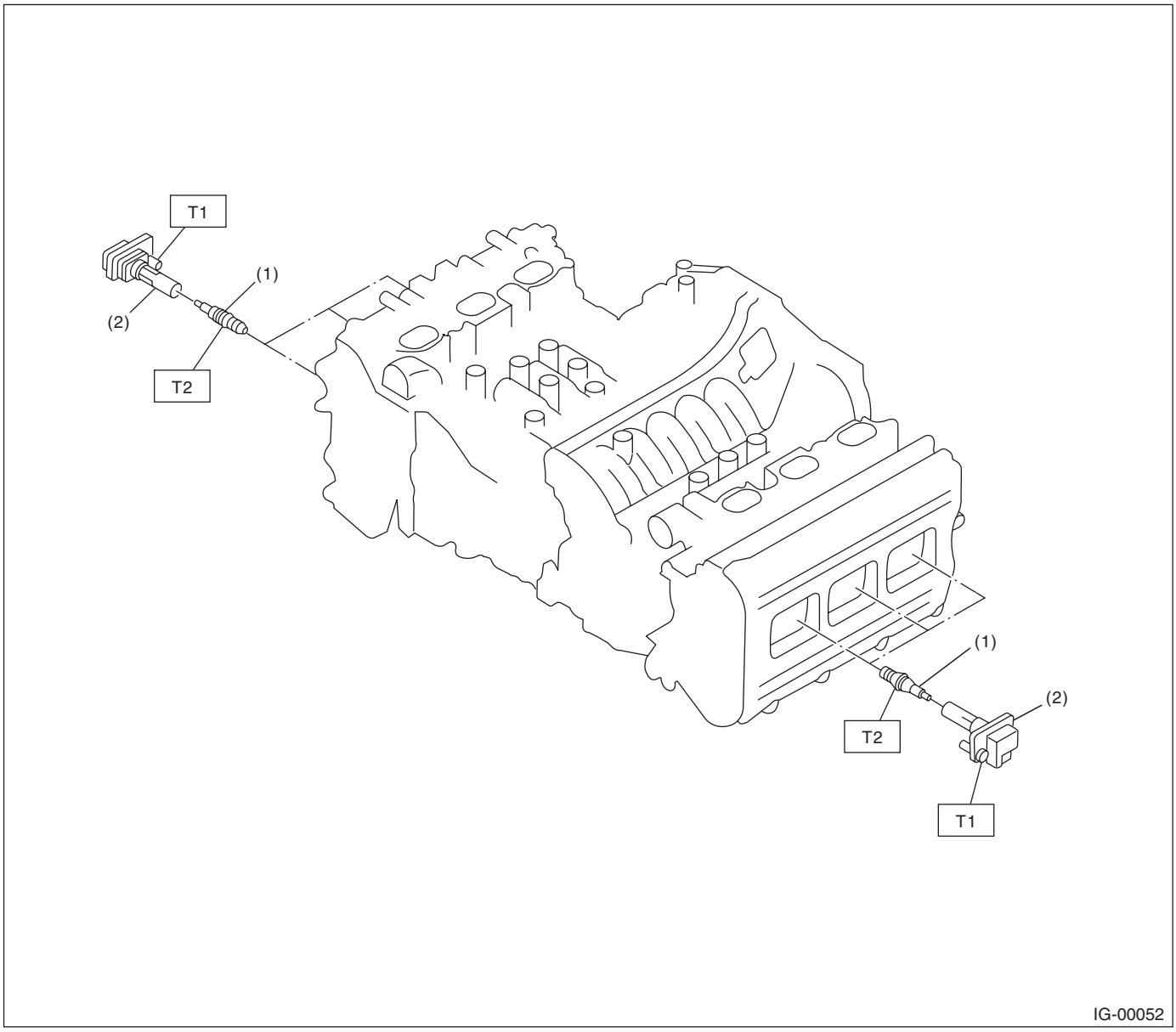
1. General Description 2
2. Spark Plug 4
3. Ignition Coil & Ignitor ASSY 7

1. General Description

A: SPECIFICATION

Item		Specification
Ignition coil & ignitor ASSY	Model	FK0140
	Ignition system	Independent ignition coil
	Manufacturer	Diamond Electric
Spark plug	Manufacturer and type	NGK: ILFR6B
	Thread size (diameter, pitch, length) mm	14, 1.25, 19
	Spark plug gap mm (in)	0.7 — 0.8 (0.028 — 0.031)
	Electrode	Iridium

B: COMPONENT



(1) Spark plug
(2) Ignition coil & ignitor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.7)
T2: 21 (2.1, 15.2)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

2. Spark Plug

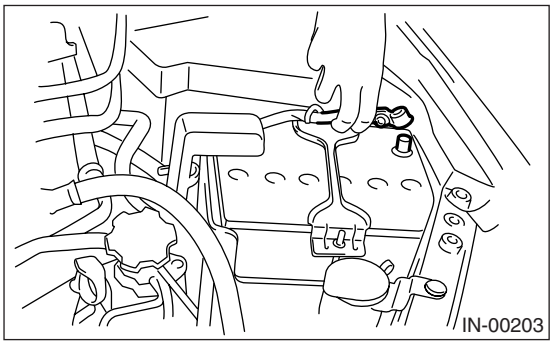
A: REMOVAL

CAUTION:
All spark plugs installed on an engine must be of the same heat range.

Spark plug:
NGK: ILFR6B

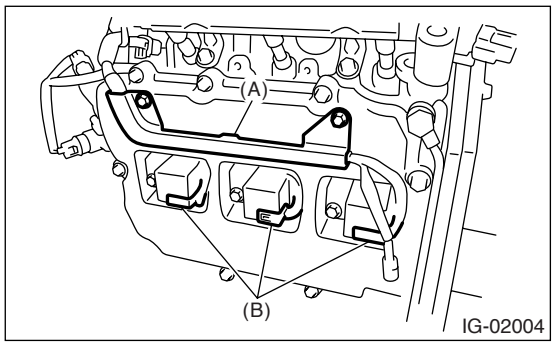
1. RH SIDE

1) Remove the collector cover.
2) Disconnect the ground cable from battery.



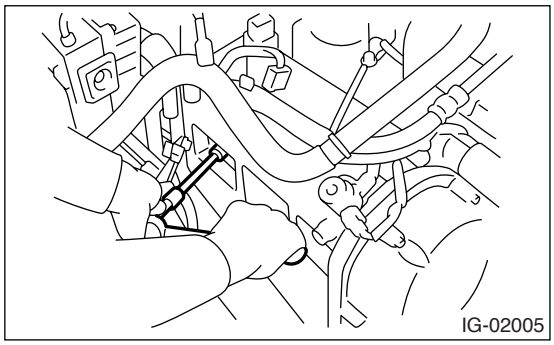
3) Remove the air cleaner case.
<Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
4) Remove the bracket.
5) Disconnect the connector from ignition coil.
6) Remove the ignition coil.

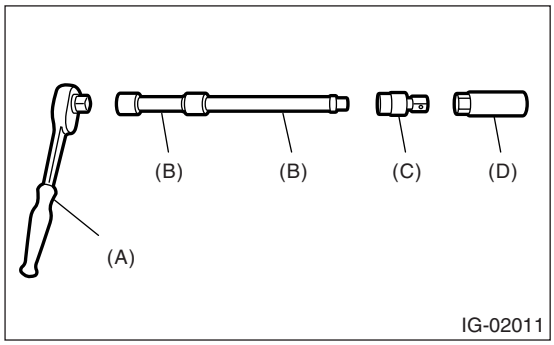
NOTE:
Turn the #5 ignition coil to remove it.



(A) Bracket
(B) Connector

7) Remove the spark plug with a spark plug socket.



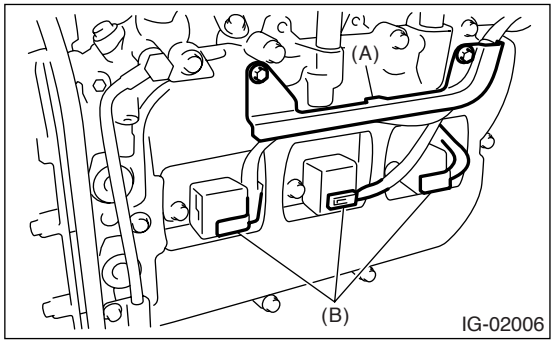


(A) Ratchet handle
(B) Extension bar
(C) Universal joint
(D) Spark plug socket

2. LH SIDE

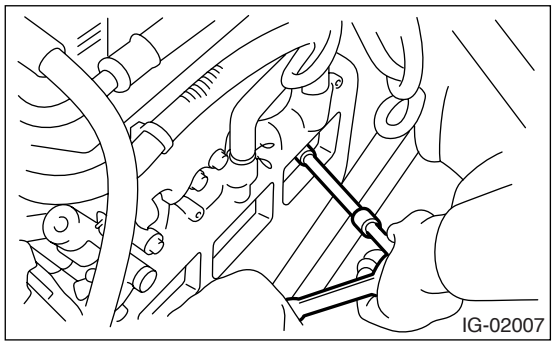
1) Remove the collector cover.
2) Remove the battery and battery carrier.
3) Remove the bracket.
4) Disconnect the connector from ignition coil.
5) Remove the ignition coil.

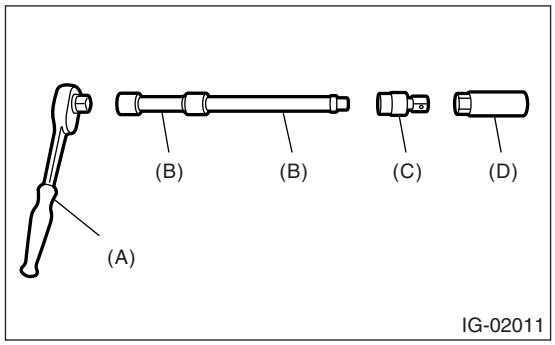
NOTE:
Turn the #6 ignition coil to remove it.



(A) Bracket
(B) Connector

6) Remove the spark plug with a spark plug socket.





(A) Ratchet handle
(B) Extension bar
(C) Universal joint
(D) Spark plug socket

B: INSTALLATION

1. RH SIDE

Install in the reverse order of removal.

Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

2. LH SIDE

Install in the reverse order of removal.

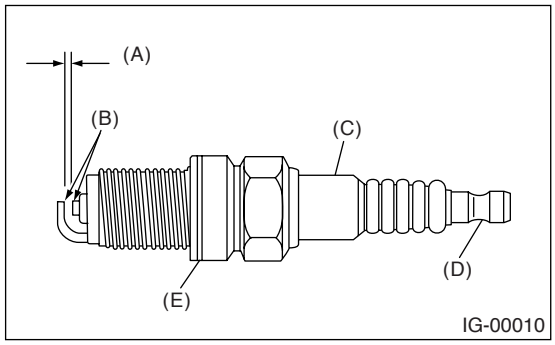
Tightening torque (Spark plug):
21 N·m (2.1 kgf-m, 15.2 ft-lb)

Tightening torque (Ignition coil):
16 N·m (1.6 kgf-m, 11.7 ft-lb)

NOTE:
The above torque should be only applied to new spark plugs without oil on their threads.
In case their threads are lubricated, the torque should be reduced by approx. 1/3 of the specified torque in order to avoid over-stressing.

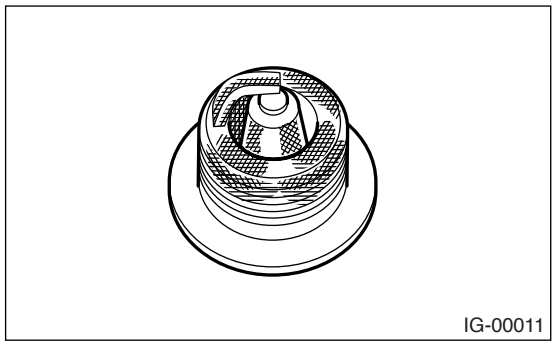
C: INSPECTION

Check the electrodes and inner and outer ceramic insulator of plugs, noting the type of deposits and the degree of electrode erosion.

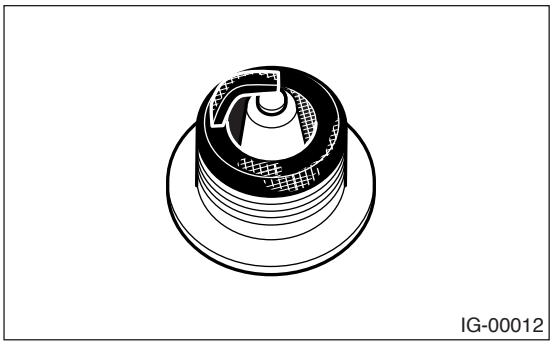


(A) Spark plug gap
(B) Carbon accumulation or wear
(C) Crack
(D) Damage
(E) Damaged gasket

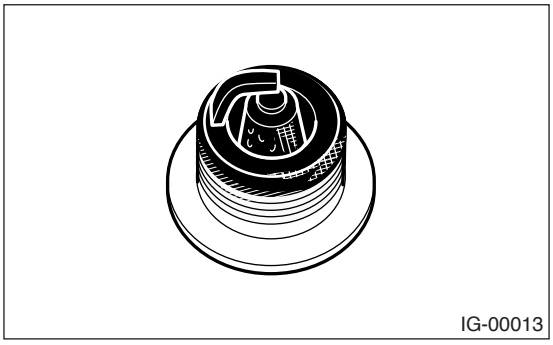
1) Normal:
Brown to grayish-tan deposits and slight electrode wear indicate correct spark plug heat range.



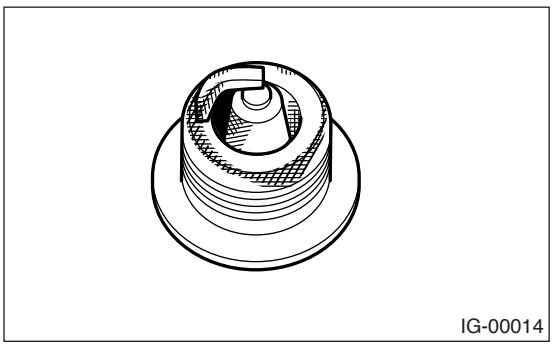
2) Carbon fouled:
Dry fluffy carbon deposits on insulator and electrode are mostly caused by slow speed driving in the city, weak ignition, too rich fuel mixture, dirty air cleaner, etc.
It is advisable to replace with plugs having hotter heat range.


IG-00012

3) Oil fouled:
Wet black deposits show excessive oil entrance into combustion chamber through worn rings and pistons or excessive clearance between valve guides and stems. If the same condition remains after repair, use a hotter plug.


IG-00013

4) Overheating:
White or light gray insulator with black or brown spots and bluish burnt electrodes indicate engine overheating. Moreover, those appearance also results from incorrect ignition timing, loose spark plugs, wrong selection of fuel, hotter range plug, etc. It is advisable to replace with plugs having colder heat range.

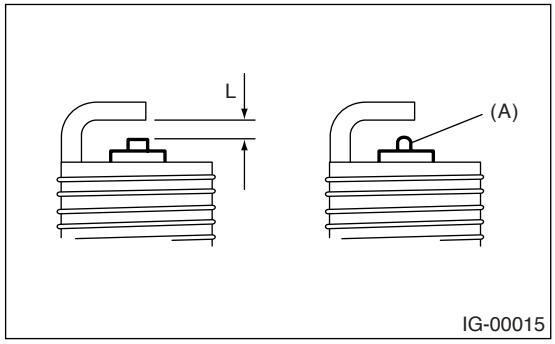

IG-00014

D: ADJUSTMENT

Clean the spark plugs using a wire brush.
Clean and remove the carbon or oxide deposits. But do not wear away ceramic insulator at this time. If deposits are too stubborn, replace the spark plugs.
After cleaning the spark plugs, correct the spark plug gap using a gap gauge.

NOTE:
Do not use a plug cleaner because the spark plugs are applied with iridium tip.

Spark plug gap: L
0.7 — 0.8 mm (0.028 — 0.031 in)



IG-00015

NOTE:
Replace with a new spark plug if the area (A) is worn to “ball” shape.

3. Ignition Coil & Ignitor ASSY

A: REMOVAL

Direct ignition type has been adopted. Refer to “Spark Plug” for removal procedure. **<Ref. to IG(H6DO)-4,** REMOVAL**, Spark Plug.>**

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
16 N·m (1.6 kgf-m, 11.7 ft-lb)

C: INSPECTION

For inspection procedure, refer to “Diagnostics for Engine Starting Failure”. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>

Ignition Coil & Ignitor ASSY

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

STARTING/CHARGING SYSTEMS

SC(H6DO)

Page

1. General Description 2
2. Starter 6
3. Generator 14
4. Battery 20

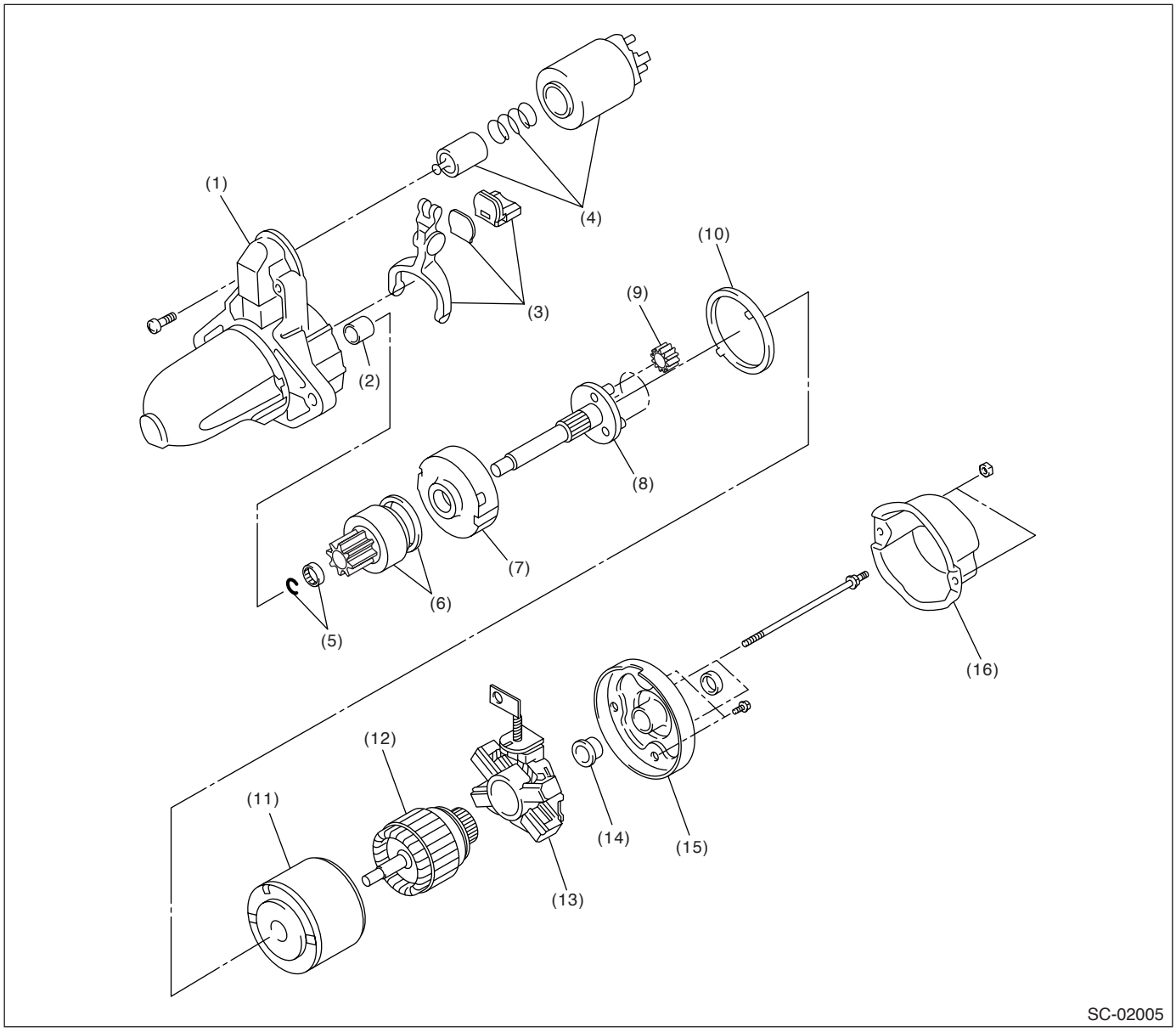
1. General Description

A: SPECIFICATION

Item			Specification
Starter	Type		Reduction type
	Model		M000T20171
	Manufacturer		Mitsubishi Electric
	Voltage and output		12 V — 1.4 kW
	Revolving direction		Counterclockwise (when observed from pinion)
	Number of pinion teeth		9
	No-load characteristics	Voltage	11 V
		Current	90 A or less
		Rotating speed	2,000 rpm or more
	Load characteristics	Voltage	7.7 V
		Current	400 A
		Torque	16.7 N·m (1.70 kgf-m, 12.3 ft-lb) or more
		Rotating speed	710 rpm or more
	Lock characteristics	Voltage	3.5 V
		Current	960 A or less
		Torque	31 N·m (3.16 kgf-m, 22.9 ft-lb) or more
Generator	Model		Rotating-field three-phase type, voltage regulator built-in type, with load response control system
	Model		A3TG0591
	Manufacturer		Mitsubishi Electric
	Voltage and output		12 V — 110 A
	Polarity on ground side		Negative
	Revolving direction		Clockwise (when observed from pulley side)
	Armature connection		3-phase Y-type
	Output current		1,500 rpm — 50 A or more 2,500 rpm — 91 A or more 5,000 rpm — 105 A or more
	Regulated voltage		14.1 — 14.8 V [20°C (68°F)]
Battery	Type and capacity	For Europe	12 V — 52 AH (75D23L)
		For other destinations	12V — 48 AH (55D23L)

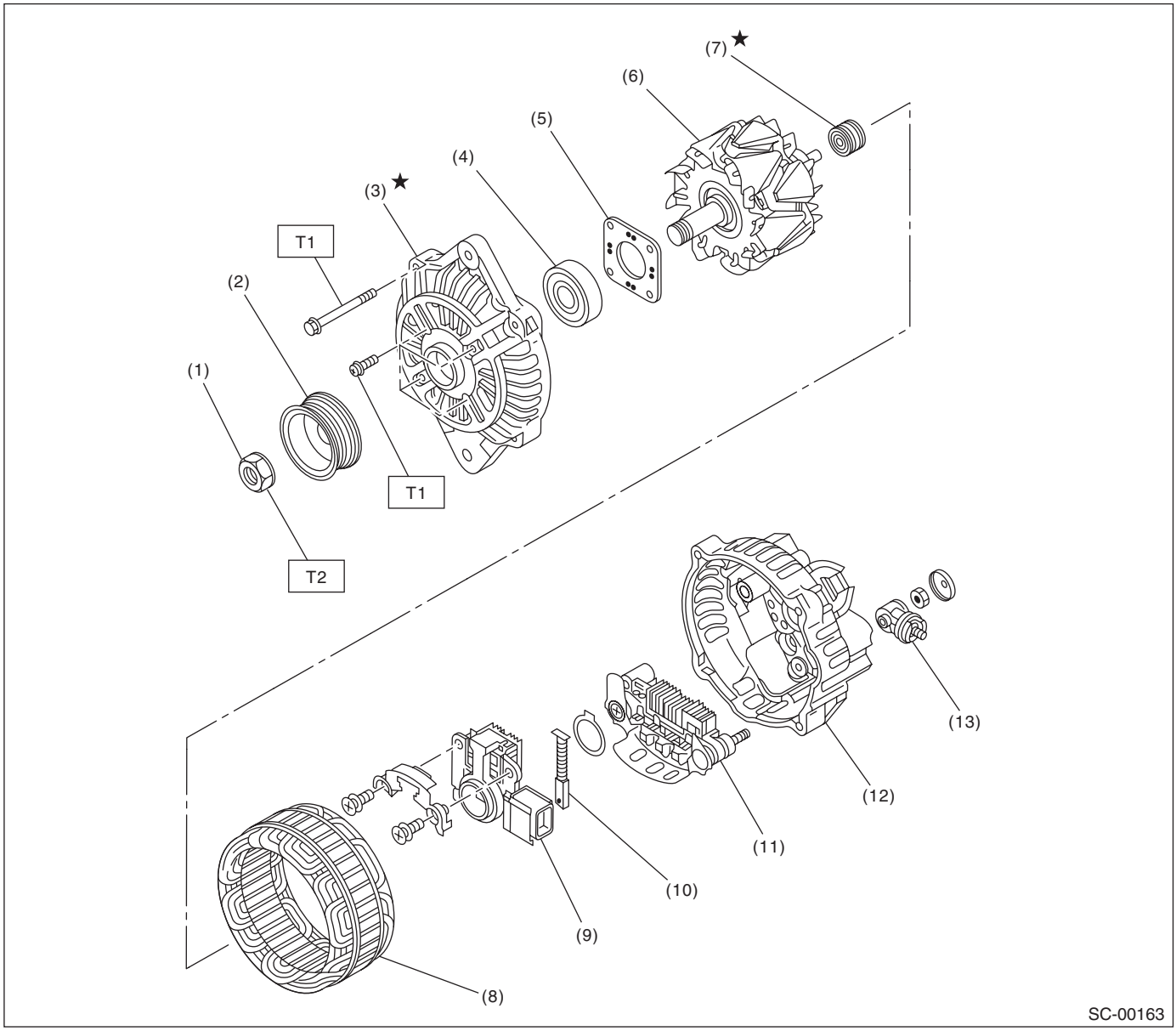
B: COMPONENT

1. STARTER



(1) Front bracket
(2) Sleeve bearing
(3) Lever set
(4) Magnet switch ASSY
(5) Stopper set
(6) Overrunning clutch
(7) Internal gear ASSY
(8) Shaft ASSY
(9) Gear ASSY
(10) Packing
(11) Yoke ASSY
(12) Armature
(13) Brush holder ASSY
(14) Sleeve bearing
(15) Rear cover
(16) Rear cover set

2. GENERATOR



(1) Pulley nut
(2) Pulley
(3) Front cover
(4) Ball bearing
(5) Bearing retainer
(6) Rotor
(7) Bearing
(8) Stator coil
(9) IC regulator with brush
(10) Brush
(11) Rectifier
(12) Rear cover
(13) Terminal

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.7 (0.48, 3.5)
T2: 108 (11.0, 80)

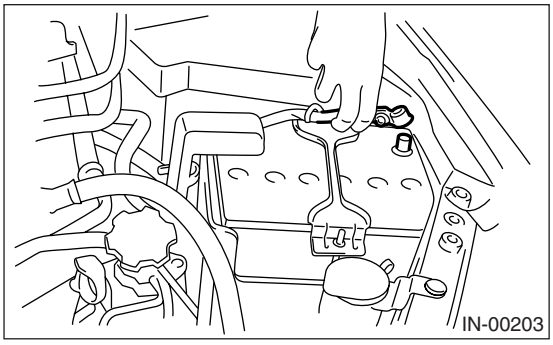
C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.

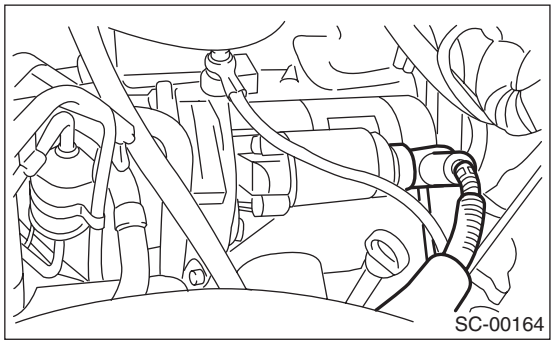
2. Starter

A: REMOVAL

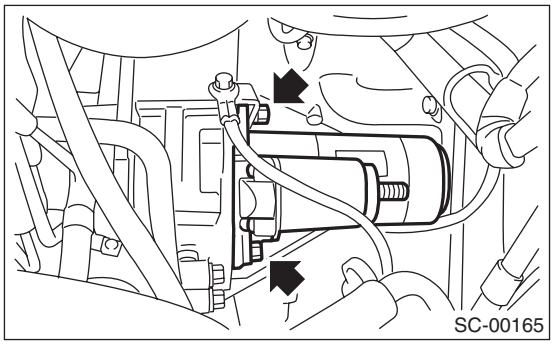
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Remove the air intake chamber.
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the connector and terminal from starter.



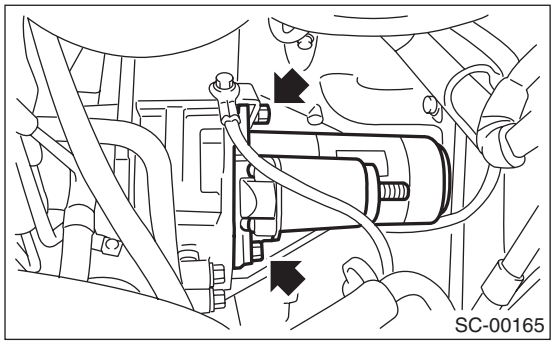
5) Remove the starter from transmission.



B: INSTALLATION

Install in the reverse order of removal.

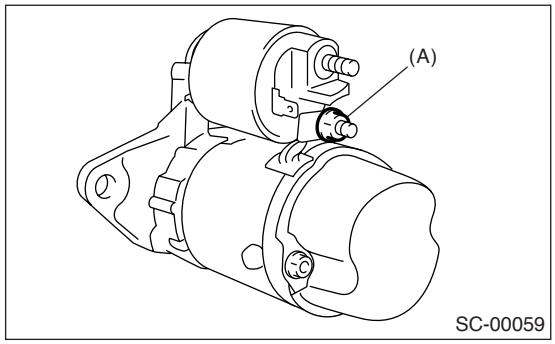
Tightening torque:
50 N·m (5.1 kgf-m, 37 ft-lb)



C: DISASSEMBLY

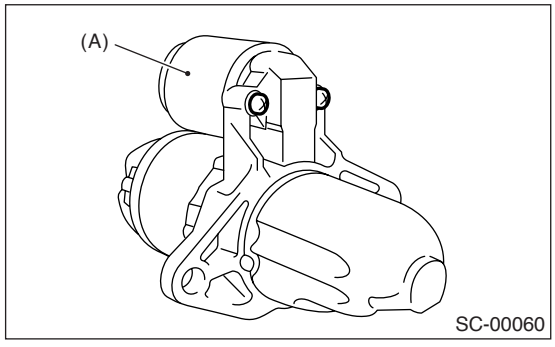
1. STARTER ASSEMBLY

1) Loosen the nut which holds terminal M of switch assembly, and then disconnect the connector.



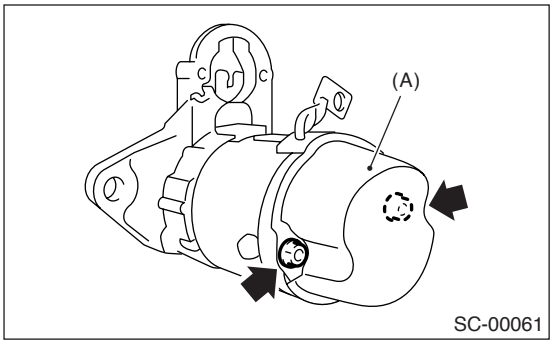
(A) Terminal M

2) Remove the bolts which hold switch assembly, and then remove the switch assembly, plunger and plunger spring from starter as a unit.



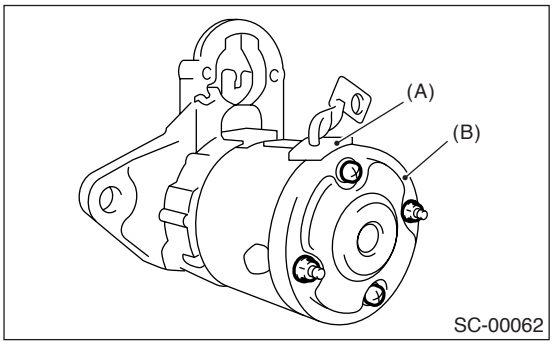
(A) Switch ASSY

3) Remove the nuts of both sides, and then remove rear cover set.



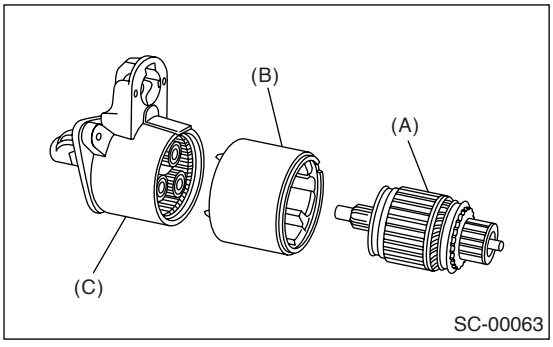
(A) Rear cover set

4) Remove the through-bolts and brush holder screws of both sides, and then detach the rear cover and brush holder assembly.



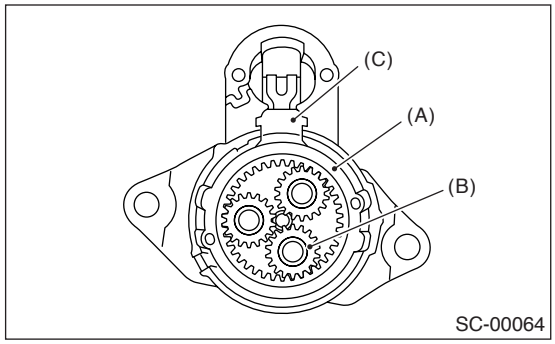
(A) Brush holder ASSY
(B) Rear cover

5) Remove the armature and yoke assembly from front bracket.



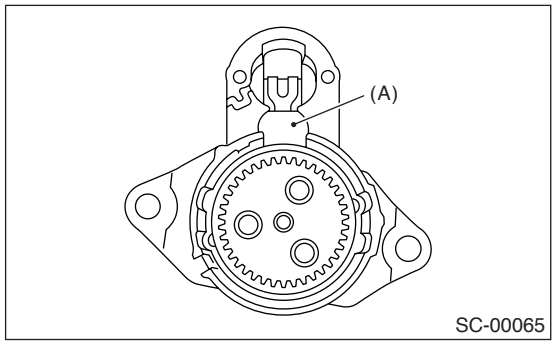
(A) Armature
(B) Yoke ASSY
(C) Front bracket

6) Remove the packing A, planetary gear and packing B.



(A) Packing A
(B) Planetary gear
(C) Packing B

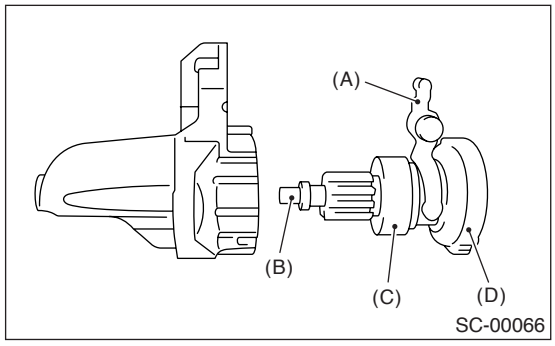
7) Remove the plate.



(A) Plate

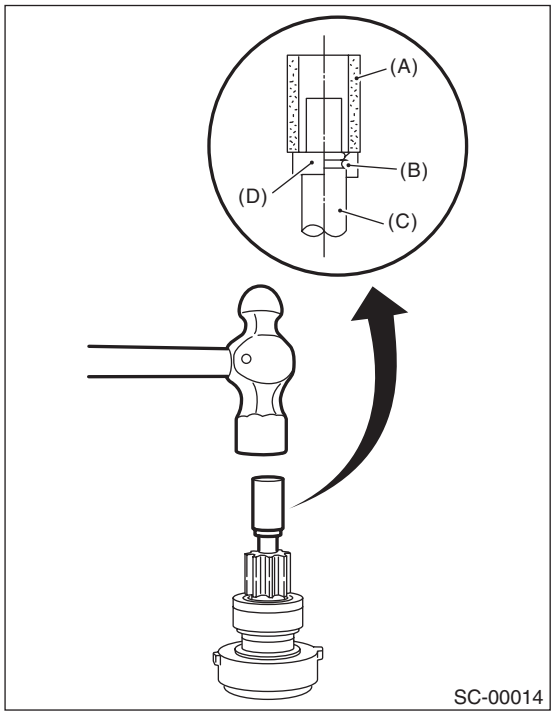
8) Remove the shaft assembly and overrunning clutch from front bracket as a unit.

NOTE:
Check the following points before removal.
- Lever direction
- Position of internal gear assembly



(A) Lever
(B) Shaft ASSY
(C) Overrunning clutch
(D) Internal gear ASSY

9) Remove the overrunning clutch from shaft assembly as follows:
(1) Remove the stopper from ring by lightly tapping the stopper with an appropriate tool (such as a fit socket wrench).
(2) Remove the ring, stopper and clutch from shaft.

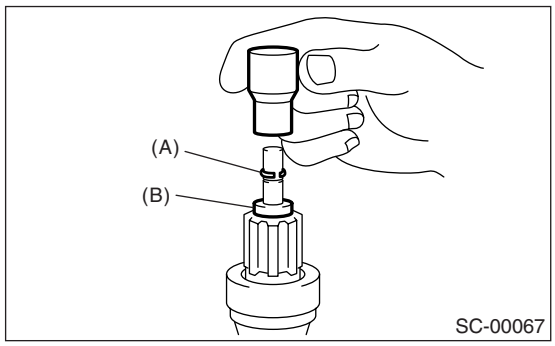


(A) Socket wrench
(B) Ring
(C) Shaft
(D) Stopper

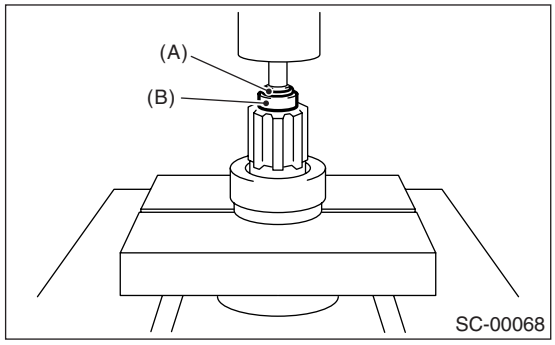
D: ASSEMBLY

NOTE:
Apply grease to the following parts before assembly.
- Sleeve bearing
- Pinion shaft rotating part
- Shaft spline portion
- Inside of reduction system
- Lever fulcrum/Clutch rotating part

1) Install the overrunning clutch to shaft assembly.
2) Install the stopper to shaft assembly as follows.
(1) Insert the ring into the shaft groove by lightly tapping it with an appropriate tool (such as a fit socket wrench).

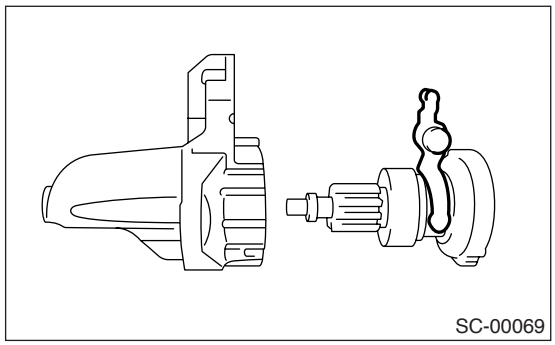


(2) Install the stopper to ring using a press.

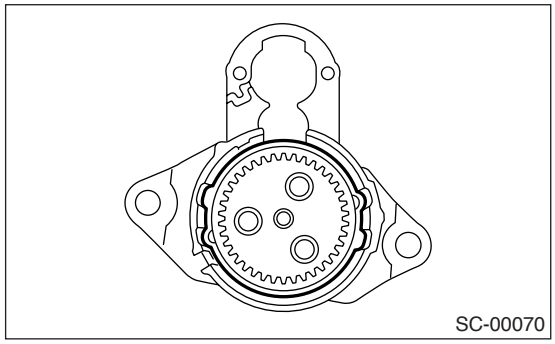


(A) Ring
(B) Stopper

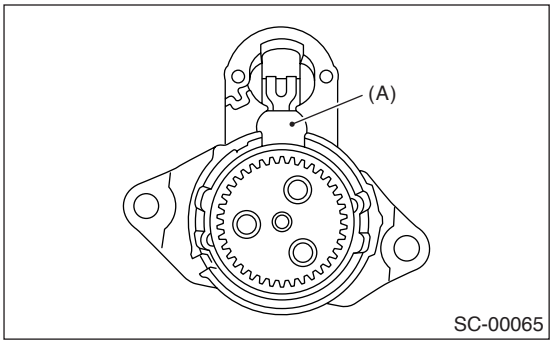
3) Install the shaft assembly to front bracket while taking care of the following points.
(1) Lever direction



(2) Internal gear position

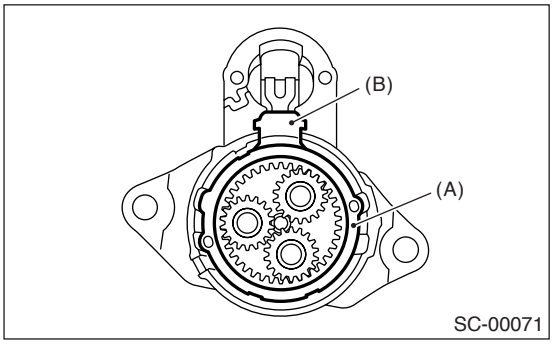


4) Install the plate.



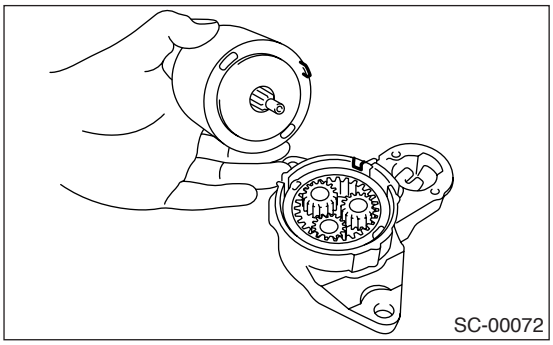
(A) Plate

5) Install the planetary gear.
6) Install the packing A and B while taking care of installing positions.



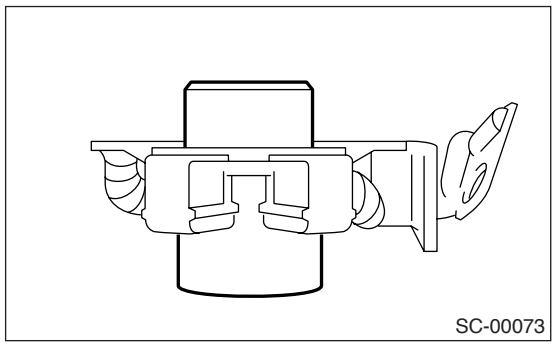
(A) Packing A
(B) Packing B

7) Install the armature to yoke assembly.
8) Install the yoke to front bracket matching front bracket to the groove of yoke assembly.

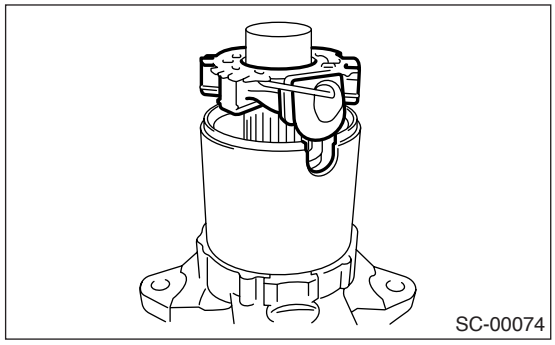


9) Install the brush holder to yoke assembly as follows.

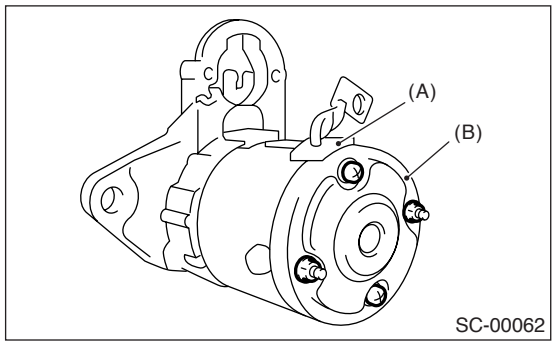
(1) Press the brush down into brush holder, and then fix the brush in that position using an appropriate tool (such as a fit socket wrench).



(2) Match the brush holder to groove of yoke, and then slide the brush holder into yoke assembly to install.

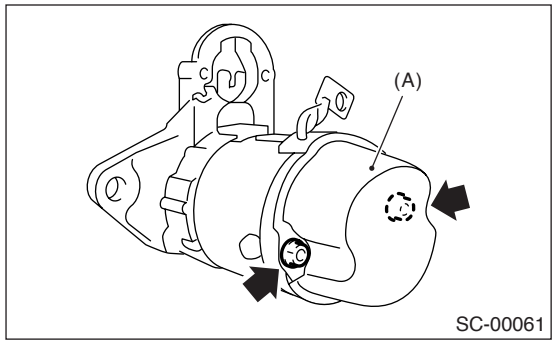


10) Install the rear cover matching it's groove to brush holder assembly.



(A) Brush holder ASSY
(B) Rear cover

11) Install rear cover set.

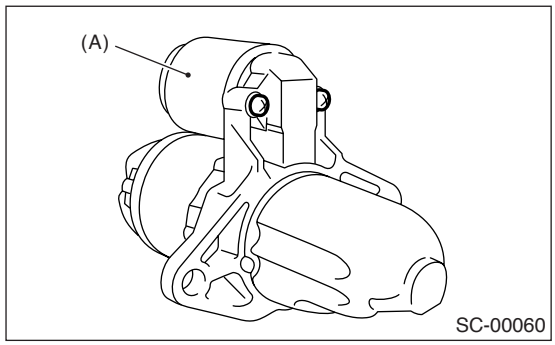


(A) Rear cover set

12) Install the switch assembly to front bracket as follows.

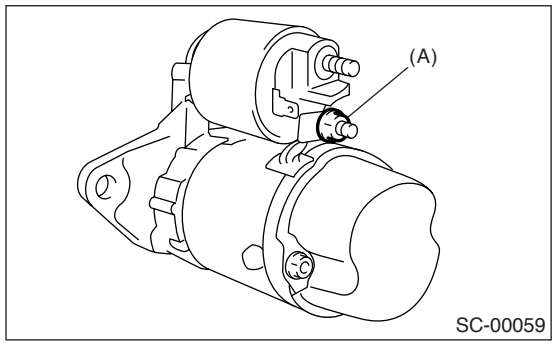
(1) Insert the plunger and plunger spring into switch assembly.

(2) Hook the plunger protrusion on lever edge to install plunger to front bracket.



(A) Switch ASSY

13) Connect the connector to terminal M of switch assembly.



(A) Terminal M

E: INSPECTION

1. ARMATURE

1) Check the commutator for any sign of burns of rough surfaces or stepped wear. If wear is of a minor nature, correct it by using sand paper.

2) Run-out test

Check the commutator for run-out, and then replace if it exceeds the limit.

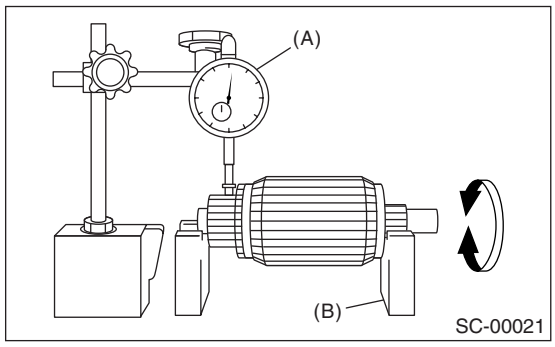
Commutator run-out:

Standard

0.05 mm (0.0020 in)

Service limit

Less than 0.10 mm (0.0039 in)



(A) Dial gauge

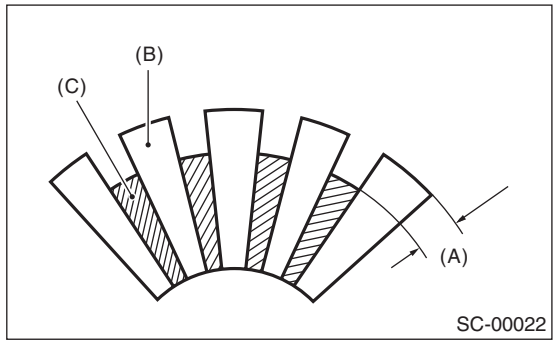
(B) V-block

3) Depth of segment mold

Check the depth of segment mold.

Depth of segment mold:

0.5 mm (0.020 in)

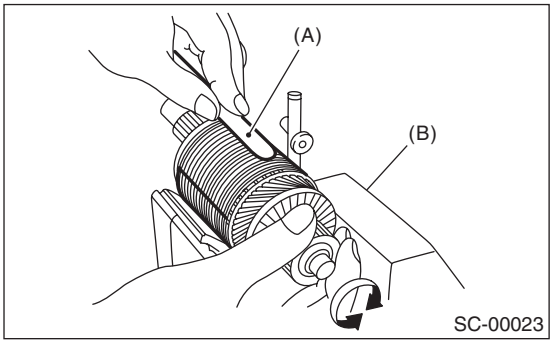


(A) Depth of mold

(B) Segment

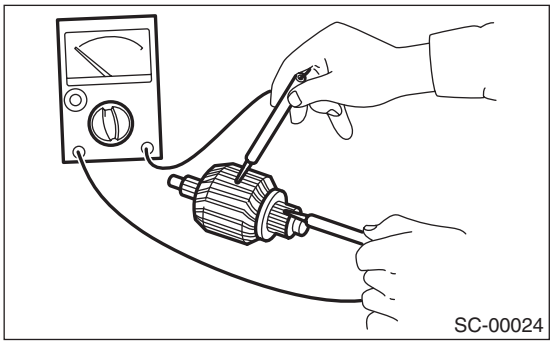
(C) Mold

4) Armature short-circuit test
Check the armature for short-circuit by placing it on growler tester. Hold an iron sheet against the armature core while slowly rotating the armature. A short-circuited armature will cause the iron sheet to vibrate and to be attracted to core. If the iron sheet is attracted or vibrates, the armature, which is short-circuited, must be replaced or repaired.



(A) Iron sheet
(B) Growler tester

5) Armature ground test
Using a circuit tester, touch one probe to the commutator segment and the other to shaft. There should be no continuity. If there is continuity, the armature is grounded.
Replace the armature if it is grounded.



2. YOKE

Make sure the pole is set in position.

3. OVERRUNNING CLUTCH

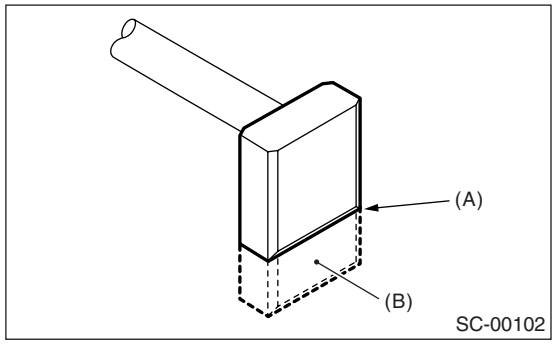
Inspect the teeth of pinion for wear and damage. Replace if it is damaged. Rotate the pinion in the right direction of rotation (counterclockwise). It should rotate smoothly. But in the opposite direction, it should be locked.

CAUTION:
Do not clean the overrunning clutch with oil to prevent grease from flowing out.

4. BRUSH AND BRUSH HOLDER

1) Brush length
Measure the brush length, and then replace if it exceeds the service limit.
Replace if abnormal wear or cracks are noticed.

Brush length:
Standard
12.3 mm (0.484 in)
Service limit
7.0 mm (0.276 in)



(A) Service limit line
(B) Brush

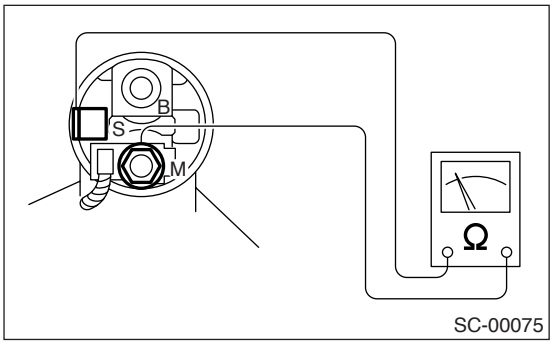
2) Brush movement
Be sure the brush moves smoothly inside brush holder.
3) Brush spring force
Measure the brush spring force with a spring scale. If it is less than the service limit, replace the brush holder.

Brush spring force:
Standard
15.9 — 19.5 N (1.62 — 1.99 kgf, 3.57 — 4.38 lb) (when new)
Service limit
2.5 N (0.25 kgf, 0.56 lb)

5. SWITCH ASSEMBLY

Be sure there is continuity between the terminals S and M, and between terminal S and ground. Use a circuit tester (set in “ohm”).
Also check to be sure there is no continuity between terminal M and B.

Terminal / Specified resistance:
S — M / Less than 1 Ω
S — Ground / Less than 1 Ω
M — B / More than 1 MΩ

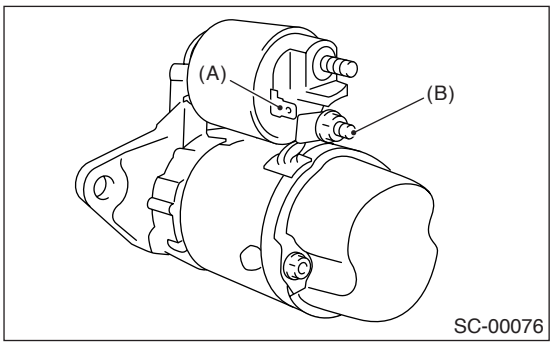


6. SWITCH ASSEMBLY OPERATION

1) Using a lead wire, connect the terminal S of switch assembly to positive terminal of battery, and starter body to ground terminal of battery. The pinion should be forced endwise on shaft.

CAUTION:
With the pinion forced endwise on shaft, starter motor can sometimes rotate because current flows, through pull-in coil, to motor. This is not a problem.

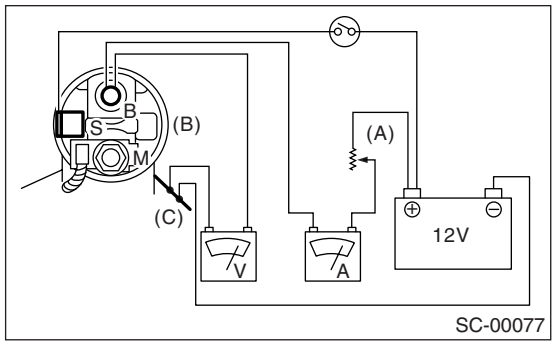
2) Disconnect the connector from terminal M. Then using a lead wire, connect the positive terminal of battery and terminal M and ground terminal to starter body.
In this test set up, the pinion should return to its original position even when it is pulled out with a screwdriver.



(A) Terminal S
(B) Terminal M

7. PERFORMANCE TEST

The starter should be submitted to performance tests whenever it has been overhauled, to assure its satisfactory performance when installed on the engine.
Three performance tests, no-load test, load test, and lock test, are presented here; however, if the load test and lock test cannot be performed, carry out at least the no-load test.
For these performance tests, use the circuit shown in figure.



(A) Variable resistor
(B) Magnetic switch
(C) Starter body

1) No-load test
With switch on, adjust the variable resistor to obtain 11 V, take the ammeter reading, and then measure the starter speed. Compare these values with the specifications.

No-load test (standards):

Voltage/Current
MAX. 11 V/90 A

Rotating speed
More than 2,000 rpm

2) Load test
Apply the specified braking torque to starter. The condition is satisfactory if the current draw and starter speed are within the specifications.

Load test (standards):

Voltage/Load
7.7 V/16.7 N·m (1.70 kgf-m, 12.3 ft-lb)

Current/Speed
More than 400 A/710 rpm

3) Lock test
With the starter stalled, or not rotating, measure the torque developed and current draw when the voltage is adjusted to specified voltage.

Lock test (standards):

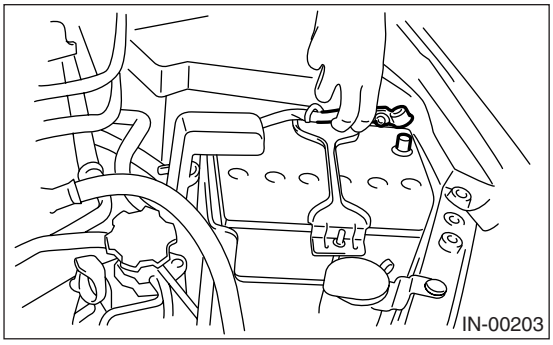
Voltage/Current
Less than 3.5 V/960 A

Torque
31 N·m (3.16 kgf-m, 22.9 ft-lb)

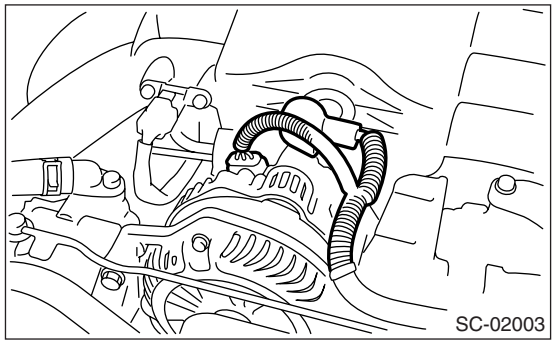
3. Generator

A: REMOVAL

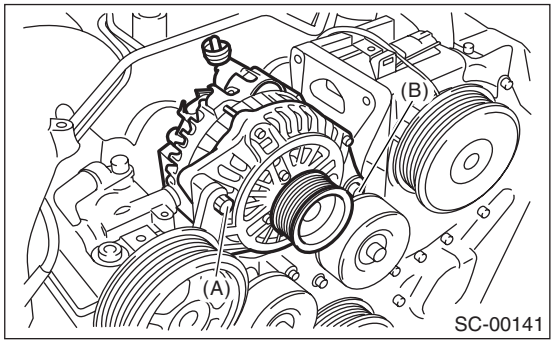
1) Remove the collector cover.
2) Disconnect the ground cable from battery.



3) Disconnect the connector and terminal from generator.



4) Remove the V-belt.
<Ref. to ME(H6DO)-33, REMOVAL, V-belt.>
5) Remove the bolt (A) and loosen the bolt (B), and then remove the generator from bracket.

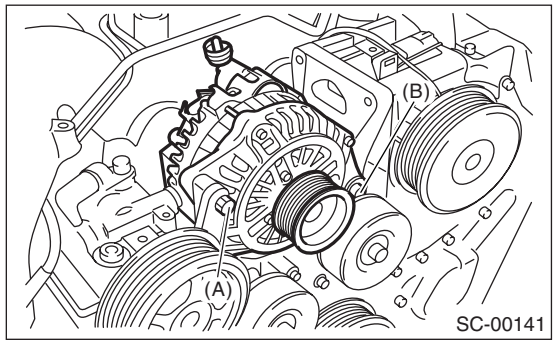


B: INSTALLATION

Install in the reverse order of removal.

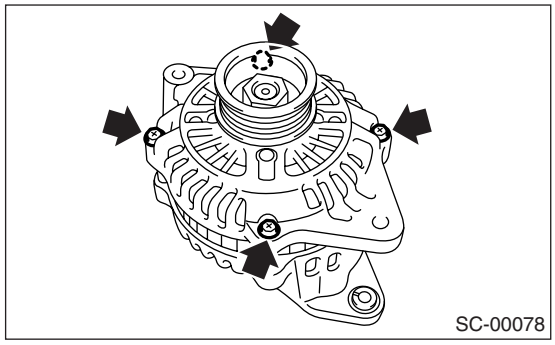
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Check and adjust the V-belt tension.
<Ref. to ME(H6DO)-33, INSPECTION, V-belt.>

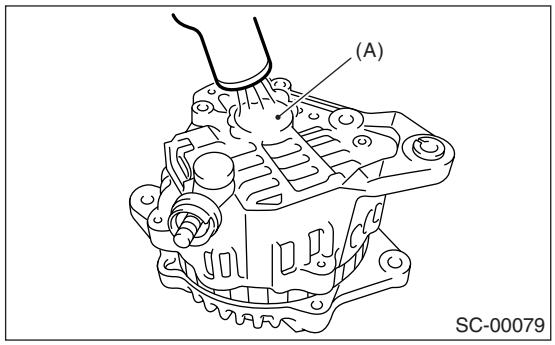


C: DISASSEMBLY

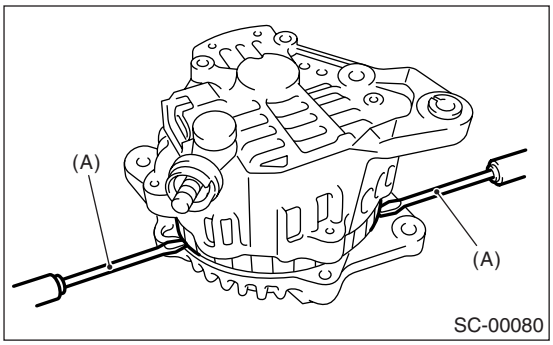
1) Remove the four through-bolts.



2) Heat the portion (A) of rear cover to 50°C (122°F) with a heater drier.

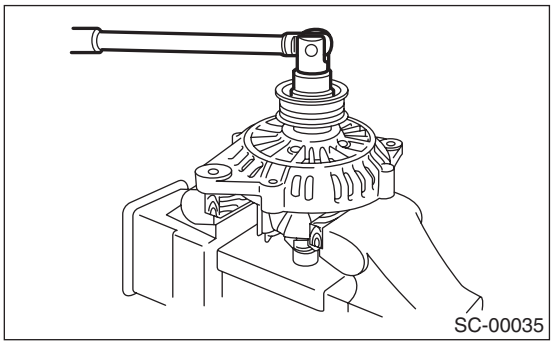


3) Then insert the tip of a flat-tip screwdriver into the gap between stator core and front cover. Pry them apart to disassemble.

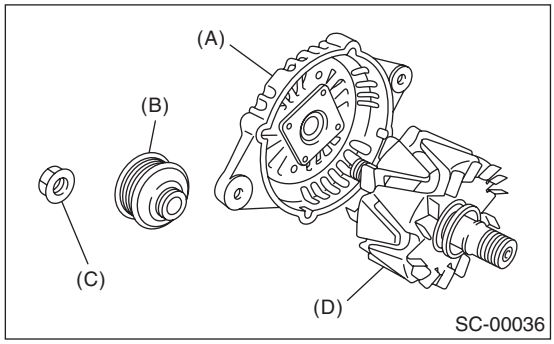


(A) Screwdriver

4) Hold the rotor with a vise and remove pulley nut.

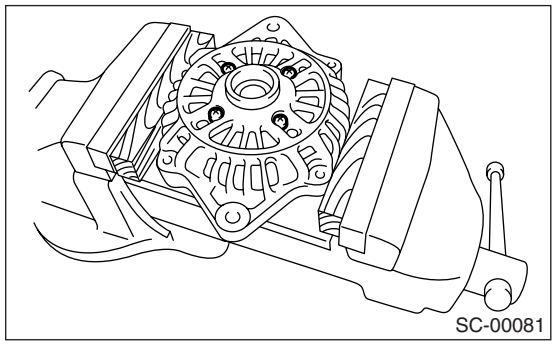


CAUTION:
When holding the rotor with a vise, place aluminum plates or wooden pieces on the vise jaws to prevent rotor from damage.

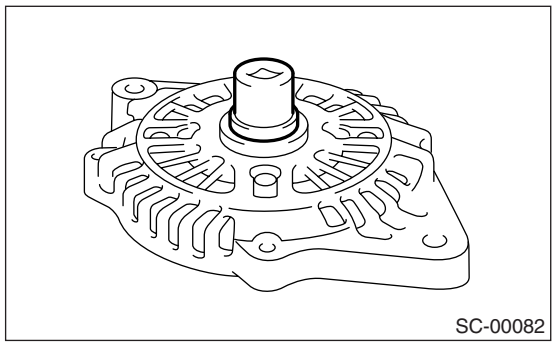


(A) Front cover
(B) Pulley
(C) Nut
(D) Rotor

5) Remove the ball bearing as follows.
(1) Remove the bolt, and then remove the bearing retainer.

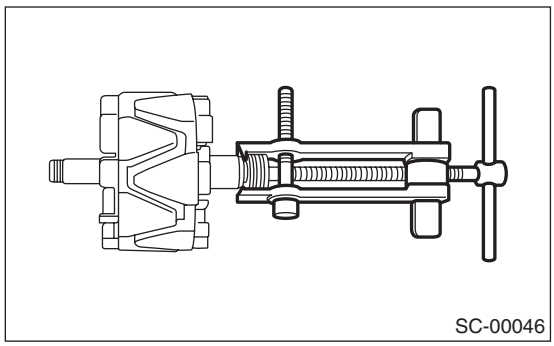


(2) Firmly install an appropriate tool (such as a fit socket wrench) to bearing inner race.



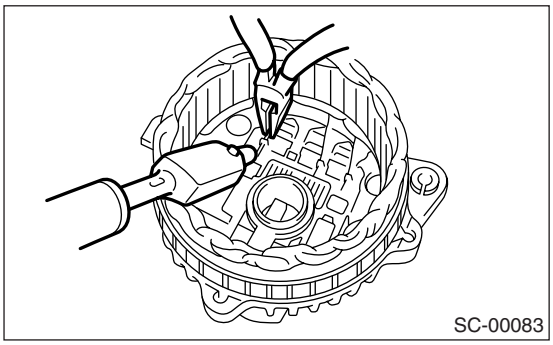
(3) Push the ball bearing off the front cover using a press.

6) Remove the bearing from rotor using a bearing puller.

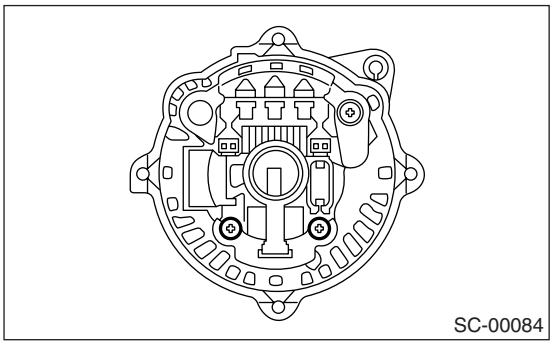


7) Unsolder the connection between rectifier and stator coil to remove stator coil.

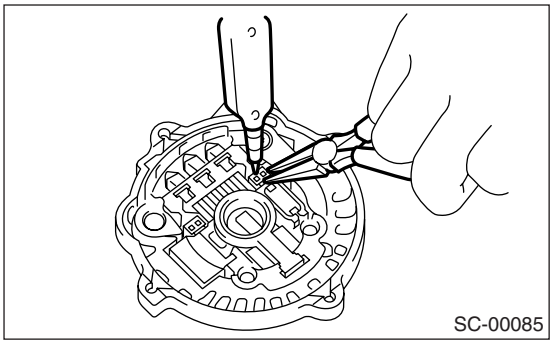
CAUTION:
Do not allow a 180 — 270 W soldering iron to contact the terminals for more than 5 seconds at once because the rectifier cannot withstand so much heat.


SC-00083

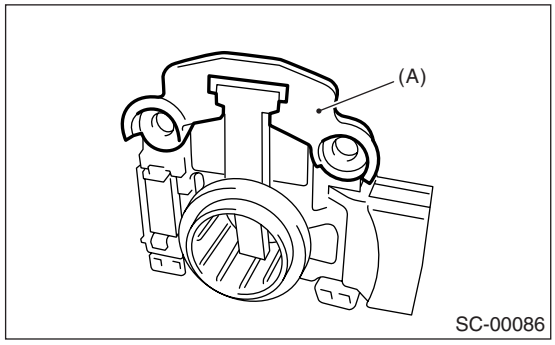
8) Remove the IC regulator as follows.
(1) Remove the screws which secure IC regulator to rear cover.


SC-00084

(2) Unsolder the connection between IC regulator and rectifier to remove IC regulator.


SC-00085

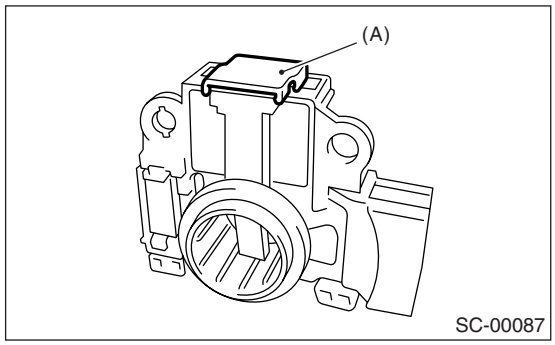
9) Remove the brush as follows.
(1) Remove the cover A.



SC-00086

(A) Cover A

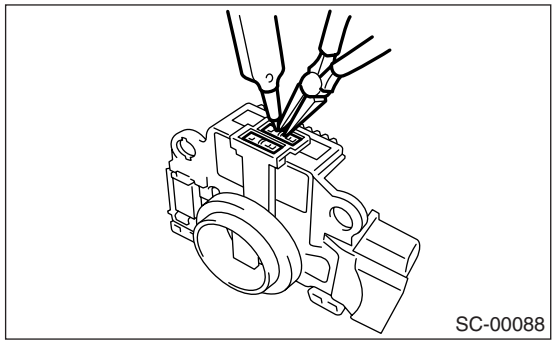
(2) Remove the cover B.



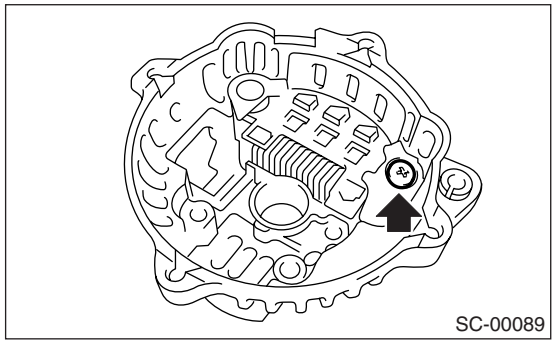
SC-00087

(A) Cover B

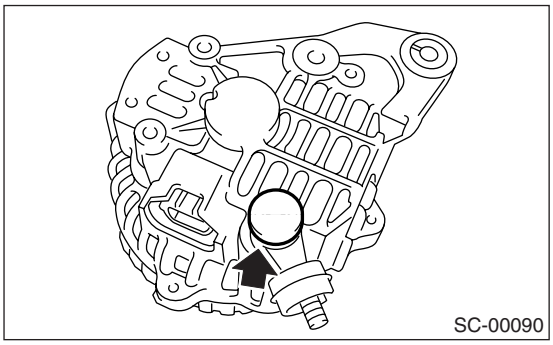
(3) Separate the brush from connection to remove.


SC-00088

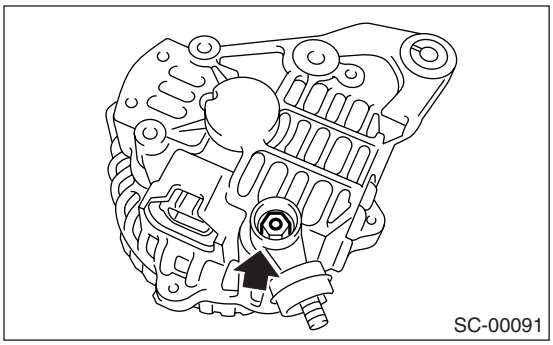
10) Remove the rectifier as follows.
(1) Remove the bolts which secure rectifier.


SC-00089

(2) Remove the cover of terminal B.



(3) Remove the nut of terminal B, and then remove the rectifier.



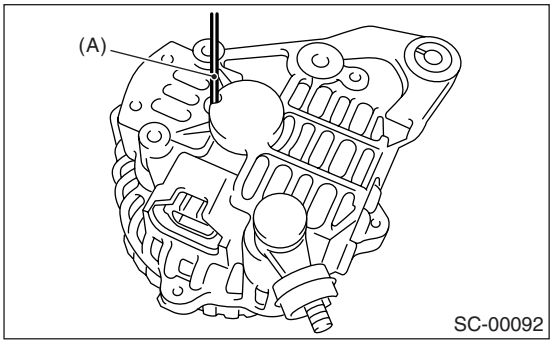
D: ASSEMBLY

Assemble in the reverse order of disassembly.

1) Pulling up brush

Before assembling, press the brush down into brush holder, and then fix them in that position by passing a [1 mm (0.08 in) dia. 40 to 50 mm (1.6 to 2.0 in) long] wire through the hole as shown in the figure.

CAUTION:
Be sure to remove the wire after reassembly.



(A) Wire

2) Install the ball bearing.

(1) Set the ball bearing on the front cover, and then securely install an appropriate tool (such as a fit socket wrench) to the bearing outer race.

(2) Press the ball bearing into the specified position using a press.

(3) Install the bearing retainer.

3) Press the bearing (rear side) into the rotor shaft using a press to install.

4) Heat the bearing box in rear cover [50 to 60°C (122 to 140°F)], and then press the rear bearing into rear cover.

CAUTION:
Grease should not be applied to rear bearing. Remove the oil completely if it is found on bearing box.

5) After reassembly, turn the pulley by hand to check that rotor turns smoothly.

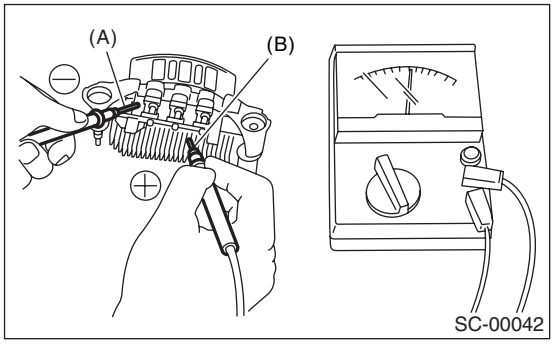
E: INSPECTION

1. DIODE

CAUTION:
Never use a mega tester (designed for reading high voltage) or any other similar instrument for this test; otherwise, the diodes may be damaged.

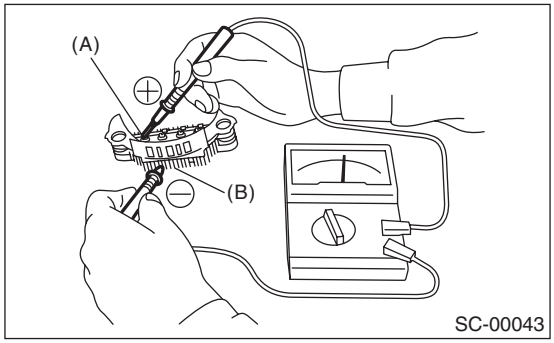
1) Checking positive diode

Check for continuity between the diode lead and positive side heat sink. The positive diode is in good condition if resistance is 1 Ω or less only in the direction from the diode lead to heat sink.



(A) Diode lead
(B) Heat sink (positive side)

2) Checking negative diode
Check for continuity between the negative side heat sink and diode lead. The negative diode is in good condition if resistance is 1 Ω or less only in the direction from the heat sink to diode lead.



(A) Diode lead
(B) Heat sink (negative side)

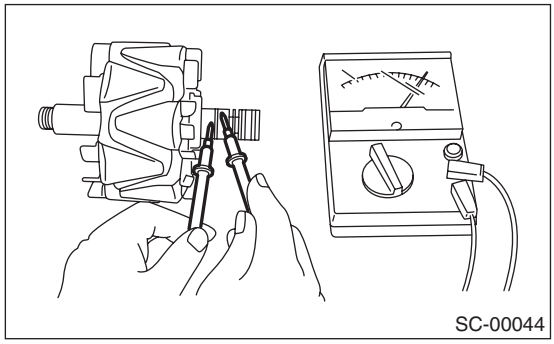
2. ROTOR

1) Slip ring surface
Inspect the slip rings for contamination or any roughness on the sliding surface. Repair the slip ring surface using a lathe or sand paper.
2) Slip ring outer diameter
Measure the slip ring outer diameter. If the slip ring is worn, replace the rotor assembly.

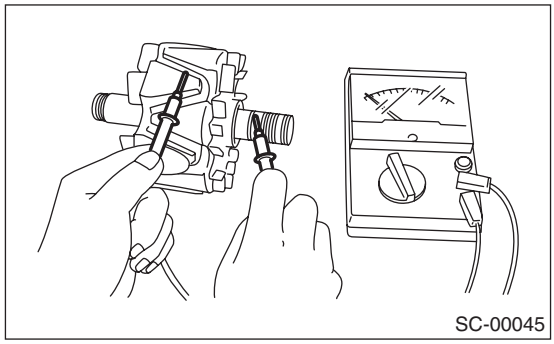
Slip ring outer diameter:
Standard
22.7 mm (0.894 in)
Limit
22.1 mm (0.870 in)

3) Continuity test
Check the resistance between slip rings using circuit tester.
If the resistance is not within the specified range, replace the rotor assembly.

Specified resistance:
Approx. 2.0 — 2.4 Ω



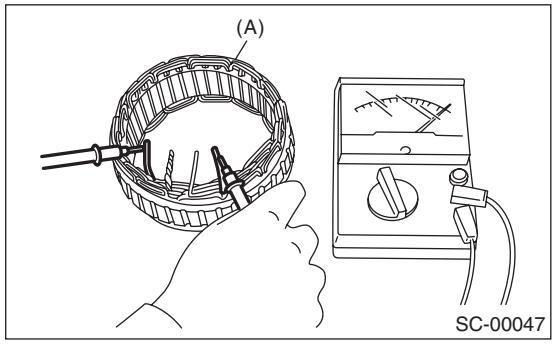
4) Insulation test
Check the continuity between slip ring and rotor core or shaft. If resistance is 1 Ω or less, the rotor coil is grounded, and so replace the rotor assembly.



5) Ball bearing (rear side)
Check the rear ball bearing. Replace if it is noisy or if the rotor does not turn smoothly.

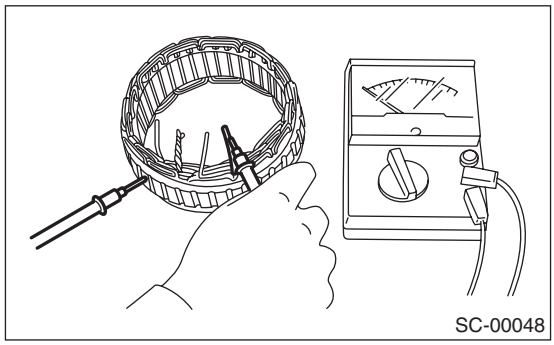
3. STATOR

1) Continuity test
Inspect the stator coil for continuity between each end of the lead wires. If resistance is 1 MΩ or more, the lead wire is broken, and so replace the stator assembly.



(A) Stator

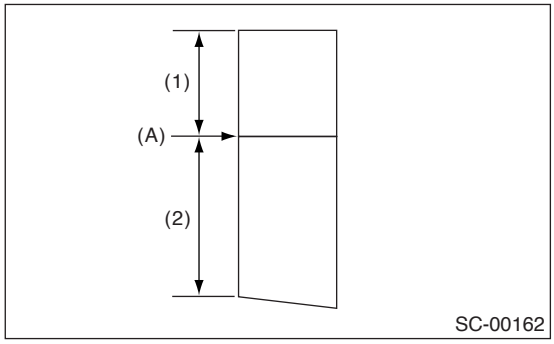
2) Insulation test
Inspect the stator coil for continuity between stator core and each end of lead wire. If resistance is 1 Ω or less, the stator coil is grounded, and so replace the stator assembly.



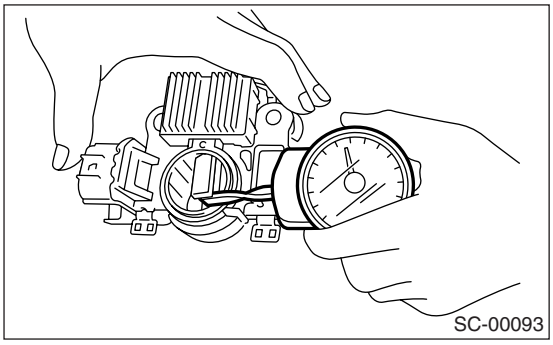
4. BRUSH

1) Measure the length of each brush. If wear exceeds the service limit, replace the brush. Each brush has the service limit mark (A) on it.

Brush length:
Service limit (1)
5.0 mm (0.197 in)
Standard (2)
18.5 mm (0.728 in)



2) Checking brush spring for proper pressure
Using a spring pressure indicator, push the brush into the brush holder until its tip protrudes 2 mm (0.08 in). Then measure the pressure of brush spring. If the pressure is less than 2.2 N (224 g, 7.91 oz), replace the brush spring with a new one. The new spring must have a pressure of 4.8 to 6.0 N (489 to 612 g, 17.26 to 21.60 oz).



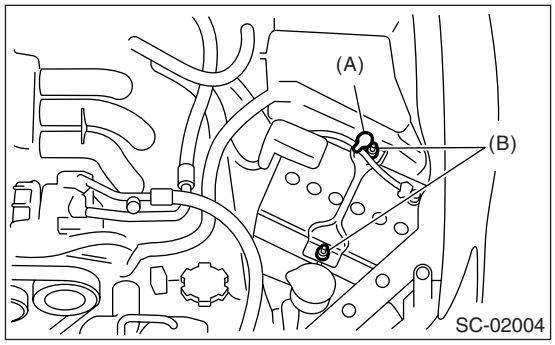
5. BEARING (FRONT SIDE)

Check the front ball bearing. If the resistance is felt while rotating, or if noise is heard, replace the ball bearing.

4. Battery

A: REMOVAL

1) Remove the battery cable holder from battery rod.
2) Disconnect the positive (+) terminal after disconnecting the negative (−) terminal of battery.
3) Remove the flange nuts from battery rods and take off battery holder.



(A) Battery cable holder
(B) Battery rod

4) Remove the battery.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

NOTE:
• Clean the battery cable terminals and apply grease to retard the formation of corrosion.
• Connect the positive (+) terminal, and then connect the negative (−) terminal of battery.
• Initial diagnosis of electronic control throttle is performed after battery installation. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.

C: INSPECTION

WARNING:
• Electrolyte has toxicity; be careful of handling the fluid.
• Avoid contact with skin, eyes or clothing. Especially at contact with eyes, flush with water for 15 minutes and get prompt medical attention.
• Batteries produce explosive gases. Keep sparks, flame, cigarettes away.
• Ventilate when charging or using in enclosed space.
• For safety, in case an explosion does occur, wear eye protection or shield your eyes when working near any battery. Never lean over a battery.
• Do not let battery fluid contact eyes, skin, fabrics, or paint-work because battery fluid is corrosive acid.
• To lessen the risk of sparks, remove rings, metal watch-bands, and other metal jewelry. Never allow metal tools to contact the positive battery terminal and anything connected to it while you are at the same time in contact with any other metallic portion of the vehicle. This may cause short circuit.

1. EXTERNAL PARTS

Check the battery case, top cover, vent plugs, and terminal posts for dirt or cracks. If necessary, clean with water and wipe with a dry cloth.
Apply a thin coat of grease on the terminal posts to prevent corrosion.

2. ELECTROLYTE LEVEL

Check the electrolyte level in each cell. If the level is below MIN level, bring the level to MAX level by pouring distilled water into the battery cell. Do not fill beyond MAX level.

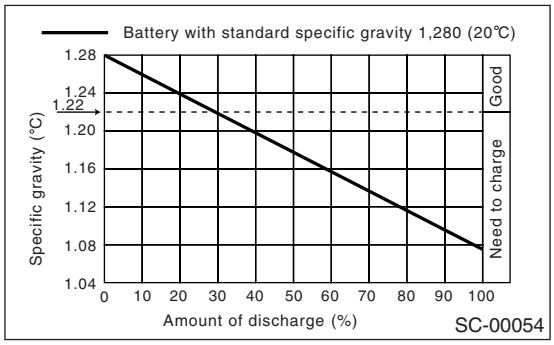
3. SPECIFIC GRAVITY OF ELECTROLYTE

1) Measure specific gravity of electrolyte using a hydrometer and a thermometer.
Specific gravity varies with temperature of electrolyte so that it must be corrected at 20°C (68°F) using the following equation:

$$S_{20} = St + 0.0007 \times (t - 20)$$

S_{20}: Specific gravity corrected at electrolyte temperature of 20°C (68°F)
St: Measured specific gravity
t: Measured temperature (°C)
Determine whether or not battery must be charged, according to corrected specific gravity.
Standard specific gravity: 1.220 — 1.290 [20°C (68°F)]

2) Measuring the specific gravity of the electrolyte in the battery will disclose the state of charge of the battery. The relation between specific gravity and state of charge is as shown in the figure.



D: MEASUREMENT

WARNING:
Do not bring an open flame close to the battery at this time.

CAUTION:
• Prior to charging, corroded terminals should be cleaned with a brush and common caustic soda solution.
• Be careful since battery electrolyte overflows while charging the battery.
• Observe instructions when handling the battery charger.
• Before charging the battery on the vehicle, disconnect the battery ground terminal to prevent damage of generator diodes or other electrical units.

1. JUDGMENT OF BATTERY IN CHARGED CONDITION

1) Specific gravity of electrolyte should be held within the specific range from 1.250 to 1.290 for more than one hour.
2) Voltage per battery cell should be held at a specific value in a range from 2.5 to 2.8 volts for more than one hour.

2. CHECK HYDROMETER FOR STATE OF CHARGE

Hydrometer indicator	Charge battery	Corrective action
Green	Above 65%	Load test
Dark	Below 65%	Charge battery
Clear	Low electrolyte	Replace battery* (If cranking is difficult)
* Check electrical system before replacement.		

3. NORMAL CHARGING

Charge the battery at the current value specified by manufacturer or at approximately 1/10 of battery's ampere-hour rating.

4. QUICK CHARGING

Quick charging is a method that the battery is charged in a short period of time with a relatively large current by using a quick charger.
Since a large current flow raises electrolyte temperature, the battery is subject to damage if the large current is used for prolonged time. For this reason, the quick charging must be carried out within a current range that will not increase the electrolyte temperature above 40°C (104°F).
Also the quick charging is a temporary means to bring battery voltage up to a fair value and, as a rule, a battery should be charged slowly with a low current.

CAUTION:
• Observe the items in 3. NORMAL CHARGING.
• Never use more than 10 A when charging the battery because it will shorten the battery life.

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

ENGINE (DIAGNOSTICS)

EN(H6DO)(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. ENGINE

	Step	Check	Yes	No
1	**CHECK ENGINE START FAILURE.** 1) Ask the customer when and how the trouble occurred using the interview check list. <Ref. to EN(H6DO)(diag)-3, CHECK, Check List for Interview.> 2) Start the engine.	Does the engine start?	Go to step **2.**	Inspection using "Diagnostics for Engine Start Failure". <Ref. to EN(H6DO)(diag)-52, Diagnostics for Engine Starting Failure.>
2	**CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.**	Does check malfunction indicator light illuminate?	Go to step **3.**	Inspection using "General Diagnostic Table". <Ref. to EN(H6DO)(diag)-265, INSPECTION, General Diagnostic Table.>
3	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read DTC on Subaru Select Monitor.	Is DTC displayed on the Subaru Select Monitor?	Record the DTC. Repair the trouble cause. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> Go to step **4.**	Repair the related parts. NOTE: If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnostics of malfunction indicator light circuit or combination meter. <Ref. to EN(H6DO)(diag)-43, Malfunction Indicator Light.>
4	**PERFORM THE DIAGNOSIS.** 1) Perform clear memory mode. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Perform the inspection mode. <Ref. to EN(H6DO)(diag)-33, Inspection Mode.>	Is DTC displayed on the Subaru Select Monitor?	Check on "Diagnostic Procedure with Diagnostic Trouble Code (DTC)" <Ref. to EN(H6DO)(diag)-72, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

1. CHECK LIST No. 1

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of sale		Fuel brand	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		
Headlight	❑ ON / ❑ OFF	Rear defogger	❑ ON / ❑ OFF
Blower	❑ ON / ❑ OFF	Audio	❑ ON / ❑ OFF
A/C compressor	❑ ON / ❑ OFF	Car phone	❑ ON / ❑ OFF
Radiator fan	❑ ON / ❑ OFF		
Front wiper	❑ ON / ❑ OFF		
Rear wiper	❑ ON / ❑ OFF		

2. CHECK LIST No. 2

Check the following items about the vehicle's state when malfunction indicator light turns on.

NOTE:
Use copies of this page for interviewing customers.

a) Other warning lights or indicators turn on. ❑ Yes / ❑ No
❑ Low fuel warning light ❑ Charge indicator light ❑ AT diagnostic indicator light ❑ ABS warning light ❑ Oil pressure indicator light
b) Fuel level
• Lack of gasoline: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of harness connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of other parts except genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

3. General Description

A: CAUTION

1) Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.

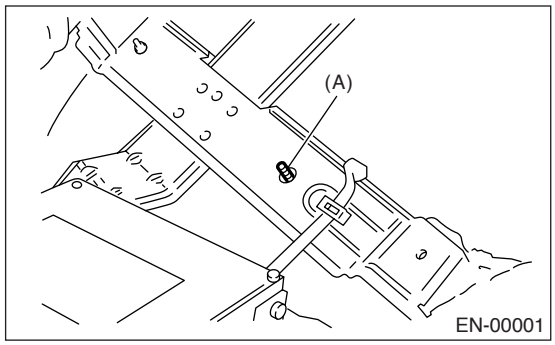
CAUTION:
• All air bag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the Airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.

2) Never connect the battery in reverse polarity.
• The ECM will be destroyed instantly.
• The fuel injector and other part will be damaged.
3) Do not disconnect the battery terminals while the engine is running.
A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM, etc.
4) Before disconnecting the connectors of each sensor and the ECM, be sure to turn the ignition switch to OFF. Perform the clear memory mode after connecting the connectors.
5) Poor contact has been identified as a primary cause of this problem. Measure the voltage or resistance of individual sensor or all electrical control modules using a tapered pin with a diameter of less than 0.64 mm (0.025 in). Do not insert the pin more than 5 mm (0.20 in) into the part.
6) Remove the ECM from the located position after disconnecting two cables on battery.
Otherwise, the ECM may be damaged.

CAUTION:
When replacing the ECM, be careful not to use the wrong spec. ECM to avoid any damage on the fuel injection system.

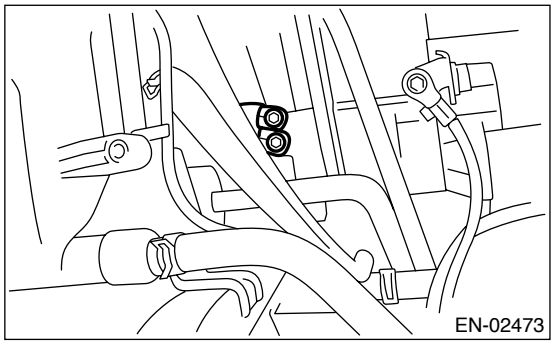
7) Connectors to each sensor in the engine compartment and the harness connectors on the engine side and body side are all designed to be waterproof. However, it is still necessary to take care not to allow water to get into the connectors when washing the vehicle, or when servicing the vehicle on a rainy day.

8) Use ECM mounting stud bolts as the grounding point to chassis when measuring voltage and resistance inside the passenger compartment.

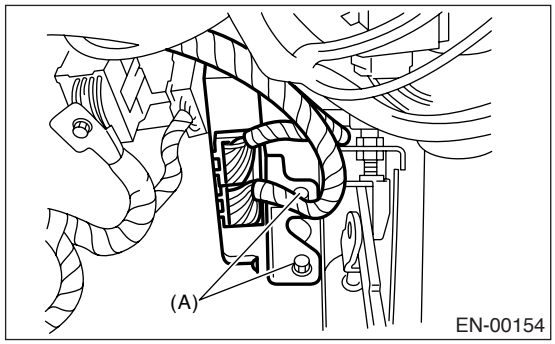


(A) Stud bolt

9) Use engine grounding terminal or engine proper as the grounding point to chassis when measuring voltage and resistance in the engine compartment.



10) Use TCU mounting stud bolts as the body side grounding point to chassis when measuring voltage and resistance inside the passenger compartment.



(A) Stud bolt

11) Every MFI-related part is a precision part. Do not drop them.
12) Observe the following cautions when installing a radio in MFI equipped models.

CAUTION:
• The antenna must be kept as far apart as possible from the control unit. (The ECM is located under the steering column, inside of the instrument panel lower trim panel.)

• The antenna feeder must be placed as far apart as possible from the ECM and MFI harness.
• Carefully adjust the antenna for correct matching.
• When mounting a large power type radio, pay special attention to the three items above mentioned.
• Incorrect installation of the radio may affect the operation of the ECM.

13) Before disconnecting the fuel hose, disconnect the fuel pump connector and crank the engine for more than five seconds to release pressure in the fuel system. If engine starts during this operation, run it until it stops.
14) Problems in the electronic-controlled automatic transmission may be caused by failure of the engine, the electronic control system, the transmission proper, or by a combination of these. These three causes (engine, electrical control system, transmission) must be distinguished clearly when performing diagnostics.
15) Diagnostics should be conducted by rotating with simple, easy operations and proceeding to complicated, difficult operations. The most important thing in diagnostics is to understand the customer's complaint, and distinguish between the three causes (engine, electrical control system, transmission).
16) In AT models, do not continue the stall for more than five seconds at a time. (from closed throttle, fully open throttle to stall speed reading, and then decrease engine speed.).
17) On the model with ABS, when performing driving test in jacked-up or lifted-up position, sometimes the warning light may be lit, but this is not a malfunction of the system. The reason for this is the speed difference between the front and rear wheels. After diagnosis of engine control system, perform the ABS memory clearance procedure of self-diagnosis system.

B: INSPECTION

Before performing diagnostics, check the following items which might affect engine problems:

1. BATTERY

1) Measure battery voltage and specific gravity of electrolyte.

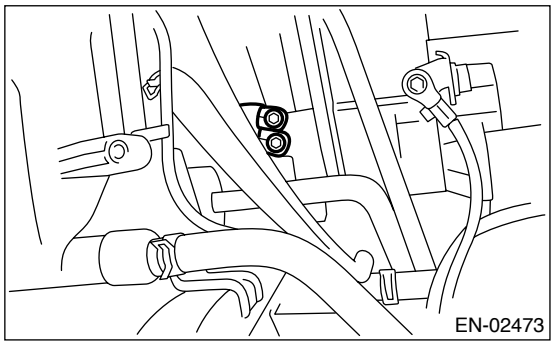
Standard voltage: 12 V

Specific gravity: Above 1.260

2) Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

Make sure the engine grounding terminal is properly connected to the engine.



C: NOTE

1. GENERAL DESCRIPTION

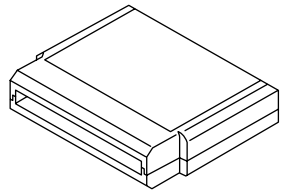
• The on-board diagnostics (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
• Further, against such a failure or sensors as may disable the drive, the fail-safe function is provided to ensure the minimal driveability.
• The OBD system incorporated with the vehicles within this engine family complies with Section 1968.1, California Code of Regulations (OBD-II regulation). The OBD system monitors the components and the system malfunction listed in Engine Section which affects on emissions.
• When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, a diagnostic DTC and a freeze frame engine conditions are stored into on-board computer.
• The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction first.
• If the OBD system detects the various malfunctions including the fault of fuel trim or misfire, the OBD system first stores freeze frame engine conditions about the fuel trim or misfire.
• When the malfunction does not occur again for three consecutive driving cycles, malfunction indicator light is turned off, but DTC remains at on-board computer.
• The OBD-II system is capable of communication with a general scan tool (OBD-II general scan tool) formed by ISO 9141 CARB.

• The OBD-II diagnostics procedure is different from the usual diagnostics procedure. When troubleshooting OBD-II vehicles, connect Subaru Select Monitor or the OBD-II general scan tool to the vehicle.

2. ENGINE AND EMISSION CONTROL SYSTEM

• The Multipoint Fuel Injection (MFI) system is a system that supplies the optimum air-fuel mixture to the engine for all the various operating conditions through the use of the latest electronic technology.
With this system fuel, which is pressurized at a constant pressure, is injected into the intake air passage of the cylinder head. The injection quantity of fuel is controlled by an intermittent injection system where the electro-magnetic injection valve (fuel injector) opens only for a short period of time, depending on the quantity of air required for one cycle of operation. In actual operation, the injection quantity is determined by the duration of an electric pulse applied to the fuel injector and this permits simple, yet highly precise metering of the fuel.
• Further, all the operating conditions of the engine are converted into electric signals, and this results in additional features of the system, such as large improved adaptability, easier addition of compensating element, etc.
The MFI system also has the following features:
- Reduced emission of harmful exhaust gases.
- Reduced in fuel consumption.
- Increased engine output.
- Superior acceleration and deceleration.
- Superior startability and warm-up performance in cold weather since compensation is made for coolant and intake air temperature.

D: PREPARATION TOOL

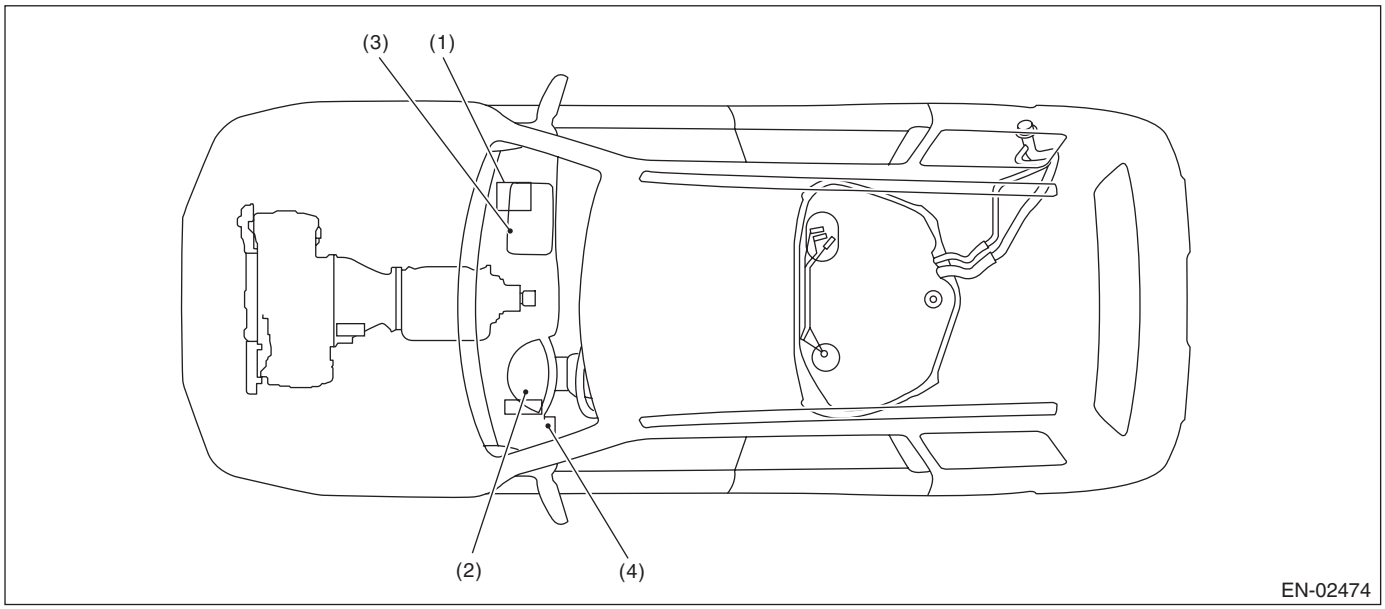
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

4. Electrical Component Location

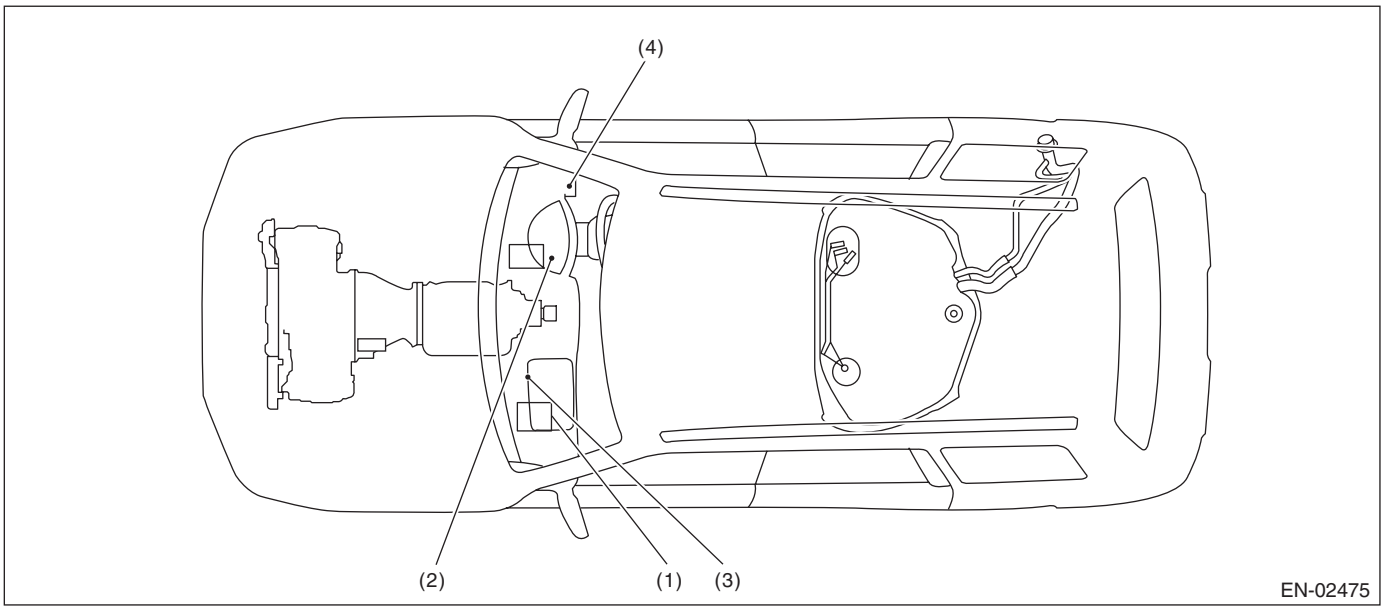
A: LOCATION

1. ENGINE

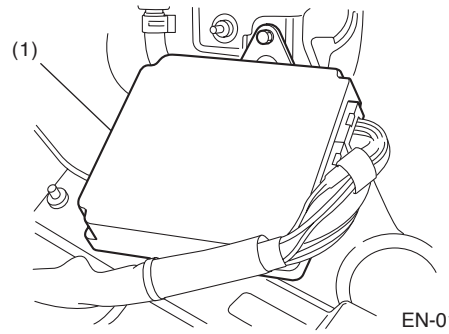
- Control module
  - LHD model



  - RHD model



(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Test mode connector
(4) Data link connector



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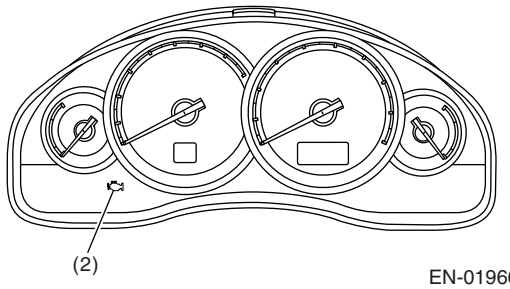
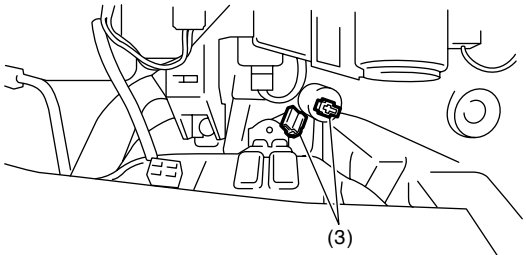
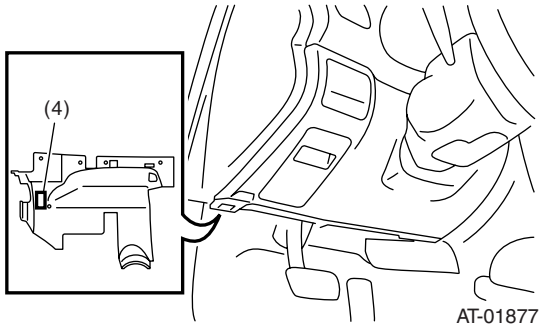


EN-01966

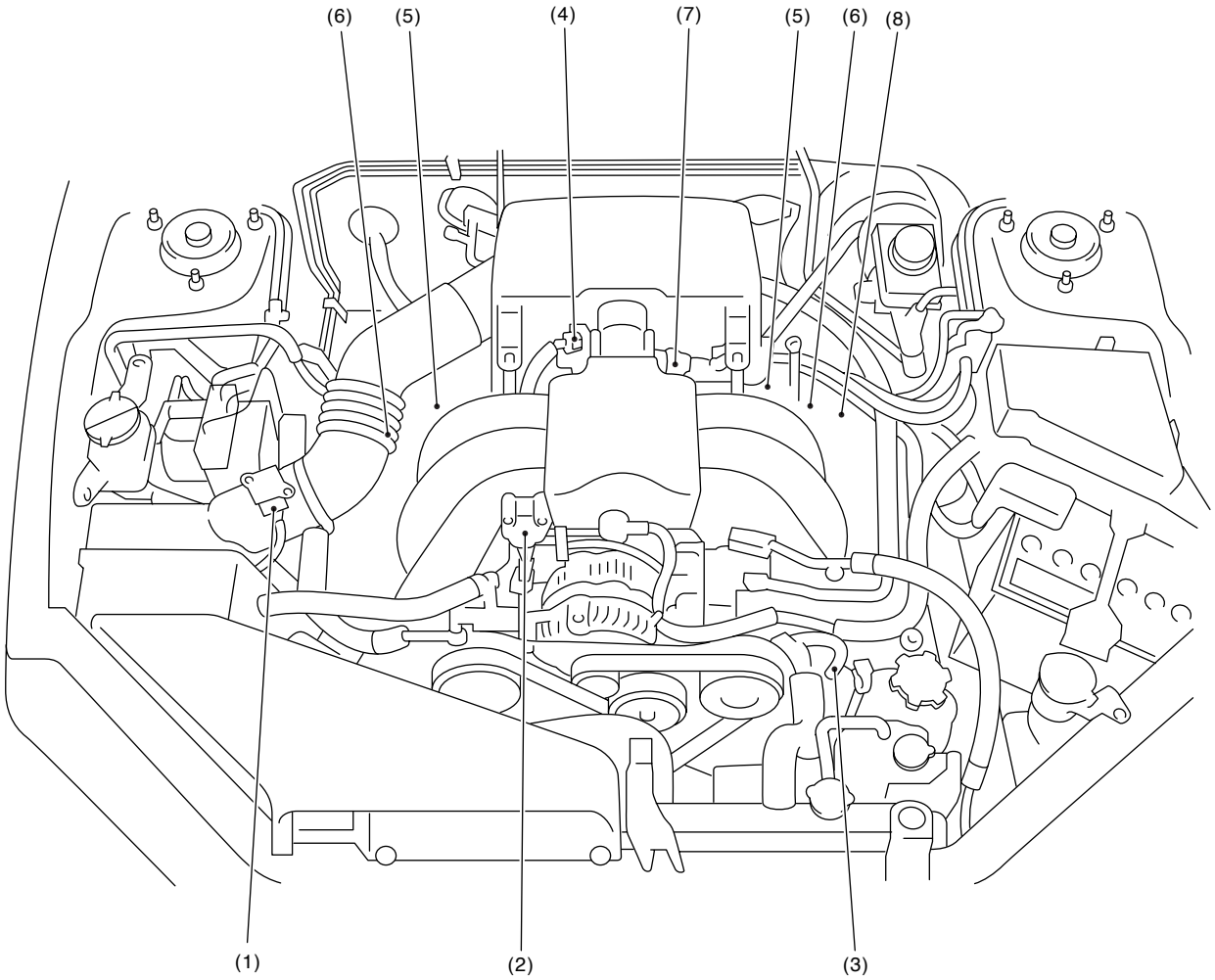


EN-02414

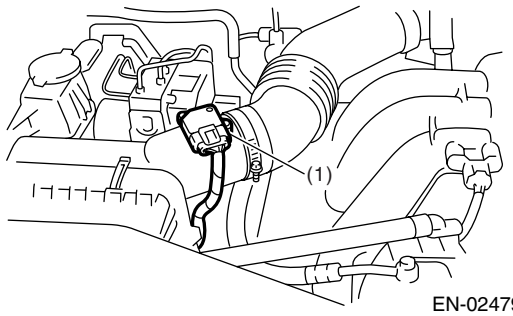


AT-01877

• Sensor



(1) Mass air flow and intake air temperature sensor
(2) Manifold absolute pressure sensor
(3) Engine coolant temperature sensor
(4) Electronic throttle control
(5) Knock sensor
(6) Camshaft position sensor
(7) Crankshaft position sensor
(8) Oil temperature sensor



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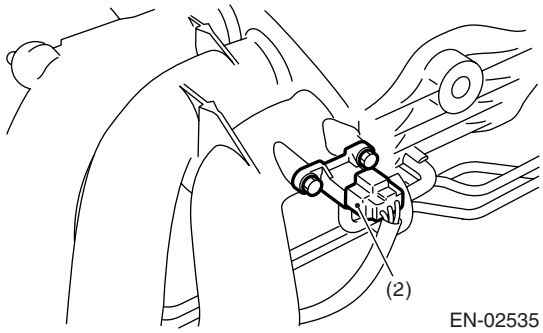

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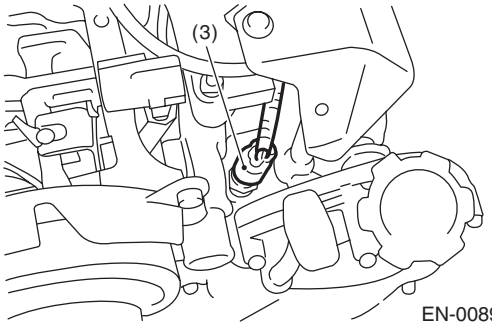

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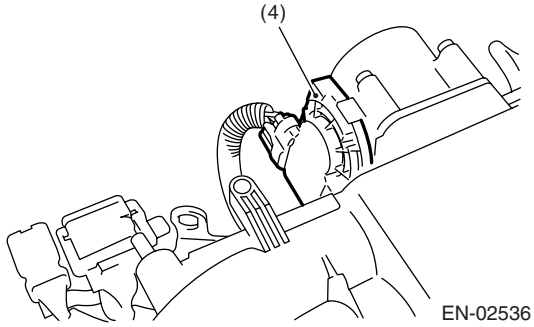

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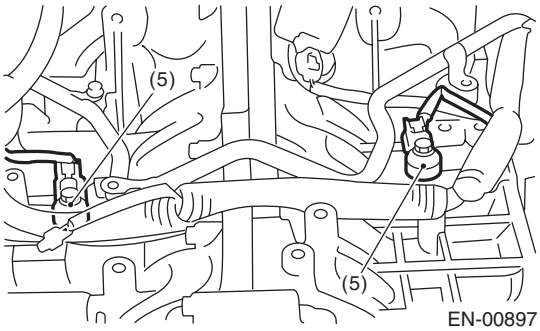

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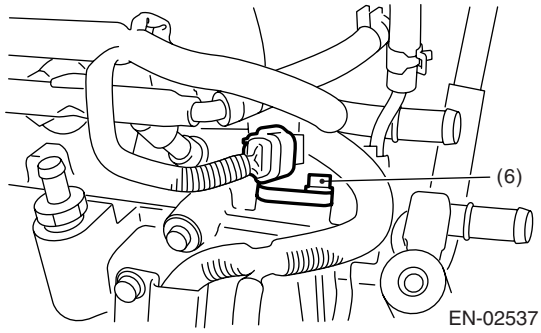
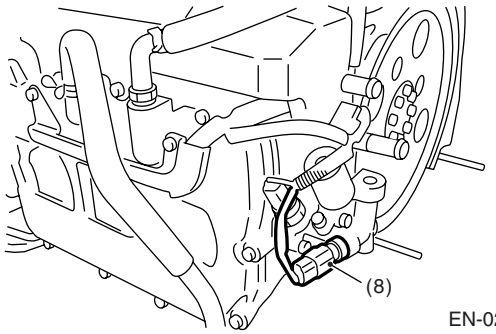


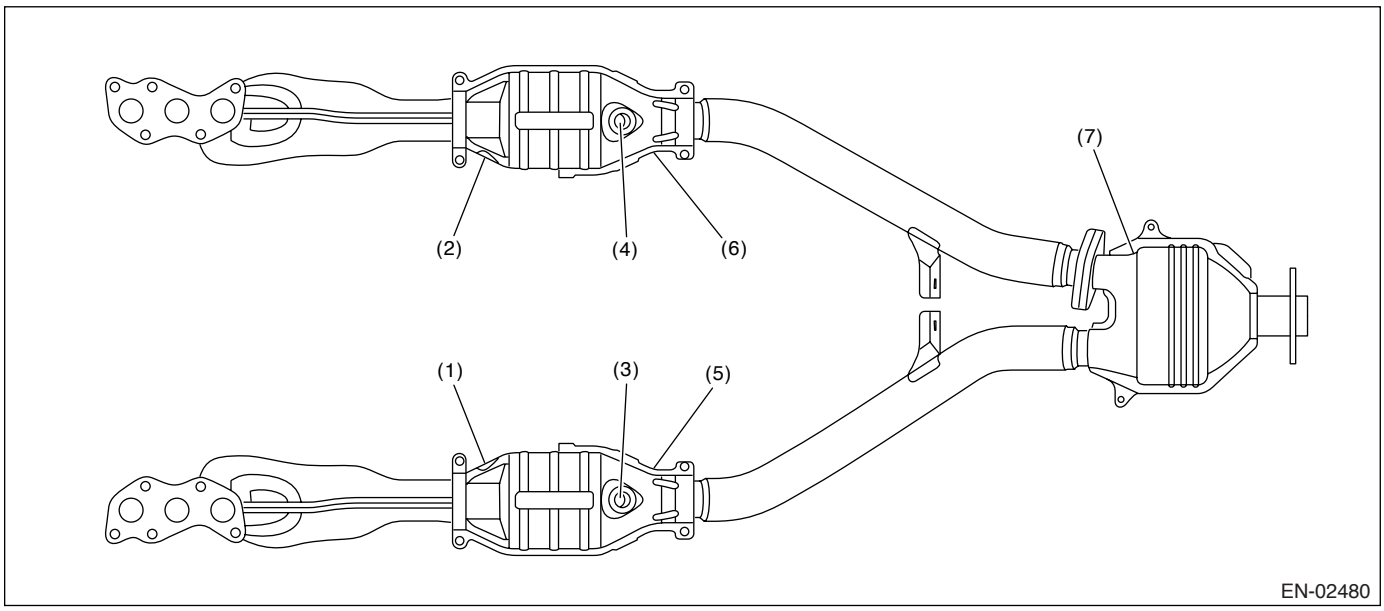
EN-02537

EN-00899

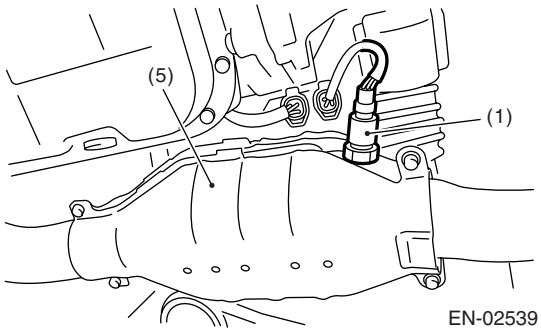


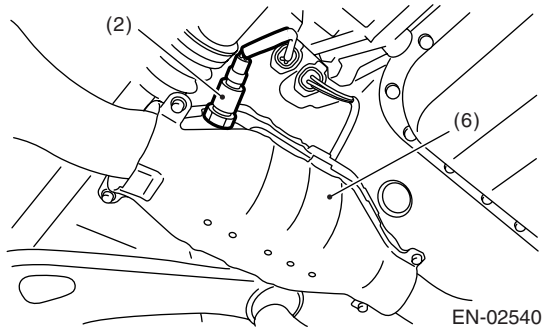
EN-02538

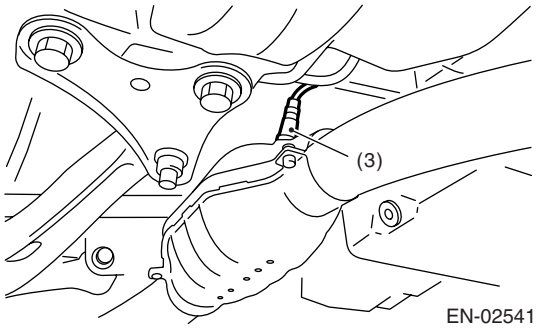
Electrical Component Location

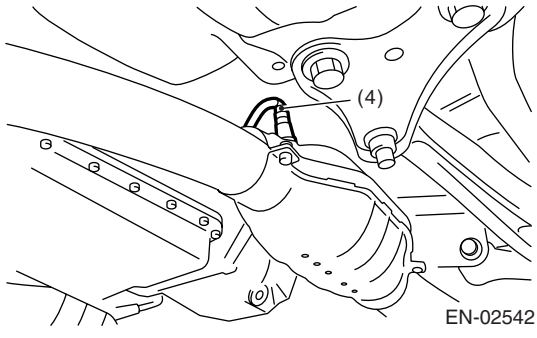


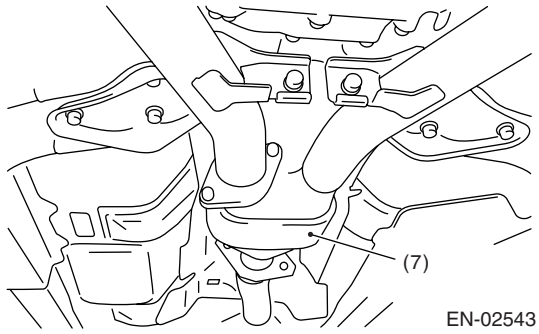
(1) Front oxygen (A/F) sensor LH
(2) Front oxygen (A/F) sensor RH
(3) Rear oxygen sensor LH
(4) Rear oxygen sensor RH
(5) Front catalytic converter LH
(6) Front catalytic converter RH
(7) Rear catalytic converter





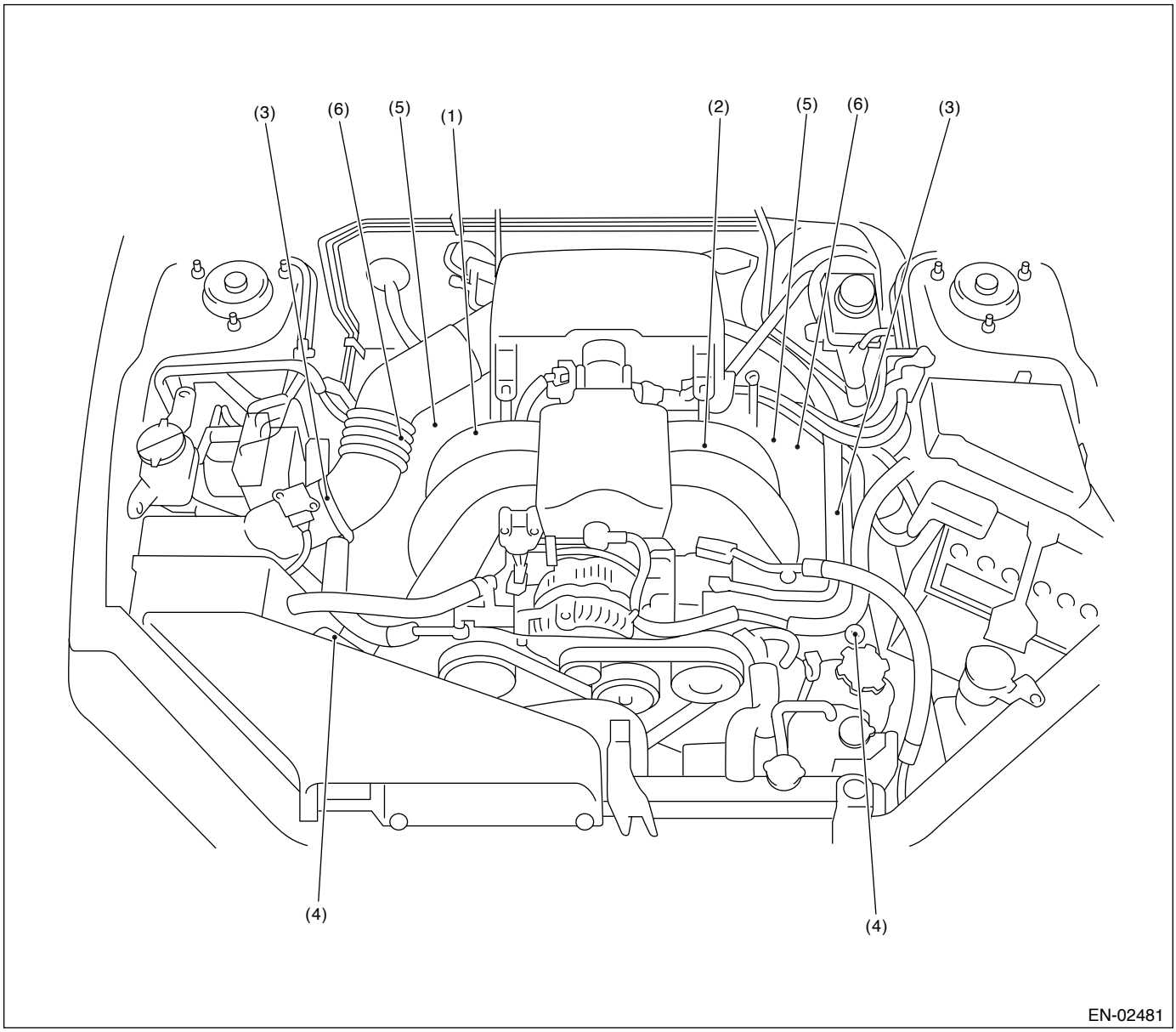






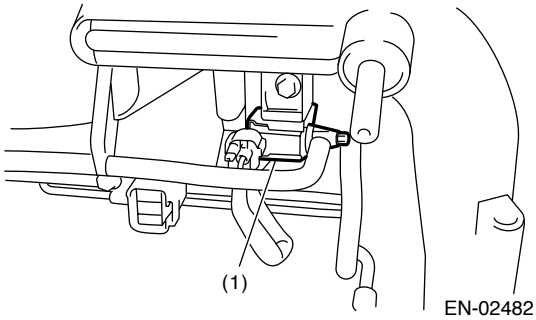
SUBARU.

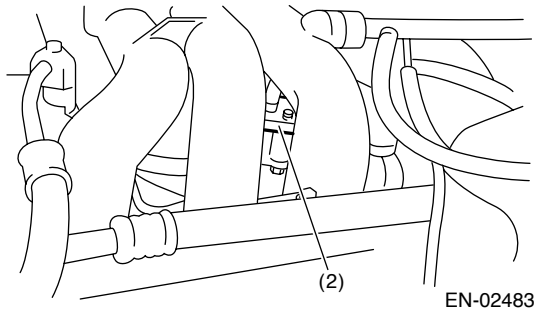
- Solenoid valve, actuator, emission control system parts and ignition system parts

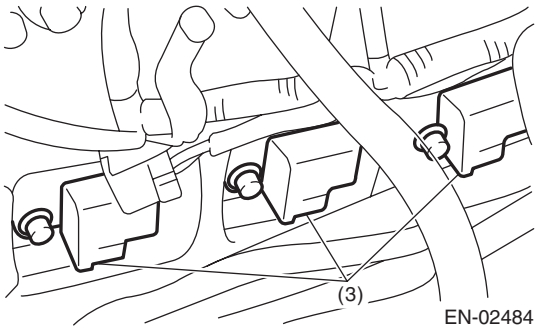


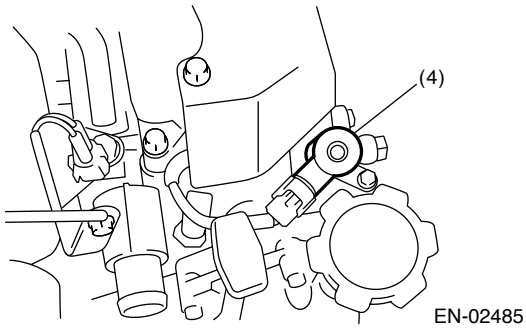
(1) Purge control solenoid valve
(2) EGR valve
(3) Ignition coil & ignitor ASSY
(4) Oil flow control solenoid valve
(5) Oil switching solenoid valve
(6) Variable valve lift diagnosis oil pressure switch

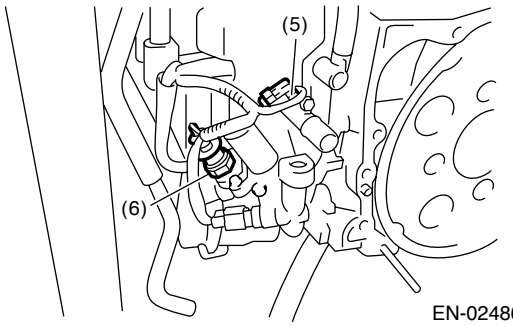
Electrical Component Location



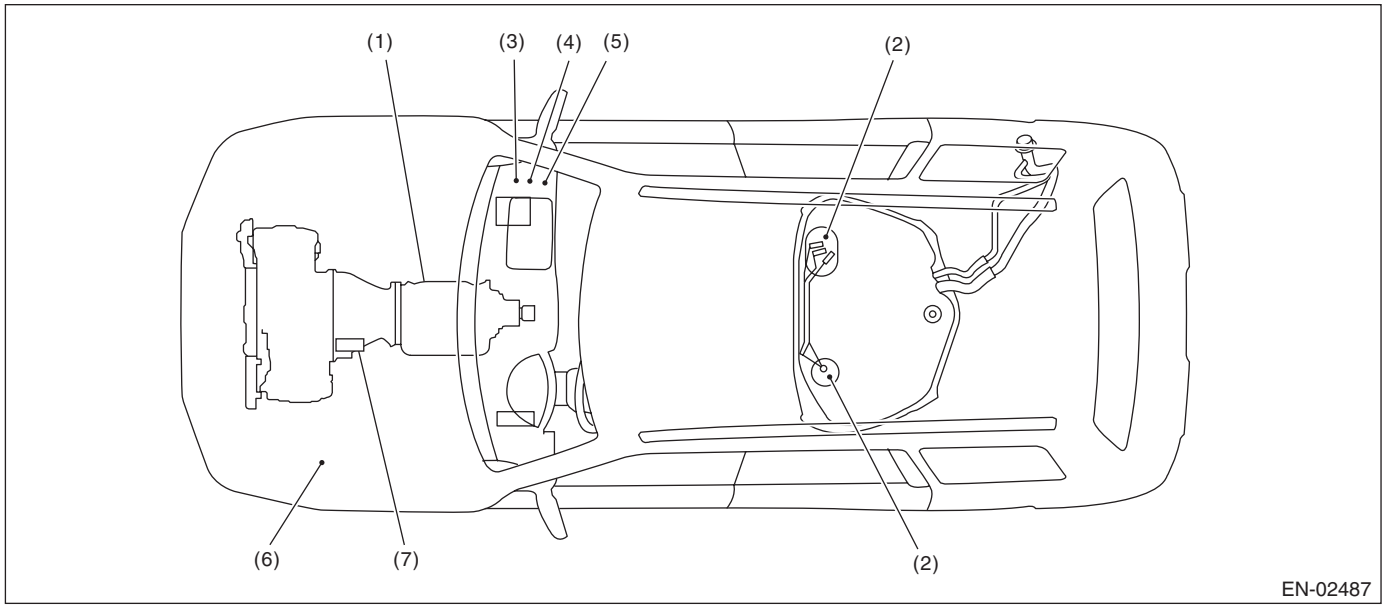




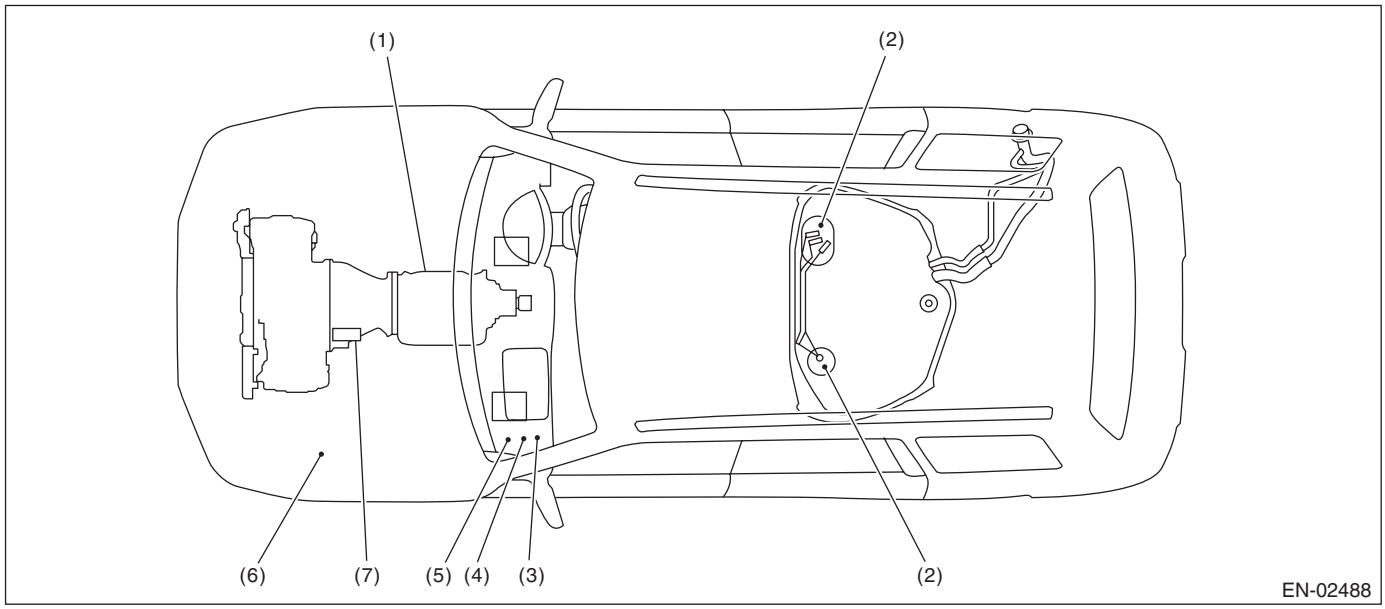




• LHD model

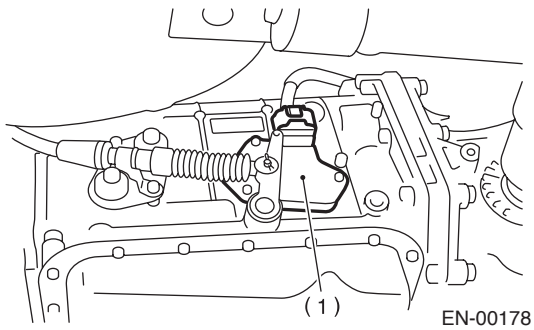


• RHD model

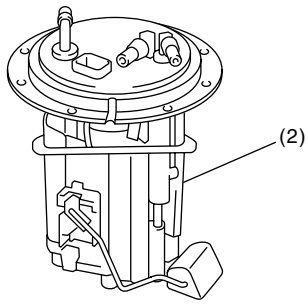


(1) Inhibitor switch
(2) Fuel pump
(3) Main relay
(4) Fuel pump relay
(5) Electronic throttle control relay
(6) Radiator fan relay
(7) Starter

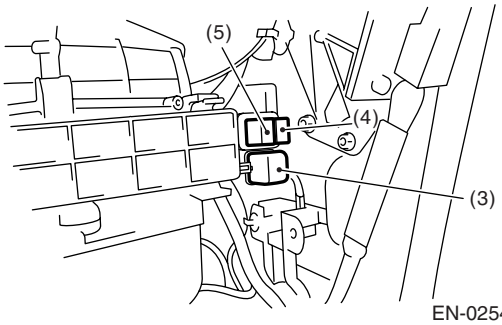
Electrical Component Location



EN-00178



EN-02093



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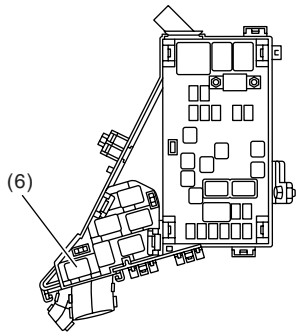
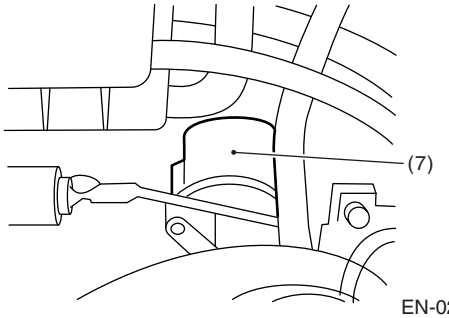


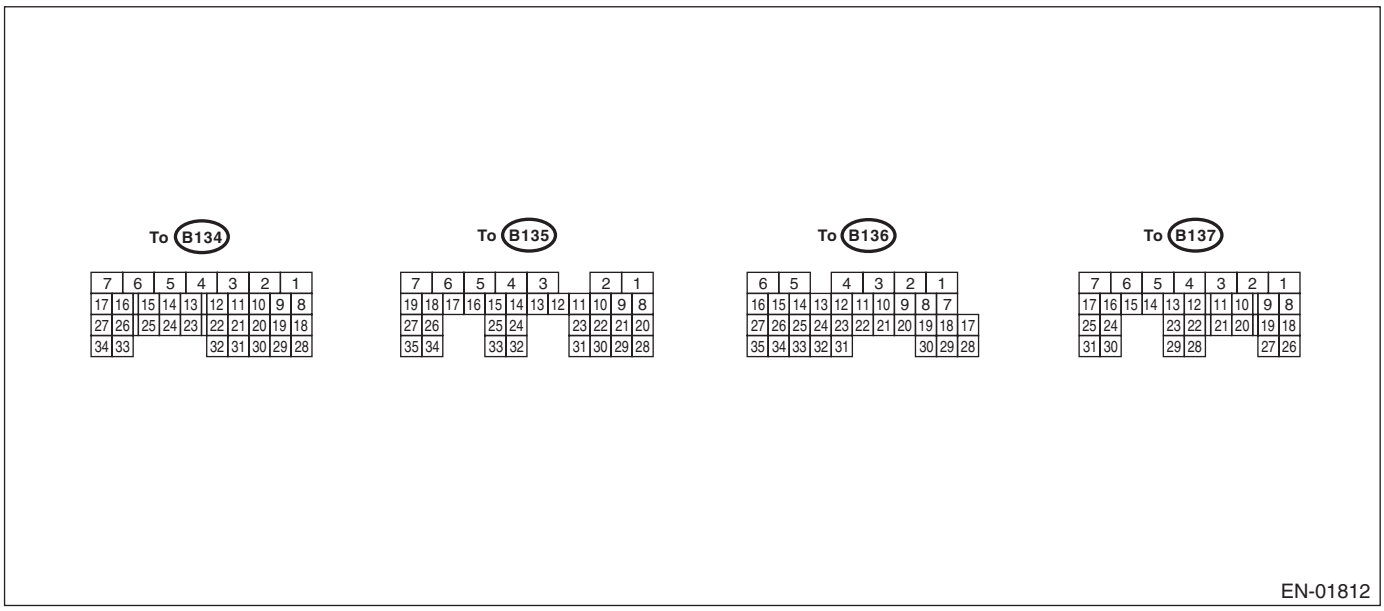
EN-02489



EN-02490

5. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Crankshaft position sensor	Signal (+)	B135	10	0	–7 — +7	Waveform
	Signal (–)	B135	22	0	0	—
	Shield	B135	31	0	0	—
Camshaft position sensor (LH)		B135	8	0.275	0 or 5	Waveform
Camshaft position sensor (RH)		B135	9	0.275	0 or 5	Waveform
Electronic throttle control	Main	B136	18	0.64 — 0.94 Fully opens: 4.01	0.64 — 0.72 (After engine is warmed-up.)	Fully closed: 0.6 Fully opened: 4.01
	Sub	B136	29	1.51 — 1.76 Fully opens: 4.23	1.51 — 1.58 (After engine is warmed-up.)	Fully closed: 1.48 Fully opens: 4.23
Electronic throttle control motor (+)		B137	5	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor (–)		B137	4	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B137	6	10 — 13	12 — 14	—
Electronic throttle control motor relay		B135	35	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	When ignition switch is turned to ON: ON
Accelerator position sensor	Main	B136	17	Fully closed: 1 Fully opens: 3.6	Fully closed: 1 Fully opens: 3.3	—
	Power supply	B136	15	5	5	—
	Ground	B136	34	0	0	—
	Sub	B136	28	Fully closed: 1 Fully opens: 3.7	Fully closed: 1 Fully opens: 3.3	—
Engine coolant temperature sensor		B136	14	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
Starter switch		B137	8	0	0	Cranking: 8 — 14

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Starter relay		B135	32	ON: 0 OFF: 10 — 13	ON: 0 OFF: 13 — 14	—
A/C switch		B137	17	ON: 10 — 13 OFF: 0	ON: 13 — 14 OFF: 0	—
Ignition switch		B137	14	10 — 13	13 — 14	—
Neutral position switch		B137	9	ON: 0 OFF: 12±0.5		Switch is ON when select lever is shifted into “P” or “N” range.
Test mode connector		B137	15	12 — 14	12 — 14	When connected: 0
Knock sensor 1	Signal	B136	25	2.4	2.4	—
	Shield	B136	33	0	0	—
Knock sensor 2	Signal	B136	24	2.4	2.4	—
	Shield	B136	33	0	0	—
Back-up power supply		B135	19	10 — 13	13 — 14	Ignition switch “OFF”: 10 — 13
Control module power supply		B135	6	10 — 13	13 — 14	—
		B135	5	10 — 13	13 — 14	—
Sensor power supply		B136	16	5	5	—
Ignition control	#1	B135	18	0	13 — 14	Waveform
	#2	B135	17	0	13 — 14	Waveform
	#3	B135	16	0	13 — 14	Waveform
	#4	B135	15	0	13 — 14	Waveform
	#5	B135	14	0	13 — 14	Waveform
	#6	B135	13	0	13 — 14	Waveform
Fuel injector	#1	B136	6	10 — 13	1 — 14	Waveform
	#2	B136	5	10 — 13	1 — 14	Waveform
	#3	B136	4	10 — 13	1 — 14	Waveform
	#4	B136	3	10 — 13	1 — 14	Waveform
	#5	B136	2	10 — 13	1 — 14	Waveform
	#6	B136	1	10 — 13	1 — 14	Waveform
A/C relay control		B135	33	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan control		B134	31	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Radiator fan control power supply		B135	30	ON: 0.5, or less OFF: 10 — 13	ON: 0.5, or less OFF: 13 — 14	—
Self-shutoff control		B137	16	0	0	—
Malfunction indicator light		B134	17	—	—	Light “ON”: 1, or less Light “OFF”: 10 — 14
Engine speed output		B134	23	—	0 — 13, or more	Waveform
Purge control solenoid valve		B134	14	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
EGR solenoid valve	Signal A+	B134	11	10 — 13	10 — 13	—
	Signal A–	B134	10	10 — 13	10 — 13	—
	Signal B+	B134	9	10 — 13	10 — 13	—
	Signal B–	B134	8	10 — 13	10 — 13	—
Power steering switch		B137	10	ON: 1, or less OFF: 10 — 13	ON: 1, or less OFF: 13 — 14	—
Manifold absolute pressure sensor		B136	22	3.5 — 4.8	1.1 — 1.9	—

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Air flow sensor	Signal	B136	23	0.74	0.3 — 4.5	—
	Shield	B136	32	0	0	—
	Ground	B136	31	0	0	—
Intake air temperature sensor		B136	13	3.15 — 3.33	3.15 — 3.33	intake air temperature:25°C (75°F)
Front oxygen (A/F) sensor RH	Signal (+)	B134	33	2.8 — 3.2	2.8 — 3.2	—
	Signal (–)	B134	26	2.4 — 2.7	2.4 — 2.7	—
	Shield	B134	25	0	0	—
Front oxygen (A/F) sensor heater RH	Signal 1	B134	3	12 — 14	—	Waveform
	Signal 2	B134	2	12 — 14	—	Waveform
Front oxygen (A/F) sensor LH	Signal (+)	B134	34	2.8 — 3.2	2.8 — 3.2	—
	Signal (–)	B134	27	2.4 — 2.7	2.4 — 2.7	—
	Shield	B134	25	0	0	—
Front oxygen (A/F) sensor heater LH	Signal 1	B134	1	12 — 14	—	Waveform
	Signal 2	B135	7	12 — 14	—	Waveform
Rear oxygen sensor RH	Signal	B137	24	0	0 — 0.9	—
	Shield	B137	31	0	0	—
Rear oxygen sensor heater RH signal		B135	2	12 — 14	—	Waveform
Rear oxygen sensor LH	Signal	B137	25	0	0 — 0.9	—
	Shield	B137	31	0	0	—
Rear oxygen sensor heater LH signal		B135	3	12 — 14	—	Waveform
Immobilizer communication 1		B137	19	10	10	—
Immobilizer communication 2		B137	27	10	10	—
Fuel pump control unit	Signal 1	B137	28	0	13 — 14	—
	Signal 2	B135	27	0	0 or 5	—
Brake switch 1		B136	9	When brake pedal is depressed: 0 When brake pedal is released: 10 — 13	When brake pedal is depressed: 0 When brake pedal is released: 13 — 14	—
Brake switch 2		B136	8	When brake pedal is depressed: 10 — 13 When brake pedal is released: 0	When brake pedal is depressed: 13 — 14 When brake pedal is released: 0	—
Cruise control command switch		B136	11	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Cruise control main switch		B136	7	ON: 0 OFF: 5	ON: 0 OFF: 5	—

Engine Control Module (ECM) I/O Signal

Description		Connector No.	Terminal No.	Signal (V)		Reference
				Ignition SW ON (engine OFF)	Engine ON (idling)	
Oil flow control solenoid valve RH	Signal (+)	B134	18	0	0.6	—
	Signal (–)	B134	28	0	0	—
Oil flow control solenoid valve LH	Signal (+)	B134	19	0	0.6	—
	Signal (–)	B134	29	0	0	—
Oil switching solenoid valve RH	Signal (+)	B134	21	0	1.9	—
	Signal (–)	B134	20	0	0	—
Oil switching solenoid valve LH	Signal (+)	B135	25	0	1.9	—
	Signal (–)	B135	24	0	0	—
Oil temperature sensor signal		B136	27	1.0 — 1.4	1.0 — 1.4	After engine is warmed-up.
Variable valve lift diagnosis oil pressure switch RH		B135	21	0	0	—
Variable valve lift diagnosis oil pressure switch LH		B135	29	0	0	—
Generator control		B134	22	0 — 6.5	0 — 6.5	—
SSM communication line		B137	20	Less than 1 ←→ More than 4	Less than 1 ←→ More than 4	—
GND (sensor)		B136	35	0	0	—
GND (injector)		B137	7	0	0	—
GND (ignition system)		B135	12	0	0	—
GND (power supply)		B135	4	0	0	—
		B135	1	0	0	—
GND (control system)		B137	2	0	0	—
		B137	1	0	0	—
GND (Front oxygen (A/F) sensor heater RH)		B134	7	0	0	—
GND (Front oxygen (A/F) sensor heater LH)		B134	5	0	0	—
GND (Electronic throttle control)		B137	3	0	0	—

6. Engine Condition Data

A: ELECTRICAL SPECIFICATION

Remarks	Specification
Engine load	1.6 — 2.9 (%): Idling
	6.4 — 12.8 (%): 2,500 rpm racing

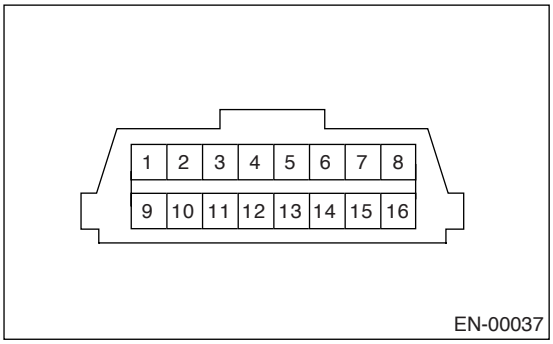
Measuring condition:
- After engine is warmed-up.
- Gear position is in “N” or “P” range.
- Turn the A/C to OFF.
- Turn all accessory switches to OFF.

7. Data Link Connector

A: NOTE

This connector is used for Subaru Select Monitor.

CAUTION:
Do not connect any scan tools other than the Subaru Select Monitor and the OBD-II general scan tools, because the circuit for the Subaru Select Monitor may be damaged.



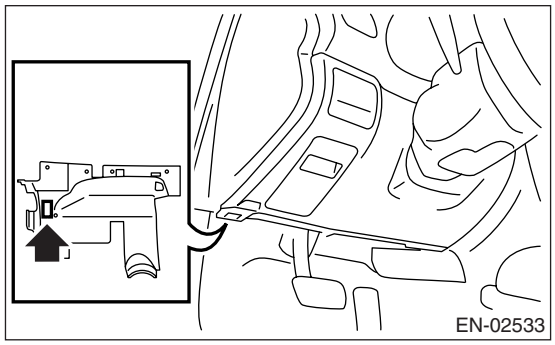
Terminal No.	Remarks	Terminal No.	Remarks
1	Power supply	9	Empty
2	Empty	10	Subaru Select Monitor signal
3	Empty	11	Empty
4	Empty	12	Ground
5	Empty	13	Ground
6	Empty	14	Empty
7	Empty	15	Empty
8	Empty	16	Empty

8. OBD-II General Scan Tool

A: OPERATION

1. HOW TO USE OBD-II GENERAL SCAN TOOL

1) Prepare a general scan tool (OBD-II general scan tool) required by SAE J1978.
2) Open the cover and connect the OBD-II general scan tool to the data link connector located in the lower portion of the instrument panel (on the driver's side).



3) Using the OBD-II general scan tool, call up DTC and freeze frame data.
OBD-II general scan tool functions consist of:
(1) MODE $01: Current powertrain diagnostic data
(2) MODE $02: Powertrain freeze frame data
(3) MODE $03: Emission-related powertrain DTC
(4) MODE $04: Clear/Reset emission-related diagnostic information
Read out data according to repair procedures. (For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.)

NOTE:
For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refers to data denoting the current operating condition of analog input/output, digital input/output and/or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
01	Number of emission-related powertrain DTC and malfunction indicator light status	ON/OFF
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim (bank 1)	%
07	Long term fuel trim (bank 1)	%
08	Short term fuel trim (bank 2)	%
09	Long term fuel trim (bank 2)	%
0B	Intake manifold absolute pressure	kPa
0C	Engine revolution	rpm
0D	Vehicle speed	km/h
0E	Ignition timing advance	°
10	Air flow rate of manifold absolute pressure sensor	g/sec
11	Throttle valve opening angle	%
13	Check whether oxygen sensor is installed.	—
24	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 1)	V and %
28	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor (bank 2)	V and %
1C	On-board diagnostic system	—

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access generic OBD-II PIDs (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refers to data denoting the operating condition when trouble is sensed by the on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit of measure
02	DTC that caused CARB required freeze frame data storage	—
03	Fuel system control status	—
04	Calculated engine load value	%
05	Engine coolant temperature	°C
06	Short term fuel trim (bank 1)	%
07	Long term fuel trim (bank 1)	%
08	Short term fuel trim (bank 2)	%
09	Long term fuel trim (bank 2)	%
0B	Intake manifold absolute pressure	kPa
0C	Engine speed	rpm
0D	Vehicle speed	km/h

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DTC)

Refer to "Read Diagnostic Trouble Code" for information about data denoting emission-related powertrain DTC. <Ref. to EN(H6DO)(diag)-32, Read Diagnostic Trouble Code (DTC).>

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refers to the mode used to clear or reset emission-related diagnostic information (OBD-II trouble diagnostic information).

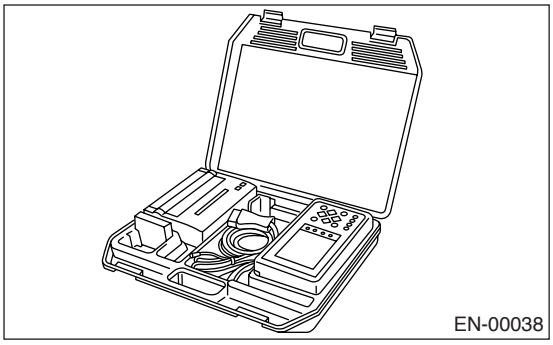
NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to clear or reset emission-related diagnostic information (MODE $04).

9. Subaru Select Monitor

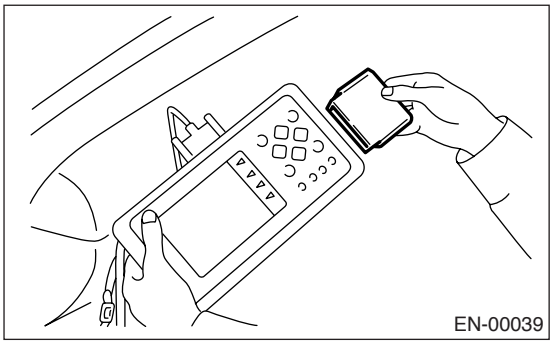
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>

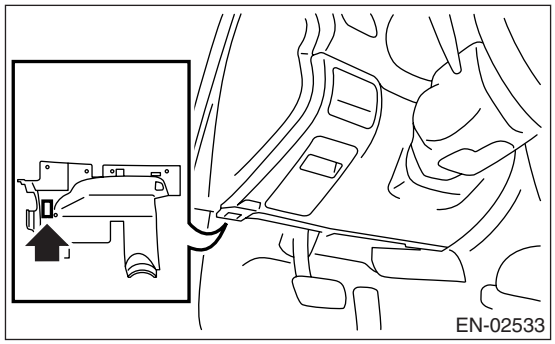


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

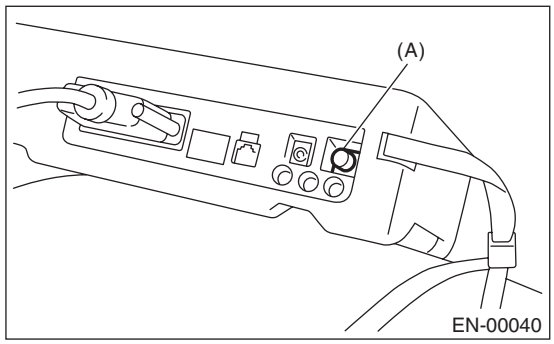
(1) Data link connector located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor and OBD-II general scan tool.

5) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



(A) Power switch

6) Using the Subaru Select Monitor, call up DTC and data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTC. <Ref. to EN(H6DO)(diag)-32, Read Diagnostic Trouble Code (DTC).>

3. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (OBD MODE)

Refer to "Read Diagnostic Trouble Code (DTC)" for information about how to indicate DTC. <Ref. to EN(H6DO)(diag)-32, Read Diagnostic Trouble Code (DTC).>

4. READ CURRENT DATA FOR ENGINE. (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Unit of measure	Note (at idling)
Engine load	Engine load	%	3.5%
Engine coolant temperature signal	Engine coolant temperature	°C	≥ 75°C (After engine is warmed-up.)
A/F compensation 1	A/F Compensation 1	%	3.1%
A/F learning 1	A/F learning 1	%	0.0%
A/F compensation 2	A/F Compensation 2	%	4.7%
A/F learning 2	A/F learning 2	%	0.0%
Intake manifold absolute pressure	Intake manifold absolute pressure	mmHg	200 — 300 mmHg
Engine speed signal	Engine speed	rpm	600 — 800 rpm
Meter vehicle speed signal	Meter vehicle speed	km/h	0 km/h
Ignition timing signal	Ignition timing	deg	13 — 15 deg
Intake air temperature signal	Intake air temperature	°C	(Ambient air temperature)
Amount of intake air	Amount of intake air	g/s	3.8 g/s
Throttle opening angle signal	Throttle valve angle	%	1.2 — 1.6%
Front oxygen sensor voltage value 1	Front oxygen sensor voltage value 1	V	0.035 V
Front oxygen sensor voltage value 2	Front oxygen sensor voltage value 2	V	0.020 V
Battery voltage	Battery Voltage	V	12 — 14 V
Mass air flow voltage	Mass air flow voltage	V	1.1 — 1.2 V
Injection 1 pulse width	Injection 1 pulse width	ms	2.82 ms
Injection 2 pulse width	Injection 2 pulse width	ms	2.82 ms
Knock sensor compensation	Knock correction	deg	0 deg
Atmospheric pressure signal	Atmospheric pressure	mmHg	(Atmospheric pressure)
Intake manifold relative pressure	Intake manifold relative pressure	mmHg	(Intake manifold absolute pressure — Atmospheric pressure)
Acceleration opening angle signal	Acceleration opening angle	%	0%
Radiator fan output	Radiator fan output	%	0%
Purge control solenoid valve duty ratio	CPC duty	%	0 — 3%
EGR step number	EGR step number	STEP	0
Generator duty	ALT duty	%	0%
Fuel pump duty	Fuel pump duty	%	33%
Variable valve timing advance angle amount R	VVT advance angle amount R	deg	0 deg
Variable valve timing advance angle amount L	VVT advance angle amount L	deg	0 deg
Oil flow control solenoid valve duty R	OCV duty R	%	9.4%
Oil flow control solenoid valve duty L	OCV duty L	%	9.4%
Oil flow control solenoid valve current R	OCV current R	mA	64 mA
Oil flow control solenoid valve current L	OCV current L	mA	64 mA

Remarks	Display	Unit of measure	Note (at idling)
Front oxygen (A/F) sensor current value 1	A/F sensor current value 1	mA	0.0 mA
Front oxygen (A/F) sensor current value 2	A/F sensor current value 2	mA	0.0 mA
Front oxygen (A/F) sensor resistance value 1	A/F sensor resistance value 1	Ω	31 Ω
Front oxygen (A/F) sensor resistance value 2	A/F sensor resistance value 2	Ω	31 Ω
Front oxygen (A/F) sensor output lambda 1	A/F sensor output lambda 1	—	1.01
Front oxygen (A/F) sensor output lambda 2	A/F sensor output lambda 2	—	1.00
A/F compensation 3	A/F Compensation 3	%	–0.16%
A/F learning 3	A/F learning 3	%	0.0%
Throttle motor duty	Throttle motor duty	%	–27%
Throttle power supply voltage	Throttle power supply voltage	V	(Battery voltage)
Sub throttle sensor voltage	Sub throttle sensor voltage	V	1.50 V
Main throttle sensor voltage	Main throttle sensor voltage	V	0.64 V
Sub acceleration sensor voltage	Sub acceleration sensor voltage	V	1.10 V
Main acceleration sensor voltage	Main acceleration sensor voltage	V	0.98 V
Memory vehicle speed	Memory vehicle speed	km/h	0 km/h
A/F compensation 4	A/F compensation 4	%	0.31%
A/F learning 4	A/F learning 4	%	0.0%
Fuel level sensor resistance	Fuel level resistance	Ω	4 — 96 Ω
Engine oil temperature	Oil Temperature	°C	≥ 85°C (After engine is warmed-up.)
Oil switching solenoid valve duty R	OSV duty R	%	17.3%
Oil switching solenoid valve duty L	OSV duty L	%	17.3%
Oil switching solenoid valve current R	OSV current R	mA	192 mA
Oil switching solenoid valve current L	OSV current L	mA	192 mA
Variable valve lift lift mode	VVL Lift Mode	—	1
#1 cylinder roughness monitor	#1 cylinder roughness monitor	—	0
#2 cylinder roughness monitor	#2 cylinder roughness monitor	—	0
#3 cylinder roughness monitor	#3 cylinder roughness monitor	—	0
#4 cylinder roughness monitor	#4 cylinder roughness monitor	—	0
#5 cylinder roughness monitor	#5 cylinder roughness monitor	—	0
#6 cylinder roughness monitor	#6 cylinder roughness monitor	—	0
Test mode terminal	Test mode terminal	—	U check
Neutral position switch signal	Neutral SW	—	Neutral
Idle switch signal	Soft idle SW	—	In idle
Ignition switch signal	Ignition SW	—	ON input
Power steering switch signal	Power steering SW input signal	—	OFF input (when OFF)

Remarks	Display	Unit of measure	Note (at idling)
Air conditioning switch signal	A/C SW	—	OFF input (when OFF)
Steering wheel switch signal	Steering wheel SW	—	Hi input
Starter switch signal	Starter SW	—	OFF input
Front oxygen monitor 1	Front oxygen monitor 1	—	Rich
Front oxygen monitor 2	Front oxygen monitor 2	—	Rich
Knocking signal	Knock signal	—	No
Crankshaft position sensor signal	Crankshaft angle signal	—	Yes
Camshaft position sensor signal	Camshaft angle signal	—	Yes
Rear defogger switch signal	Rear defogger SW	—	OFF input (when OFF)
Blower fan switch signal	Blower fan SW	—	OFF input (when OFF)
Light switch signal	Light SW	—	OFF input (when OFF)
Wiper switch signal	Wiper SW	—	OFF input (when OFF)
A/C lock signal	A/C lock signal	—	OFF input
A/C middle pressure switch signal	A/C middle pressure SW	—	OFF input
A/C compressor relay signal	A/C compressor relay output	—	OFF output
AT coordinate retard angle demand signal	AT coordinate retard angle demand	—	Yes
AT coordinate fuel cut demand signal	AT coordinate fuel cut demand	—	No
Vehicle dynamics control (VDC) torque down prohibition output	VDC torque down prohibition output	—	ON
Vehicle dynamics control (VDC) torque down demand	VDC torque down demand	—	OFF
AT coordinate permission signal	AT coordinate permission signal	—	ON
Electronic throttle control motor relay signal	ETC motor relay	—	ON
Stop light switch signal	Stop light SW	—	OFF
SET/COAST switch signal	SET/COAST SW	—	OFF
RESUME/ACCEL switch signal	RESUME/ACCEL SW	—	OFF
Brake switch signal	Brake SW	—	OFF
Main switch signal	Main SW	—	OFF
Body integrated unit data reception	Body Int. Unit Data	—	ON
Body integrated unit counter update	Body Int. Unit Count	—	ON
Cruise control cancel switch signal	CC Cancel SW	—	OFF

5. READ CURRENT DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD system} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Current Data Display/Save}, and press the [YES] key.
6) On the «Data Display Menu» display screen, select the {Data Display} and press the [YES] key.
7) Using the scroll key, scroll the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
Number of diagnosis code	Number of Diag. Code:	0
Condition of malfunction indicator light	MI (MIL)	OFF
Monitoring test of misfire	Misfire monitoring	No
Monitoring test of fuel system	Fuel system monitoring	Finish
Monitoring test of comprehensive component	Component monitoring	Finish
Test of catalyst	Catalyst Diagnosis	No
Test of heating-type catalyst	Heated catalyst	No
Test of evaporative emission purge control system	Evaporative purge system	No
Test of secondary air system	Secondary air system	No
Test of air conditioning system refrigerant	A/C system refrigerant	No
Test of oxygen sensor	Oxygen sensor	Finish
Test of oxygen sensor heater	Oxygen sensor heater	Finish
Test of EGR system	EGR system	Finish
A/F control #1	Fuel system for Bank 1	OPEN early period
A/F control #2	Fuel system for Bank 2	OPEN early period
Load	Calculated load valve	%
Engine coolant temperature	Coolant Temp.	°C
A/F compensation #1	Short term fuel trim B1	%
A/F learning #1	Long term fuel trim B1	%
A/F compensation #2	Short term fuel trim B2	%
A/F learning #2	Long term fuel trim B2	%
Intake manifold absolute pressure	Mani. Absolute Pressure	kPa
Engine speed	Engine Speed	rpm
Vehicle speed	Vehicle Speed	km/h
Ignition timing #1	Ignition timing adv. #1	°
Intake air temperature	Intake Air Temp.	°C
Amount of intake air	Mass Air Flow	g/s
Throttle valve angle	Throttle Opening Angle	%
Oxygen sensor #12	Oxygen sensor #12	V
A/F compensation #12	Short term fuel trim #12	%
OBD system	OBD System	—
Oxygen sensor #11	Oxygen sensor #11	Support
Oxygen sensor #12	Oxygen sensor #12	Support
A/F sensor #11	A/F sensor #11	—
A/F sensor #11	A/F sensor #11	V

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

6. READ FREEZE FRAME DATA FOR ENGINE (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {Freeze Frame Data} and press the [YES] key.

• A list of the support data is shown in the following table.

DESCRIPTION	Display	Unit of measure
DTC of freeze frame data	Freeze frame data	DTC
Air fuel ratio control system for bank 1	Fuel system for Bank1	—
Air fuel ratio control system for bank 2	Fuel system for bank 2	—
Engine load data	Engine Load	%
Engine coolant temperature signal	Coolant Temp.	°C or °F
Short term fuel trim by front oxygen (A/F) sensor (bank 1)	Short term fuel trim B1	%
Long term fuel trim by front oxygen (A/F) sensor (bank 1)	Long term fuel trim B1	%
Short term fuel trim by front oxygen (A/F) sensor (bank 2)	Short term fuel trim B2	%
Long term fuel trim by front oxygen (A/F) sensor (bank 2)	Long term fuel trim B2	%
Intake manifold absolute pressure signal	Mani. Absolute Pressure	mmHg, kPa, inHg or psi
Engine speed signal	Engine Speed	rpm
Vehicle speed signal	Vehicle Speed	km/h or MPH

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

7. LED OPERATION MODE FOR ENGINE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the {Data & LED Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A list of the support data is shown in the following table.

Remarks	Display	Message	When LED "ON" required
Test mode signal	Test mode terminal	D check/U check	D check
Neutral position switch signal	Neutral SW	Neutral/Other than neutral	Neutral
Idle switch signal	Soft idle SW	Idle/Other than idle	In idle
Ignition switch signal	Ignition SW	ON Input/OFF Input	ON input
Power steering switch signal	Power steering SW	ON Input/OFF Input	ON input
Air conditioning switch signal	A/C SW	ON Input/OFF Input	ON input
Steering wheel switch signal	Steering wheel SW	Hi input/Low input	Low input
Starter switch signal	Starter SW	ON Input/OFF Input	ON input
Front oxygen monitor 1	FtO2 monitor 1	Lean/Rich	Rich
Front oxygen monitor 2	FtO2 monitor 2	Lean/Rich	Rich
Knocking signal	Knock signal	Yes/No	Yes
Crankshaft position sensor signal	Crankshaft angle signal	Yes/No	Yes
Camshaft position sensor signal	Camshaft angle signal	Yes/No	Yes
Rear defogger switch signal	Rear defogger SW	ON Input/OFF Input	ON input
Blower fan switch signal	Blower fan SW	ON Input/OFF Input	ON input
Light switch signal	Light SW	ON Input/OFF Input	ON input
Windshield wiper switch signal	Wiper SW	ON Input/OFF Input	ON input
Air conditioning lock signal	A/C lock signal	ON Input/OFF Input	ON input
A/C middle pressure switch signal	A/C middle pressure SW	ON Input/OFF Input	ON input
Air conditioner compressor relay signal	Compressor relay	ON output/OFF output	ON output
AT retard angle demand signal	AT retard angle demand	Yes/No	Yes
AT fuel cut signal	AT fuel cut	Yes/No	Yes
VDC torque down prohibition output	Torque down output	ON/OFF	Prohibition
VDC torque down demand	Torque down demand	Yes/No	Yes
AT coordinate permission signal	AT coordinate permission signal	ON/OFF	Permission
Electronic throttle control motor relay signal	ETC motor relay	ON/OFF	ON
Stop light switch signal	Stop SW	ON Input/OFF Input	ON input
SET/COAST switch signal	SET/CST SW	ON Input/OFF Input	ON input
RESUME/ACCEL switch signal	RES/ACC SW	ON Input/OFF Input	ON input
Brake switch signal	Brake SW	ON Input/OFF Input	ON input
Main switch signal	Main SW	ON Input/OFF Input	ON input
Body integrated unit data reception	Body Int. Unit Data	Yes/No	Yes
Body integrated unit counter update	Body Int. Unit Count	Yes/No	Yes
Cruise control cancel switch signal	CC Cancel SW	ON Input/OFF Input	ON input

NOTE:
For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

10. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type has been displayed.
4) On the «Engine Diagnosis» screen, select the {DTC Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Display} and press the [YES] key.
6) Make sure DTC is shown on the screen.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

3. OBD-II GENERAL SCAN TOOL

Refers to data denoting emission-related power-train DTC.
For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

NOTE:
Refer to OBD-II general scan tool manufacturer's instruction manual to access power train DTC (MODE $03).

11.Inspection Mode

A: PROCEDURE

When performing the diagnose without the “List of Diagnostic Trouble Code (DTC)”, refer the item of drive cycle. <Ref. to EN(H6DO)(diag)-38, Drive Cycle.>

DTC	Item	On condition
P0011	“A” Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)	—
P0021	“A” Camshaft Position-Timing Over-Advanced or System Performance (Bank 2)	—
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	—
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	—
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	—
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	—
P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)	—
P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)	—
P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)	—
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	—
P0077	Intake Valve Control Solenoid Circuit High (Bank 1)	—
P0083	Intake Valve Control Solenoid Circuit High (Bank 2)	—
P0102	Mass or Volume Air Flow Circuit Low Input	—
P0103	Mass or Volume Air Flow Circuit High Input	—
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	—
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	—
P0112	Intake Air Temperature Circuit Low Input	—
P0113	Intake Air Temperature Circuit High Input	—
P0117	Engine Coolant Temperature Circuit Low Input	—
P0118	Engine Coolant Temperature Circuit High Input	—
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low Input	—
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High Input	—
P0131	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	—
P0132	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	—
P0137	O_2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	—
P0138	O_2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	—
P0151	O_2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	—
P0152	O_2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	—
P0157	O_2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	—
P0158	O_2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	—
P0171	System Too Lean (Bank 1)	—
P0172	System Too Rich (Bank 1)	—
P0174	System Too Lean (Bank 2)	—
P0175	System Too Rich (Bank 2)	—
P0197	Engine Oil Temperature Sensor Circuit Low	—
P0198	Engine Oil Temperature Sensor Circuit High	—
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low Input	—
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High Input	—
P0230	Fuel Pump Primary Circuit	—
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	—
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	—
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	—
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	—
P0335	Crankshaft Position Sensor “A” Circuit	—
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	—

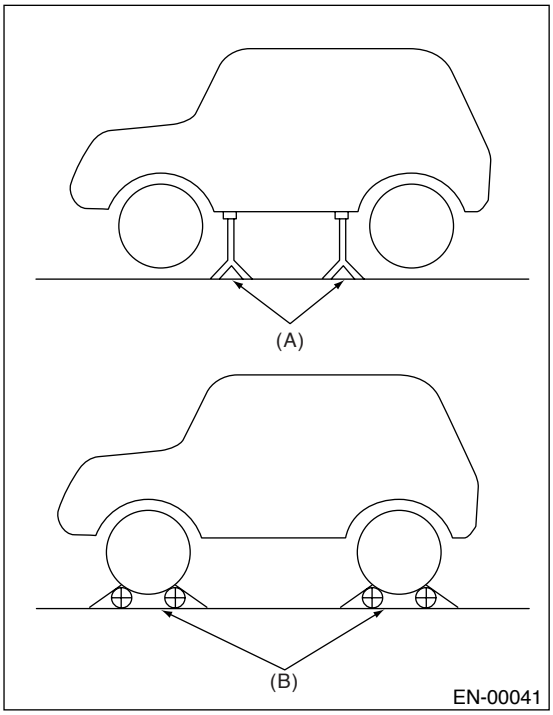
DTC	Item	On condition
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	—
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	—
P0462	Fuel Level Sensor Circuit Low Input	—
P0463	Fuel Level Sensor Circuit High Input	—
P0500	Vehicle Speed Sensor	—
P0512	Starter Request Circuit	—
P0519	Idle Control System Malfunction (Fail-Safe)	—
P0558	Generator Circuit Low Input	—
P0600	Serial Communication Link	—
P0604	Internal Control Module Random Access Memory (RAM) Error	—
P0605	Internal Control Module Read Only Memory (ROM) Error	—
P0607	Control Module Performance	—
P0638	Throttle Actuator Control Range/Performance (Bank 1)	—
P0691	Cooling Fan 1 Control Circuit Low	—
P0692	Cooling Fan 1 Control Circuit High	—
P0700	Transmission Control System (MIL Request)	—
P1160	Return Spring Failure	—
P1518	Starter Switch Circuit Low input	—
P1560	Back-up Voltage Circuit Malfunction	—
P2088	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	—
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	—
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	—
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	—
P2101	Throttle Actuator Control Motor Circuit Range/Performance	—
P2102	Throttle Actuator Control Motor Circuit Low	—
P2103	Throttle Actuator Control Motor Circuit High	—
P2109	Throttle/Pedal Position Sensor A Minimum Stop Performance	—
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low Input	—
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High Input	—
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low Input	—
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High Input	—
P2135	Throttle/Pedal Position Sensor/Switch “A”/“B” Voltage Rationality	—
P2138	Throttle/Pedal Position Sensor/Switch “D”/“E” Voltage Rationality	—

1. PREPARATION FOR THE INSPECTION MODE

1) Check battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) Lift-up the vehicle using a garage jack and place it on rigid racks or drive the vehicle onto free rollers.

WARNING:
• Before lifting-up the vehicle, ensure parking brakes are applied.
• Do not use a pantograph jack in place of a rigid rack.
• Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.
• Do not abruptly depress/release clutch pedal or accelerator pedal during works even when the engine is operating at low speeds since this may cause vehicle to jump off free rollers.
• In order to prevent the vehicle from slipping due to vibration, do not place any wooden blocks or similar items between the rigid racks and the vehicle.

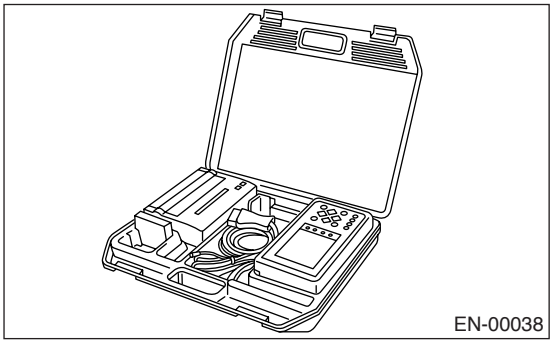
• **Since the rear wheels will also rotate, do not place anything near them. Also, make sure that nobody goes in front of the vehicle.**



(A) Rigid racks
(B) Free rollers

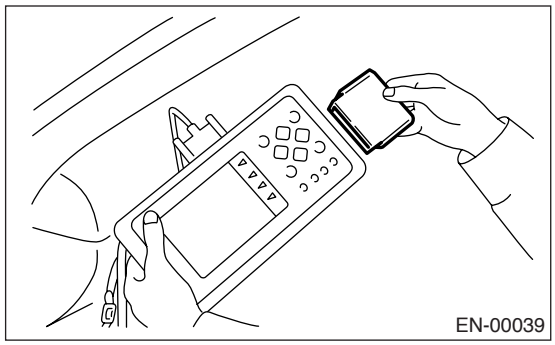
2. SUBARU SELECT MONITOR

1) After clearing the memory, check for any remaining unresolved trouble data. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.>
2) Idle the engine.
3) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>

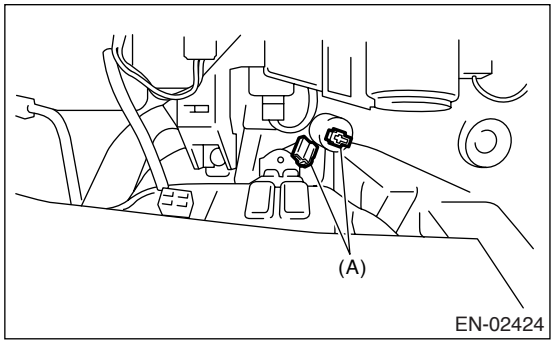


4) Connect the diagnosis cable to Subaru Select Monitor.

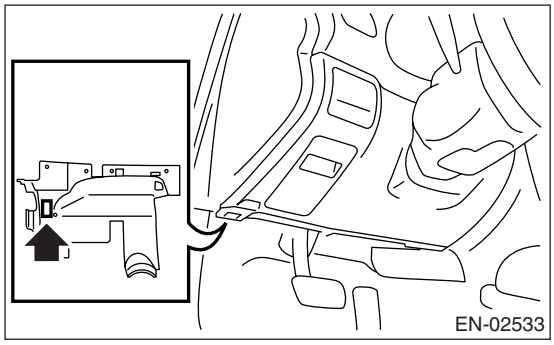
5) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



6) Connect the test mode connector (A) located at the lower portion of glove box.

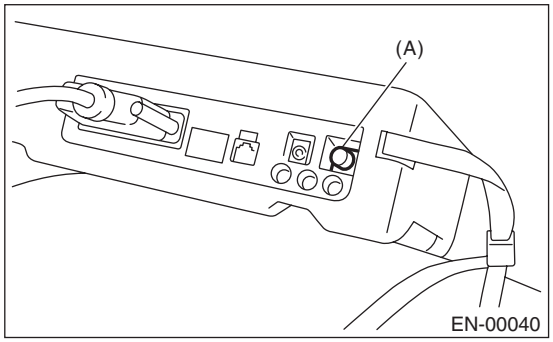


7) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.

8) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.



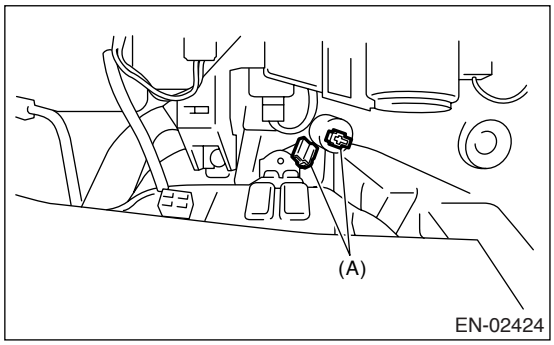
(A) Power switch

9) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
10) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
11) Press the [YES] key after the information of engine type was displayed.
12) On the «Engine Diagnosis» screen, select the {D Check} and press the [YES] key.
13) When the “Perform D Check?” is shown on the screen, press the [YES] key.
14) Perform subsequent procedures as instructed on the display screen.
• If trouble still remains in the memory, the corresponding DTC appears on the display screen.

NOTE:
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>
• Release the parking brake.
• The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

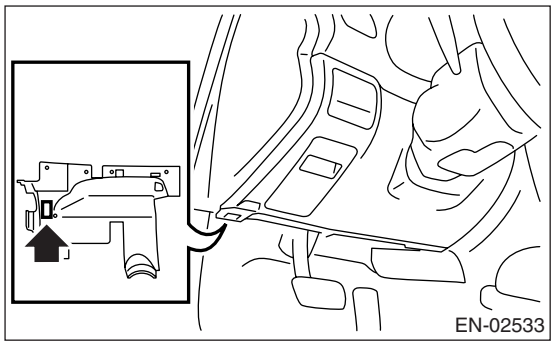
3. OBD-II GENERAL SCAN TOOL

1) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data: <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.>
2) Idle the engine.
3) Connect the test mode connector (A) located at the lower portion of glove box.



4) Connect the OBD-II general scan tool to its data link connector in the lower portion of the instrument panel (on the driver’s side).

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.



5) Start the engine.

NOTE:
• Ensure the select lever is placed in the “P” position before starting. (AT model)
• Depress the clutch pedal when starting the engine. (MT model)

6) Using the select lever or shift lever, turn the “P” position switch and the “N” position switch to ON.
7) Depress the brake pedal to turn the brake switch ON. (AT model)
8) Keep the engine speed in the 2,500 — 3,000 rpm range for 40 seconds.
9) Shift the select lever or shift lever in the “D” range (AT model) or “1st” gear (MT model) and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

NOTE:
• On AWD vehicles, release the parking brake.
• The speed difference between front and rear wheels may light either the ABS warning light, but this indicates no malfunctions. When engine control diagnosis is finished, perform the ABS memory clearance procedure of self-diagnosis system.

10) Using the OBD-II general scan tool, check for DTC and record the result(s).

NOTE:
• For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC).
<Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

12.Drive Cycle

A: PROCEDURE

For the troubleshooting, there are three driving patterns. By driving the vehicle with specified pattern, following trouble items could be diagnosed. After the repair of following trouble items, be sure to drive the vehicle with specified patterns to check the trouble was repaired correctly.

1. PREPARATION FOR DRIVE CYCLE

1) Check battery voltage is more than 12 V and fuel remains half [20 — 40 ℓ (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2) After performing the diagnostics and clearing the memory, check for any remaining unresolved trouble data: <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.>
3) Separate the test mode connector.

NOTE:
• Perform the diagnosis after warming up the engine except the engine coolant temperature was specified at engine start.
• Perform the diagnosis twice if the DTC marked with *. After completing the first diagnosis, stop the engine and perform second diagnosis in same condition.

2. DRIVE THE VEHICLE WITH 80 KM/H (50 MPH) FOR 20 MINUTES, AND THEN IDLE THE ENGINE FOR A MINUTE.

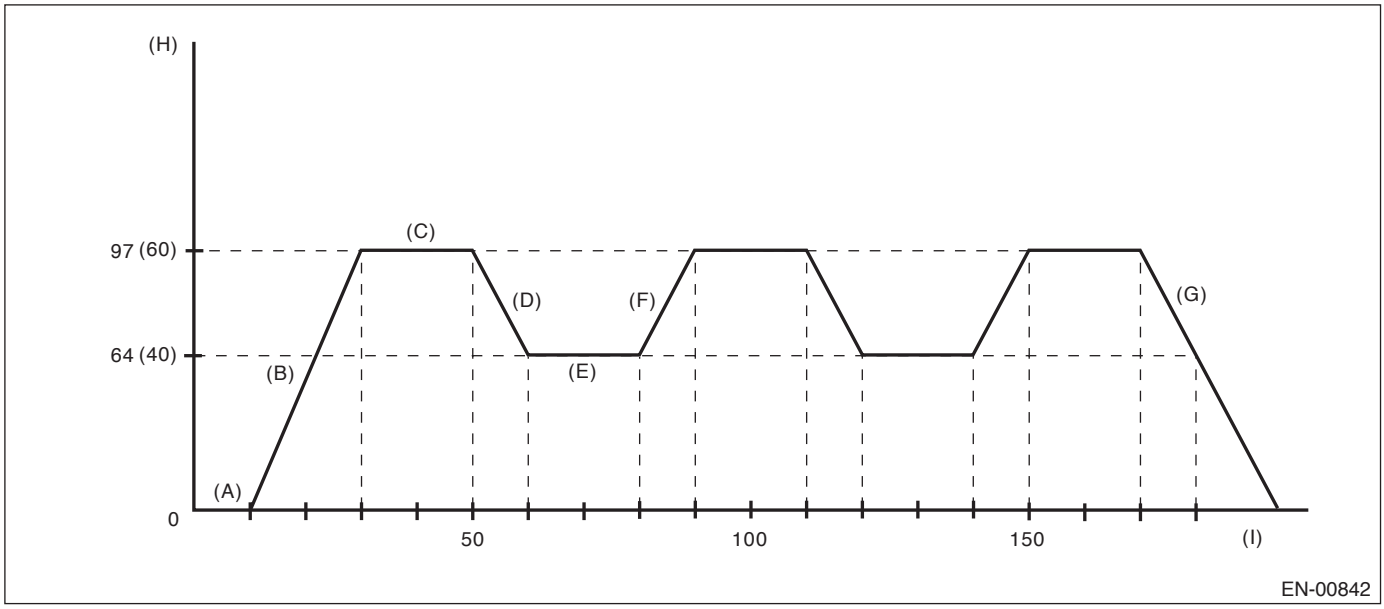
DTC	Item	On condition
*P0125	Insufficient Coolant Temperature For Closed Loop Fuel Control	Engine coolant temperature at engine start is 20°C (68°F) or less.
*P0133	O_2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	—
*P0153	O_2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	—
*P0420	Catalyst System Efficiency Below Threshold (Bank 1)	—

3. 10 MINUTES IDLING

NOTE:
Drive the vehicle in more than 10 km/h (6 MPH) before diagnosis.

DTC	Item	On condition
*P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	—
*P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	—
*P0459	Evaporative Emission Control System Purge Control Valve Circuit High	—

4. DRIVE THE VEHICLE WITH FOLLOWING DRIVE PATTERNS



(A) Idle the engine for more than 10 seconds.
(B) Accelerate the vehicle to 97 km/h (60 MPH) within 20 seconds.
(C) Drive the vehicle at 97 km/h (60 MPH) for 20 seconds.
(D) Decelerate the vehicle to 64 km/h (40 MPH) with throttle fully closed.
(E) Drive the vehicle at 64 km/h (40 MPH) for 20 seconds.
(F) Accelerate the vehicle to 97 km/h (60 MPH) within 10 seconds.
(G) Stop the vehicle with throttle fully closed.
(H) Vehicle speed km/h (MPH)
(I) Sec.

DTC	Item	On condition
P0076	Intake Valve Control Solenoid Circuit Low (Bank 1)	—
P0082	Intake Valve Control Solenoid Circuit Low (Bank 2)	—
*P0101	Mass or Volume Air Flow Circuit Range/Performance	—
P0134	O_2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	—
P0154	O_2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	—
*P0301	Cylinder 1 Misfire Detected	Diagnosis may complete at once
*P0302	Cylinder 2 Misfire Detected	Diagnosis may complete at once
*P0303	Cylinder 3 Misfire Detected	Diagnosis may complete at once
*P0304	Cylinder 4 Misfire Detected	Diagnosis may complete at once
*P0305	Cylinder 5 Misfire Detected	Diagnosis may complete at once
*P0306	Cylinder 6 Misfire Detected	Diagnosis may complete at once
P0400	Exhaust Gas Recirculation Flow	—
P0559	Generator Circuit High Input	—
P1026	VVL System 1 Malfunction	—
P1028	VVL System 2 Malfunction	—
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	—
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	—
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	—
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	—
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	—
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	—
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	—
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	—

13.Clear Memory Mode

A: OPERATION

1. SUBARU SELECT MONITOR (NORMAL MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.
5) When the “Done” and “Turn Ignition Switch OFF” are shown on the display screen, turn the ignition switch to OFF and then Subaru Select Monitor switch to OFF.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. SUBARU SELECT MONITOR (OBD MODE)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
3) Press the [YES] key after the information of engine type was displayed.
4) On the «Engine Diagnosis» display screen, select the {OBD System} and press the [YES] key.
5) On the «OBD Menu» display screen, select the {DTC Clear} and press the [YES] key.
6) When the “Perform Diagnostic Code(s) Clear?” is shown on the screen, press the [YES] key.
7) Turn the ignition switch to OFF and then turn off the Subaru Select Monitor.

NOTE:
• Initial diagnosis of electronic control throttle is performed after memory clearance. For this reason, start the engine after 10 seconds or more have elapsed since the ignition switch was turned to ON.
• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

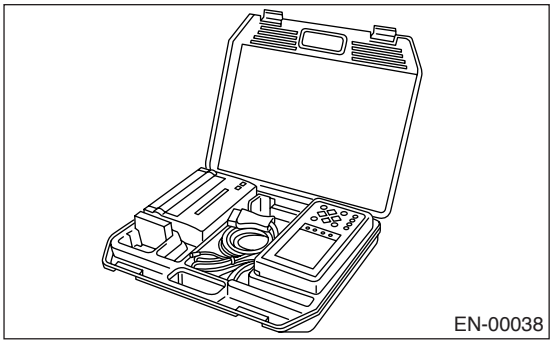
3. OBD-II GENERAL SCAN TOOL

For clear memory procedures using the OBD-II general scan tool, refer to the OBD-II General Scan Tool Instruction Manual.

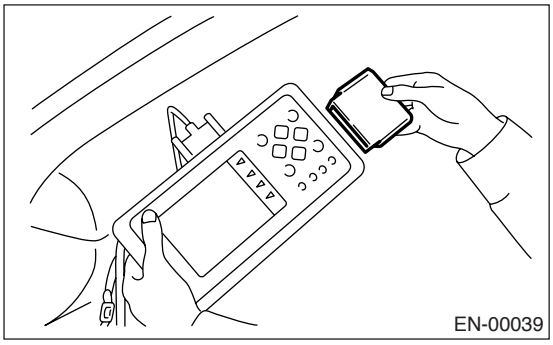
14. Compulsory Valve Operation Check Mode

A: OPERATION

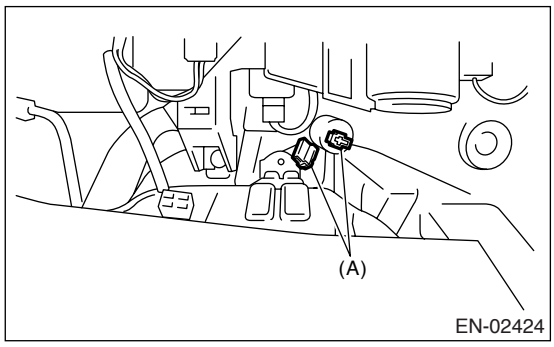
1) Prepare the Subaru Select Monitor kit. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



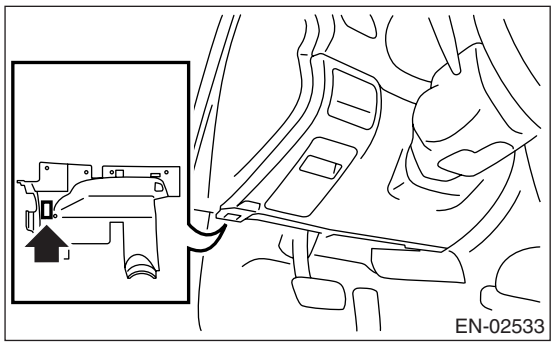
2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-7, PREPARATION TOOL, General Description.>



4) Connect the test mode connector (A) located at the lower portion of glove box.

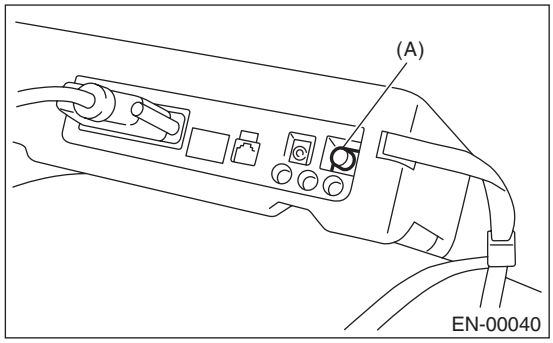


5) Connect the Subaru Select Monitor to data link connector located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect the scan tools except for Subaru Select Monitor or OBD-II general scan tool.

6) Turn ignition switch to ON (engine OFF) and turn on the Subaru Select Monitor switch.



(A) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
8) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
9) Press the [YES] key after the information of engine type was displayed.
10) On the «Engine Diagnosis» display screen, select the {System Operation Check Mode} and press the [YES] key.
11) On the «System Operation Check Mode» display screen, select the {Actuator ON/OFF Operation} and press the [YES] key.
12) Select the desired actuator on the «Actuator ON/OFF Operation» display screen and press the [YES] key.
13) Pressing the [NO] key completes the compulsory valve operation check mode. The display will then return to the «Actuator ON/OFF Operation» screen.

• A list of the support data is shown in the following table.

DESCRIPTION	Display
Compulsory fuel pump relay operation check	Fuel Pump
Compulsory radiator fan relay operation check	Radiator Fan Relay
Compulsory air conditioning relay operation check	A/C Compressor Relay
Compulsory purge control solenoid valve operation check	CPC Solenoid

NOTE:
• The following parts will be displayed but not functional.

Display
EGR Solenoid
ASV Solenoid
FICD Solenoid
Pressure Switching Solenoid 1
Pressure Switching Solenoid 2
Supercharger Control Solenoid
PCV Solenoid
Vent Control Solenoid
AAI Solenoid
Atmospheric pressure switching solenoid
Exhaust Bypass Valve Control Permit Flag

• For detailed operation procedures, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

15.Malfunction Indicator Light

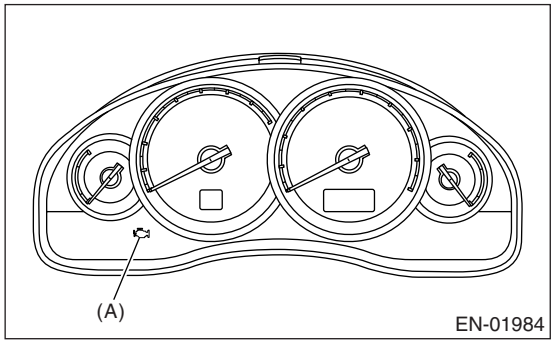
A: PROCEDURE

1. Activation of malfunction indicator light. <Ref. to EN(H6DO)(diag)-43, ACTIVATION OF MALFUNCTION INDICATOR LIGHT, Malfunction Indicator Light.>
↓
2. Malfunction indicator light does not come on. <Ref. to EN(H6DO)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
↓
3. Malfunction indicator light does not go off. <Ref. to EN(H6DO)(diag)-47, MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF., Malfunction Indicator Light.>
↓
4. Malfunction indicator light does not blink. <Ref. to EN(H6DO)(diag)-48, MALFUNCTION INDICATOR LIGHT DOES NOT BLINK., Malfunction Indicator Light.>
↓
5. Malfunction indicator light keep blinking. <Ref. to EN(H6DO)(diag)-50, MALFUNCTION INDICATOR LIGHT REMAINS BLINKING., Malfunction Indicator Light.>

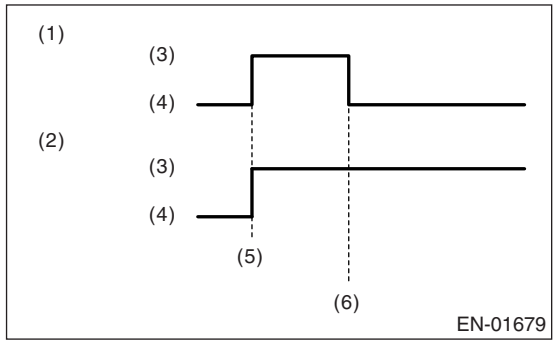
B: ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1) When the ignition switch is turned to ON (engine off), the malfunction indicator light (A) in the combination meter illuminates.

NOTE:
If the malfunction indicator light does not illuminate, perform the diagnosis of malfunction indicator light circuit or the combination meter circuit. <Ref. to EN(H6DO)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>



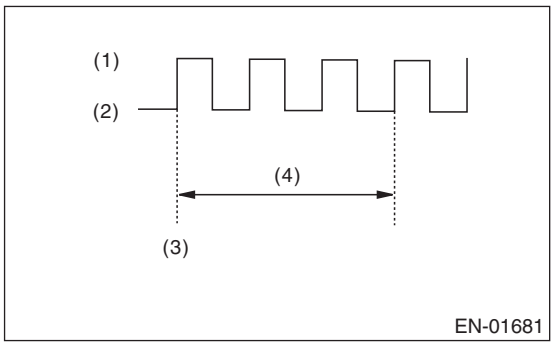
2) After starting the engine, the malfunction indicator light goes out. If it does not, either the engine or the emission control system is malfunctioning.



(1) No faulty
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3) Turn the ignition switch to OFF and connect the test mode connector.
(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
(2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz. (During diagnosis)

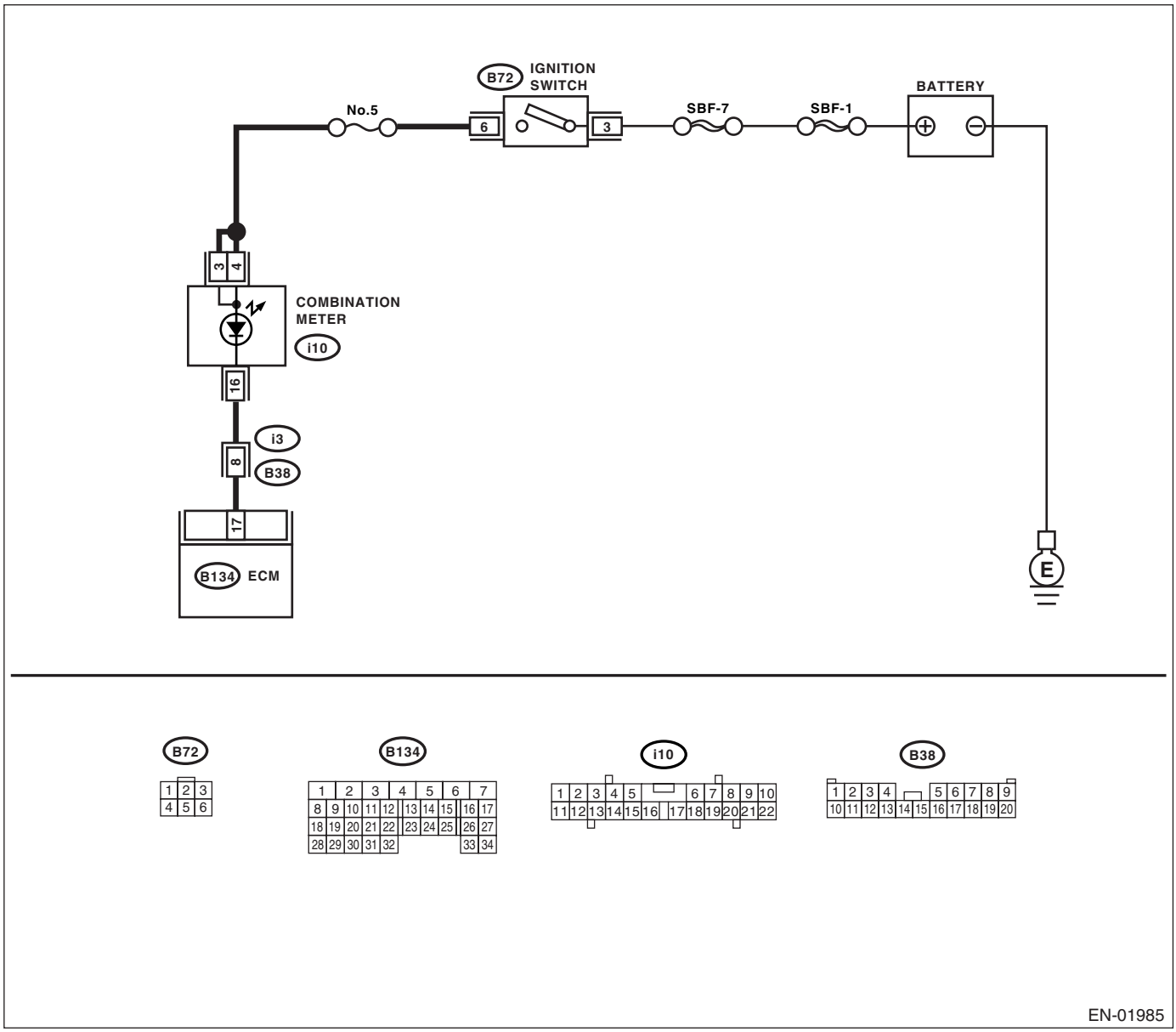
(3) After the diagnosis is completed, malfunction indicator light does not blink at a cycle of 3 Hz if there is no fault. Malfunction indicator light illuminates when the trouble occurs.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

C: MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

DIAGNOSIS:
The malfunction indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not come on.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 17 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **4.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check for poor connection when shaking or pulling ECM connector and harness.	Does the malfunction indicator light illuminate?	Repair the poor contact in ECM connector.	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK ECM CONNECTOR.** Check the connection of ECM connector.	Is the ECM connector correctly connected?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the connection of ECM connector.
4	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Remove the combination meter. <Ref. to IDI-16, Combination Meter Assembly.> 3) Disconnect the connector from ECM and combination meter. 4) Measure the resistance of harness between ECM and combination meter connector. ***Connector & terminal*** ***(B134) No. 17 — (i10) No. 16:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and combination meter connector • Poor contact in coupling connector
5	**CHECK POOR CONTACT.** Check poor contact in combination meter connector.	Is there poor contact in combination meter connector?	Repair the poor contact in combination meter connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN COMBINATION METER AND IGNITION SWITCH CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3 (+) — Chassis ground (−):*** ***(i10) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the board of combination meter. <Ref. to IDI-16, Combination Meter Assembly.>	Check the following and repair if necessary. NOTE: • Brown out fuse (No. 5) • Open or short circuit in harness between fuse (No. 5) and battery terminal • Poor contact in ignition switch connector

D: MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.

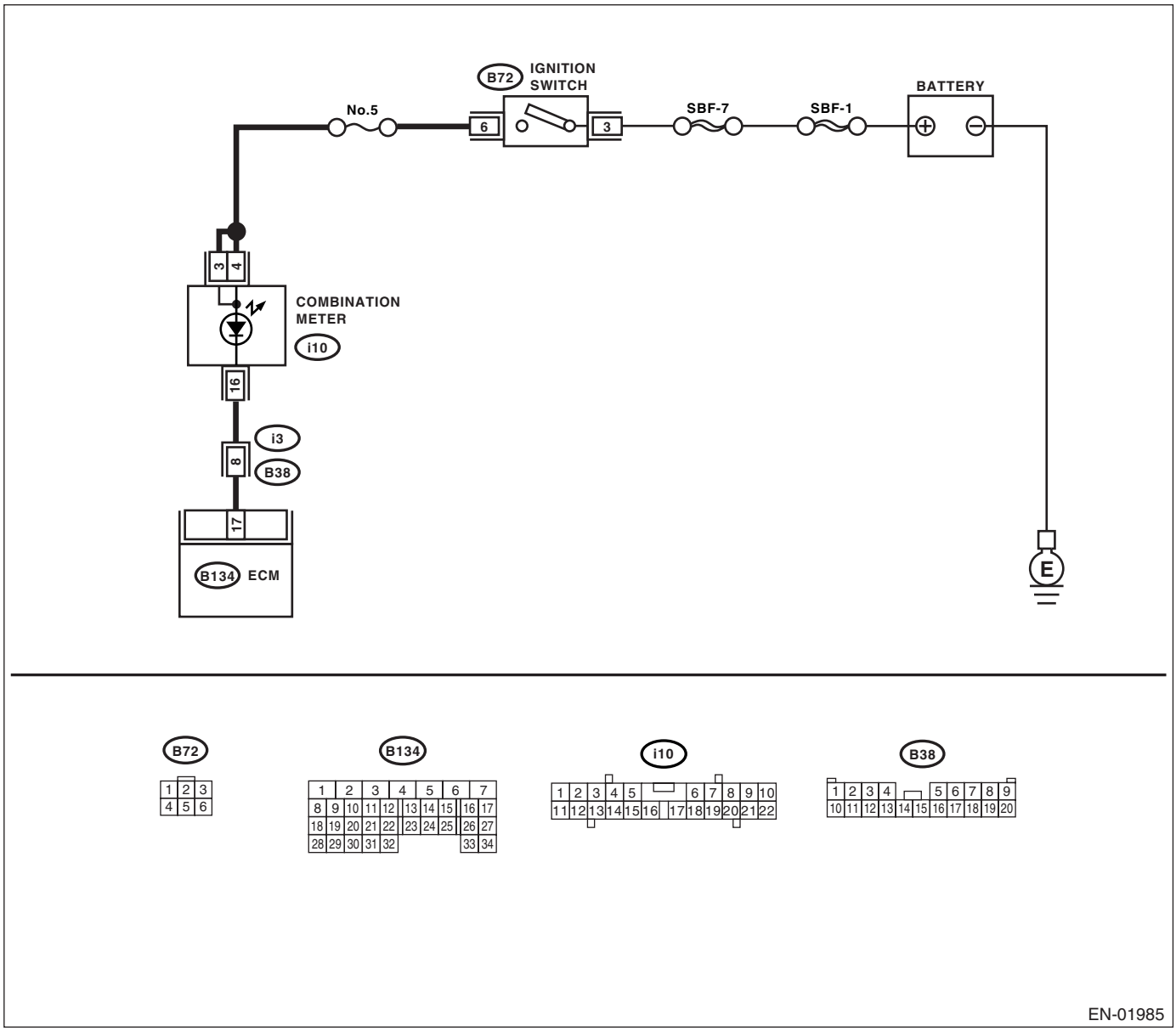
DIAGNOSIS:

The malfunction indicator light circuit is shorted.

TROUBLE SYMPTOM:

Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor display.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

E: MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.

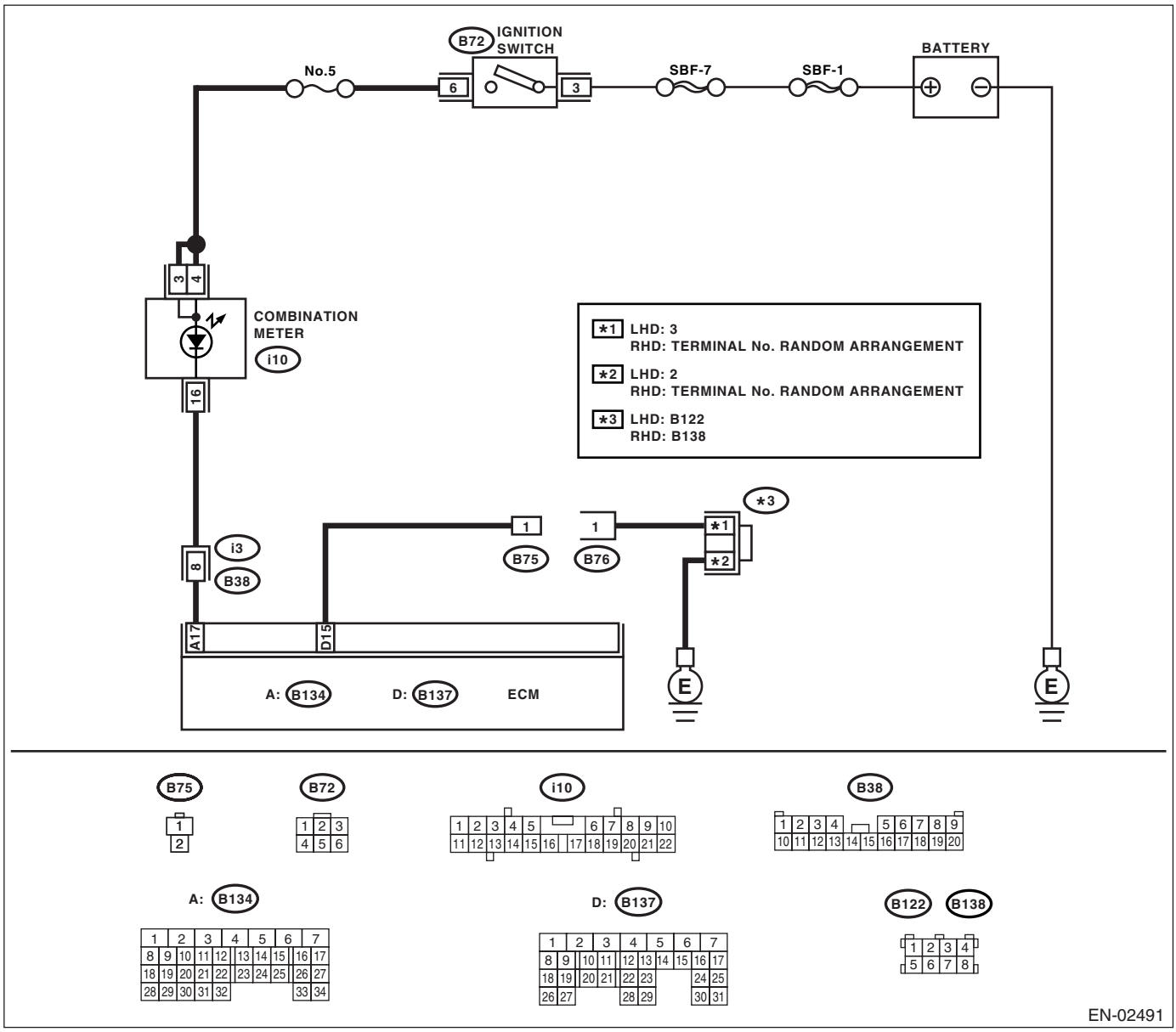
DIAGNOSIS:

- The malfunction indicator light circuit is open or shorted.
- Test mode connector circuit is in open.

TROUBLE SYMPTOM:

Malfunction indicator light does not blink during inspection mode.

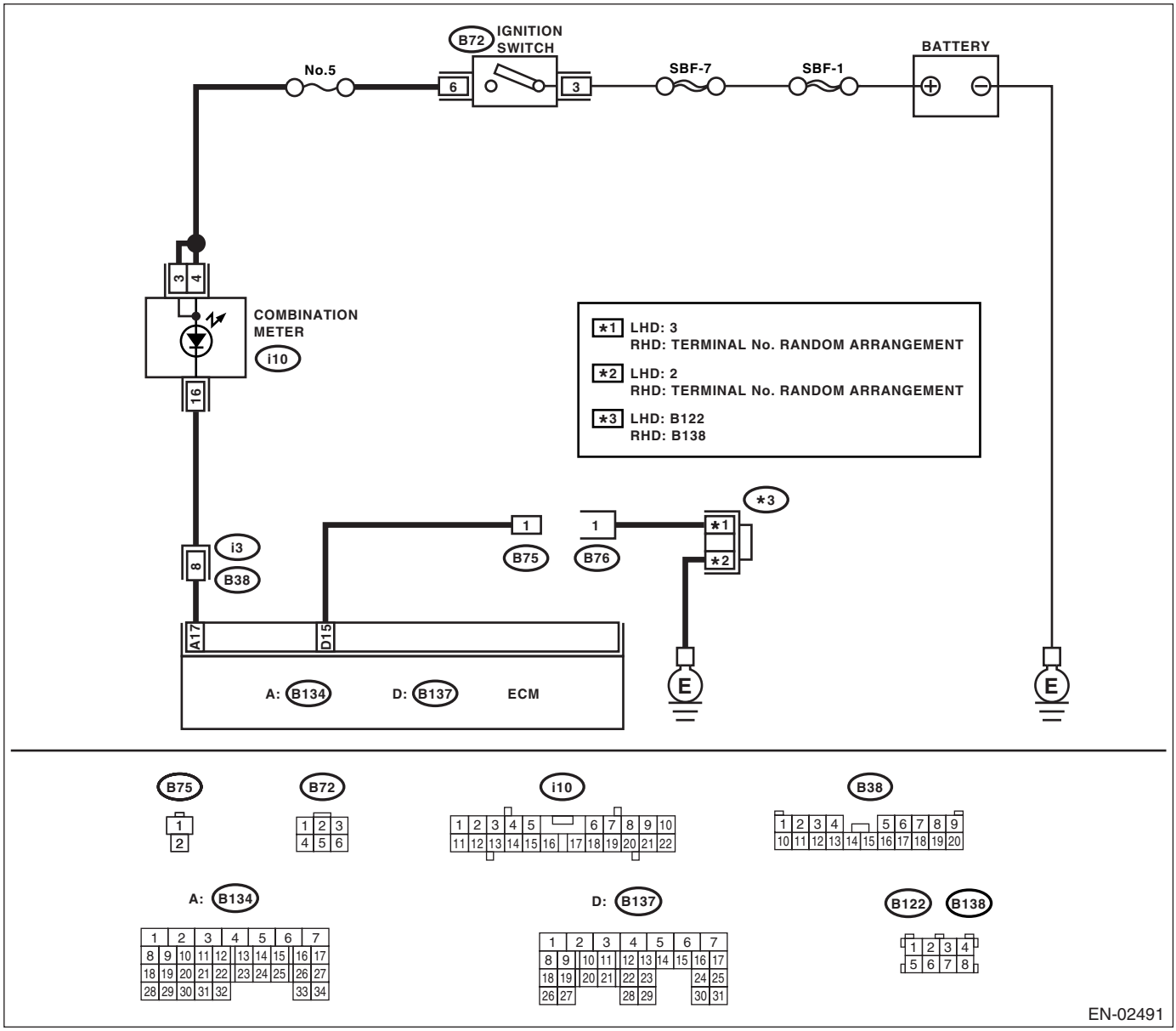
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the test mode connectors. 3) Turn the ignition switch to ON. (engine OFF)	Does the malfunction indicator light illuminate?	Go to step **2.**	Repair the malfunction indictor light circuit. <Ref. to EN(H6DO)(diag)-45, MALFUNCTION INDICATOR LIGHT DOES NOT COME ON, Malfunction Indicator Light.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Turn the ignition switch to ON.	Does the malfunction indicator light illuminate?	Repair the short circuit in harness between combination meter and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN TEST MODE CONNECTOR AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between test mode connector and chassis ground. ***Connector & terminal*** ***(B76) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between test mode connector and chassis ground
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Go to step **5.**
5	**CHECK HARNESS BETWEEN ECM AND TEST MODE CONNECTOR.** 1) Connect the test mode connector. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B137) No. 15 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and test mode connector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

F: MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

DIAGNOSIS:
Test mode connector circuit is shorted.
TROUBLE SYMPTOM:
Malfunction indicator light blinks without test mode connector connected.
WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TEST MODE CONNECTOR.** 1) Disconnect the test mode connectors. 2) Turn the ignition switch to ON.	Does the malfunction indicator light blink?	Go to step **2.**	System is in good order. NOTE: Malfunction indicator light blinks when test mode connector is connected.

	Step	Check	Yes	No
2	**CHECK HARNESS BETWEEN ECM CONNECTOR AND CHASSIS GROUNDING TERMINAL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 15 — Chassis ground:***	Is the resistance less than 5 Ω?	Repair the short circuit in harness between ECM and test mode connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

16.Diagnostics for Engine Starting Failure

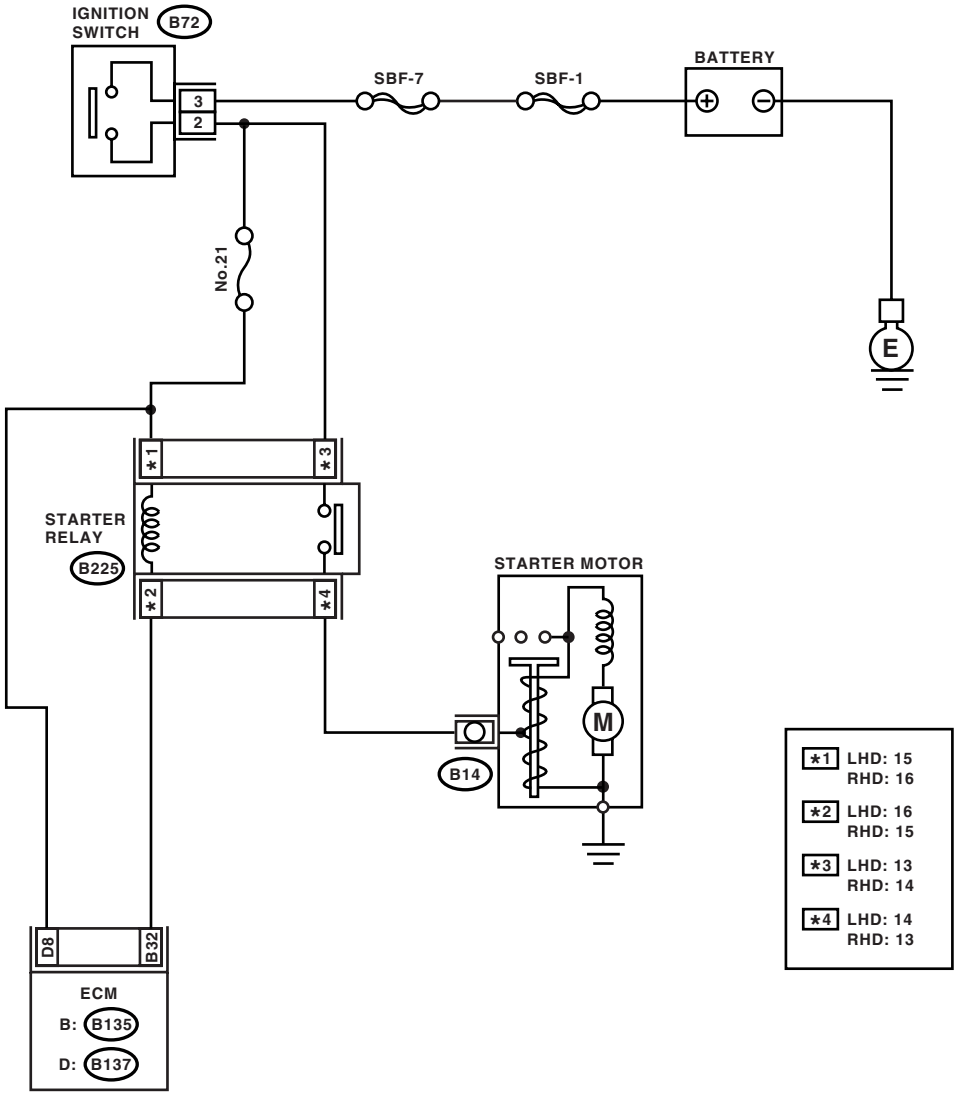
A: PROCEDURE

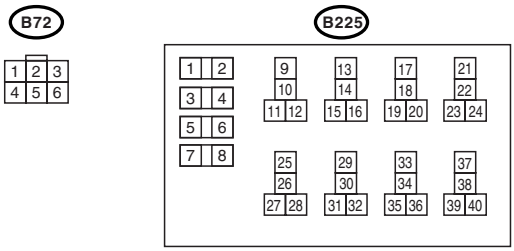
1. Check for fuel amount.
↓
2. Inspection of starter motor circuit <Ref. to EN(H6DO)(diag)-53, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
3. Inspection of ECM power supply and ground line. <Ref. to EN(H6DO)(diag)-56, CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM), Diagnostics for Engine Starting Failure.>
↓
4. Inspection of ignition control system. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>
↓
5. Inspection of fuel pump circuit. <Ref. to EN(H6DO)(diag)-62, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>
↓
6. Inspection of fuel injector circuit. <Ref. to EN(H6DO)(diag)-64, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

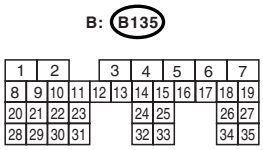
B: STARTER MOTOR CIRCUIT

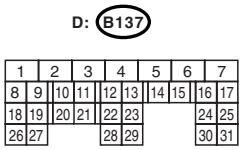
CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:









EN-02492

Diagnostics for Engine Starting Failure

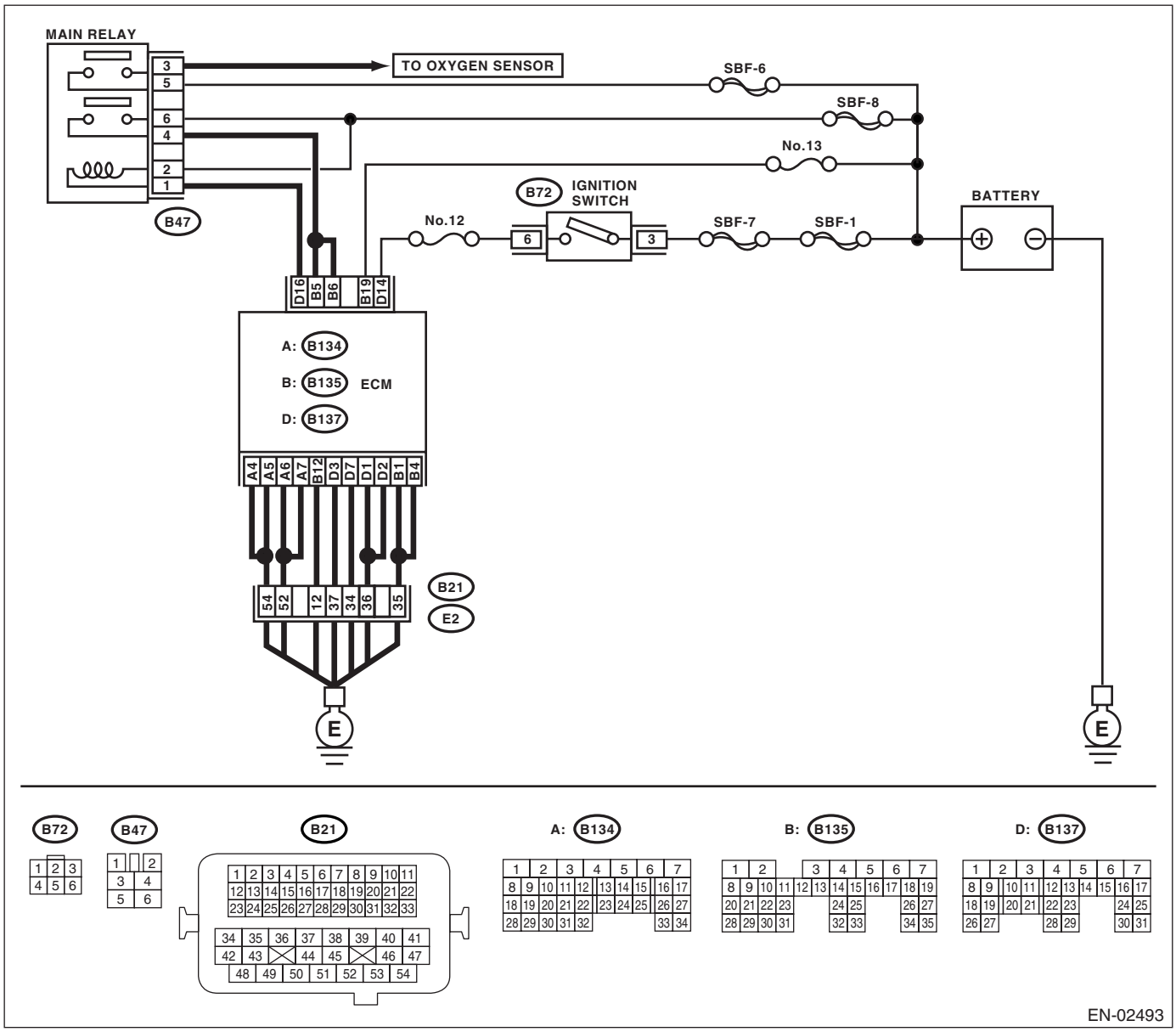
	Step	Check	Yes	No
1	**CHECK BATTERY.** Check the battery voltage.	Is the voltage more than 12 V?	Go to step **2.**	Charge or replace the battery.
2	**CHECK OPERATION OF STARTER MOTOR.**	Does the starter motor operate?	Go to step **3.**	Go to step **4.**
3	**CHECK DTC.**	Is DTC displayed? <Ref. to EN(H6DO)(diag)-32, OPERATION, Read Diagnostic Trouble Code (DTC).>	Inspect the relevant DTC using List of Diagnostic Trouble Code (DTC). <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM connector.
4	**CHECK INPUT SIGNAL FOR STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter motor. 3) Turn the ignition switch to START. 4) Measure the power supply voltage between starter motor connector terminal and engine ground. ***Connector & terminal*** ***(B14) No. 1 (+) — Engine ground (−):*** NOTE: Shift the select lever to “P” or “N” range.	Is the voltage more than 10 V?	Go to step **5.**	Go to step **6.**
5	**CHECK GROUND CIRCUIT OF STARTER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the ground cable terminal from starter motor. 3) Measure the resistance of ground cable between ground cable terminal and engine ground.	Is the resistance less than 5 Ω?	Check the starter motor. <Ref. to SC(H6DO)-6, Starter.>	Repair the open circuit of ground cable.
6	**CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.** 1) Disconnect the connector from ignition switch. 2) Measure the power supply voltage between ignition switch connector and chassis ground. ***Connector & terminal*** ***(B72) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open circuit in harness between ignition switch and battery, and check fuse SBF No.7 and SBF No.1.
7	**CHECK IGNITION SWITCH.** 1) Disconnect the connector from ignition switch. 2) Measure the resistance between ignition switch terminals while turning the ignition switch to START position. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 5 Ω?	Go to step **8.**	Replace the ignition switch.

	Step	Check	Yes	No
8	**CHECK INPUT VOLTAGE OF STARTER RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from starter relay. 3) Connect the connector to ignition switch. 4) Measure the input voltage between starter relay connector and chassis ground while turning the ignition switch to START position. ***Connector & terminal*** ***LHD model*** ***(B225) No. 13 (+) — Chassis ground (–):*** ***(B225) No. 15 (+) — Chassis ground (–):*** ***RHD model*** ***(B225) No. 14 (+) — Chassis ground (–):*** ***(B225) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9.**	Repair the open circuit in harness between starter relay and ignition switch.
9	**CHECK STARTER RELAY.** 1) Connect the battery to starter relay terminals No. 15 and No. 16. 2) Measure the resistance between starter relay terminals. ***Terminals*** ***No. 13 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the starter relay.
10	**CHECK INPUT VOLTAGE FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to starter relay. 3) Disconnect the connectors from ECM. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 32 (+) — Chassis ground (–):*** ***(B137) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the open or ground short circuit in harness between ECM and starter relay.

C: CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



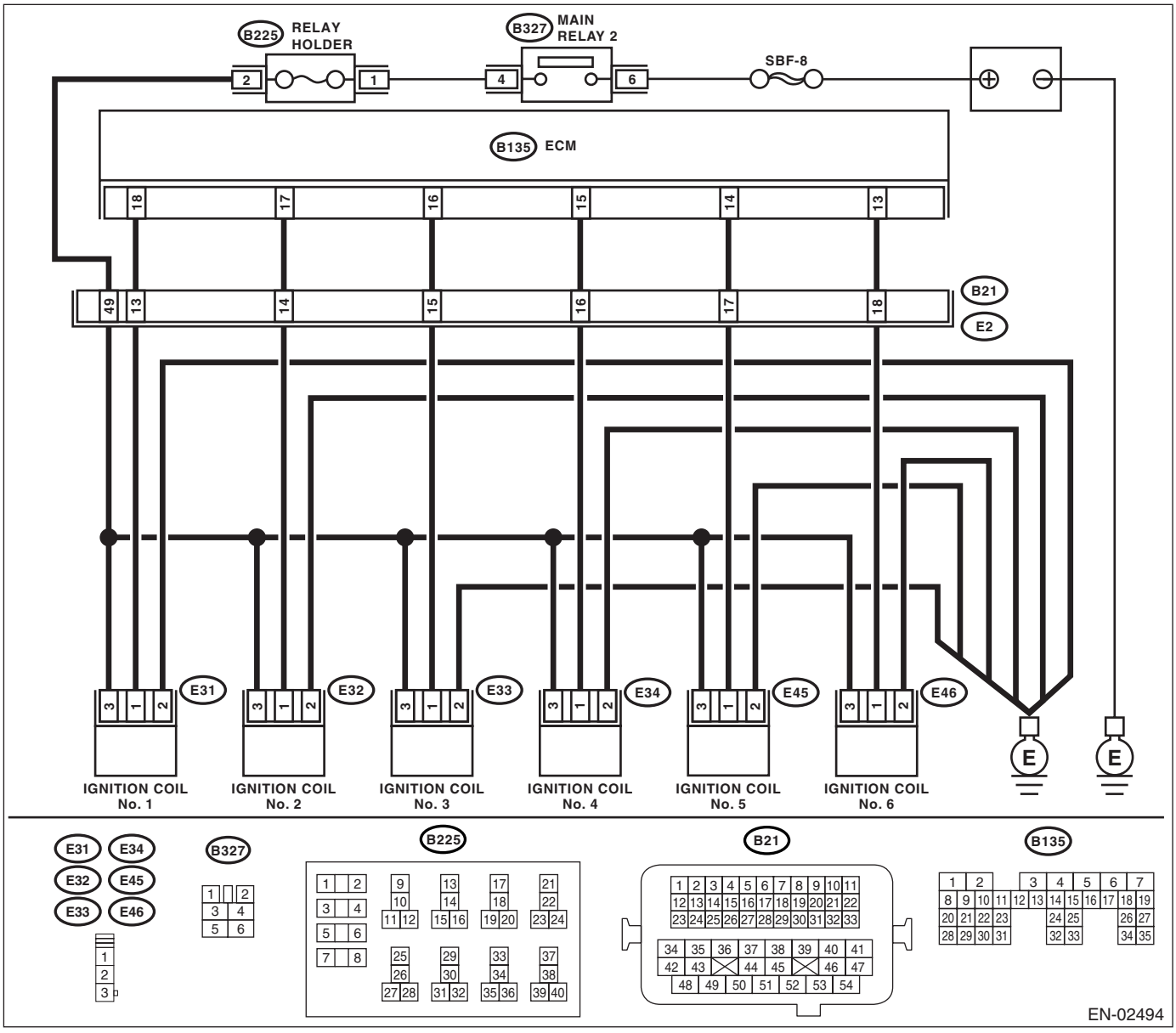
	Step	Check	Yes	No
1	**CHECK MAIN RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the main relay. 3) Connect the battery to main relay terminals No. 1 and No. 2. 4) Measure the resistance between main relay terminals. ***Terminals*** ***No. 3 — No. 5:*** ***No. 4 — No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the main relay.
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:*** ***(B135) No. 1 — Chassis ground:*** ***(B135) No. 4 — Chassis ground:*** ***(B135) No. 12 — Chassis ground:*** ***(B137) No. 1 — Chassis ground:*** ***(B137) No. 2 — Chassis ground:*** ***(B137) No. 3 — Chassis ground:*** ***(B137) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK INPUT VOLTAGE OF ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open or ground short circuit of power supply circuit.
4	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Repair the open or ground short circuit of power supply circuit.
5	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between ECM connector and main relay connector.
6	**CHECK INPUT VOLTAGE OF ECM.** 1) Connect the connectors to ECM and main relay. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Repair the open or ground short circuit in harness between ECM connector and main relay connector.
7	**CHECK INPUT VOLTAGE OF MAIN RELAY.** Measure the voltage between main relay connector and chassis ground. ***Connector & terminal*** ***(B47) No. 5 (+) — Chassis ground (–):*** ***(B47) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Repair the open or ground short circuit in harness of power supply circuit.

Step		Check	Yes	No
8	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Check ignition control system. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Repair the open or ground short circuit in harness between ECM connector and main relay connector.

D: IGNITION CONTROL SYSTEM

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK SPARK PLUG CONDITION.** 1) Remove the spark plug. <Ref. to IG(H6DO)-4, REMOVAL, Spark Plug.> 2) Check the spark plug condition. <Ref. to IG(H6DO)-5, INSPECTION, Spark Plug.>	Is the spark plug's status OK?	Go to step **2.**	Replace the spark plug.

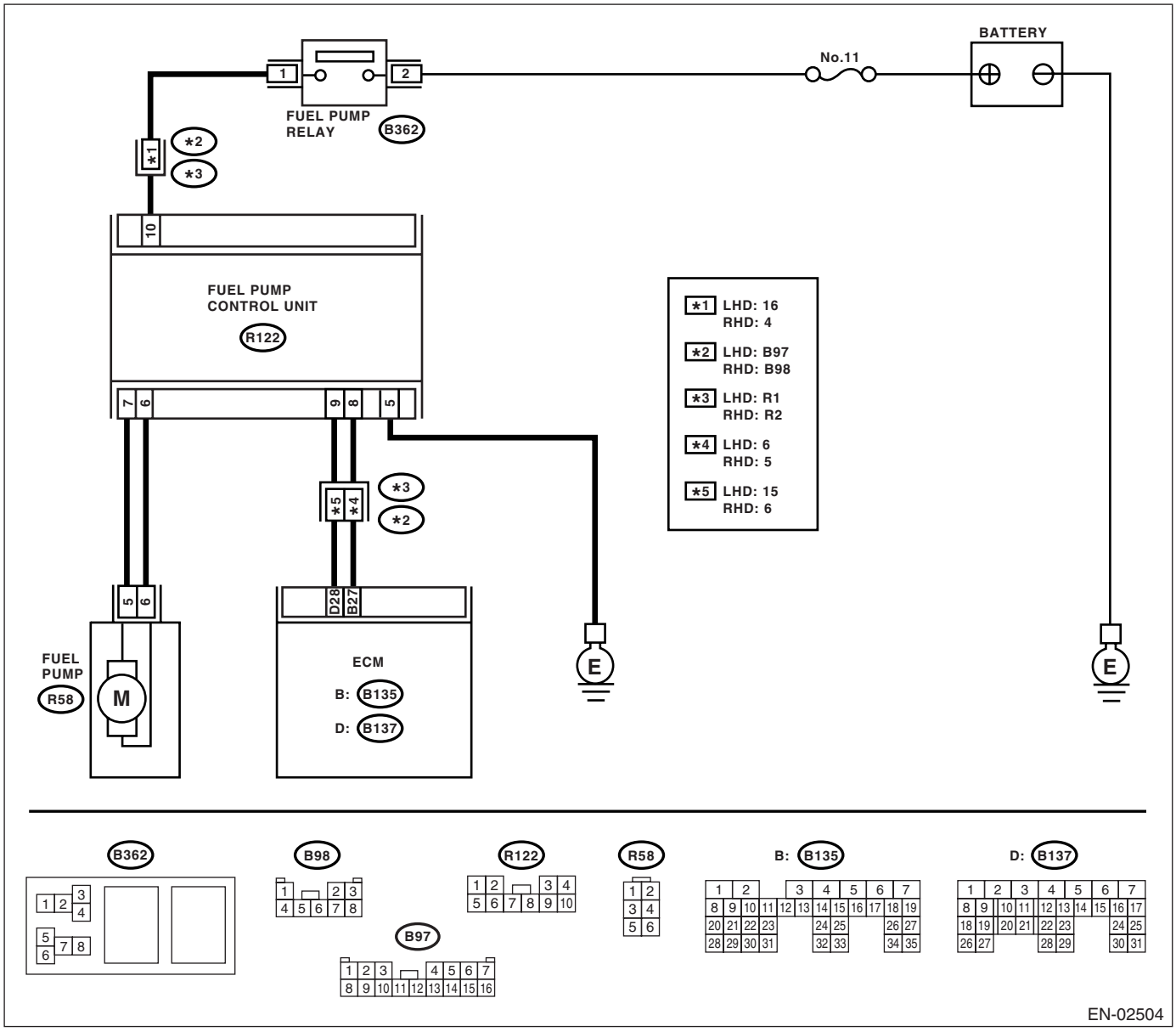
	Step	Check	Yes	No
2	**CHECK IGNITION SYSTEM FOR SPARKS.** 1) Connect the spark plug to ignition coil. 2) Release the fuel pressure. 3) Contact the spark plug's thread portion on engine. 4) While opening the throttle valve fully, start the engine to check that spark occurs at each cylinder.	Does spark occur at each cylinder?	Check fuel pump system. <Ref. to EN(H6DO)(diag)-62, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>	Go to step **3.**
3	**CHECK POWER SUPPLY CIRCUIT FOR IGNITION COIL & IGNITOR ASSY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ignition coil & ignitor ASSY. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 3 (+) — Engine ground (–):*** ***(E32) No. 3 (+) — Engine ground (–):*** ***(E33) No. 3 (+) — Engine ground (–):*** ***(E34) No. 3 (+) — Engine ground (–):*** ***(E45) No. 3 (+) — Engine ground (–):*** ***(E46) No. 3 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ignition coil & ignitor ASSY, and ignition switch connector • Poor contact in coupling connector
4	**CHECK HARNESS OF IGNITION COIL & IGNITOR ASSY GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ignition coil & ignitor ASSY connector and engine ground. ***Connector & terminal*** ***(E31) No. 2 — Engine ground:*** ***(E32) No. 2 — Engine ground:*** ***(E33) No. 2 — Engine ground:*** ***(E34) No. 2 — Engine ground:*** ***(E45) No. 2 — Engine ground:*** ***(E46) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ignition coil & ignitor ASSY connector and engine grounding terminal
5	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from ignition coil & ignitor ASSY. 4) Measure the resistance of harness between ECM and ignition coil & ignitor ASSY connector. ***Connector & terminal*** ***(B135) No. 18 — (E31) No. 1:*** ***(B135) No. 17 — (E32) No. 1:*** ***(B135) No. 16 — (E33) No. 1:*** ***(B135) No. 15 — (E34) No. 1:*** ***(B135) No. 14 — (E45) No. 1:*** ***(B135) No. 13 — (E46) No. 1:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and ignition coil & ignitor ASSY connector. • Poor contact in coupling connector

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND IGNITION COIL & IGNITOR ASSY CONNECTOR.** Measure the resistance of harness between ECM and engine ground. ***Connector & terminal:*** ***(B135) No. 18 — Engine ground:*** ***(B135) No. 17 — Engine ground:*** ***(B135) No. 16 — Engine ground:*** ***(B135) No. 15 — Engine ground:*** ***(B135) No. 14 — Engine ground:*** ***(B135) No. 13 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit in harness between ECM and ignition coil & ignitor ASSY connector.
7	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Check fuel pump circuit. <Ref. to EN(H6DO)(diag)-62, FUEL PUMP CIRCUIT, Diagnostics for Engine Starting Failure.>

E: FUEL PUMP CIRCUIT

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:

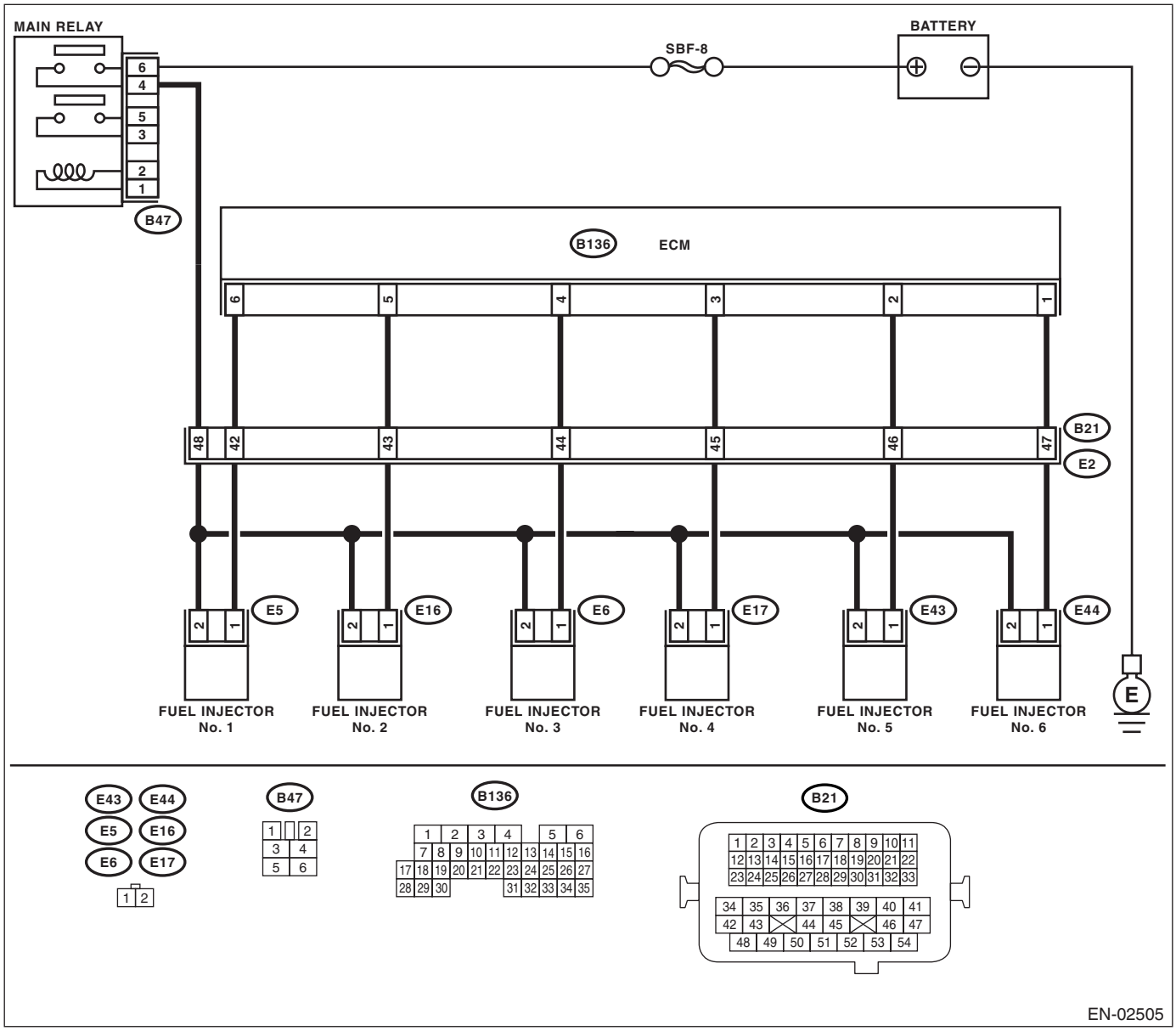


	Step	Check	Yes	No
1	**CHECK OPERATING SOUND OF FUEL PUMP.** Make sure that fuel pump is in operation for two seconds when turning the ignition switch to ON. NOTE: Fuel pump operation can also be executed using Subaru Select Monitor. Refer to “Compulsory Valve Operation Check Mode” for procedures. <Ref. to EN(H6DO)(diag)-41, Compulsory Valve Operation Check Mode.>	Does the fuel pump produce operating sound?	Check the fuel injector circuit. <Ref. to EN(H6DO)(diag)-64, FUEL INJECTOR CIRCUIT, Diagnostics for Engine Starting Failure.>	Display DTC. <Ref. to EN(H6DO)(diag)-32, OPERATION, Read Diagnostic Trouble Code (DTC).>

F: FUEL INJECTOR CIRCUIT

CAUTION:
- **Check or repair only faulty parts.**
- **After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.**

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK OPERATION OF EACH FUEL INJECTOR.** While cranking the engine, check that each fuel injector emits operating sound. Use a sound scope or apply a screwdriver to the injector for this check.	Does the fuel injector emit operating sound?	Check the fuel pressure. <Ref. to ME(H6DO)-27, INSPECTION, Fuel Pressure.>	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK POWER SUPPLY TO EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage between fuel injector terminal and engine ground. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** ***#5 (E43) No. 2 (+) — Engine ground (–):*** ***#6 (E44) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between main relay and fuel injector connector • Poor contact in main relay connector • Poor contact in coupling connector • Poor contact in fuel injector connector
3	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) No. 1:*** ***#5 (B136) No. 2 — (E43) No. 1:*** ***#6 (B136) No. 1 — (E44) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.** Measure the resistance of harness between ECM and fuel injector connector. ***Connector & terminal*** ***#1 (B136) No. 6 — Chassis ground:*** ***#2 (B136) No. 5 — Chassis ground:*** ***#3 (B136) No. 4 — Chassis ground:*** ***#4 (B136) No. 3 — Chassis ground:*** ***#5 (B136) No. 2 — Chassis ground:*** ***#6 (B136) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and fuel injector connector.
5	**CHECK EACH FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between each fuel injector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector.
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Inspection using “General Diagnostics Table”. <Ref. to EN(H6DO)(diag)-265, INSPECTION, General Diagnostic Table.>

17.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Reference
P0011	“A” Camshaft Position-Timing Over-Advanced or System Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-72, DTC P0011 “A” CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0021	“A” Camshaft Position-Timing Over-Advanced or System Performance (Bank 2)	<Ref. to EN(H6DO)(diag)-73, DTC P0021 “A” CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-74, DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-76, DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-79, DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0037	HO2S Heater Control Circuit Low (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-81, DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0038	HO2S Heater Control Circuit High (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-84, DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0050	HO2S Heater Control Circuit (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-86, DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0051	HO2S Heater Control Circuit Low (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-88, DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0052	HO2S Heater Control Circuit High (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-91, DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0057	HO2S Heater Control Circuit Low (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-93, DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0058	HO2S Heater Control Circuit High (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-96, DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0076	Intake Valve Control Solenoid Circuit Low (Bank 1)	<Ref. to EN(H6DO)(diag)-98, DTC P0076 INTAKE VALVE CONTROL SOLENOID CIRCUIT LOW (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0077	Intake Valve Control Solenoid Circuit High (Bank 1)	<Ref. to EN(H6DO)(diag)-100, DTC P0077 INTAKE VALVE CONTROL SOLENOID CIRCUIT HIGH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0082	Intake Valve Control Solenoid Circuit Low (Bank 2)	<Ref. to EN(H6DO)(diag)-102, DTC P0082 INTAKE VALVE CONTROL SOLENOID CIRCUIT LOW (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0083	Intake Valve Control Solenoid Circuit High (Bank 2)	<Ref. to EN(H6DO)(diag)-104, DTC P0083 INTAKE VALVE CONTROL SOLENOID CIRCUIT HIGH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0101	Mass or Volume Air Flow Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-106, DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0102	Mass or Volume Air Flow Circuit Low Input	<Ref. to EN(H6DO)(diag)-108, DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0103	Mass or Volume Air Flow Circuit High Input	<Ref. to EN(H6DO)(diag)-111, DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0107	Manifold Absolute Pressure/Barometric Pressure Circuit Low Input	<Ref. to EN(H6DO)(diag)-113, DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0108	Manifold Absolute Pressure/Barometric Pressure Circuit High Input	<Ref. to EN(H6DO)(diag)-116, DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0112	Intake Air Temperature Circuit Low Input	<Ref. to EN(H6DO)(diag)-119, DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0113	Intake Air Temperature Circuit High Input	<Ref. to EN(H6DO)(diag)-121, DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0117	Engine Coolant Temperature Circuit Low Input	<Ref. to EN(H6DO)(diag)-124, DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0118	Engine Coolant Temperature Circuit High Input	<Ref. to EN(H6DO)(diag)-126, DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0122	Throttle/Pedal Position Sensor/ Switch “A” Circuit Low Input	<Ref. to EN(H6DO)(diag)-129, DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0123	Throttle/Pedal Position Sensor/ Switch “A” Circuit High Input	<Ref. to EN(H6DO)(diag)-131, DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0125	Insufficient Coolant Temperature For Closed Loop Fuel Control	<Ref. to EN(H6DO)(diag)-133, DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0131	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-134, DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0132	O2 Sensor Circuit High Voltage (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-136, DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-138, DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0134	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	<Ref. to EN(H6DO)(diag)-140, DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0137	O2 Sensor Circuit Low Voltage (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-143, DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0138	O2 Sensor Circuit High Voltage (Bank 1 Sensor 2)	<Ref. to EN(H6DO)(diag)-146, DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0151	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-149, DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0152	O2 Sensor Circuit High Voltage (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-151, DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0153	O2 Sensor Circuit Slow Response (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-153, DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Reference
P0154	O2 Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	<Ref. to EN(H6DO)(diag)-155, DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0157	O2 Sensor Circuit Low Voltage (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-158, DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0158	O2 Sensor Circuit High Voltage (Bank 2 Sensor 2)	<Ref. to EN(H6DO)(diag)-161, DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0171	System Too Lean (Bank 1)	<Ref. to EN(H6DO)(diag)-163, DTC P0171 SYSTEM TOO LEAN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0172	System Too Rich (Bank 1)	<Ref. to EN(H6DO)(diag)-163, DTC P0172 SYSTEM TOO RICH (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0174	System Too Lean (Bank 2)	<Ref. to EN(H6DO)(diag)-163, DTC P0174 SYSTEM TOO LEAN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0175	System Too Rich (Bank 2)	<Ref. to EN(H6DO)(diag)-164, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0197	Engine Oil Temperature Sensor Circuit Low	<Ref. to EN(H6DO)(diag)-166, DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0198	Engine Oil Temperature Sensor Circuit High	<Ref. to EN(H6DO)(diag)-168, DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0222	Throttle/Pedal Position Sensor/ Switch “B” Circuit Low Input	<Ref. to EN(H6DO)(diag)-170, DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0223	Throttle/Pedal Position Sensor/ Switch “B” Circuit High Input	<Ref. to EN(H6DO)(diag)-172, DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH “B” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0230	Fuel Pump Primary Circuit	<Ref. to EN(H6DO)(diag)-174, DTC P0230 FUEL PUMP PRIMARY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0301	Cylinder 1 Misfire Detected	<Ref. to EN(H6DO)(diag)-177, DTC P0301 CYLINDER 1 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0302	Cylinder 2 Misfire Detected	<Ref. to EN(H6DO)(diag)-177, DTC P0302 CYLINDER 2 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0303	Cylinder 3 Misfire Detected	<Ref. to EN(H6DO)(diag)-177, DTC P0303 CYLINDER 3 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0304	Cylinder 4 Misfire Detected	<Ref. to EN(H6DO)(diag)-177, DTC P0304 CYLINDER 4 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0305	Cylinder 5 Misfire Detected	<Ref. to EN(H6DO)(diag)-177, DTC P0305 CYLINDER 5 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0306	Cylinder 6 Misfire Detected	<Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0327	Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-185, DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0328	Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-187, DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0332	Knock Sensor 2 Circuit Low Input (Bank 2)	<Ref. to EN(H6DO)(diag)-189, DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0333	Knock Sensor 2 Circuit High Input (Bank 2)	<Ref. to EN(H6DO)(diag)-191, DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P0335	Crankshaft Position Sensor “A” Circuit	<Ref. to EN(H6DO)(diag)-193, DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0340	Camshaft Position Sensor “A” Circuit (Bank 1 or Single Sensor)	<Ref. to EN(H6DO)(diag)-195, DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0345	Camshaft Position Sensor “A” Circuit (Bank 2)	<Ref. to EN(H6DO)(diag)-197, DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0400	Exhaust Gas Recirculation Flow	<Ref. to EN(H6DO)(diag)-199, DTC P0400 EXHAUST GAS RECIRCULATION FLOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	<Ref. to EN(H6DO)(diag)-202, DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0458	Evaporative Emission Control System Purge Control Valve Circuit Low	<Ref. to EN(H6DO)(diag)-203, DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0459	Evaporative Emission Control System Purge Control Valve Circuit High	<Ref. to EN(H6DO)(diag)-205, DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0462	Fuel Level Sensor Circuit Low Input	<Ref. to EN(H6DO)(diag)-207, DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0463	Fuel Level Sensor Circuit High Input	<Ref. to EN(H6DO)(diag)-207, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0500	Vehicle Speed Sensor	<Ref. to EN(H6DO)(diag)-207, DTC P0500 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0512	Starter Request Circuit	<Ref. to EN(H6DO)(diag)-208, DTC P0512 STARTER REQUEST CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0519	Idle Control System Malfunction (Fail-Safe)	<Ref. to EN(H6DO)(diag)-211, DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0558	Alternator Circuit Low	<Ref. to EN(H6DO)(diag)-211, DTC P0558 ALTERNATOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0559	Alternator Circuit High	<Ref. to EN(H6DO)(diag)-212, DTC P0559 ALTERNATOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0600	Serial Communication Link	<Ref. to EN(H6DO)(diag)-213, DTC P0600 SERIAL COMMUNICATION LINK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0604	Internal Control Module Random Access Memory (RAM) Error	<Ref. to EN(H6DO)(diag)-214, DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0605	Internal Control Module Read Only Memory (ROM) Error	<Ref. to EN(H6DO)(diag)-215, DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0607	Control Module Performance	<Ref. to EN(H6DO)(diag)-216, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0638	Throttle Actuator Control Range/Performance (Bank 1)	<Ref. to EN(H6DO)(diag)-217, DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0691	Cooling Fan 1 Control Circuit Low	<Ref. to EN(H6DO)(diag)-218, DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0692	Cooling Fan 1 Control Circuit High	<Ref. to EN(H6DO)(diag)-218, DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Item	Reference
P0700	Transmission Control System (MIL Request)	<Ref. to EN(H6DO)(diag)-218, DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1026	VVL System 1 Performance	<Ref. to EN(H6DO)(diag)-219, DTC P1026 VVL SYSTEM 1 PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1028	VVL System 2 Performance	<Ref. to EN(H6DO)(diag)-221, DTC P1028 VVL SYSTEM 2 PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1160	Return Spring Failure	<Ref. to EN(H6DO)(diag)-223, DTC P1160 RETURN SPRING FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1492	EGR Solenoid Valve Signal #1 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1493	EGR Solenoid Valve Signal #1 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1494	EGR Solenoid Valve Signal #2 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1495	EGR Solenoid Valve Signal #2 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1496	EGR Solenoid Valve Signal #3 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1497	EGR Solenoid Valve Signal #3 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-223, DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1498	EGR Solenoid Valve Signal #4 Circuit Malfunction (Low Input)	<Ref. to EN(H6DO)(diag)-224, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1499	EGR Solenoid Valve Signal #4 Circuit Malfunction (High Input)	<Ref. to EN(H6DO)(diag)-226, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1518	Starter Switch Circuit Low Input	<Ref. to EN(H6DO)(diag)-228, DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1560	Back-Up Voltage Circuit Malfunction	<Ref. to EN(H6DO)(diag)-231, DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2088	OCV Solenoid Valve Signal A Circuit Open (Bank 1)	<Ref. to EN(H6DO)(diag)-233, DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2089	OCV Solenoid Valve Signal A Circuit Short (Bank 1)	<Ref. to EN(H6DO)(diag)-235, DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2092	OCV Solenoid Valve Signal A Circuit Open (Bank 2)	<Ref. to EN(H6DO)(diag)-237, DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2093	OCV Solenoid Valve Signal A Circuit Short (Bank 2)	<Ref. to EN(H6DO)(diag)-239, DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2101	Throttle Actuator Control Motor Circuit Range/Performance	<Ref. to EN(H6DO)(diag)-241, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2102	Throttle Actuator Control Motor Circuit Low	<Ref. to EN(H6DO)(diag)-246, DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Reference
P2103	Throttle Actuator Control Motor Circuit High	<Ref. to EN(H6DO)(diag)-248, DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2109	Throttle Angle Sensor Closed Position Error	<Ref. to EN(H6DO)(diag)-249, DTC P2109 THROTTLE ANGLE SENSOR CLOSED POSITION ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2122	Throttle/Pedal Position Sensor/ Switch “D” Circuit Low Input	<Ref. to EN(H6DO)(diag)-250, DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2123	Throttle/Pedal Position Sensor/ Switch “D” Circuit High Input	<Ref. to EN(H6DO)(diag)-252, DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2127	Throttle/Pedal Position Sensor/ Switch “E” Circuit Low Input	<Ref. to EN(H6DO)(diag)-254, DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2128	Throttle/Pedal Position Sensor/ Switch “E” Circuit High Input	<Ref. to EN(H6DO)(diag)-256, DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH “E” CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2135	Throttle/Pedal Position Sensor/ Switch “A”/“B” Voltage Rationality	<Ref. to EN(H6DO)(diag)-258, DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH “A” / “B” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P2138	Throttle/Pedal Position Sensor/ Switch “D”/“E” Voltage Rationality	<Ref. to EN(H6DO)(diag)-261, DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH “D” / “E” VOLTAGE RATIONALITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

ENGINE SECTION 3

FUEL INJECTION (FUEL SYSTEMS)	FU(H6DO)
EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)	EC(H6DO)
INTAKE (INDUCTION)	IN(H6DO)
MECHANICAL	ME(H6DO)
EXHAUST	EX(H6DO)
COOLING	CO(H6DO)
LUBRICATION	LU(H6DO)
SPEED CONTROL SYSTEMS	SP(H6DO)
IGNITION	IG(H6DO)
STARTING/CHARGING SYSTEMS	SC(H6DO)
ENGINE (DIAGNOSTICS)	EN(H6DO)(diag)

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE4

ENGINE (DIAGNOSTICS)

EN(H6DO)(diag)

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18.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0011 “A” CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 1)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Measure the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following and repair or replace if necessary. • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.

B: DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE (BANK 2)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine and let it idle. 2) Measure the AVCS system operating angle and oil flow control solenoid valve duty output using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the AVCS system operating angle approx. 0 deg., and oil flow control solenoid valve duty output approx. 10%?	Check the following and repair or replace if necessary. • Engine oil (amount, dirt) • Oil pipe (clog) • Oil flow control solenoid valve (clog or dirt of oil routing, setting of spring, clog of valve) • Intake camshaft (dirt, damage of camshaft) • Timing chain (matching of timing mark)	A temporary malfunction. Perform the following, and clean the oil routing. Replace the engine oil and idle the engine for 5 minutes, and then replace the oil filter and engine oil.

C: DTC P0030 HO2S HEATER CONTROL CIRCUIT (BANK 1 SENSOR 1)

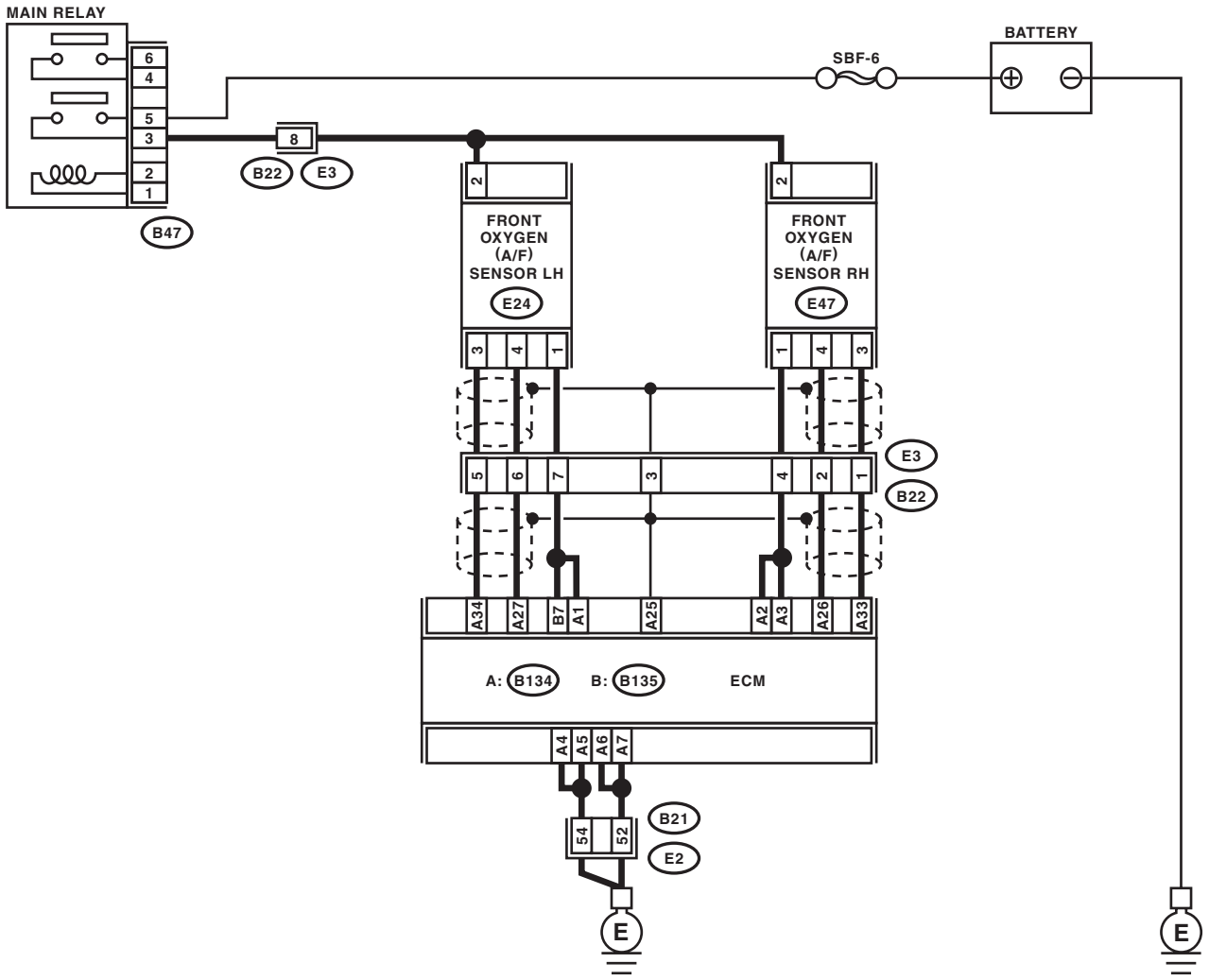
DTC DETECTING CONDITION:

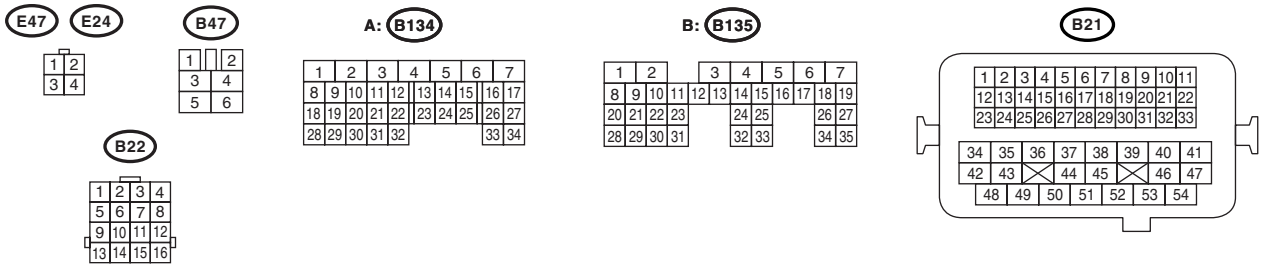
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 2 — (E47) No. 1:*** ***(B134) No. 3 — (E47) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E47) No. 4:*** ***(B134) No. 33 — (E47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 3 — (E47) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between main relay and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

D: DTC P0031 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 1)

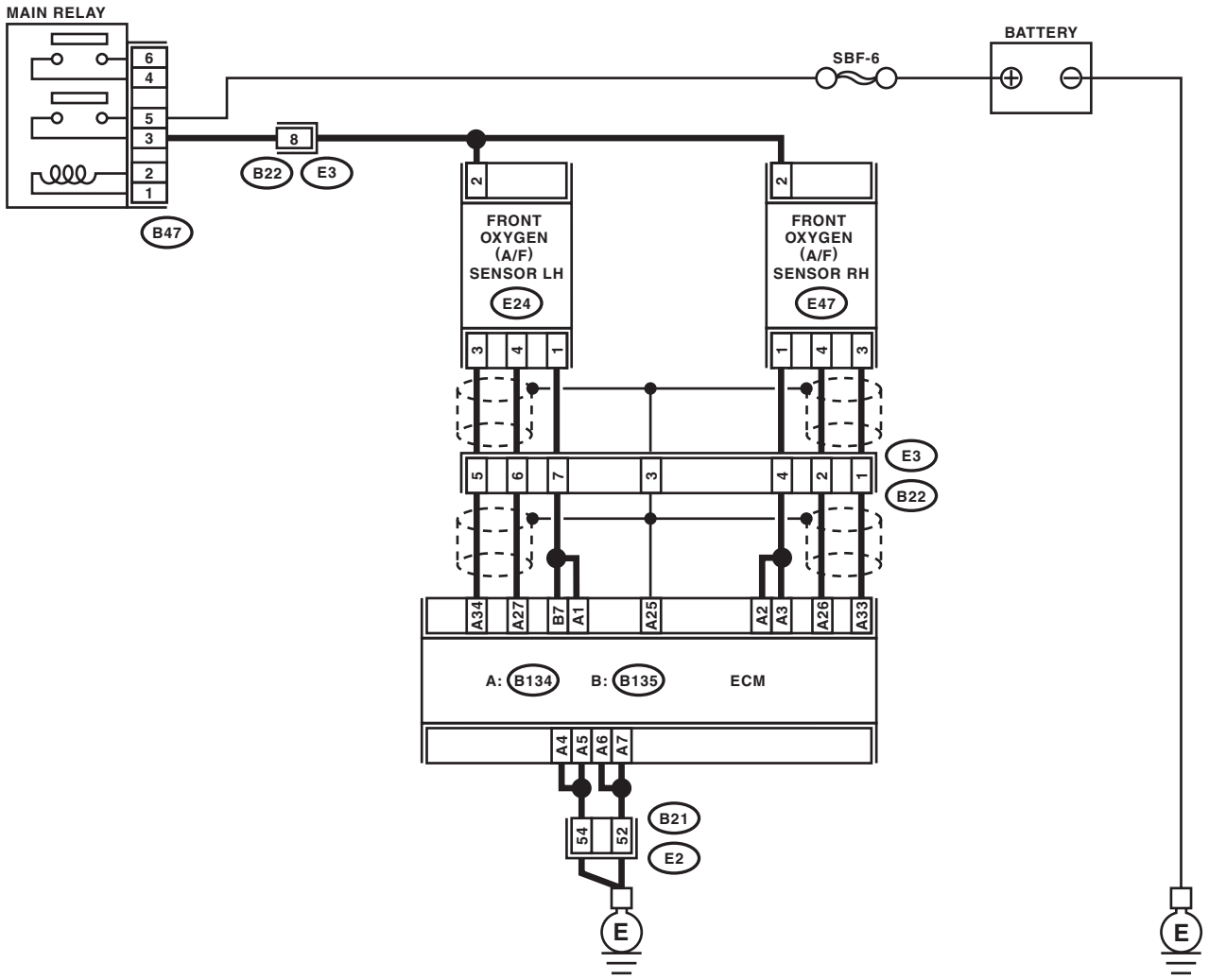
DTC DETECTING CONDITION:

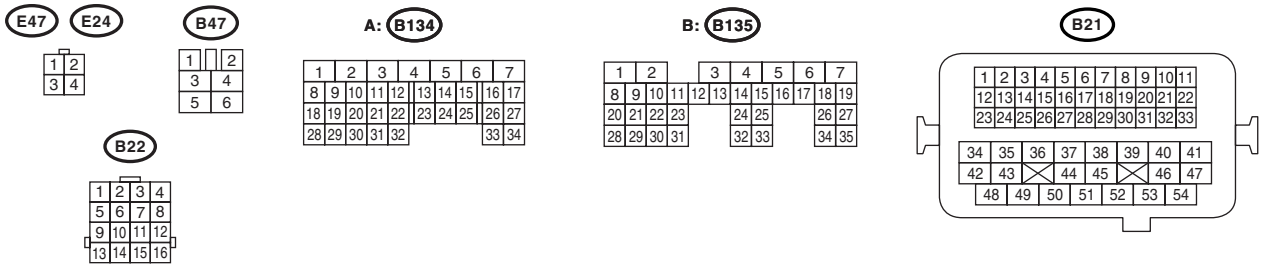
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E47) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 0.2 A?	Repair the poor contact in connector. NOTE: In this case repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in coupling connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (–):*** ***(B134) No. 3 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (–):*** ***(B134) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

E: DTC P0032 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 1)

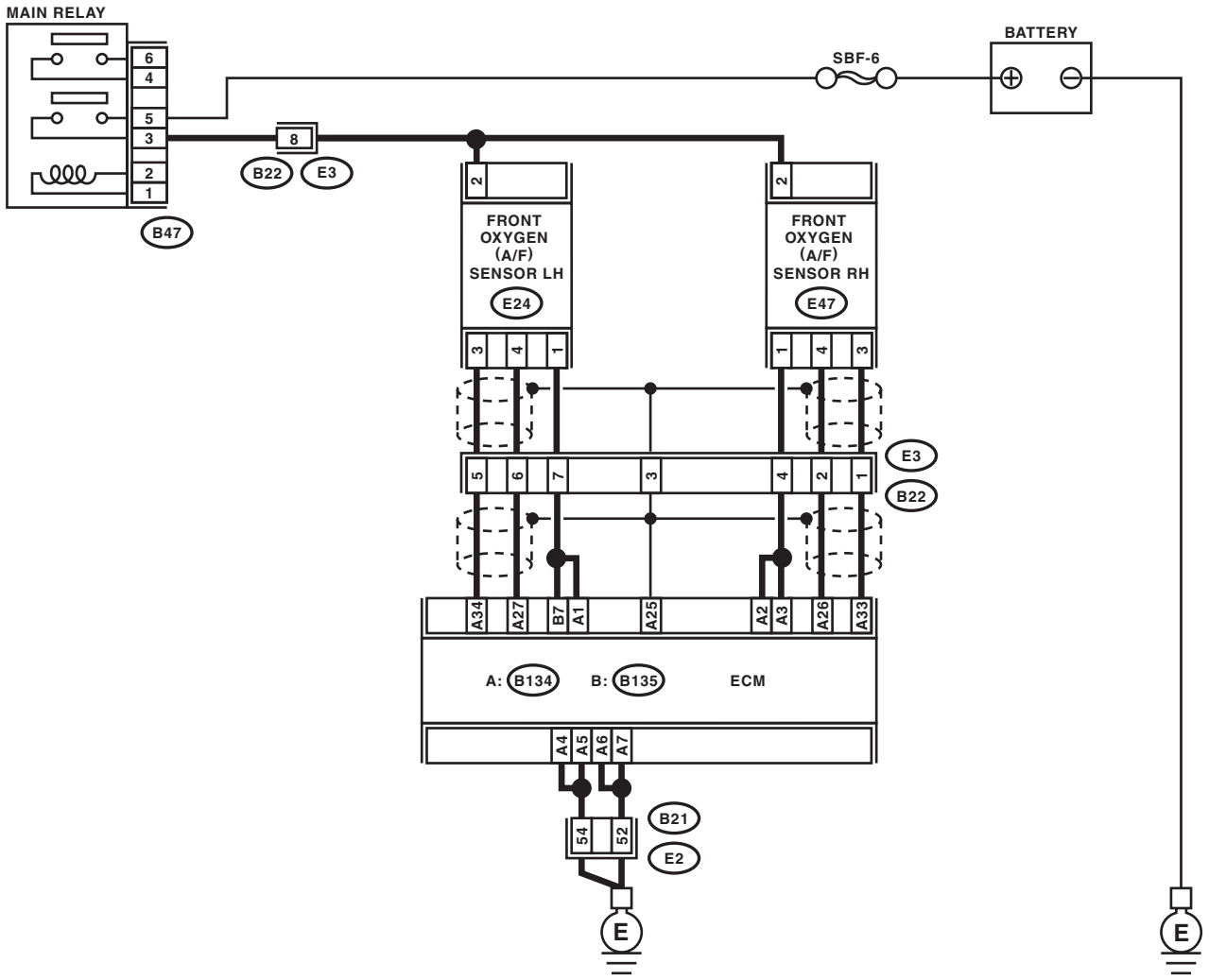
DTC DETECTING CONDITION:

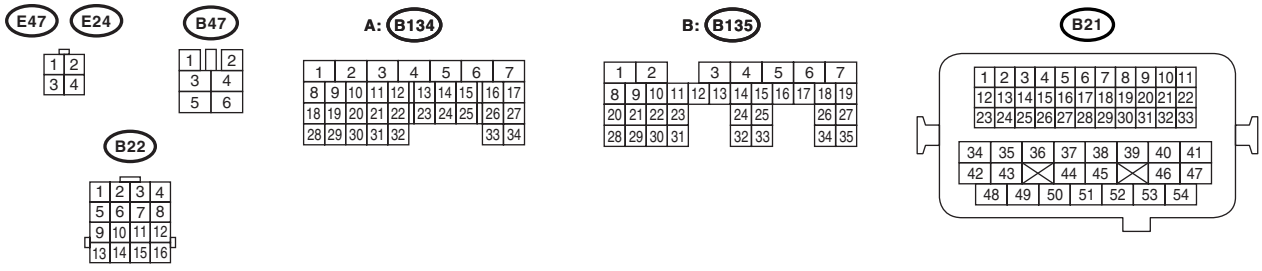
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (–):*** ***(B134) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	END.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 2 (+) — Chassis ground (–):*** ***(B134) No. 3 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END.

F: DTC P0037 HO2S HEATER CONTROL CIRCUIT LOW (BANK 1 SENSOR 2)

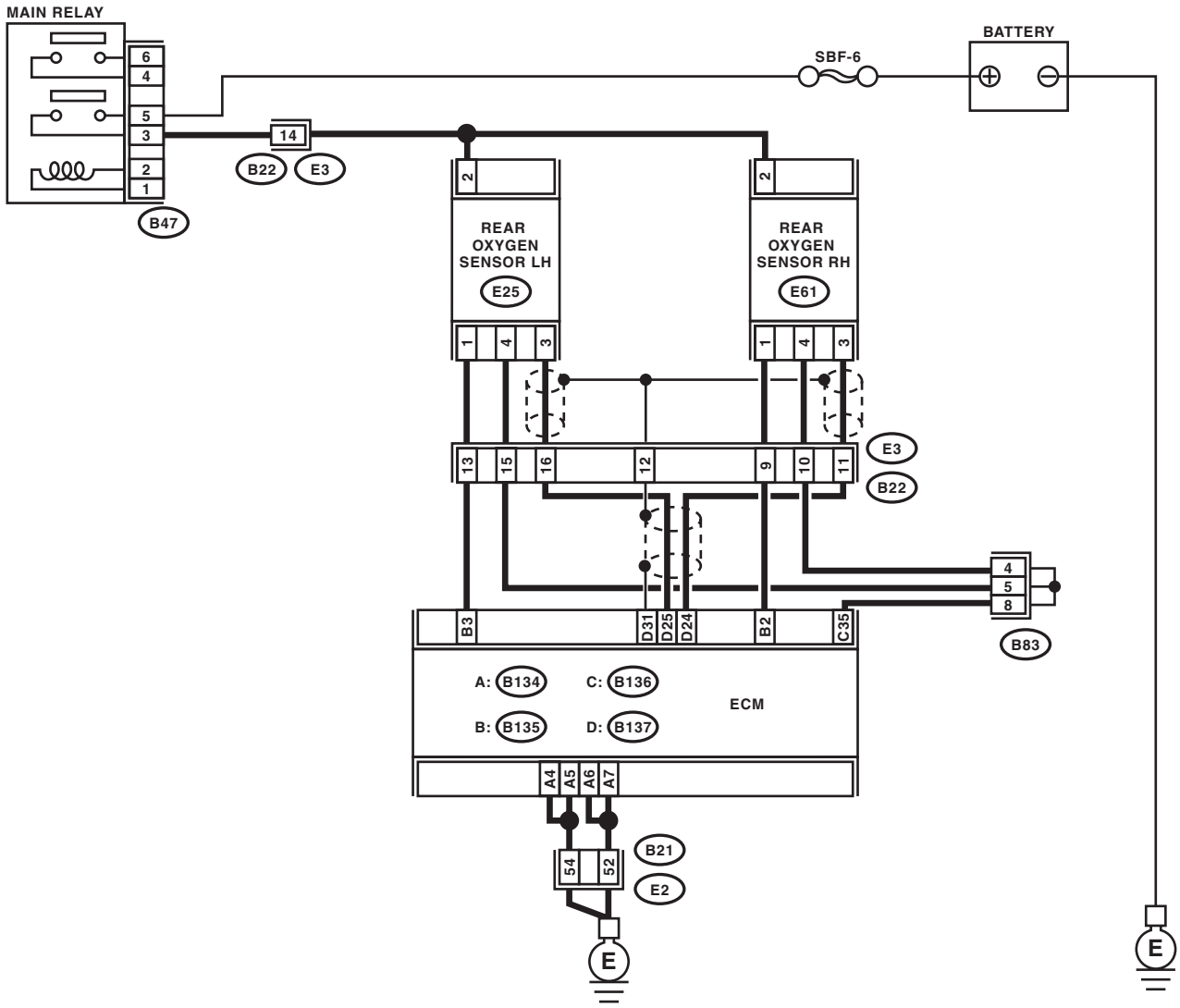
DTC DETECTING CONDITION:

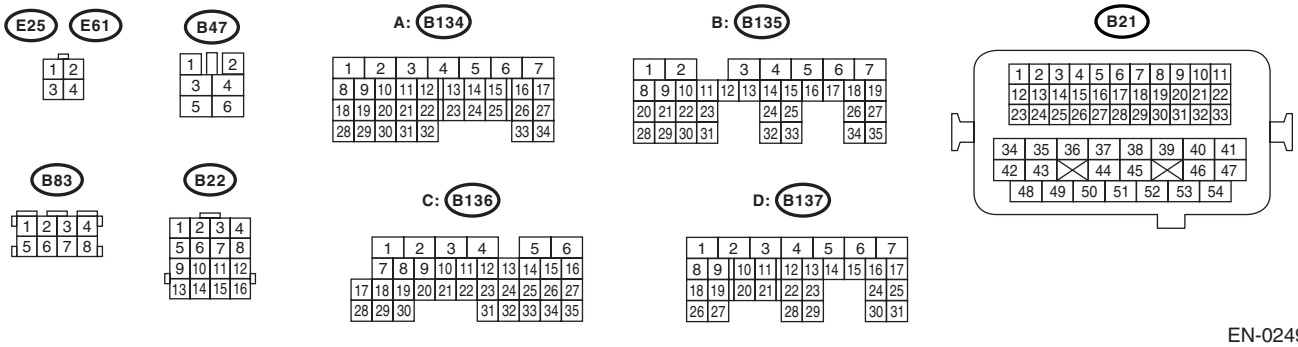
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E61) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

G: DTC P0038 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 1 SENSOR 2)

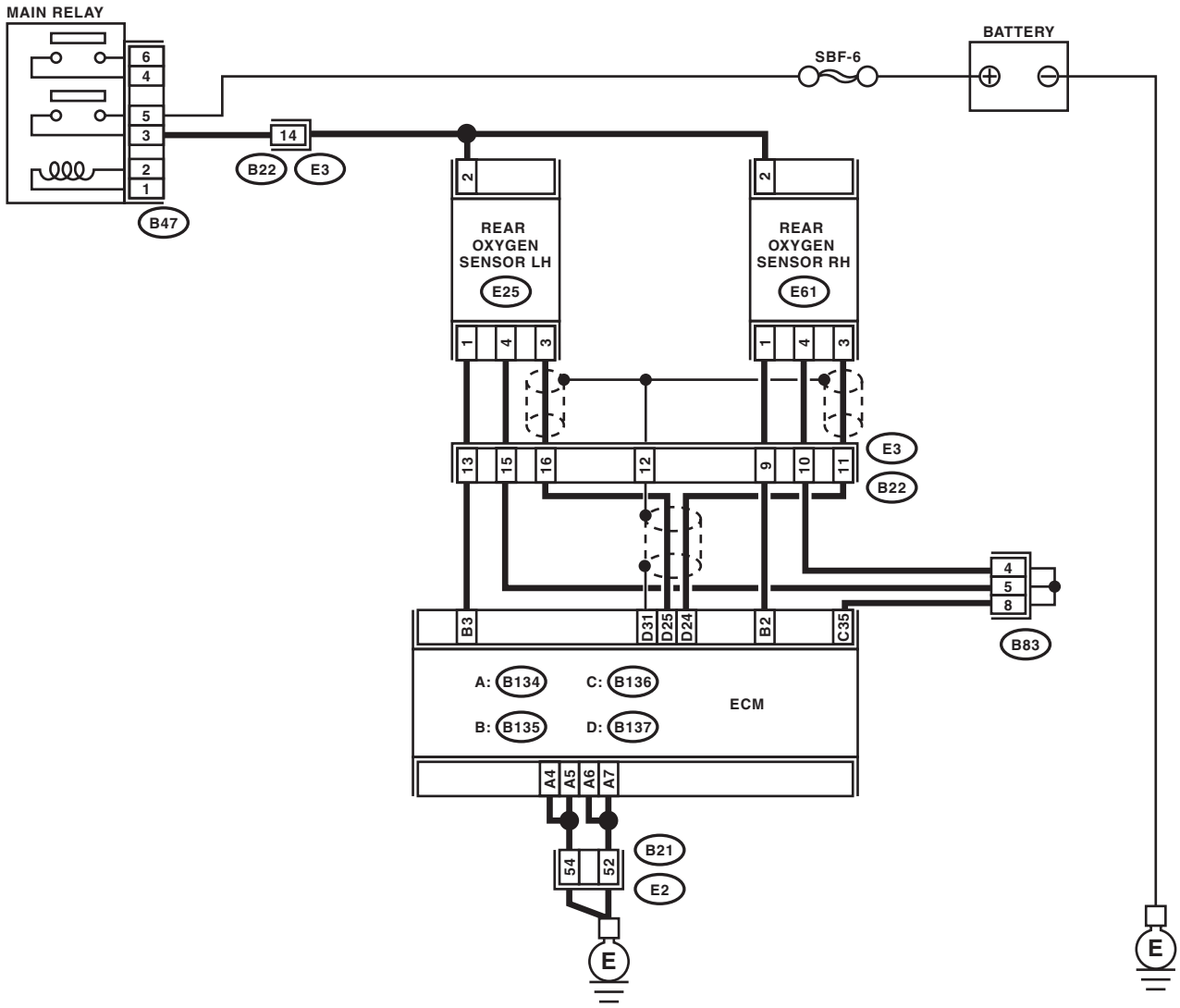
DTC DETECTING CONDITION:

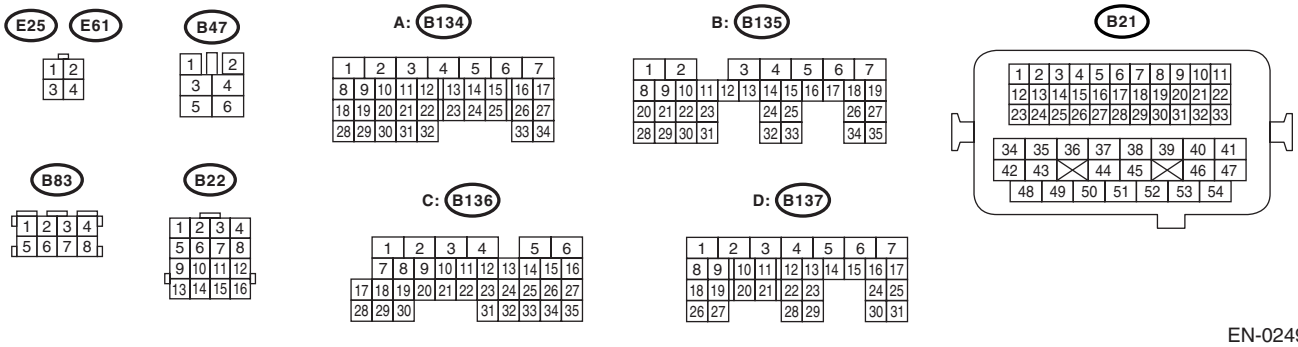
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	END.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	END.

H: DTC P0050 HO2S HEATER CONTROL CIRCUIT (BANK 2 SENSOR 1)

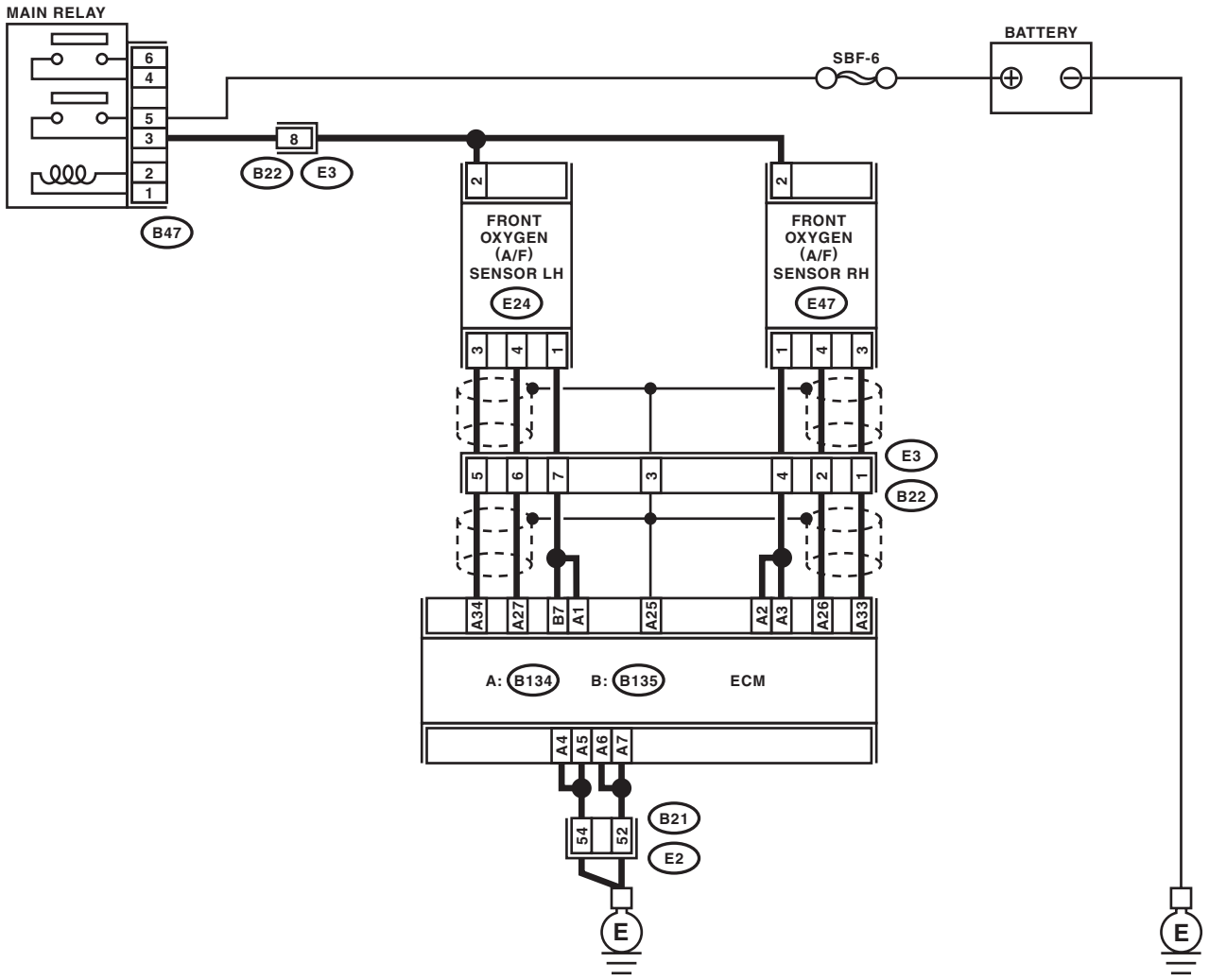
DTC DETECTING CONDITION:

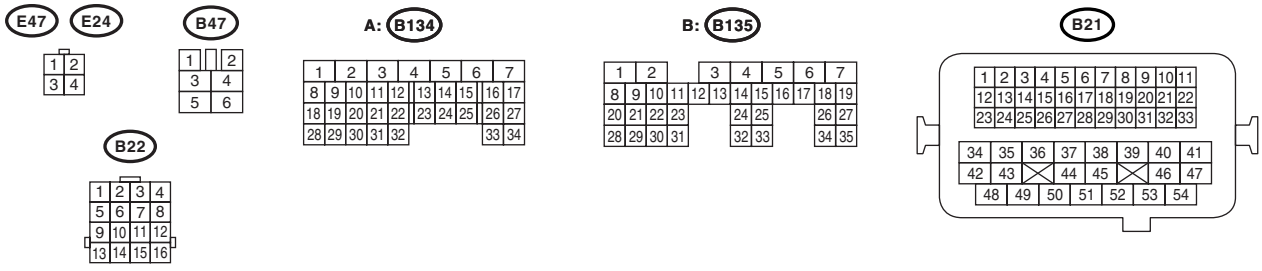
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Start the engine, and warm-up the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connector from ECM and front oxygen (A/F) sensor. 4) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 1 — (E24) No. 1:*** ***(B135) No. 7 — (E24) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
2	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — (E24) No. 4:*** ***(B134) No. 34 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM and front oxygen (A/F) sensor connector.
3	**CHECK HARNESS BETWEEN MAIN RELAY AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** Measure the resistance of harness between main relay and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B47) No. 3 — (E24) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between main relay and front oxygen (A/F) sensor connector.
4	**CHECK FRONT OXYGEN (A/F) SENSOR.** Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 5 Ω?	Go to step **5.**	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>
5	**CHECK POOR CONTACT.** Check poor contact in ECM and front oxygen (A/F) sensor connector.	Is there poor contact in ECM or front oxygen (A/F) sensor connector?	Repair the poor contact in ECM or front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

I: DTC P0051 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 1)

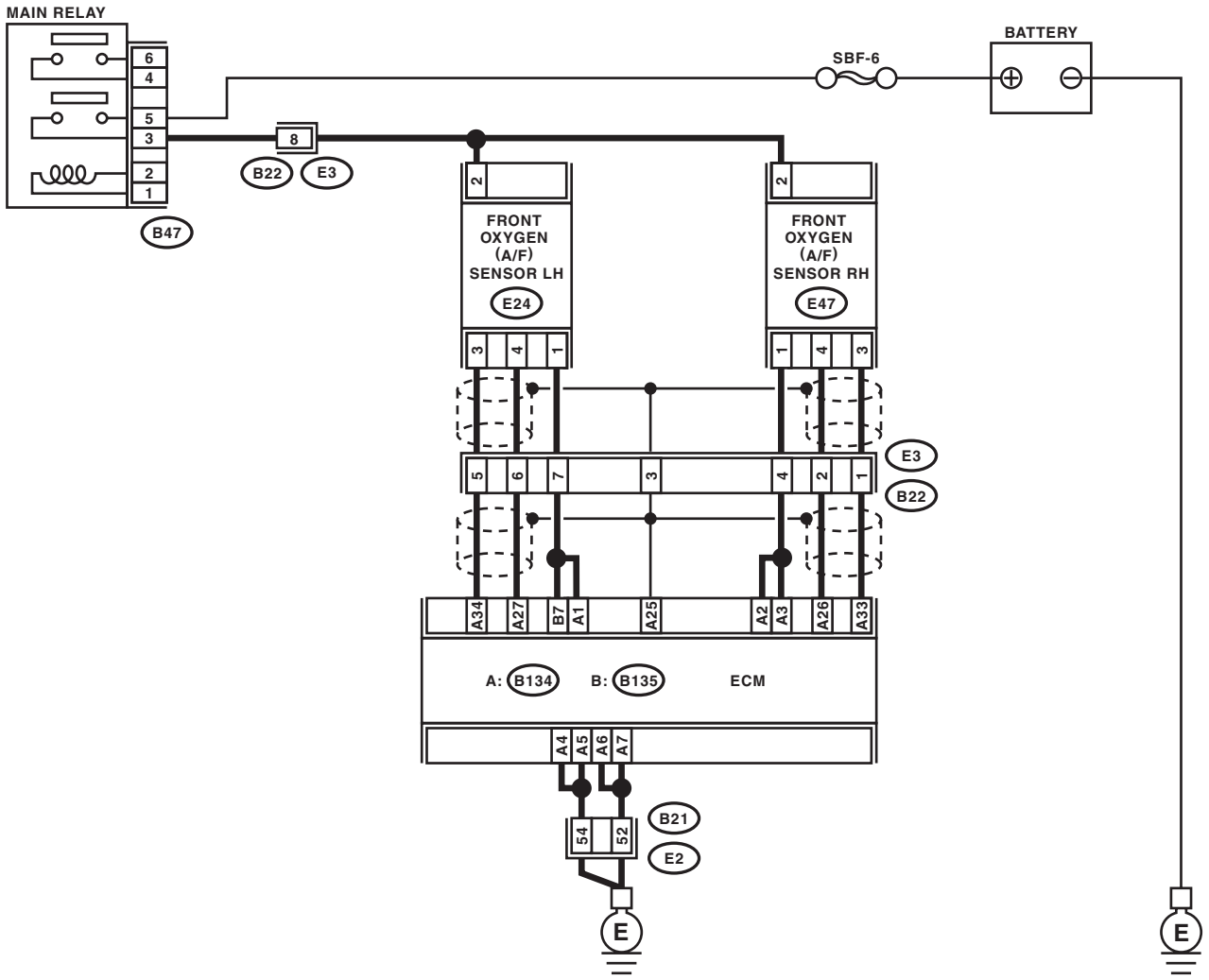
DTC DETECTING CONDITION:

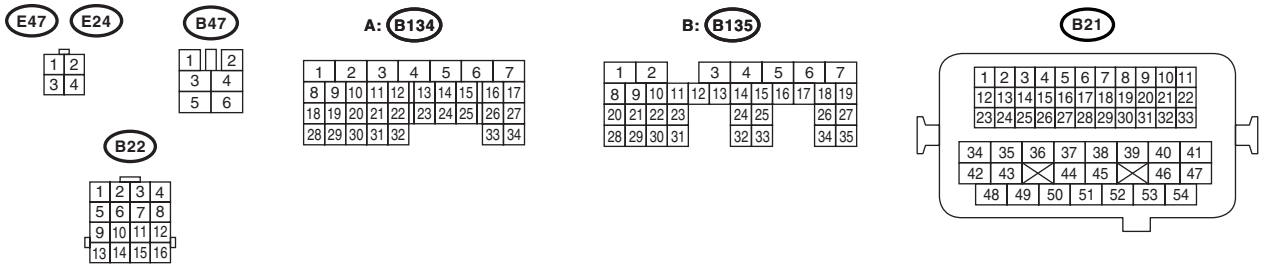
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between front oxygen (A/F) sensor connector and engine ground. ***Connector & terminal*** ***(E24) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case repair the following: • Open circuit in harness between main relay and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in main relay connector
2	**CHECK GROUND CIRCUIT FOR ECM.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 0.2 A?	Repair the poor contact connector. NOTE: In this case repair the following: • Poor contact in front oxygen (A/F) sensor connector • Poor contact in coupling connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **6.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (–):*** ***(B135) No. 7 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK FRONT OXYGEN (A/F) SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between front oxygen (A/F) sensor connector terminals. ***Terminals*** ***No. 2 — No. 1:***	Is the resistance less than 10 Ω?	Repair the harness and connector. NOTE: In this case repair the following: • Open or ground short circuit in harness between front oxygen (A/F) sensor and ECM connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

J: DTC P0052 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 1)

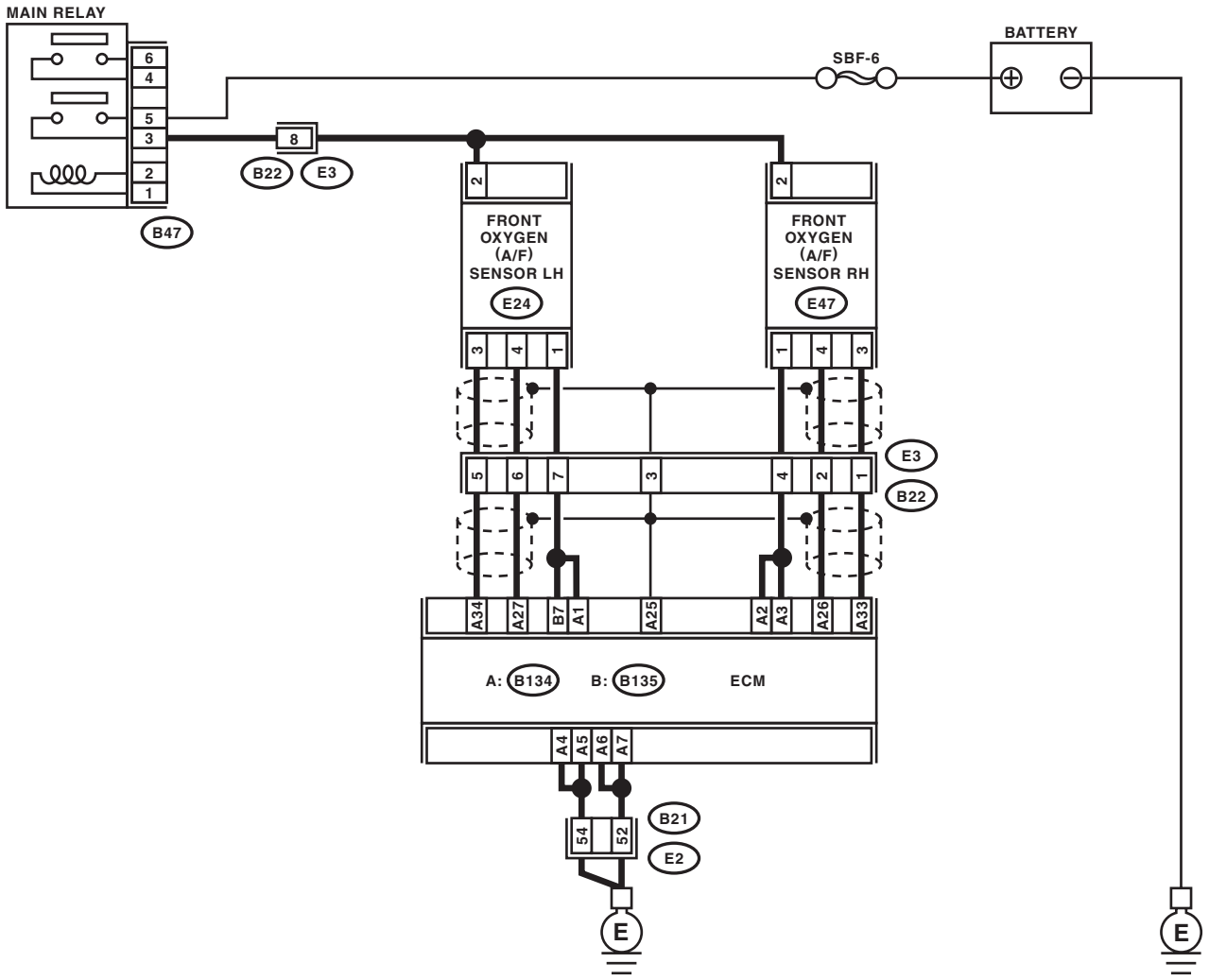
DTC DETECTING CONDITION:

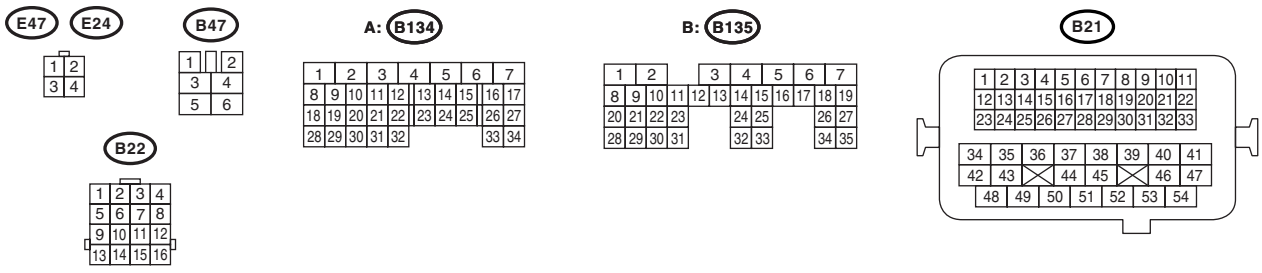
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK FRONT OXYGEN (A/F) SENSOR HEATER CURRENT.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of front oxygen (A/F) sensor heater current using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the current more than 2.3 A?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	END.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 1 (+) — Chassis ground (−):*** ***(B135) No. 7 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector?	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.	END.

K: DTC P0057 HO2S HEATER CONTROL CIRCUIT LOW (BANK 2 SENSOR 2)

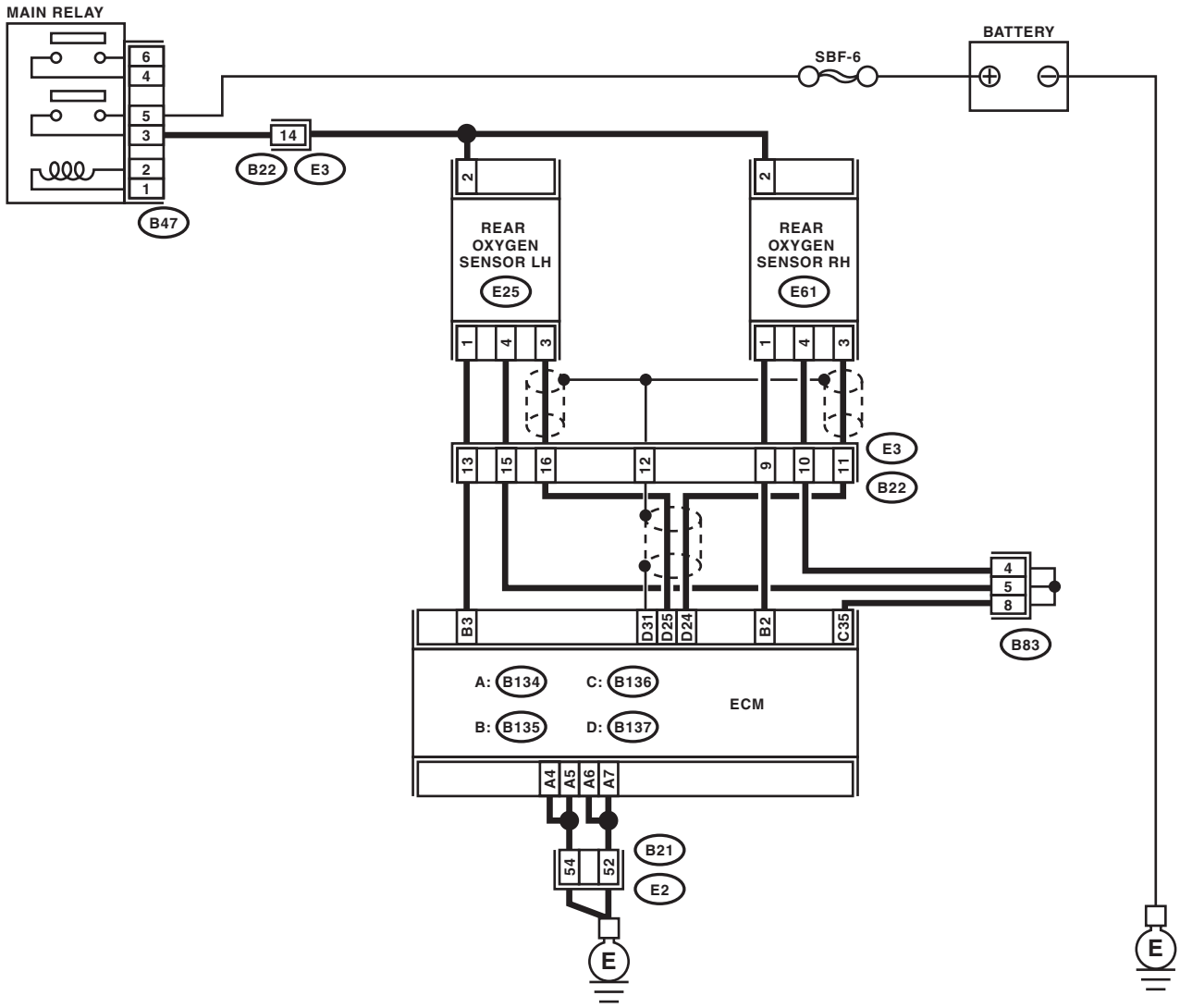
DTC DETECTING CONDITION:

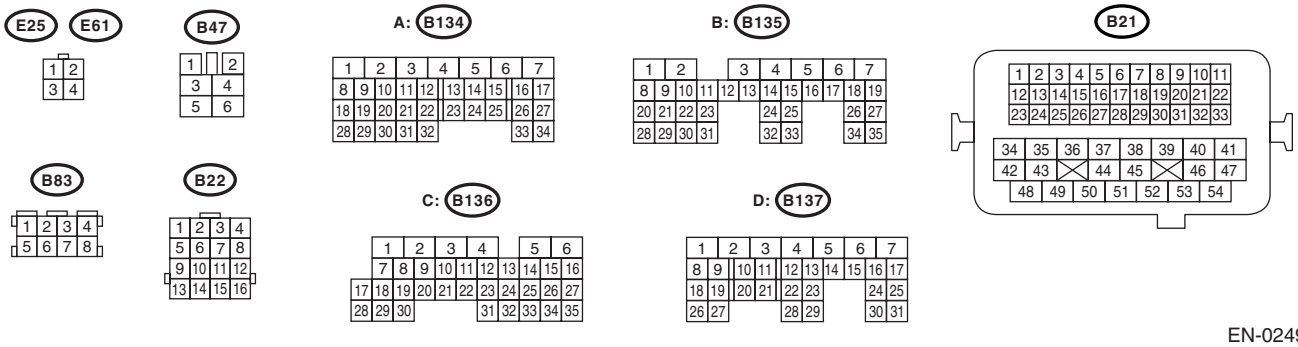
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor connector and chassis ground. ***Connector & terminal*** ***(E25) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply line. NOTE: In this case repair the following: • Open circuit in harness between main relay and rear oxygen sensor connector • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 4 — Chassis ground:*** ***(B134) No. 5 — Chassis ground:*** ***(B134) No. 6 — Chassis ground:*** ***(B134) No. 7 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine ground terminal • Poor contact in ECM connector • Poor contact in coupling connector
3	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 0.2 A?	Repair the connector. NOTE: In this case repair the following: • Poor contact in rear oxygen sensor connector • Poor contact in coupling connector • Poor contact in ECM connector	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Start and idle the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Go to step **5.**
5	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Does the voltage change by shaking the ECM harness and connector while monitoring the value of voltage meter?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Disconnect the connector from rear oxygen sensor. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. After repair, replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
7	**CHECK REAR OXYGEN SENSOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between rear oxygen sensor connector terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 30 Ω?	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

L: DTC P0058 HO2S HEATER CONTROL CIRCUIT HIGH (BANK 2 SENSOR 2)

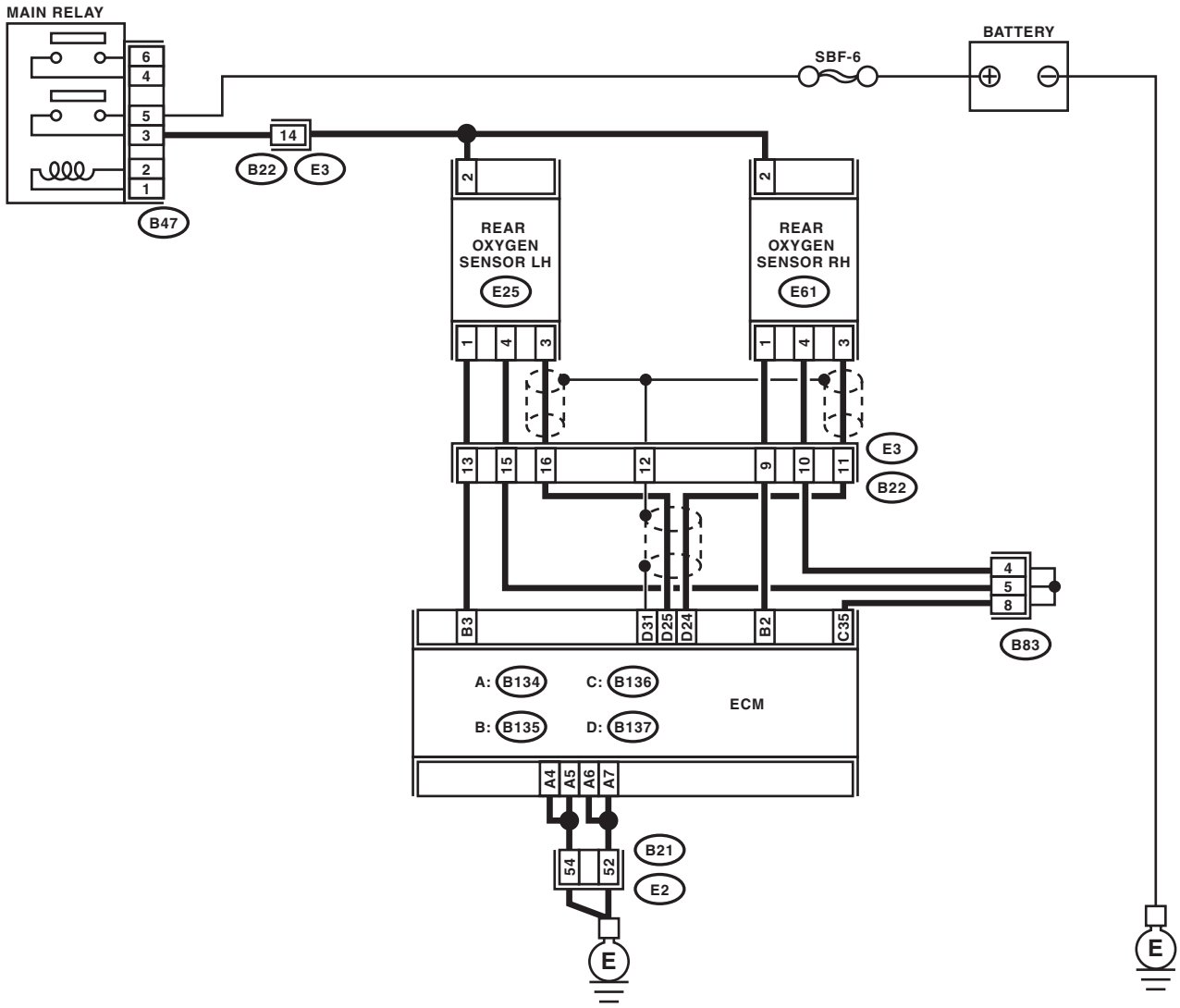
DTC DETECTING CONDITION:

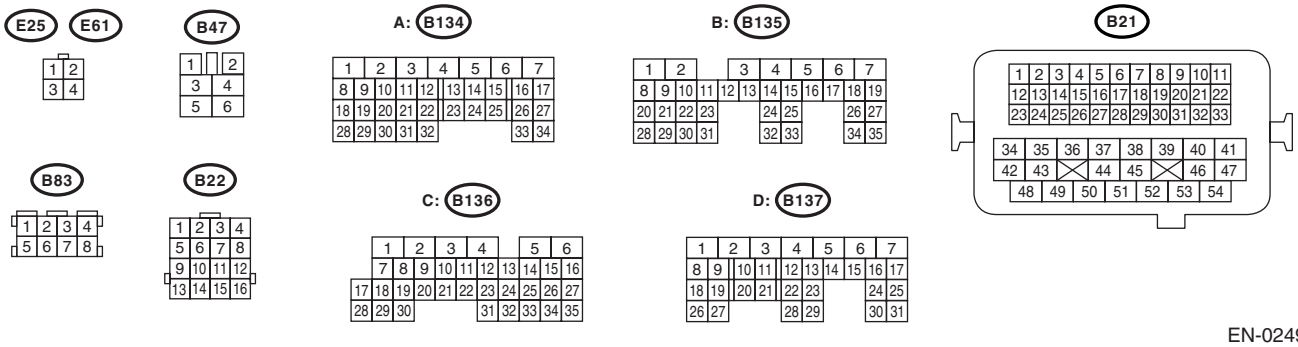
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK CURRENT DATA.** 1) Turn the ignition switch to OFF. 2) Repair the battery short circuit in harness between ECM and rear oxygen sensor connector. 3) Turn the ignition switch to ON. 4) Read the data of rear oxygen sensor heater current using Subaru Select Monitor or the OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the current more than 7 A?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	END.
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	END.

M: DTC P0076 INTAKE VALVE CONTROL SOLENOID CIRCUIT LOW (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

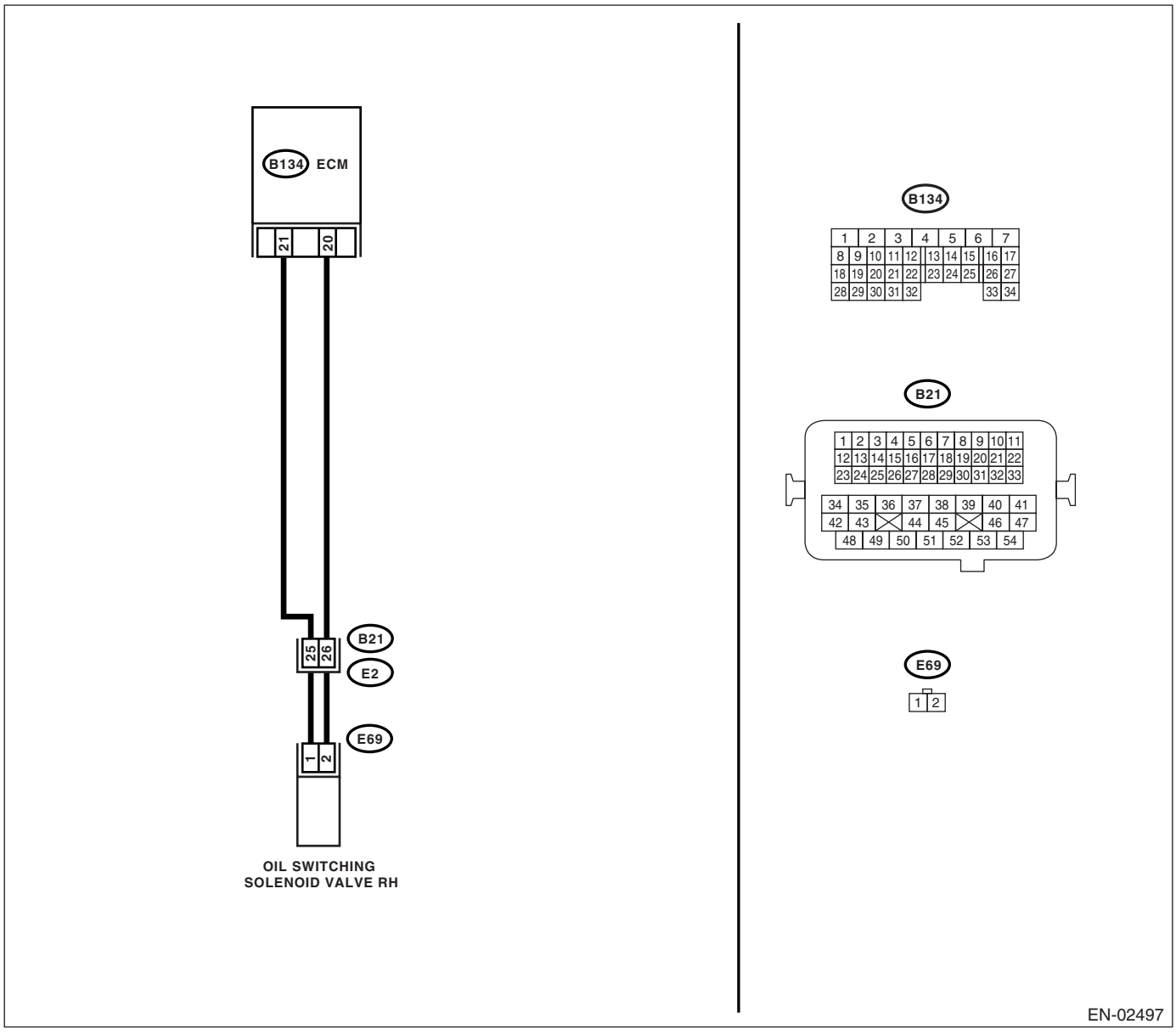
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between ECM and oil switching solenoid valve. ***Connector & terminal*** ***(B134) No. 21 — (E69) No. 1:*** ***(B134) No. 20 — (E69) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil switching solenoid valve connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil switching solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

N: DTC P0077 INTAKE VALVE CONTROL SOLENOID CIRCUIT HIGH (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

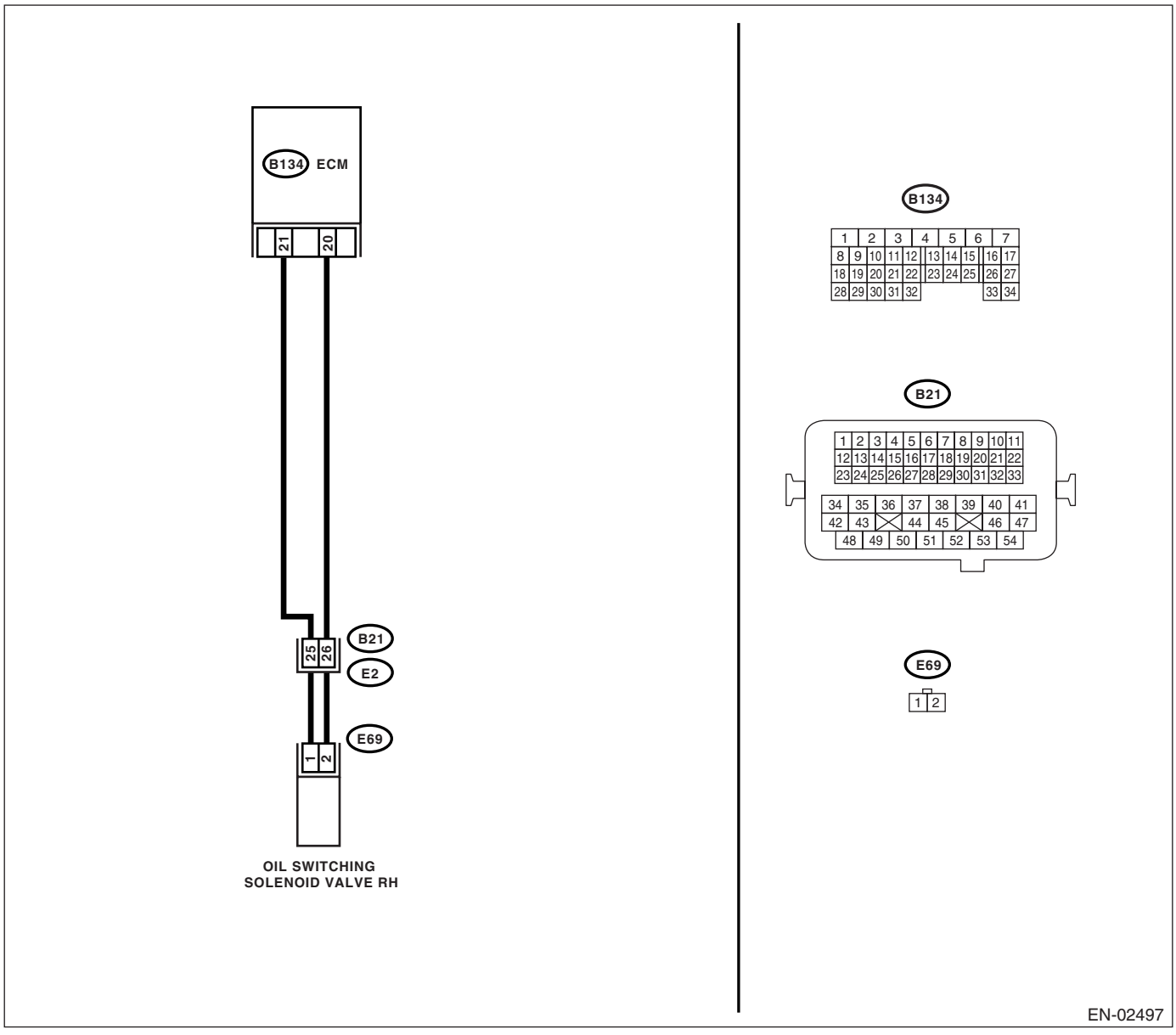
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between oil switching solenoid valve and engine ground. ***Connector & terminal*** ***(E69) No. 1 — Engine ground:*** ***(E69) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil switching solenoid valve connector.
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

O: DTC P0082 INTAKE VALVE CONTROL SOLENOID CIRCUIT LOW (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

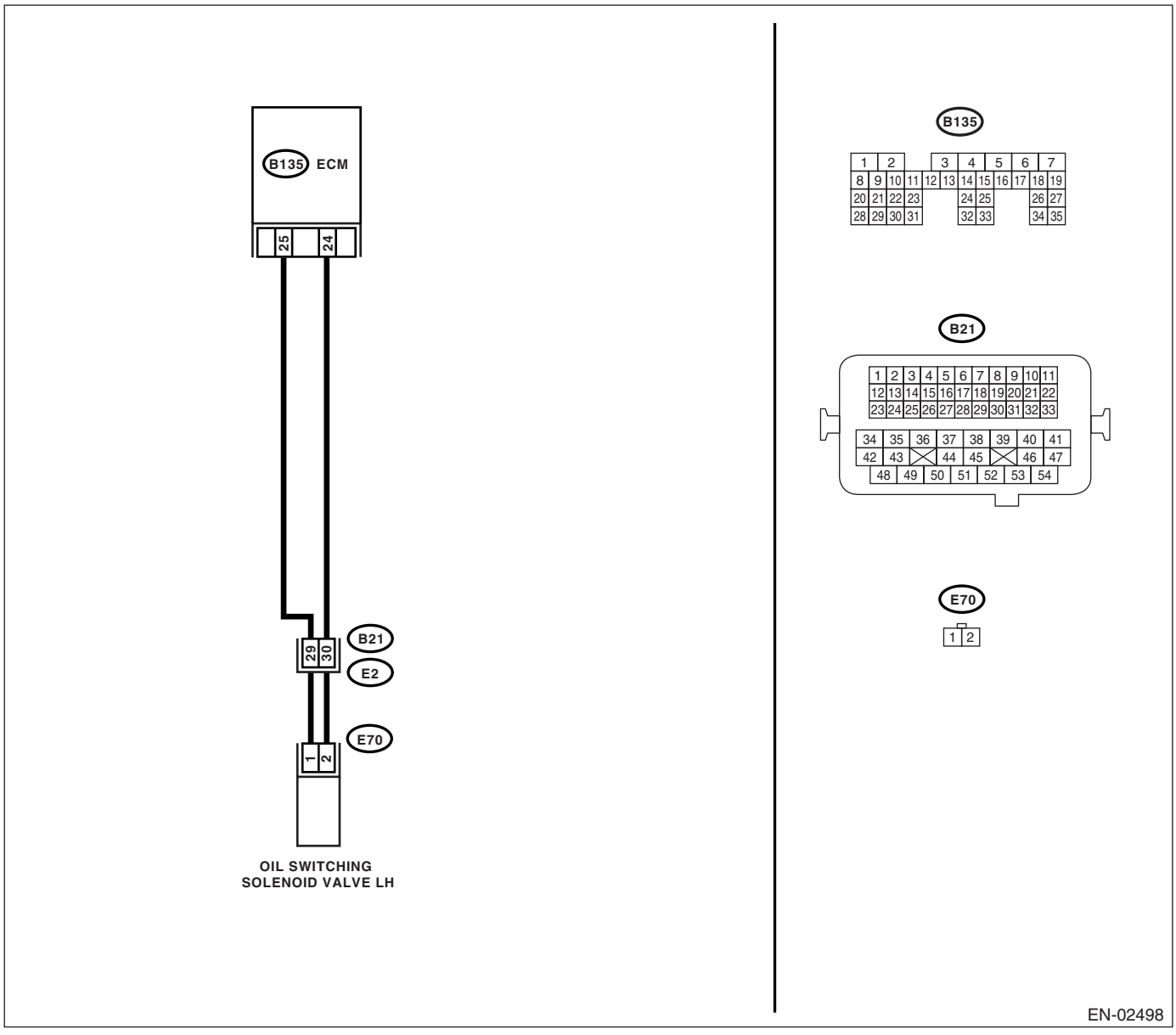
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between ECM and oil switching solenoid valve. ***Connector & terminal*** ***(B135) No. 25 — (E70) No. 1:*** ***(B135) No. 24 — (E70) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil switching solenoid valve connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil switching solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

P: DTC P0083 INTAKE VALVE CONTROL SOLENOID CIRCUIT HIGH (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

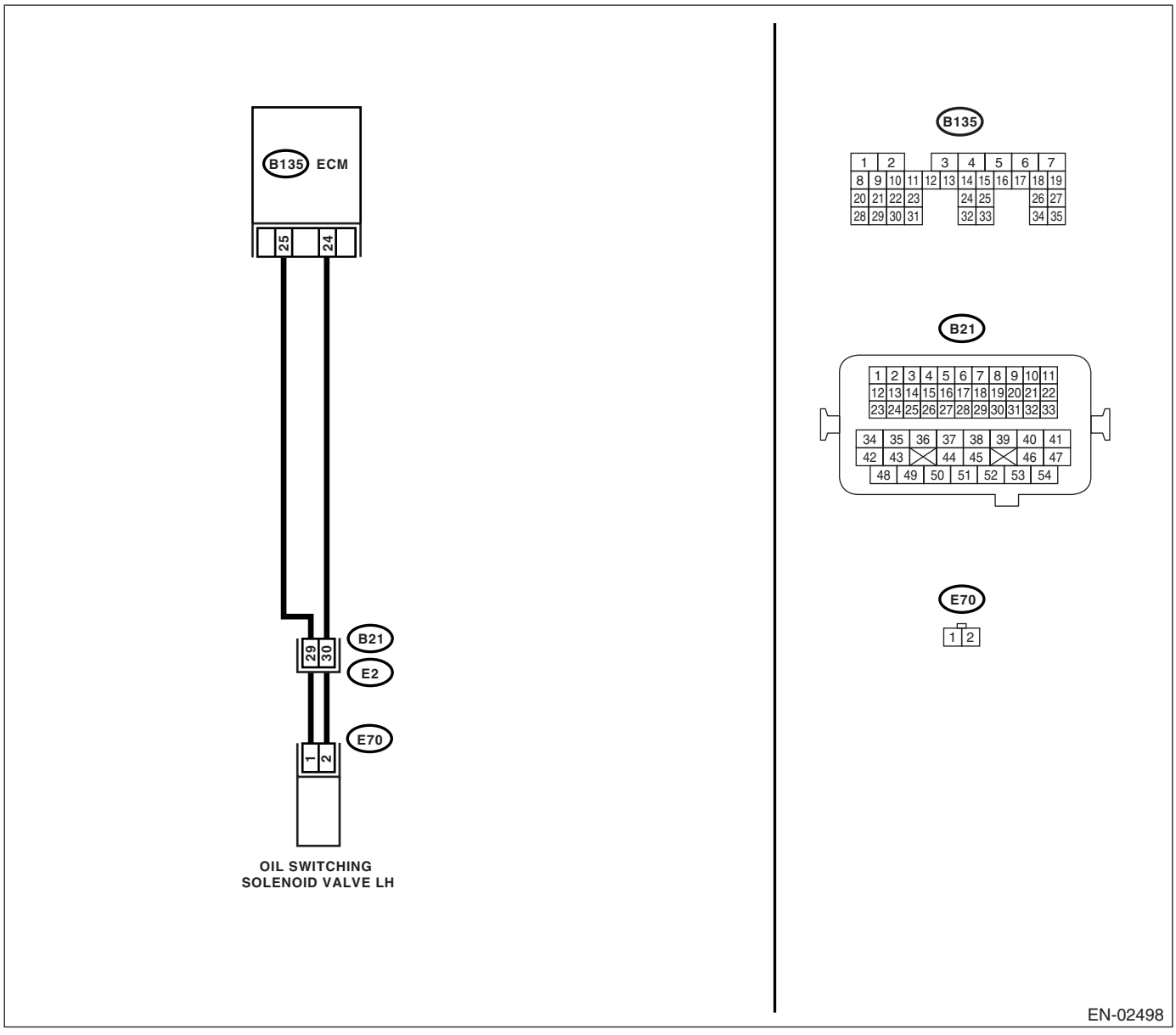
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL SWITCHING SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and oil switching solenoid valve. 3) Measure the resistance between oil switching solenoid valve and engine ground. ***Connector & terminal*** ***(E70) No. 1 — Engine ground:*** ***(E70) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil switching solenoid valve connector.
2	**CHECK OIL SWITCHING SOLENOID VALVE.** 1) Remove the oil switching solenoid valve connector. 2) Measure the resistance between oil switching solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil switching solenoid valve.	Replace the oil switching solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

Q: DTC P0101 MASS OR VOLUME AIR FLOW CIRCUIT RANGE/PERFORMANCE

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

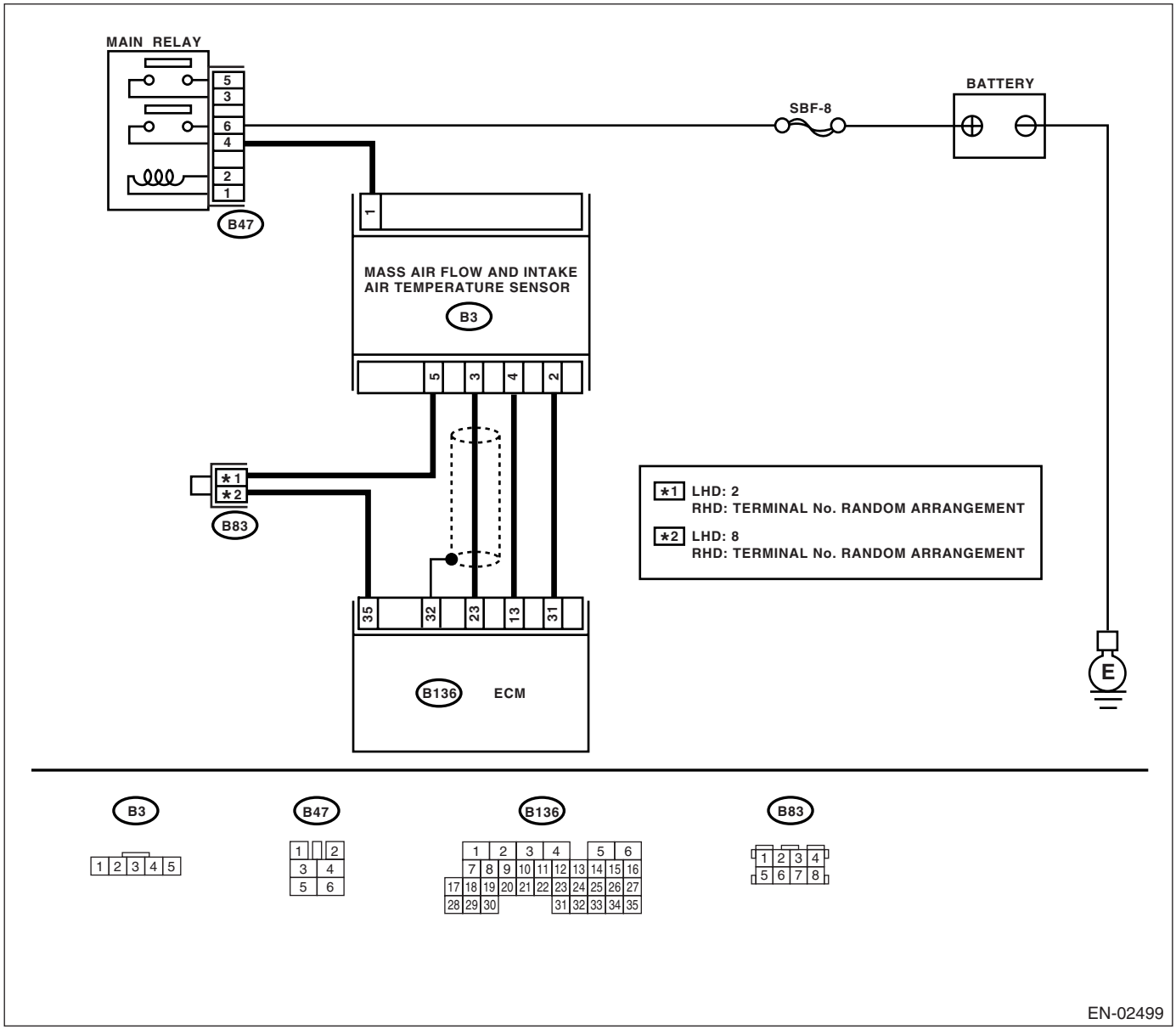
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0101.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-24, Mass Air Flow and Intake Air Temperature Sensor.>

R: DTC P0102 MASS OR VOLUME AIR FLOW CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

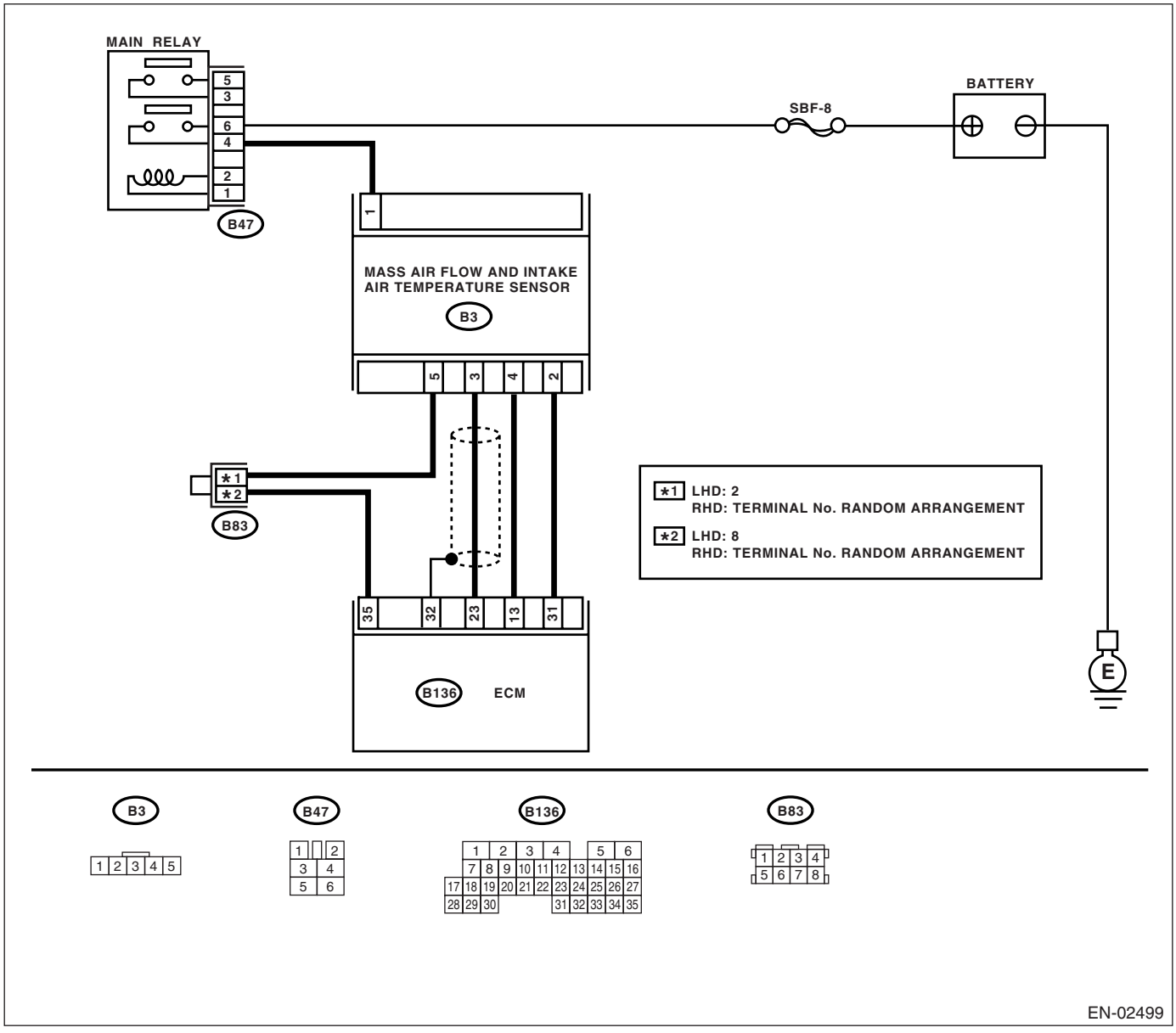
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. A temporary poor contact in the connector or harness may be the cause. Repair harness or connector in the mass air flow sensor. NOTE: In this case repair the following: • Open or ground short circuit in harness between mass air flow sensor and ECM connector • Poor contact in mass air flow sensor or ECM connector	Go to step **2.**
2	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground while engine is idling. ***Connector & terminal*** ***(B136) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 0.2 V?	Go to step **4.**	Go to step **3.**
3	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Measure the voltage between ECM connector and chassis ground while engine is idling.	Does the voltage change by shaking the harness and connector of ECM while monitoring the value with Subaru Select Monitor?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
4	**CHECK POWER SUPPLY TO MASS AIR FLOW SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass air flow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **5.**	Repair the open circuit between mass air flow sensor and main relay
5	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and mass air flow sensor connector. ***Connector & terminal*** ***(B136) No. 23 — (B3) No. 3:*** ***(B136) No. 31 — (B3) No. 2:*** ***(B136) No. 35 — (B3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit between ECM and mass air flow sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 23 — Chassis ground:*** ***(B136) No. 31 — Chassis ground:*** ***(B136) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between ECM and mass air flow sensor connector.
7	**CHECK POOR CONTACT.** Check poor contact in mass air flow sensor connector.	Is there poor contact in mass air flow sensor connector?	Repair the poor contact in mass air flow sensor connector.	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-24, Mass Air Flow and Intake Air Temperature Sensor.>

S: DTC P0103 MASS OR VOLUME AIR FLOW CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

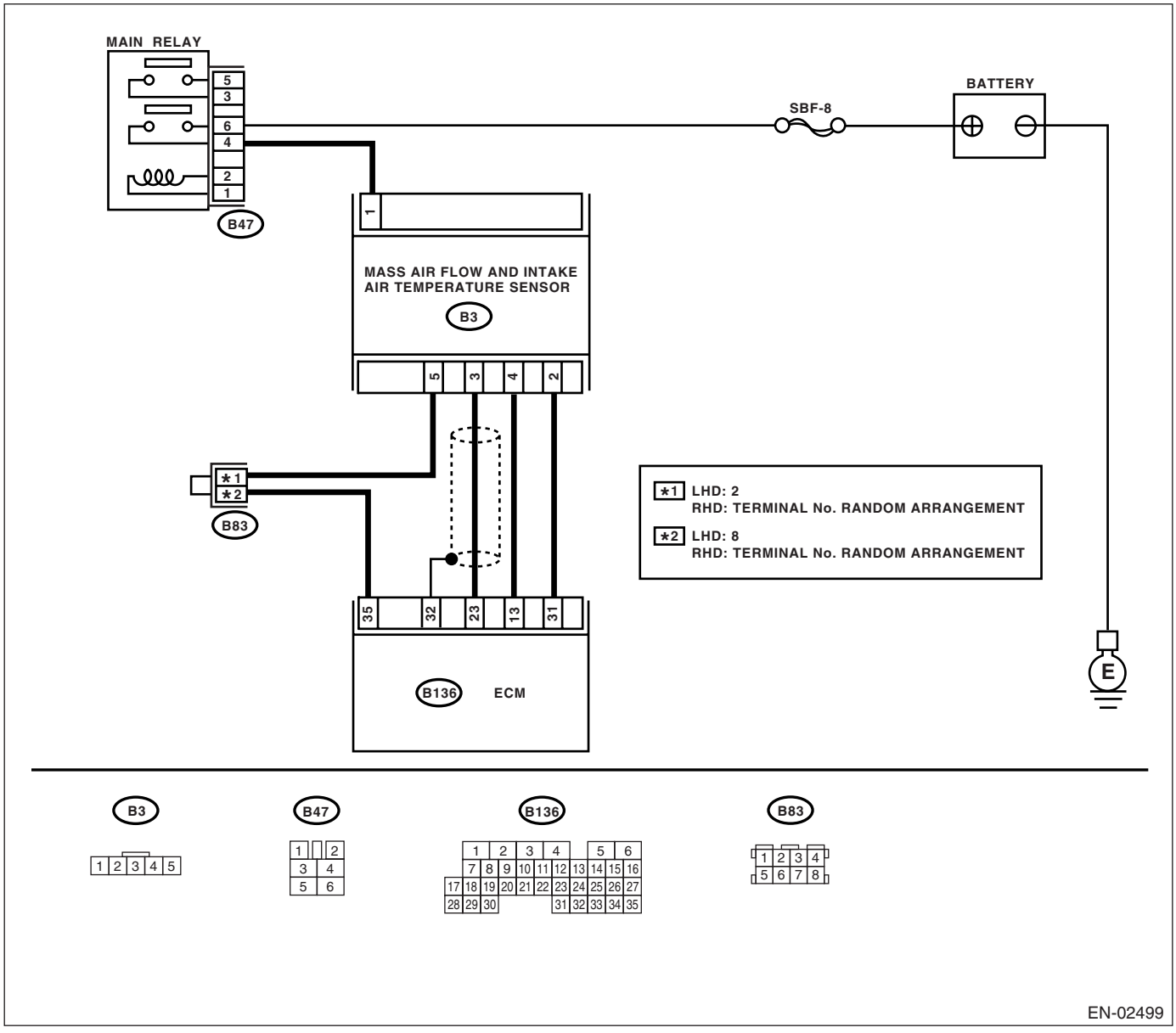
TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**READ THE DATA CONNECTING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Read the voltage of mass air flow sensor using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage 0.2 — 4.7 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from mass airflow sensor. 3) Turn the ignition switch to ON. 4) Measure voltage between mass air flow sensor connector and chassis ground. ***Connector & terminal*** ***(B3) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Repair the battery short circuit in harness between mass air flow sensor connector and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM connector and mass air flow sensor connector. ***Connector & terminal*** ***(B3) No. 2 — (B136) No. 31:***	Is the resistance less than 1 Ω?	Replace the mass air flow sensor. <Ref. to FU(H6DO)-24, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the open circuit in harness between mass air flow sensor connector and ECM connector.

T: DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT LOW INPUT

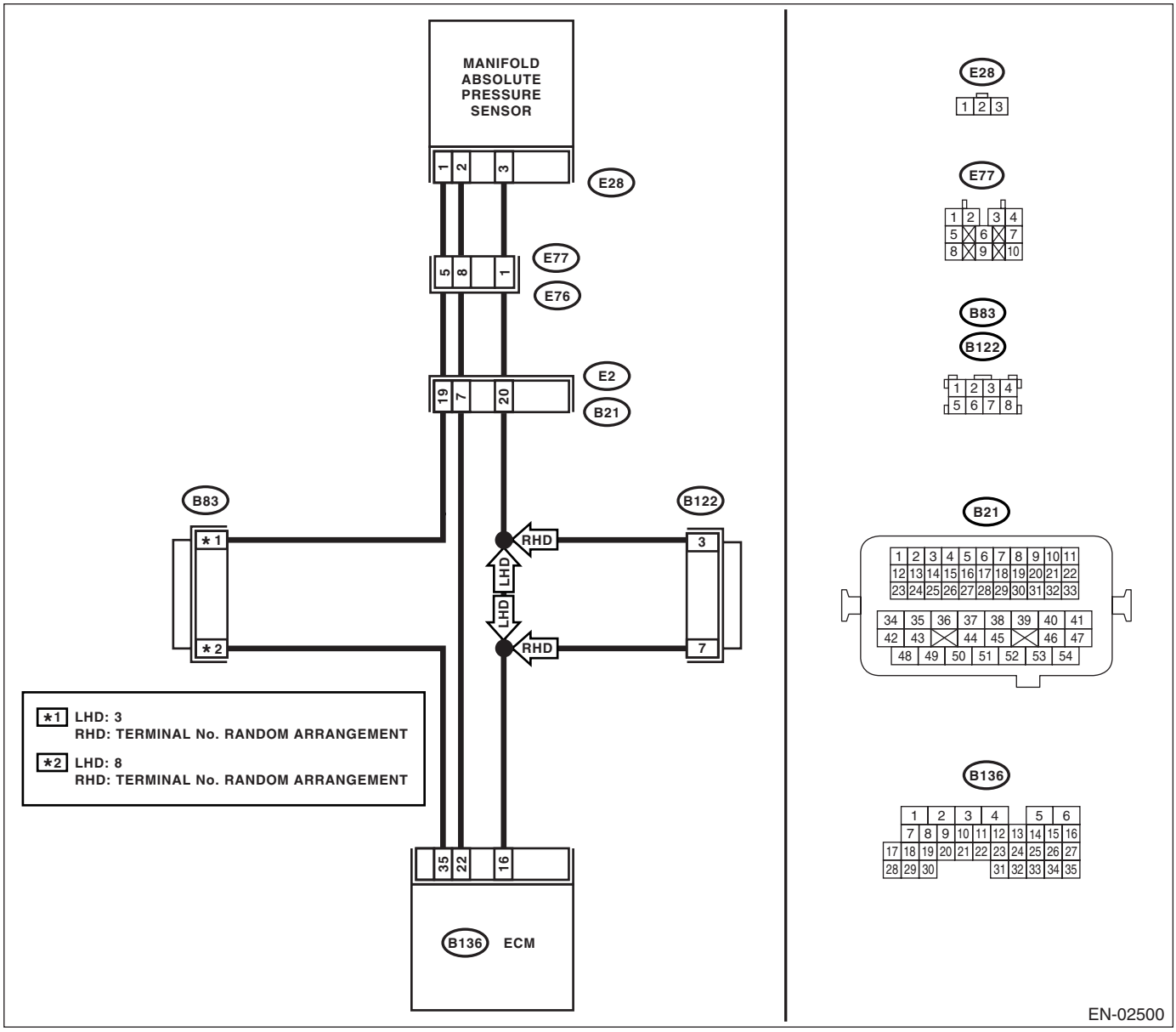
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the measured value less than 13.3 kPa (100 mmHg, 3.94 inHg)?	Go to step **3.**	Go to step **2.**
2	**CHECK POOR CONTACT.** Check poor contact in ECM and manifold pressure sensor connector.	Is there poor contact in ECM or manifold pressure sensor connector?	Repair the poor contact in ECM or manifold pressure sensor connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **7.**	Go to step **6.**
6	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **7.**
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E28) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **8.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E28) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-23, Manifold Absolute Pressure Sensor.>

U: DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE CIRCUIT HIGH INPUT

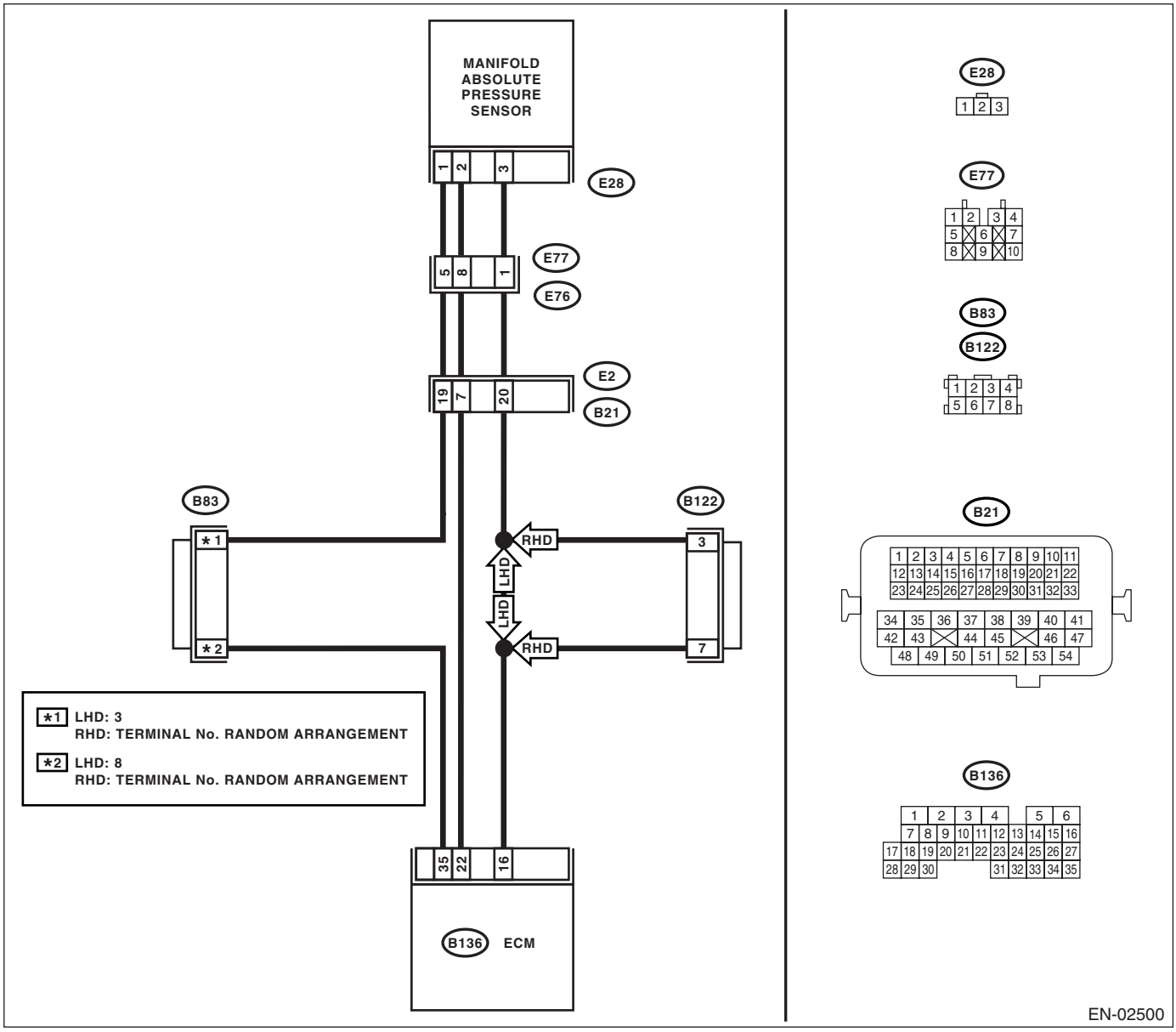
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Go to step **10.**	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Is the voltage more than 4.5 V?	Go to step **4.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 (+) — Chassis ground (–):***	Does the voltage change by shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
4	**CHECK INPUT SIGNAL FROM ECM.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 22 (+) — Chassis ground (–):***	Is the voltage less than 0.2 V?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR ECM (USING SUBARU SELECT MONITOR).** Read the data of atmospheric absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the value more than 13.3 kPa (100 mmHg, 3.94 inHg) when shaking the ECM harness and connector?	Repair the poor contact in ECM connector.	Go to step **6.**
6	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the manifold absolute pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between manifold absolute pressure sensor connector and engine ground. ***Connector & terminal*** ***(E28) No. 3 (+) — Engine ground (–):***	Is the voltage more than 4.5 V?	Go to step **7.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
7	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 22 — (E28) No. 2:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.

	Step	Check	Yes	No
8	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** Measure the resistance of harness between ECM and manifold absolute pressure sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (E28) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ECM and manifold absolute pressure sensor connector.
9	**CHECK POOR CONTACT.** Check poor contact in manifold absolute pressure sensor connector.	Is there poor contact in manifold absolute pressure sensor connector?	Repair the poor contact in manifold absolute pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-23, Manifold Absolute Pressure Sensor.>
10	**CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF, and the Subaru Select Monitor switch to OFF. 2) Disconnect the connector from the manifold absolute pressure sensor. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the value more than 119.5 kPa (896.5 mmHg, 35.29 inHg)?	Repair battery short in harness between ECM and manifold pressure sensor connector.	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-23, Manifold Absolute Pressure Sensor.>

V: DTC P0112 INTAKE AIR TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

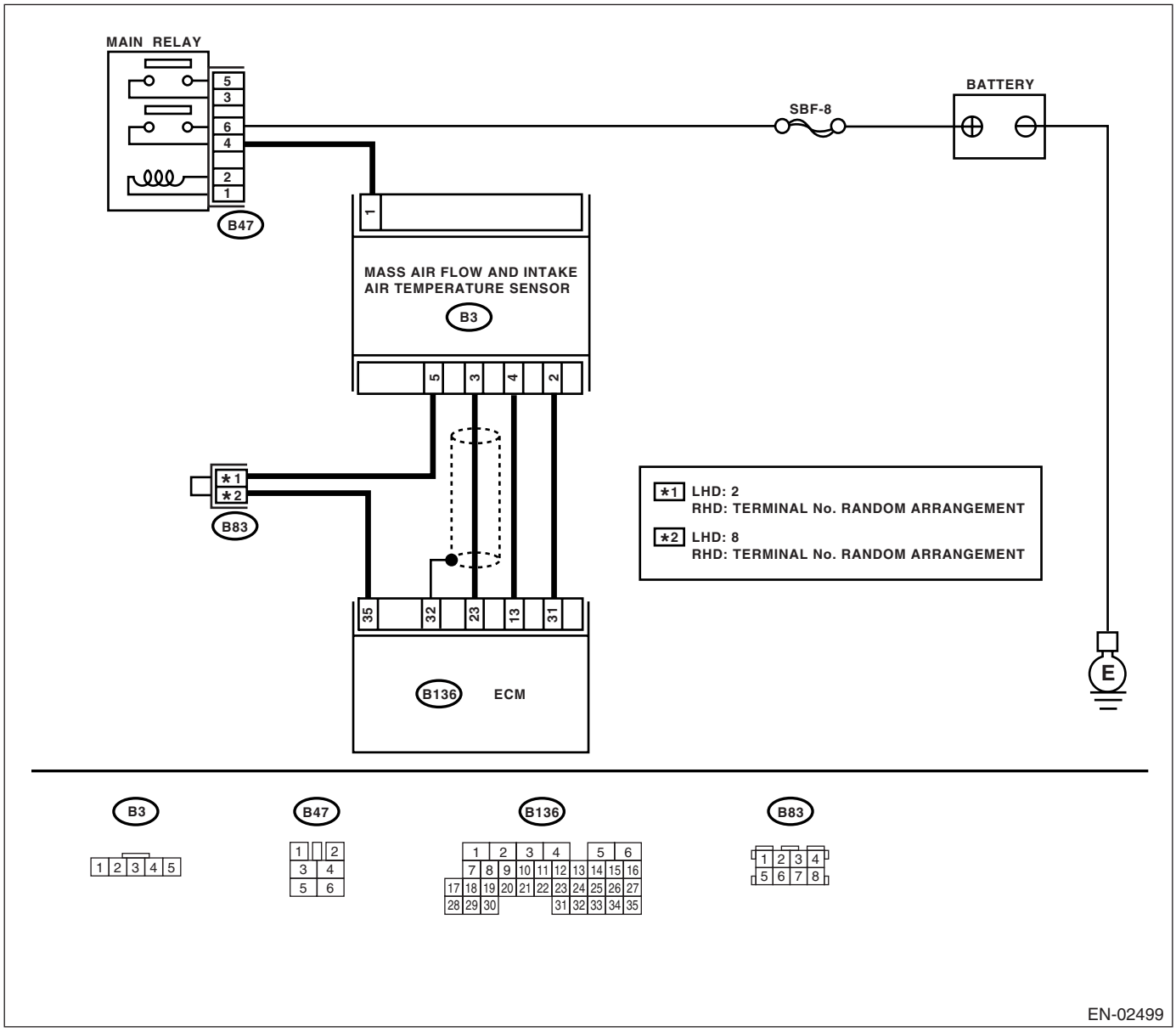
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the intake air temperature more than 120°C (248°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector mass air flow and intake air temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the intake air temperature less than −40°C (−40°F)?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-24, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the ground short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.

W: DTC P0113 INTAKE AIR TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

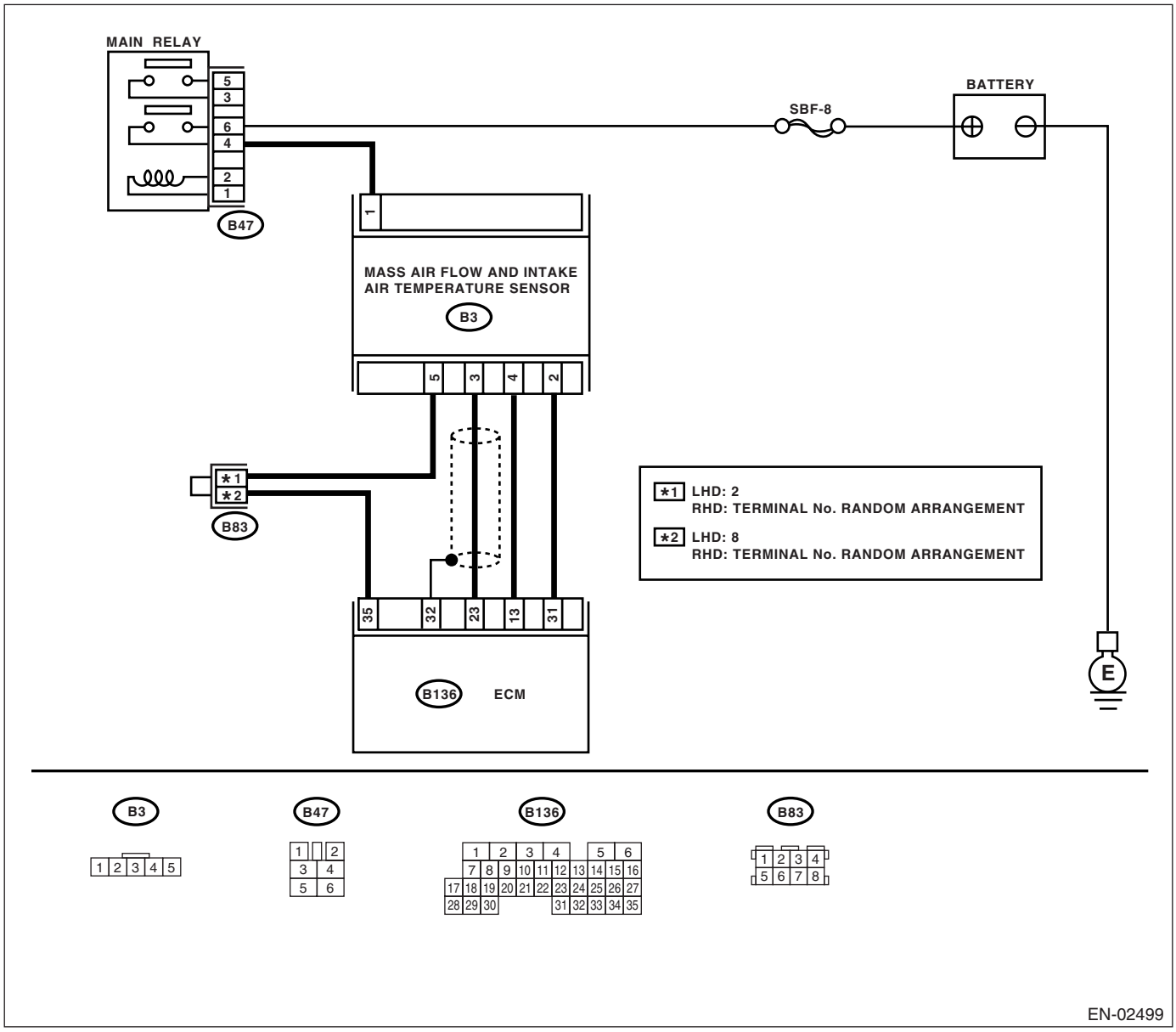
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of mass air flow and intake air temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the intake air temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case repair the following: • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector mass air flow and intake air temperature sensor. 3) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between mass air flow and intake air temperature sensor and ECM connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 4 (+) — Engine ground (−):***	Is the voltage more than 3 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground. ***Connector & terminal*** ***(B3) No. 5 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the mass air flow and intake air temperature sensor. <Ref. to FU(H6DO)-24, Mass Air Flow and Intake Air Temperature Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between mass air flow and intake air temperature sensor and ECM connector • Poor contact in mass air flow and intake air temperature sensor • Poor contact in ECM • Poor contact in joint connector

X: DTC P0117 ENGINE COOLANT TEMPERATURE CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

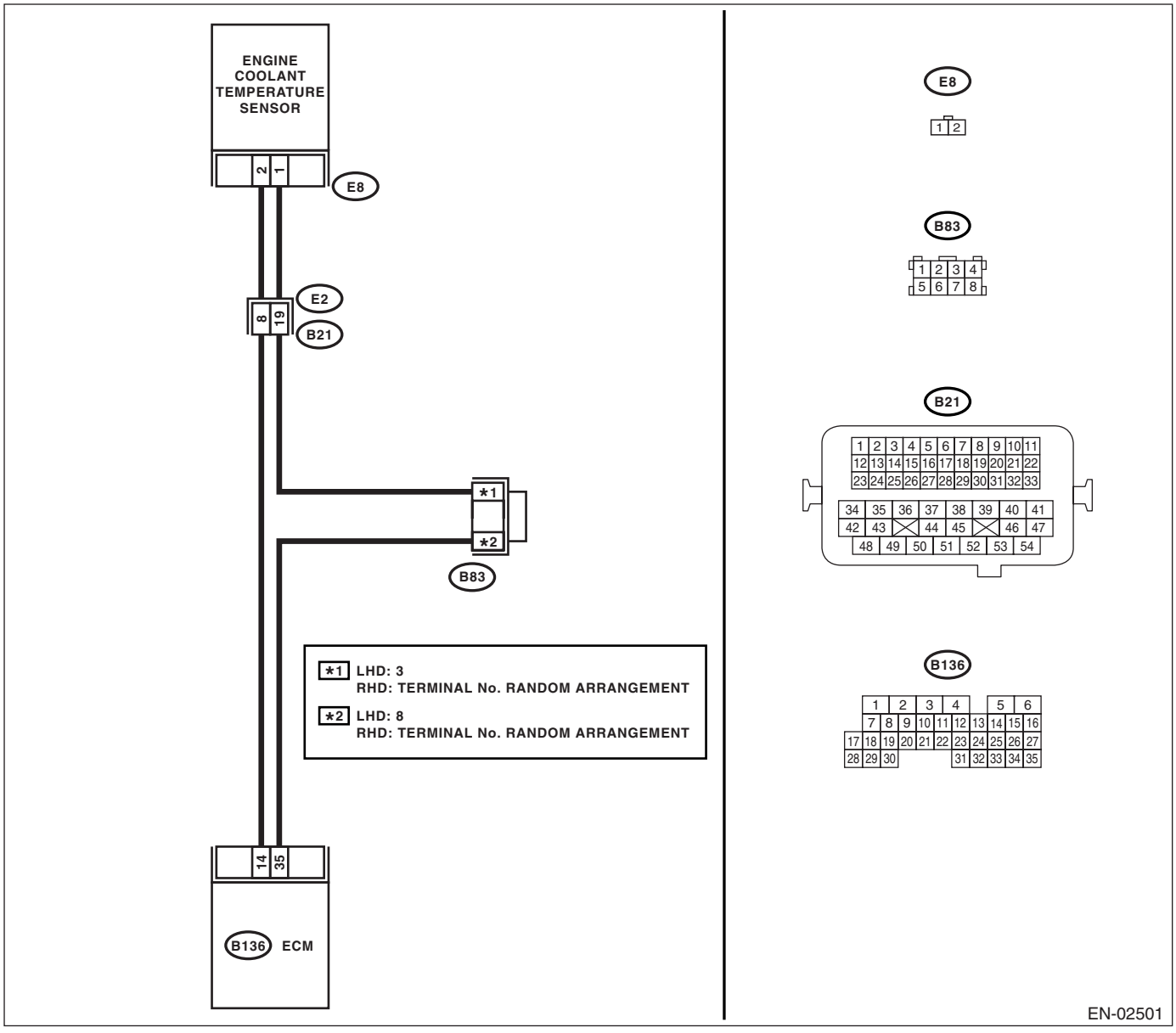
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is engine coolant temperature more than 150°C (302°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Turn the ignition switch to ON. 4) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is engine coolant temperature less than −40°C (−40°F)?	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, Engine Coolant Temperature Sensor.>	Repair the ground short circuit in harness between engine coolant temperature sensor and ECM connector.

Y: DTC P0118 ENGINE COOLANT TEMPERATURE CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

Immediately at fault recognition

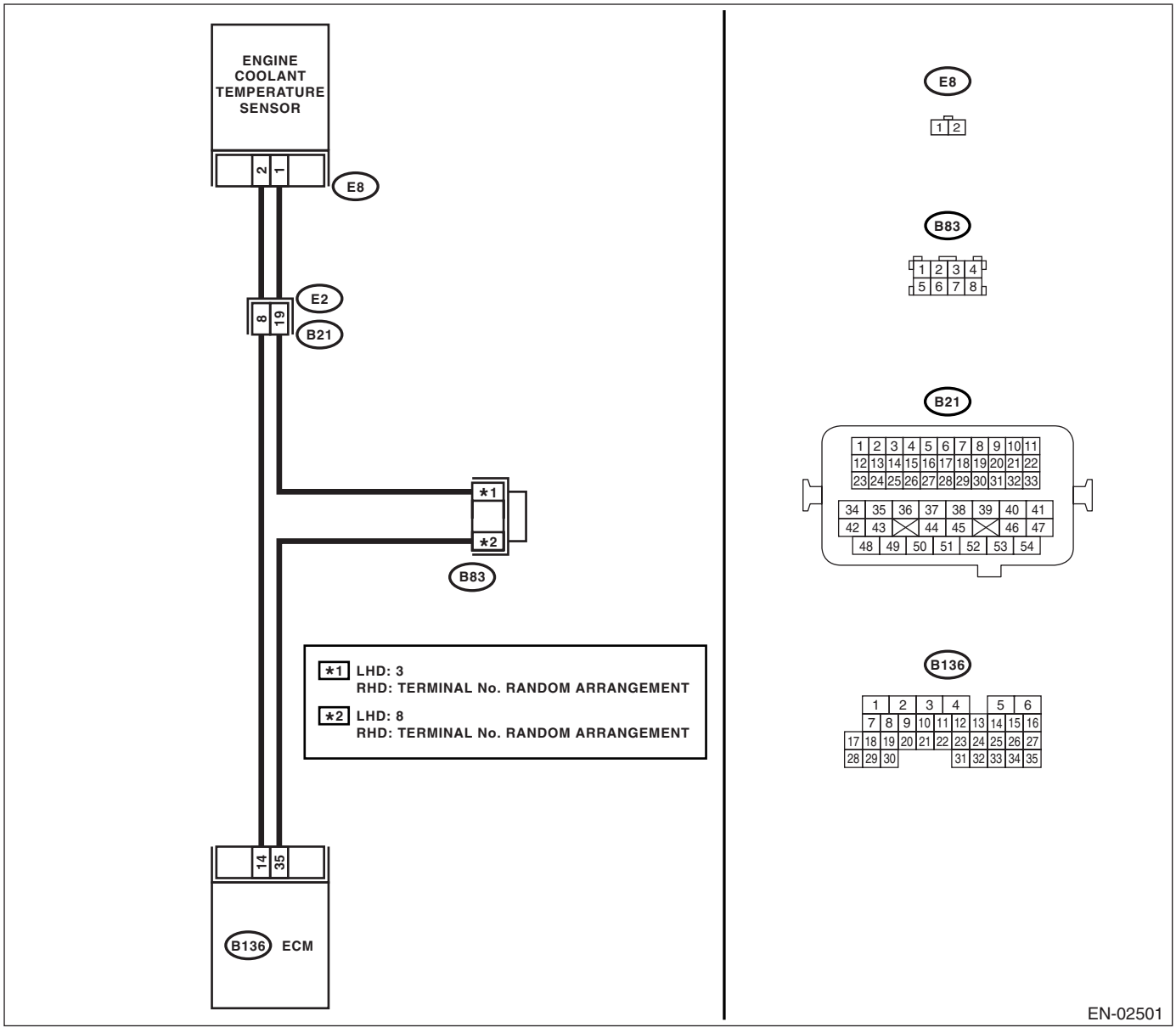
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is engine coolant temperature less than −40°C (−40°F)?	Go to step **2.**	Repair the poor contact. NOTE: In this case repair the following: • Poor contact in engine coolant temperature sensor • Poor contact in ECM • Poor contact in coupling connector • Poor contact in joint connector
2	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from the engine coolant temperature sensor. 3) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and engine coolant temperature sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **5.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN ENGINE COOLANT TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between engine coolant temperature sensor connector and engine ground. ***Connector & terminal*** ***(E8) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, Engine Coolant Temperature Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and engine coolant temperature sensor connector • Poor contact in engine coolant temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

Z: DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW INPUT

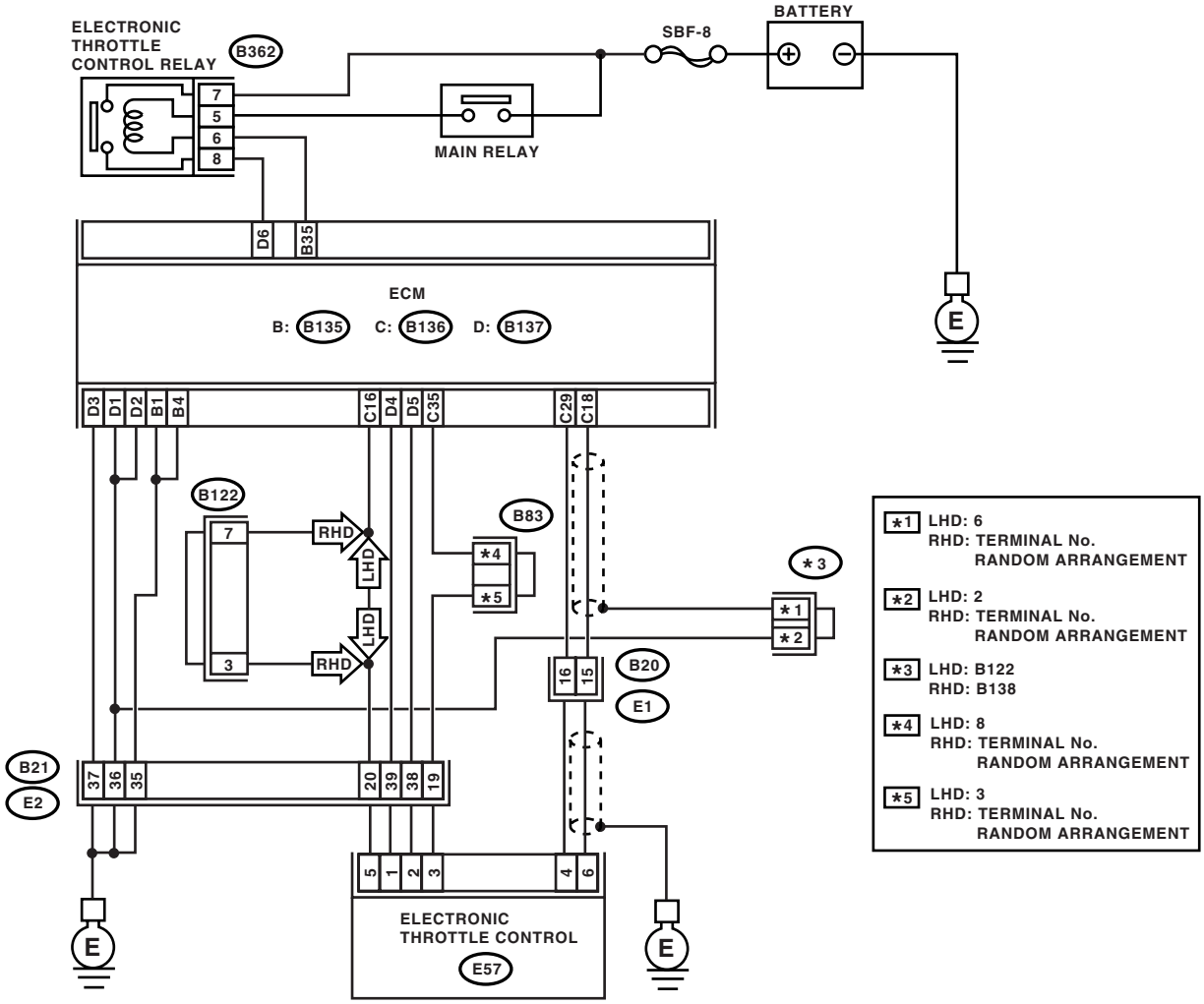
DTC DETECTING CONDITION:

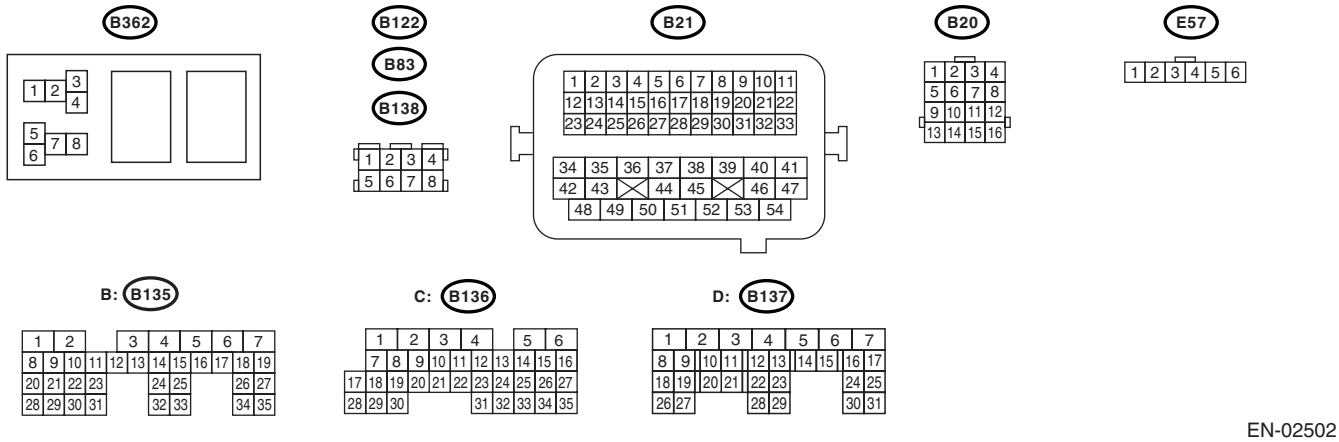
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(E136) No. 18 — (E57) No. 6:*** ***(E136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact in electronic throttle control connector. Replace the accelerator position sensor if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

AA:DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH INPUT

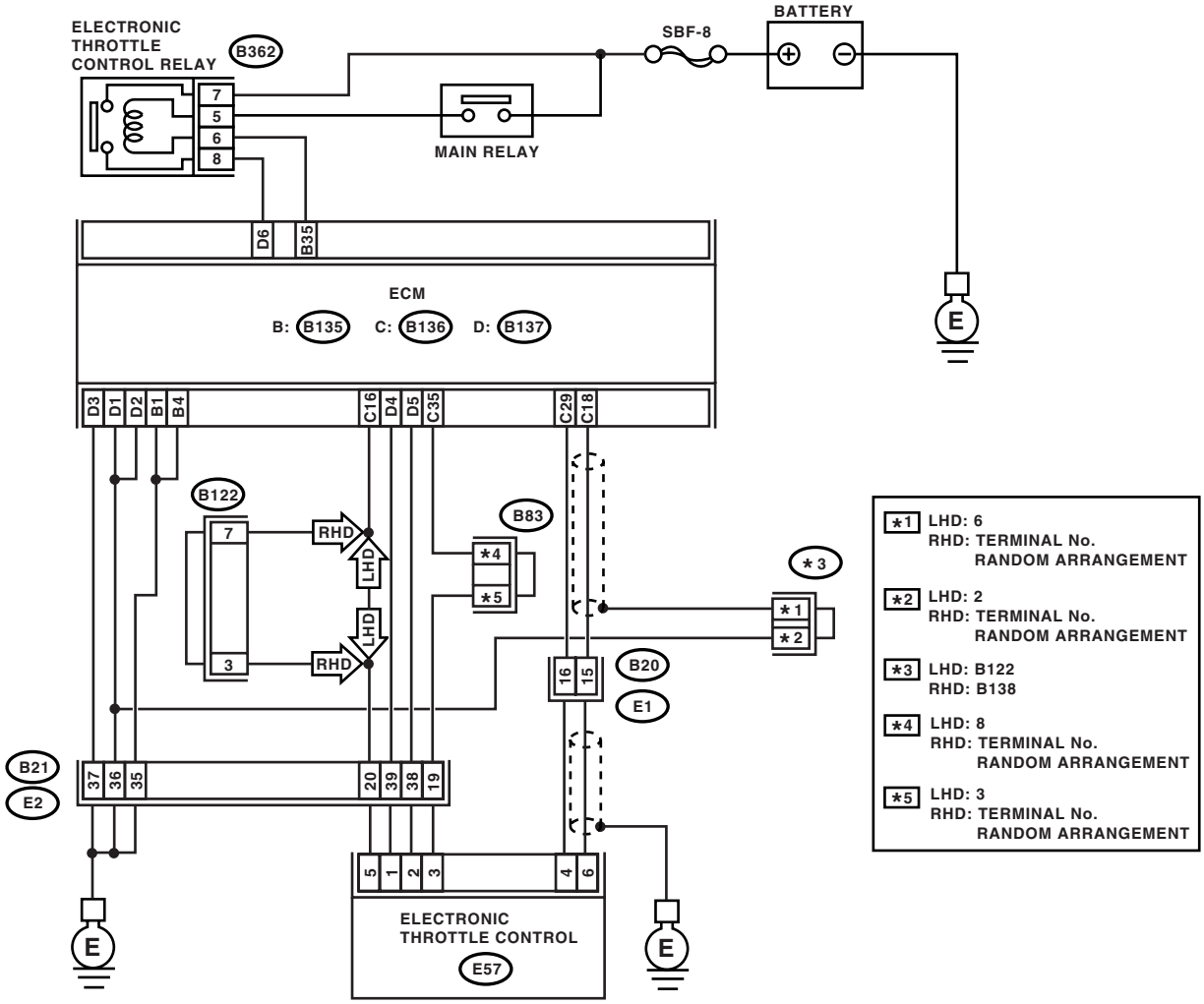
DTC DETECTING CONDITION:

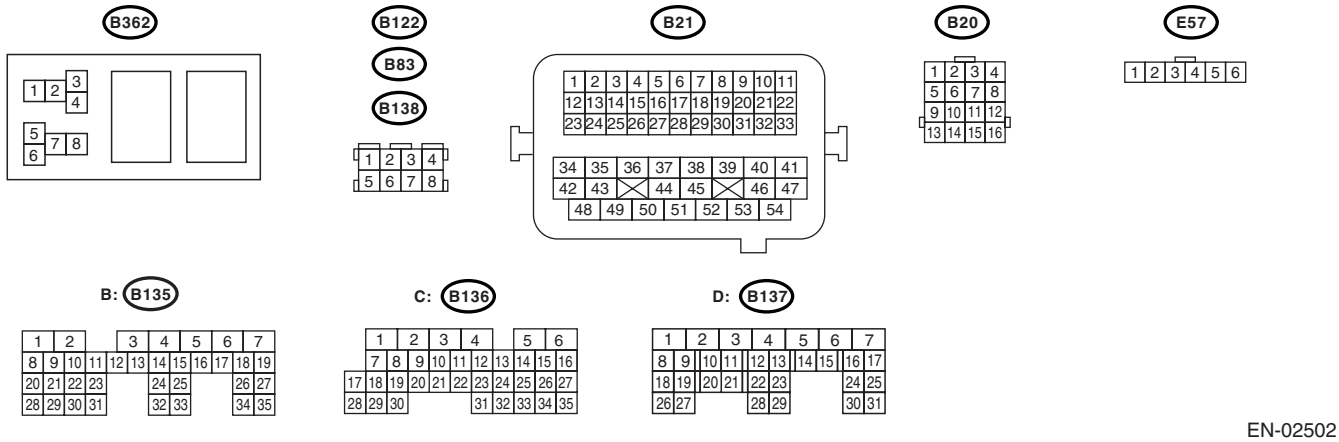
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 35 — (E57) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK SENSOR OUTPUT POWER SUPPLY.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in harness. Repair the electronic throttle control.	Repair the short circuit to sensor power supply.

AB:DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
Engine would not return to idling.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0125.	Go to step **2.**
2	**CHECK TIRE SIZE.**	Is the tire same size as specified tire and one same size as other three wheels?	Go to step **3.**	Replace the tire.
3	**CHECK ENGINE COOLANT.** Check the following items: • Amount of engine coolant • Coolant freeze • Contamination of engine coolant	Is the engine coolant normal?	Go to step **4.**	Fill or replace the engine coolant. <Ref. to CO(H6DO)-9, INSPECTION, Engine Coolant.>
4	**CHECK THERMOSTAT.**	Does the thermostat remain opened?	Replace the thermostat. <Ref. to CO(H6DO)-12, Thermostat.>	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, Engine Coolant Temperature Sensor.>

AC:DTC P0131 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 1)

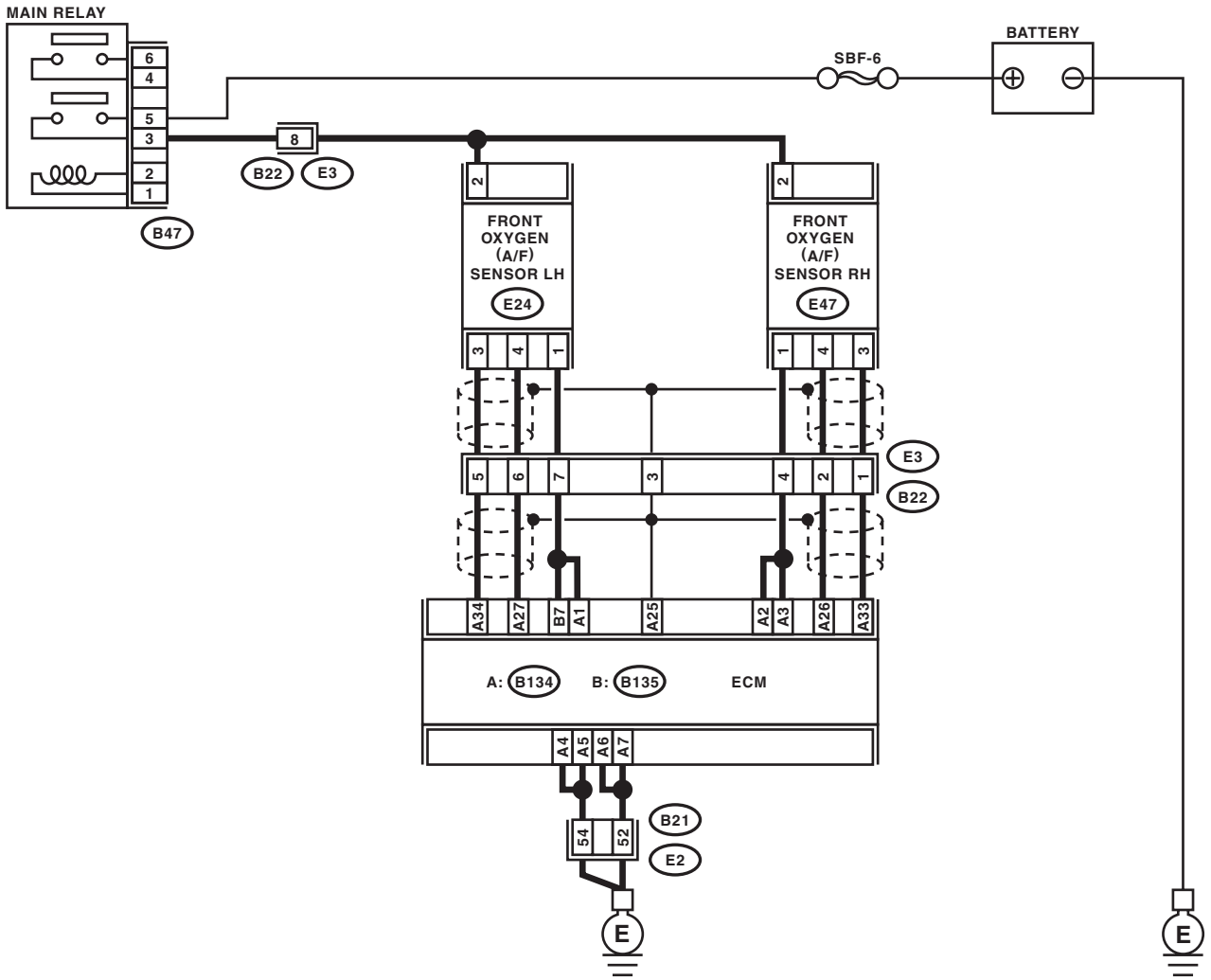
DTC DETECTING CONDITION:

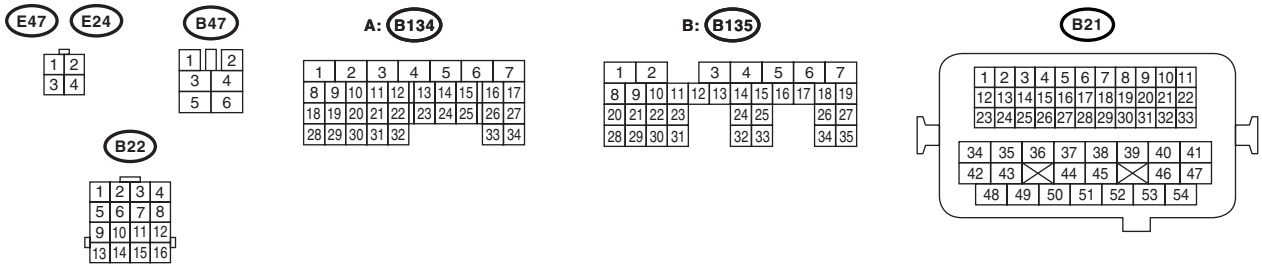
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 26 — Chassis ground:*** ***(B134) No. 33 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

AD:DTC P0132 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 1)

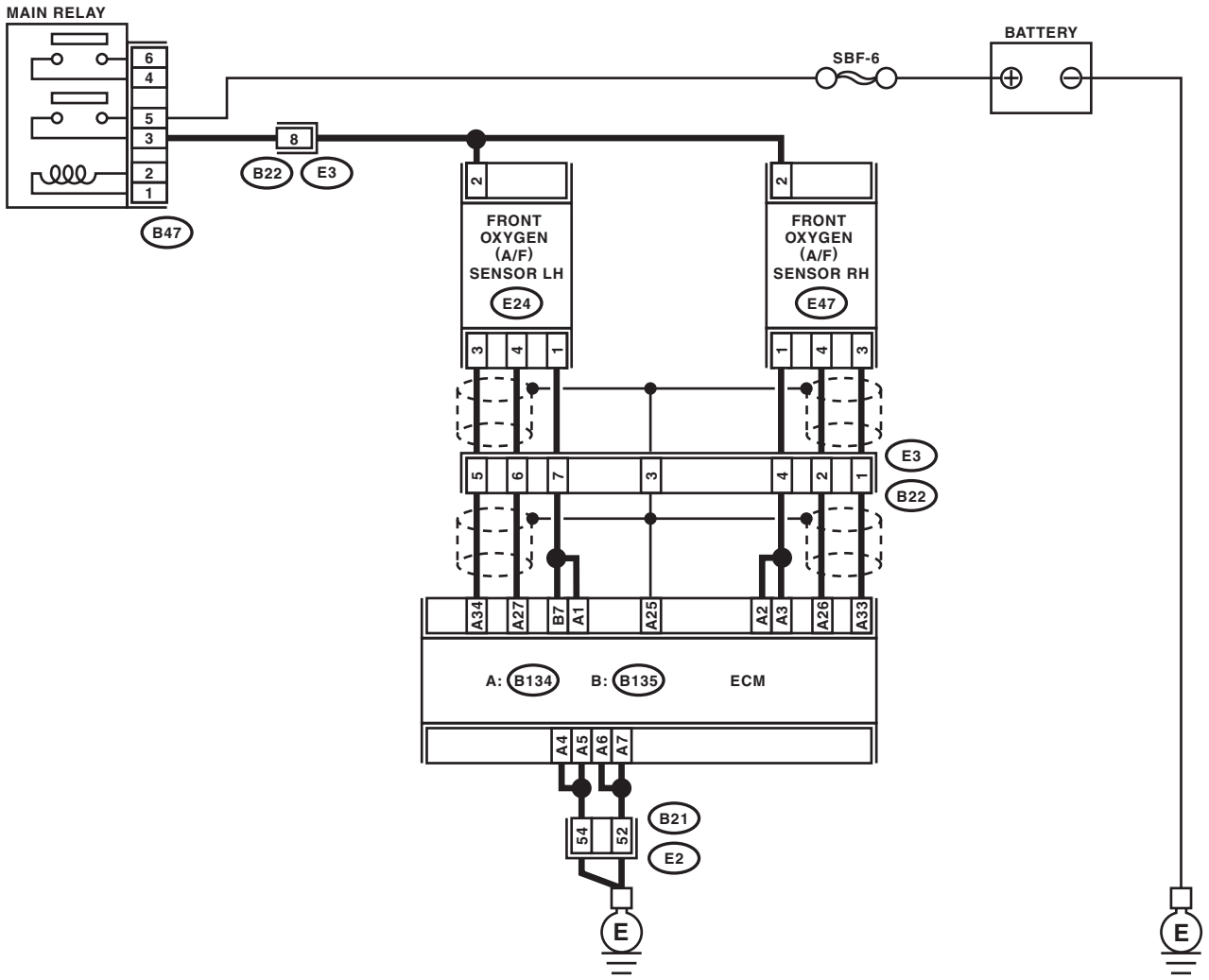
DTC DETECTING CONDITION:

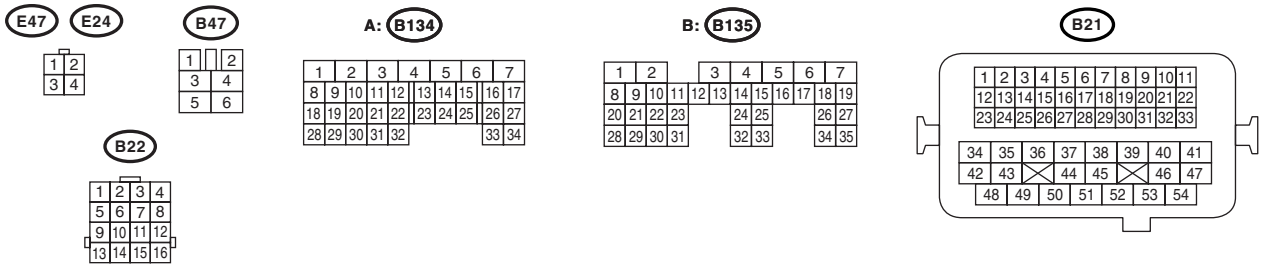
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 26 (+) — Chassis ground (−):*** ***(B134) No. 33 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

AE:DTC P0133 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 1 SENSOR 1)

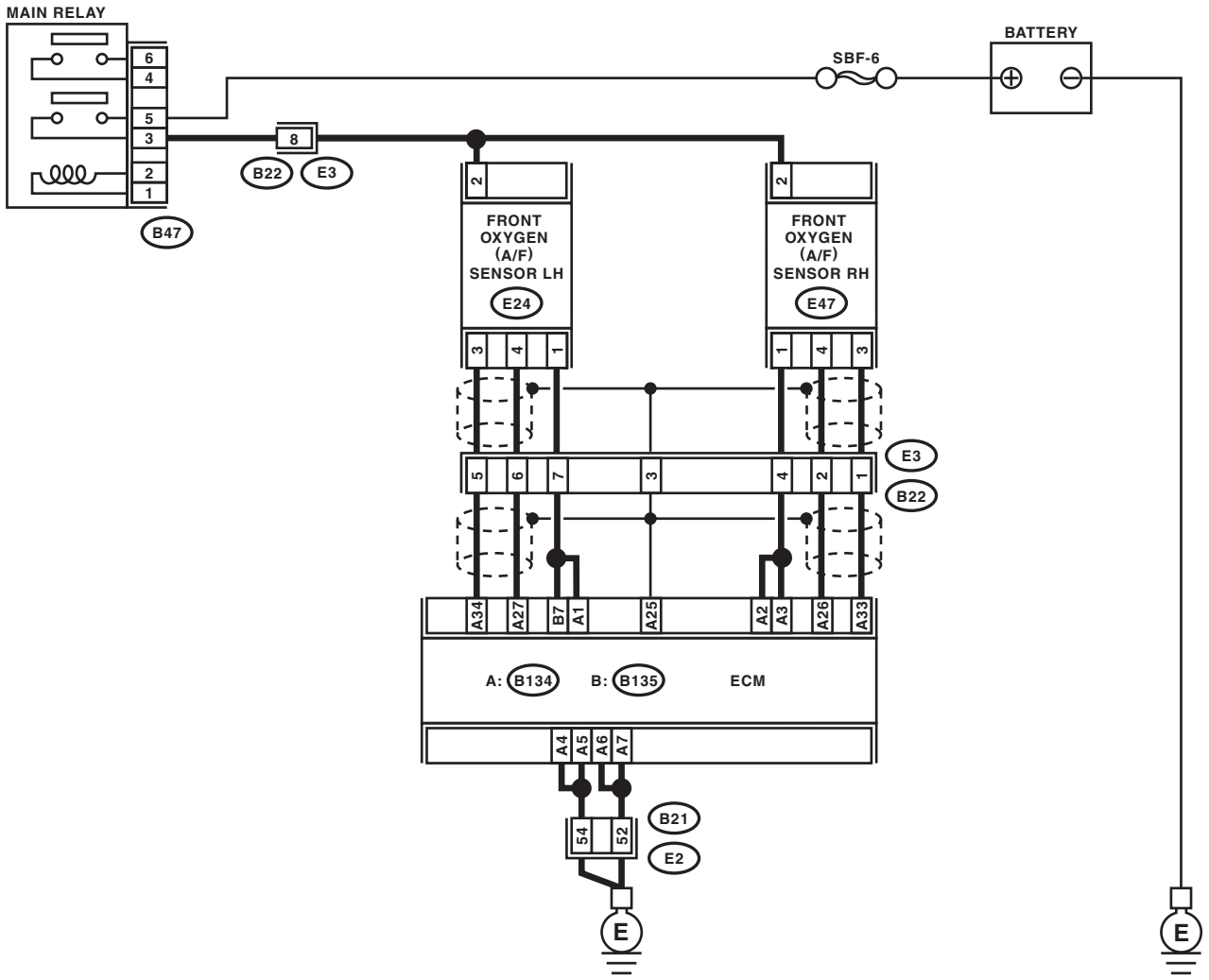
DTC DETECTING CONDITION:

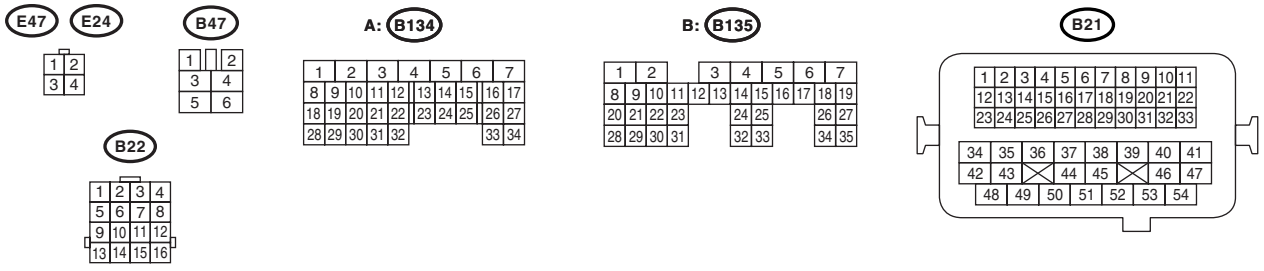
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

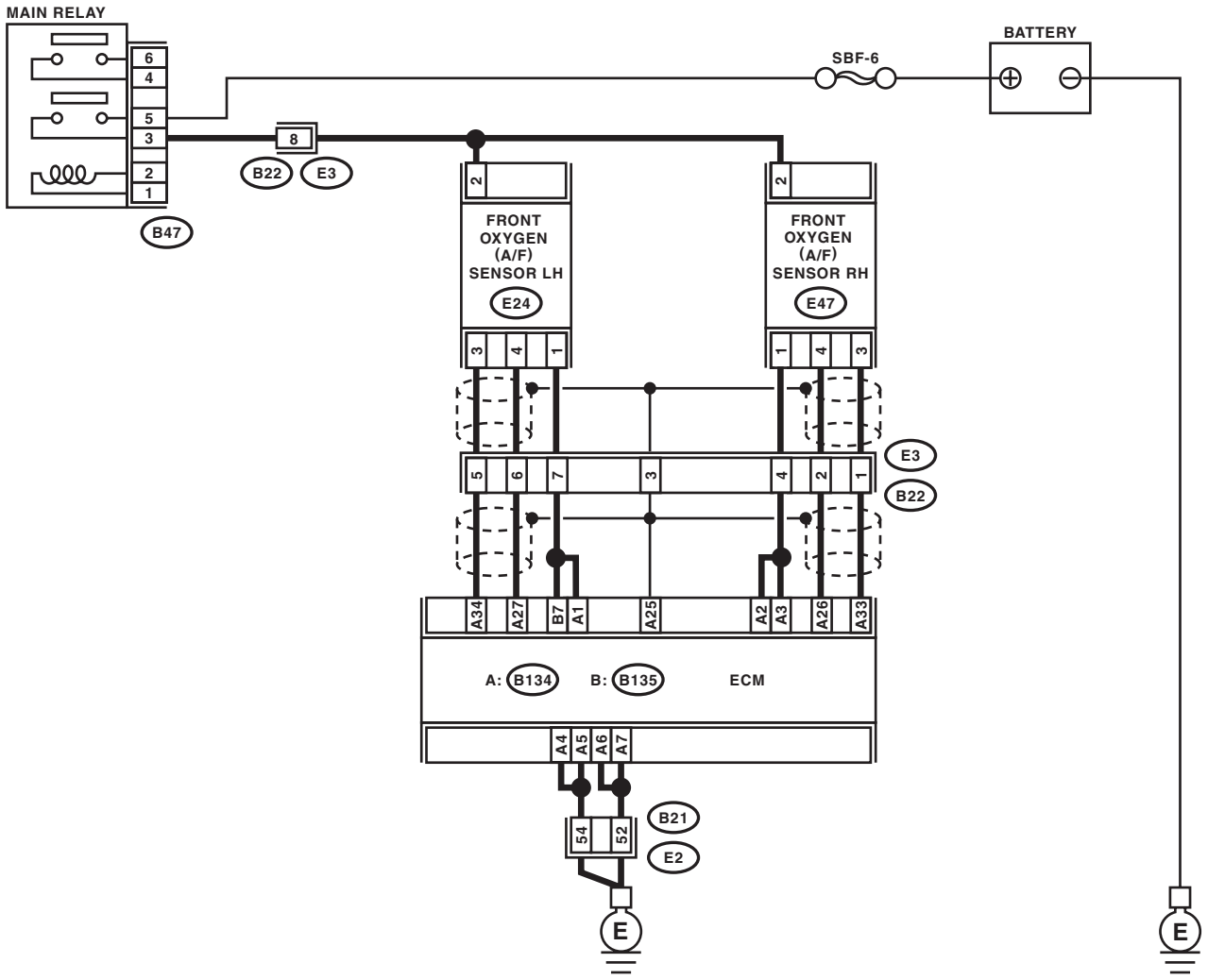
	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items: • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

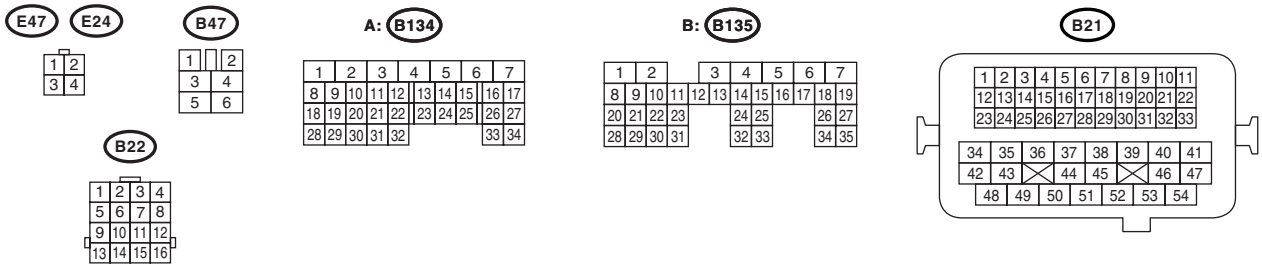
AF:DTC P0134 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 1 SENSOR 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 26 — (E47) No. 4:*** ***(B134) No. 33 — (E47) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

AG:DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 1 SENSOR 2)

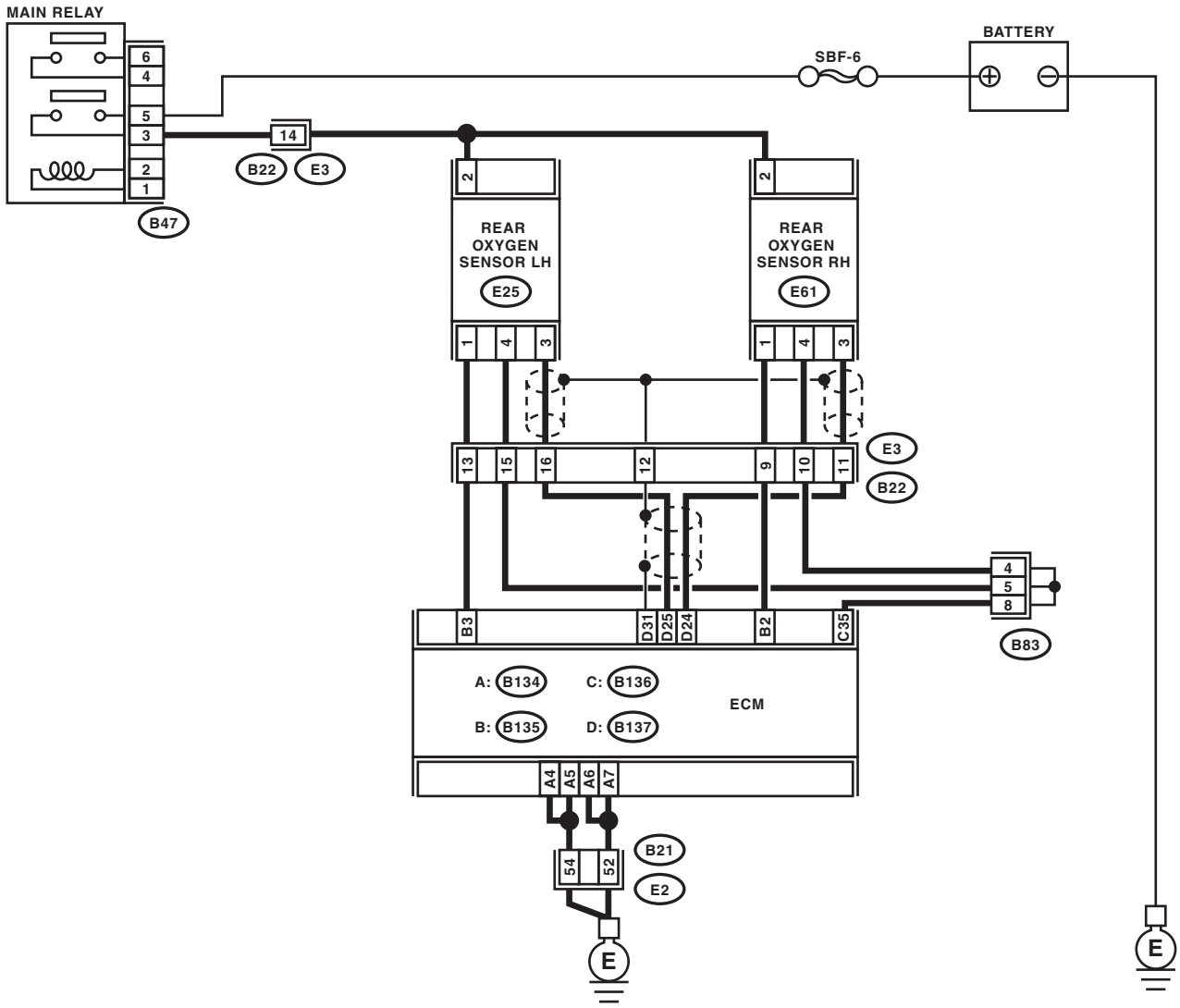
DTC DETECTING CONDITION:

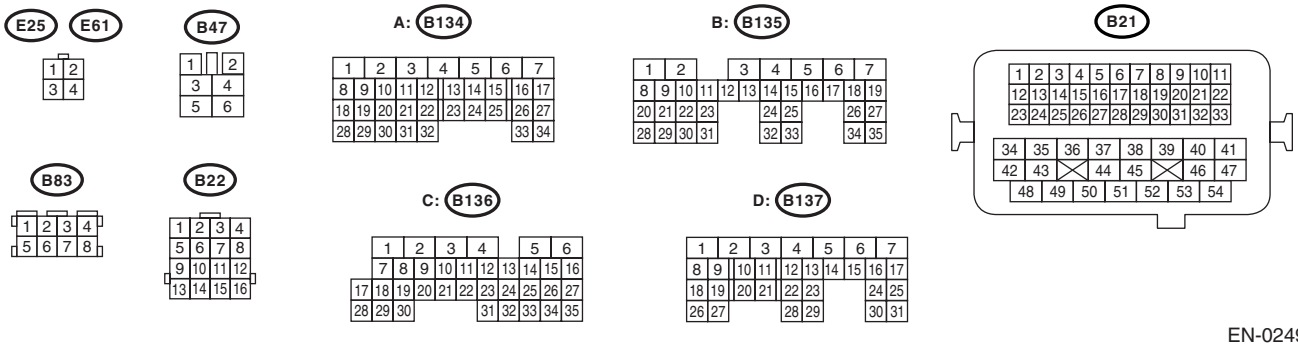
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 490 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

AH:DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 1 SENSOR 2)

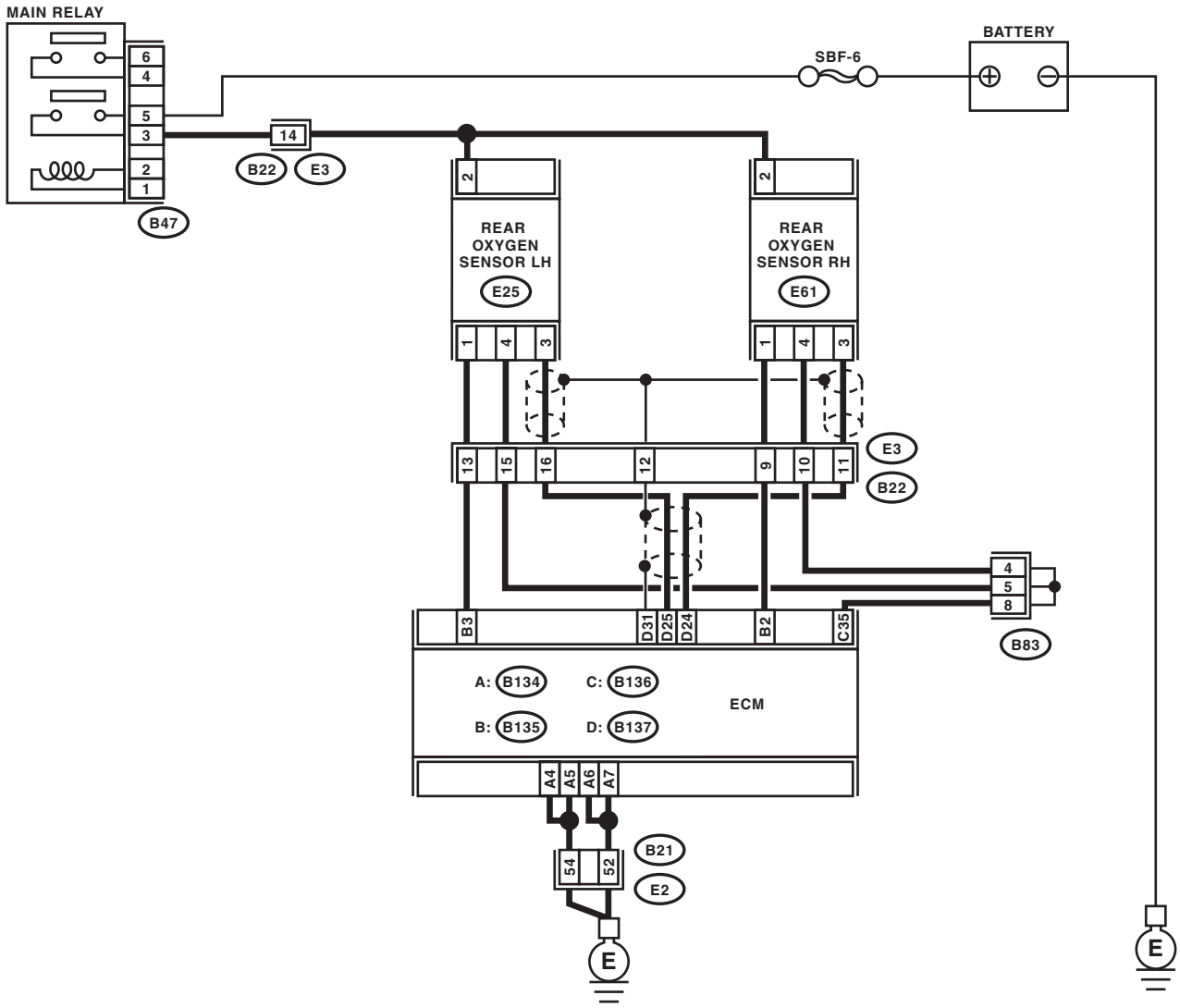
DTC DETECTING CONDITION:

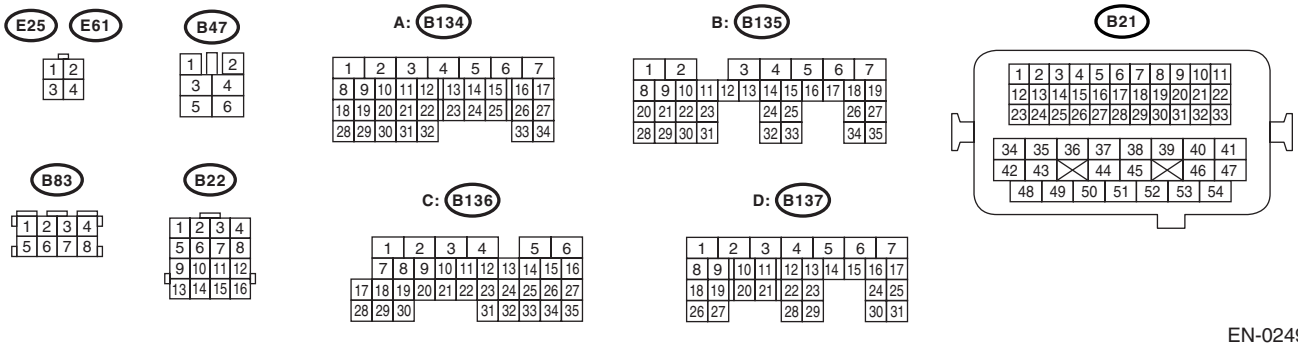
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 250 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 24 — (E61) No. 3:*** ***(B136) No. 35 — (E61) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E61) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

AI: DTC P0151 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 1)

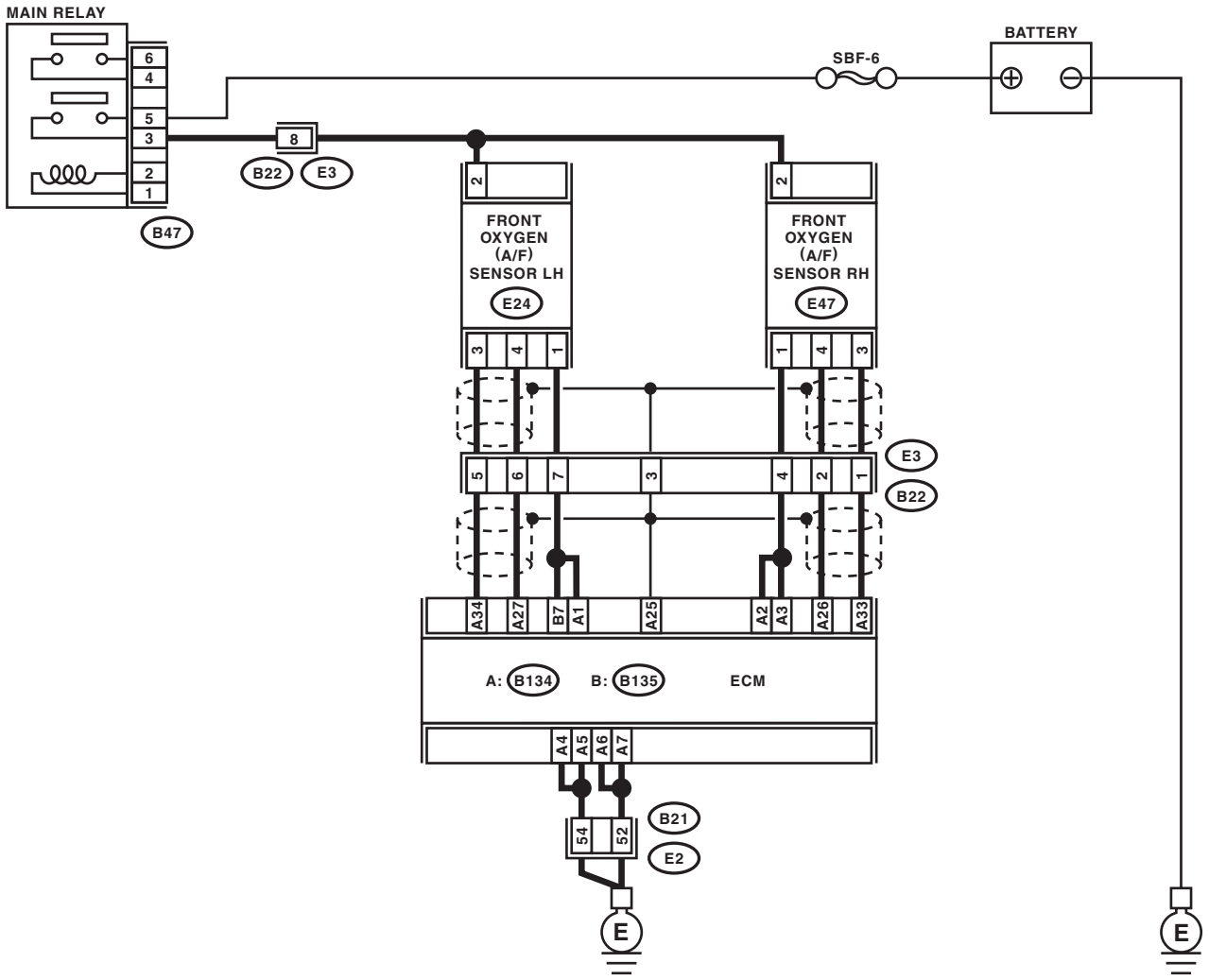
DTC DETECTING CONDITION:

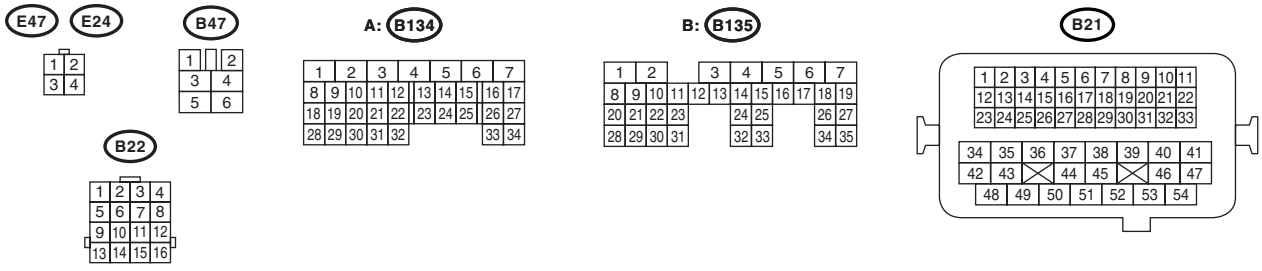
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 27 — Chassis ground:*** ***(B134) No. 34 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>	Repair the ground short circuit in harness between ECM and front oxygen (A/F) sensor connector.

AJ:DTC P0152 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 1)

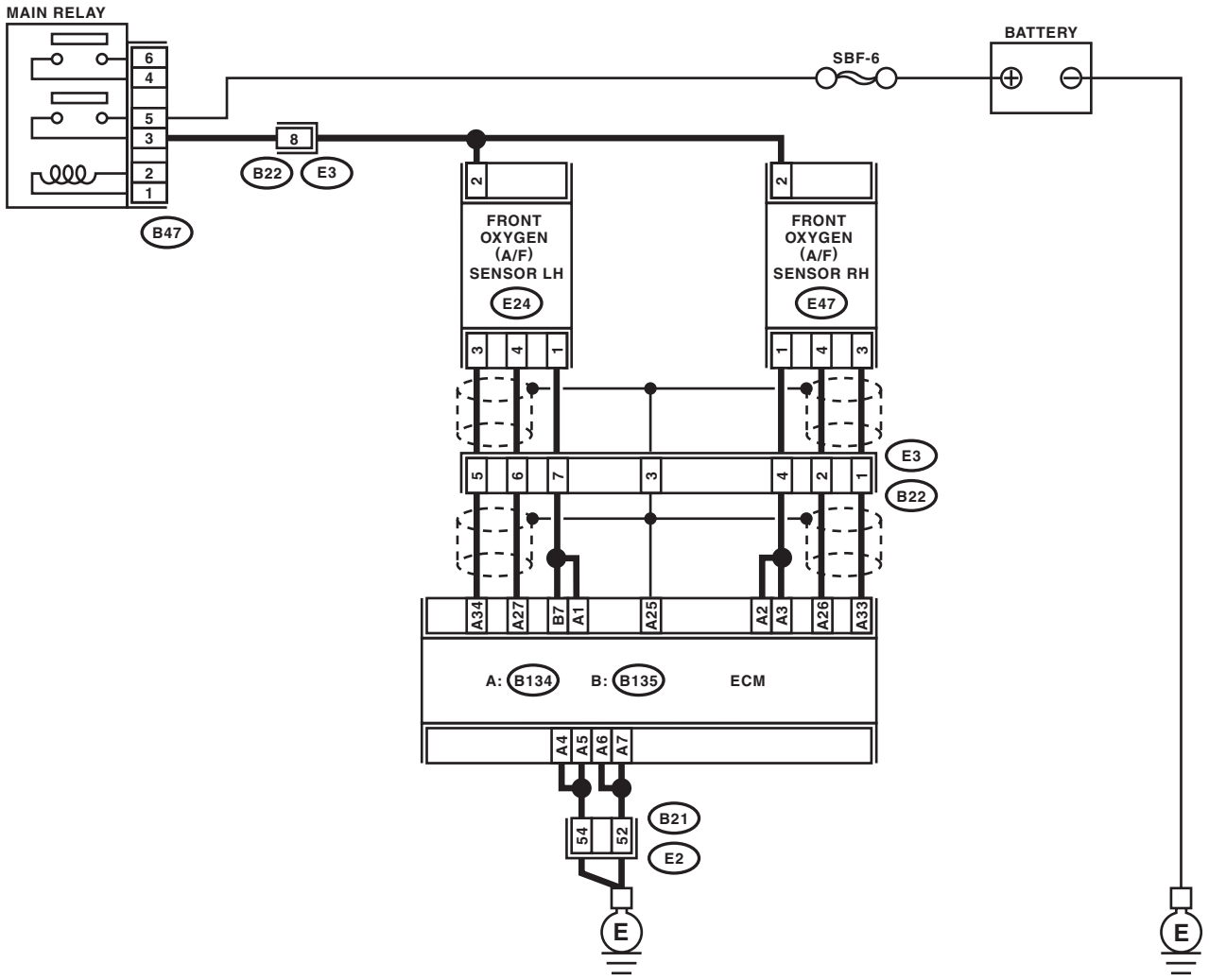
DTC DETECTING CONDITION:

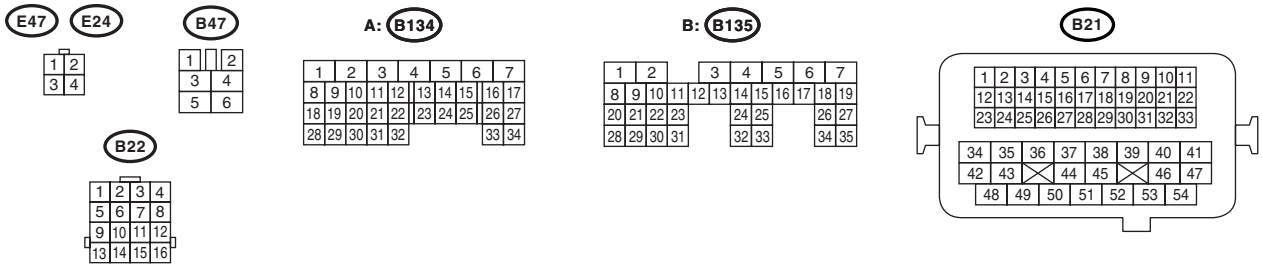
Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to ON. 2) Disconnect the connector from front oxygen (A/F) sensor. 3) Measure the voltage of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B134) No. 27 (+) — Chassis ground (−):*** ***(B134) No. 34 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>	Repair the battery short circuit in harness between ECM and front oxygen (A/F) sensor connector.

AK:DTC P0153 O2 SENSOR CIRCUIT SLOW RESPONSE (BANK 2 SENSOR 1)

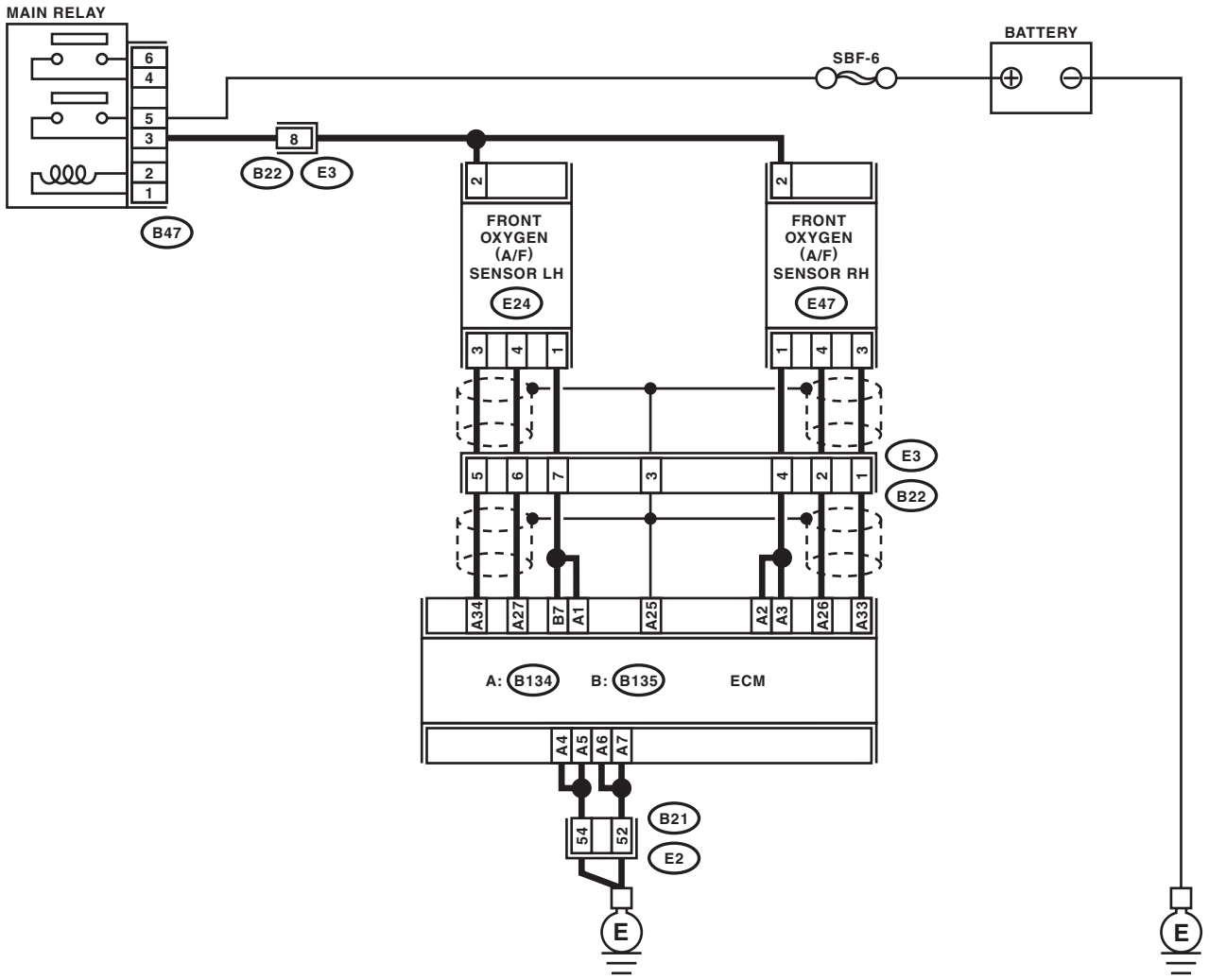
DTC DETECTING CONDITION:

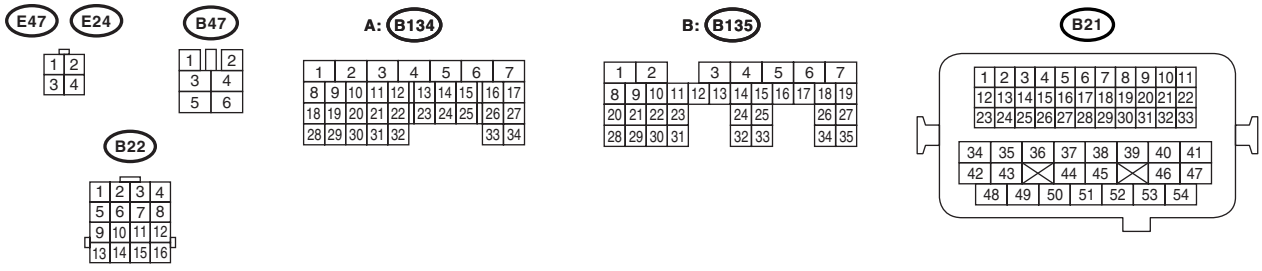
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

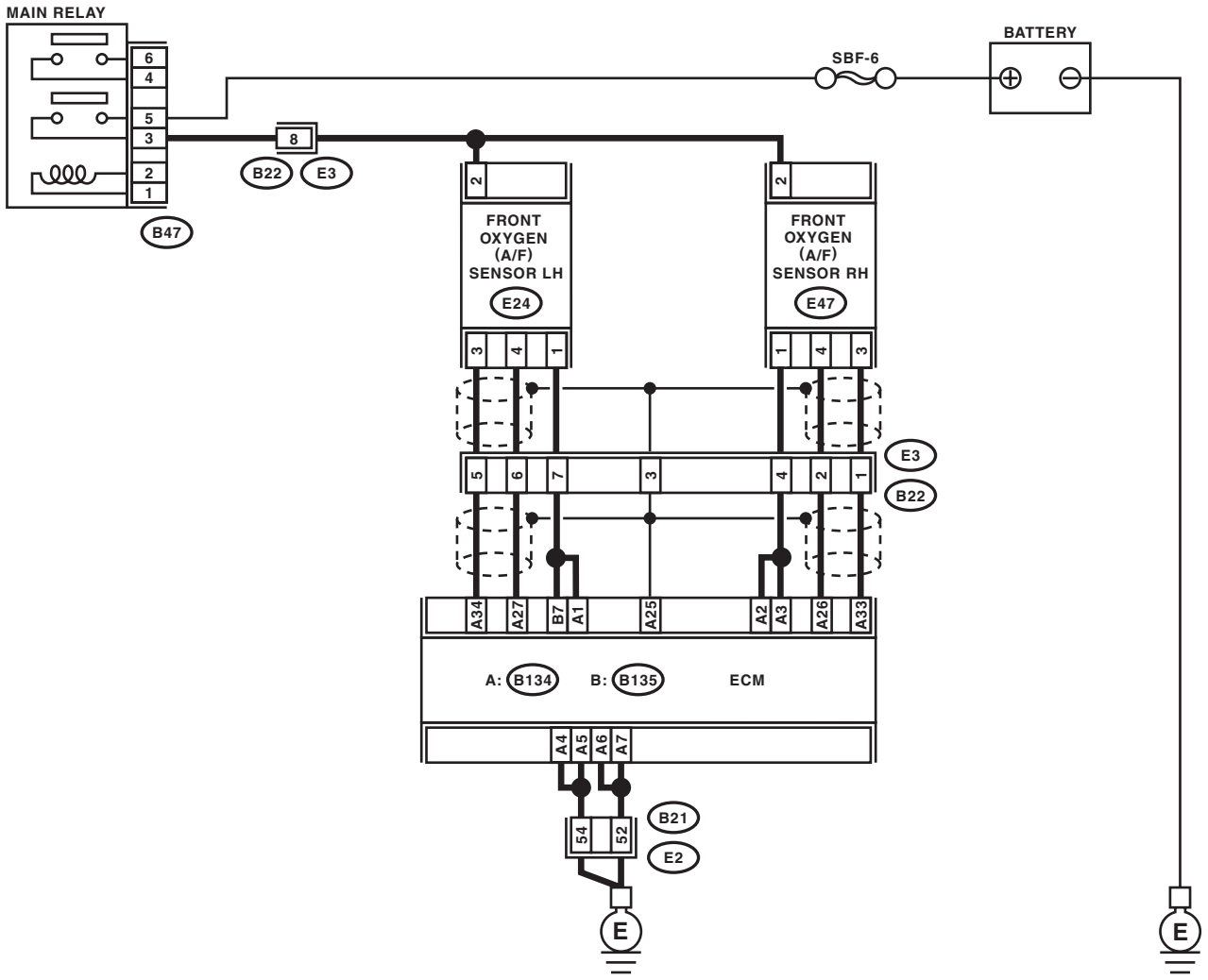
	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0133.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** NOTE: Check the following items: • Loose installation of front portion of exhaust pipe onto cylinder heads • Loose connection between front exhaust pipe and front catalytic converter • Damage of exhaust pipe resulting in a hole	Is there any fault in exhaust system?	Repair exhaust system.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

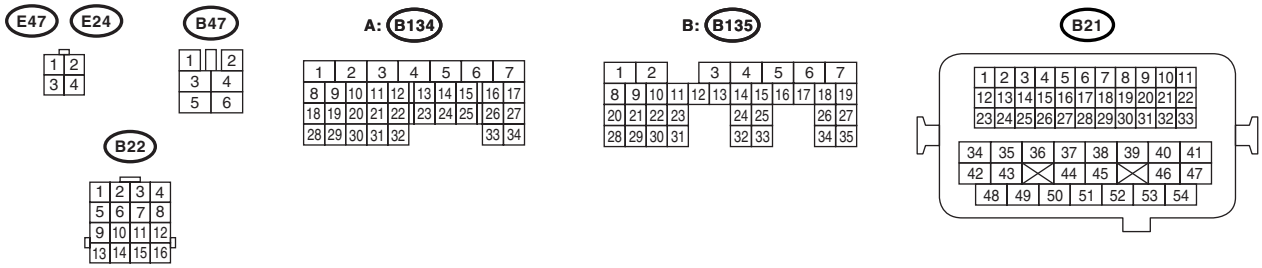
AL:DTC P0154 O2 SENSOR CIRCUIT NO ACTIVITY DETECTED (BANK 2 SENSOR 1)

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02495

	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and front oxygen (A/F) sensor connector. 3) Measure the resistance of harness between ECM and front oxygen (A/F) sensor connector. ***Connector & terminal*** ***(B134) No. 27 — (E24) No. 4:*** ***(B134) No. 34 — (E24) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and front oxygen (A/F) sensor connector • Poor contact in front oxygen (A/F) sensor connector • Poor contact in ECM connector
2	**CHECK POOR CONTACT.** Check poor contact in front oxygen (A/F) sensor connector.	Is there poor contact in front oxygen (A/F) sensor connector?	Repair the poor contact in front oxygen (A/F) sensor connector.	Replace the front oxygen (A/F) sensor. <Ref. to FU(H6DO)-30, Front Oxygen (A/F) Sensor.>

AM:DTC P0157 O2 SENSOR CIRCUIT LOW VOLTAGE (BANK 2 SENSOR 2)

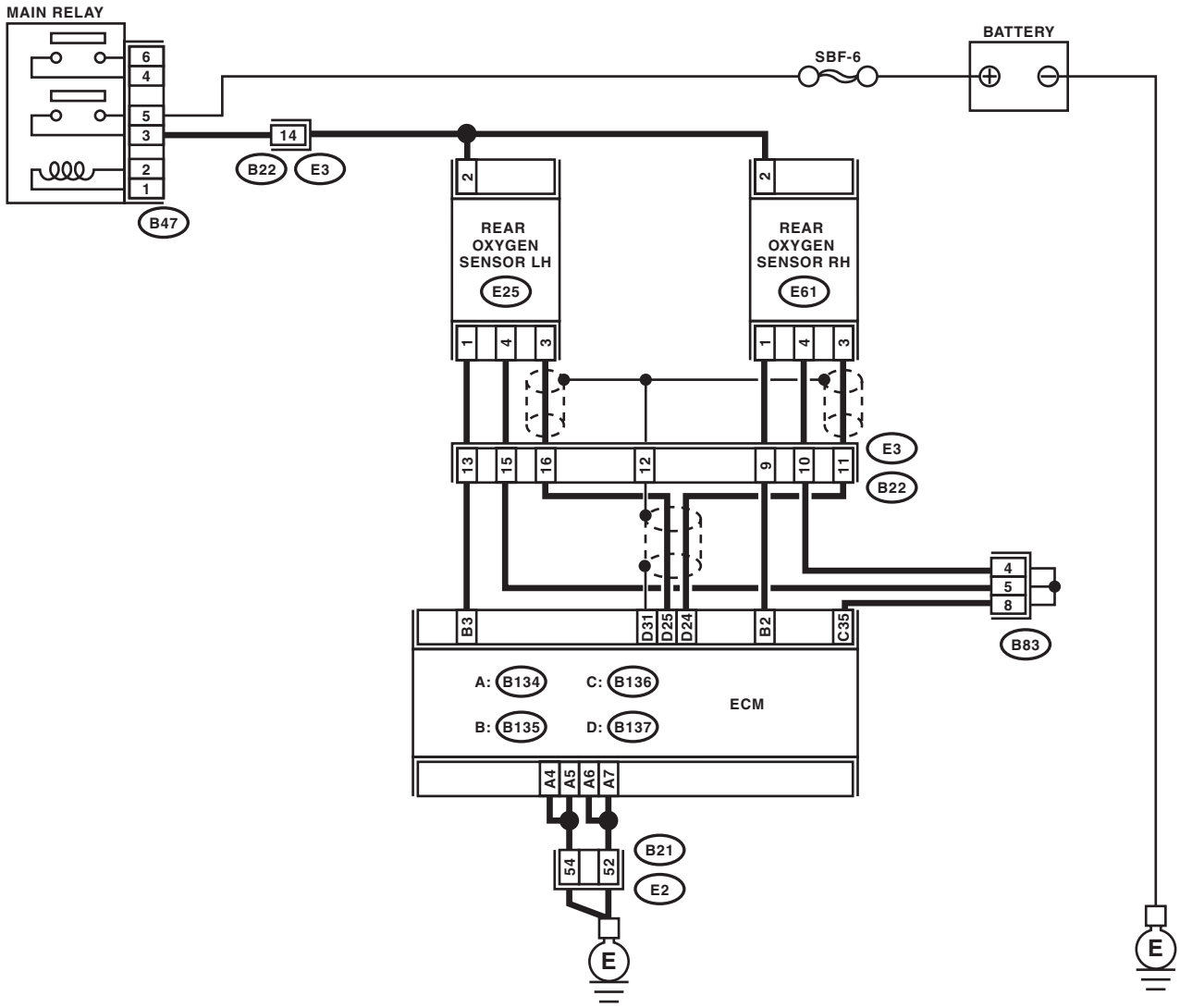
DTC DETECTING CONDITION:

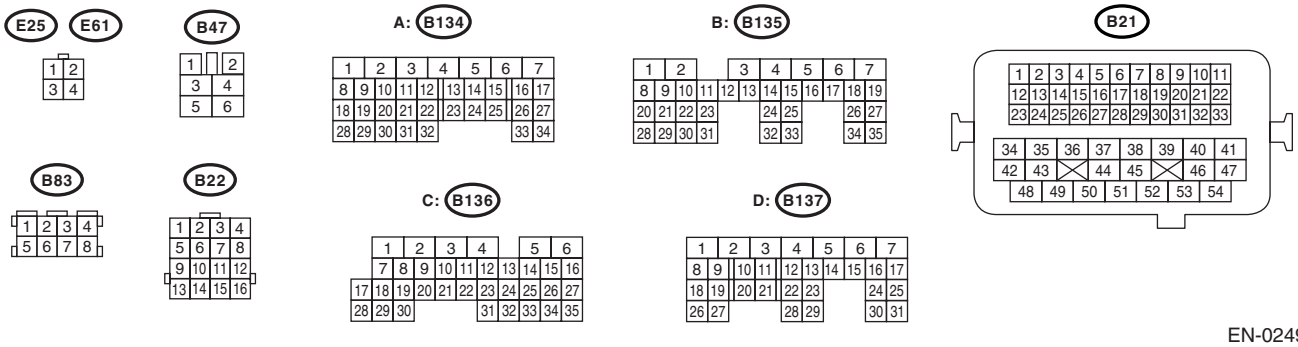
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0137.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and keep the engine speed at 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 490 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 25 — (E25) No. 3:*** ***(B136) No. 35 — (E25) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

AN:DTC P0158 O2 SENSOR CIRCUIT HIGH VOLTAGE (BANK 2 SENSOR 2)

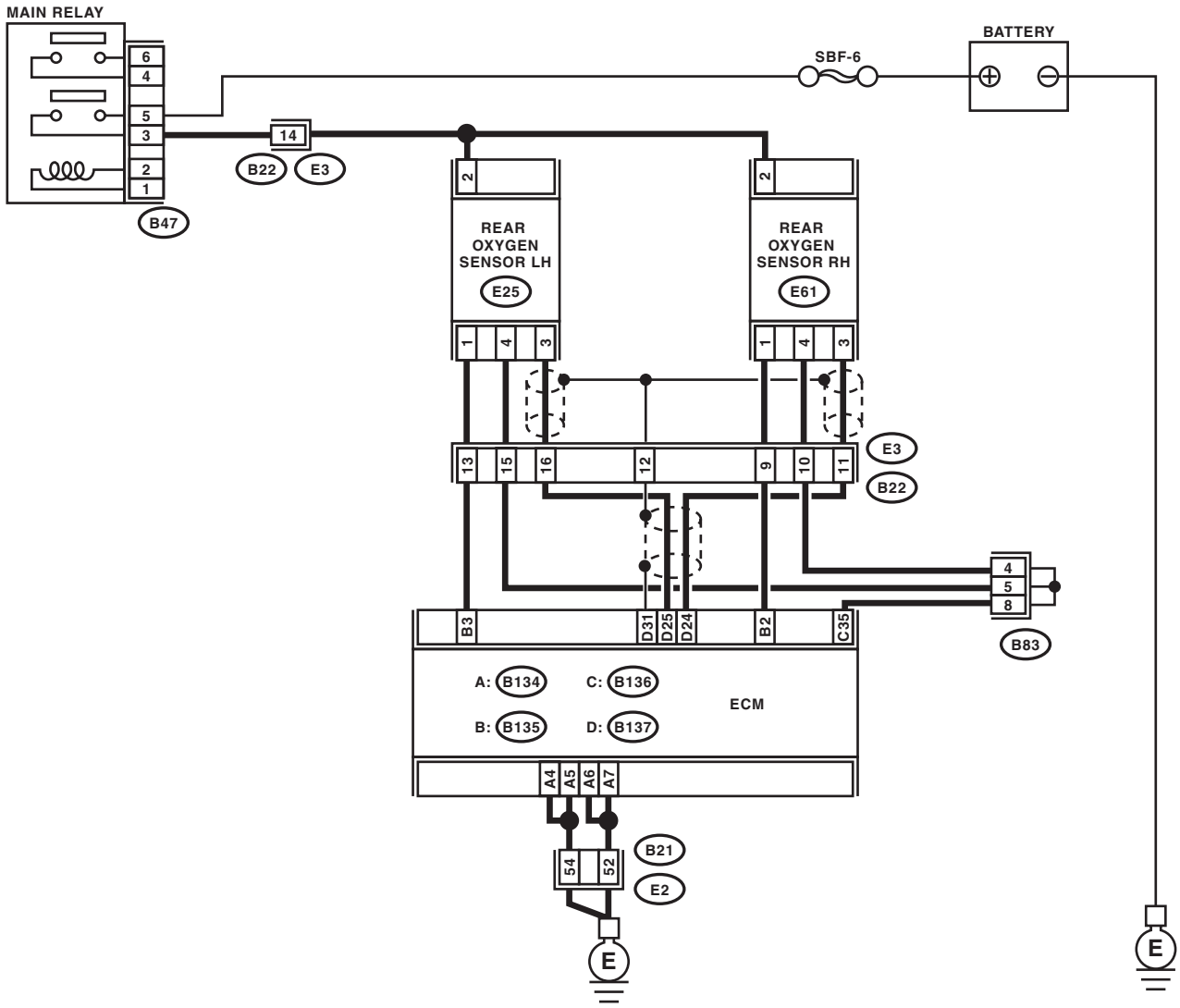
DTC DETECTING CONDITION:

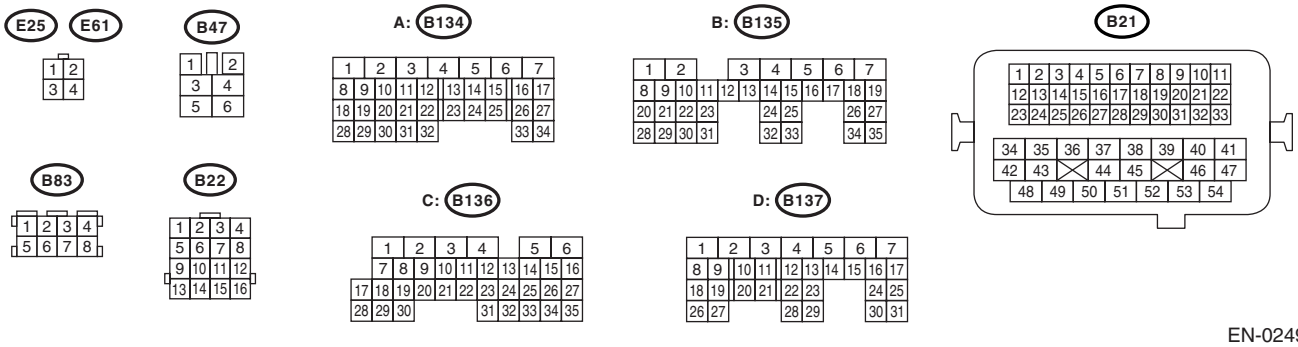
Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02496

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0138.	Go to step **2.**
2	**CHECK REAR OXYGEN SENSOR DATA.** 1) Warm-up the engine until engine coolant temperature is above 70°C (158°F), and lower the engine speed rapidly from 5,000 rpm. 2) Read the data of rear oxygen sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the “READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE”. <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the voltage more than 250 mV?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and rear oxygen sensor. 3) Measure the resistance in harness between ECM and rear oxygen sensor connector. ***Connector & terminal*** ***(B137) No. 25 — (E25) No. 3:*** ***(B136) No. 35 — (E25) No. 4:***	Is the resistance more than 3 Ω?	Repair the open circuit in harness between ECM and rear oxygen sensor connector.	Go to step **4.**
4	**CHECK HARNESS BETWEEN REAR OXYGEN SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear oxygen sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between rear oxygen sensor harness connector and chassis ground. ***Connector & terminal*** ***(E25) No. 3 (+) — Chassis ground (−):***	Is the voltage 0.2 — 0.5 V?	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between rear oxygen sensor and ECM connector • Poor contact in rear oxygen sensor connector • Poor contact in ECM connector

	Step	Check	Yes	No
5	**CHECK EXHAUST SYSTEM.** Check exhaust system parts. NOTE: Check the following items: • Loose part of exhaust system and incomplete installation • Damage (crack, hole etc.) of parts • Looseness and ill fitting of parts between front oxygen (A/F) sensor and rear oxygen sensor	Is there any fault in exhaust system?	Repair or replace the faulty part.	Replace the rear oxygen sensor. <Ref. to FU(H6DO)-32, Rear Oxygen Sensor.>

AO:DTC P0171 SYSTEM TOO LEAN (BANK 1)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-164, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AP:DTC P0172 SYSTEM TOO RICH (BANK 1)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-164, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AQ:DTC P0174 SYSTEM TOO LEAN (BANK 2)

Refer to DTC P0175 for diagnostic procedure. <Ref. to EN(H6DO)(diag)-164, DTC P0175 SYSTEM TOO RICH (BANK 2), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AR:DTC P0175 SYSTEM TOO RICH (BANK 2)

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Erroneous idling
- Engine stalls.
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK EXHAUST SYSTEM.**	Are there holes or loose bolts on exhaust system?	Repair exhaust system.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.**	Are there holes, loose bolts or disconnection of hose on air intake system?	Repair air intake system.	Go to step **3.**
3	**EGR VALVE CHECK.**	Is the EGR valve stuck?	Replace the EGR valve.	Go to step **4.**
4	**CHECK PURGE CONTROL SOLENOID VALVE.**	Is the purge control solenoid valve stuck?	Replace the purge control solenoid valve.	Go to step **5.**
5	**PCV VALVE CHECK.**	Is the PCV valve stuck?	Replace the PCV valve.	Go to step **6.**
6	**CHECK FUEL PRESSURE.** **Warning:** **• Place "NO FIRE" signs near the working area.** **• Be careful not to spill fuel.** 1) Release the fuel pressure. (1) Disconnect the connector from fuel pump relay. (2) Start the engine and run it until it stalls. (3) After the engine stalls, crank it for five more seconds. (4) Turn the ignition switch to OFF. 2) Connect the connector to fuel pump relay. 3) Disconnect the fuel delivery hose, and connect the fuel pressure gauge. 4) Install the fuel filler cap. 5) Start the engine and idle while gear position is neutral. 6) Measure the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again.	Is fuel pressure 333 — 363 kPa (3.4 — 3.7 kg/cm^2, 48 — 53 psi)?	Go to step **7.**	Repair the following items. Fuel pressure is too high: • Clogged fuel return line or bent hose Fuel pressure is too low: • Improper fuel pump discharge • Clogged fuel supply line

	Step	Check	Yes	No
7	**CHECK FUEL PRESSURE.** After connecting the pressure regulator vacuum hose, measure fuel pressure. **Warning:** **Release fuel pressure before removing the fuel pressure gauge.** NOTE: • If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then measure fuel pressure again. • If out of specification as measured at this step, check or replace pressure regulator and pressure regulator vacuum hose.	Is fuel pressure 279 — 309 kPa (2.85 — 3.15 kg/cm^2, 40 — 45 psi)?	Go to step **8.**	Repair the following items. Fuel pressure is too high: • Faulty pressure regulator • Clogged fuel return line or bent hose Fuel pressure is too low: • Faulty pressure regulator • Improper fuel pump discharge • Clogged fuel supply line
8	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** 1) Start the engine and warm-up completely. 2) Read the data of engine coolant temperature sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the engine coolant temperature 70 — 100°C (158 — 212°F)?	Go to step **9.**	Replace the engine coolant temperature sensor. <Ref. to FU(H6DO)-18, Engine Coolant Temperature Sensor.>
9	**CHECK MANIFOLD PRESSURE SENSOR SIGNAL.** 1) Start and warm-up the engine until engine coolant temperature is greater than 60°C (140°F). 2) Shift the select lever to "N" or "P" range. 3) Turn the A/C switch to OFF. 4) Turn all accessory switches to OFF. 5) Read the data of manifold pressure sensor signal using Subaru Select Monitor. NOTE: For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.>	Is the measurement value at idling: 24.0 — 41.3 kPa (180 — 310 mmHg, 7.09 — 12.20 inHg), when ignition ON: 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.50 inHg)?	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the manifold absolute pressure sensor. <Ref. to FU(H6DO)-23, Manifold Absolute Pressure Sensor.>

AS:DTC P0197 ENGINE OIL TEMPERATURE SENSOR CIRCUIT LOW

DTC DETECTING CONDITION:
Immediately at fault recognition

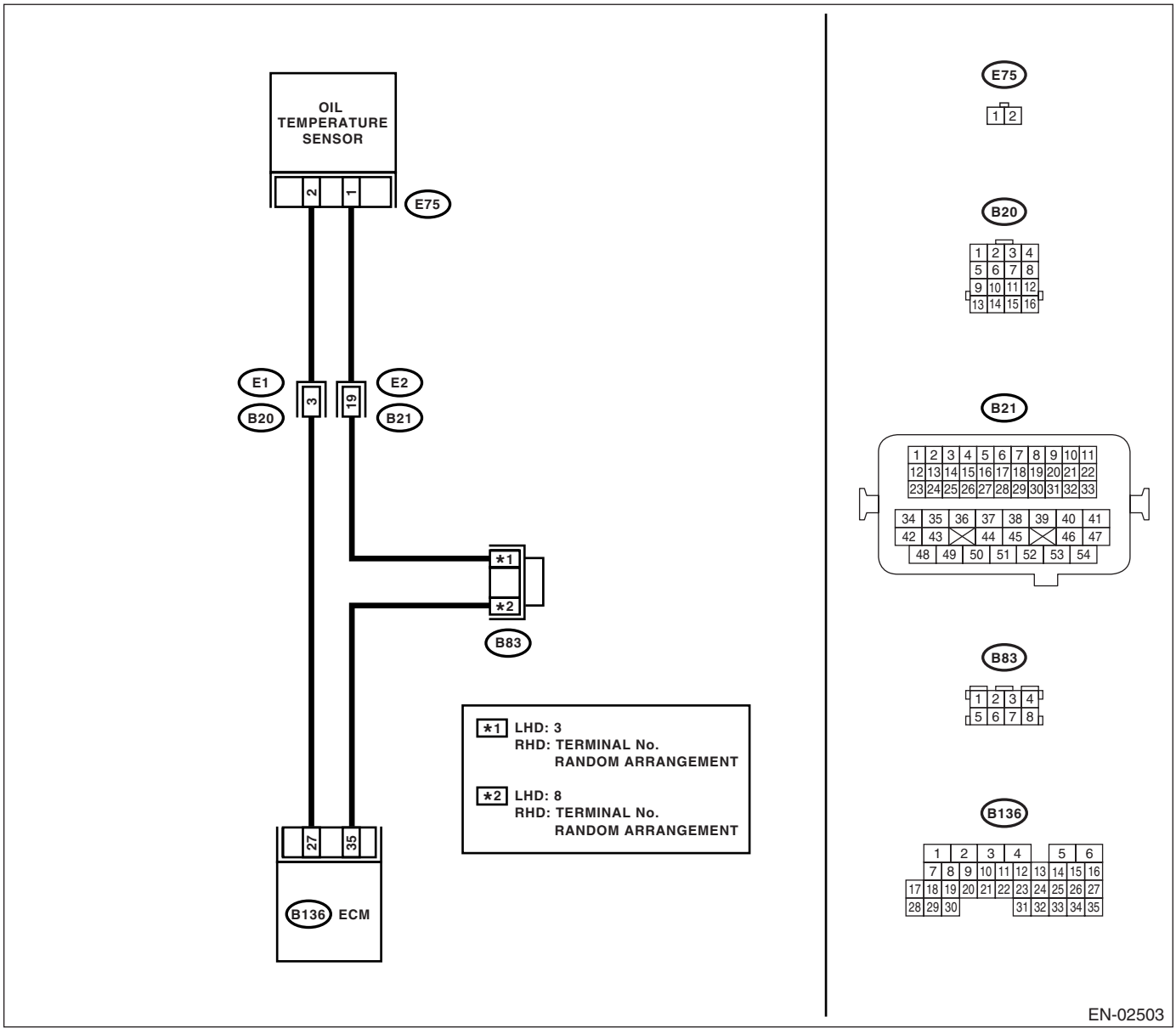
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Disconnect the ECM connector and oil temperature sensor connector. 2) Measure the resistance of harness between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(B136) No. 27 — Engine ground:*** ***(B136) No. 35 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit between ECM and oil temperature sensor connector.
2	**CHECK POOR CONTACT.** Check poor contact in oil temperature sensor connector.	Is there poor contact in oil temperature sensor connector?	Repair the poor contact.	Replace the oil temperature sensor. <Ref. to FU(H6DO)-29, Oil Temperature Sensor.>

AT:DTC P0198 ENGINE OIL TEMPERATURE SENSOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

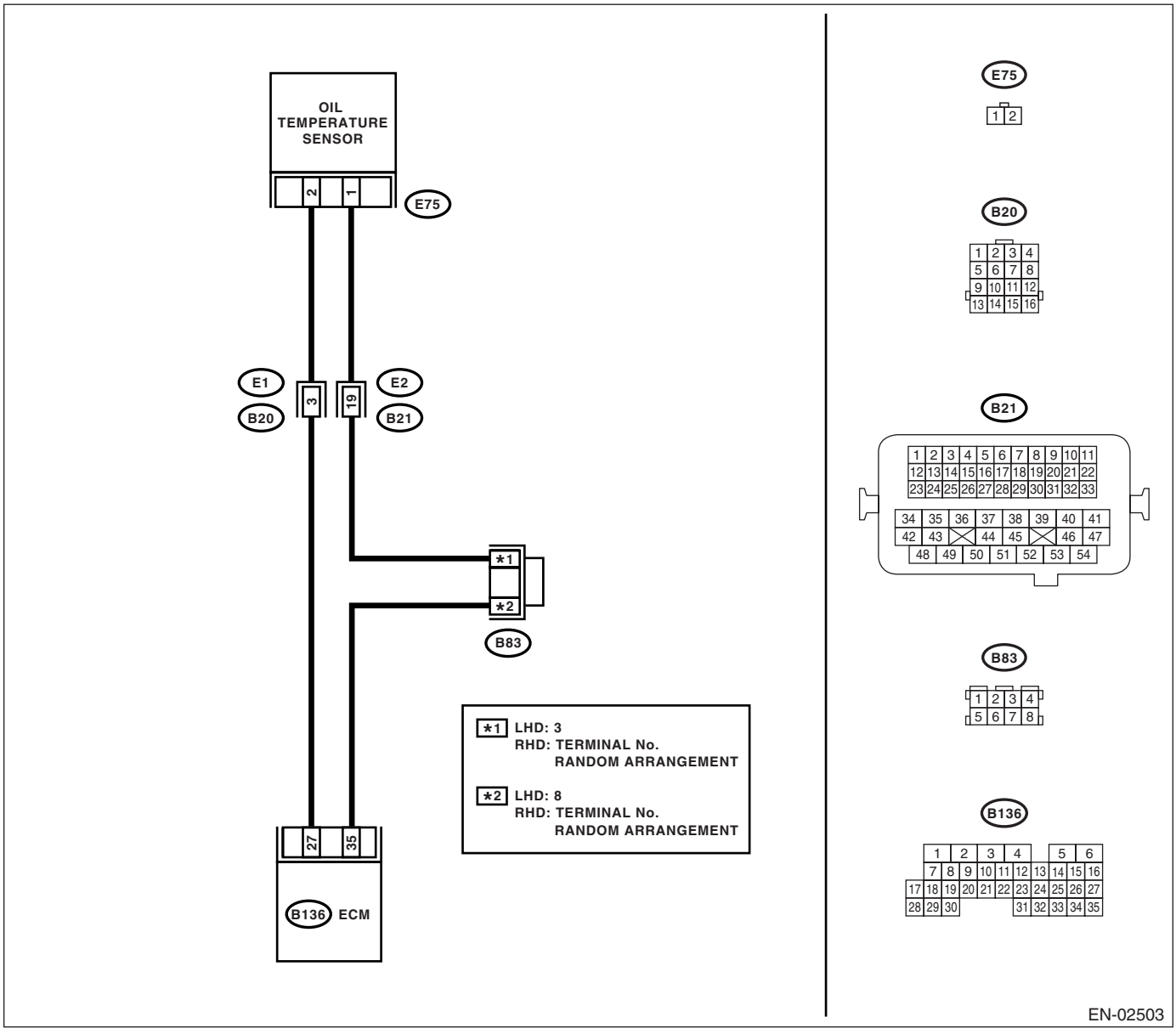
TROUBLE SYMPTOM:

- Hard to start
- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the oil temperature sensor. 3) Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and oil temperature sensor connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (−):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and oil temperature sensor connector.	Go to step **3.**
3	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** Measure the voltage between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 2 (+) — Engine ground (−):***	Is the voltage more than 4 V?	Go to step **4.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil temperature sensor connector • Poor contact in oil temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK HARNESS BETWEEN OIL TEMPERATURE SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between oil temperature sensor connector and engine ground. ***Connector & terminal*** ***(E75) No. 1 — Engine ground:***	Is the resistance less than 5 Ω?	Replace the oil temperature sensor. <Ref. to FU(H6DO)-29, Oil Temperature Sensor.>	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil temperature sensor connector • Poor contact in oil temperature sensor connector • Poor contact in ECM connector • Poor contact in coupling connector • Poor contact in joint connector

AU:DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW INPUT

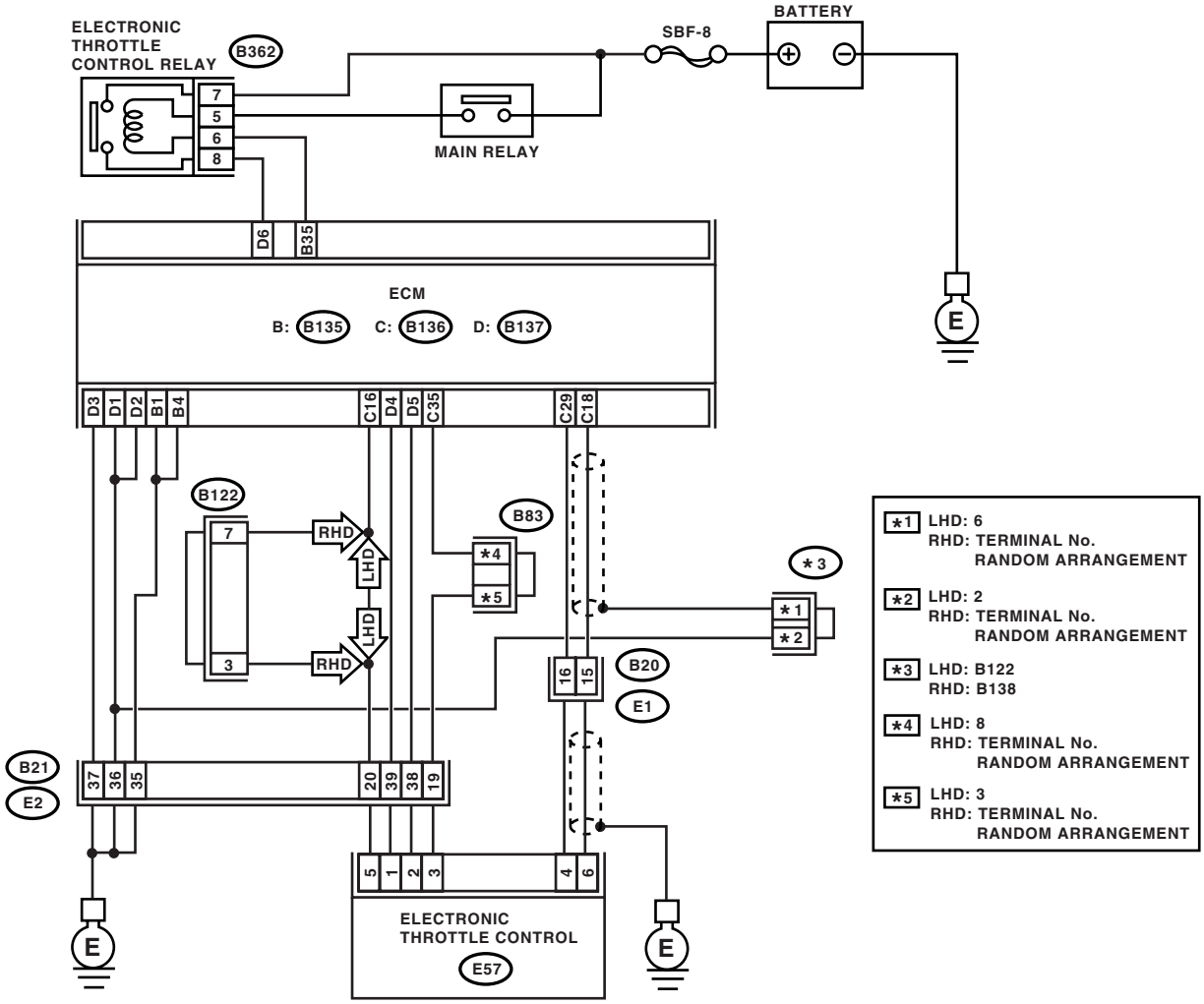
DTC DETECTING CONDITION:

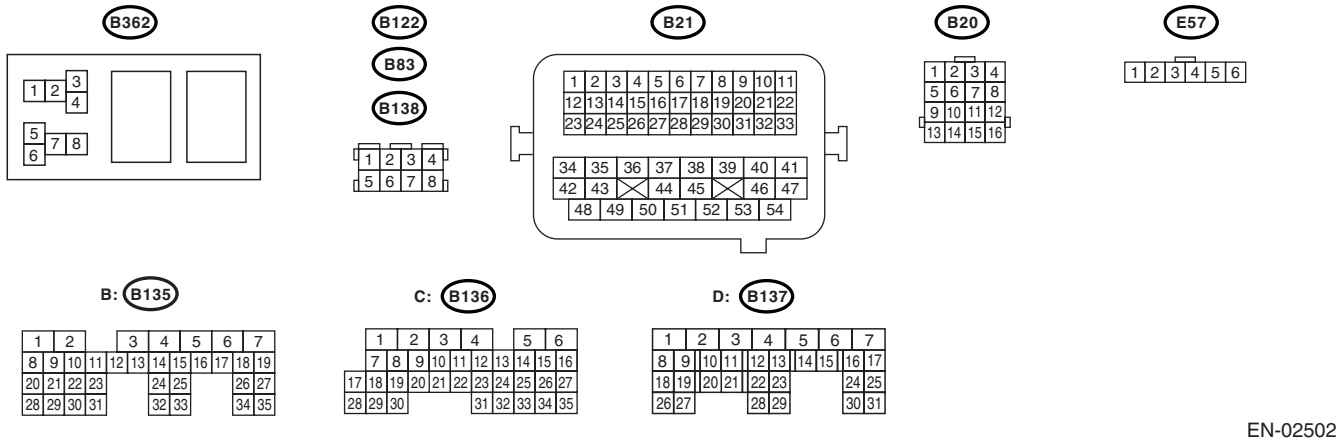
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contactrepair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
6	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Repair the poor contact in electronic throttle control connector. Replace the electronic throttle control if defective.	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

AV:DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH INPUT

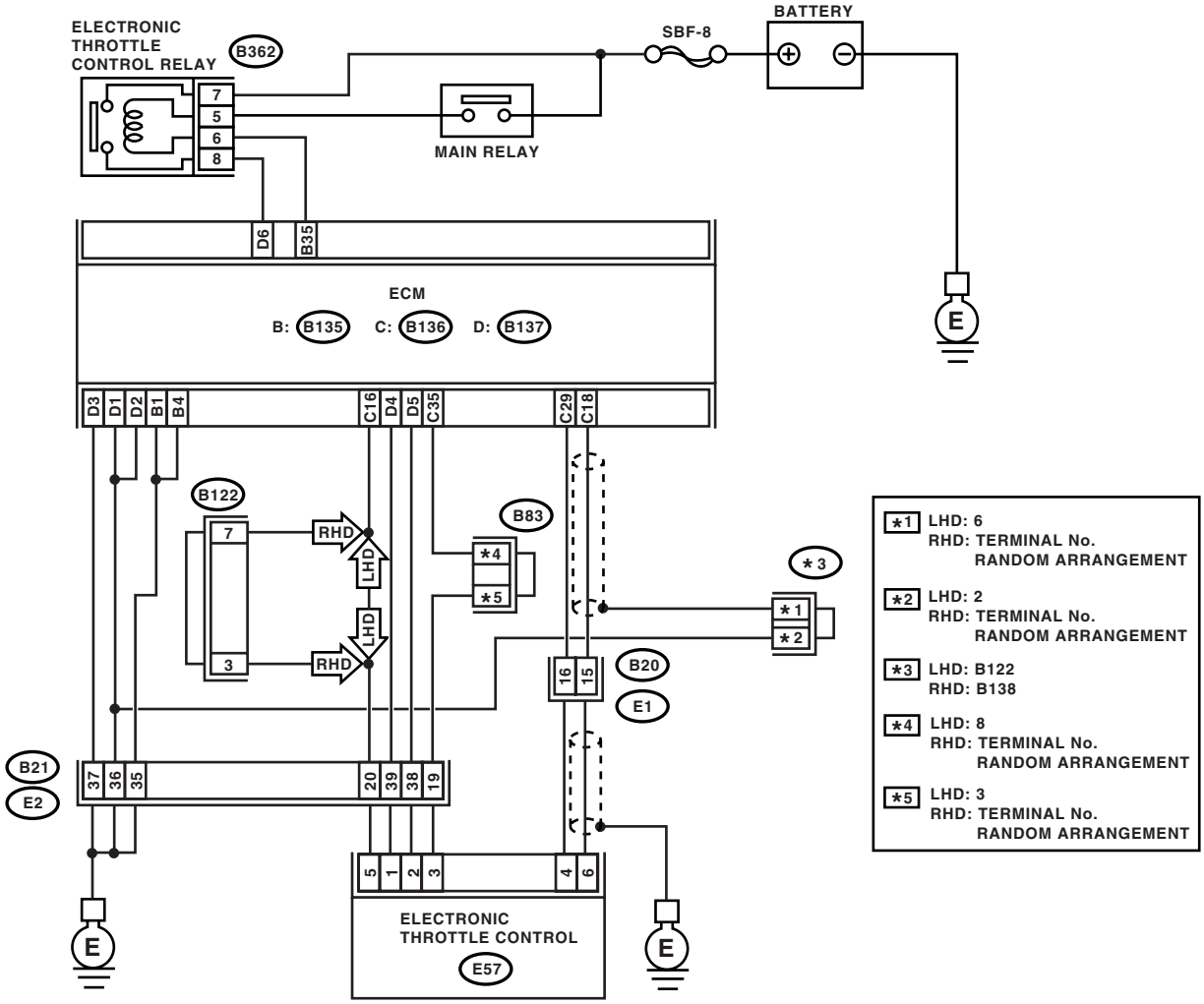
DTC DETECTING CONDITION:

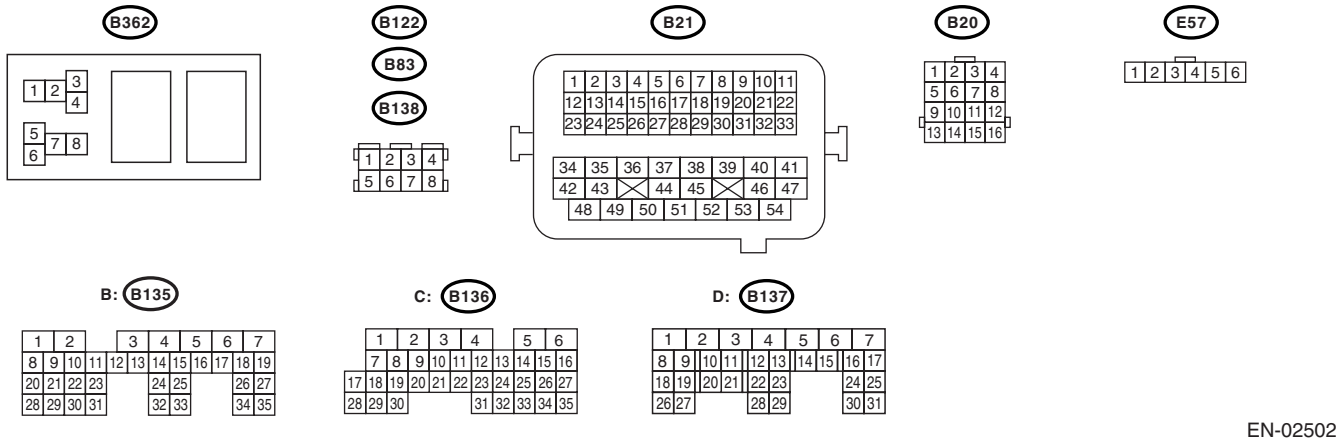
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact in connector between ECM and electronic throttle control?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
6	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between connector terminals. ***Connector & terminal*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact. Repair the electronic throttle control.	Sensor power supply circuit may be shorted.

AW:DTC P0230 FUEL PUMP PRIMARY CIRCUIT

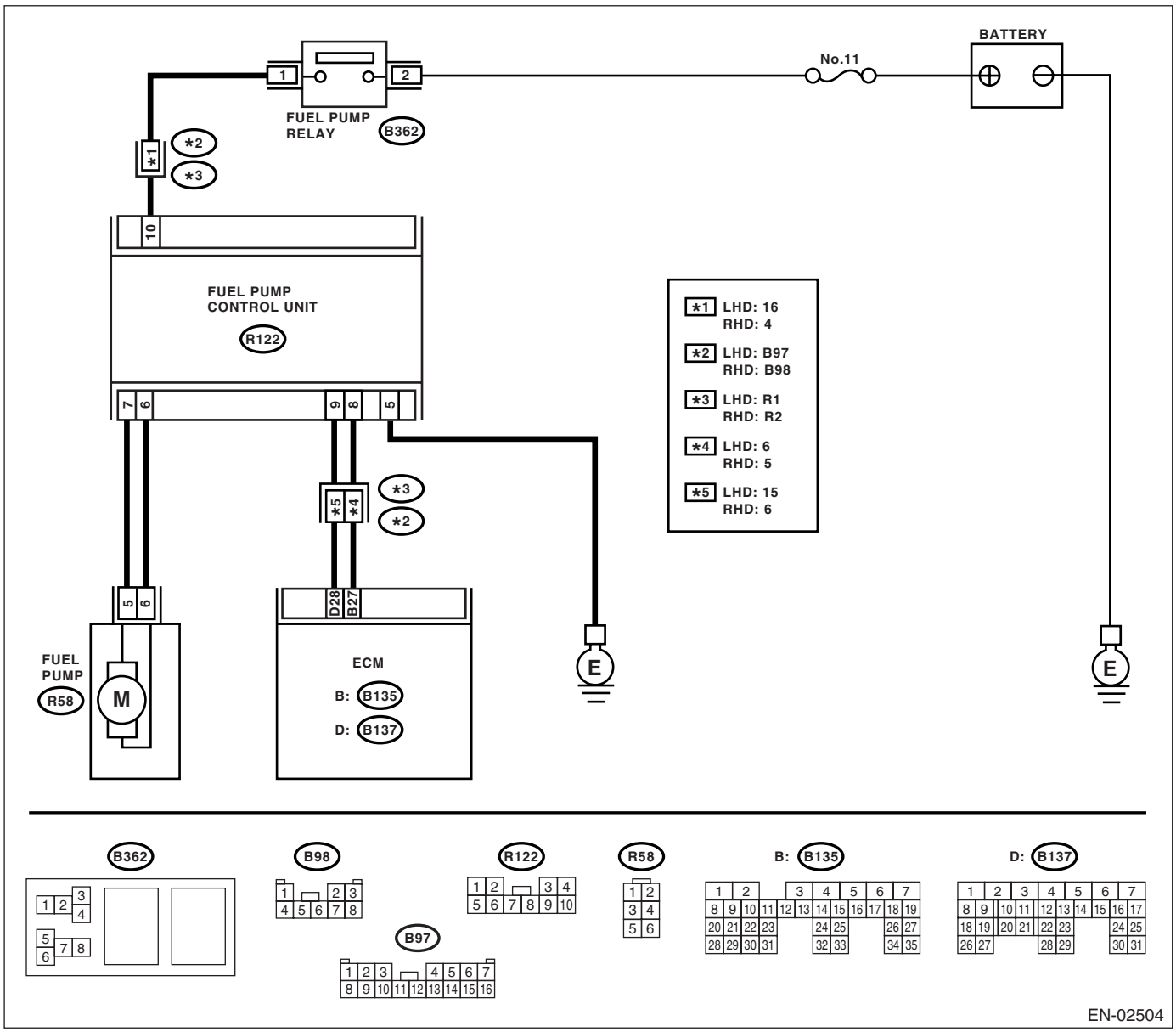
DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel pump control unit. 3) Turn the ignition switch to ON. 4) Measure the voltage between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the power supply circuit. NOTE: In this case repair the following: • Open or ground short circuit in harness between fuel pump relay and fuel pump control unit. • Poor contact in fuel pump control unit connector. • Poor contact in fuel pump relay connector.
2	**CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 5 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit between fuel pump control unit and chassis ground. • Poor contact in fuel pump control unit connector.
3	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** 1) Disconnect the connector from fuel pump. 2) Measure the resistance of harness between fuel pump control unit and fuel pump connector. ***Connector & terminal*** ***(R122) No. 7 — (R58) No. 5:*** ***(R122) No. 6 — (R58) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit between fuel pump control unit and fuel pump.
4	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 7 — Chassis ground:*** ***(R122) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit between fuel pump control unit and fuel pump.

	Step	Check	Yes	No
5	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance in harness between fuel pump control unit and ECM connector. ***Connector & terminal*** ***(R122) No. 9 — (B137) No. 28:*** ***(R122) No. 8 — (B135) No. 27:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit between fuel pump control unit and ECM. • Poor contact in fuel pump control unit and ECM connector
6	**CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND ECM CONNECTOR.** Measure the resistance of harness between fuel pump control unit and chassis ground. ***Connector & terminal*** ***(R122) No. 9 — Chassis ground:*** ***(R122) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the ground short circuit between fuel pump control unit and ECM.
7	**CHECK POOR CONTACT.** Check poor contact in ECM and fuel pump control unit connector.	Is there poor contact in ECM and fuel pump control unit connector?	Repair the poor contactrepair the poor contact in ECM and fuel pump control unit connector.	Go to step **8.**
8	**CHECK EXPERIENCE OF RUNNING OUT OF FUEL.**	Did the vehicle experience running out of fuel?	Finish the diagnosis. NOTE: DTC record may be conducted as a result of fuel pump idling while running out of gas.	Replace the fuel pump control unit. <Ref. to FU(H6DO)-38, Fuel Pump Control Unit.>

AX:DTC P0301 CYLINDER 1 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AY:DTC P0302 CYLINDER 2 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AZ:DTC P0303 CYLINDER 3 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BA:DTC P0304 CYLINDER 4 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BB:DTC P0305 CYLINDER 5 MISFIRE DETECTED

NOTE:
For the diagnostic procedure, refer to DTC P0306. <Ref. to EN(H6DO)(diag)-178, DTC P0306 CYLINDER 6 MISFIRE DETECTED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BC:DTC P0306 CYLINDER 6 MISFIRE DETECTED

DTC DETECTING CONDITION:

- Two consecutive driving cycles with fault
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

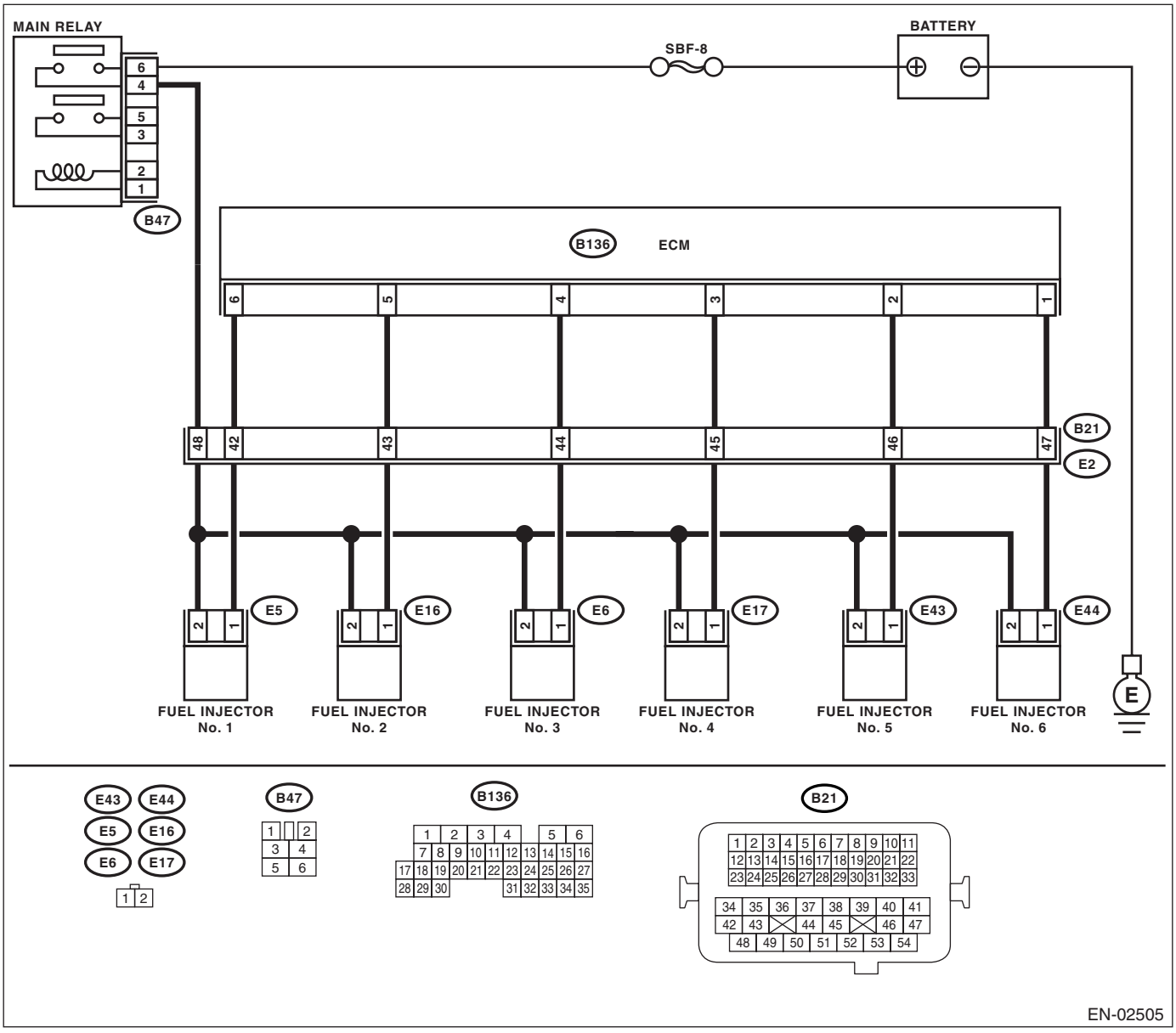
TROUBLE SYMPTOM:

- Engine stalls.
- Erroneous idling
- Rough driving

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0301, P0302, P0304, P0305 and P0306.	Go to step **2.**
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):*** ***#5 (B136) No. 2 (+) — Chassis ground (–):*** ***#6 (B136) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **3.**
3	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Measure the resistance between ECM connector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 1 — Engine ground:*** ***#2 (E16) No. 1 — Engine ground:*** ***#3 (E6) No. 1 — Engine ground:*** ***#4 (E17) No. 1 — Engine ground:*** ***#5 (E43) No. 1 — Engine ground:*** ***#6 (E44) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the ground short circuit in harness between fuel injector and ECM connector.
4	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** Measure the resistance of harness connector between ECM connector and fuel injector on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 — (E5) No. 1:*** ***#2 (B136) No. 5 — (E16) No. 1:*** ***#3 (B136) No. 4 — (E6) No. 1:*** ***#4 (B136) No. 3 — (E17) No. 1:*** ***#5 (B136) No. 2 — (E43) No. 1:*** ***#6 (B136) No. 1 — (E44) No. 2:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and fuel injector connector • Poor contact in coupling connector
5	**CHECK FUEL INJECTOR.** Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 5 — 20 Ω?	Go to step **6.**	Replace the faulty fuel injector. <Ref. to FU(H6DO)-26, Fuel Injector.>

	Step	Check	Yes	No
6	**CHECK POWER SUPPLY LINE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between fuel injector and engine ground on faulty cylinders. ***Connector & terminal*** ***#1 (E5) No. 2 (+) — Engine ground (–):*** ***#2 (E16) No. 2 (+) — Engine ground (–):*** ***#3 (E6) No. 2 (+) — Engine ground (–):*** ***#4 (E17) No. 2 (+) — Engine ground (–):*** ***#5 (E43) No. 2 (+) — Engine ground (–):*** ***#6 (E44) No. 2 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in all connectors in fuel injector circuit.	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between main relay and fuel injector on faulty cylinders • Poor contact in coupling connector • Poor contact in main relay connector • Poor contact in fuel injector connector on faulty cylinders
7	**CHECK HARNESS BETWEEN FUEL INJECTOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from fuel injector on faulty cylinder. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground on faulty cylinders. ***Connector & terminal*** ***#1 (B136) No. 6 (+) — Chassis ground (–):*** ***#2 (B136) No. 5 (+) — Chassis ground (–):*** ***#3 (B136) No. 4 (+) — Chassis ground (–):*** ***#4 (B136) No. 3 (+) — Chassis ground (–):*** ***#5 (B136) No. 2 (+) — Chassis ground (–):*** ***#6 (B136) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and fuel injector. After repair, replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Go to step **8.**
8	**CHECK FUEL INJECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between fuel injector terminals on faulty cylinder. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the faulty fuel injector and ECM. <Ref. to FU(H6DO)-26, Fuel Injector.> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Go to step **9.**
9	**CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.**	Is the camshaft position sensor or crankshaft position sensor loosely installed?	Tighten camshaft position sensor or crankshaft position sensor.	Go to step **10.**
10	**CHECK CRANK PLATE.**	Is the crank sprocket rusted or the teeth of crank plate broken?	Replace the crank plate. <Ref. to ME(H6DO)-63, Cylinder Block.>	Go to step **11.**
11	**CHECK INSTALLATION CONDITION OF TIMING CHAIN.** Turn the crankshaft using ST, and align alignment mark on crank sprocket with alignment mark on cylinder block. ST 18252AA000 CRANKSHAFT SOCKET	Is the timing chain dislocated from its proper position?	Repair installation condition of timing chain. <Ref. to ME(H6DO)-45, Timing Chain Assembly.>	Go to step **12.**

	Step	Check	Yes	No
12	**CHECK FUEL LEVEL.**	Is the fuel meter indication lower than the “Lower” level?	Replenish fuel so fuel meter indication is higher than the “Lower” level. After replenishing fuel, Go to step **13.**	Go to step **13.**
13	**CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.** 1) Clear the memory using Subaru Select Monitor. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Start the engine, and drive the vehicle more than 10 minutes.	Does the malfunction indicator light illuminate or blink?	Go to step **15.**	Go to step **14.**
14	**CHECK CAUSE OF MISFIRE DIAGNOSED.**	Was the cause of misfire detected when the engine is running?	Finish diagnostics operation, if the engine has no abnormality.	Repair the poor contact. NOTE: In this case repair the following: • Poor contact in ignition coil connector • Poor contact in fuel injector connector on faulty cylinders • Poor contact in ECM connector • Poor contact in coupling connector
15	**CHECK AIR INTAKE SYSTEM.**	Is there any fault in air intake system?	Repair air intake system. NOTE: Check the following items: • Are there air leaks or air suction caused by loose or dislocated nuts and bolts? • Are there cracks or any disconnection of hoses?	Go to step **16.**

	Step	Check	Yes	No
16	**CHECK MISFIRE SYMPTOM.** 1) Turn the ignition switch to ON. 2) READ DTC. <Ref. to EN(H6DO)(diag)-32, Read Diagnostic Trouble Code (DTC).>	Does the Subaru Select Monitor or OBD-II general scan tool indicate a DTC?	Go to step **22.**	Go to step **17.**
17	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0301 and P0302 displayed?	Go to step **23.**	Go to step **18.**
18	**CHECK DTC ON DISPLAY.**	Is DTC P0303 and P0304 displayed?	Go to step **24.**	Go to step **19.**
19	**CHECK DTC ON DISPLAY.**	Is DTC P0305 and P0306 displayed?	Go to step **25.**	Go to step **20.**
20	**CHECK DTC ON DISPLAY.**	Is DTC P0301, P0303 and P0305 displayed?	Go to step **26.**	Go to step **21.**
21	**CHECK DTC ON DISPLAY.**	Is DTC P0302, P0304 and P0306 displayed?	Go to step **27.**	Go to step **28.**
22	**ONLY ONE CYLINDER.**	Is there any fault in that cylinder?	Repair or replace the faulty part. NOTE: Check the following items: • Spark plug • Fuel injector • Compression ratio	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>
23	**GROUP OF #1 AND #2 CYLINDERS.**	Is there any fault in #1 and #2 cylinders?	Repair or replace the faulty part. NOTE: • Check the following items: • Spark plug • Fuel injector • Ignition coil • Compression ratio • If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #1 and #2 cylinders side. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
24	GROUP OF #3 AND #4 CYLINDERS.	Is there any fault in #3 and #4 cylinders?	Repair or replace the faulty part. NOTE: • Check the following items: • Spark plug • Fuel injector • Ignition coil • If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #3 and #4 cylinders side. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>
25	GROUP OF #5 AND #6 CYLINDERS.	Is there any fault in #5 and #6 cylinder?	Repair or replace the faulty part. NOTE: • Check the following items: • Spark plug • Fuel injector • Ignition coil • Compression ratio • If no abnormal is discovered, check for “IGNITION CONTROL SYSTEM” of #5 and #6 cylinders side. <Ref. to EN(H6DO)(diag)-59, IGNITION CONTROL SYSTEM, Diagnostics for Engine Starting Failure.>	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>
26	GROUP OF #1, #3 AND #5 CYLINDERS.	Is there any fault in #1, #3 and #5 cylinders?	Repair or replace the faulty part. NOTE: Check the following items: • Spark plug • Fuel injector • Skipping timing chain teeth	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

Step		Check	Yes	No
27	**GROUP OF #2, #4 AND #6 CYLINDERS.**	Is there any fault in #2, #4 and #6 cylinders?	Repair or replace the faulty part. NOTE: Check the following items: • Spark plug • Fuel injector • Compression ratio • Skipping timing chain teeth	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>
28	**CYLINDER AT RANDOM.**	Is the engine idle rough?	Inspect the DTC P0171, P0172, P0174 or P0175 using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Repair or replace the faulty part. NOTE: Check the following items: • Spark plug • Fuel injector • Compression ratio

BD:DTC P0327 KNOCK SENSOR 1 CIRCUIT LOW INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

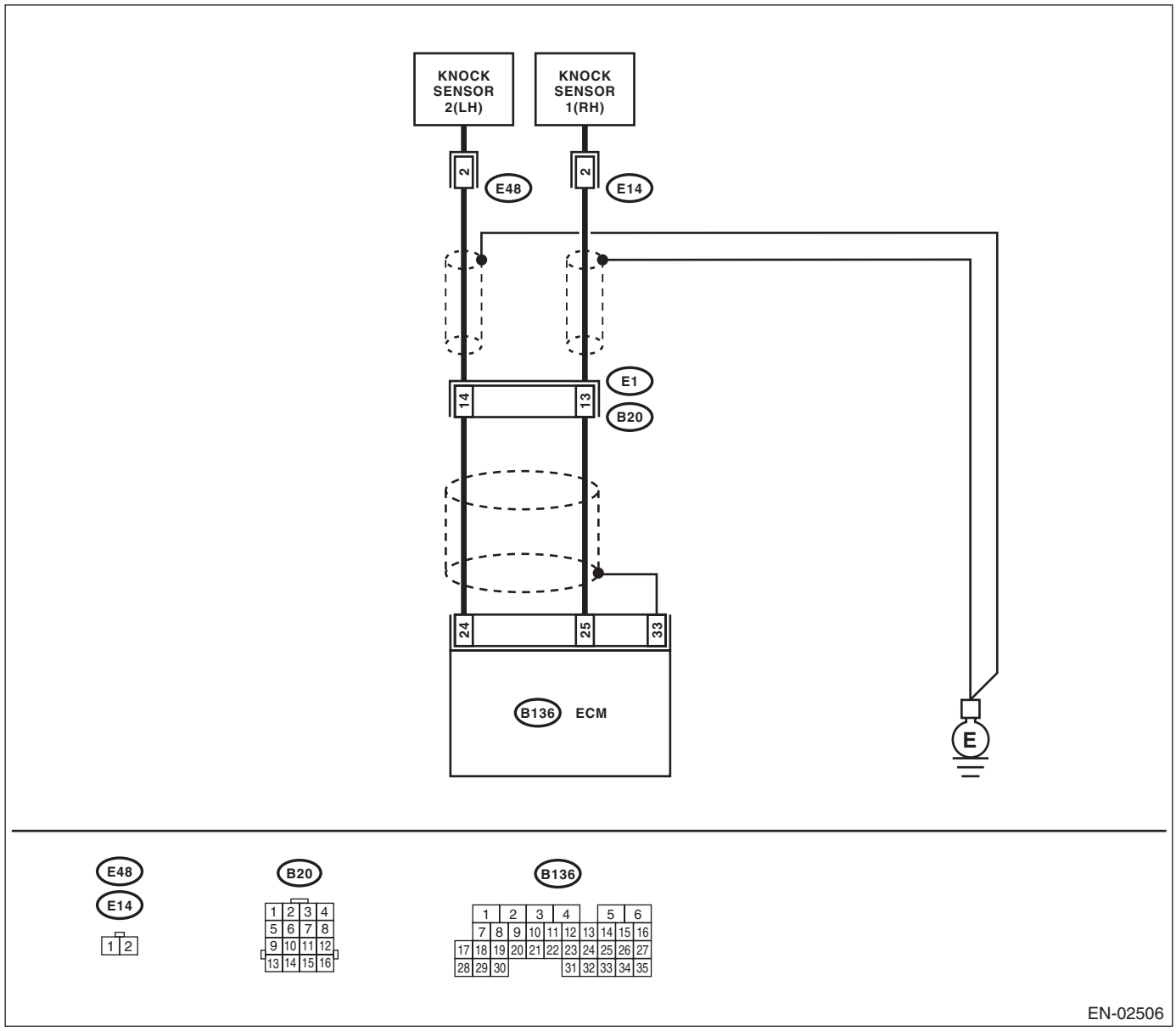
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Poor contact in knock sensor connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H6DO)-21, Knock Sensor.>	Tighten knock sensor installation bolt securely.

BE:DTC P0328 KNOCK SENSOR 1 CIRCUIT HIGH INPUT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

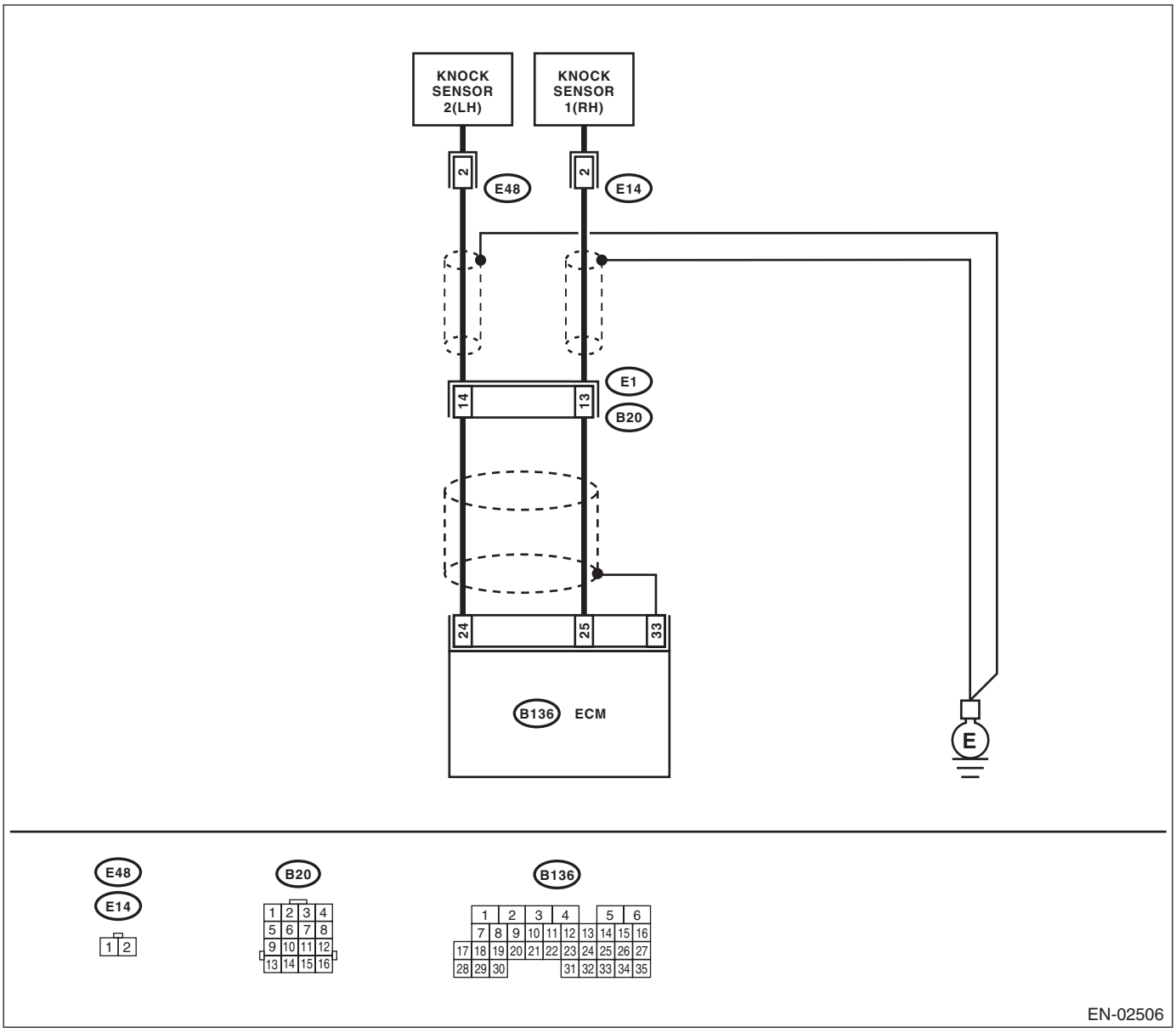
TROUBLE SYMPTOM:

- Poor driving performance
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 25 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H6DO)-21, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit in harness covered with shield.
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

BF:DTC P0332 KNOCK SENSOR 2 CIRCUIT LOW INPUT (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

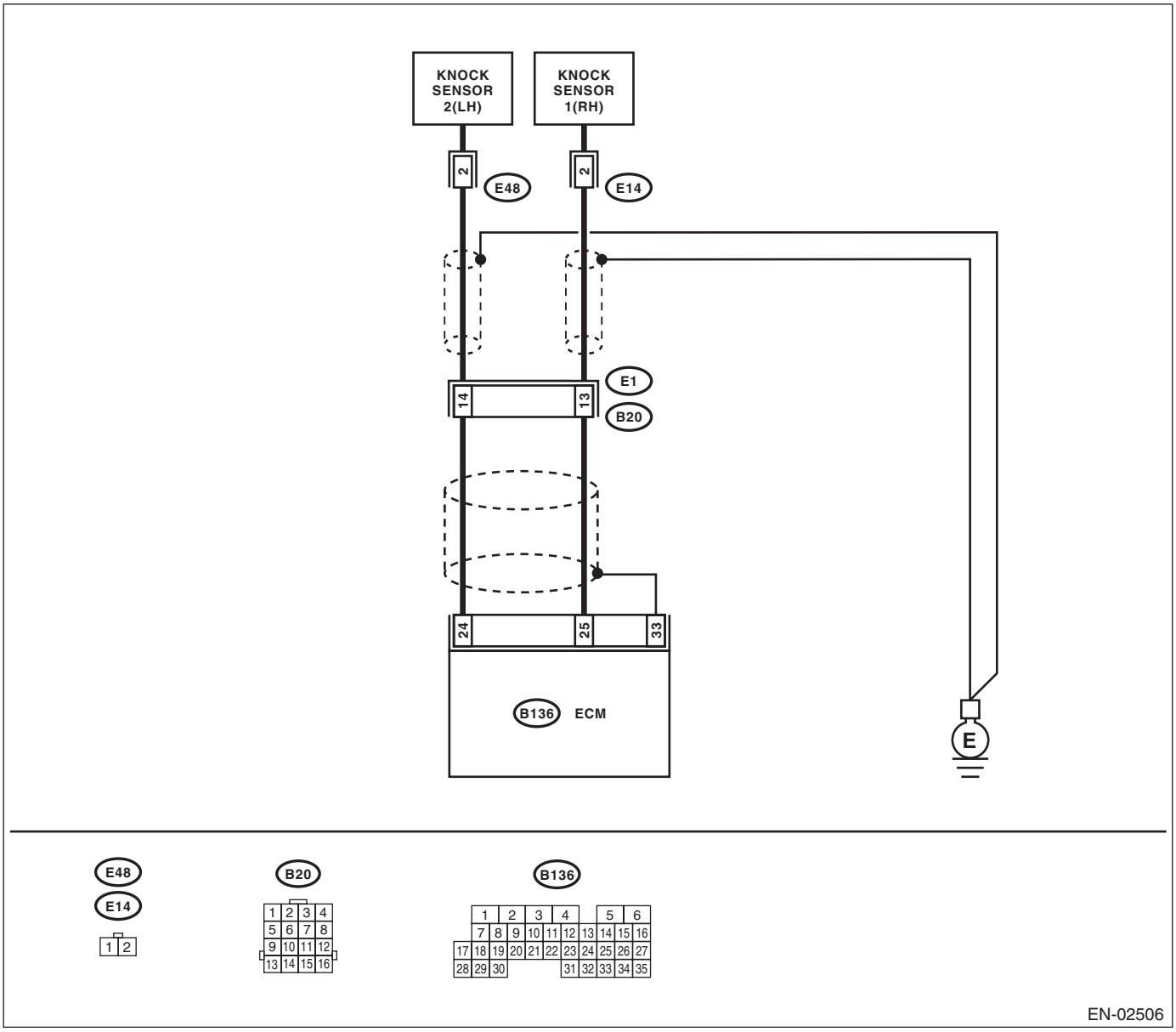
TROUBLE SYMPTOM:

- Driving performance problem
- Knocking is occurred.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM harness connector and chassis ground. ***Connector & terminal*** ***(B136) No. 24 — Chassis ground:***	Is the resistance more than 700 kΩ?	Go to step **2.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between knock sensor and ECM connector • Poor contact in knock sensor connector • Poor contact in coupling connector
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance more than 700 kΩ?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Poor contact in knock sensor connector
3	**CHECK CONDITION OF KNOCK SENSOR INSTALLATION.**	Is the knock sensor installation bolt tightened securely?	Replace the knock sensor. <Ref. to FU(H6DO)-21, Knock Sensor.>	Tighten knock sensor installation bolt securely.

BG:DTC P0333 KNOCK SENSOR 2 CIRCUIT HIGH INPUT (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

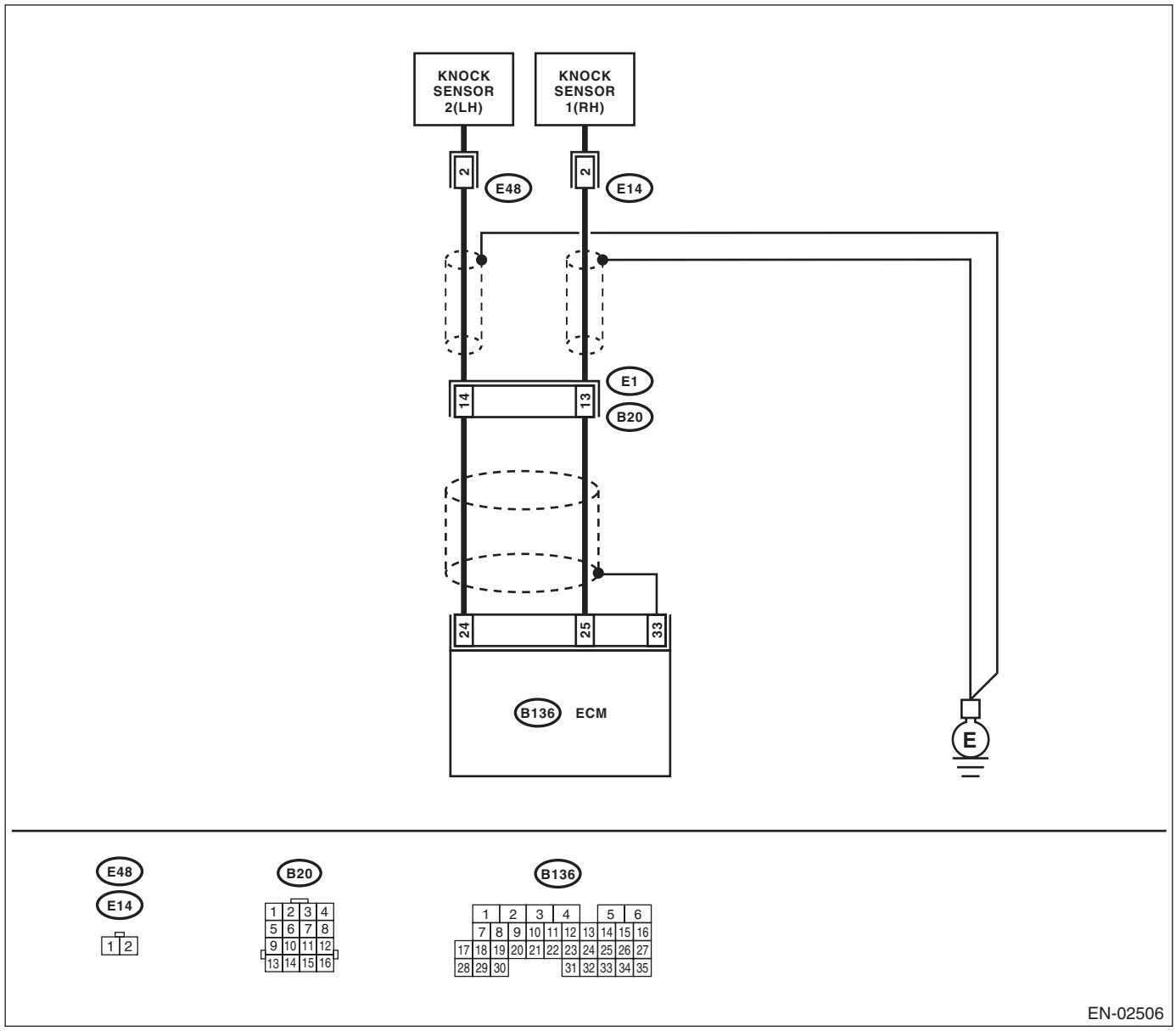
TROUBLE SYMPTOM:

- Driving performance problem
- Knocking occurs.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN KNOCK SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 24 — Chassis ground:***	Is the resistance less than 400 kΩ?	Go to step **2.**	Go to step **3.**
2	**CHECK KNOCK SENSOR.** 1) Disconnect the connector from knock sensor. 2) Measure the resistance between knock sensor connector terminal and engine ground. ***Terminals*** ***No. 2 — Engine ground:***	Is the resistance less than 400 kΩ?	Replace the knock sensor. <Ref. to FU(H6DO)-21, Knock Sensor.>	Repair the ground short circuit in harness between knock sensor connector and ECM connector. NOTE: The harness between both connectors are shielded. Repair the short circuit in harness covered with shield.
3	**CHECK INPUT SIGNAL FROM ECM.** 1) Connect the connectors to ECM and knock sensor. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B136) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 2 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. (However, the possibility of poor contact still remains.) NOTE: In this case repair the following: • Poor contact in knock sensor connector • Poor contact in ECM connector • Poor contact in coupling connector	Repair the poor contact in ECM connector.

BH:DTC P0335 CRANKSHAFT POSITION SENSOR “A” CIRCUIT

DTC DETECTING CONDITION:

Immediately at fault recognition

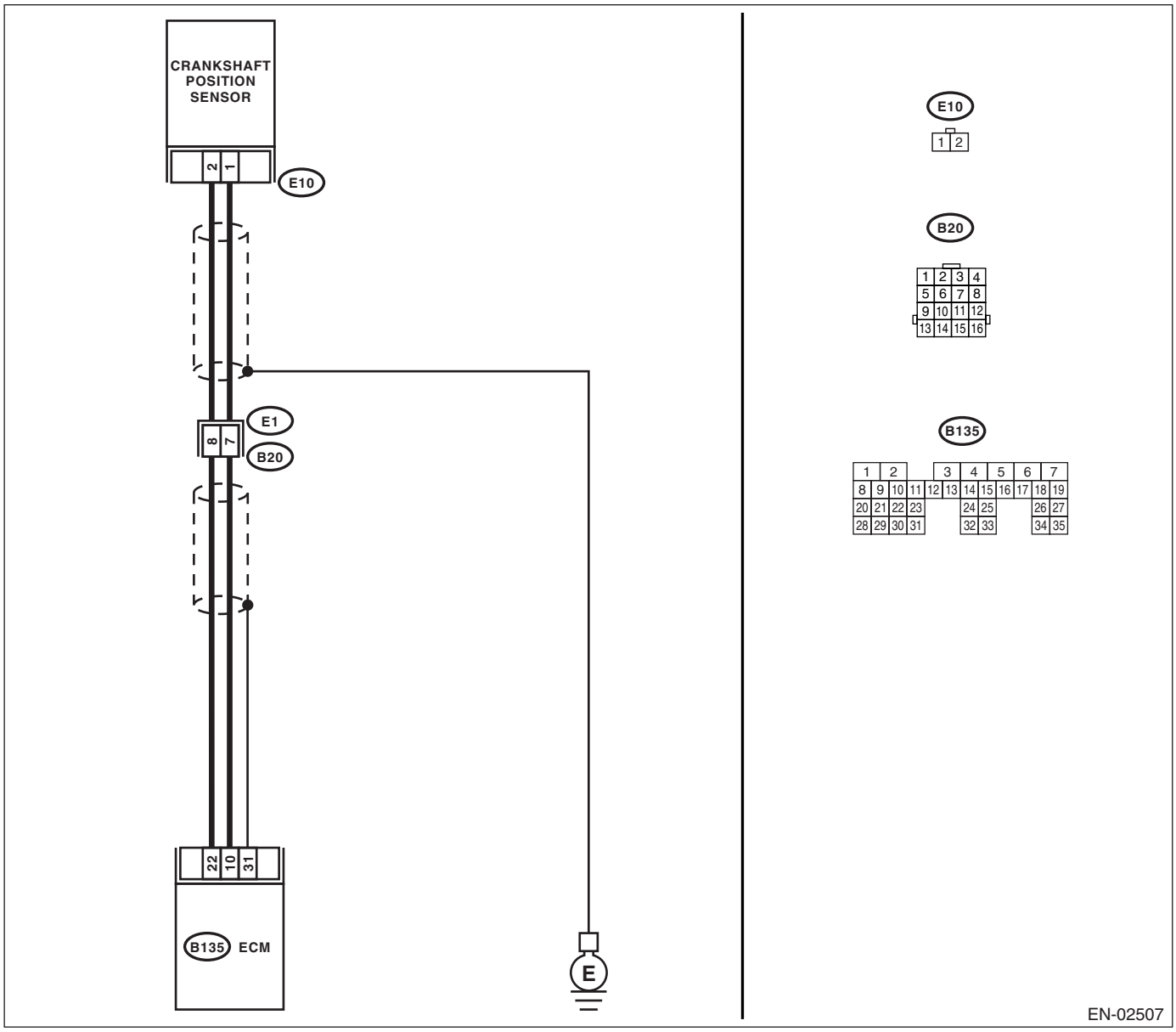
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the crankshaft position sensor. 3) Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance more than 100 kΩ?	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector	Go to step **2.**
2	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 1 — Engine ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between crankshaft position sensor and ECM connector. NOTE: The harness between both connectors are shielded. Repair the ground short circuit in harness together with shield.	Go to step **3.**
3	**CHECK HARNESS BETWEEN CRANKSHAFT POSITION SENSOR AND ECM CONNECTOR.** Measure the resistance of harness between crankshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E10) No. 2 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **4.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between crankshaft position sensor and ECM connector • Poor contact in ECM connector • Poor contact in coupling connector
4	**CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.**	Is the crankshaft position sensor installation bolt tightened securely?	Go to step **5.**	Tighten the crankshaft position sensor installation bolt securely.
5	**CHECK CRANKSHAFT POSITION SENSOR.** 1) Remove the crankshaft position sensor. 2) Measure the resistance between connector terminals of crankshaft position sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1 — 4 kΩ?	Repair the poor contact in crankshaft position sensor connector.	Replace the crankshaft position sensor. <Ref. to FU(H6DO)-19, Crankshaft Position Sensor.>

BI: DTC P0340 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 1 OR SINGLE SENSOR)

DTC DETECTING CONDITION:

Immediately at fault recognition

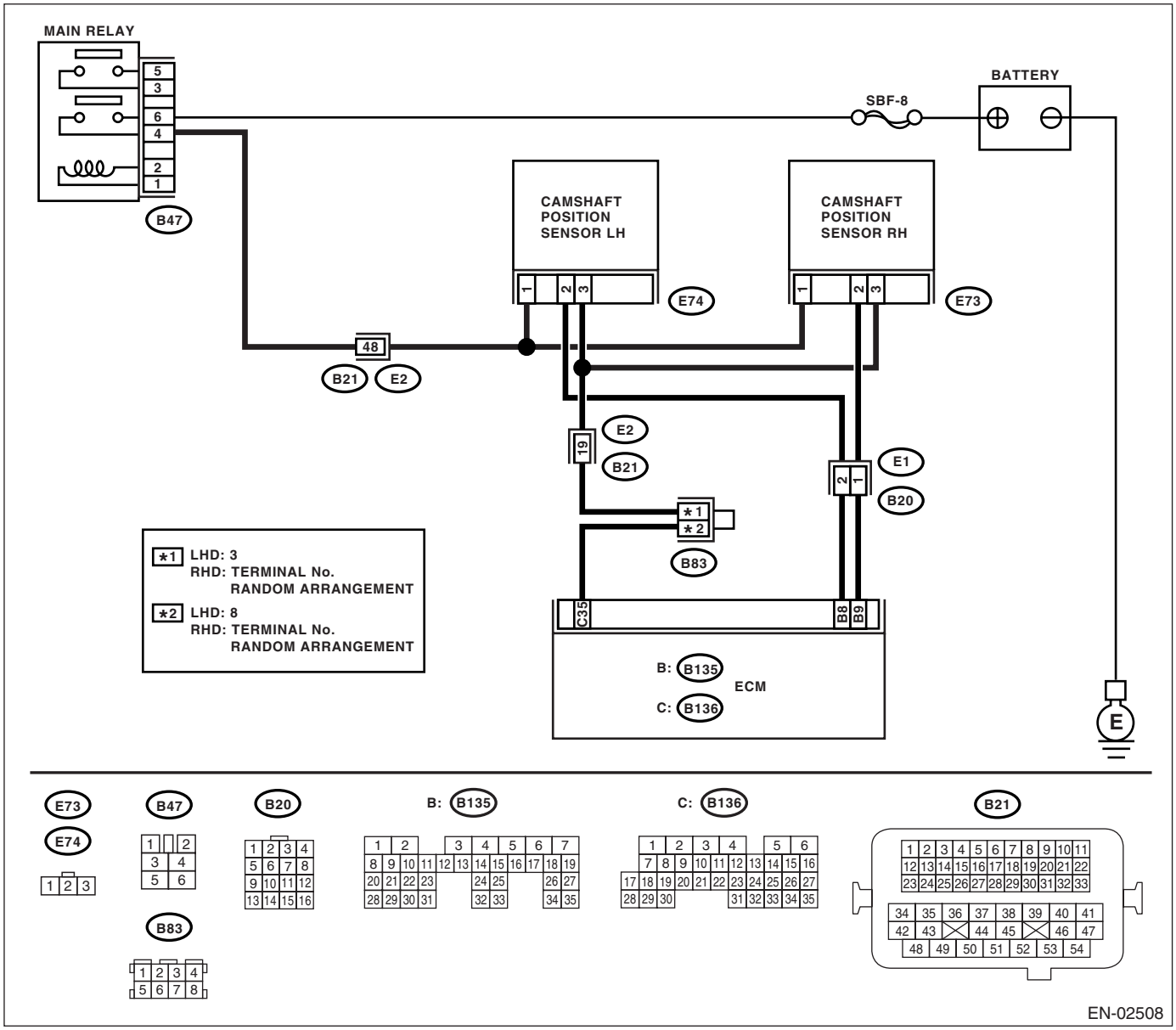
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3.**
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open or battery short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E73) No. 2 — (B135) No. 9:*** ***(E73) No. 3 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E73) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7.**	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H6DO)(diag)-17, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-19, Crankshaft Position Sensor.>	Go to step **8.**
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

BJ:DTC P0345 CAMSHAFT POSITION SENSOR “A” CIRCUIT (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

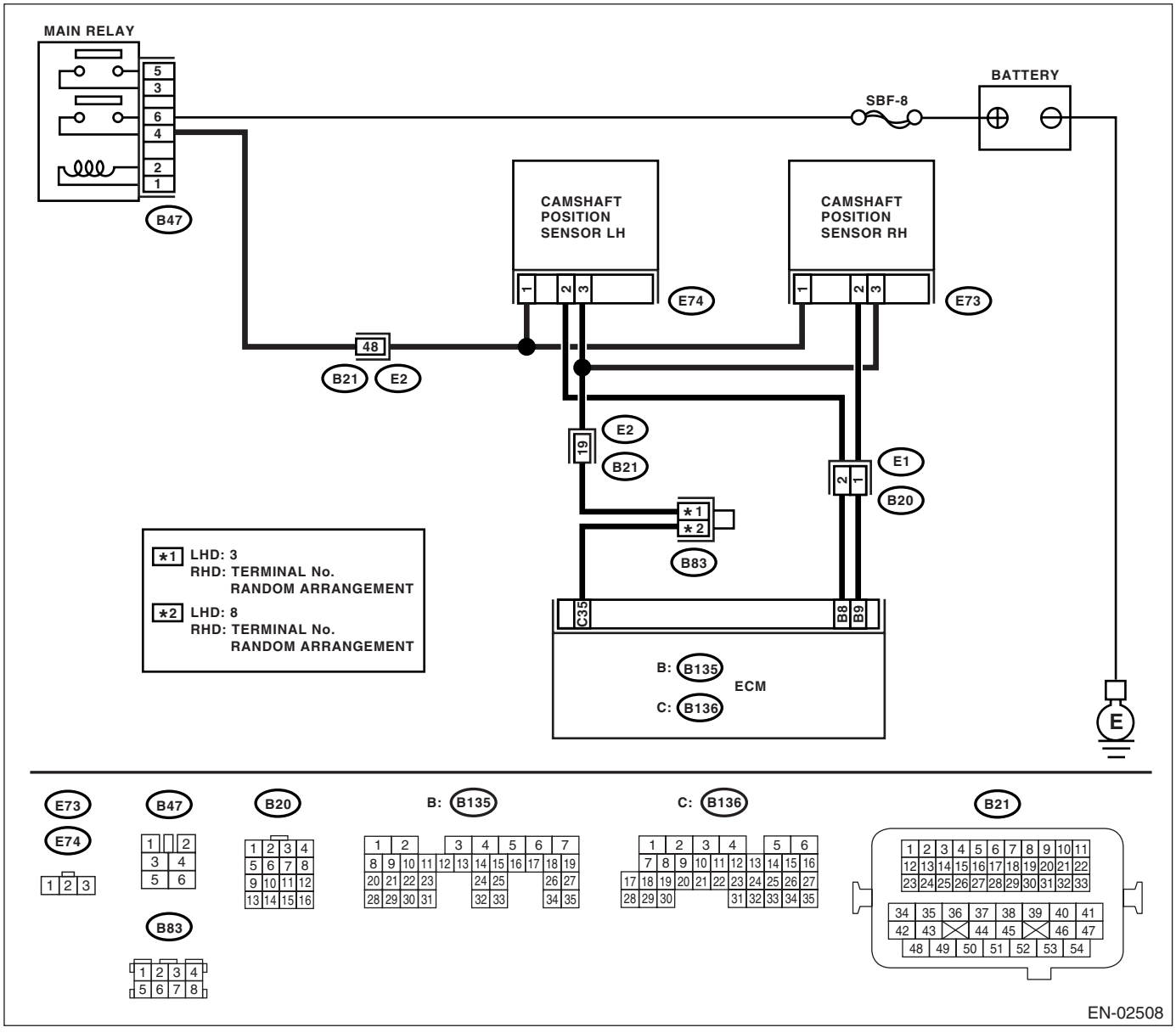
TROUBLE SYMPTOM:

- Engine stalls.
- Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from camshaft position sensor. 3) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit between main relay connector and camshaft position sensor connector.	Go to step **3.**
3	**CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Repair open or battery short circuit between main relay connector and camshaft position sensor connector.
4	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between camshaft position sensor connector and ECM. ***Connector & terminal*** ***(E74) No. 2 — (B135) No. 8:*** ***(E74) No. 3 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit between camshaft position sensor and ECM.
5	**CHECK HARNESS BETWEEN CAMSHAFT POSITION SENSOR CONNECTOR AND ECM.** Measure the resistance between camshaft position sensor connector and engine ground. ***Connector & terminal*** ***(E74) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit between camshaft position sensor and ECM.
6	**CHECK CONDITION OF CAMSHAFT POSITION SENSOR.**	Is the camshaft position sensor installation bolt tightened securely?	Go to step **7.**	Tighten the camshaft position sensor installation bolt securely.
7	**CHECK CAMSHAFT POSITION SENSOR.** Check waveform of camshaft position sensor. <Ref. to EN(H6DO)(diag)-17, Engine Control Module (ECM) I/O Signal.>	Is there any abnormality in waveform?	Replace the camshaft position sensor. <Ref. to FU(H6DO)-20, Camshaft Position Sensor.>	Go to step **8.**
8	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

BK:DTC P0400 EXHAUST GAS RECIRCULATION FLOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

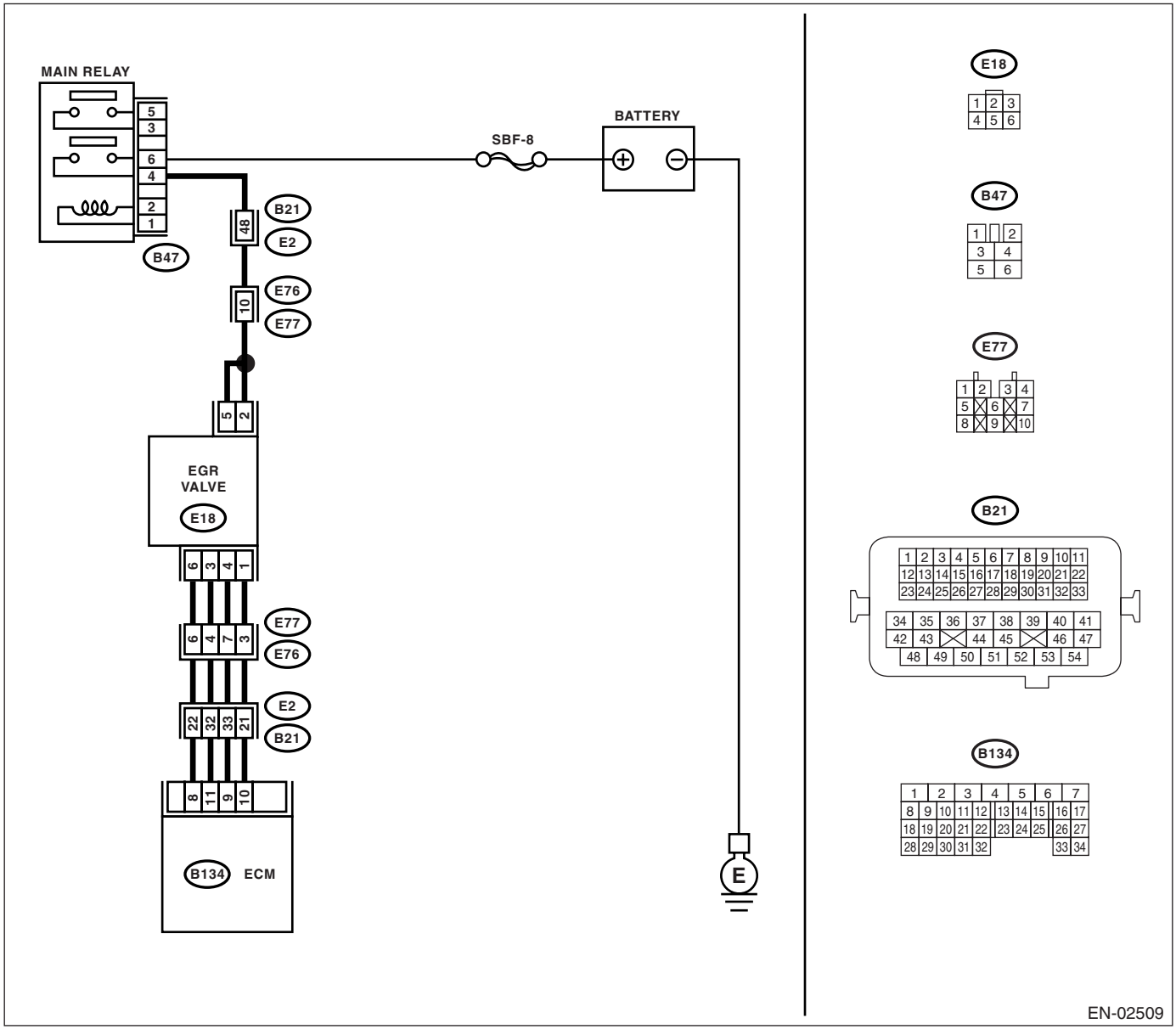
TROUBLE SYMPTOM:

- Movement performance problem when engine low speed
- Erroneous idling
- Movement performance problem

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK CURRENT DATA.** 1) Start the engine. 2) Read the data of intake manifold absolute pressure signal using Subaru Select Monitor or OBD-II general scan tool. NOTE: • Subaru Select Monitor For detailed operation procedures, refer to the "READ CURRENT DATA SHOWN ON DISPLAY FOR ENGINE". <Ref. to EN(H6DO)(diag)-25, Subaru Select Monitor.> • OBD-II general scan tool For detailed operation procedures, refer to the OBD-II General Scan Tool Operation Manual.	Is the value more than 53.3 kPa (400 mmHg, 15.75 inHg)?	Make sure that the EGR valve, manifold pressure sensor and throttle body are tightened firmly.	Go to step **3.**
3	**CHECK THE POWER SUPPLY OF EGR SOLENOID VALVE.** 1) Detach the connector from EGR solenoid valve. 2) Turn the ignition switch to ON. 3) Measure the voltage between EGR solenoid valve and engine ground. ***Connector & terminal*** ***(E18) No. 2 — Engine ground:*** ***(E18) No. 5 — Engine ground:***	Is the voltage more than 10 V?	Go to step **4.**	Repair the open circuit in harness between main relay and EGR solenoid valve connector.
4	**CHECK EGR SOLENOID VALVE.** Measure the resistance between EGR solenoid valve terminals. NOTE: Make sure there is no foreign material between EGR solenoid valve and valve seat. ***Terminals*** ***No. 1 — No. 2:*** ***No. 3 — No. 2:*** ***No. 4 — No. 5:*** ***No. 6 — No. 5:***	Is the resistance between 20 — 30 Ω?	Go to step **5.**	Replace the EGR solenoid valve. <Ref. to FU(H6DO)-25, EGR Valve.>
5	**OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to ECM and EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 8 (+) — Chassis ground (−):*** ***(B134) No. 9 (+) — Chassis ground (−):*** ***(B134) No. 10 (+) — Chassis ground (−):*** ***(B134) No. 11 (+) — Chassis ground (−):***	Is the voltage 0 — 10 V?	Repair the poor contact in ECM connector.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Detach the connector from EGR solenoid valve and ECM. 3) Measure the resistance of harness between EGR solenoid valve and ECM connector. ***Connector & terminal*** ***(B134) No. 8 — (E18) No. 6:*** ***(B134) No. 10 — (E18) No. 1:*** ***(B134) No. 9 — (E18) No. 4:*** ***(B134) No. 11 — (E18) No. 3:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and EGR solenoid valve connector.
7	**CHECK HARNESS BETWEEN EGR SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between EGR solenoid valve and chassis ground. ***Connector & terminal*** ***(B134) No. 8 — Chassis ground:*** ***(B134) No. 9 — Chassis ground:*** ***(B134) No. 10 — Chassis ground:*** ***(B134) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between main relay and EGR solenoid valve connector.
8	**CHECK POOR CONTACT.** Check the poor contact in ECM and EGR solenoid valve connector.	Is there poor contact in ECM or EGR solenoid valve connector?	Repair the poor contactrepair the poor contact in ECM and EGR solenoid valve connector.	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.

BL:DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD (BANK 1)

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault
TROUBLE SYMPTOM:
- Engine stalls.
- Idle mixture is out of specifications.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0420.	Go to step **2.**
2	**CHECK EXHAUST SYSTEM.** Check for gas leaks or air suction caused by loose or dislocated nuts and bolts, and open hole at exhaust pipes. NOTE: Check the following positions. • Between cylinder head and front exhaust pipe • Between front exhaust pipe and front catalytic converter • Between front catalytic converter and rear catalytic converter	Is there any fault in exhaust system?	Repair or replace the exhaust system.	Go to step **3.**
3	**CHECK REAR CATALYTIC CONVERTER.** Separate the rear catalytic converter from rear exhaust pipe.	Is there damage at rear face of rear catalyst?	Front catalytic converter <Ref. to EC(H6DO)-3, Front Catalytic Converter.> and rear catalytic converter<Ref. to EC(H6DO)-4, Rear Catalytic Converter.>	Go to step **4.**
4	**CHECK FRONT CATALYTIC CONVERTER.** Separate the front catalytic converter.	Is there damage at rear face or front face of front catalyst?	Front Catalytic Converter<Ref. to EC(H6DO)-3, Front Catalytic Converter.>	Contact the SUBARU dealer. NOTE: Inspection by DTM is required for fear of deterioration of some parts.

BM:DTC P0458 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

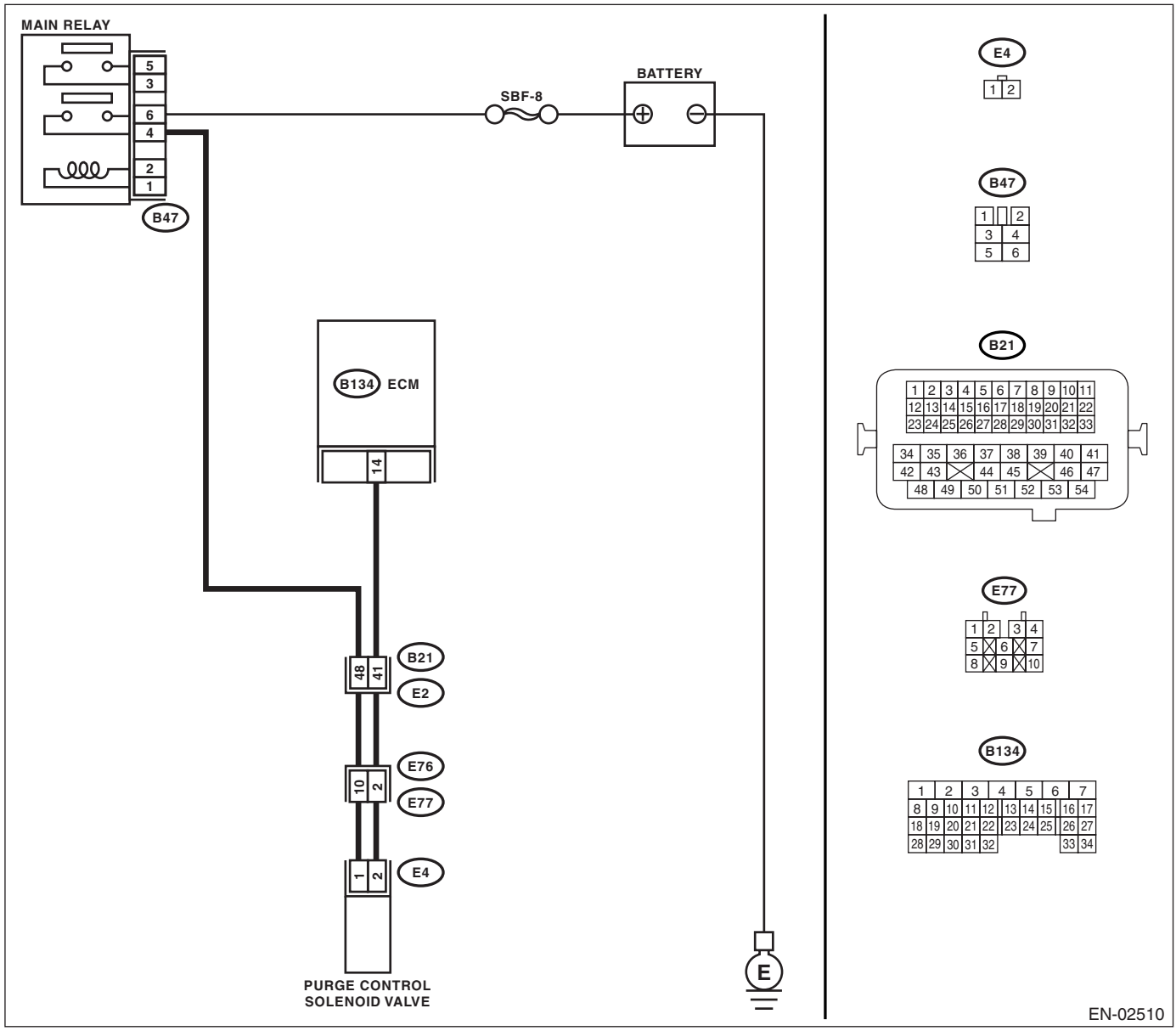
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time.	Go to step **2.**
2	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from purge control solenoid valve and ECM. 3) Measure the resistance of harness between purge control solenoid valve connector and engine ground. ***Connector & terminal*** ***(E4) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and purge control solenoid valve connector.
3	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** Measure the resistance of harness between ECM and purge control solenoid valve of harness connector. ***Connector & terminal*** ***(B134) No. 14 — (E4) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between ECM and purge control solenoid valve connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and purge control solenoid valve connector • Poor contact in coupling connector
4	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Remove the purge control solenoid valve. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 10 — 100 Ω?	Go to step **5.**	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.>
5	**CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between purge control solenoid valve and engine ground. ***Connector & terminal*** ***(E4) No. 1 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **6.**	Repair the open circuit in harness between main relay and purge control solenoid valve connector.
6	**CHECK POOR CONTACT.** Check poor contact in purge control solenoid valve connector.	Is there poor contact in purge control solenoid valve connector?	Repair the poor contact in purge control solenoid valve connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

BN:DTC P0459 EVAPORATIVE EMISSION CONTROL SYSTEM PURGE CONTROL VALVE CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

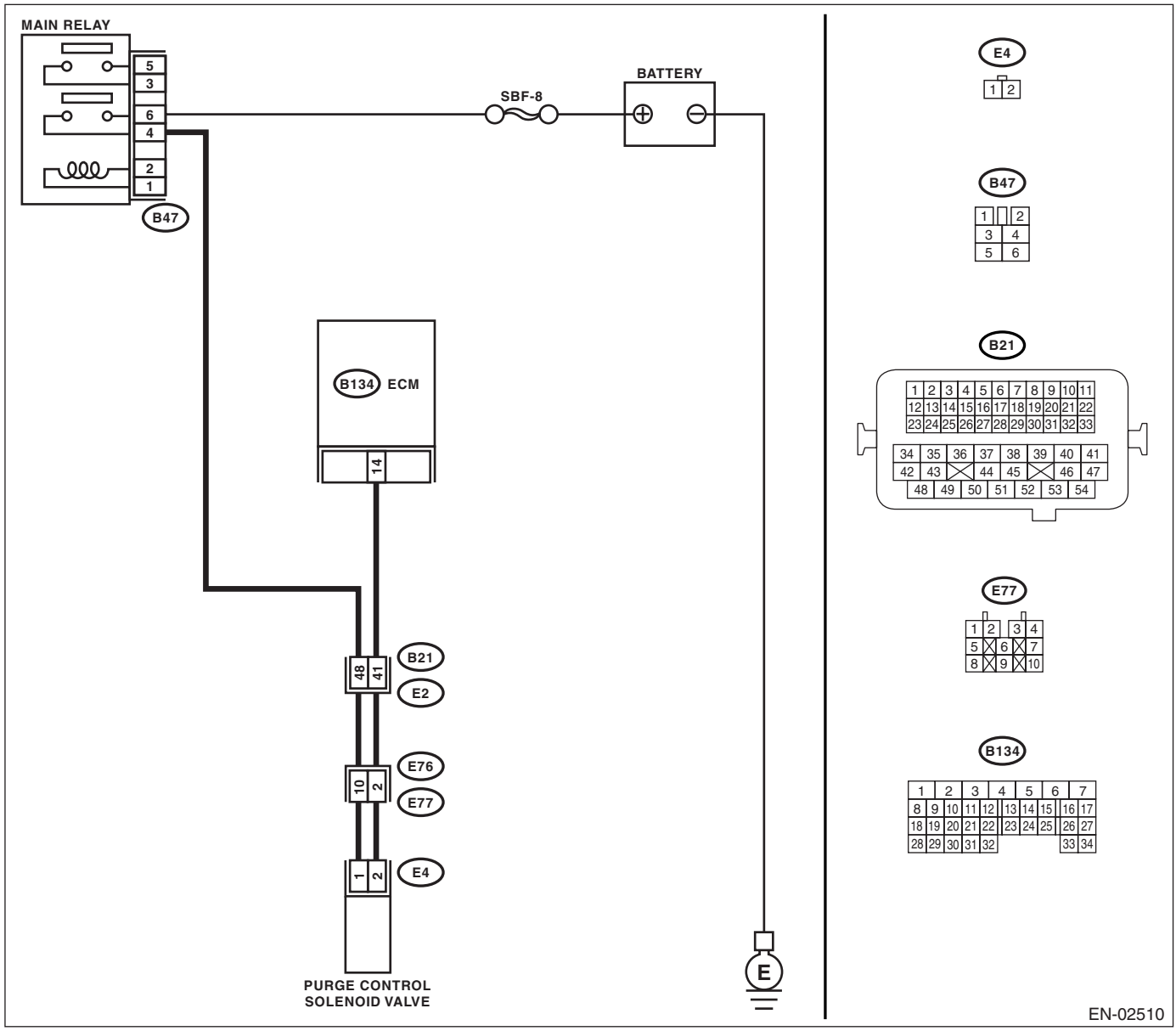
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Connect the test mode connector at the lower portion of instrument panel (on the driver's side). 3) Turn the ignition switch to ON. 4) While operating the purge control solenoid valve, measure voltage between ECM and chassis ground. NOTE: Purge control solenoid valve operation can be executed using Subaru Select Monitor. Refer to "Compulsory Valve Operation Check Mode" for procedures. <Ref. to EN(H6DO)(diag)-41, Compulsory Valve Operation Check Mode.> ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage 0 — 10 V?	Go to step **2.**	Even if the malfunction indicator light illuminates, the circuit has returned to a normal condition at this time. In this case repair the poor contact in ECM connector.
2	**CHECK OUTPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Go to step **3.**
3	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
4	**CHECK HARNESS BETWEEN PURGE CONTROL SOLENOID VALVE AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from purge control solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B134) No. 14 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the battery short circuit in harness between ECM and purge control solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Go to step **5.**
5	**CHECK PURGE CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between purge control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 1 Ω?	Replace the purge control solenoid valve. <Ref. to EC(H6DO)-7, Purge Control Solenoid Valve.> and ECM <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Go to step **6.**
6	**CHECK POOR CONTACT.** Check poor contact in ECM connector.	Is the poor contact in ECM connector?	Repair the poor contact in ECM connector.	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

BO:DTC P0462 FUEL LEVEL SENSOR CIRCUIT LOW INPUT

NOTE:
For the diagnostic procedure, refer to DTC P0463. <Ref. to EN(H6DO)(diag)-207, DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BP:DTC P0463 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:
Two consecutive driving cycles with fault

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0462 or P0463 displayed on the Subaru Select Monitor?	Check the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>	Temporary poor contact occurs.

BQ:DTC P0500 VEHICLE SPEED SENSOR

DTC DETECTING CONDITION:
Immediately at fault recognition

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK DTC OF ABS.** Check DTC of ABS.	Is DTC of ABS displayed?	Perform the diagnosis according to DTC. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Repair the poor contact in ECM.

BR:DTC P0512 STARTER REQUEST CIRCUIT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

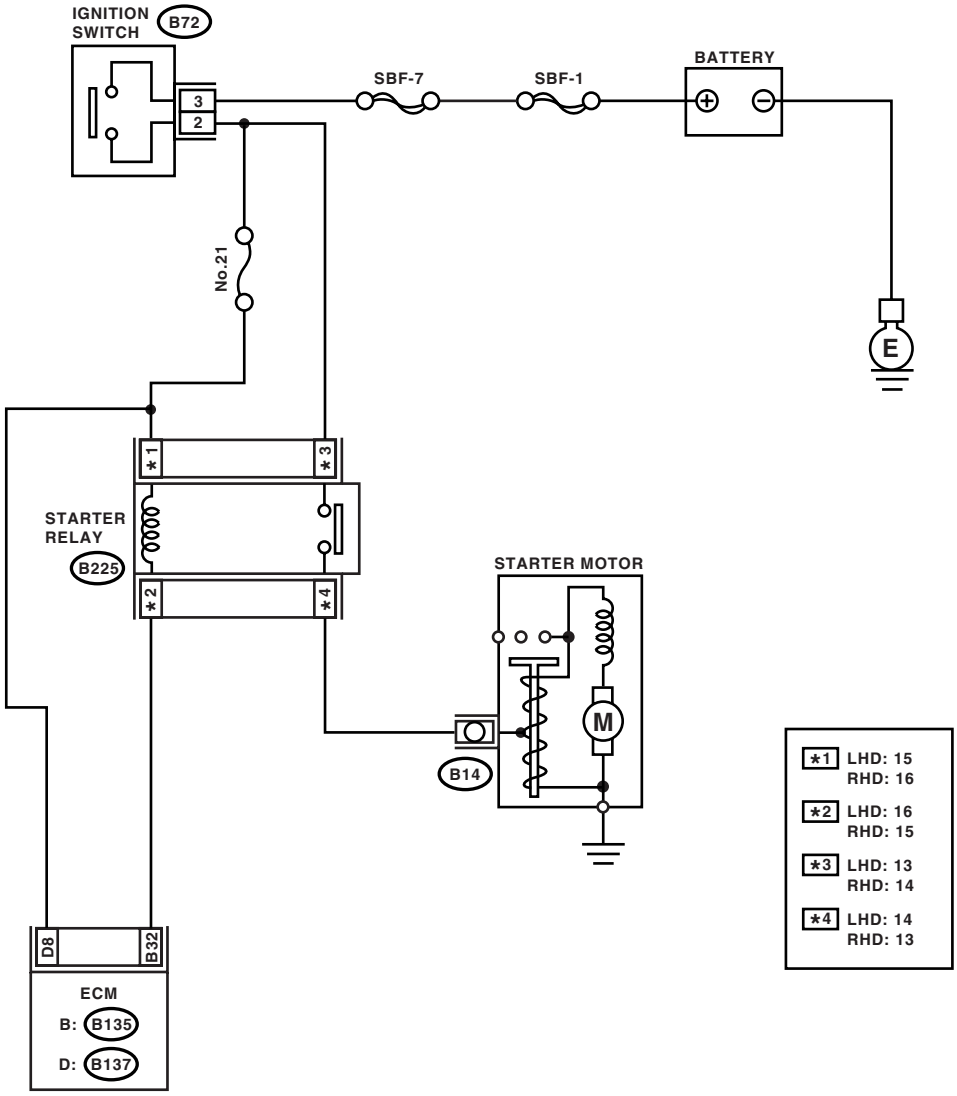
TROUBLE SYMPTOM:

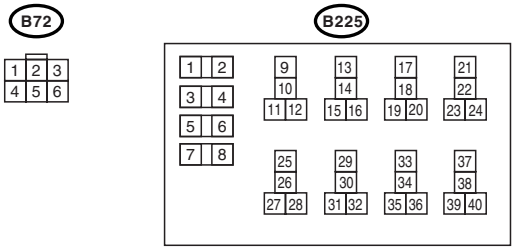
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02492

Step		Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Turn the ignition switch to ON. NOTE: Place the inhibitor switch in each position.	Does the starter motor operate?	Repair the battery short circuit in starter motor circuit.	Check starter motor circuit. <Ref. to EN(H6DO)(diag)-53, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

BS:DTC P0519 IDLE CONTROL SYSTEM MALFUNCTION (FAIL-SAFE)

DTC DETECTING CONDITION:
Immediately at fault recognition
TROUBLE SYMPTOM:
Engine keeps running at higher revolution than specified idling revolution.

CAUTION:
After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).> NOTE: In this case, it is not necessary to inspect DTC P0519.	Go to step **2.**
2	**CHECK AIR INTAKE SYSTEM.** 1) Turn the ignition switch to ON. 2) Start and idle the engine. 3) Check the following items: • Loose installation of intake manifold and throttle body • Cracks of intake manifold gasket and throttle body gasket • Disconnections of vacuum hoses	Is there any fault in air intake system?	Repair air suction and leaks.	Go to step **3.**
3	**CHECK ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control. 3) Check the electronic throttle control.	Are foreign matters found inside the electronic throttle control?	Remove foreign matters from the electronic throttle control.	Perform the diagnosis of DTC P2101.

BT:DTC P0558 ALTERNATOR CIRCUIT LOW

NOTE:
For diagnostic procedure, refer to DTC P0559. <Ref. to EN(H6DO)(diag)-212, DTC P0559 ALTERNATOR CIRCUIT HIGH, DIAGNOSTIC PROCEDURE WITH DIAGNOSTIC TROUBLE CODE (DTC).>

BU:DTC P0559 ALTERNATOR CIRCUIT HIGH

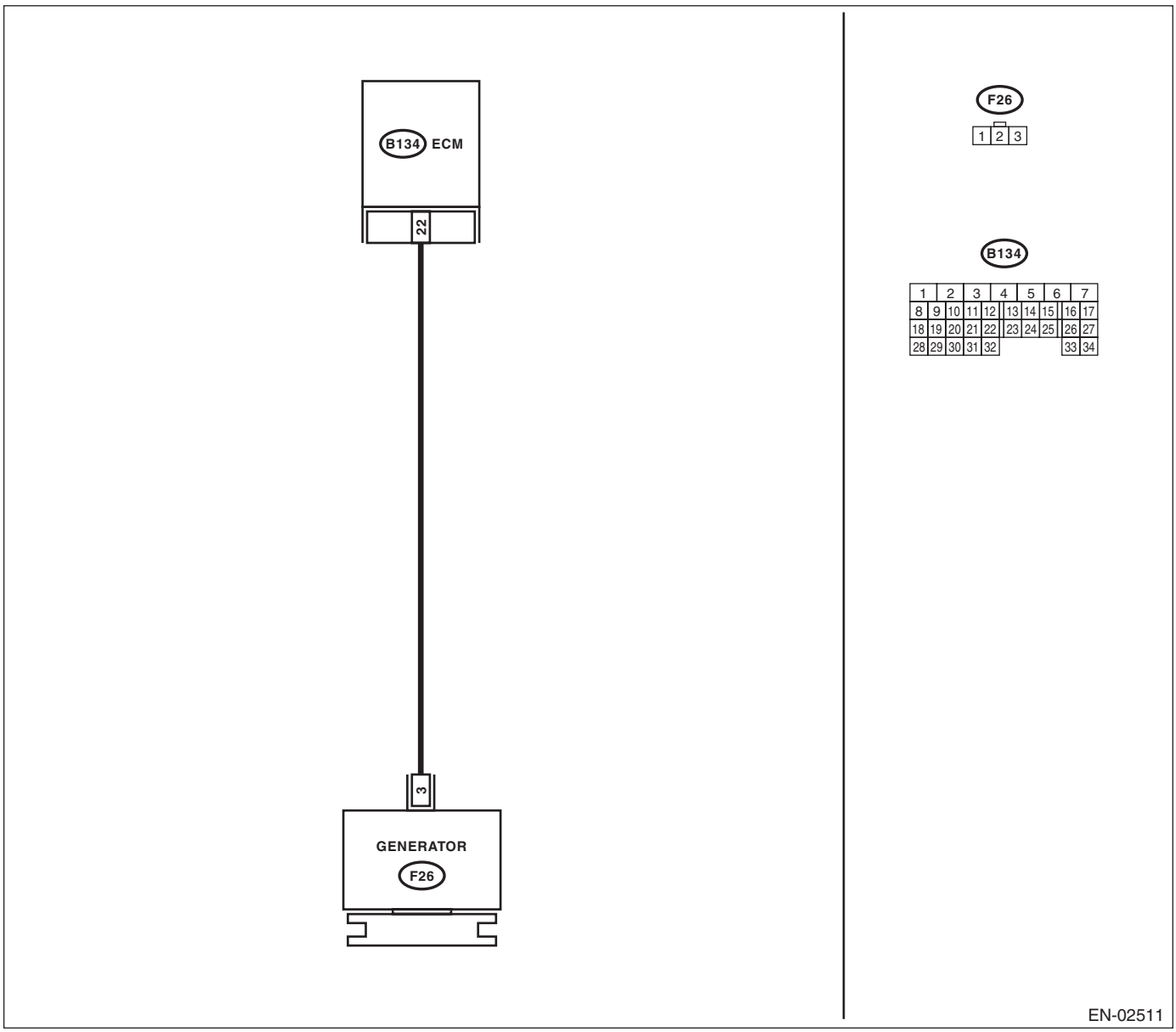
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from generator and ECM. 3) Measure the resistance of harness between generator connector and engine ground. ***Connector & terminal*** ***(F26) No. 3 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the ground short circuit in harness between ECM and generator connector.
2	**CHECK HARNESS BETWEEN GENERATOR AND ECM CONNECTOR.** Measure the resistance of harness between ECM and generator. ***Connector & terminal*** ***(B136) No. 22 — (F26) No. 3:***	Is the resistance less than 1 Ω?	Repair the poor contact connector.	Repair the open circuit in harness between ECM and generator connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and generator connector • Poor contact in coupling connector

BV:DTC P0600 SERIAL COMMUNICATION LINK

NOTE:
For the diagnostic procedure, refer to LAN section. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

BW:DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC DETECTING CONDITION:

Immediately at fault recognition

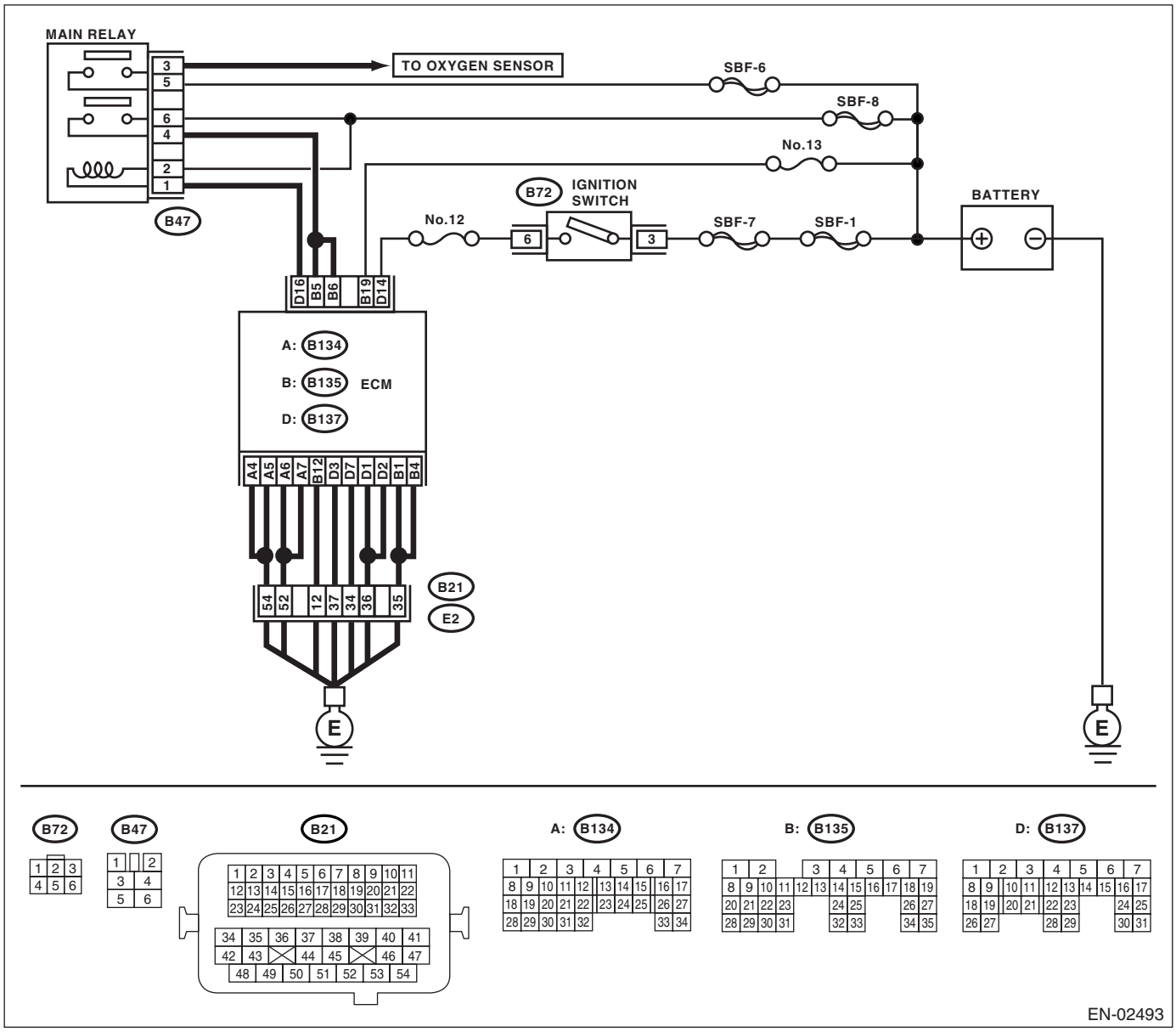
TROUBLE SYMPTOM:

- Engine does not start.
- Engine stalls.

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



Step		Check	Yes	No
1	CHECK ANY OTHER DTC ON DISPLAY.	Is any other DTC displayed?	Inspect the relevant DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

BX:DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

NOTE:
For the diagnostic procedure, refer to DTC P0607. <Ref. to EN(H6DO)(diag)-216, DTC P0607 CONTROL MODULE PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BY:DTC P0607 CONTROL MODULE PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

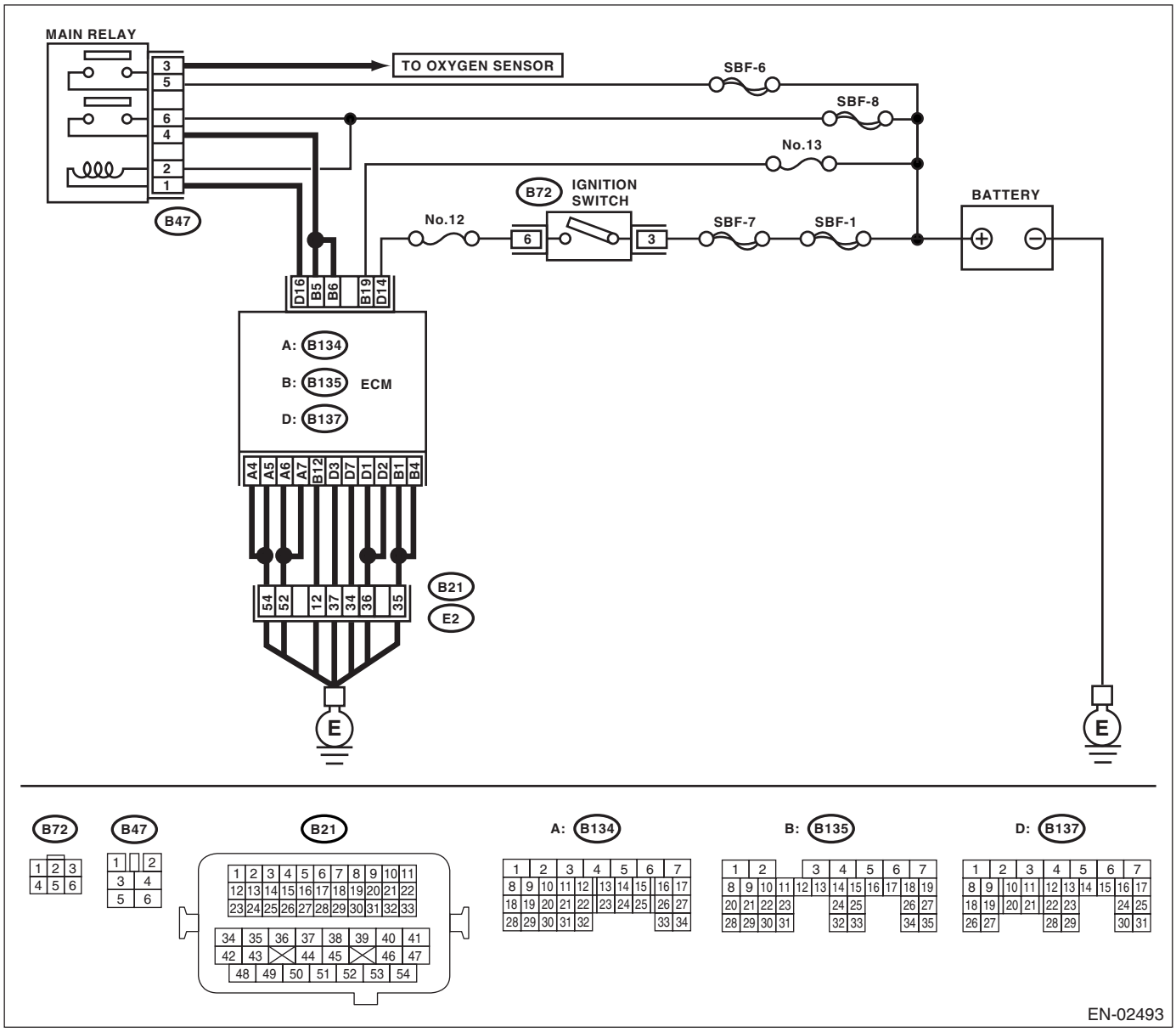
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ECM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **2.**	Repair the open or ground short circuit of power supply circuit.
2	**CHECK INPUT VOLTAGE OF ECM.** 1) Start the engine. 2) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 5 (+) — Chassis ground (−):*** ***(B135) No. 6 (+) — Chassis ground (−):***	Is the voltage 13 — 15 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK ECM GROUND HARNESS.** Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 1 (+) — Chassis ground (−):*** ***(B137) No. 2 (+) — Chassis ground (−):*** ***(B137) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Further tighten the engine ground terminal.

BZ:DTC P0638 THROTTLE ACTUATOR CONTROL RANGE/PERFORMANCE (BANK 1)

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-241, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CA:DTC P0691 COOLING FAN 1 CONTROL CIRCUIT LOW

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Over-heating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0691 displayed?	Check radiator fan system. <Ref. to CO(H6DO)-6, Radiator Fan System.>	Temporary poor contact occurs.

CB:DTC P0692 COOLING FAN 1 CONTROL CIRCUIT HIGH

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

TROUBLE SYMPTOM:

- Radiator fan does not operate properly.
- Over-heating

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is DTC P0692 displayed?	Check radiator fan system. <Ref. to CO(H6DO)-6, Radiator Fan System.>	Temporary poor contact occurs.

CC:DTC P0700 TRANSMISSION CONTROL SYSTEM (MIL REQUEST)

NOTE:
For the diagnostic procedure, refer to AT section. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>

CD:DTC P1026 VVL SYSTEM 1 PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

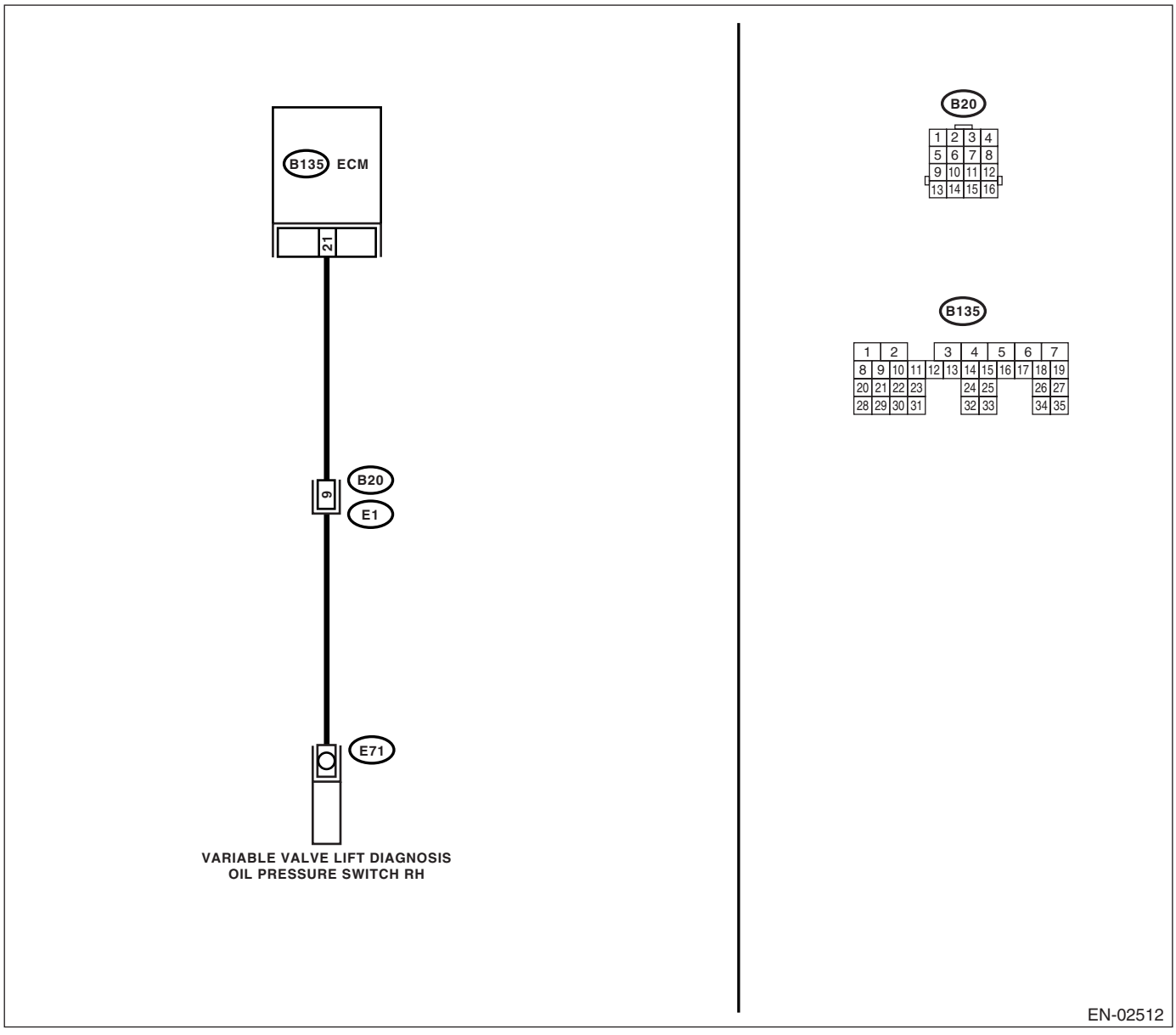
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** 1) Idle the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and variable valve lift diagnosis oil pressure switch connector. 4) Measure the resistance of harness between variable valve lift diagnosis oil pressure switch connector and engine ground. ***Connector & terminal*** ***(E71) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and variable valve lift diagnosis oil pressure switch connector.
3	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** Measure the resistance in harness between ECM and variable valve lift diagnosis oil pressure switch connector. ***Connector & terminal*** ***(B135) No. 21 — (E71) No. 1:***	Is the resistance less than 1 Ω?	Replace the variable valve lift oil pressure switch. <Ref. to FU(H6DO)-28, Variable Valve Lift Diagnosis Oil Pressure Switch.> Go to step **4.**	Repair the open circuit in harness between ECM and variable valve lift diagnosis oil pressure switch connector.
4	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Check the DTC after idle the engine.	Is DTC displayed?	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.> Go to step **5.**	Temporary poor contact occurs.
5	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Check the DTC after idle the engine.	Is DTC displayed?	Check for oil routing. Contact the SUBARU dealer.	Temporary poor contact occurs.

CE:DTC P1028 VVL SYSTEM 2 PERFORMANCE

DTC DETECTING CONDITION:

Immediately at fault recognition

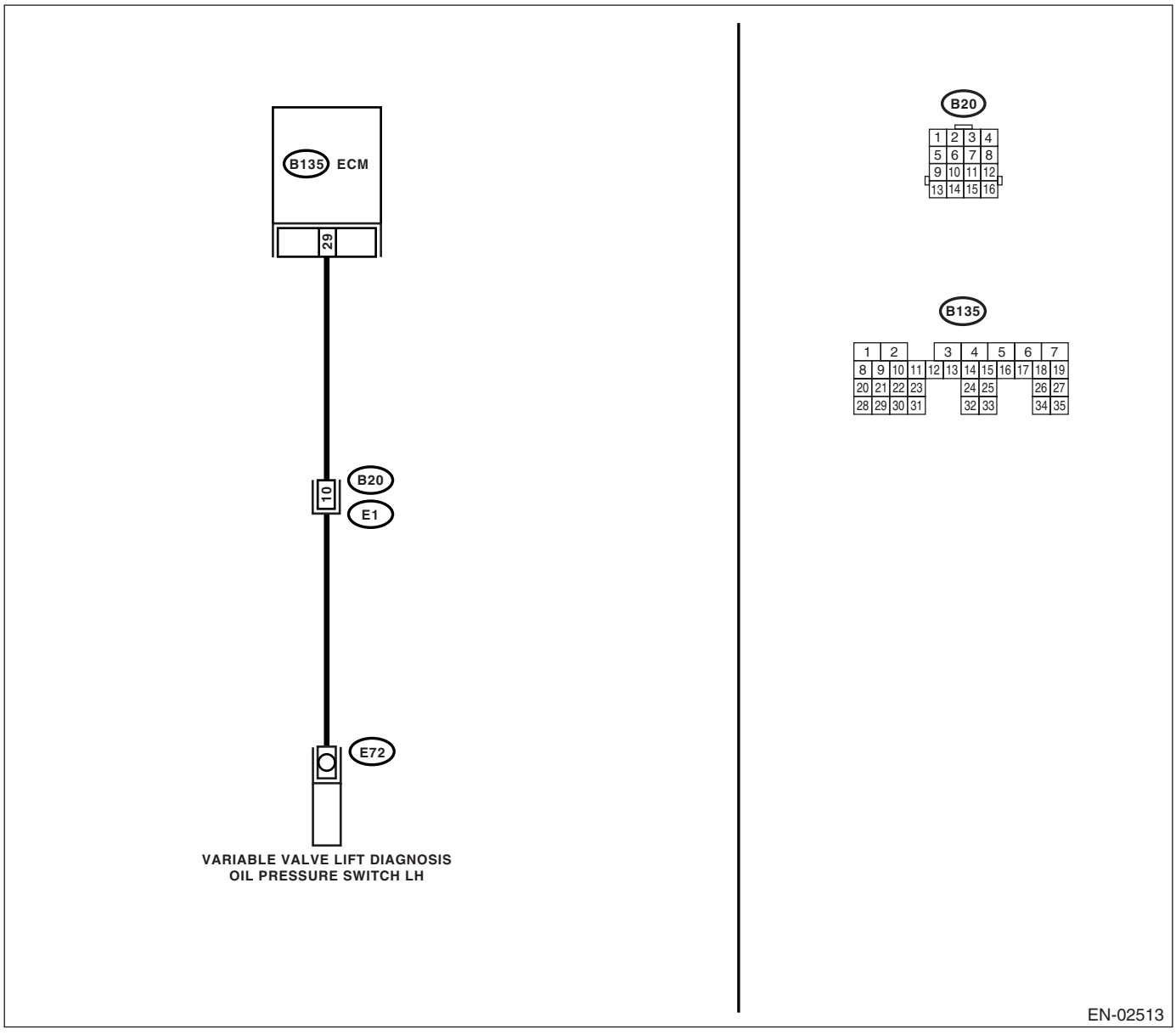
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** 1) Idle the engine. 2) Turn the ignition switch to OFF. 3) Disconnect the connectors from ECM and variable valve lift diagnosis oil pressure switch connector. 4) Measure the resistance of harness between variable valve lift diagnosis oil pressure switch connector and engine ground. ***Connector & terminal*** ***(E72) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the ground short circuit in harness between ECM and variable valve lift diagnosis oil pressure switch connector.
3	**CHECK HARNESS BETWEEN ECM AND VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH CONNECTOR.** Measure the resistance in harness between ECM and variable valve lift diagnosis oil pressure switch connector. ***Connector & terminal*** ***(B135) No. 29 — (E72) No. 1:***	Is the resistance less than 1 Ω?	Replace the variable valve lift oil pressure switch. <Ref. to FU(H6DO)-28, Variable Valve Lift Diagnosis Oil Pressure Switch.> Go to step **4.**	Repair the open circuit in harness between ECM and variable valve lift diagnosis oil pressure switch connector.
4	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Check the DTC after idle the engine.	Is DTC displayed?	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.> Go to step **5.**	Temporary poor contact occurs.
5	**CHECK DTC.** 1) Erase the memory. <Ref. to EN(H6DO)(diag)-40, Clear Memory Mode.> 2) Check the DTC after idle the engine.	Is DTC displayed?	Check for oil routing. Contact the SUBARU dealer.	Temporary poor contact occurs.

CF:DTC P1160 RETURN SPRING FAILURE

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-241, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CG:DTC P1492 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-224, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CH:DTC P1493 EGR SOLENOID VALVE SIGNAL #1 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-226, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CI: DTC P1494 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-224, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CJ:DTC P1495 EGR SOLENOID VALVE SIGNAL #2 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-226, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CK:DTC P1496 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (LOW INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1498. <Ref. to EN(H6DO)(diag)-224, DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CL:DTC P1497 EGR SOLENOID VALVE SIGNAL #3 CIRCUIT MALFUNCTION (HIGH INPUT)

NOTE:
For the diagnostic procedure, refer to DTC P1499. <Ref. to EN(H6DO)(diag)-226, DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CM:DTC P1498 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (LOW INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

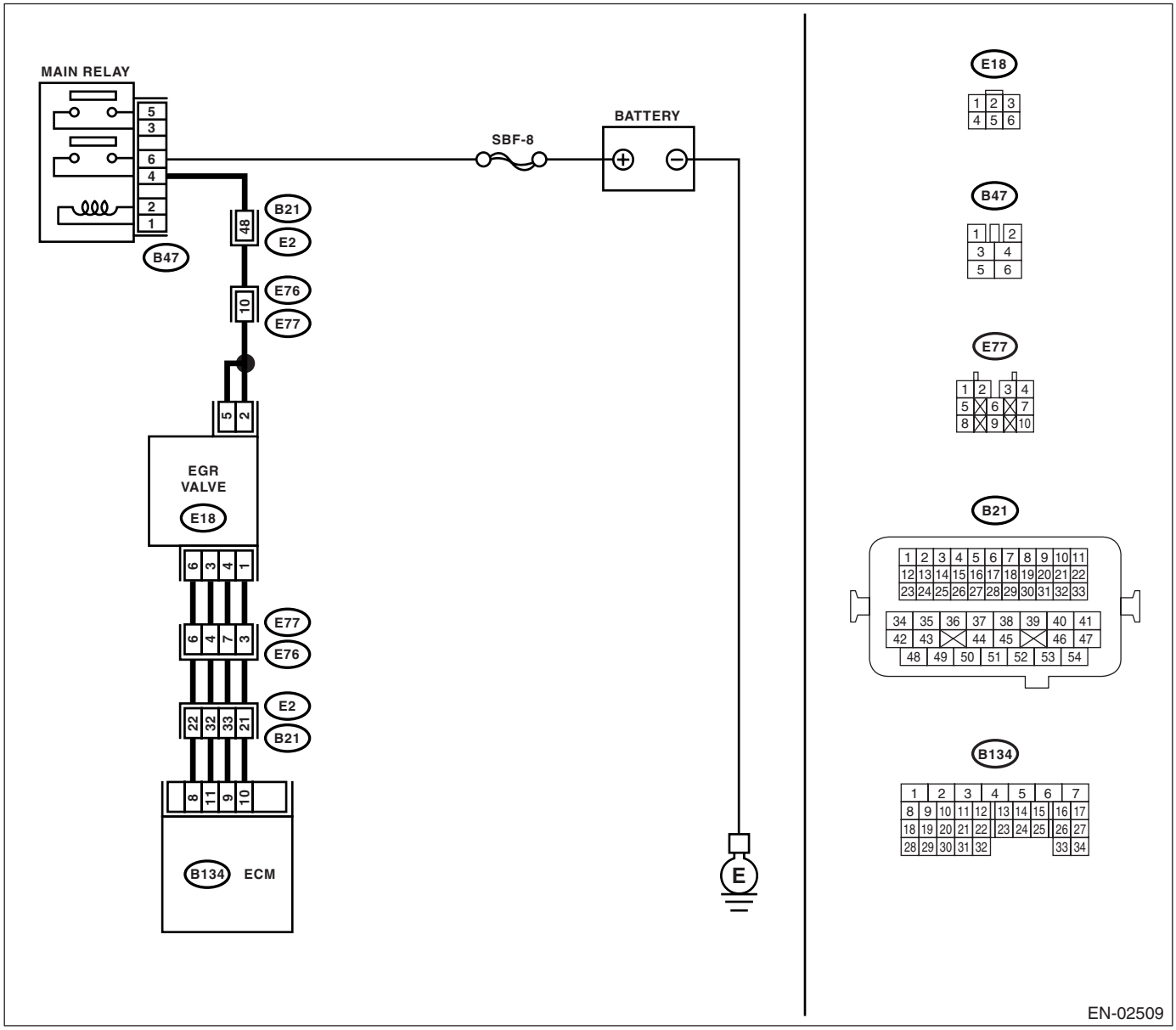
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POWER SUPPLY TO EGR SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between EGR solenoid valve connector and engine ground. ***Connector & terminal*** ***(E18) No. 2 (+) — Engine ground (–):*** ***(E18) No. 5 (+) — Engine ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between EGR solenoid valve and main relay connector • Poor contact in coupling connector
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and EGR solenoid valve connector. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — (E18) No. 3:*** ***DTC P1494; (B134) No. 10 — (E18) No. 1:*** ***DTC P1496; (B134) No. 9 — (E18) No. 4:*** ***DTC P1498; (B134) No. 8 — (E18) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and EGR solenoid valve connector. • Poor contact in coupling connector
3	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1492; (B134) No. 11 — Chassis ground:*** ***DTC P1494; (B134) No. 10 — Chassis ground:*** ***DTC P1496; (B134) No. 9 — Chassis ground:*** ***DTC P1498; (B134) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair ground short in harness between ECM and EGR solenoid valve connector.
4	**CHECK POOR CONTACT.** Check poor contact in ECM connector and EGR solenoid valve connector.	Is there poor contact in ECM connector or EGR solenoid valve connector?	Repair the poor contact in ECM connector or EGR solenoid valve connector.	Replace the EGR solenoid valve. <Ref. to FU(H6DO)-25, EGR Valve.>

CN:DTC P1499 EGR SOLENOID VALVE SIGNAL #4 CIRCUIT MALFUNCTION (HIGH INPUT)

DTC DETECTING CONDITION:

Immediately at fault recognition

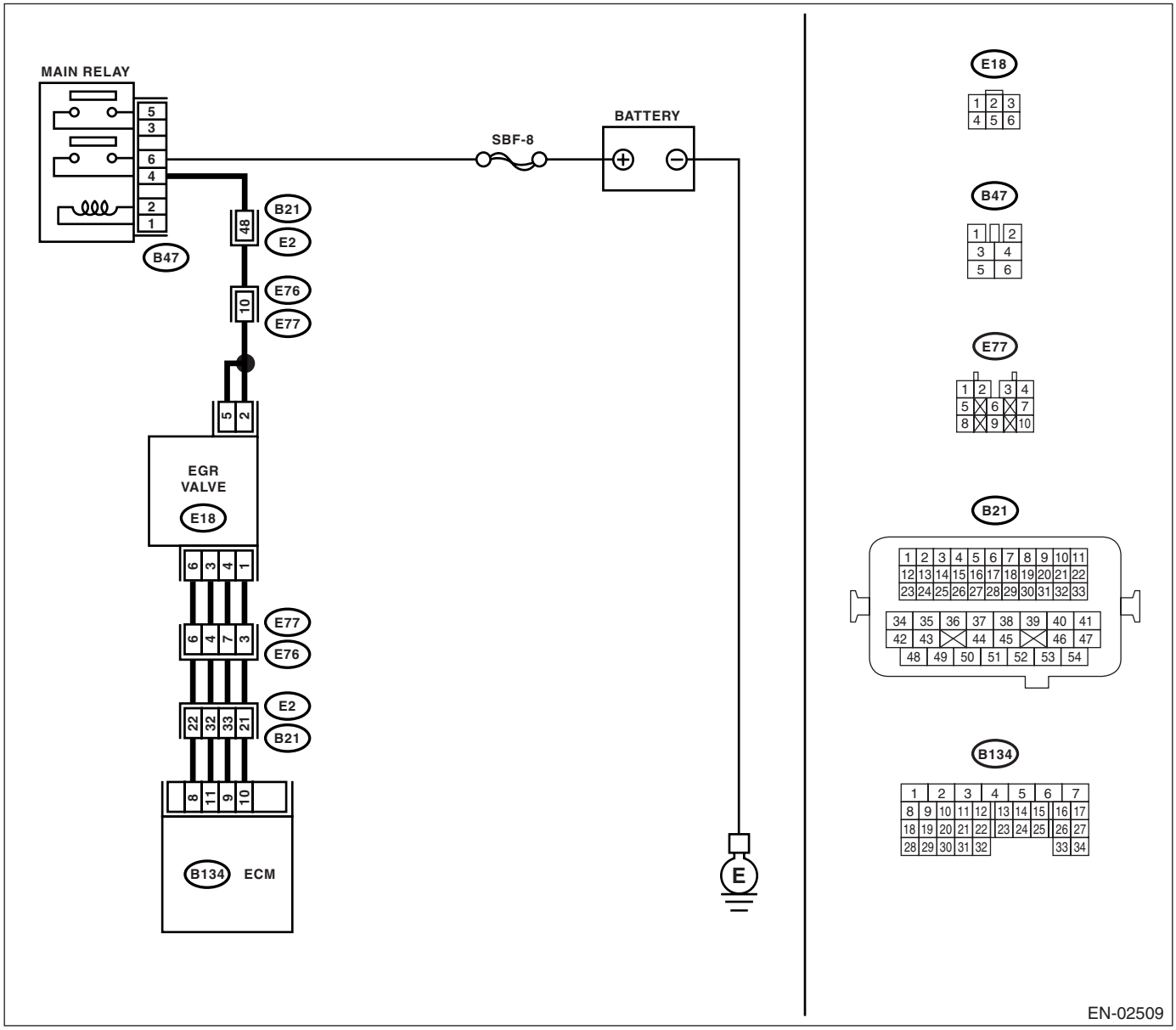
TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine breathing

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND EGR SOLENOID VALVE CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from EGR solenoid valve. 3) Turn the ignition switch to ON. 4) Measure the voltage between ECM connector and chassis ground. ***Connector & terminal*** ***DTC P1493; (B134) No. 11 (+) — Chassis ground (–):*** ***DTC P1495; (B134) No. 10 (+) — Chassis ground (–):*** ***DTC P1497; (B134) No. 9 (+) — Chassis ground (–):*** ***DTC P1499; (B134) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair battery short in harness between ECM and EGR solenoid valve connector. After repair, replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the ECM. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

CO:DTC P1518 STARTER SWITCH CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

Two consecutive driving cycles with fault

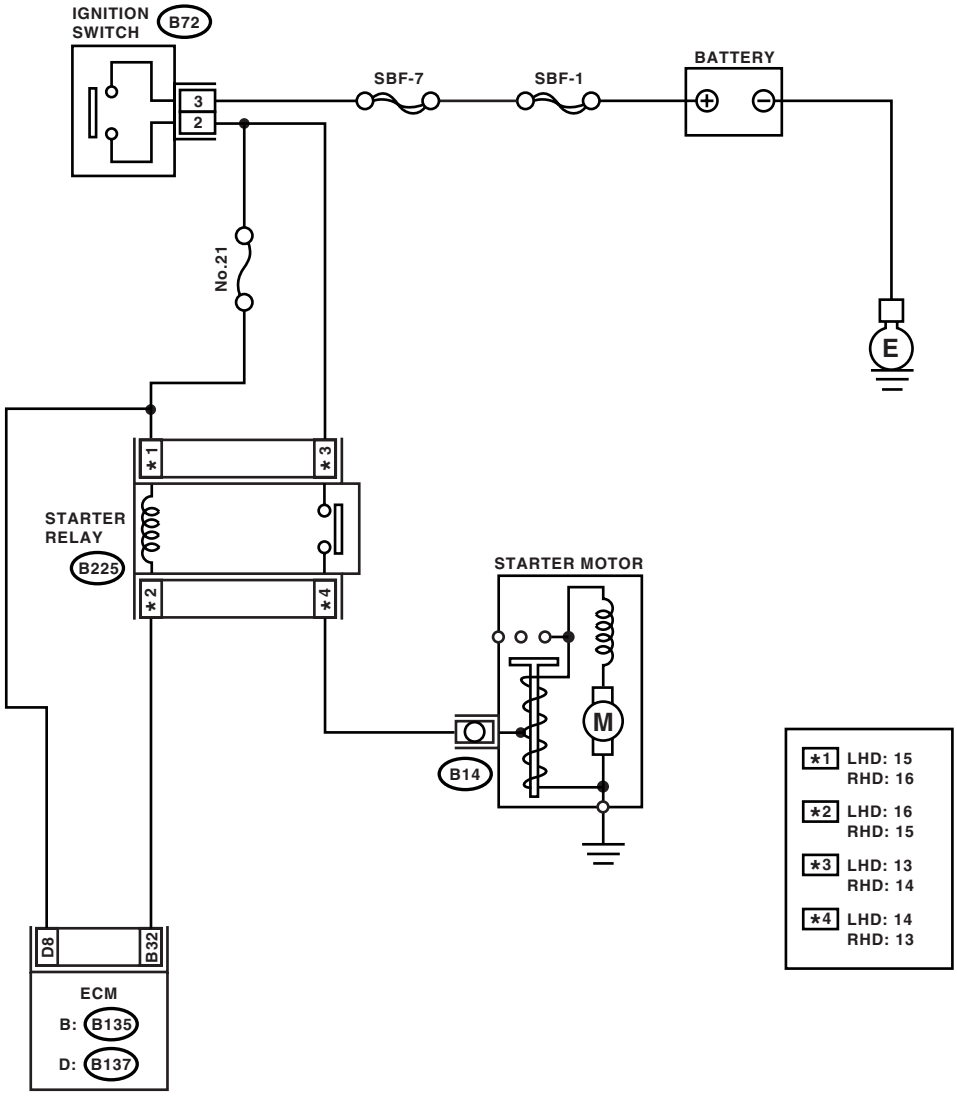
TROUBLE SYMPTOM:

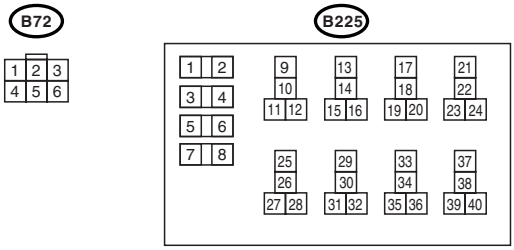
Failure of engine to start

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:





EN-02492

Step		Check	Yes	No
1	**CHECK OPERATION OF STARTER MOTOR.** Set the inhibitor switch to “P” or “N” range.	Does the starter motor operate when ignition switch to START?	Repair the harness and connector. NOTE: In this case repair the following: • Open or ground short circuit in harness between ECM and starter motor connector. • Poor contact in ECM connector	Check starter motor circuit. <Ref. to EN(H6DO)(diag)-53, STARTER MOTOR CIRCUIT, Diagnostics for Engine Starting Failure.>

CP:DTC P1560 BACK-UP VOLTAGE CIRCUIT MALFUNCTION

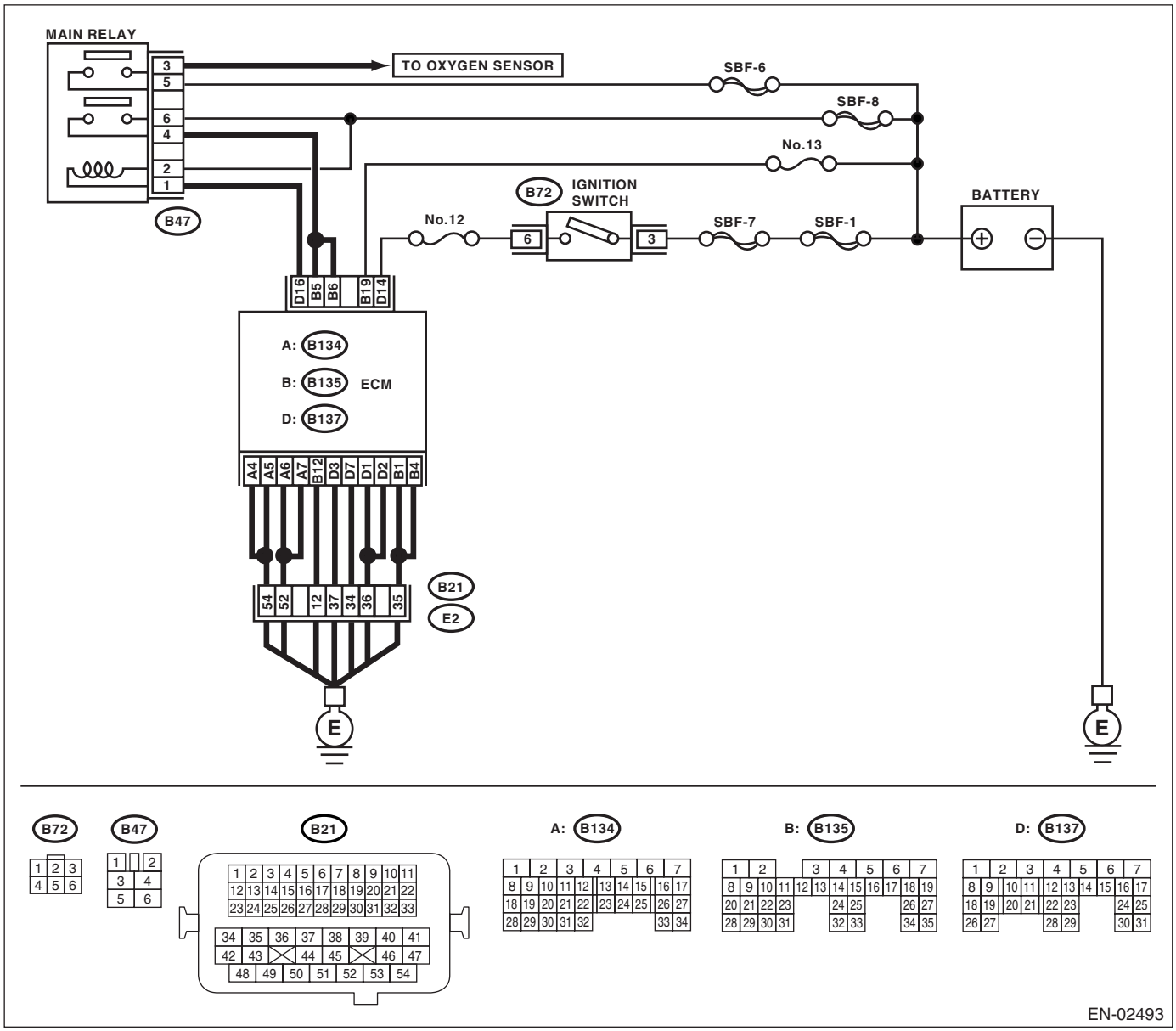
DTC DETECTING CONDITION:

Immediately at fault recognition

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL FROM ECM.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Repair the poor contact in ECM connector.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.** 1) Disconnect the connector from ECM. 2) Measure the resistance of harness between ECM and chassis ground. ***Connector & terminal*** ***(B135) No. 19 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the ground short circuit in harness between ECM connector and battery terminal.	Go to step **3.**
3	**CHECK FUSE No. 13.**	Is the fuse blown out?	Replace the fuse.	Repair the harness and connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and battery • Poor contact in ECM connector • Poor contact in battery terminal

CQ:DTC P2088 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

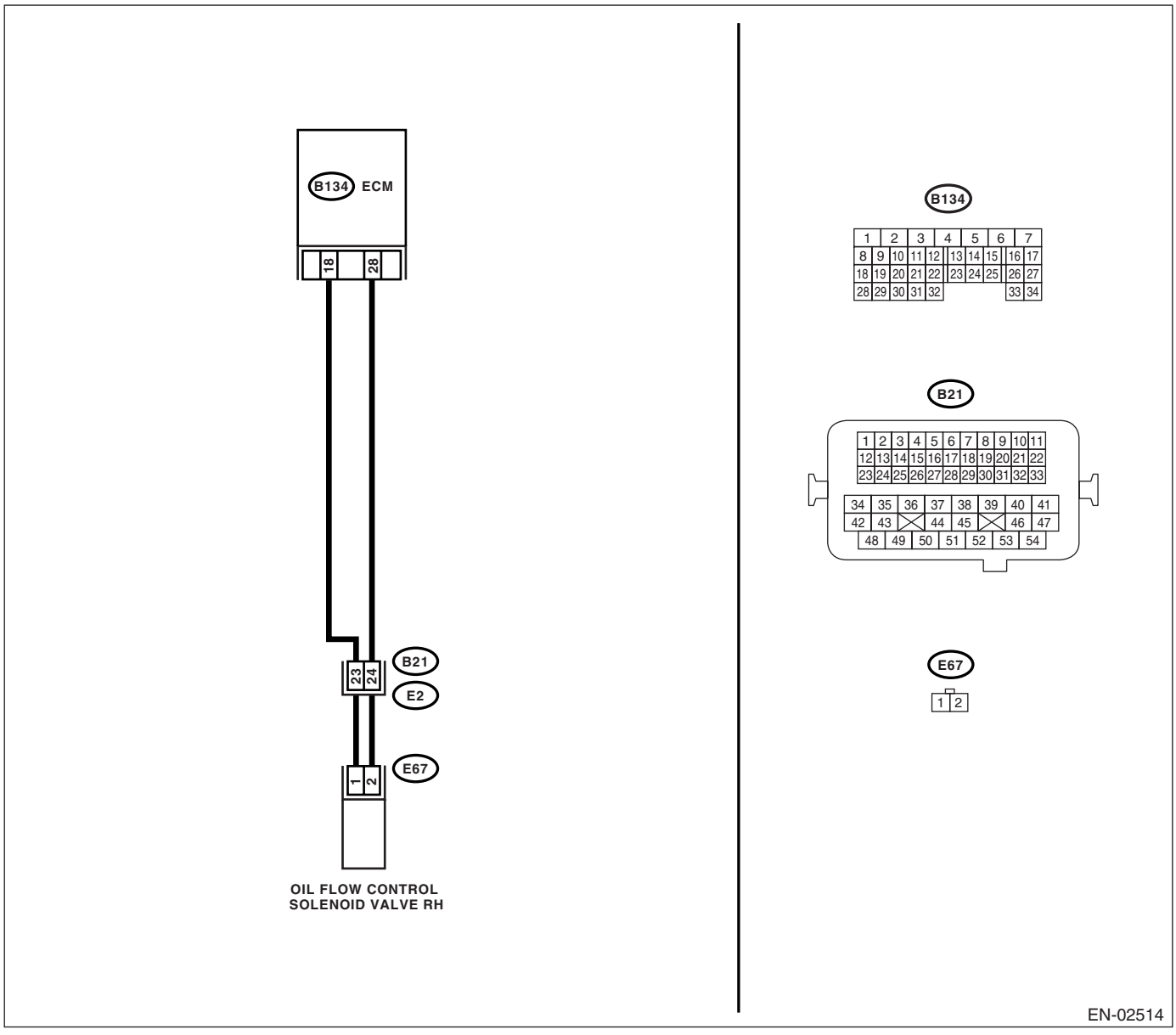
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 18 — (E67) No. 1:*** ***(B134) No. 28 — (E67) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

CR:DTC P2089 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 1)

DTC DETECTING CONDITION:

Immediately at fault recognition

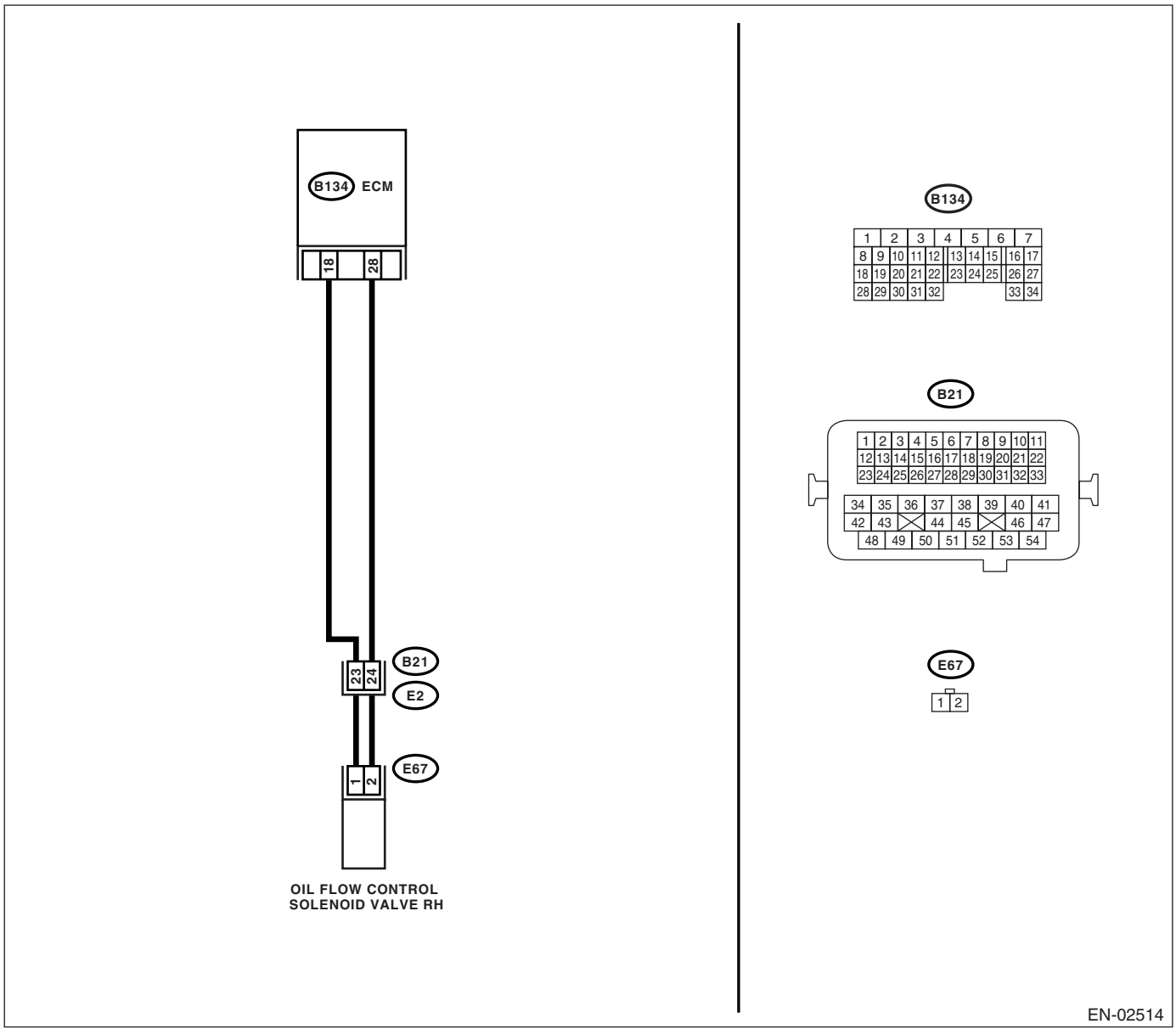
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E67) No. 1 — Engine ground:*** ***(E67) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

CS:DTC P2092 OCV SOLENOID VALVE SIGNAL A CIRCUIT OPEN (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

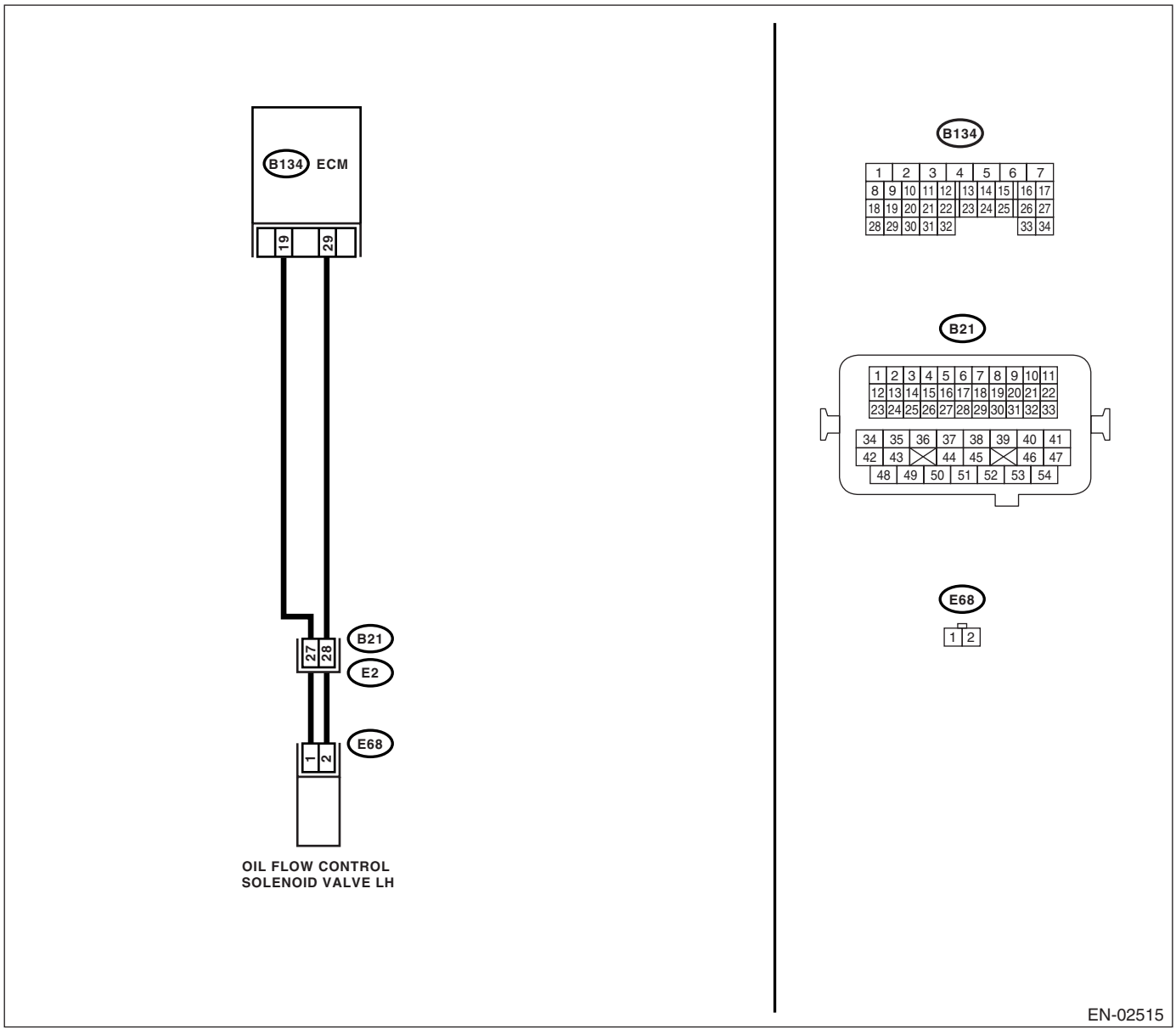
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between ECM and oil flow control solenoid valve. ***Connector & terminal*** ***(B134) No. 19 — (E68) No. 1:*** ***(B134) No. 29 — (E68) No. 2:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between ECM and oil flow control solenoid valve connector. NOTE: In this case repair the following: • Open circuit in harness between ECM and oil flow control solenoid valve connector • Poor contact in coupling connector
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

CT:DTC P2093 OCV SOLENOID VALVE SIGNAL A CIRCUIT SHORT (BANK 2)

DTC DETECTING CONDITION:

Immediately at fault recognition

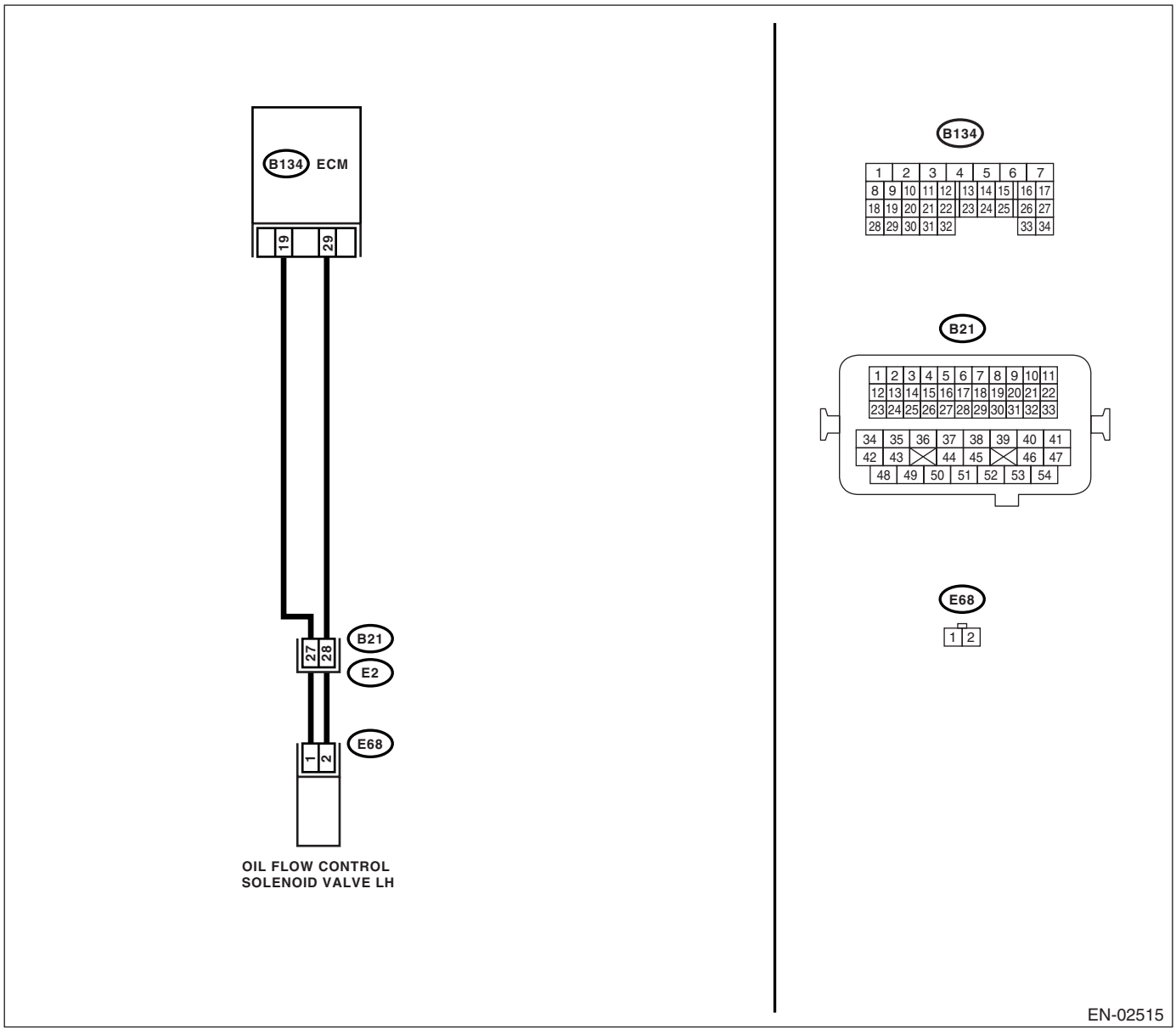
TROUBLE SYMPTOM:

Erroneous idling

CAUTION:

After repair or replacement of faulty parts, conduct Clear Memory Mode <Ref. to EN(H6DO)(diag)-40, OPERATION, Clear Memory Mode.> and Inspection Mode. <Ref. to EN(H6DO)(diag)-33, PROCEDURE, Inspection Mode.>

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from ECM and oil flow control solenoid valve. 3) Measure the resistance between oil flow control solenoid valve and engine ground. ***Connector & terminal*** ***(E68) No. 1 — Engine ground:*** ***(E68) No. 2 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit between ECM and oil flow control solenoid valve connector.
2	**CHECK OIL FLOW CONTROL SOLENOID VALVE.** 1) Remove the oil flow control solenoid valve connector. 2) Measure the resistance between oil flow control solenoid valve terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 6 — 12 Ω?	Repair the poor contact in ECM and oil flow control solenoid valve.	Replace the oil flow control solenoid valve. <Ref. to ME(H6DO)-78, Oil Flow Control Solenoid Valve.>

CU:DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/ PERFORMANCE

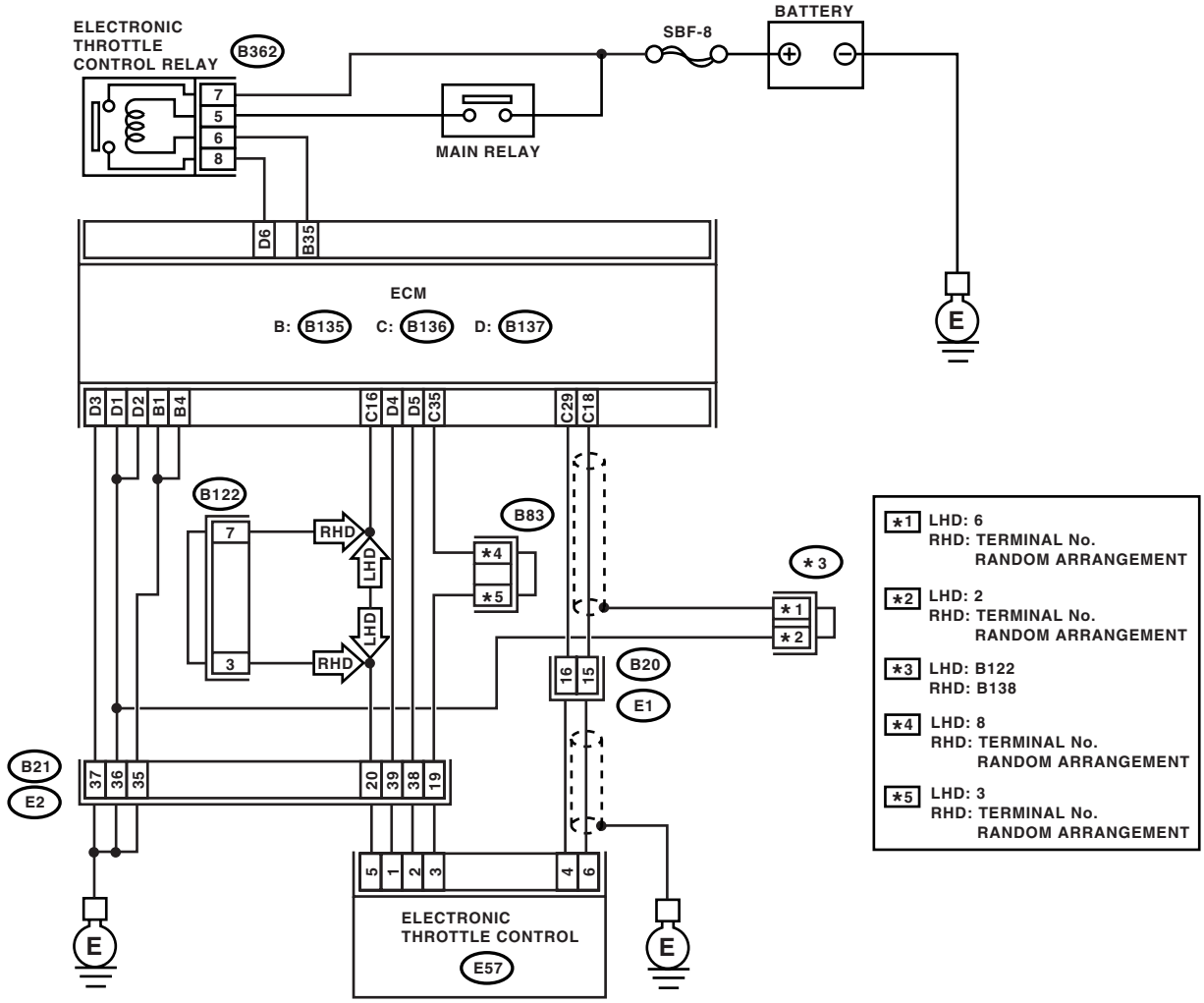
DTC DETECTING CONDITION:

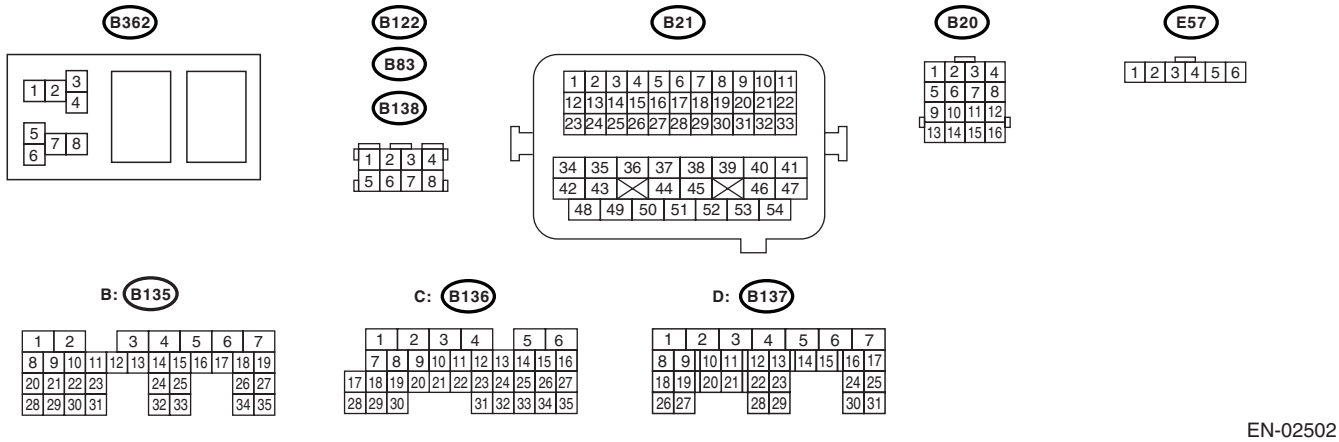
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **4.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between ECM and electronic throttle control relay.
6	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **7.**	Go to step **9.**
7	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **8.**	Go to step **9.**
8	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **13.**

	Step	Check	Yes	No
9	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit of harness connector.
10	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 16 — Chassis ground:*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **11.**	Repair the ground short circuit of harness.
11	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **12.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
12	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
13	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.63 V?	Go to step **14.**	Go to step **16.**
14	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 4.73 V?	Go to step **15.**	Go to step **16.**
15	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **21.**
16	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **17.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
17	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **18.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
18	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **19.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
19	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **20.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
20	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Remove the ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **21.**	Repair the short circuit to sensor power supply.
21	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect the connectors except of the electric throttle control relay. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage 0.81 — 0.87 V?	Go to step **22.**	Repair the poor contact in electronic throttle control connector. Replace the electronic throttle control if defective.
22	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage 1.64 — 1.70 V?	Go to step **23.**	Repair the poor contact in ECM connector. Replace the electronic throttle control if defective.
23	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B137) No. 5 — (E57) No. 2:*** ***(B137) No. 4 — (E57) No. 1:***	Is the resistance less than 1 Ω?	Go to step **24.**	Repair the open circuit of harness connector.

	Step	Check	Yes	No
24	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Connect the connector to ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 (+) — Engine ground (−):*** ***(E57) No. 1 (+) — Engine ground (−):***	Is the voltage less than 5 V?	Go to step **25.**	Repair power supply short circuit in harness between ECM and electronic throttle control.
25	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 2 — Engine ground:*** ***(E57) No. 1 — Engine ground:***	Is the resistance more than 1 MΩ?	Go to step **26.**	Repair the short circuit of harness.
26	**CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.** Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 2 — (E57) No. 1:***	Is the resistance more than 1 MΩ?	Go to step **27.**	Repair the short circuit of harness.
27	**CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B137) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **28.**	Repair the open circuit of harness.
28	**CHECK ELECTRONIC THROTTLE CONTROL.** Measure the resistance between electronic throttle control terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance less than 5 Ω?	Go to step **29.**	Repair the electronic throttle control.
29	**CHECK ELECTRONIC THROTTLE CONTROL.** Move the throttle valve to the fully open and fully closed positions with fingers Check the valve returns to the specified position when releasing fingers.	Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the electronic throttle control.

CV:DTC P2102 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT LOW

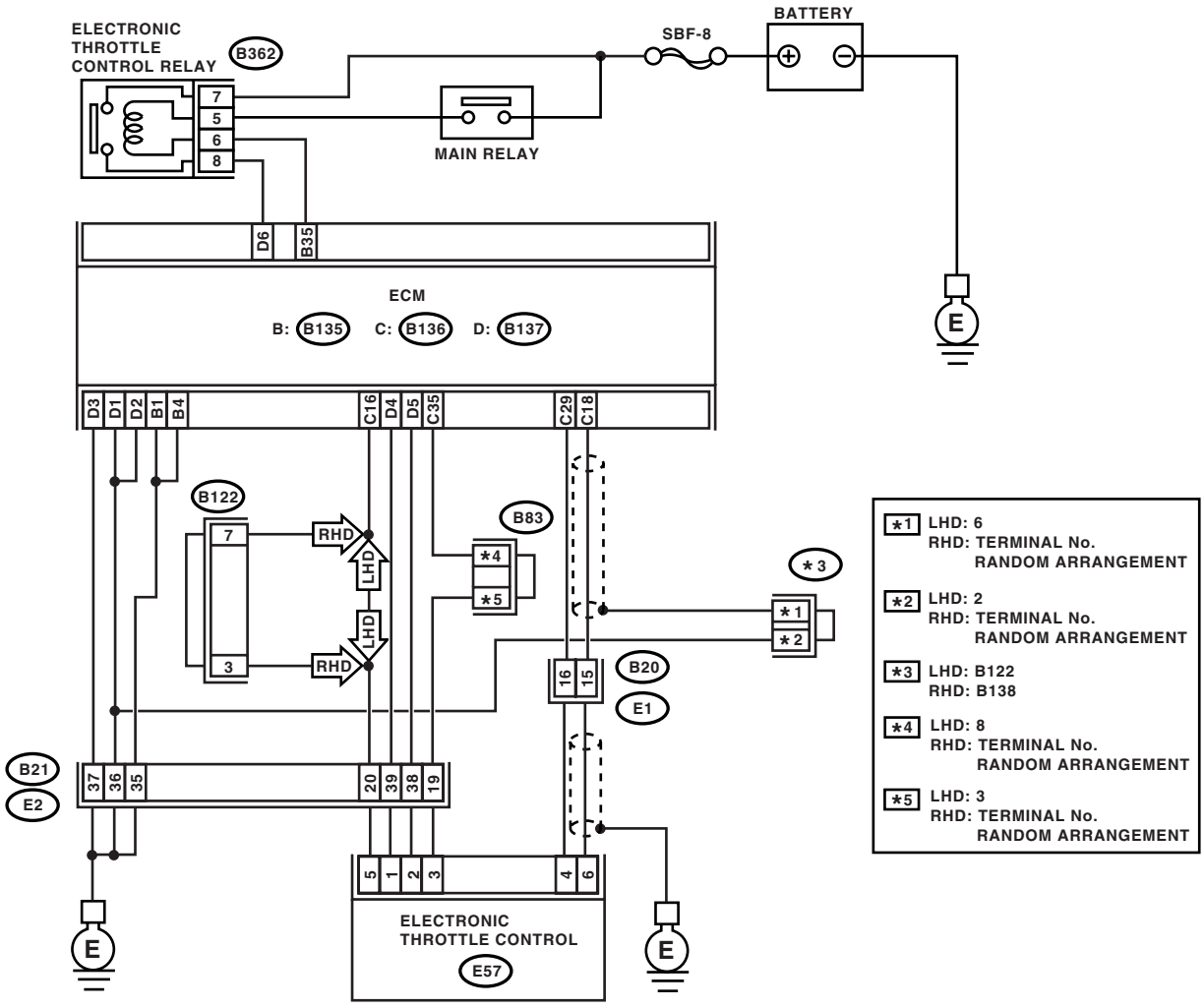
DTC DETECTING CONDITION:

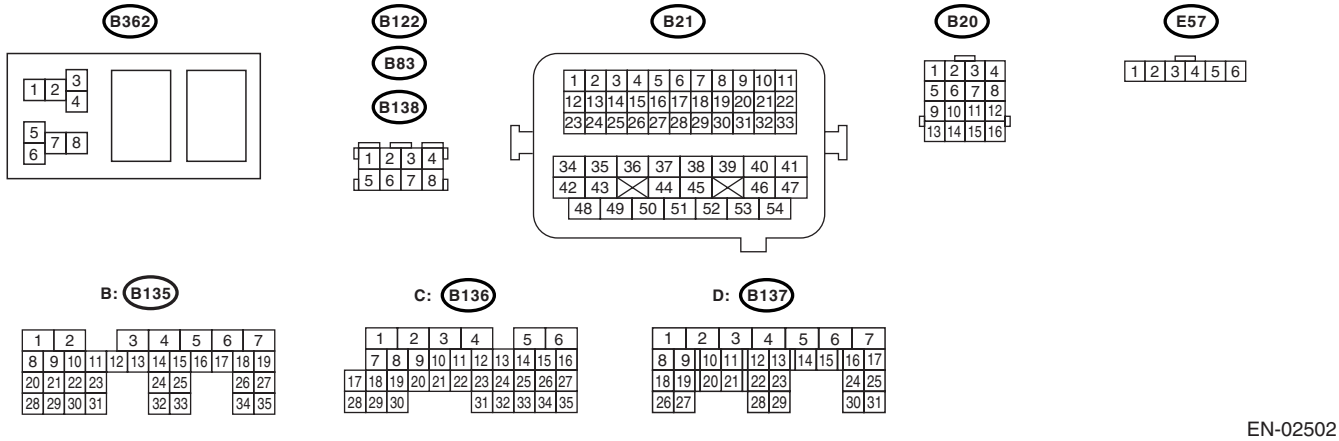
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance
- Engine stalls.

WIRING DIAGRAM:





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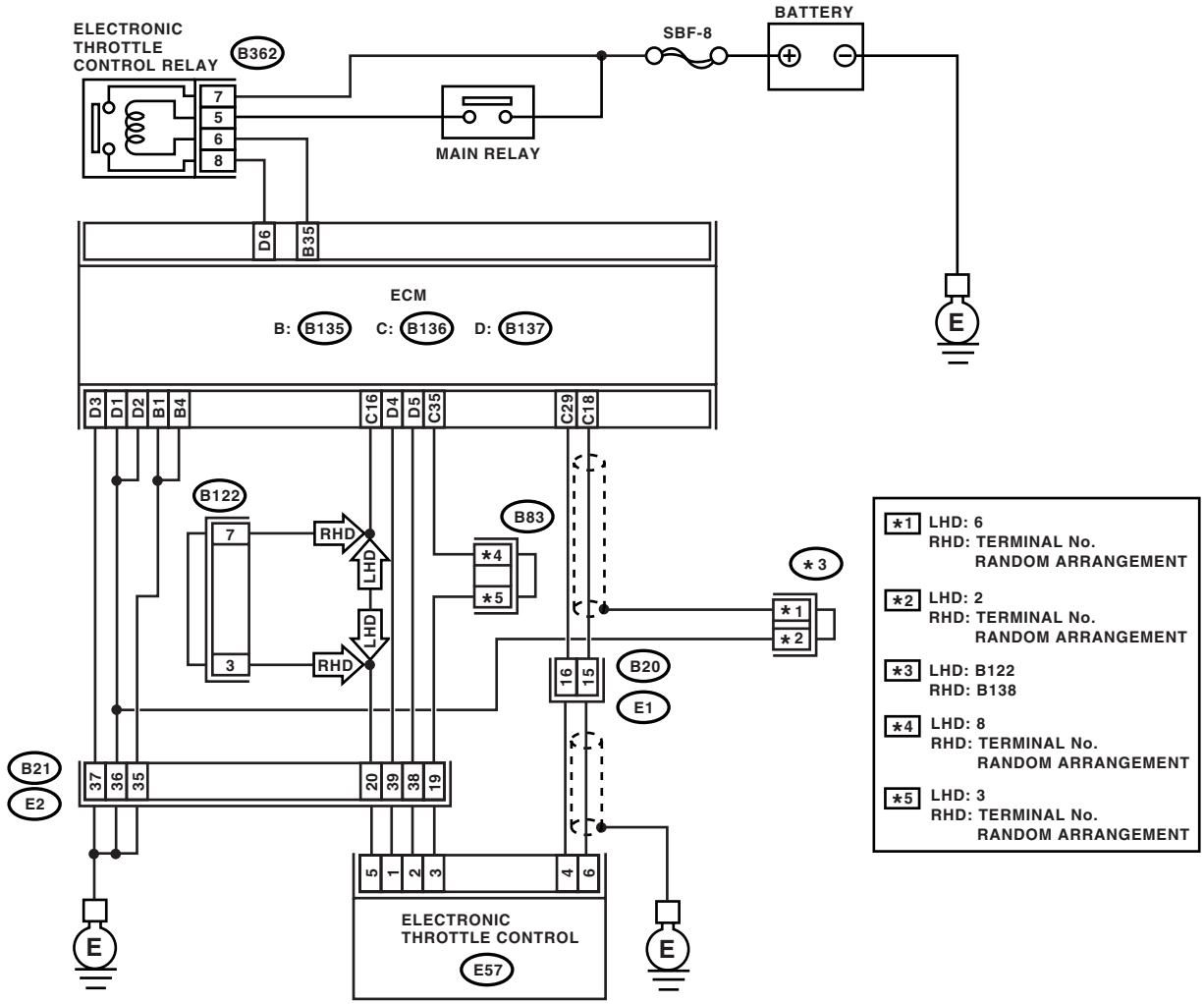
	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Connect the battery to electronic throttle control relay terminals No. 5 and No. 6. 4) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.** Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 7 (+) — Chassis ground (−):*** ***(B362) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair the open or ground short circuit of power supply circuit.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Disconnect the connector from ECM. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 5 V?	Go to step **4.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 6 — Chassis ground:*** ***(B362) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit in harness between ECM and electronic throttle control relay.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** Measure the resistance between ECM connector and electronic throttle control relay connector. ***Connector & terminal*** ***(B135) No. 35 — (B362) No. 6:*** ***(B137) No. 6 — (B362) No. 8:***	Is the resistance less than 1 Ω?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the open circuit in harness between ECM and electronic throttle control relay.

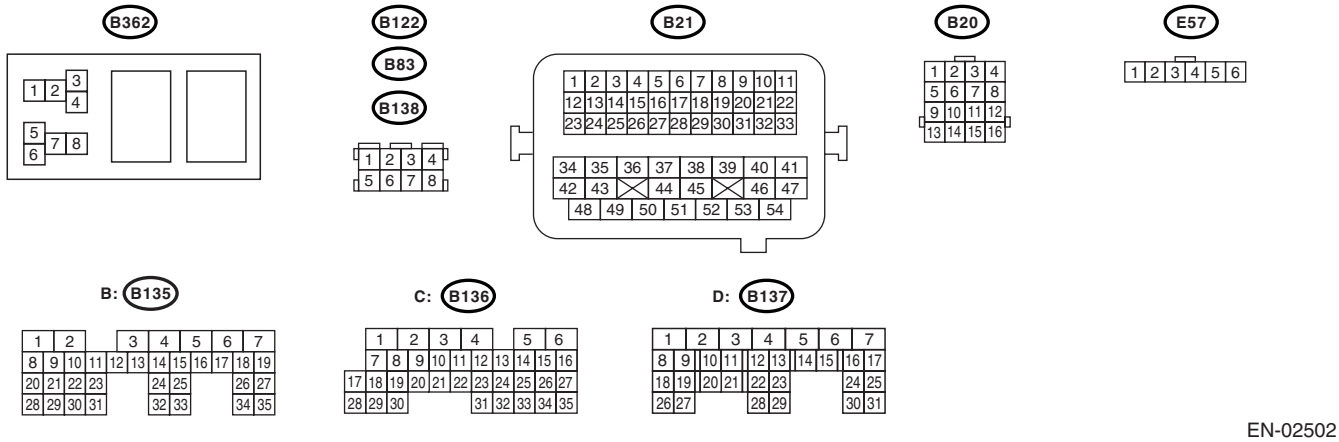
CW:DTC P2103 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Immediately at fault recognition

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the electronic throttle control relay. 3) Measure the resistance between electronic throttle control relay terminals. ***Terminals*** ***No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the electronic throttle control relay.
2	**CHECK POWER SUPPLY SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between electronic throttle control relay connector and chassis ground. ***Connector & terminal*** ***(B362) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 5 V?	Go to step **3.**	Repair power supply short circuit in harness between ECM and electronic throttle control relay.
3	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B135) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the ground short circuit in harness between ECM and electronic throttle control relay.

CX:DTC P2109 THROTTLE ANGLE SENSOR CLOSED POSITION ERROR

NOTE:
For diagnostic procedure, refer to DTC P2101. <Ref. to EN(H6DO)(diag)-241, DTC P2101 THROTTLE ACTUATOR CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

CY:DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW INPUT

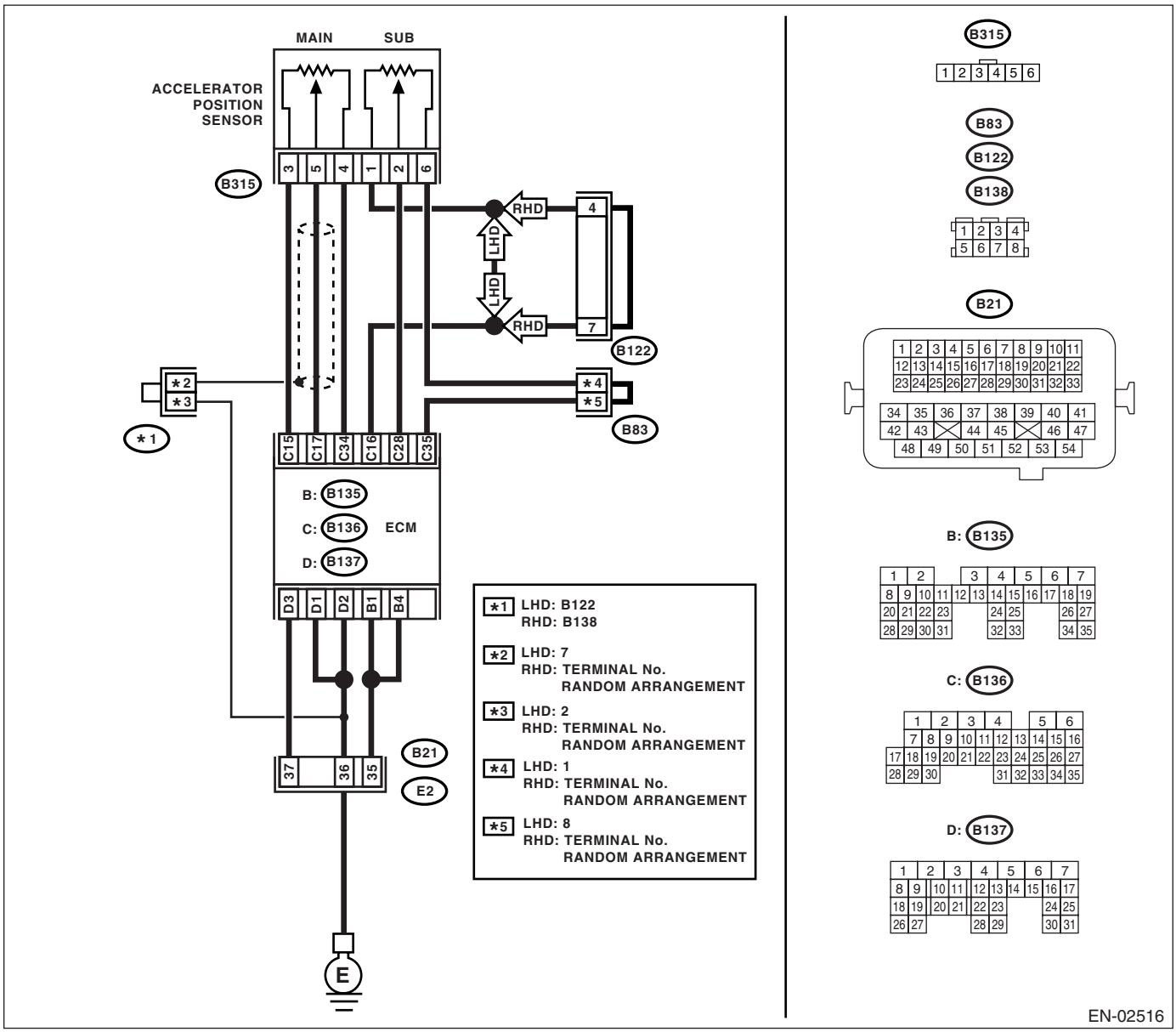
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.2 — 1.0 kΩ?	Go to step **8.**	Replace the accelerator position sensor.
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 5 — No. 4:*** Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.5 — 2.5 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the accelerator position sensor.

CZ:DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH INPUT

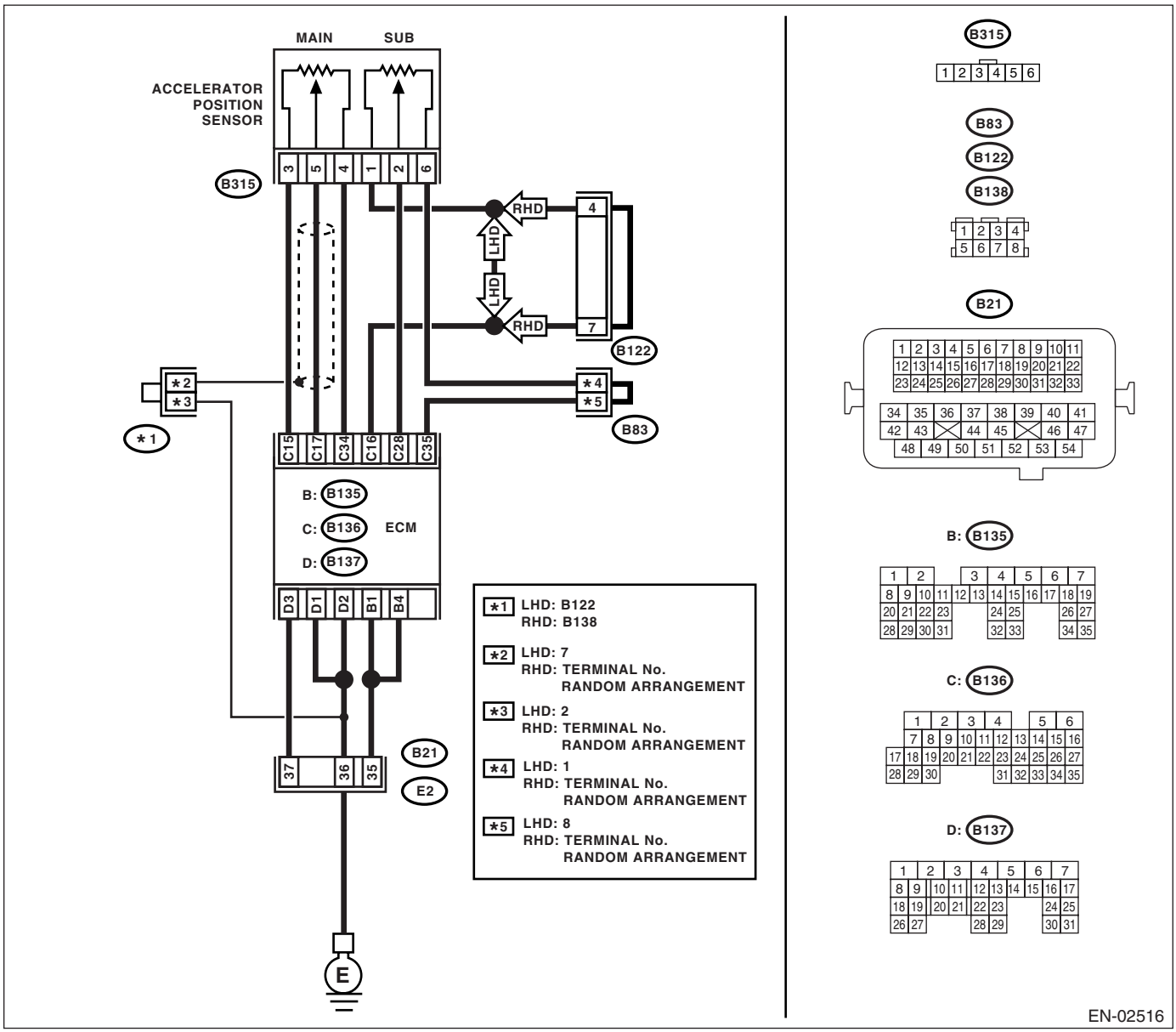
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

DA:DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW INPUT

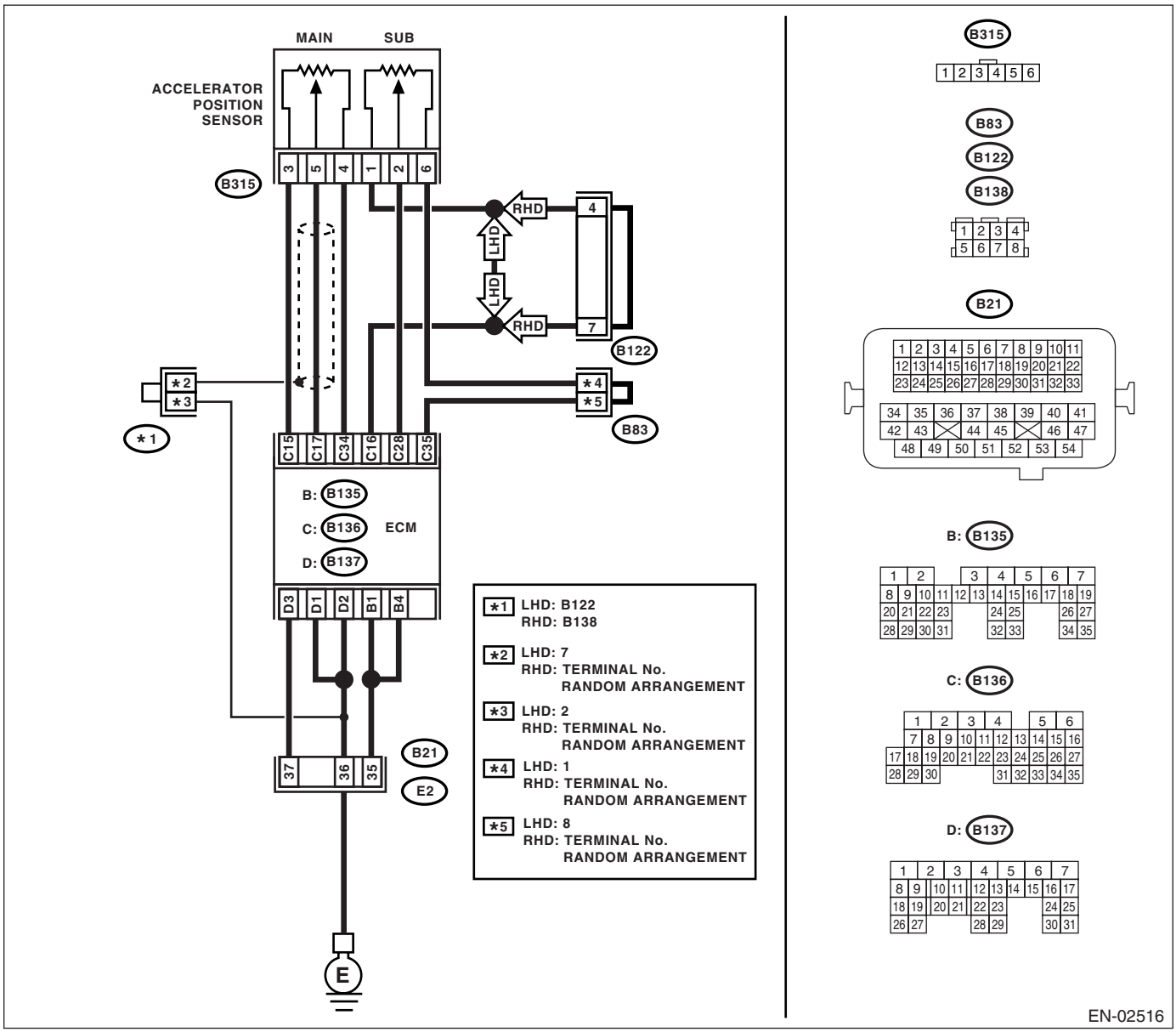
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the chassis short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 1 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification without depressing the accelerator pedal.	Is the resistance 0.15 — 0.63 kΩ?	Go to step **8.**	Replace the accelerator position sensor.
8	**CHECK ACCELERATOR POSITION SENSOR.** 1) Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 2 — No. 6:*** 2) Check the measured value is within the specification with the accelerator pedal depressed.	Is the resistance 0.28 — 1.68 kΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the accelerator position sensor.

DB:DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH INPUT

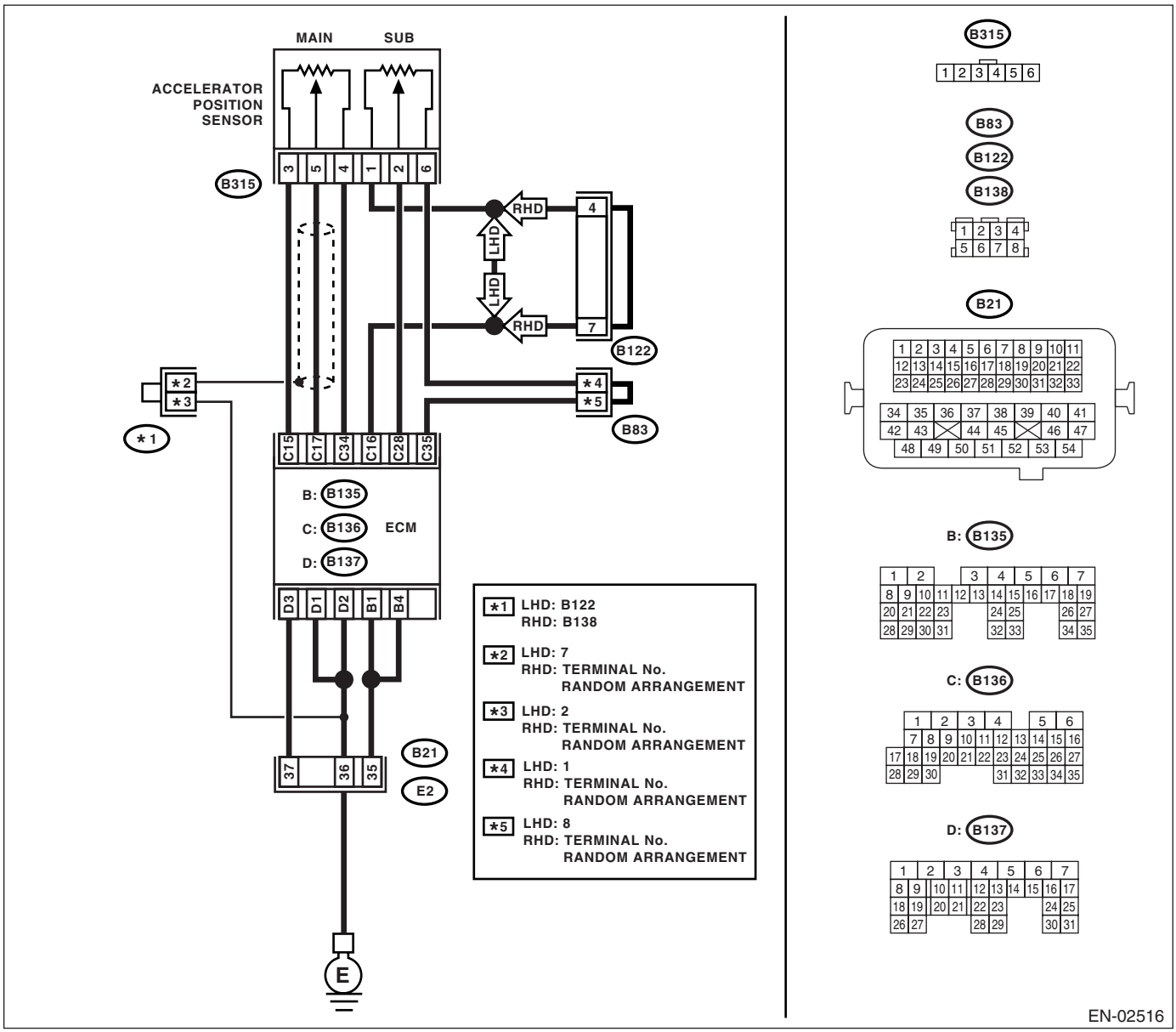
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **5.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **6.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.
6	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Repair the poor contact in accelerator position sensor connector. Replace the accelerator position sensor if defective.	Repair the short circuit to sensor power supply.

DC:DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" / "B" VOLTAGE RATIONALITY

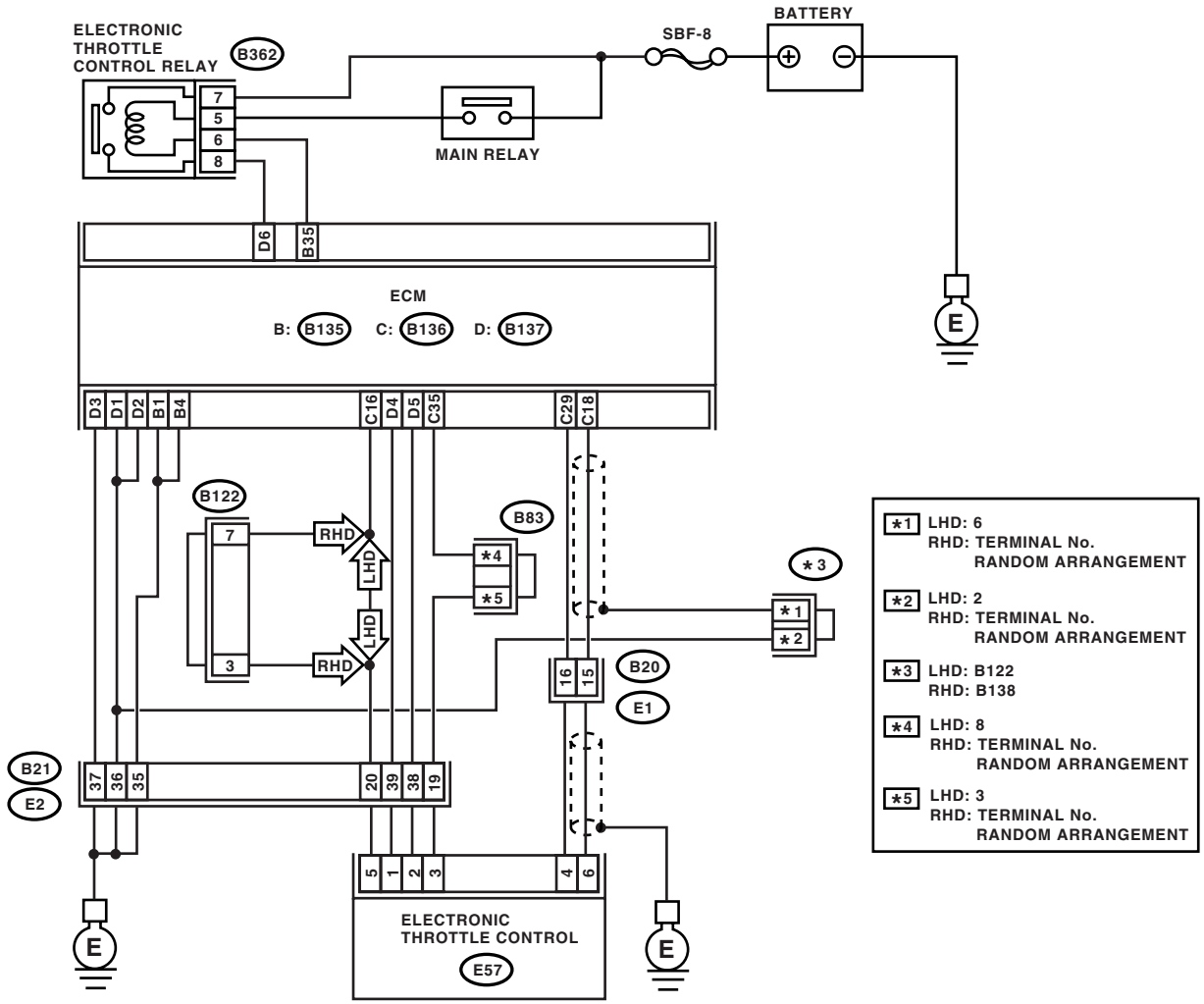
DTC DETECTING CONDITION:

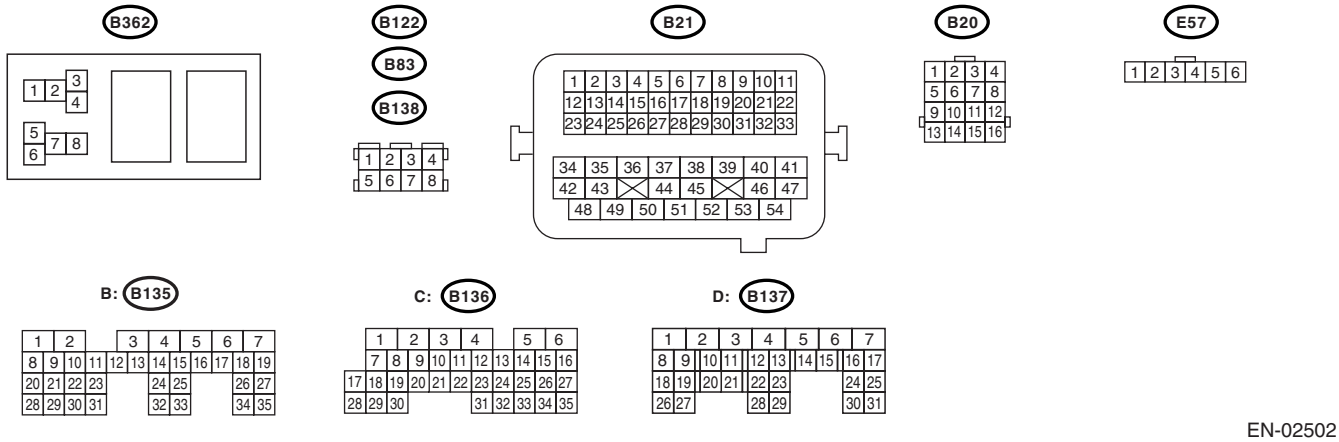
Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:





EN-02502

	Step	Check	Yes	No
1	**CHECK SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **4.**
2	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage more than 0.8 V?	Go to step **3.**	Go to step **4.**
3	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Go to step **14.**
4	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:*** ***(B136) No. 16 — (E57) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit of harness connector.
5	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 18 — Chassis ground:*** ***(B136) No. 29 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the ground short circuit of harness.
6	**CHECK SENSOR POWER SUPPLY.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage 4.5 — 5.5 V?	Go to step **7.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
7	**CHECK SHORT CIRCUIT IN ECM.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 — Engine ground:*** ***(E57) No. 4 — Engine ground:***	Is the resistance more than 10 Ω?	Go to step **8.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
8	**CHECK SENSOR OUTPUT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Read the data of main throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.63 V?	Go to step **9.**	Go to step **11.**
9	**CHECK SENSOR OUTPUT.** Read the data of sub throttle sensor signal using Subaru Select Monitor.	Is the voltage less than 4.73 V?	Go to step **10.**	Go to step **11.**
10	**CHECK POOR CONTACT.** Check the poor contact in connector between ECM and electronic throttle control.	Is there poor contact?	Repair the poor contact.	Temporary poor contact occurred, but it is normal at present.

	Step	Check	Yes	No
11	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the electronic throttle control. 4) Measure the resistance between ECM connector and electronic throttle control connector. ***Connector & terminal*** ***(B136) No. 35 — (E57) No. 3:*** ***(B136) No. 18 — (E57) No. 6:*** ***(B136) No. 29 — (E57) No. 4:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit of harness connector.
12	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Measure the resistance between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 3 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **13.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
13	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 5 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **14.**	Repair the battery short circuit in harness between ECM connector and electronic throttle control connector.
14	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** Measure the voltage between electronic throttle control connector and engine ground. ***Connector & terminal*** ***(E57) No. 6 (+) — Engine ground (−):*** ***(E57) No. 4 (+) — Engine ground (−):***	Is the voltage less than 10 V?	Go to step **15.**	Repair the short circuit in harness between ECM connector and electronic throttle control connector.
15	**CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 18 — (B136) No. 16:*** ***(B136) No. 29 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Repair the short circuit to sensor power supply.
16	**CHECK ELECTRONIC THROTTLE CONTROL HARNESS.** 1) Disconnect the connector from ECM. 2) Disconnect the connector from the electronic throttle control. 3) Measure the resistance between electronic throttle control connector terminals. ***Connector & terminal*** ***(E57) No. 6 — (E57) No. 4:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the short circuit of harness.

DD:DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" / "E" VOLTAGE RATIONALITY

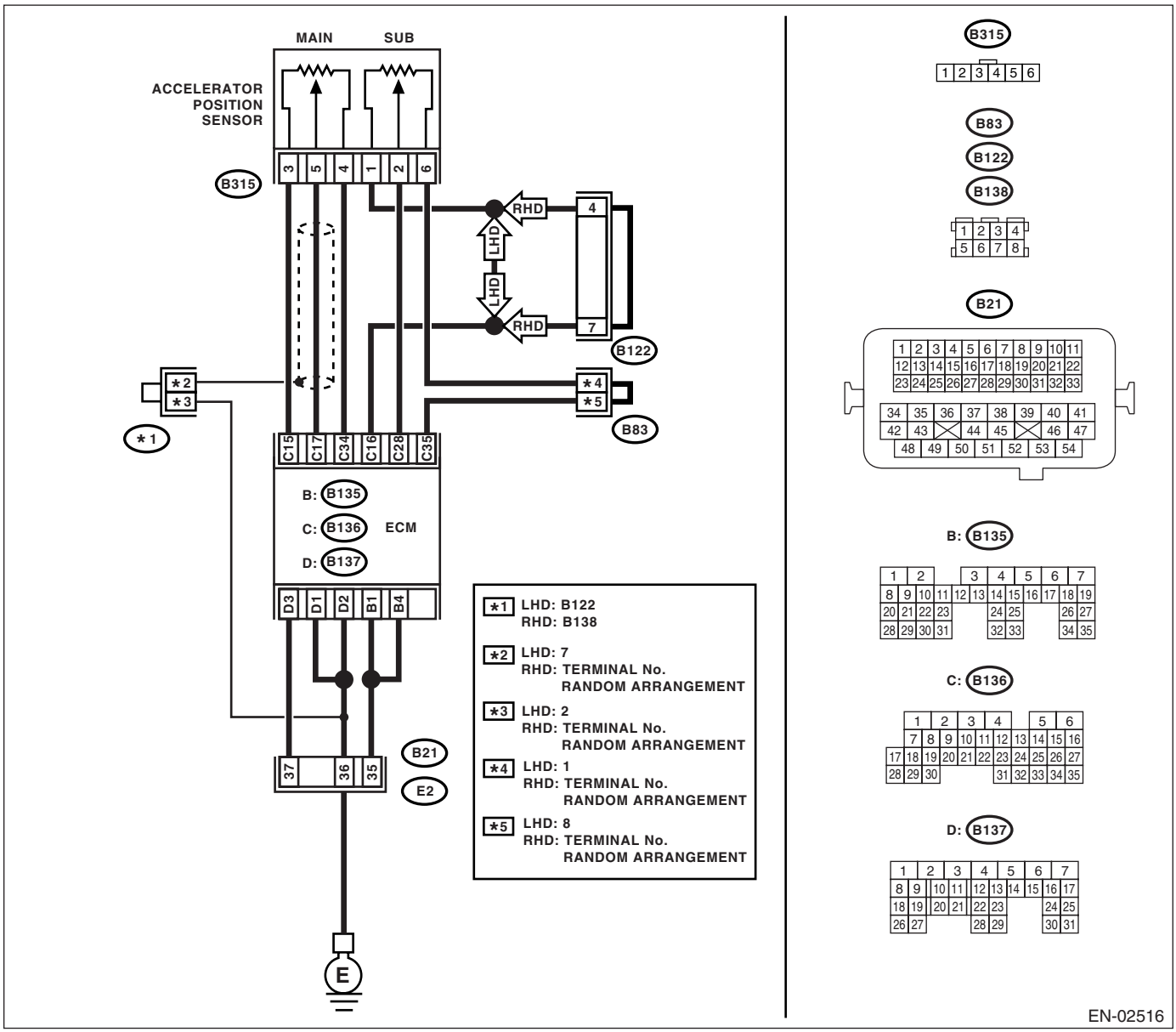
DTC DETECTING CONDITION:

Immediately at fault recognition

TROUBLE SYMPTOM:

- Erroneous idling
- Poor driving performance

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to ON. 2) Read the data of main accelerator position sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage more than 0.4 V?	Go to step **2.**	Go to step **3.**

	Step	Check	Yes	No
2	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **12.**
3	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 17 — (B315) No. 5:*** ***(B136) No. 15 — (B315) No. 3:*** ***(B136) No. 28 — (B315) No. 2:*** ***(B136) No. 16 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness connector.
4	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** Measure the resistance between ECM connector and chassis ground. ***Connector & terminal*** ***(B136) No. 17 — Chassis ground:*** ***(B136) No. 15 — Chassis ground:*** ***(B136) No. 28 — Chassis ground:*** ***(B136) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the ground short circuit of harness.
5	**CHECK POWER SUPPLY OF ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 3 (+) — Engine ground (–):*** ***(B315) No. 1 (+) — Engine ground (–):***	Is the voltage 4.5 — 5.5 V?	Go to step **6.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
6	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 3 — No. 4:***	Is the resistance 1.2 — 4.8 kΩ?	Go to step **7.**	Replace the accelerator position sensor.
7	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor. ***Terminals*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **8.**	Replace the accelerator position sensor.
8	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.2 — 0.8 kΩ?	Go to step **9.**	Replace the accelerator position sensor.

	Step	Check	Yes	No
9	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor without depressing the accelerator pedal. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **10.**	Replace the accelerator position sensor.
10	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 5 — No. 4:***	Is the resistance 0.5 — 2.5 kΩ?	Go to step **11.**	Replace the accelerator position sensor.
11	**CHECK ACCELERATOR POSITION SENSOR.** Measure the resistance of accelerator position sensor with the accelerator pedal depressed. ***Terminals*** ***No. 2 — No. 6:***	Is the resistance 0.28 — 1.68 kΩ?	Go to step **12.**	Replace the accelerator position sensor.
12	**CHECK ACCELERATOR POSITION SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Read the data of main throttle sensor signal and sub accelerator position sensor signal using Subaru Select Monitor.	Is the voltage less than 4.8 V?	Go to step **13.**	Go to step **14.**
13	**CHECK POOR CONTACT.** Check poor contact in connector between ECM and accelerator position sensor.	Is there poor contact?	Repair the poor contact.	Go to step **18.**
14	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between ECM connector and accelerator position sensor connector. ***Connector & terminal*** ***(B136) No. 34 — (B315) No. 4:*** ***(B136) No. 35 — (B315) No. 6:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit of harness connector.
15	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Measure the resistance between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 4 — Engine ground:*** ***(B315) No. 6 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **16.**	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
16	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Connect the ECM connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between accelerator position sensor connector and engine ground. ***Connector & terminal*** ***(B315) No. 5 (+) — Engine ground (−):*** ***(B315) No. 2 (+) — Engine ground (−):***	Is the voltage less than 6 V?	Go to step **17.**	Repair the battery short circuit in harness between ECM connector and accelerator position sensor connector.

	Step	Check	Yes	No
17	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance between ECM connectors. ***Connector & terminal*** ***(B136) No. 17 — (B136) No. 15:*** ***(B136) No. 17 — (B136) No. 16:*** ***(B136) No. 28 — (B136) No. 15:*** ***(B136) No. 28 — (B136) No. 16:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the short circuit to sensor power supply.
18	**CHECK HARNESS BETWEEN ECM AND ACCELERATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Disconnect the connector from the accelerator position sensor. 4) Measure the resistance between connector terminals of accelerator position sensor. ***Connector & terminal*** ***(B315) No. 5 — (B315) No. 2:***	Is the resistance more than 1 MΩ?	Repair the poor contact in ECM connector. Replace the ECM if defective. <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the short circuit in harness between ECM connector and accelerator position sensor connector.

19.General Diagnostic Table

A: INSPECTION

1. ENGINE

NOTE:
Malfunction of parts other than those listed is also possible. <Ref. to ME(H6DO)-81, Engine Trouble in General.>

Symptom	Problem parts
1. Engine stalls during idling.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Ignition parts (*1) 4) Engine coolant temperature sensor (*2) 5) Crankshaft position sensor (*3) 6) Camshaft position sensor (*3) 7) Fuel injection parts (*4)
2. Rough idling	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Ignition parts (*1) 5) Air intake system (*5) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Crankshaft position sensor (*3) 9) Camshaft position sensor (*3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay 12) EGR valve
3. Engine does not return to idle.	1) Engine coolant temperature sensor 2) Electronic throttle control 3) Manifold absolute pressure sensor 4) Mass air flow and intake air temperature sensor 5) EGR valve 6) Accelerator position sensor 7) Oil temperature sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (*2) 7) Crankshaft position sensor (*3) 8) Camshaft position sensor (*3) 9) A/C switch and A/C cut relay 10) Engine torque control signal circuit 11) Ignition parts (*1) 12) EGR valve 13) Accelerator position sensor 14) Oil temperature sensor
5. Engine stalls or engine sags or hesitates at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Purge control solenoid valve 7) Fuel injection parts (*4) 8) Electronic throttle control 9) Fuel pump and fuel pump relay 10) EGR valve

General Diagnostic Table

Symptom	Problem parts
6. Surging	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Crankshaft position sensor (*3) 5) Camshaft position sensor (*3) 6) Fuel injection parts (*4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay 9) EGR valve
7. Spark knock	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (*4) 6) Fuel pump and fuel pump relay 7) EGR valve
8. After burning in exhaust system	1) Mass air flow and intake air temperature sensor 2) Manifold absolute pressure sensor 3) Engine coolant temperature sensor (*2) 4) Fuel injection parts (*4) 5) Fuel pump and fuel pump relay

*1: Check ignition coil & ignitor ASSY and spark plug.
*2: Indicate the symptom occurring only in cold temperatures.
*3: Ensure the secure installation.
*4: Check the fuel injector and fuel pressure regulator.
*5: Inspect air leak in air intake system.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

CONTROL SYSTEMS

CS

		Page
1.	General Description	2
2.	Select Lever	7
3.	Select Cable	12
4.	AT Steering Shift Switch	16
5.	Shift Lock Solenoid	18
6.	MT Gear Shift Lever	21
7.	MT Drive Select Lever	28
8.	Drive Select Cable	30
9.	General Diagnostic Table	32

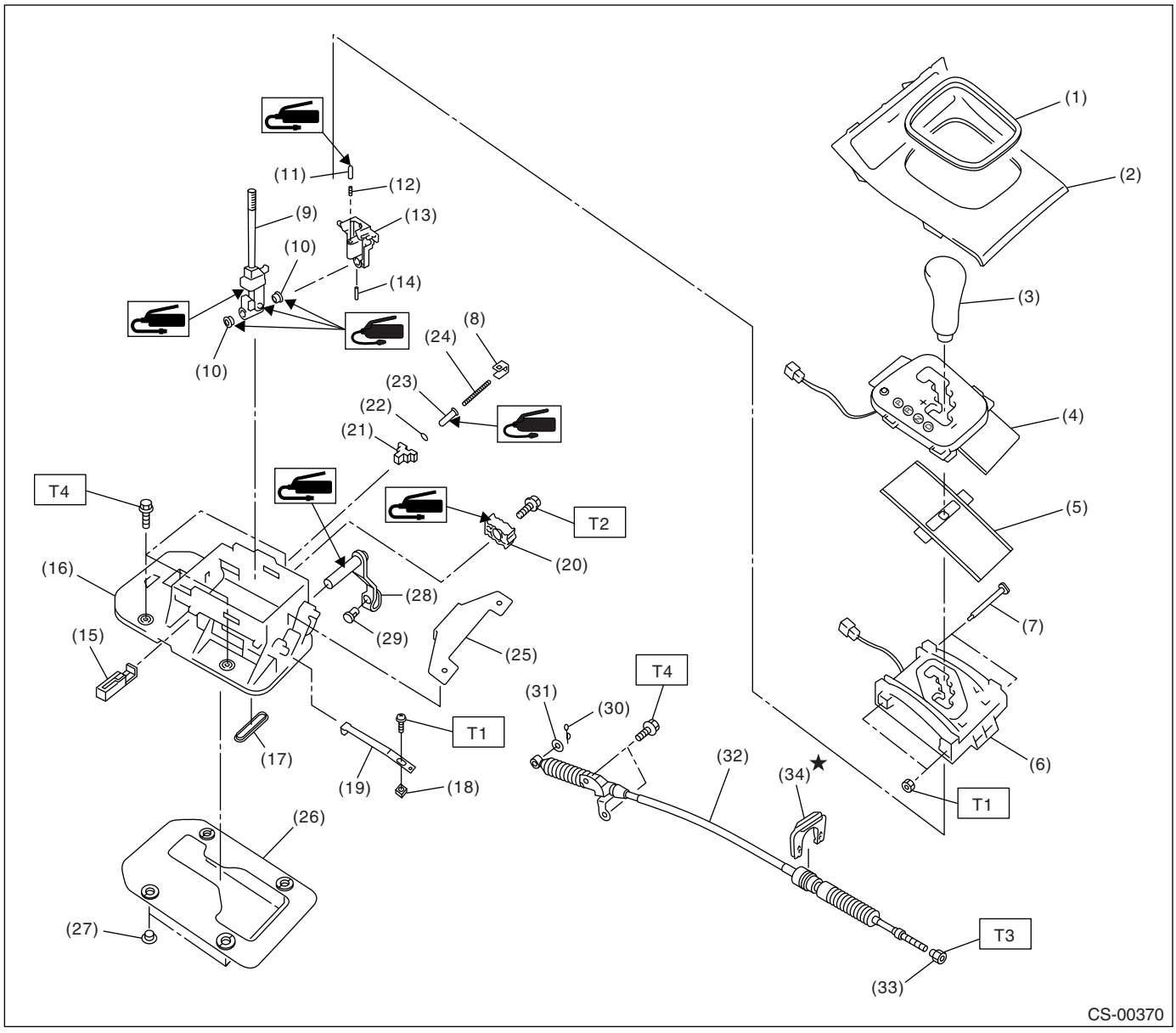
1. General Description

A: SPECIFICATION

Item	Specification
Swing torque of rod against lever N (kgf, lb)	3.7 (0.38, 0.84) or less

B: COMPONENT

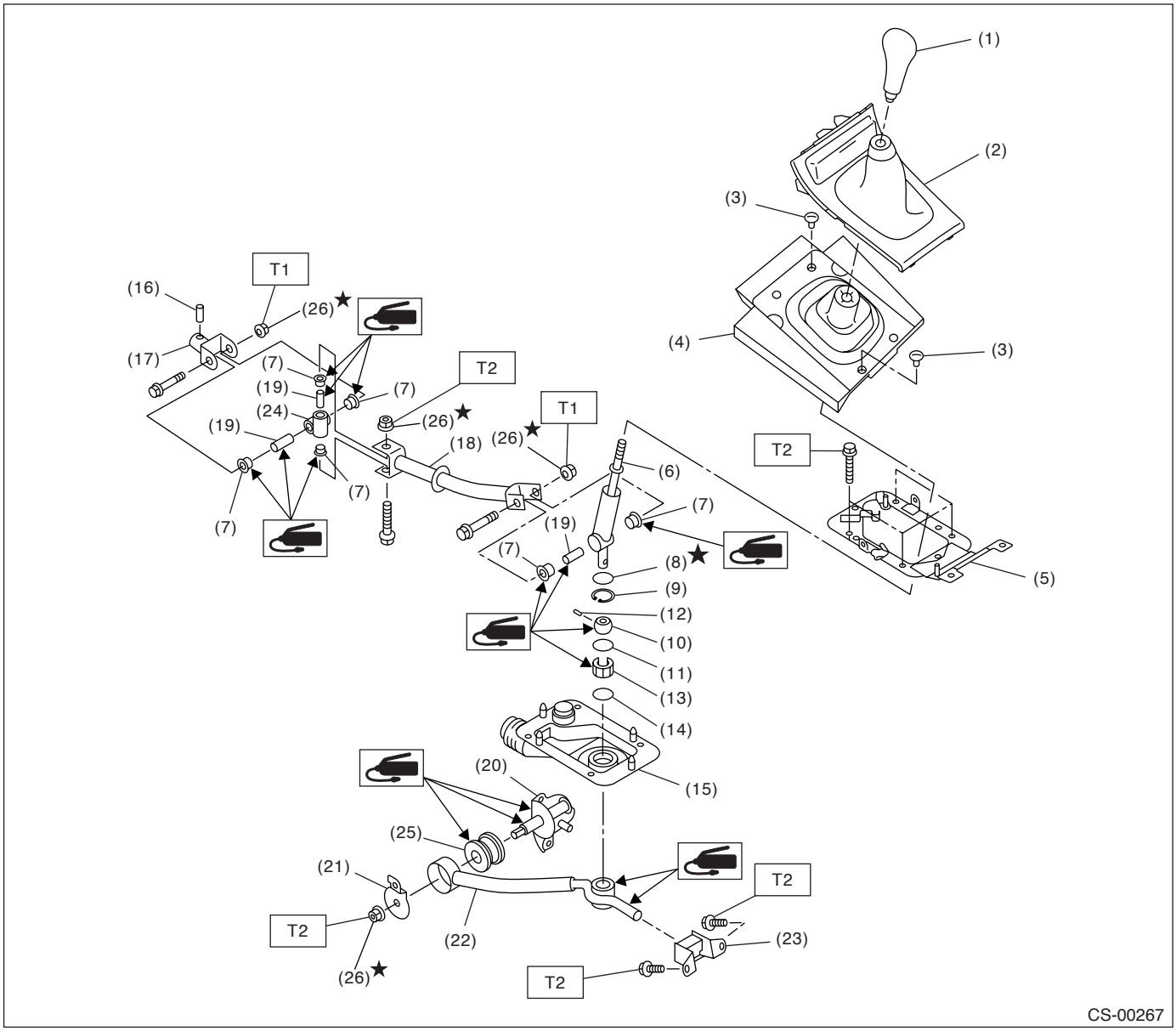
1. AT SELECT LEVER



(1) Ring indicator
(2) Front cover
(3) Grip
(4) Indicator cover ASSY
(5) Blind
(6) Guide plate
(7) Pin
(8) Clamp
(9) Lever ASSY
(10) Bushing
(11) Rod
(12) Spring
(13) Arm
(14) Spring pin
(15) Shift lock solenoid UNIT
(16) Plate
(17) Grommet
(18) Plate nut
(19) Detent spring
(20) Detent plate
(21) Bushing
(22) Packing
(23) Rod
(24) Spring
(25) Bracket
(26) Packing
(27) Spacer
(28) Arm ASSY
(29) Connector pin
(30) Snap pin
(31) Washer
(32) Select cable
(33) Nut A
(34) Clamp

Tightening torque: N·m (kgf-m, ft-lb)
T1: 2.2 (0.22, 1.62)
T2: 6 (0.61, 4.4)
T3: 7.5 (0.76, 5.5)
T4: 18 (1.8, 13.3)

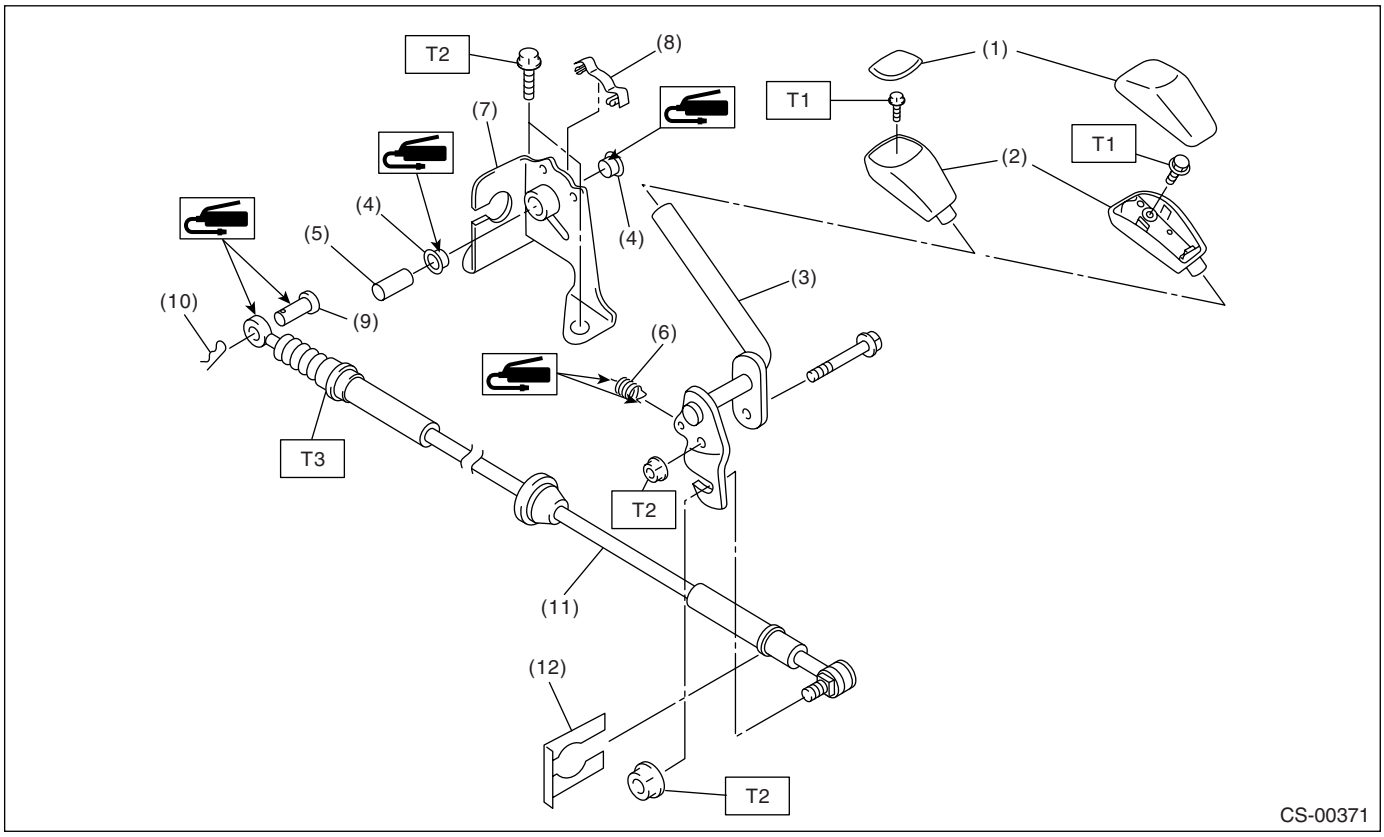
2. 5MT GEAR SHIFT LEVER



(1) Gear shift knob
(2) Front cover ASSY
(3) Clamp
(4) Boot and insulator ASSY
(5) Plate ASSY
(6) Lever
(7) Bushing
(8) Lock wire
(9) Snap ring
(10) Bushing
(11) O-ring
(12) Spring pin
(13) Bushing B
(14) O-ring
(15) Boot
(16) Spring pin
(17) Joint
(18) Rod
(19) Spacer
(20) Bracket
(21) Washer
(22) Stay
(23) Cushion rubber
(24) Boss
(25) Bushing
(26) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 12 (1.2, 8.9)
T2: 18 (1.8, 13.3)

3. DRIVE SELECT LEVER



(1) Cover
(2) Knob
(3) Lever ASSY
(4) Bushing
(5) Spacer
(6) Spring
(7) Plate ASSY
(8) Bushing
(9) Clevis pin
(10) Snap pin
(11) Cable
(12) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 12 (1.2, 8.9)
T3: 27.5 (2.80, 20.3)

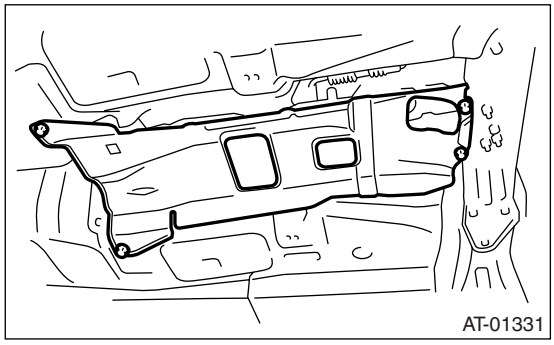
C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
• Before securing a part in a vice, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and vice.
• Before disconnecting electrical connectors, be sure to disconnect the negative terminal from battery.

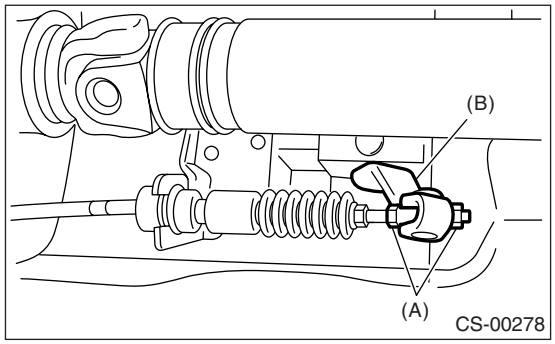
2. Select Lever

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Shift the select lever to “N” range.
4) Lift-up the vehicle.
5) Remove the rear exhaust pipe and muffler.
• SOHC model
<Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
6) Remove the heat shield cover.

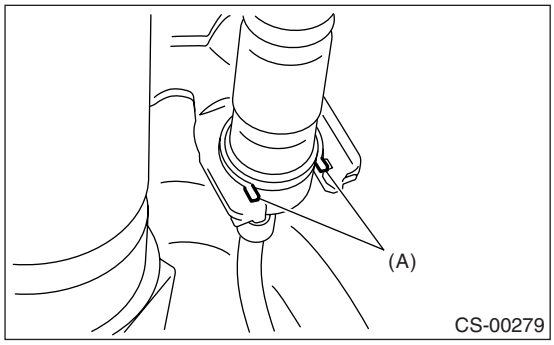


7) Remove the cable from arm assembly.



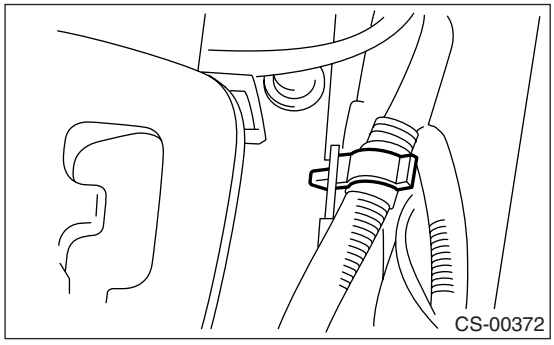
(A) Adjusting nut
(B) Arm ASSY

8) Raise the pawl of clamp to remove cable.

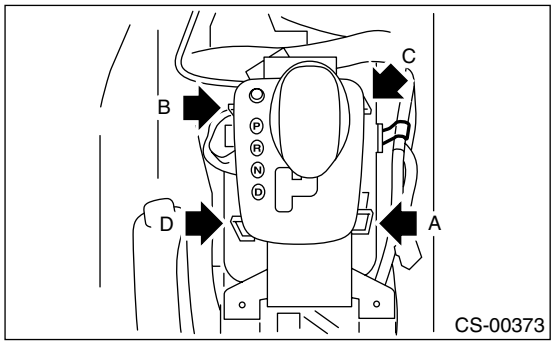


(A) Claw

9) Lower the vehicle.
10) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
11) Remove the harness clips from bracket.



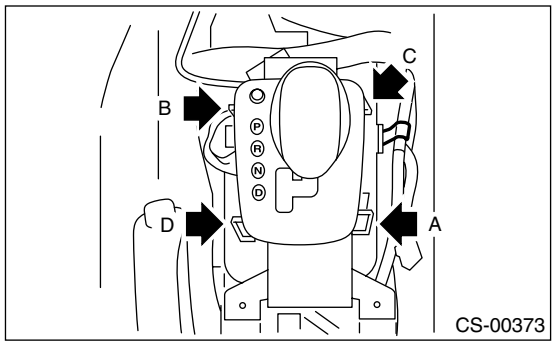
12) Disconnect the connectors, and then remove the four bolts to take out the select lever assembly from vehicle body.



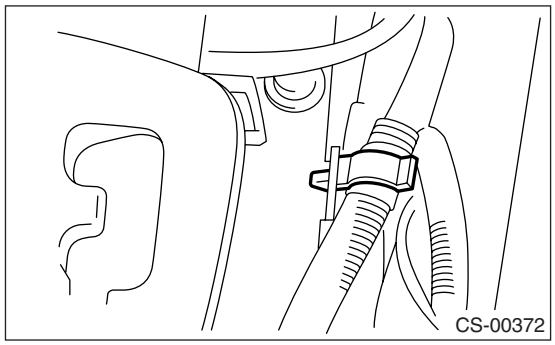
B: INSTALLATION

1) Set the select lever to vehicle body.
2) Tighten the four bolts to install the select lever to vehicle body, and then connect the connector.
(1) Temporarily tighten the bolt A.
(2) Tighten the bolt B.
(3) Tighten the bolt A.
(4) Tighten the bolts C and D.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



3) Install the harness clips to bracket.



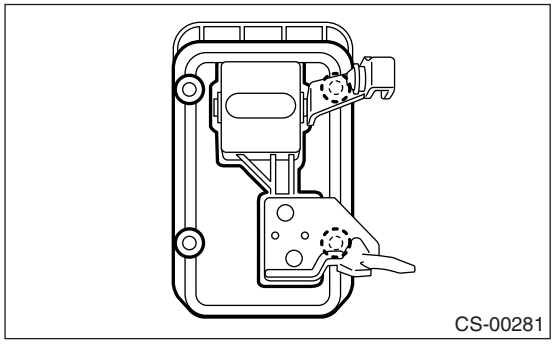
4) Install the console box. <Ref. to EI-53, INSTALLATION, Console Box.>
5) Shift the select lever to “N” range.
6) Lift-up the vehicle.
7) Shift the range select lever to “N” range.
8) Fix the cable to bracket. <Ref. to CS-13, INSTALLATION, Select Cable.>
9) Adjust the select cable position. <Ref. to CS-15, ADJUSTMENT, Select Cable.>
10) After the completion of adjustment, confirm that the select lever operates properly at all range positions.
11) Install the heat shield cover.
12) Install the rear exhaust pipe and muffler.
• SOHC model
<Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
13) Inspect the following items. When malfunctions are found in the inspection, adjust the select cable and inhibitor switch.

NOTE:
Inhibitor switch for 5AT model is not adjustable. <Ref. to CS-15, ADJUSTMENT, Select Cable.> <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.>

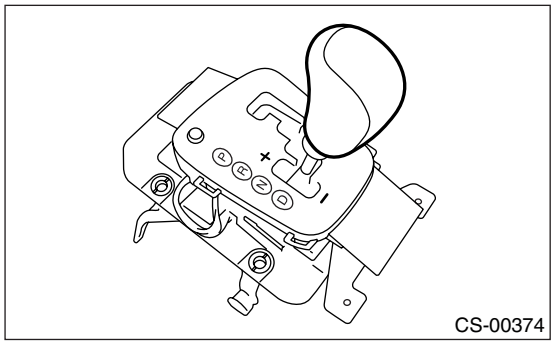
(1) Engine starts when the select lever is in “P” and “N” range, but not in other range.
(2) Back-up light illuminates when the select lever is in “R” range, but not in other range.
(3) Select lever and indicator positions are matched.

C: DISASSEMBLY

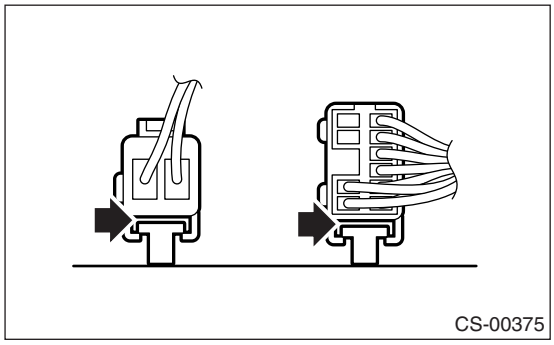
1) Remove the packing and plate.



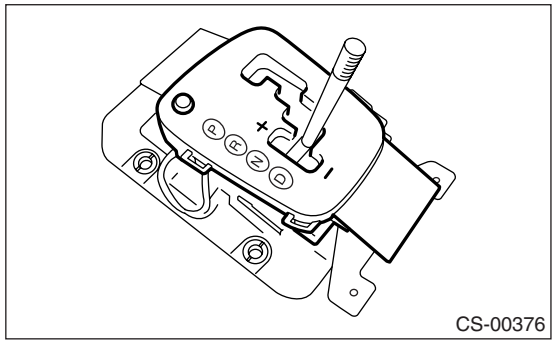
2) Remove the grip.



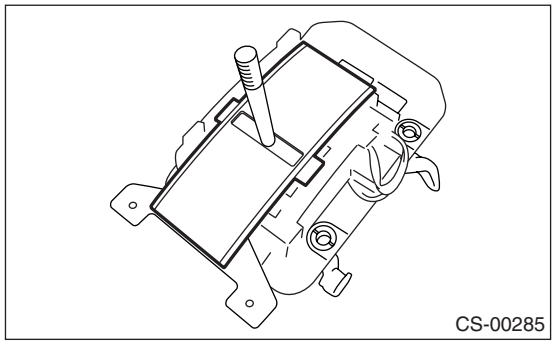
3) Insert a flat-tip screwdriver with thin tip under the connector to disconnect each connector from plate assembly.



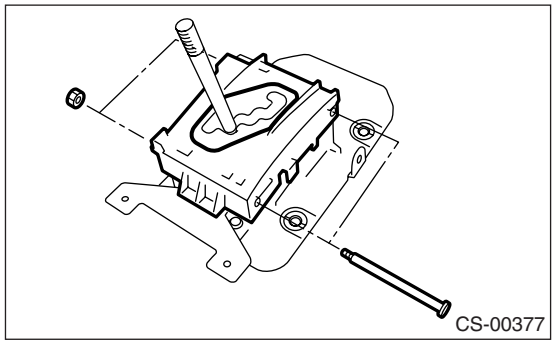
4) Remove the indicator cover.



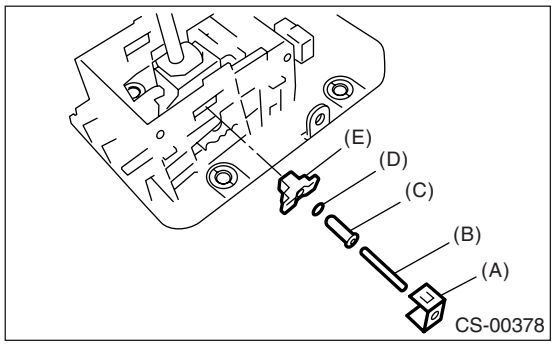
5) Remove the blind.



6) Remove the bolts, and then remove the guide plate.

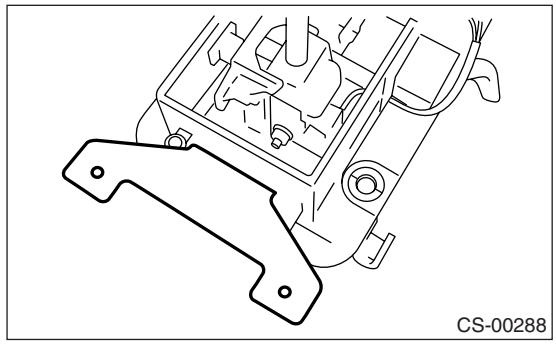


7) Remove the clamp, spring, rod, packing and bushing.

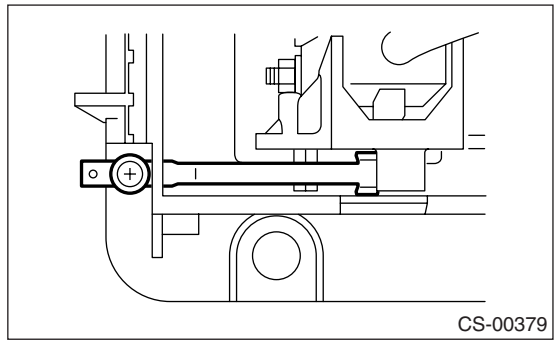


(A) Clamp
(B) Spring
(C) Rod
(D) Bushing
(E) Plate

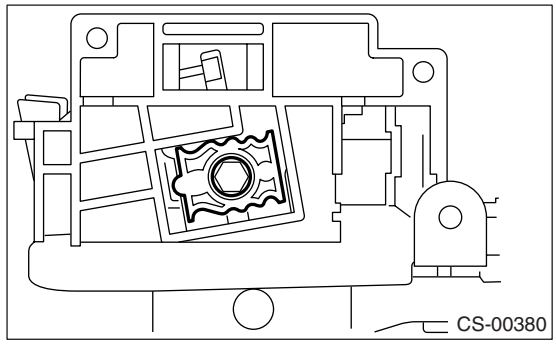
8) Remove the bracket.



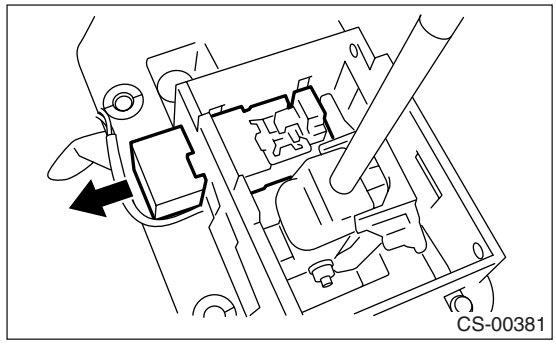
9) Remove the detent spring.



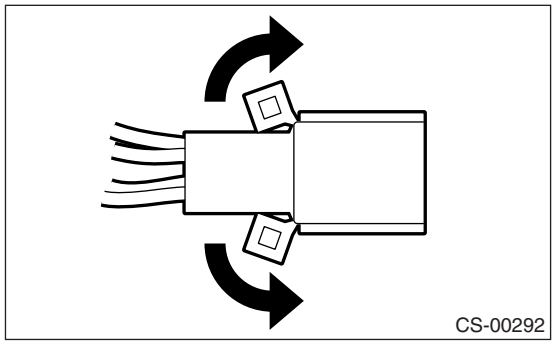
10) Remove the detent plate.



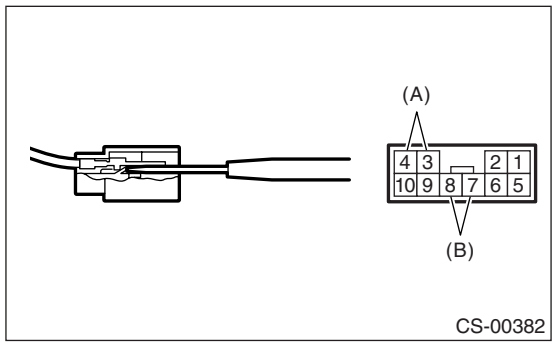
11) Remove the shift lock solenoid assembly.



12) Raise the connector pawl.

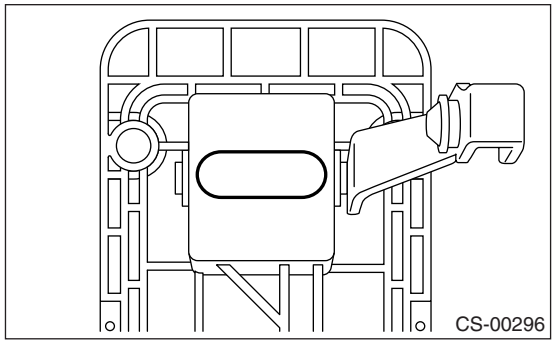


13) Use a flat-tip screwdriver with thin tip to disconnect the connectors from terminals of SPORT mode switch, shift lock solenoid assembly.

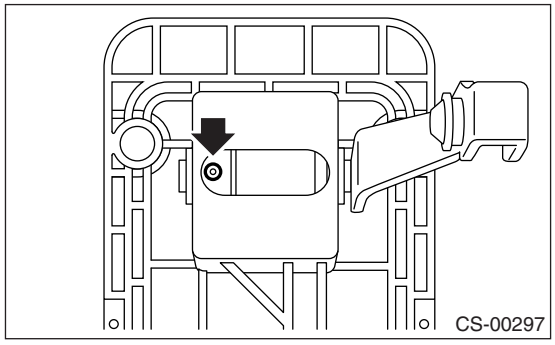


(A) Shift lock solenoid terminal
(B) SPORT mode switch terminal

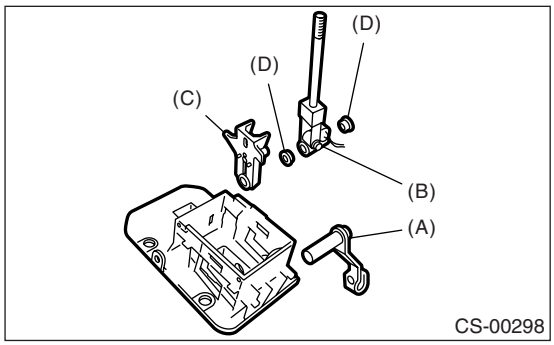
14) Remove the grommet.



15) Remove the spring pin.

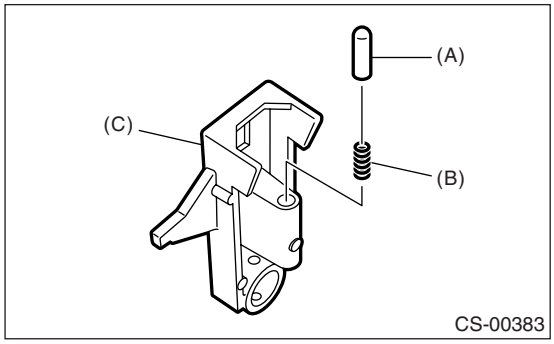


16) Pull out the arm assembly, and then remove the select lever assembly to remove the arm bracket and bushing.



(A) Arm ASSY
(B) Select lever ASSY
(C) Arm bracket
(D) Bushing

17) Remove the rod and spring from arm bracket.



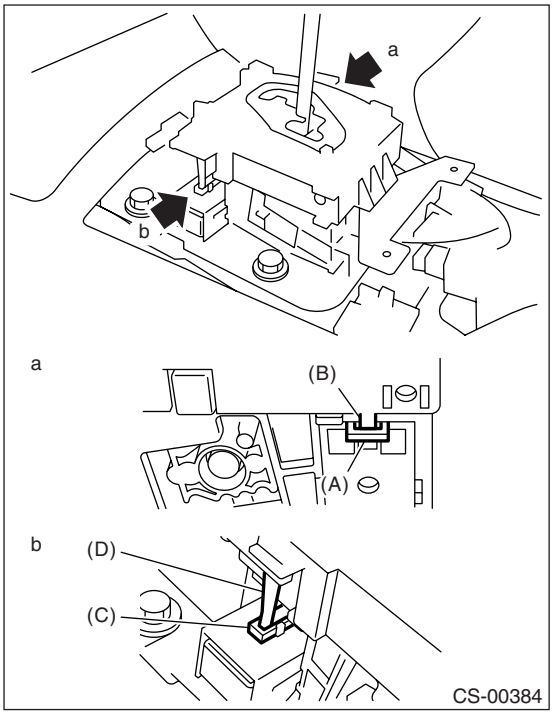
(A) Rod
(B) Spring
(C) Arm bracket

D: ASSEMBLY

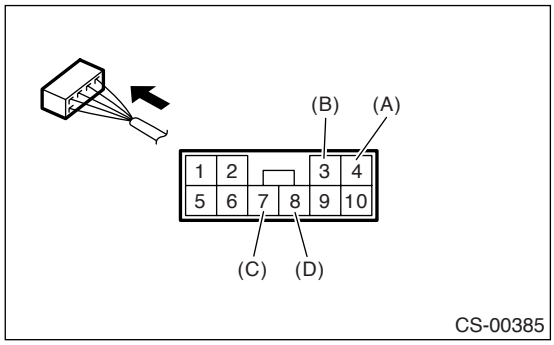
1) Clean all the parts before assembly.
2) Apply grease [SUNLIGHT 2 (Part No. 003602010) or equivalent] to each parts. <Ref. to CS-2, AT SELECT LEVER, COMPONENT, General Description.>
3) Assemble in the reverse order of disassembly.

NOTE:
• When installing the guide plate, shift the select lever to “D” range (normal mode position), care should be taken in the following points.
  • Insert the protrusion (B) of guide plate into the hole of shift lock solenoid assembly (A).

• Insert the link (D) of shift lock release into the link (C) of shift lock solenoid assembly.



• Connect the switch and solenoid terminal to connector.



(A) Shift lock solenoid (Color code: Blue and Red)
(B) Shift lock solenoid (Color code: Black)
(C) SPORT mode switch (Color code: White)
(D) SPORT mode switch (Color code: Black)

4) After completion of installation, shift the select lever from “P” range to “D” range, then check whether the indicator and select lever matches, whether the pointer and position mark matches and what the operating force is.

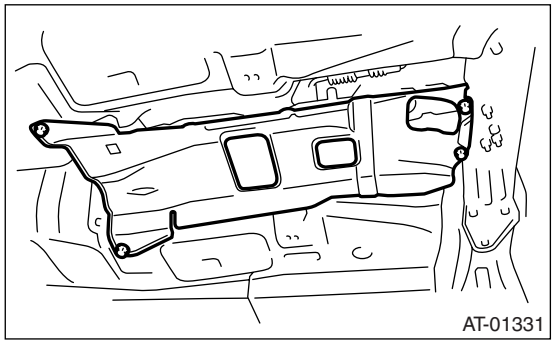
E: INSPECTION

1) Inspect the removed parts by comparing with new ones for deformation, damage and wear. Repair or replace if defective.
2) Confirm the select lever operating condition before assembly. Normal if it operates smoothly.

3. Select Cable

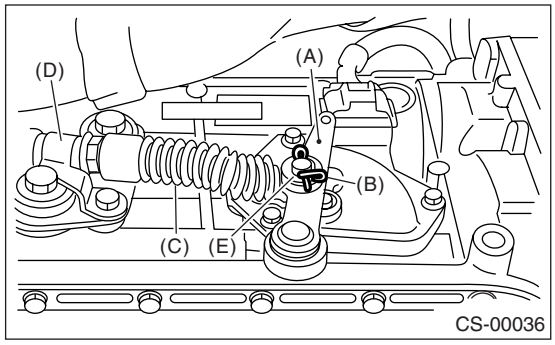
A: REMOVAL

1) Set the vehicle on a lift.
2) Shift the select lever to “N” range.
3) Disconnect the ground cable from battery.
4) Lift-up the vehicle.
5) Remove the front, center and rear exhaust pipes and muffler. (SOHC and DOHC non-turbo model)
• SOHC model
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-10, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
6) Remove the center and rear exhaust pipe and muffler. (DOHC turbo model)
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
7) Remove the heat shield cover.



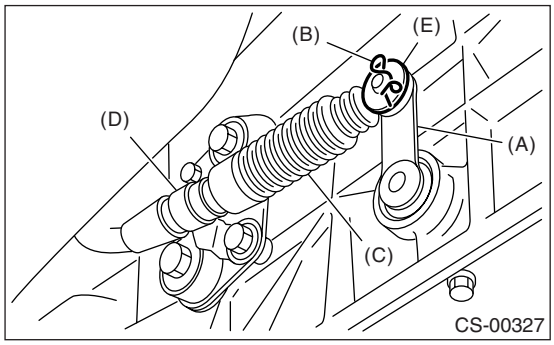
8) Remove the snap pin and washer from range select lever.

• 4AT



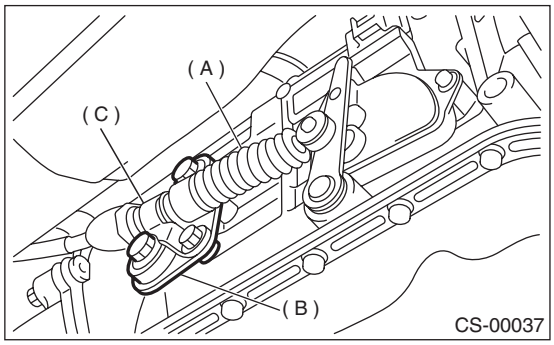
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

• 5AT



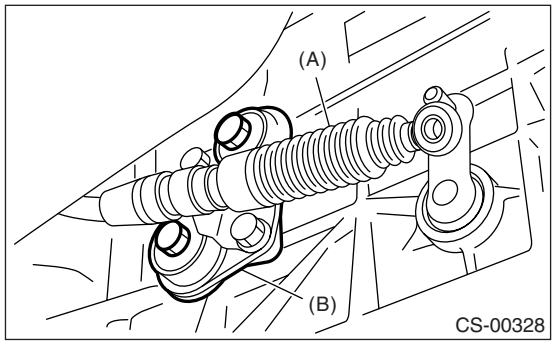
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

9) Remove the plate assembly from transmission case.
• 4AT



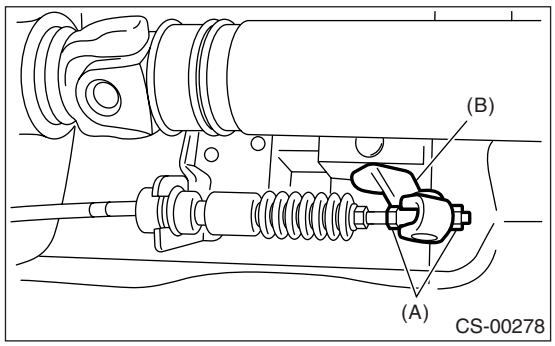
(A) Select cable
(B) Plate ASSY
(C) Bracket

• 5AT



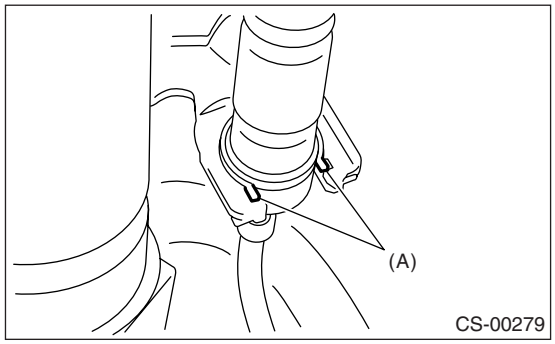
(A) Select cable
(B) Plate ASSY

10) Disconnect the cable from arm assembly.



(A) Adjusting nut
(B) Arm ASSY

11) Raise the pawl of clamp to remove the cable from bracket.



(A) Pawl

12) Remove the select cable from plate assembly.

B: INSTALLATION

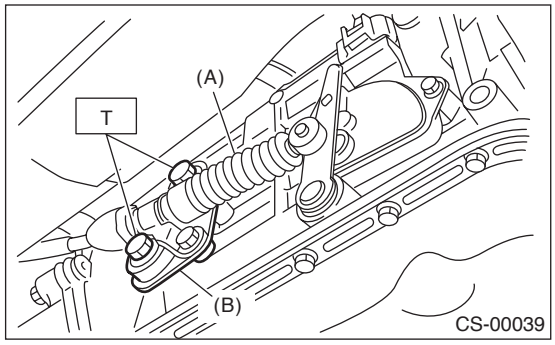
1) Install the select cable to plate assembly.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

2) Install the select cable to range select lever.
3) Install the plate assembly to transmission.

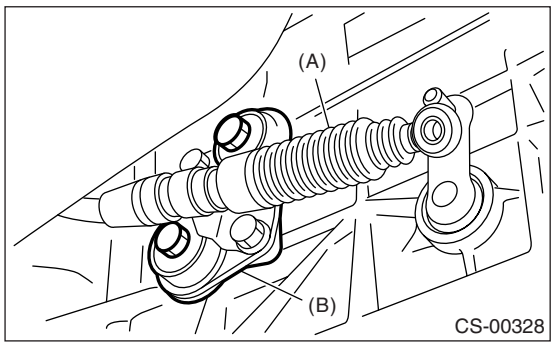
Tightening torque:
T: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

• 4AT



(A) Select cable
(B) Plate ASSY

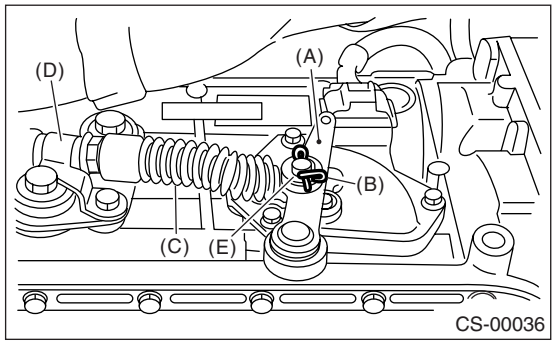
• 5AT



(A) Select cable
(B) Plate ASSY

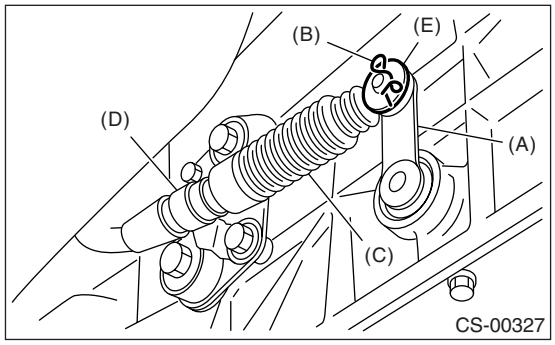
4) Install the washer and snap pin to range select lever.

• 4AT



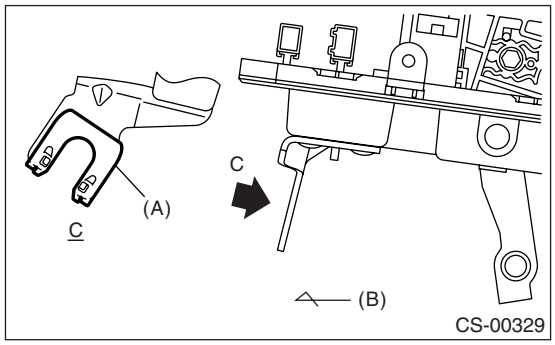
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Bracket
(E) Washer

• 5AT



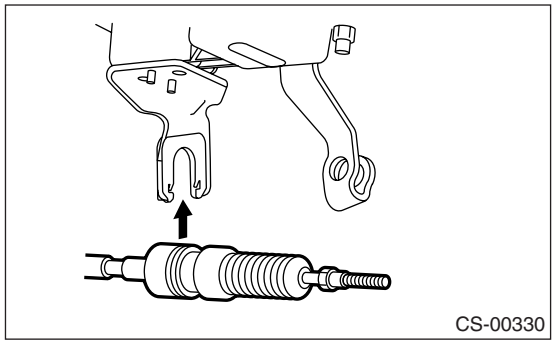
(A) Range select lever
(B) Snap pin
(C) Select lever
(D) Bracket
(E) Washer

5) Install a new clump paying attention to the installing direction.



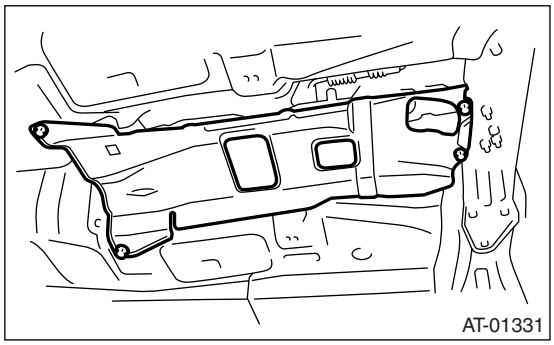
(A) Clamp
(B) Forward

6) Insert the tip of inner cable into connector hole of the select lever, and fix the cable to bracket.



7) Shift the select lever to “N” range, and then adjust the select cable position. <Ref. to CS-15, ADJUSTMENT, Select Cable.>

8) Install the heat shield cover.



9) Install the front, center and rear exhaust pipes and muffler. (SOHC and DOHC non-turbo model)

• SOHC model

<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-10, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

• DOHC non-turbo model

<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.><Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>

10) Install the center and rear exhaust pipe and muffler. (DOHC turbo model)

<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>

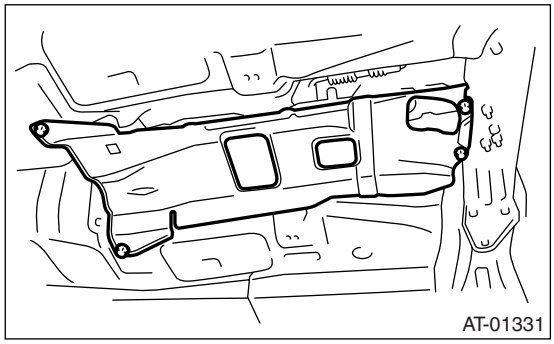
C: INSPECTION

Check the removed cable and replace or adjust if damaged, rusty or malfunctioning.

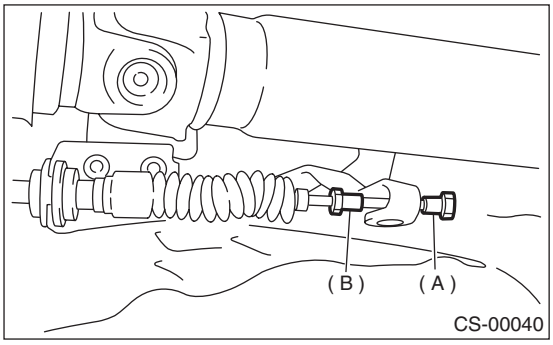
1) Check for smooth operation of the cable.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.
4) Check the boot for damage, cracks and deterioration.
5) Move the select lever from “P” to “D” range. Check the existence of feel to contact the detents in each range. If the detents cannot be felt or the position pointer is improperly aligned, adjust the cable.
6) Check if the starter motor rotates when the select lever is set to “P” range.
7) Check the back-up light illumination when the select lever is in “R” range.
8) Check the parking lock operation when the select lever is in “P” range.

D: ADJUSTMENT

1) Shift the select lever to “N” range.
2) Remove the rear exhaust pipe and muffler.
• SOHC model
<Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
3) Remove the heat shield cover.

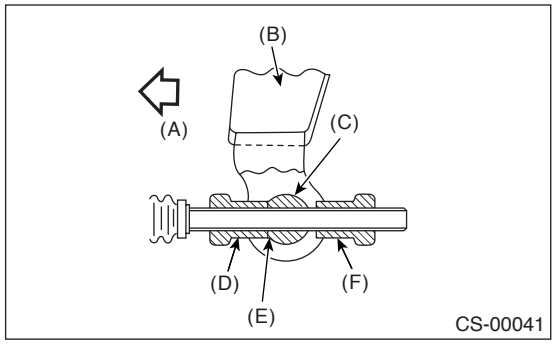


4) Loosen the adjusting nuts on both sides.



(A) Adjusting nut A
(B) Adjusting nut B

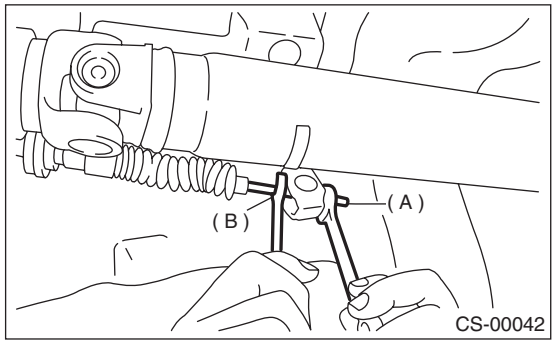
5) Turn the adjusting nut B until it lightly touches the connector.



(A) Forward side
(B) Select lever
(C) Connector
(D) Adjusting nut B
(E) Contact point
(F) Adjusting nut A

6) Set a spanner wrench to adjusting nut B so that it does not rotate, and then tighten the adjusting nut A.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Adjusting nut A
(B) Adjusting nut B

7) After the completion of adjustment, confirm that the select lever operates normally at all ranges.
8) Install in the reverse order of removal.

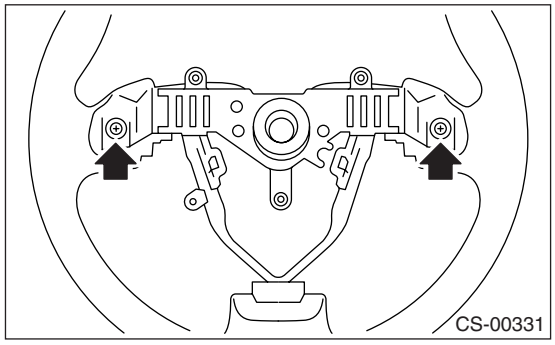
4. AT Steering Shift Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tire to the straight-ahead position.
3) Remove the airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

WARNING:
With the airbag module equipped, always refer to "Airbag System" when performing the airbag module repair service. <Ref. to AB-14, INSPECTION, Driver's Airbag Module.>

4) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
5) Remove the cover from steering wheel.
6) Remove each one of AT steering shift switch mounting screw from the LH and RH side.

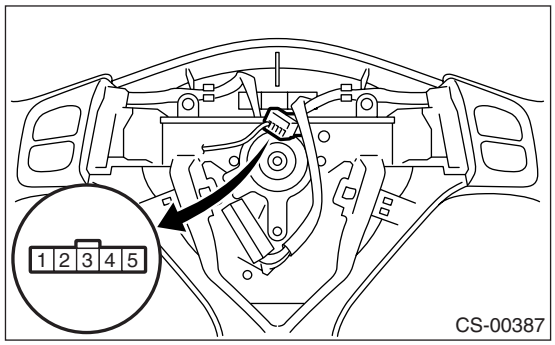


7) Remove the steering shift switch.

B: INSTALLATION

1) Clean all parts before installation.
2) Install in the reverse order of removal.
3) After completion of installation, set the select lever to SPORT shift side and confirm that manual mode "1" illuminates on the combination meter.
4) Operate the steering shift switch and confirm that the "2" illuminates on combination meter.

C: INSPECTION

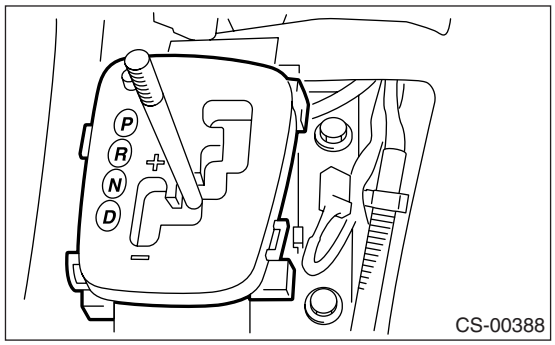


Step		Check	Yes	No
1	**SHIFT-UP SWITCH CONTINUITY CHECK.** 1) Press the shift-up switch. 2) Measure the resistance between shift switch connector terminals. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the steering shift switch.
2	**SHIFT-DOWN SWITCH CONTINUITY CHECK.** 1) Press the shift-down switch. 2) Measure the resistance between shift switch connector terminals. ***Terminals*** ***No. 3 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the steering shift switch.
3	**CHECK SHIFT SWITCH INSULATION.** 1) Not to operate the shift switch. 2) Measure the resistance between shift switch connector terminals. ***Terminals*** ***No. 3 — No. 2:*** ***No. 3 — No. 4:***	Is the resistance 1 MΩ?	Steering shift switch is normal.	Replace the steering shift switch.

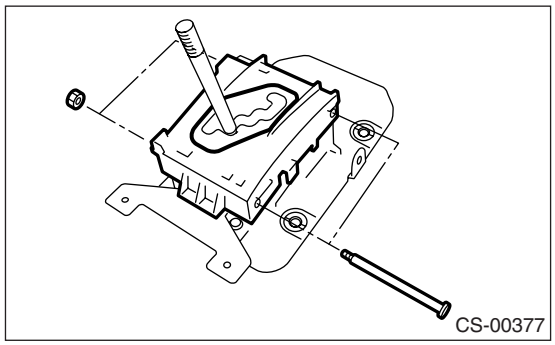
5. Shift Lock Solenoid

A: REMOVAL

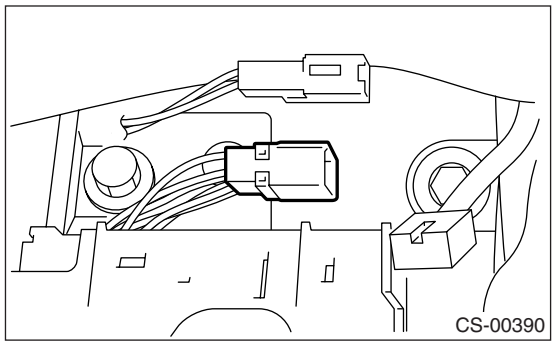
1) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
2) Disconnect the connector.
3) Shift the select lever to “N” range.
4) Remove the grip.
5) Remove the indicator cover.



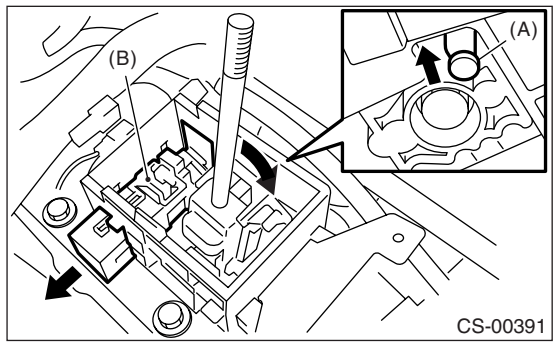
6) Remove the blind.
7) Remove the bolts, and then remove the guide plate.



8) Remove the connector from the plate assembly using a flat-tip screwdriver.

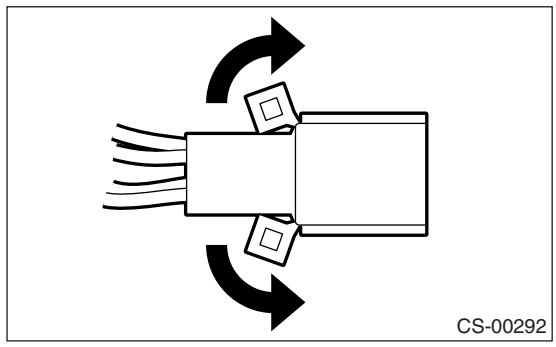


9) Press the select lever backward while lifting up the detent spring and remove the shift lock solenoid assembly.

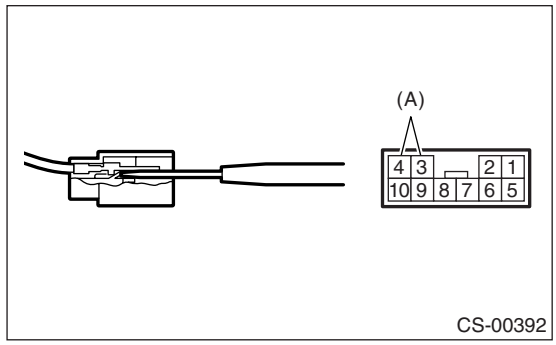


(A) Detent spring
(B) Shift lock solenoid ASSY

10) Raise the connector pawl.



11) Use a flat-tip screwdriver with thin tip to disconnect the connectors from terminals of “P” range switch and shift lock solenoid assembly.



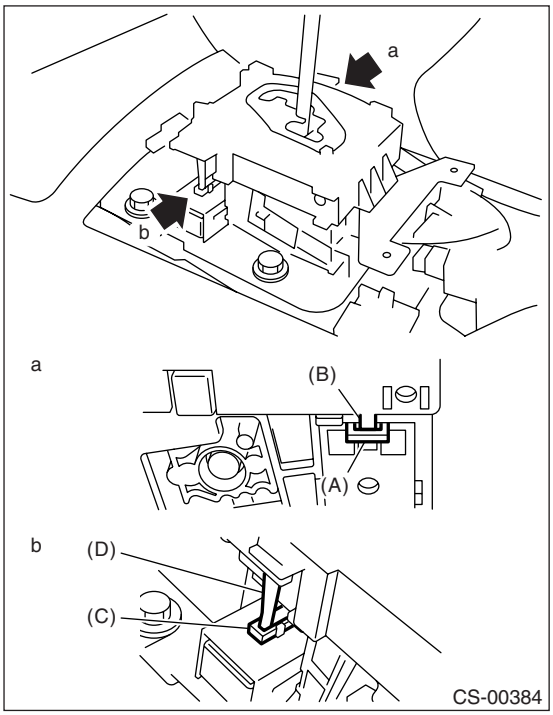
(A) Shift lock solenoid terminal

B: INSTALLATION

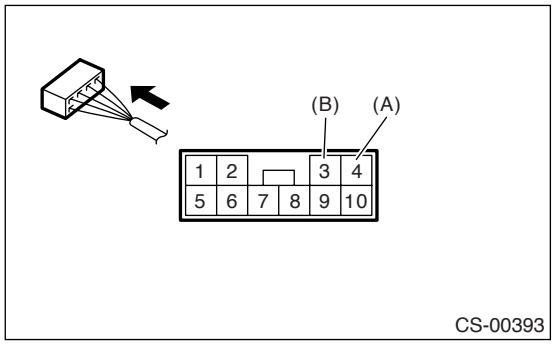
Install in the reverse order of removal.

NOTE:
• Refer to COMPONENT for each tightening torque. <Ref. to CS-2, COMPONENT, General Description.>
• When installing the guide plate, shift the select lever to “D” range (normal mode position), care should be taken in the following points.

• Insert the protrusion (B) of guide plate into the hole of shift lock solenoid assembly (A).
• Insert the link (D) of shift lock release into the link (C) of shift lock solenoid assembly.



• Connect the switch and solenoid terminal to connector.



(A) Shift lock solenoid (Color code: Blue and Red)
(B) Shift lock solenoid (Color code: Black)

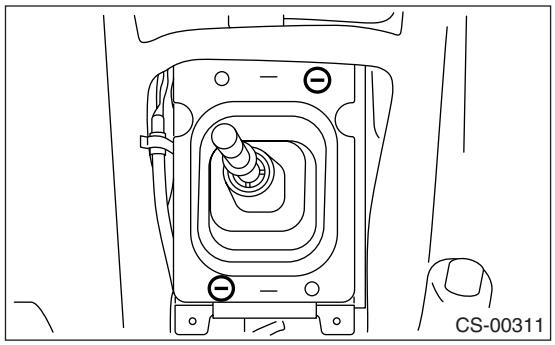
C: INSPECTION

Step		Check	Yes	No
1	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid connector terminals. ***Terminals*** ***No. 4 — No. 3:***	Is the resistance 7 — 18 Ω?	Go to step **2.**	Replace the shift lock solenoid.
2	**CHECK SHIFT LOCK SOLENOID.** Connect the battery to shift lock solenoid connector terminal, and then operate the solenoid. ***Terminals*** ***No. 3 (+) — No. 4 (–):***	Does the shift lock solenoid operate normally?	Normal operation	Replace the shift lock solenoid.

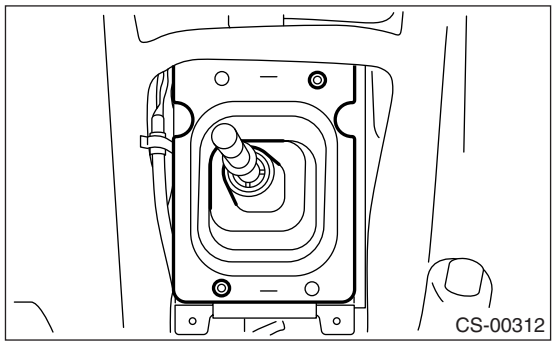
6. MT Gear Shift Lever

A: REMOVAL

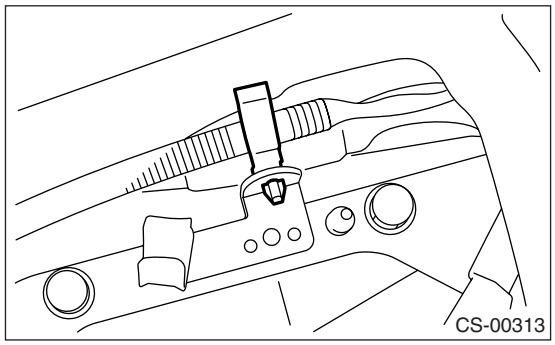
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the gear shift knob.
4) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
5) Remove the clamp.



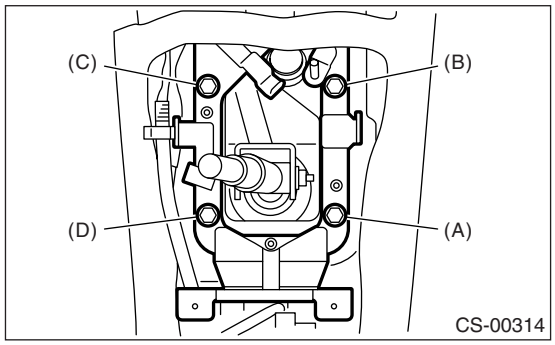
6) Remove the boot and insulator assembly.



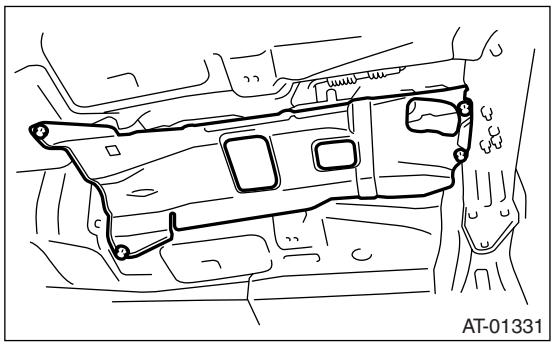
7) Remove the harness clamp from plate.



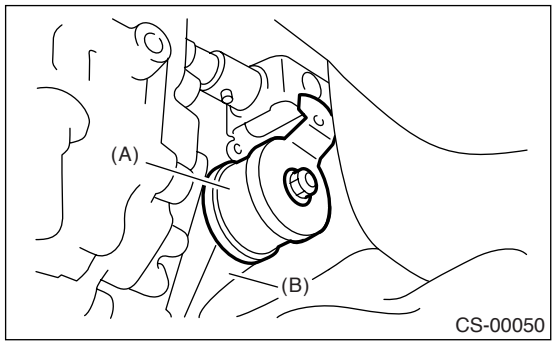
8) Remove the plate assembly from vehicle body.



9) Lift-up the vehicle.
10) Remove the rear exhaust pipe and muffler.
• SOHC model
<Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-10, REMOVAL, Joint Pipe.>
11) Remove the heat shield cover.

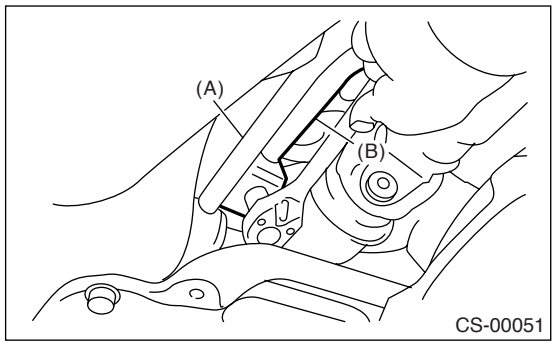


12) Remove the stay from transmission bracket.



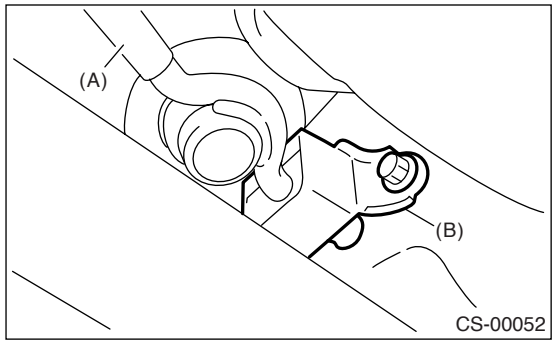
(A) Stay
(B) Transmission bracket

13) Remove the rod from joint.



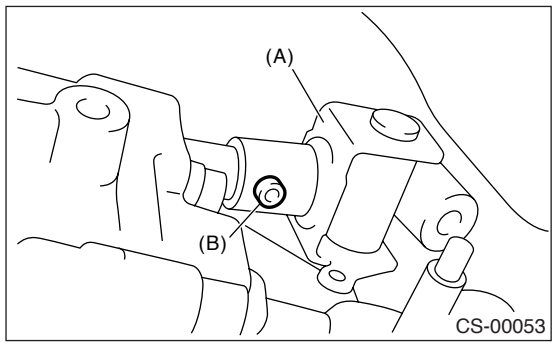
(A) Stay
(B) Rod

14) Remove the cushion rubber from vehicle body.



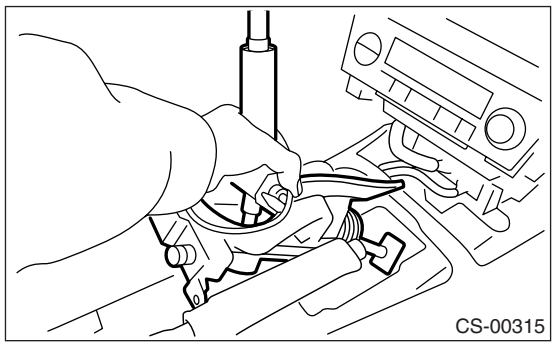
(A) Stay
(B) Cushion rubber

15) Extract the spring pin and remove the joint.



(A) Joint
(B) Spring pin

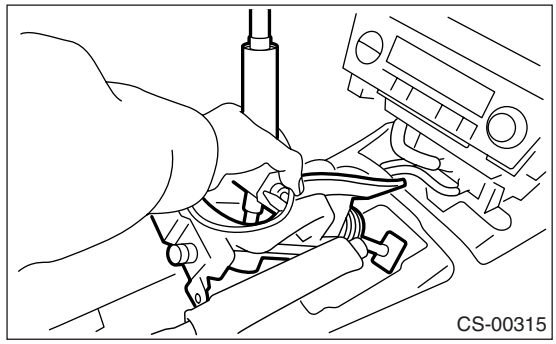
16) Lower the vehicle.
17) Remove the gear shift lever.



B: INSTALLATION

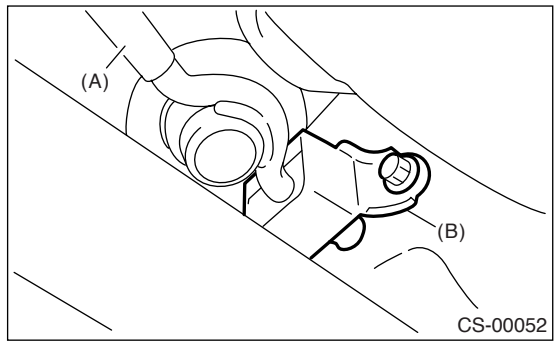
1) Install the joint to transmission and secure with spring pin.
2) Insert the gear shift lever from the room side.

NOTE:
Insert the rod and the stay, and then temporarily set them onto transmission mount.



3) Lift-up the vehicle.
4) Mount the cushion rubber on the vehicle body.

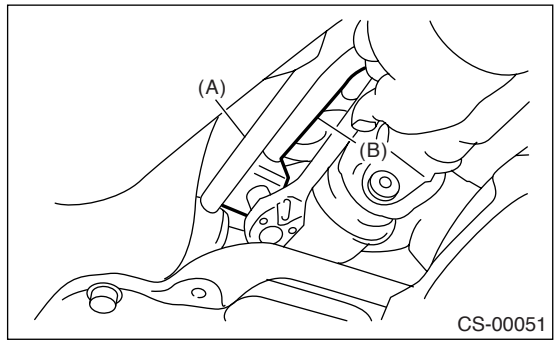
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Stay
(B) Cushion rubber

5) Using new self-locking nuts, connect the rod to the joint.

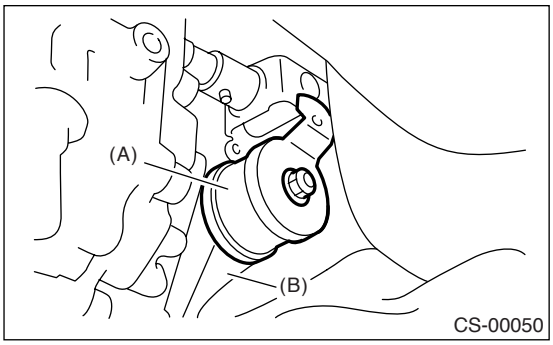
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Stay
(B) Rod

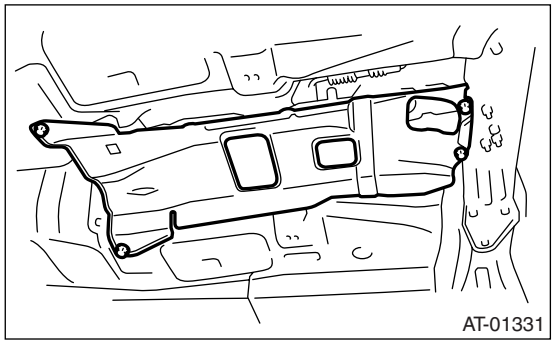
6) Using new self-locking nuts, connect the stay to transmission bracket.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



(A) Stay
(B) Transmission bracket

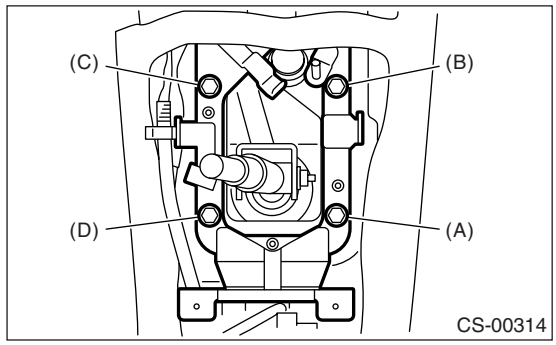
7) Install the heat shield cover.



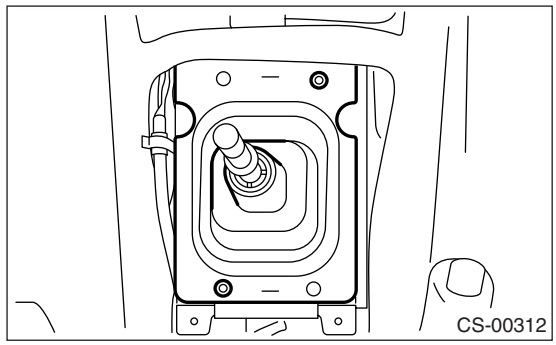
8) Install the rear exhaust pipe and muffler.
• SOHC model
<Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
• DOHC non-turbo model
<Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
• DOHC turbo model
<Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
9) Install the plate assembly to vehicle body.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

(1) Set the plate assembly to vehicle.
(2) Temporarily tighten the bolt (A).
(3) Tighten the bolt (B).
(4) Tighten the bolt (A).
(5) Tighten the bolts (C) and (D).



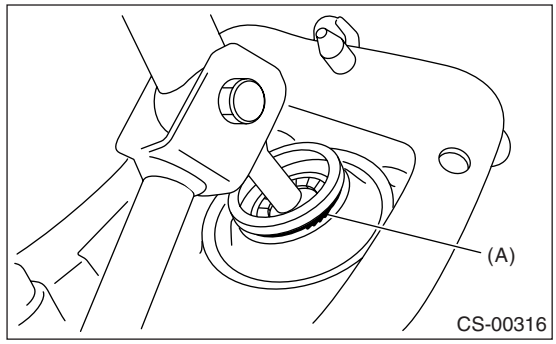
10) Install the harness clamp to plate.
11) Install the boot and insulator assembly, and secure them with clamp.



12) Install the console box. <Ref. to EI-53, INSTALLATION, Console Box.>

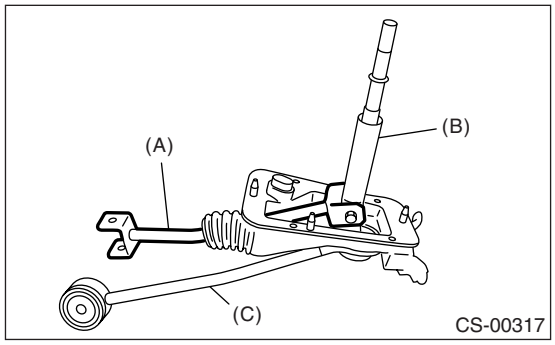
C: DISASSEMBLY

1) Remove the lock wires.



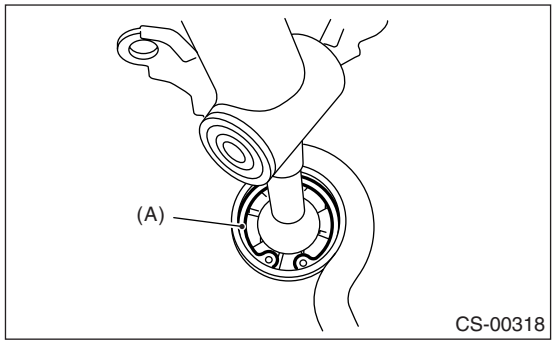
(A) Lock wire

2) Remove the rod from lever.



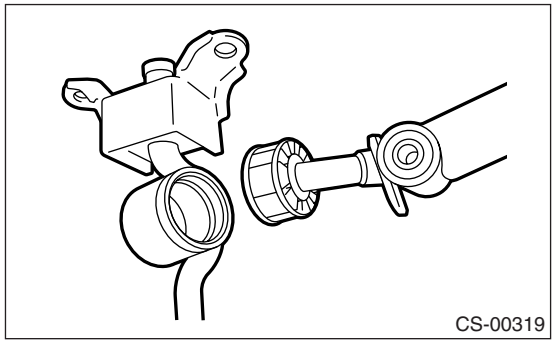
(A) Rod
(B) Lever
(C) Stay

3) Separate the rod and inner boot.
4) Remove the snap ring from the stay.

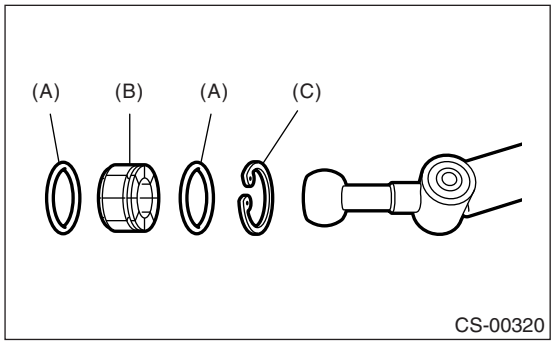


(A) Snap ring

5) Separate the gear shift lever and the stay.

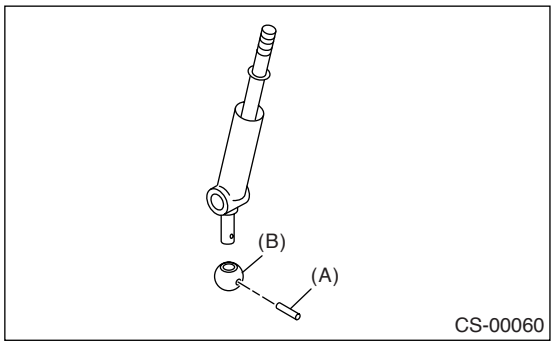


6) Remove the boot, bushing and snap ring from gear shift lever.



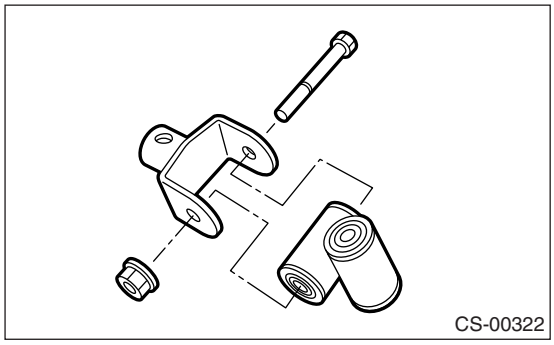
(A) O-ring
(B) Bushing
(C) Snap ring

7) Remove the spring pin, and then remove the bushing and snap ring.

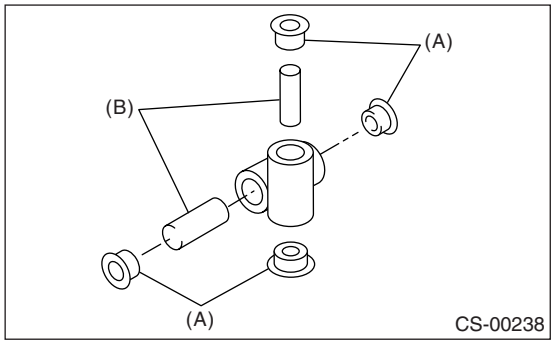


(A) Spring pin
(B) Bushing

8) Remove the boss from the joint.

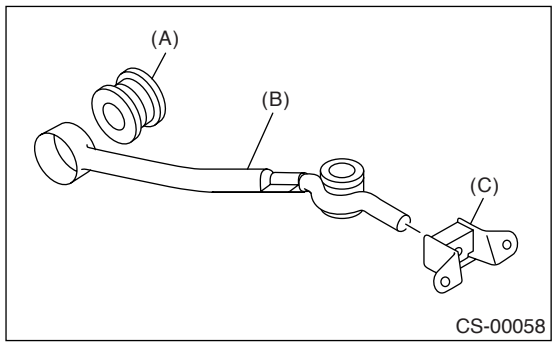


9) Remove the bushing and spacer from boss.



(A) Bushing
(B) Spacer

10) Remove the bushing and cushion rubber from the stay.

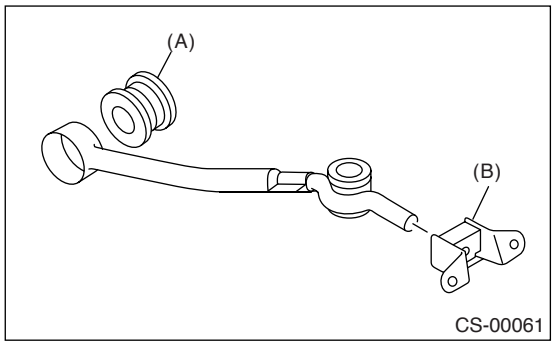


(A) Bushing B
(B) Stay
(C) Cushion rubber

D: ASSEMBLY

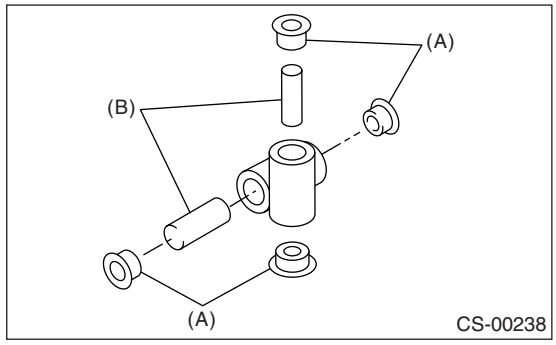
NOTE:
• Clean all the parts before assembly.
• Apply grease [SUNLIGHT 2 (Part No. 003602010) or equivalent] to each part.

1) Mount the bushing and cushion rubber on the stay.



(A) Bushing
(B) Cushion rubber

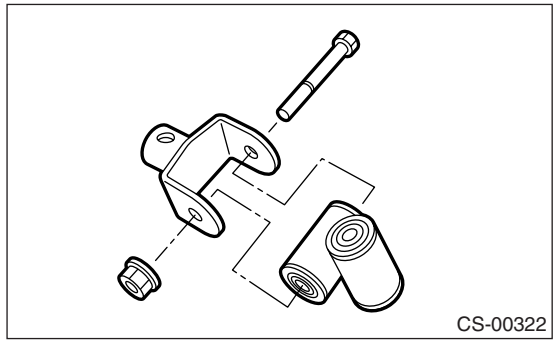
2) Install the bushing and spacer to boss.



(A) Bushing
(B) Spacer

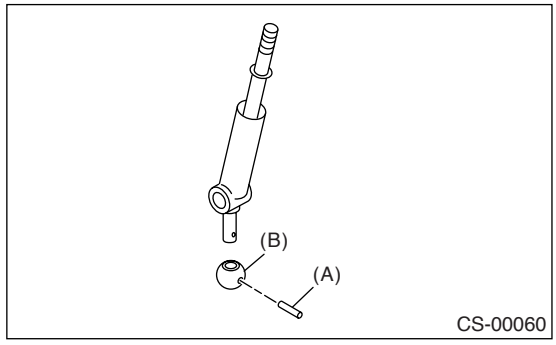
3) Using new self-locking nuts, install the boss to the joint.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



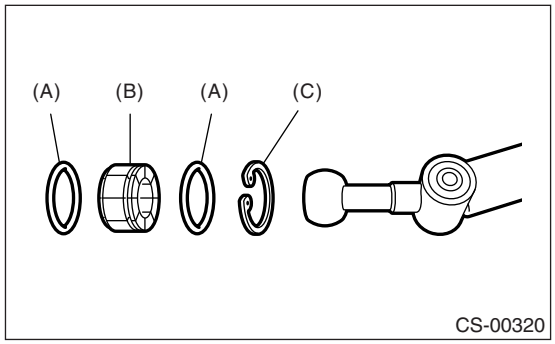
4) Install the snap ring to gear shift lever and install the bushing.

NOTE:
Apply grease to the bushing.



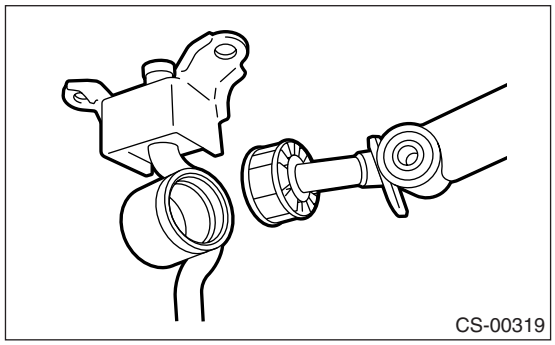
(A) Spring pin
(B) Bushing

5) Apply grease to the bushing and O-ring, and then install to the gear shift lever.

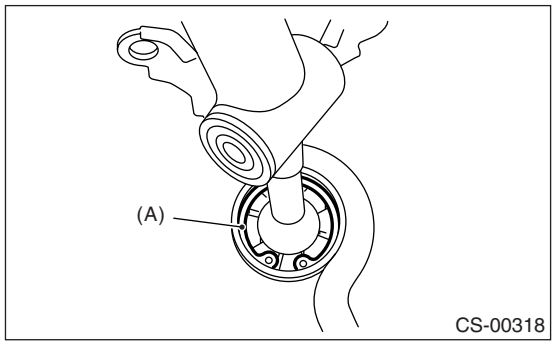


(A) O-ring
(B) Bushing
(C) Snap ring

6) Apply sufficient grease into boss, and then install the gear shift lever to the stay.



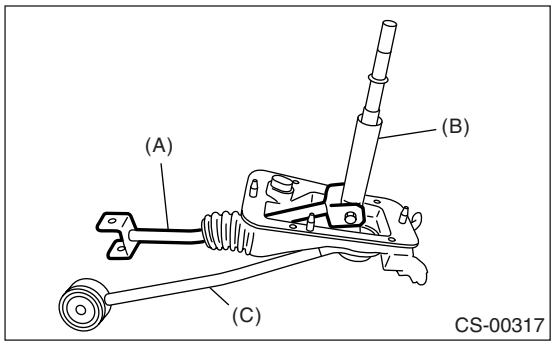
7) Install the washer and snap ring.



(A) Snap ring

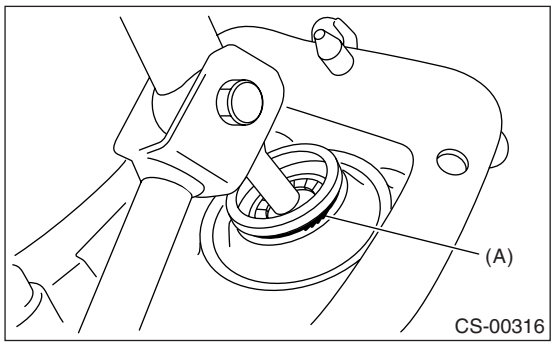
8) Insert the gear shift lever and rod into boot hole.
9) Install the rod.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)



(A) Rod
(B) Lever
(C) Stay

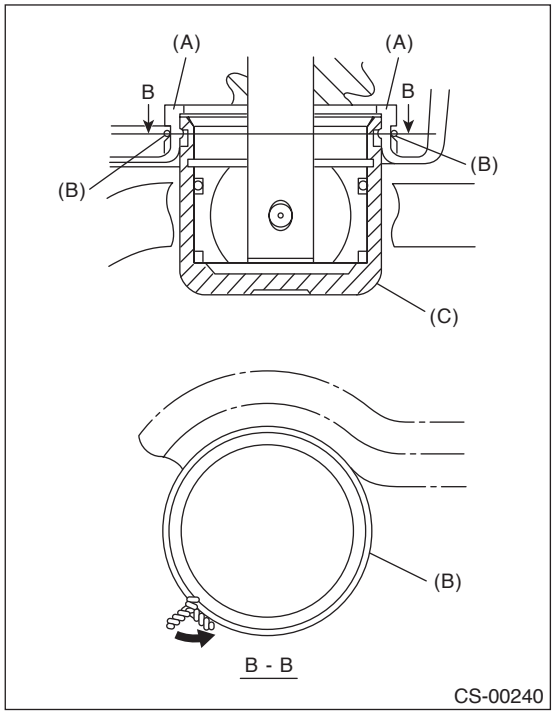
10) Install a new lock wire.



(A) Lock wire

NOTE:
• Install the lock wire to the stay groove.

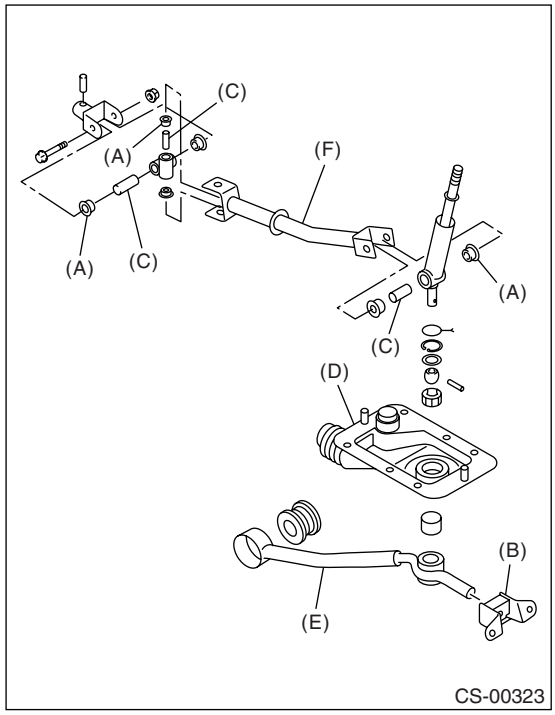
• Bend the extra wire to same direction of lock wire winding.



(A) Inner boot
(B) Lock wire
(C) Stay

E: INSPECTION

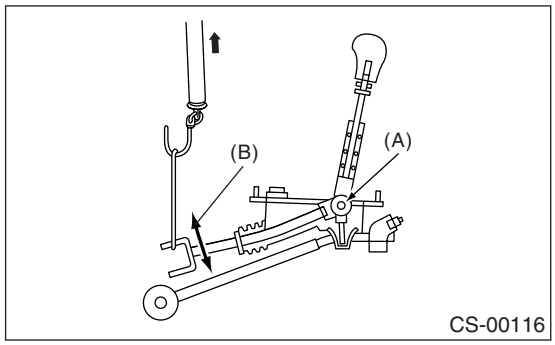
1) Check the parts (bushing, cushion rubber, spacer, boot, stay and rod, etc.) for deformation, damage and wear. If necessary, repair or replace faulty parts. Compare the removed parts with new ones to judge if there are damages or not.



(A) Bushing
(B) Cushion rubber
(C) Spacer
(D) Boot
(E) Stay
(F) Rod

2) Check the swing torque of rod linked with the gear shift lever.
If the torque exceeds the specifications, replace the bushing or retighten nuts.

Swing torque:
Less than 3.7 N (0.38 kgf, 0.84 lb)

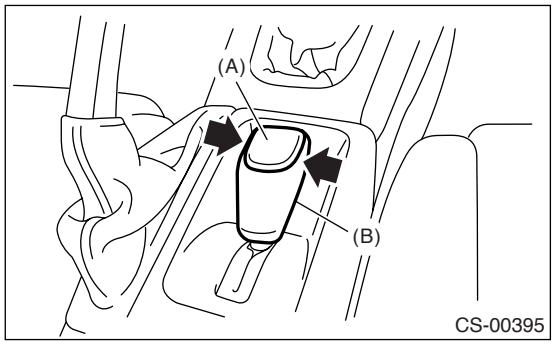


(A) Pivot
(B) Swing torque

7. MT Drive Select Lever

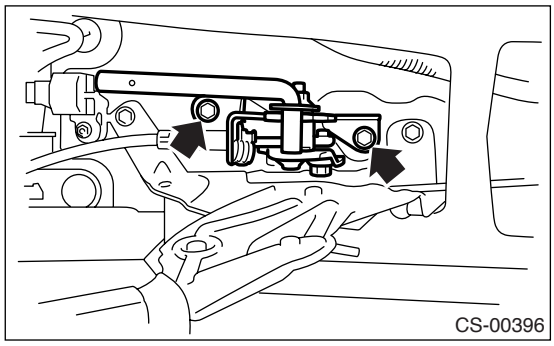
A: REMOVAL

1) Place the drive select lever in HI position.
2) Push the both sides of knob, and remove the cover. (Rubber type)

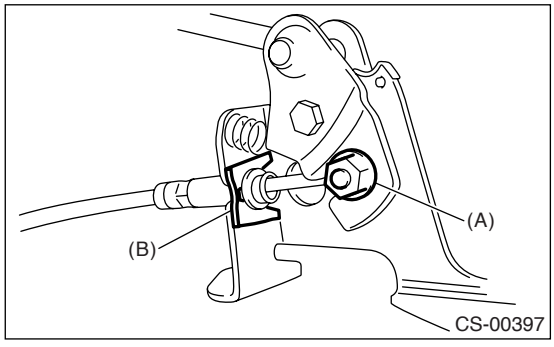


(A) Cover
(B) Knob

3) Insert a screwdriver with thin tip into the both sides of knob, and push to remove the cover. (Leather type)
4) Remove the bolt, and then remove the knob.
5) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
6) Remove the drive select lever from vehicle body.



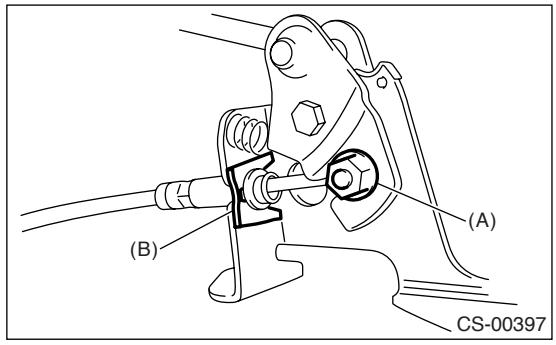
7) Remove the flange nut and clip, and then remove the drive select cable.



(A) Flange nut
(B) Clip

B: INSTALLATION

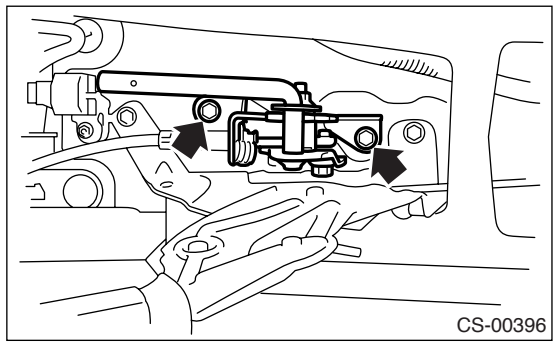
1) Secure the drive select cable to the lever with clip, and temporary tighten the flange nut.



(A) Flange nut
(B) Clip

2) Install the drive select lever to vehicle.

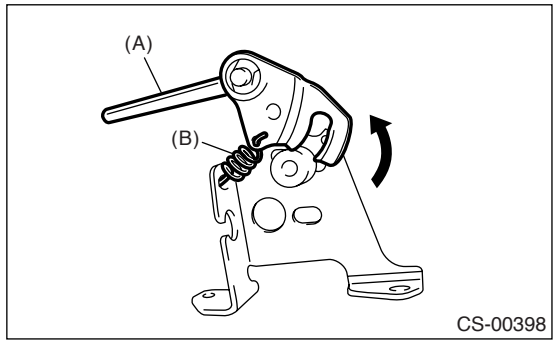
Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)



3) Adjust the drive select cable. <Ref. to CS-31, ADJUSTMENT, Drive Select Cable.>
4) Install in the reverse order of removal.

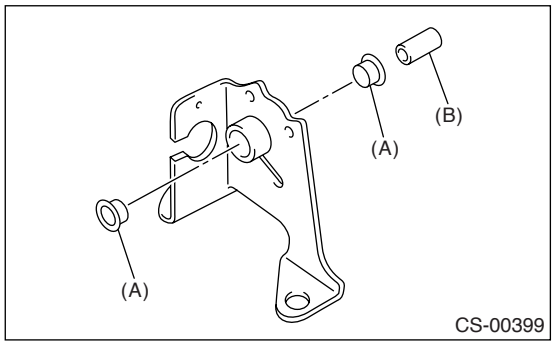
C: DISASSEMBLY

1) Remove the bolt and nut.
2) Remove the lever and spring.



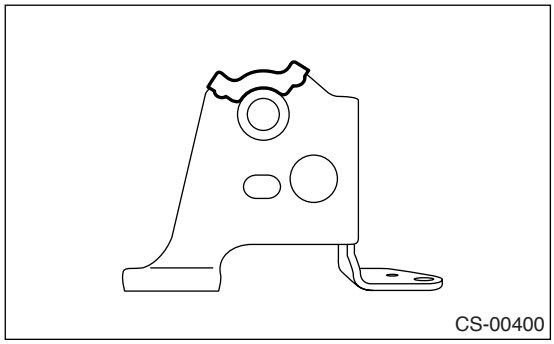
(A) Lever
(B) Spring

3) Remove the bushing and spacer from plate assembly.



(A) Bushing
(B) Spacer

4) Remove the bushing from plate assembly.



D: ASSEMBLY

1) Assemble in the reverse order of disassembly.

Tightening torque:
12 N·m (1.2 kgf-m, 8.9 ft-lb)

NOTE:
Refer to “COMPONENT” for greasing points. <Ref. to CS-2, COMPONENT, General Description.>

2) Check the select lever for smooth operation.

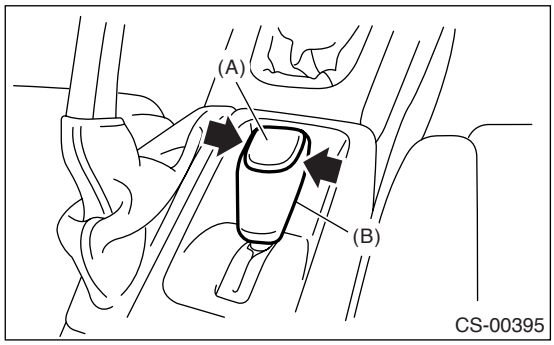
E: INSPECTION

1) Check the select lever for smooth operation. If not, check the transmission and drive select lever.
2) Transmission gear switches between HI and LO positions normally. If not, adjust the drive select cable, and inspect the transmission.
3) Check that the drive select lever is not damaged. Repair or replace if it is damaged.

8. Drive Select Cable

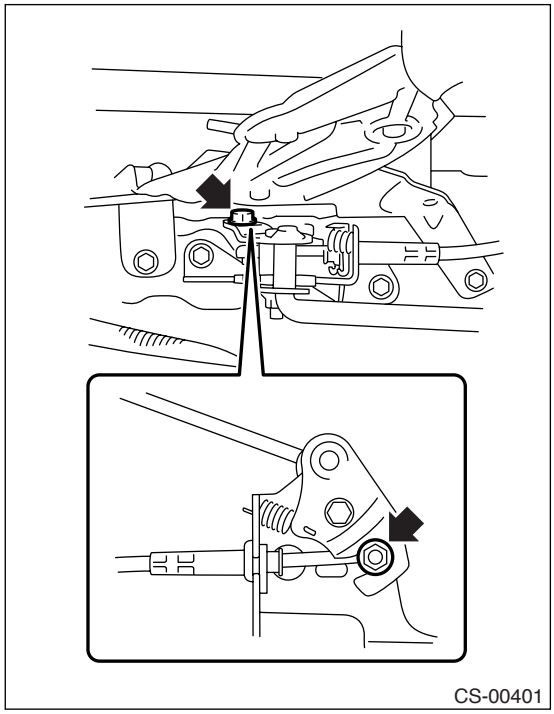
A: REMOVAL

1) Set the vehicle on a lift.
2) Place the drive select lever in HI position.
3) Push the both sides of knob, and remove the cover. (Rubber type)

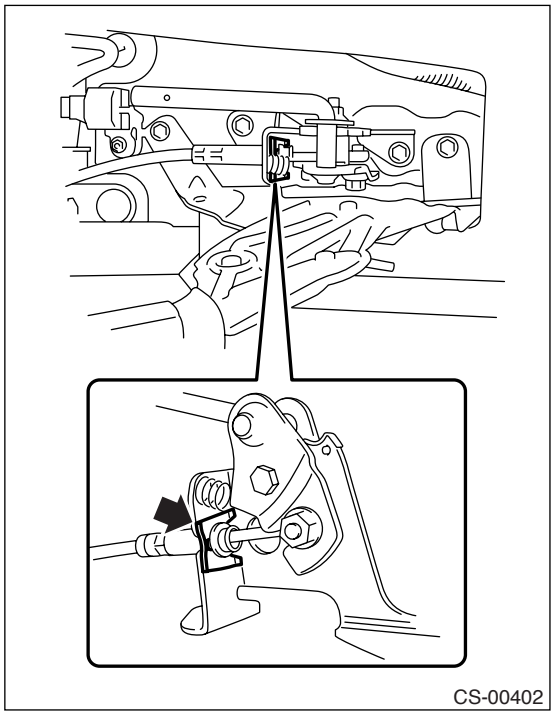


(A) Cover
(B) Knob

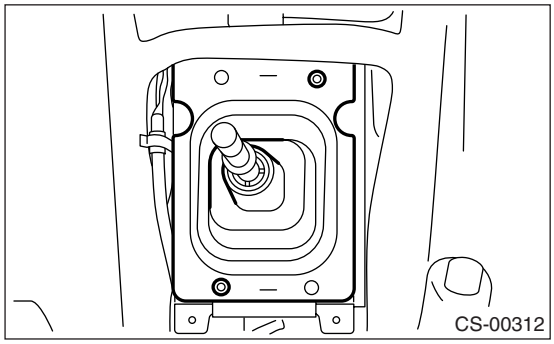
4) Insert a screwdriver with thin tip into the both sides of knob, and push to remove the cover. (Leather type)
5) Remove the bolt, and then remove the knob.
6) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
7) Loosen the flange nut.



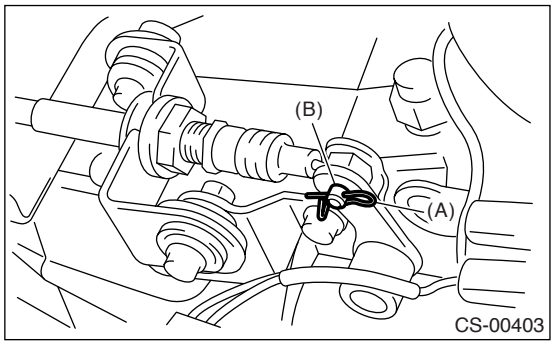
8) Remove the clamp, and remove the drive select cable from plate assembly.



9) Remove the boot and insulator assembly.

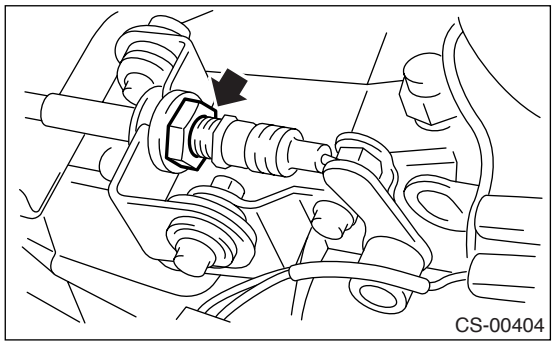


10) Remove the air intake chamber and air intake duct. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.> <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
11) Remove the snap pin and clevis pin.

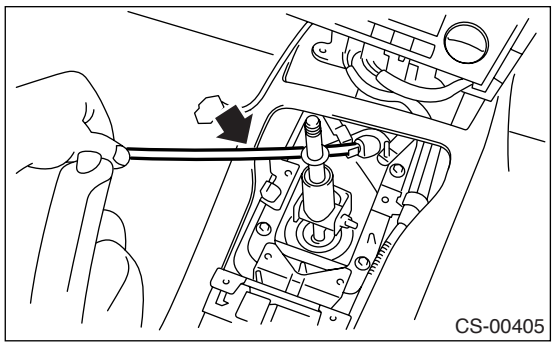


(A) Snap pin
(B) Clevis pin

12) Loosen the nut, and remove the cable from cable bracket.



13) Lift-up the vehicle, and then remove the cable under vehicle.



B: INSTALLATION

1) Install in the reverse order of removal.

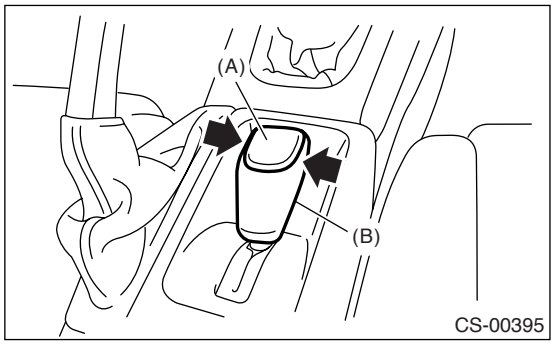
NOTE:
• Adjust the drive select cable. <Ref. to CS-31, ADJUSTMENT, Drive Select Cable.>
• Refer to “COMPONENT” for tightening torque. <Ref. to CS-2, COMPONENT, General Description.>
• Correctly insert the cable end bolt to slit of lever arm.

C: INSPECTION

1) Check the transmission is set in HI or LO position according to the operation of drive select lever. <Ref. to CS-31, ADJUSTMENT, Drive Select Cable.>
2) Check the cable for damage.
3) Check the cable for smooth operation. Replace the cable if it does not operate smoothly.

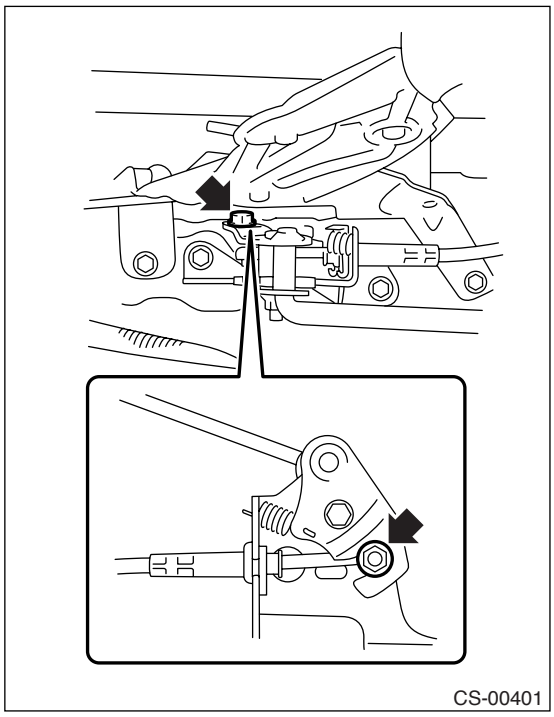
D: ADJUSTMENT

1) Place the drive select lever in HI position.
2) Push the both sides of knob, and remove the cover. (Rubber type)



(A) Cover
(B) Knob

3) Insert a screwdriver with thin tip into the both sides of knob, and push to remove the cover. (Leather type)
4) Remove the bolt, and then remove the knob.
5) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
6) Loosen the flange nut.



7) Verify the transmission gear is set in HI position. If not, pull the cable to set it in HI position.
8) Verify the select lever is set in HI position.
9) Tighten the flange nut with cable fixed.

Tightening torque:
18 N·m (1.8 kgf-m, 13.3 ft-lb)

10) Install in the reverse order of removal.

9. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Corrective action
Select lever	Starter does not run.	Adjust the select cable and inhibitor switch, or inspect circuit.
	Back-up light does not illuminate.	Adjust the select cable and inhibitor switch, or inspect circuit.
	Shift lock control system does not operate normally.	Inspect shift lock circuit.
	Manual mode is not engaged.	Adjust the mode switch and select lever, or inspect circuit.
	Up-shift is not engaged at manual mode.	Check the shift-up switch and circuit.
	Down-shift is not engaged at manual mode.	Check the shift-down switch and circuit.
Drive select lever	Does not shift to HI or LO.	Adjust the drive select cable, or inspect transmission.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION

4AT

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1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	2.0 L	2.5 L
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.0 — 2.2	2.1 — 2.3
Nominal diameter mm (in)	236 (9.29)	249 (9.69)
Stall speed (at sea level)	2,300 — 2,700 rpm	2,500 — 2,900 rpm
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP

Type	Pracoid constant-displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	4-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	2 sets
One-way clutch (sprague type)	1 sets

4. TRANSMISSION GEAR RATIO

1st	2.785
2nd	1.545
3rd	1.000
4th	0.694
Rev	2.272

5. PLANETARY GEAR AND PLATE

Model	2.0 L	2.5 L
Front sun gear number of teeth	33	
Front pinion number of teeth	21	
Front internal gear number of teeth	75	
Rear sun gear number of teeth	42	
Rear pinion number of teeth	17	
Rear internal gear number of teeth	75	
Drive plate number of high clutch	4	
Drive plate number of low clutch	4	5
Drive plate number of reverse clutch	2	
Drive plate number of 2-4 brake	2	3
Drive plate number of low & reverse brake	4	5

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	4-forward automatic gear change 1st $\leftarrow_{\rightarrow}$ 2nd $\leftarrow_{\rightarrow}$ 3rd $\leftarrow_{\rightarrow}$ 4th
SPORT mode	4-forward automatic gear change 1st $\leftarrow_{\rightarrow}$ 2nd $\leftarrow_{\rightarrow}$ 3rd $\leftarrow_{\rightarrow}$ 4th
Manual mode (+)	4-forward manual gear change (shift up) 1st $\rightarrow$ 2nd $\rightarrow$ 3rd $\rightarrow$ 4th
Manual mode (–)	4-forward manual gear change (shift down) 1st $\leftarrow$2nd $\leftarrow$ 3rd $\leftarrow$ 4th
Control method	Wire cable

7. HYDRAULIC CONTROL AND LUBRICATION

Type	Electronic hydraulic control [Four forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	SUBARU ATF or Idemitsu “Apolloil ATF HP”, Castrol “Transmax J” NOTE: If the ATFs above are not available, use Dexron III.
Fluid capacity ℓ (US qt, Imp qt)	8.4 — 8.7 (8.9 — 9.2, 7.4 — 7.7)
Lubrication system	Forced feed lubrication with oil pump
Oil	Automatic transmission fluid (above mentioned)

8. COOLING AND HARNESS

Cooling System	Liquid-cooled cooler
Inhibitor switch	12 poles
Transmission harness	20 poles

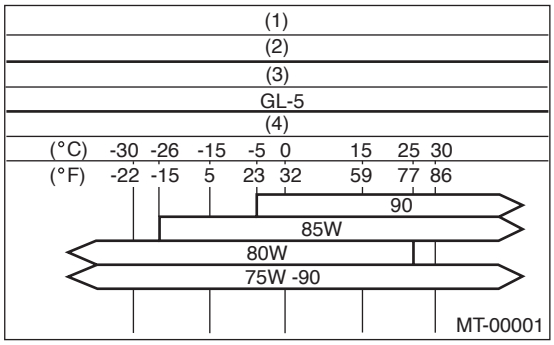
9. TRANSFER

Model	2.0 L	2.5 L without vehicle dynamics control (VDC)	2.5 L with vehicle dynamics control (VDC)
Transfer type	Multi-plate transfer (MPT)		Variable torque distribution (VTD)
Drive & driven plate number of transfer clutch	4	5	3
Control method	Electronic hydraulic type		
Lubricant	The same Automatic transmission fluid used in automatic transmission		
Reduction gear ratio	1.000 (53/53)		

10.FINAL REDUCTION

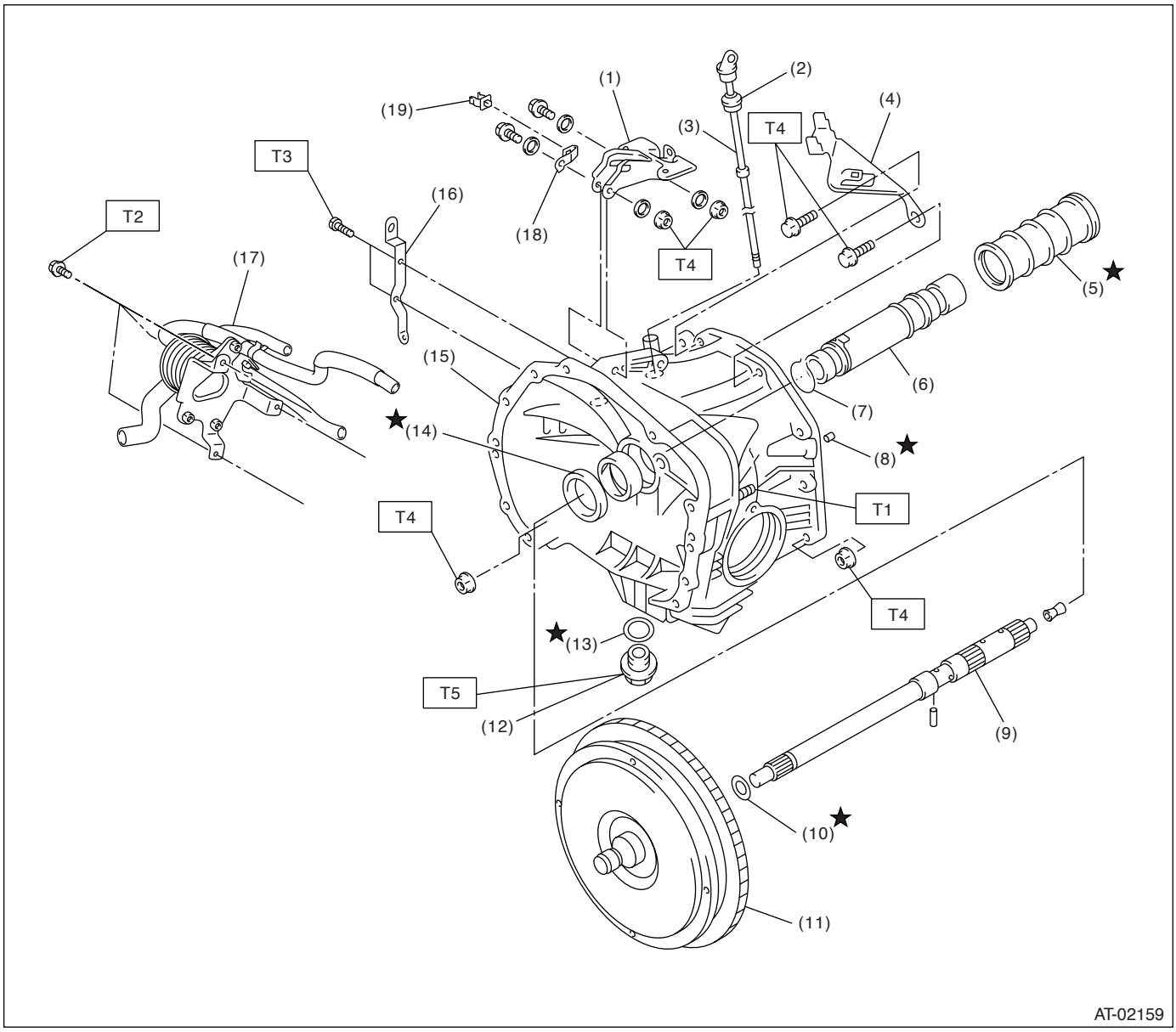
Model	Except for OUTBACK	OUTBACK
Front final reduction gear ratio	4.111 (37/9)	4.444 (40/9)

11.RECOMMENDED GEAR OIL

Lubrication oil	 (1) Item (2) Front differential gear oil (3) API classification (4) SAE viscosity No. and applicable temperature
Front differential oil capacity ℓ (US qt, Imp qt)	1.1 — 1.3 (1.2 — 1.4, 1.0 — 1.1)

B: COMPONENT

1. TORQUE CONVERTER CLUTCH AND CASE

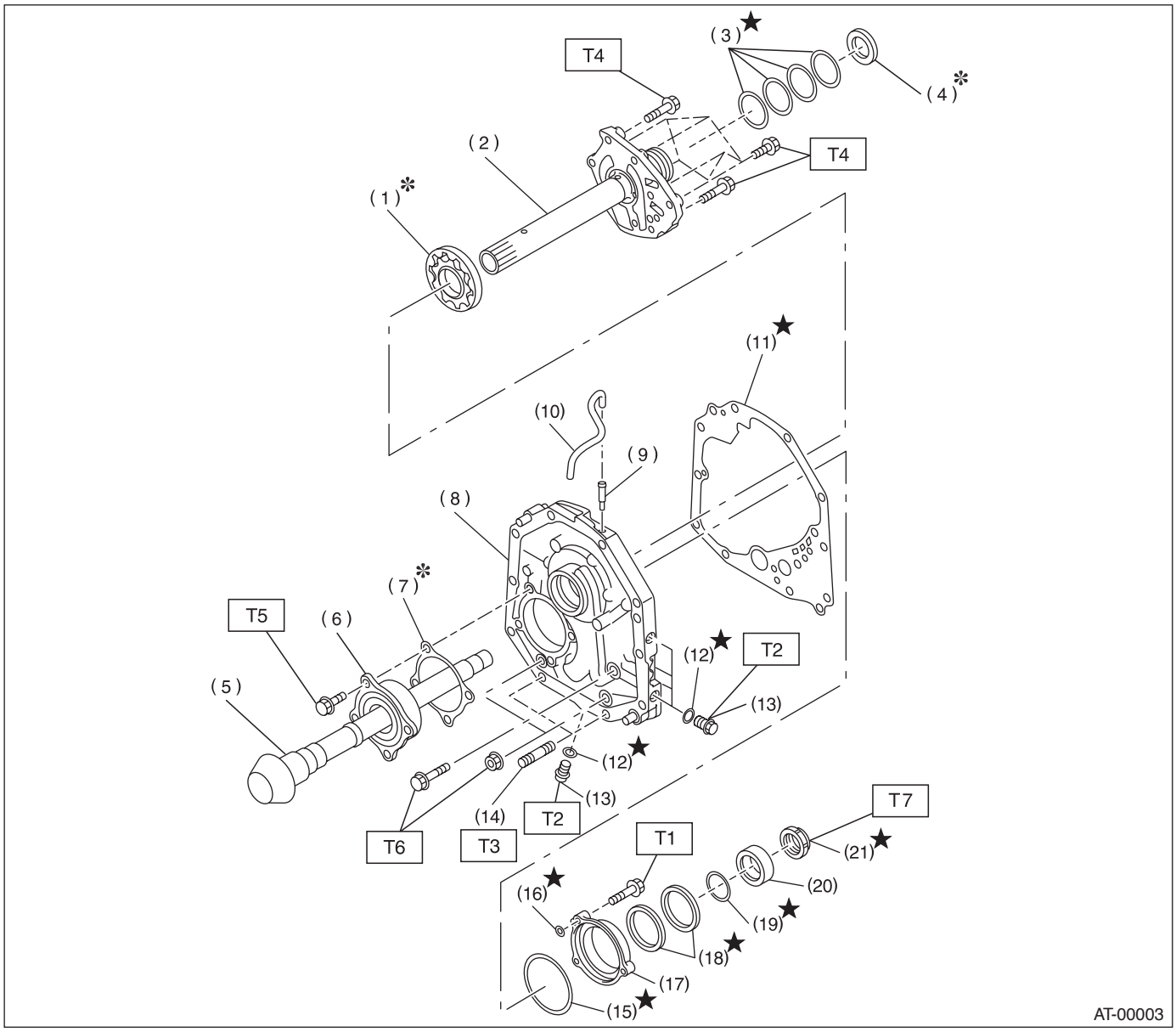


(1) Pitching stopper bracket
(2) O-ring
(3) Differential oil level gauge
(4) Stay
(5) Seal pipe
(6) Oil pump shaft
(7) Clip
(8) Oil drain pipe
(9) Input shaft
(10) O-ring
(11) Torque converter clutch ASSY
(12) Drain plug
(13) Gasket
(14) Oil seal
(15) Converter case
(16) Harness stay
(17) ATF cooler ASSY with warmer function (if equipped)
(18) Bracket (if equipped)
(19) Clip (if equipped)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 18 (1.8, 13.0)
T2: 23 (2.3, 16.7)
T3: 33 (3.4, 24.3)
T4: 41 (4.2, 30.4)
T5: 70 (7.1, 51.6)

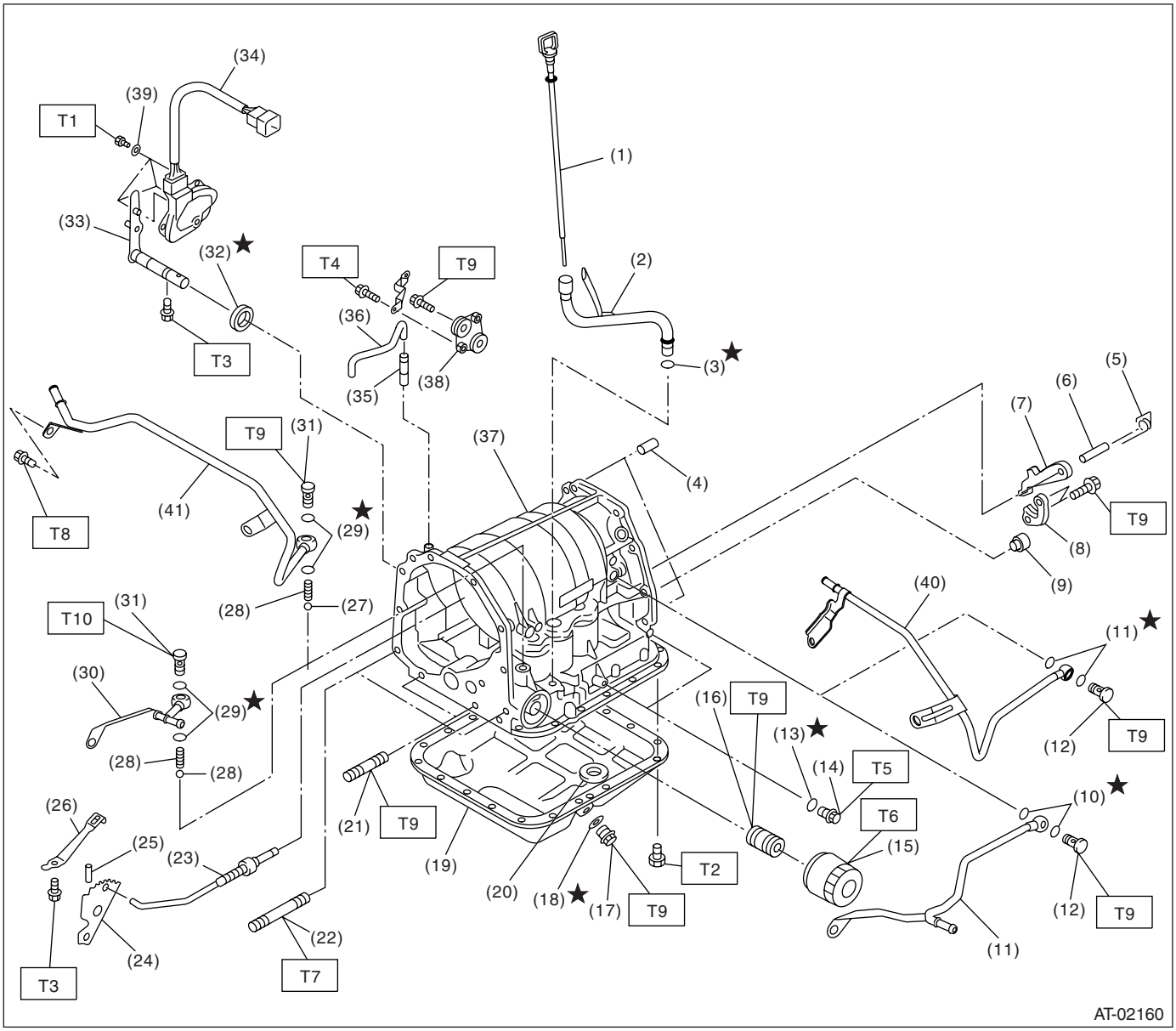
2. OIL PUMP



(1) Oil pump rotor
(2) Oil pump cover
(3) Seal ring
(4) Thrust needle bearing
(5) Drive pinion shaft
(6) Roller bearing
(7) Shim
(8) Oil pump housing
(9) Nipple
(10) Air breather hose
(11) Gasket
(12) O-ring
(13) Test plug
(14) Stud bolt
(15) O-ring
(16) O-ring
(17) Oil seal retainer
(18) Oil seal
(19) O-ring
(20) Drive pinion collar
(21) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*7 (0.7, 5.1)*
T2:	*13 (1.3, 9.4)*
T3:	*18 (1.8, 13.0)*
T4:	*25 (2.5, 18.1)*
T5:	*40 (4.1, 30)*
T6:	*42 (4.3, 31)*
T7:	*116 (11.8, 85)*

3. TRANSMISSION CASE AND CONTROL DEVICE

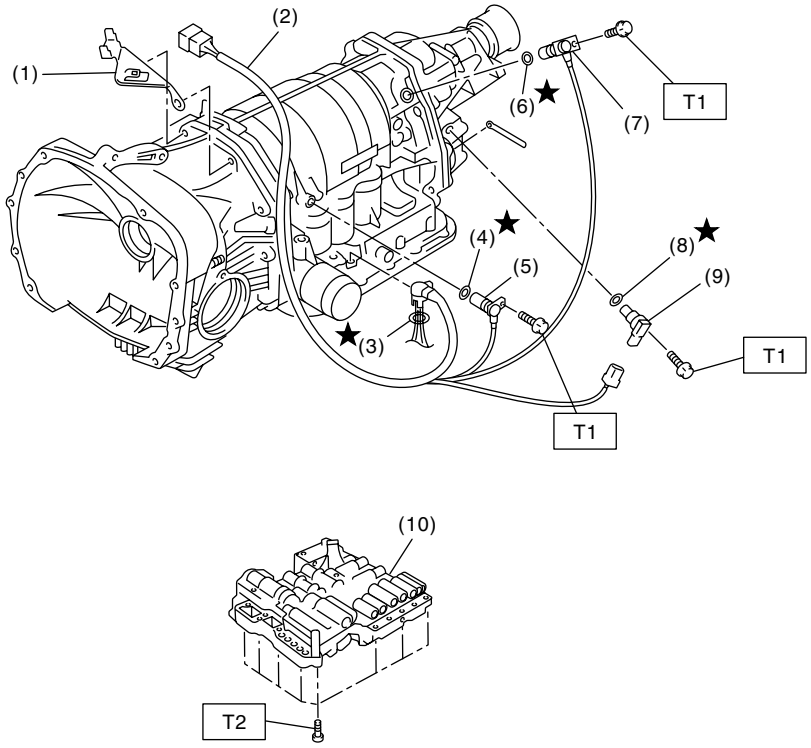


(1) ATF level gauge
(2) Oil charge pipe
(3) O-ring
(4) Straight pin
(5) Return spring
(6) Shaft
(7) Parking pawl
(8) Parking support
(9) Bushing
(10) Gasket
(11) Inlet pipe (Model without ATF cooler with warmer function)
(12) Union screw
(13) O-ring
(14) Test plug
(15) Oil filter
(16) Oil filter stud bolt
(17) Drain plug
(18) Gasket
(19) Oil pan
(20) Magnet
(21) Stud bolt (Short)
(22) Stud bolt (Long)
(23) Parking rod
(24) Manual plate
(25) Spring pin
(26) Detention spring
(27) Ball
(28) Spring
(29) Gasket
(30) Outlet pipe (Model without ATF cooler with warmer function)
(31) Union screw
(32) Oil seal
(33) Select lever
(34) Inhibitor switch ASSY
(35) Nipple
(36) Air breather hose
(37) Transmission case
(38) Plate ASSY
(39) Washer
(40) Inlet pipe (Model with ATF cooler with warmer function)
(41) Outlet pipe (Model with ATF cooler with warmer function)

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***3.4 (0.35, 2.5)***
T2:	***5 (0.5, 3.6)***
T3:	***6 (0.6, 4)***
T4:	***12 (1.2, 8.7)***
T5:	***13 (1.3, 10)***
T6:	***14 (1.4, 10)***
T7:	***18 (1.8, 13)***
T8:	***21 (2.1, 15.5)***
T9:	***25 (2.5, 18.1)***
T10:	***44 (4.5, 32.5)***

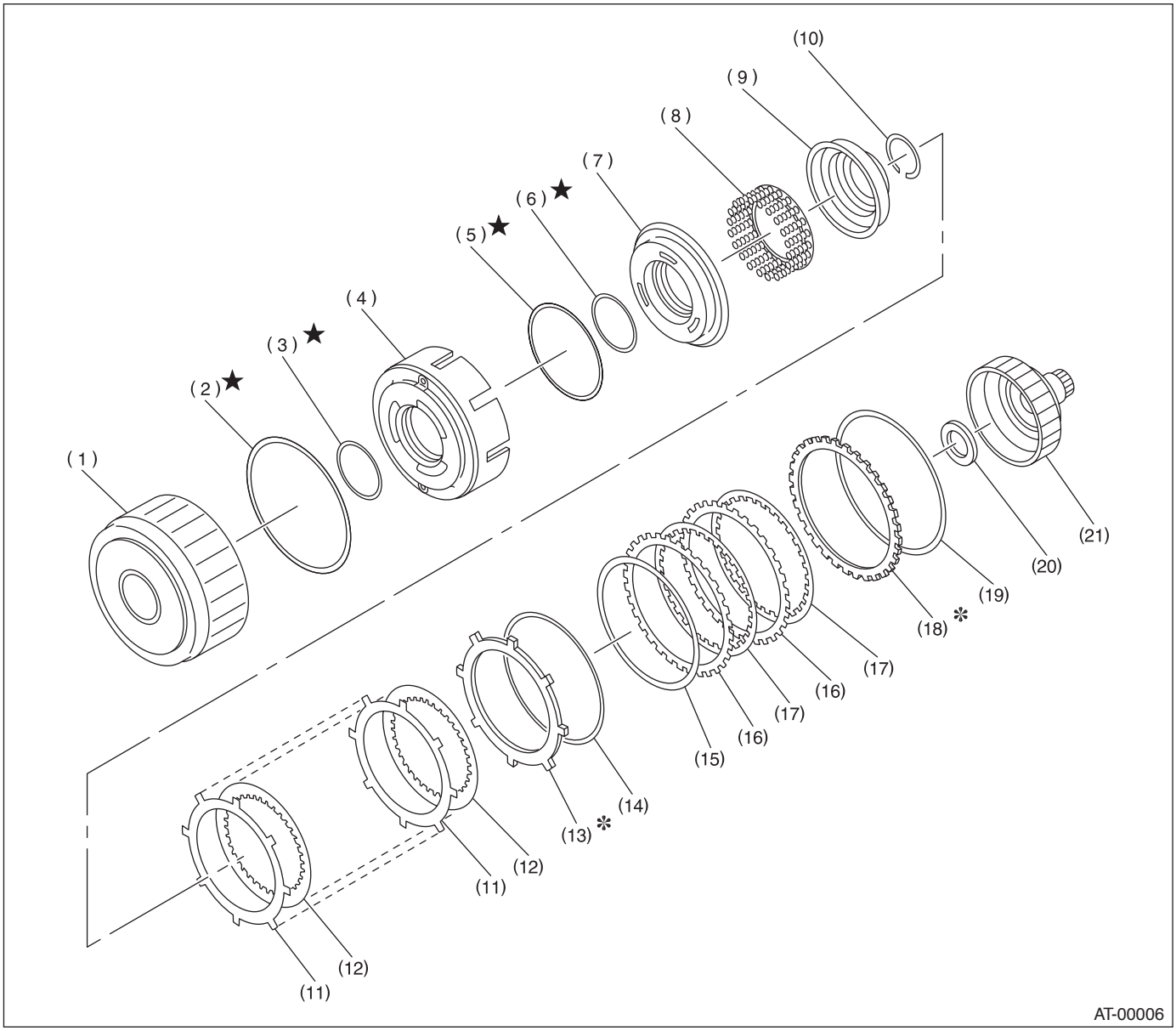
4. CONTROL VALVE AND HARNESS ROUTING



(1)	Stay	(6)	O-ring
(2)	Transmission harness	(7)	Front vehicle speed sensor
(3)	O-ring	(8)	O-ring
(4)	O-ring	(9)	Rear vehicle speed sensor
(5)	Torque converter turbine speed sensor	(10)	Control valve body

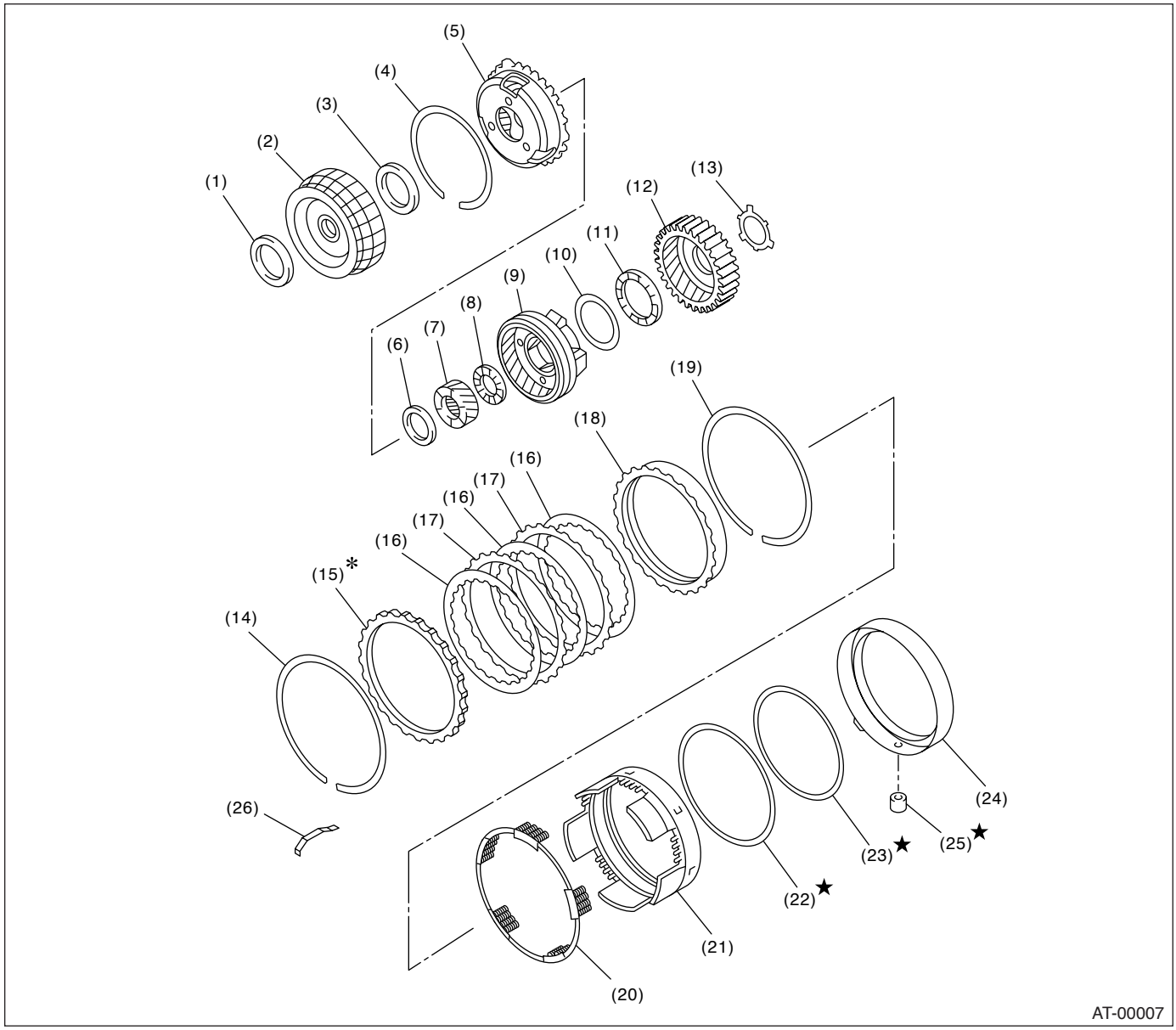
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 8 (0.8, 5.8)

5. HIGH CLUTCH AND REVERSE CLUTCH



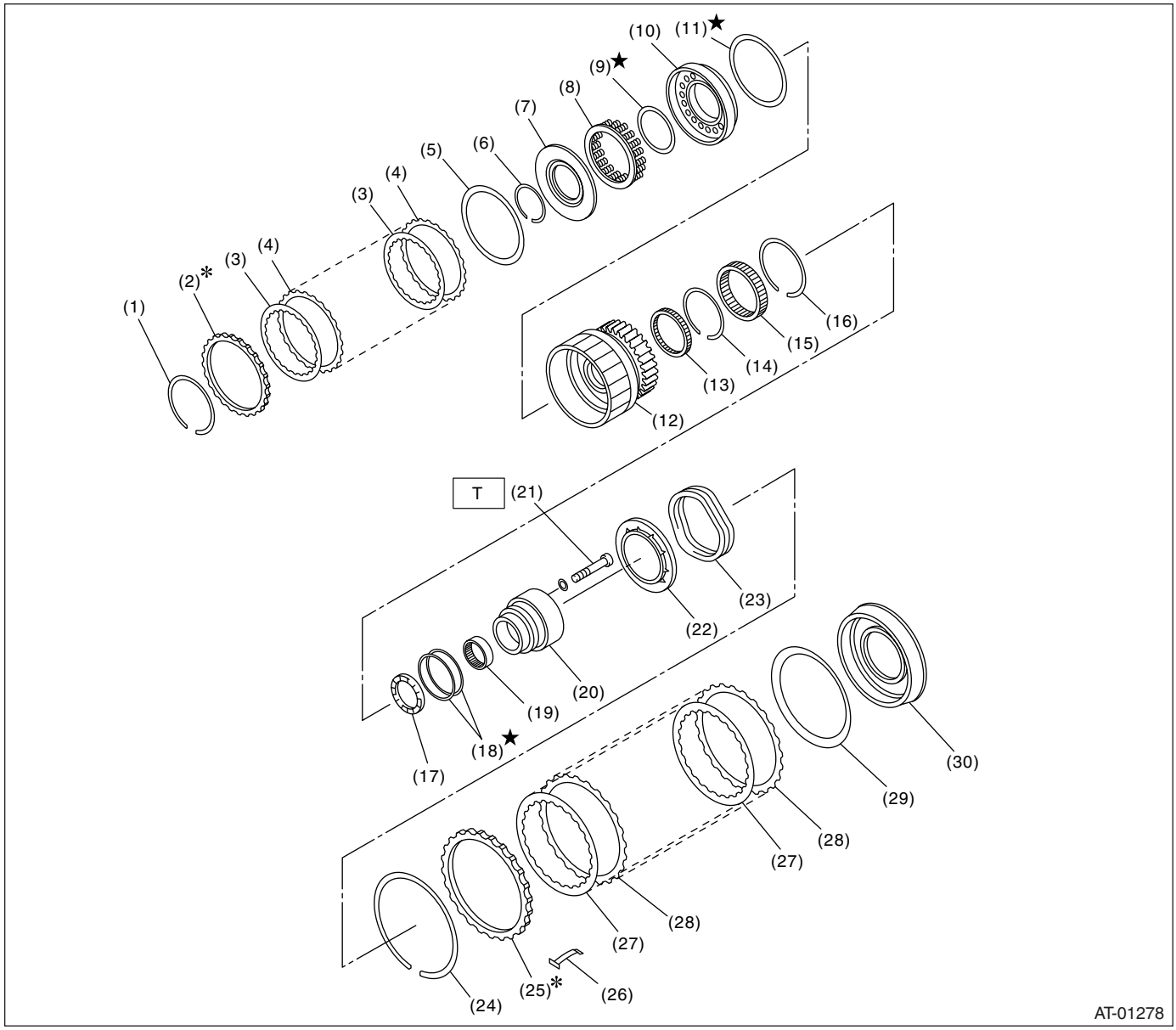
(1)	High clutch drum	(8)	Spring retainer	(15)	Dish plate
(2)	Lip seal	(9)	Cover	(16)	Driven plate (reverse clutch)
(3)	D-ring	(10)	Snap ring	(17)	Drive plate (reverse clutch)
(4)	Reverse clutch piston	(11)	Driven plate (high clutch)	(18)	Retaining plate (reverse clutch)
(5)	D-ring	(12)	Drive plate (high clutch)	(19)	Snap ring
(6)	D-ring	(13)	Retaining plate (high clutch)	(20)	Thrust needle bearing
(7)	High clutch piston	(14)	Snap ring	(21)	High clutch hub

6. PLANETARY GEAR AND 2-4 BRAKE



(1) Thrust needle bearing
(2) Front sun gear
(3) Thrust needle bearing
(4) Snap ring
(5) Front planetary carrier
(6) Thrust needle bearing
(7) Rear sun gear
(8) Thrust needle bearing
(9) Rear planetary carrier
(10) Washer
(11) Thrust needle bearing
(12) Rear internal gear
(13) Washer
(14) Snap ring
(15) Retaining plate
(16) Drive plate
(17) Driven plate
(18) Pressure rear plate
(19) Snap ring
(20) Spring retainer
(21) 2-4 brake piston
(22) D-ring
(23) D-ring
(24) 2-4 brake piston retainer
(25) 2-4 brake seal
(26) Leaf spring

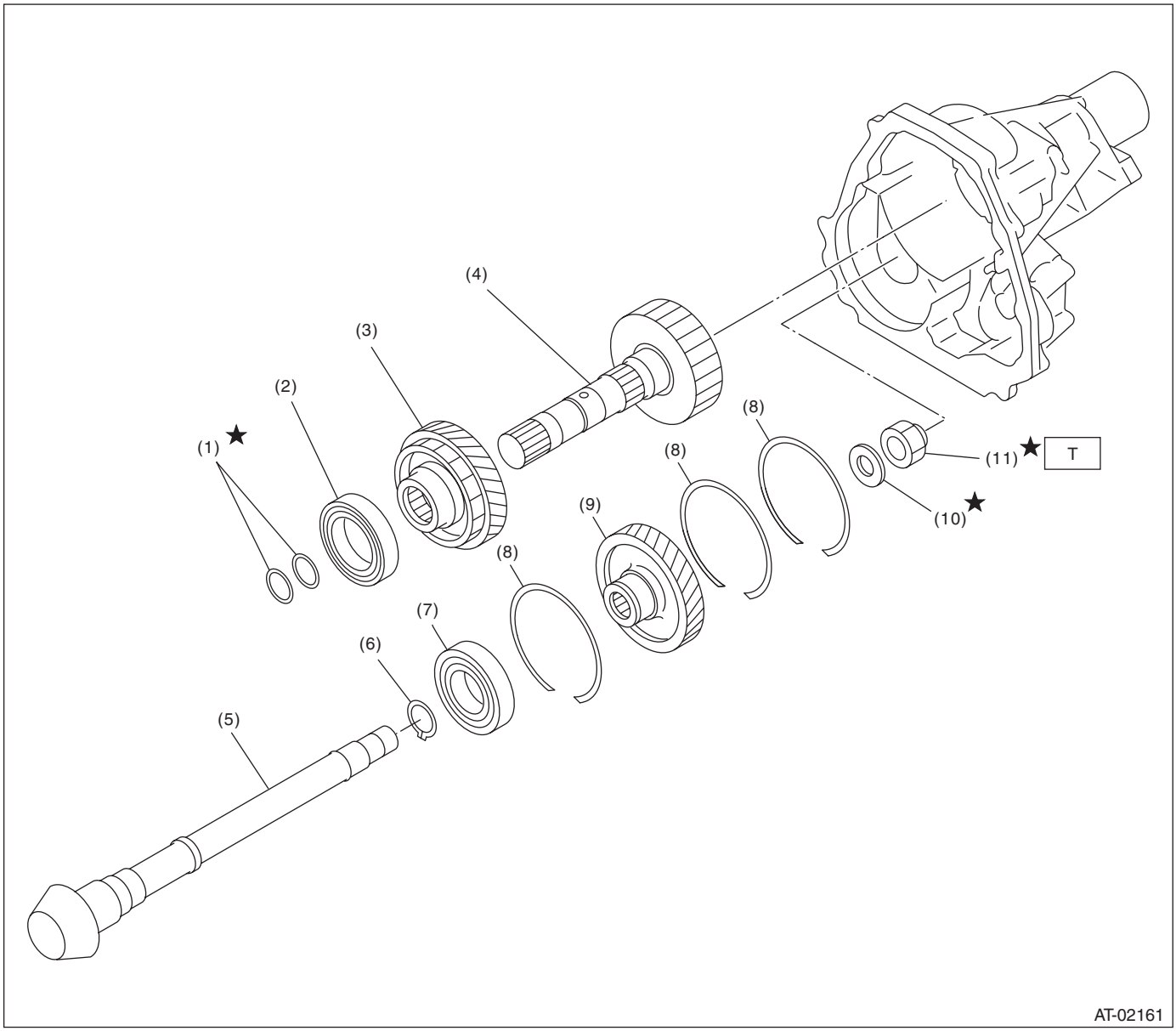
7. LOW CLUTCH AND LOW & REVERSE BRAKE



(1) Snap ring
(2) Retaining plate
(3) Drive plate
(4) Driven plate
(5) Dish plate
(6) Snap ring
(7) Cover
(8) Spring retainer
(9) D-ring
(10) Low clutch piston
(11) D-ring
(12) Low clutch dram
(13) Needle bearing
(14) Snap ring
(15) One-way clutch
(16) Snap ring
(17) Thrust needle bearing
(18) Seal ring
(19) Needle bearing
(20) One-way clutch inner race
(21) Socket bolt
(22) Spring retainer
(23) Return spring
(24) Snap ring
(25) Retaining plate
(26) Leaf spring
(27) Drive plate
(28) Driven plate
(29) Dish plate
(30) Low & reverse brake piston

Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (2.5, 18.1)

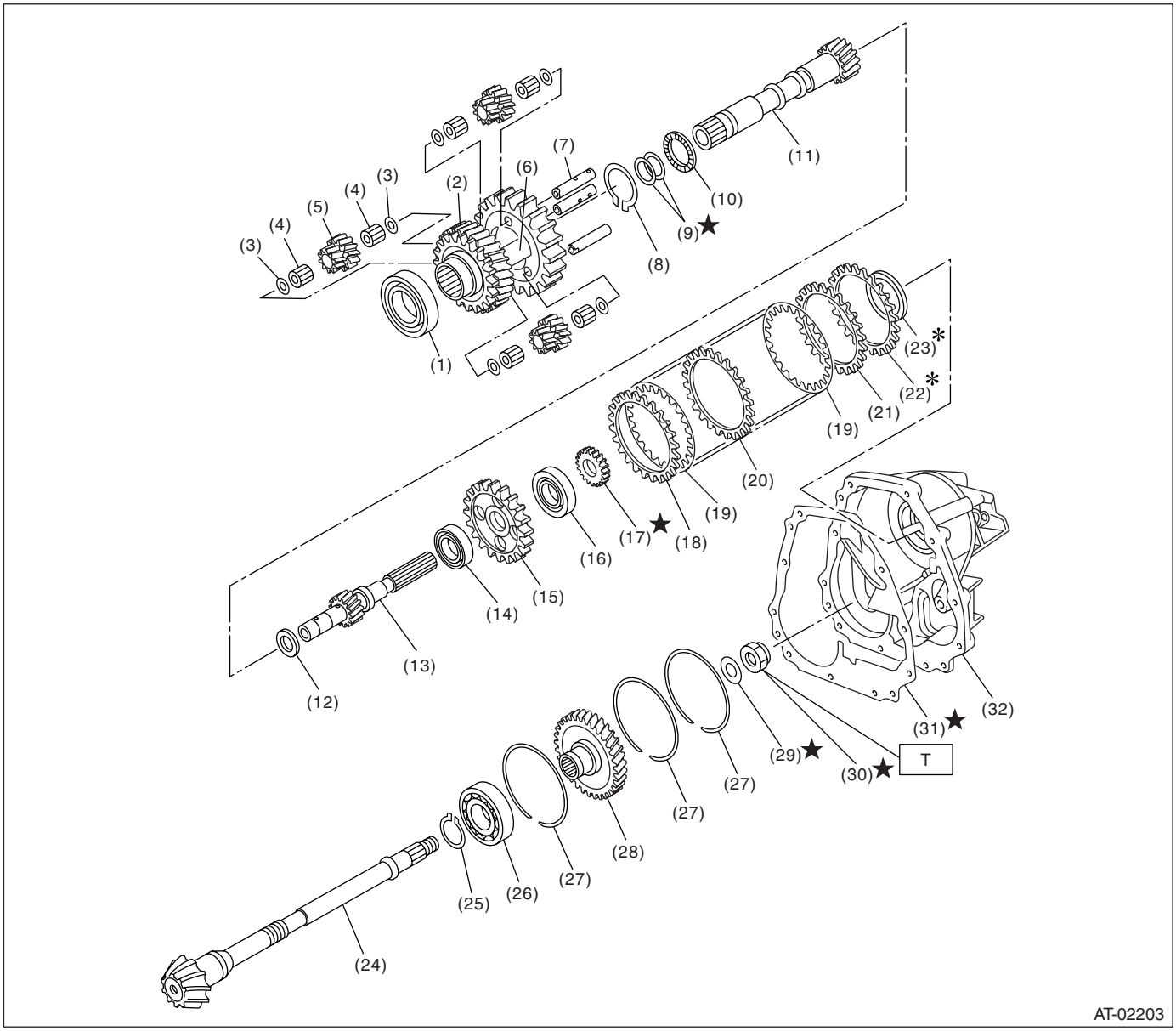
8. REDUCTION GEAR



(1) Seal ring
(2) Ball bearing
(3) Reduction drive gear
(4) Reduction drive shaft
(5) Drive pinion shaft
(6) Snap ring
(7) Ball bearing
(8) Snap ring
(9) Reduction driven gear
(10) Washer
(11) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

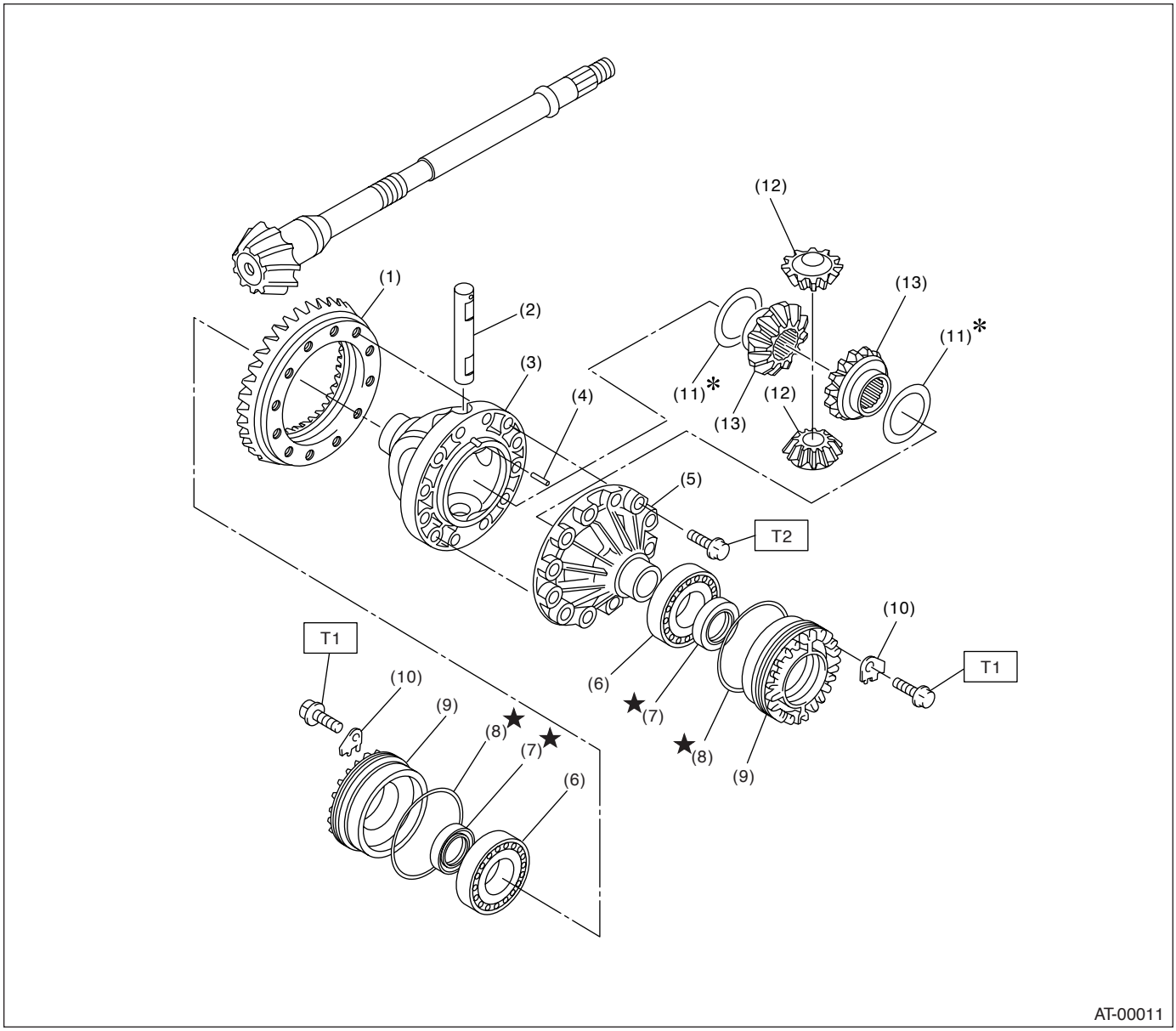
9. REDUCTION GEAR WITH VTD



(1) Ball bearing
(2) Reduction drive gear
(3) Washer
(4) Needle bearing
(5) Pinion gear
(6) Carrier
(7) Planetary pinion shaft
(8) Snap ring
(9) Seal ring
(10) Thrust needle bearing
(11) Intermediate shaft
(12) Thrust washer
(13) Rear drive shaft
(14) Ball bearing
(15) Multi-plate clutch (LSD) hub
(16) Ball bearing
(17) Revolution gear
(18) Driven plate (Thicker)
(19) Drive plate
(20) Driven plate (Thinner)
(21) Driven plate (Thicker)
(22) Pressure plate
(23) Rear drive shaft shim
(24) Drive pinion shaft
(25) Snap ring
(26) Ball bearing
(27) Snap ring
(28) Reduction driven gear
(29) Lock washer
(30) Lock nut
(31) Gasket
(32) Extension case

Tightening torque: N·m (kgf-m, ft-lb)
T: 100 (10.2, 73.8)

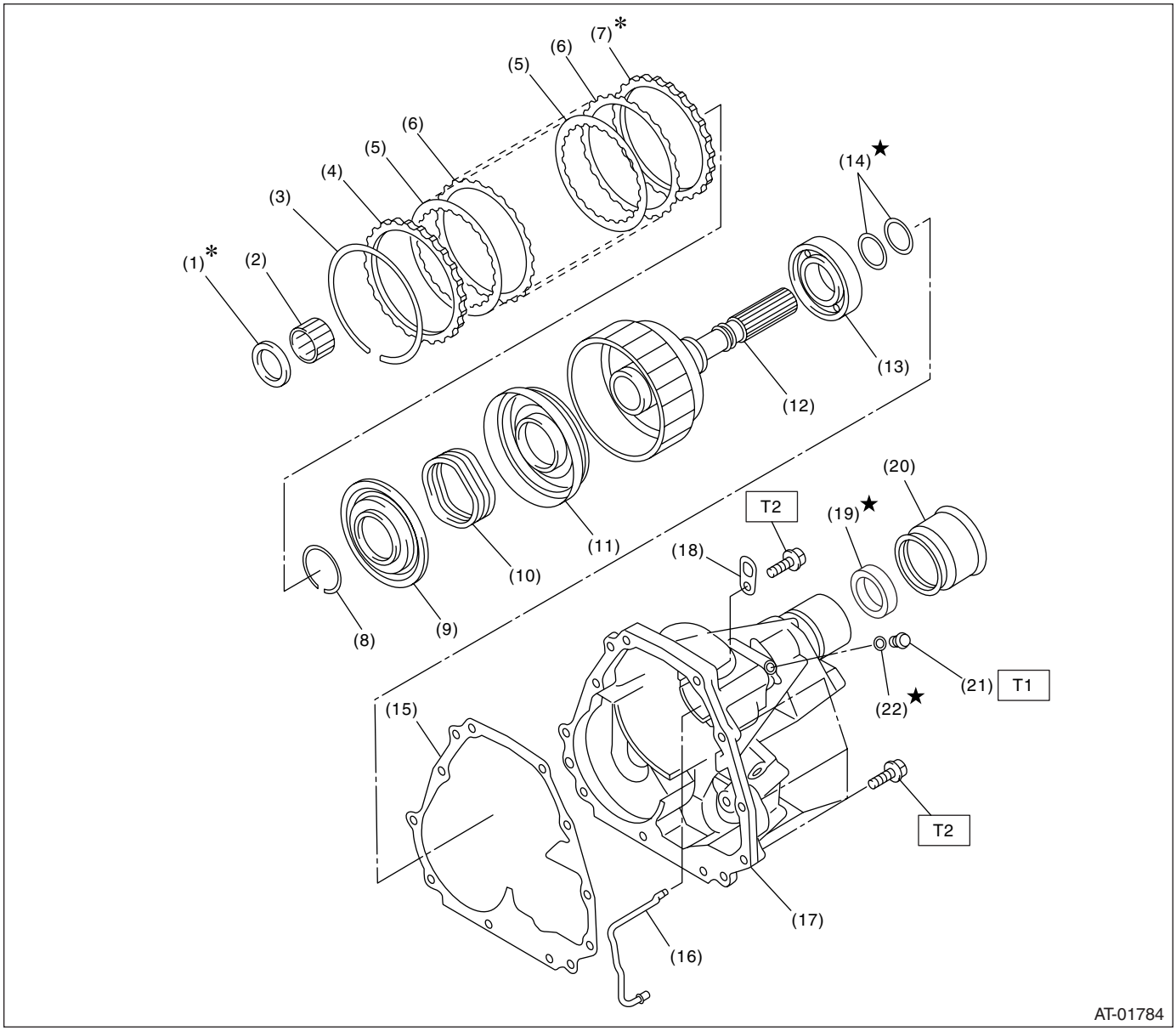
10.DIFFERENTIAL GEAR



(1) Hypoid driven gear
(2) Pinion shaft
(3) Differential case (RH)
(4) Straight pin
(5) Differential case (LH)
(6) Taper roller bearing
(7) Oil seal
(8) O-ring
(9) Differential side retainer
(10) Lock plate
(11) Washer
(12) Differential bevel pinion
(13) Differential bevel gear

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

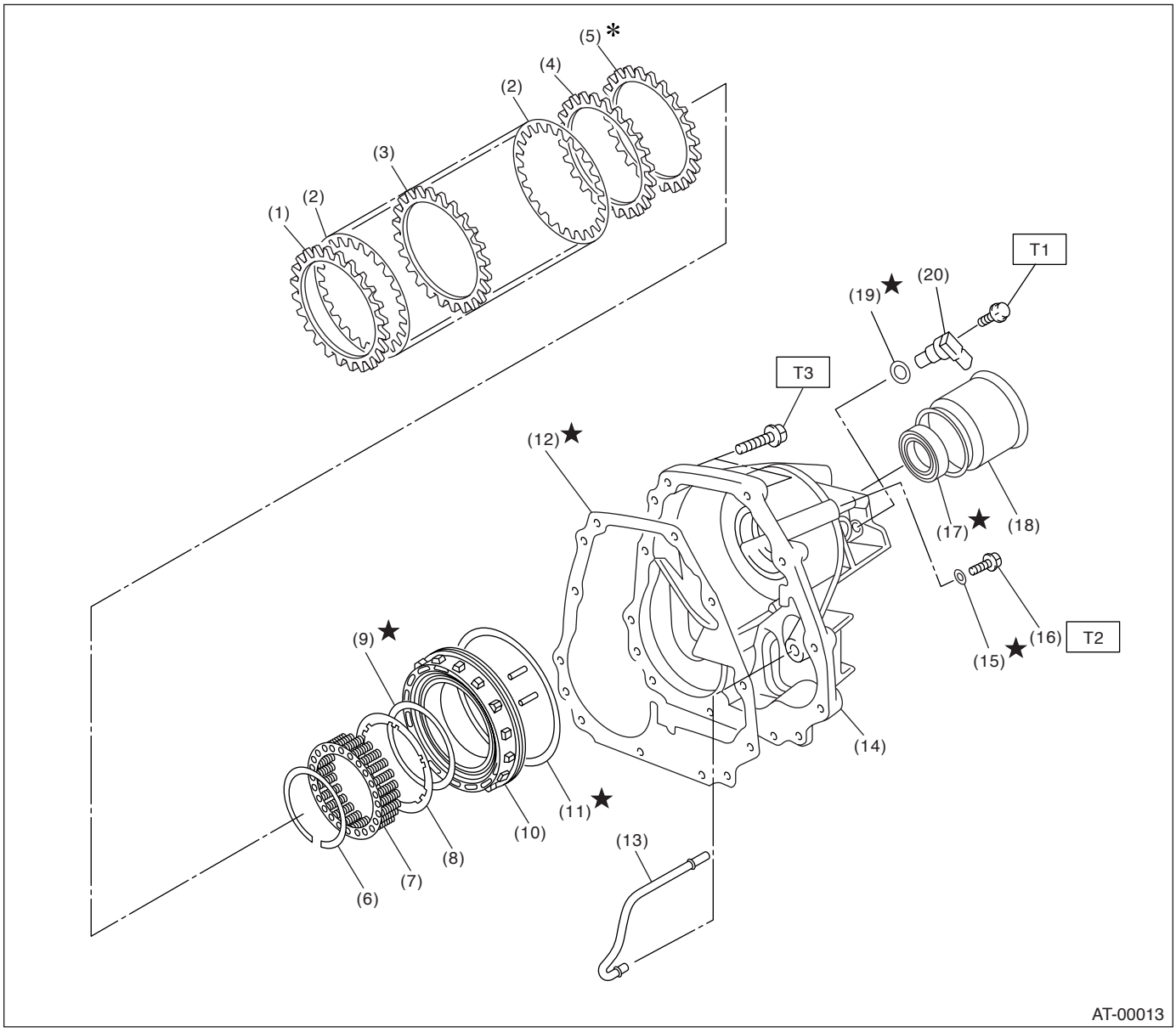
11.TRANSFER AND EXTENSION CASE



(1) Thrust needle bearing
(2) Needle bearing
(3) Snap ring
(4) Pressure plate
(5) Drive plate
(6) Driven plate
(7) Retaining plate
(8) Snap ring
(9) Transfer piston seal
(10) Return spring
(11) Transfer clutch piston
(12) Rear drive shaft
(13) Ball bearing
(14) Seal ring
(15) Gasket
(16) Transfer clutch pipe
(17) Extension case
(18) Transmission hanger
(19) Oil seal
(20) Dust cover
(21) Test plug
(22) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13 (1.3, 9.4)
T2: 25 (2.5, 18.1)

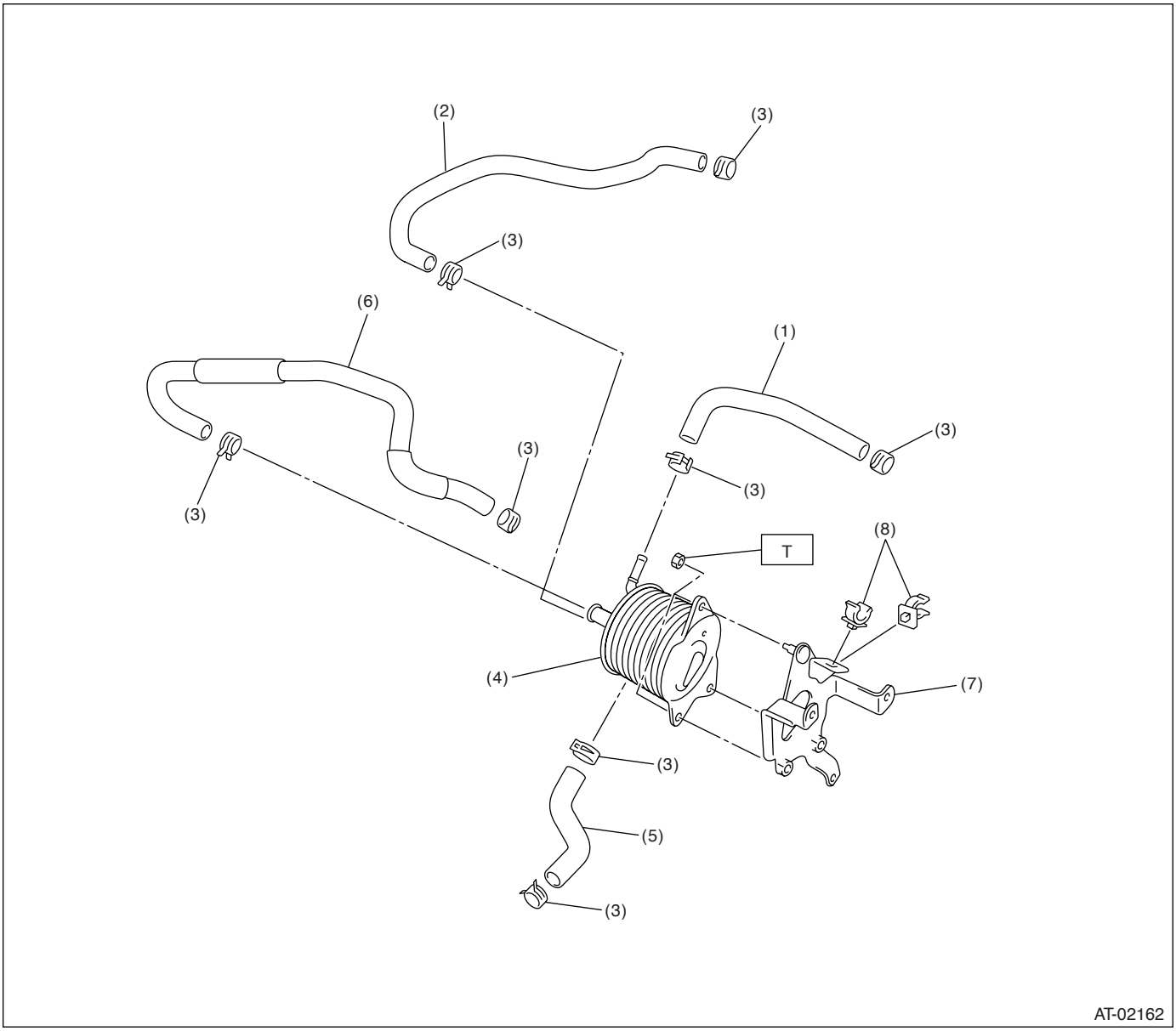
12.TRANSFER AND EXTENSION CASE WITH VTD



(1) Driven plate (Thicker)
(2) Drive plate
(3) Driven plate (Thinner)
(4) Driven plate (Thicker)
(5) Adjusting plate
(6) Snap ring
(7) Spring retainer
(8) Plate
(9) O-ring
(10) Multi-plate clutch (LSD) piston ASSY
(11) D-ring
(12) Gasket
(13) Multi-plate clutch (LSD) pipe
(14) Extension case
(15) O-ring
(16) Test plug
(17) Oil seal
(18) Dust cover
(19) O-ring
(20) Rear vehicle speed sensor

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7 (0.7, 5.1)
T2: 13 (1.3, 9.4)
T3: 25 (2.5, 18.1)

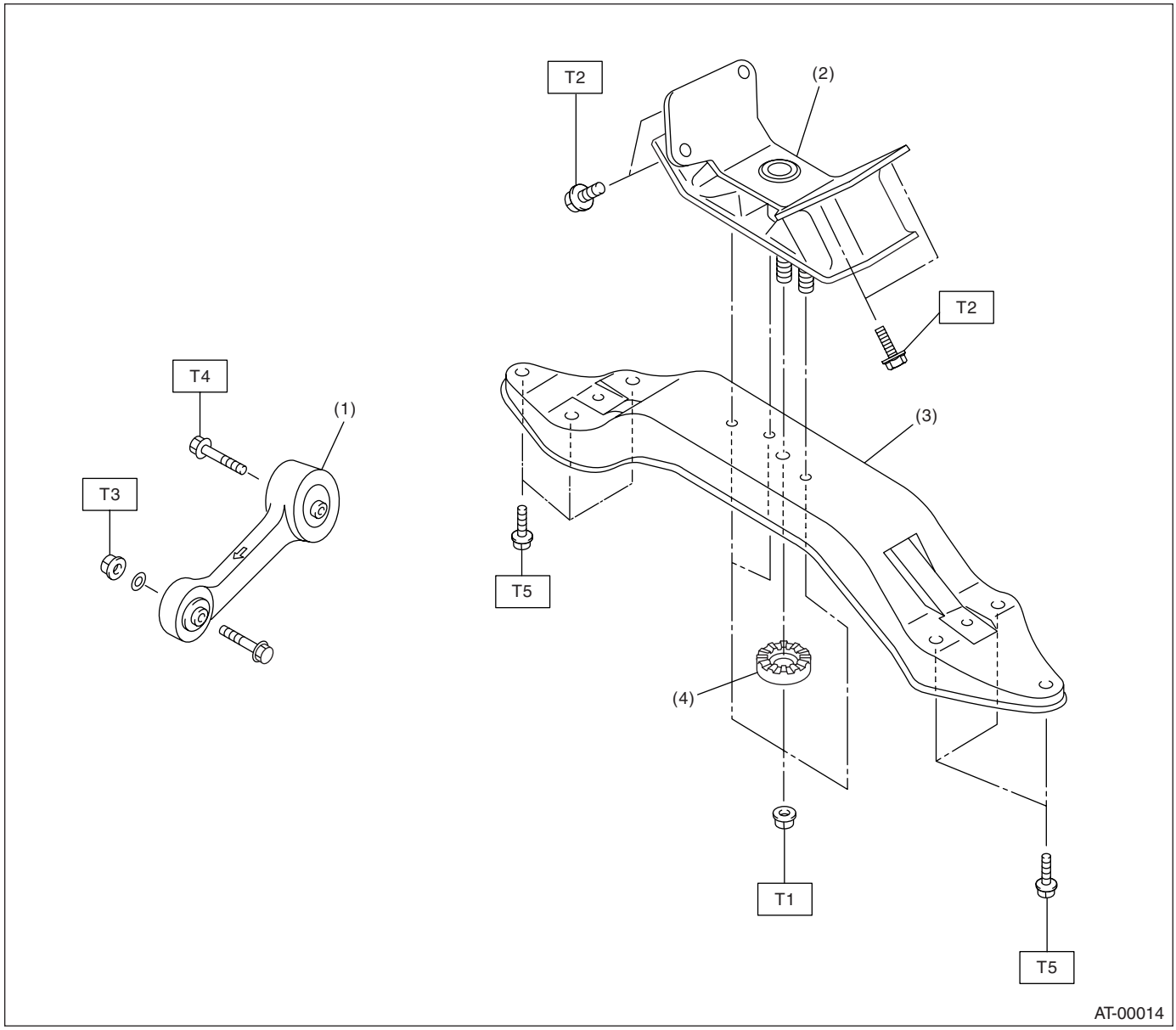
13.ATF COOLER WITH ATF WARMER FUNCTION



(1) ATF cooler outlet hose
(2) ATF cooler inlet hose
(3) Hose clamp
(4) ATF cooler ASSY
(5) Engine coolant inlet pipe
(6) Engine coolant outlet pipe
(7) ATF cooler bracket
(8) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T: 23 (2.3, 16.6)

14.TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 40 (4.1, 30)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 70 (7.1, 51)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Do not place the oil pan with its inner side facing upward until it is installed so as to prevent foreign matter intrusion into valve body.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil or ATF onto sliding or revolution surfaces before installation in view of components usage.
• Replace deformed or otherwise damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of ATF to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vice.
• Avoid damaging the mating surface of the case.
• Before applying liquid gasket, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

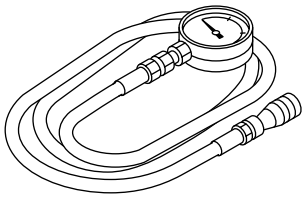
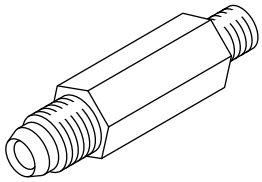
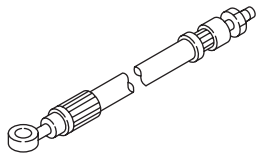
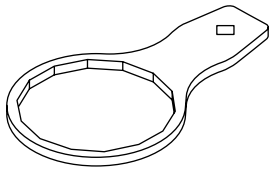
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	Used for oil pump housing when measuring reverse clutch pressure and line pressure.
 ST-498897700	498897700	ADAPTER SET	Used for measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing ATF filter.

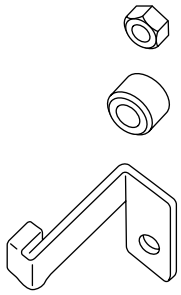
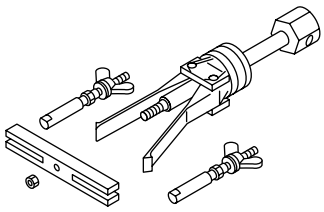
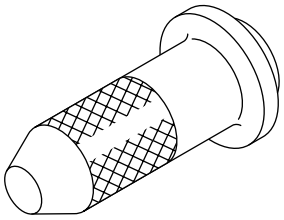
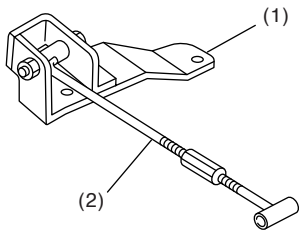
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.
 ST-398527700	398527700	PULLER ASSY	• Used for removing extension case roller bearing. • Used for removing extension oil seal. • Used for removing front differential side retainer bearing outer race. • Used for removing front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AC010) (2) ENGINE SUPPORT (41099AC020)

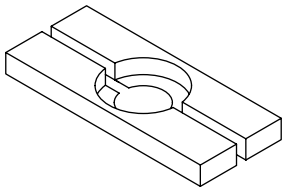
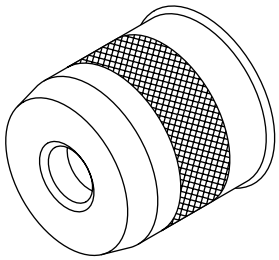
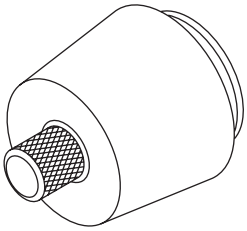
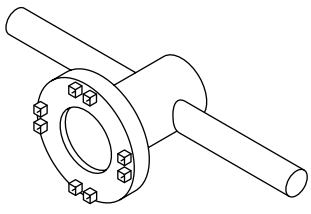
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.
 ST-499247400	499247400	INSTALLER	• Used for installing transfer outer snap ring. • Used with GUIDE (499257300).
 ST-499257300	499257300	SNAP RING OUTER GUIDE	• Used for installing transfer outer snap ring. • Used with INSTALLER (499247400).
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.

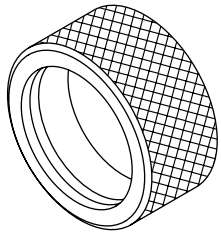
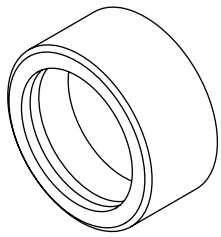
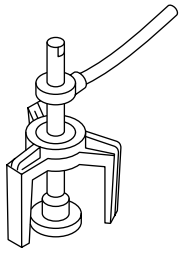
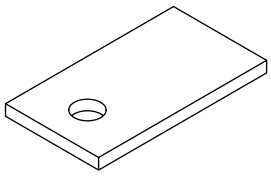
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	Used for installing converter case oil seal.
 ST-398487700	398487700	INSTALLER	Used for installing front differential taper roller bearing.
 ST-398673600	398673600	COMPRESSOR	Used for removing and installing clutch spring.
 ST-498255400	498255400	PLATE	Used for measuring backlash of hypoid gear.

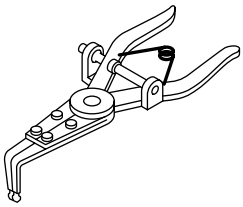
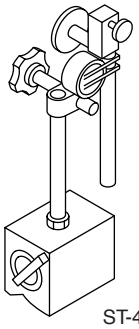
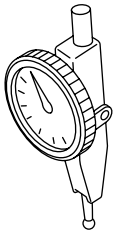
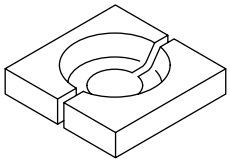
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399893600	399893600	PLIERS	Used for removing and installing clutch spring.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring gear backlash. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.

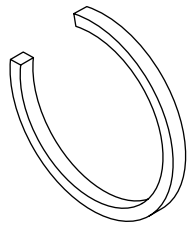
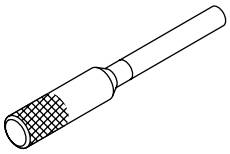
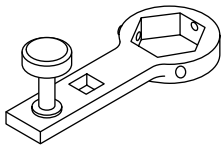
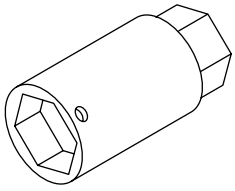
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398623600	398623600	SEAT	Used for removing spring of transfer clutch piston.
 ST-499267300	499267300	STOPPER PIN	Used for installing inhibitor switch.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.

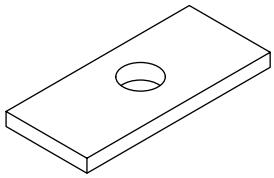
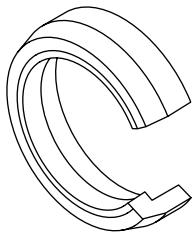
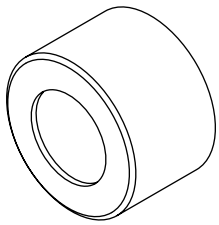
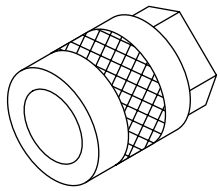
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.
 ST-498627100	498627100	SEAT	Used for holding low clutch piston retainer spring when installing snap ring.
 ST-499577000	499577000	GAUGE	Used for measuring mating surface of transmission to end of reduction gear.
 ST-499737000	499737000	PULLER	Used for removing reduction driven gear assembly.

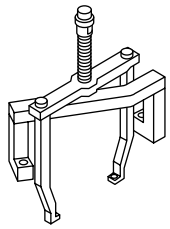
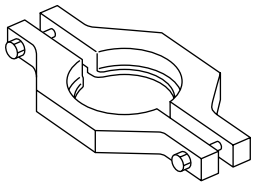
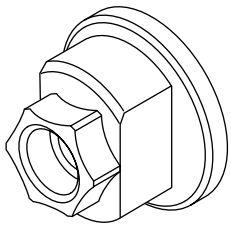
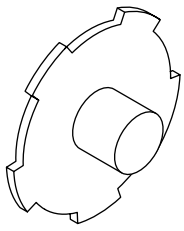
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 ST-498937110	498937110	HOLDER	Used for removing and installing drive pinion lock nut.
 ST-498677100	498677100	COMPRESSOR	Used for installing 2-4 brake snap ring.

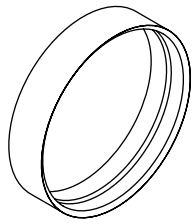
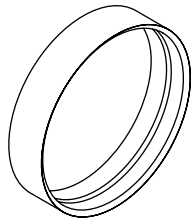
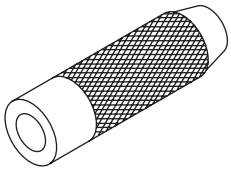
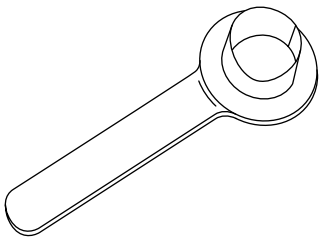
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498437000	498437000	HIGH CLUTCH PISTON GUIDE	Used for installing high clutch piston.
 ST-498437100	498437100	LOW CLUTCH PISTON GUIDE	Used for installing low clutch piston.
 ST-899580100	899580100	INSTALLER	Used for press-fitting of ball bearing for transfer clutch.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for installing axle shaft.

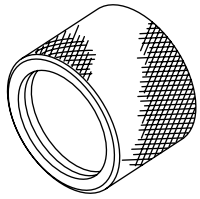
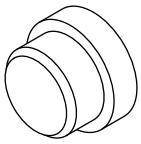
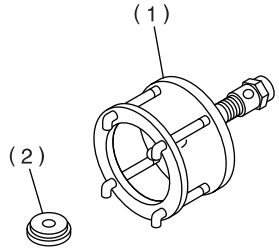
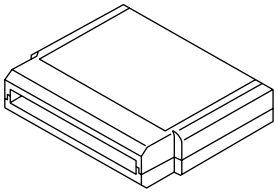
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18675AA000	18675AA000	DIFFERENTIAL OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-398497701	398497701	SEAT	Used for installing needle bearing.
 ST-899524100	899524100	PULLER SET	Used for bolt only. • Used with PULLER SET (499737100). • Used with PULLER (499737000). (1) Puller (2) Cap
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

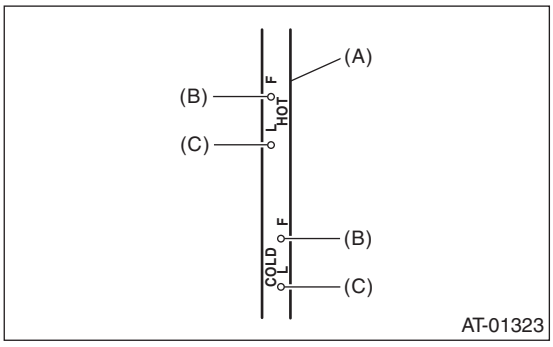
TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearance of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing differential gear oil drain plug.
Push/pull gauge	Used for measuring clutch piston stroke.

2. Automatic Transmission Fluid

A: INSPECTION

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the ATF temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Park the vehicle on a level surface.
3) After selecting all positions (P, R, N, D), set the select lever in "P" range. Measure the ATF level with engine idling for one or two minutes.



(A) ATF level gauge
(B) Upper level
(C) Lower level

4) Make sure that ATF level is above the center of upper level and lower level at HOT side.
5) If the ATF level is below the center between upper level and lower level, replenish a recommended ATF until the fluid level exceeds the center between upper level and lower level.

CAUTION:
• Use care not to exceed the upper limit level.
• Be sure that the replenishment of ATF to the upper level with the transmission cold will cause overfilling of ATF and result in a transmission failure.

6) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 — 80°C (158 — 176°F) on Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Check the ATF for leaks.
Make visual inspection for leaks from the inside of transmission. If there are leaks, repair or replace the gasket, oil seals, plugs or other parts.

B: REPLACEMENT

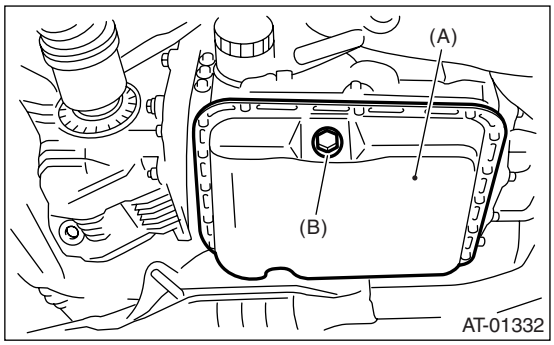
1) Lift-up the vehicle.
2) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

3) Check the condition of ATF. <Ref. to 4AT-32, CONDITION CHECK, Automatic Transmission Fluid.>
4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Lower the vehicle.
6) Pour ATF from the oil charge pipe.

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATFs above are not available, use Dexron III.

Capacity:
Fill the same amount of ATF drained.

Capacity when transmission is overhauled:
2.0 L model
8.4 — 8.7 ℓ (8.9 — 9.2 US qt, 7.4 — 7.7 Imp qt)
2.5 L model
9.3 — 9.6 ℓ (9.8 — 10.1 US qt, 8.2 — 8.4 Imp qt)

7) Bleed the air of control valve.
<Ref. to 4AT-63, Air Bleeding of Control Valve.>
8) Check the level and leaks of ATF.
<Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

NOTE:
When replacing ATF, check the inside condition of the transmission body by inspecting the drained ATF.

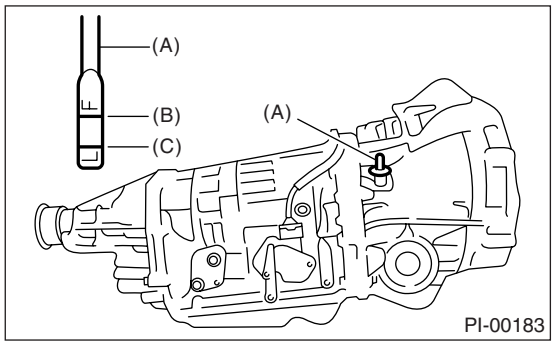
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body.	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch and etc.	Replace ATF and check AT itself and vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid.	Replace ATF and check the water entering point.

3. Differential Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the oil level gauge and wipe it clean.
3) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
4) Remove the level gauge again and note the reading. If the differential gear oil level is below the “L” line, add oil to bring the level up to the “F” line.

NOTE:
To prevent overfilling the differential gear oil, do not add oil above the “F” line.



(A) Oil level gauge
(B) Upper level
(C) Lower level

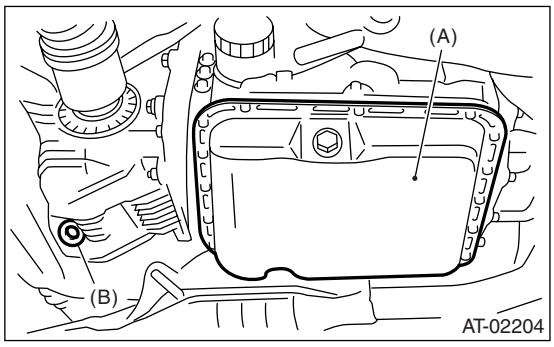
B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® BIT T70, and drain the differential gear oil completely.

CAUTION:
• Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.

3) Tighten the differential gear oil drain plug using TORX® BIT T70.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Oil pan
(B) Differential gear oil drain plug

4) Lower the vehicle.
5) Pour gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 4AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.2 — 1.4 US qt, 1.0 — 1.1 Imp qt)

6) Check the level of the differential gear oil.
<Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of the automatic transmission.

NOTE:
When performing the test, do not exceed posted speed limit.

2. D RANGE SHIFT FUNCTION

Check shifting between 1st ←→ 2nd ←→ 3rd ←→ 4th while driving on general city streets.

3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION

• Check the 3rd gear engine brake when shifting down from 4th to 3rd range while driving in 4th gear of manual mode [50 — 60 km/h (31 — 37 MPH)].
• Check the 2nd gear engine brake when shifting down from 3rd to 2nd range while driving in 3rd gear of manual mode [40 — 50 km/h (25 — 31 MPH)].
• Check the 1st gear engine brake when shifting down from 2nd to 1st range while driving in 2nd gear of manual mode [20 — 30 km/h (12 — 19 MPH)].

6. LOCK-UP FUNCTION

• Check that rpm does not change sharply when the axle pedal is lightly depressed while driving on flat roads at normal speed in “D” range.
• Check slip lock-up with following procedure. Subaru Select Monitor is needed for checking.
Before start checking, check that no DTC is displayed using Subaru Select Monitor. When DTC is displayed, perform the collective action with DTC and check that any more DTC is displayed, and then start the checking.
1) Perform the check on flat and straight road or free roller.

NOTE:
• Slip lock-up does not operate when the vehicle is lifted up, because of not occurring surface resistance.
• Also when checking on the free roller, check with depressing the foot brake lightly to make the checking easier, because the surface resistance will be deficient.

2) Connect the Subaru Select Monitor.
3) Check the ATF temperature using Subaru Select Monitor.

NOTE:
• ATF temperature is between 50 — 100°C (122 — 212°F).
• When the temperature is low, warm-up the ATF by running the vehicle or etc.

4) Start the engine, so that the lock-up duty can be read on data display of Subaru Select Monitor.
5) Drive the vehicle at a constant speed of 35 — 40 km/h (22 — 25 MPH).
6) Read the lock-up duty while vehicle is running.

Standard value:
25 — 45%

NOTE:
The value may be lower on the free roller.

• Slip lock-up control is not operating when the lock-up duty is less than 5%, or when the lock-up duty goes down immediately after starts rising. On these cases, improper ATF or deterioration of ATF may be the cause. Check the amount of ATF or replace them, and then recheck it.

7. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to “P” range. Check that the vehicle does not move when the parking brake is released.

8. NOISE AND VIBRATION

Check for noise and vibration while driving and during shifting.

9. CLIMBING CONTROL FUNCTION

• Check that the gear remains in 3rd when going up a grade.
• Check that the gear remains in 3rd when applying the brakes while going down a grade.

10.TRANSFER CLUTCH

Check tight corner braking when the vehicle started with steering fully turned.

11.OIL LEAKS

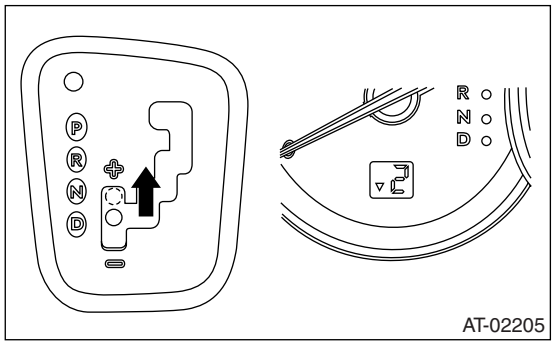
After the driving test, inspect for oil leaks.

5. Stall Test

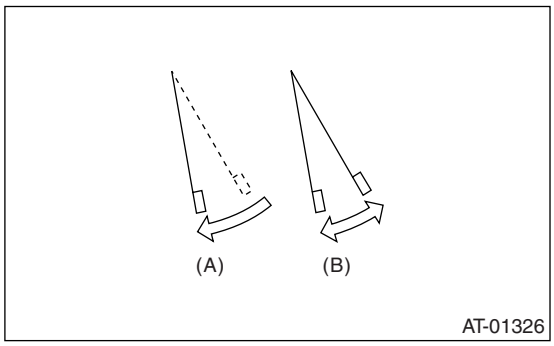
A: INSPECTION

NOTE:
The stall test is of extreme importance in diagnosing the condition of the automatic transmission and the engine. It should be conducted to measure the engine stall speeds in “R” and 2nd of manual mode.
Purposes of the stall test:
• To check the operation of the automatic transmission clutch.
• To check the operation of the torque converter clutch.
• To check engine performance.

1) Check that the throttle valve opens fully.
2) Check that the engine oil level is correct.
3) Check that the coolant level is correct.
4) Check that the ATF level is correct.
5) Check that the differential gear oil level is correct.
6) Increase ATF temperature to 70 — 80°C (158 — 176°F) by idling the engine for approximately 30 minutes (with select lever set to “N” or “P”).
7) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
8) Move the manual linkage to ensure it operates properly, and then set to the 2nd on manual mode.



9) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

10) When the engine speed is stabilized, record that speed quickly and release the accelerator pedal.
11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.
12) If the stall speed in the 2nd of manual mode is higher than specifications, low clutch slipping and 2-4 brake slipping may occur. To identify it, conduct the same test as above in “R” range.
13) Perform the stall tests with the select lever in “D” range.

NOTE:
• Do not continue the stall test for more than five seconds at a time (from closed throttle, fully open throttle to stall speed reading). Failure to follow this instruction causes the engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
• Be sure to cool down the engine for at least one minute after each stall test with the select lever set in “P” or “N” range and with the idle speed lower than 1,200 rpm.
• If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
2.0 L model:
2,300 — 2,700 rpm
2.5 L model:
2,600 — 2,900 rpm

Stall speed (at sea level)	Range	Cause
Less than standard	2nd on manual mode, R	• Throttle valve not fully open • Erroneous engine operation • Torque converter clutch's one-way clutch slipping
More than standard	D	• Line pressure is too low • Low clutch slipping • One-way clutch malfunctioning
	R	• Line pressure is too low • Reverse clutch slipping • Low & reverse brake slipping
	2nd on manual mode	• Line pressure is too low • Low clutch slipping • 2-4 brake slipping

6. Time Lag Test

A: INSPECTION

NOTE:
If the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. This is used for checking the condition of the low clutch, reverse clutch, low & reverse brake and one-way clutch.

- Perform the test at normal operation fluid temperature 70 — 80°C (158 — 176°F).
- Be sure to allow a one minute interval between tests.
- Make three measurements and take the average value.

1) Fully apply the parking brake.
2) Start the engine.
Check the idling speed (A/C OFF).
3) Shift the select lever from “N” to “D” range.
Using a stop watch, measure the time it takes from shifting the lever until the shock is felt.
Time lag: Less than 1.2 seconds
If “N” → “D” time lag is longer than specified:

- Line pressure too low
- Low clutch worn
- One-way clutch not operating properly
- D-ring worn

4) In the same manner, measure the time lag for “N” → “R”.
Time lag: Less than 1.5 seconds
If “N” → “R” time lag is longer than specified:

- Line pressure too low
- Reverse clutch worn
- Low & reverse brake worn
- D-ring worn

7. Line Pressure Test

A: MEASUREMENT

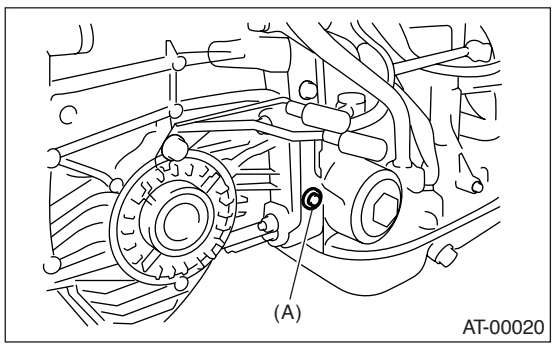
NOTE:
If the clutch or the brake shows a sign of slippage or shifting sensation is not correct, the line pressure should be checked.

• Excessive shocks during upshifting or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.

• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Line pressure measurement (under no load):
   (1) Before measuring line pressure, jack-up all the wheels.
   (2) Maintain the temperature of ATF at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above-mentioned temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
2) Line pressure measurement (under heavy load):
   (1) Before measuring line pressure, apply both the foot and parking brakes with all wheels chocked (Same as for “stall” test conditions).
   (2) Measure the line pressure when the select lever is in “R” or 2nd of manual mode with engine under stall conditions.
   (3) Measure the line pressure within 5 seconds after shifting the select lever to each position. (If the line pressure needs to be measured again, allow the engine to idle and cool it down more than 1 minute.)
   (4) Maintain the ATF temperature at approx. 70 — 80°C (158 — 176°F) during measurement. (ATF will reach the above-mentioned temperature after idling the engine for approx. 30 minutes with the select lever in “N” or “P”.)
3) Remove the test plug and install the ST instead.

ST 498897200 OIL PRESSURE GAUGE ADAPTER



(A) Test plug

4) Connect the ST1 with ST2.

ST1 498897200 OIL PRESSURE GAUGE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

5) Check for duty ratio changes by adjusting the acceleration pedal position using Subaru Select Monitor.

Standard line pressure			
Range position	Line pressure duty ratio (%)	Throttle valve angle	Line pressure kPa (kg/cm^2, psi)
Manual mode (2nd)	25 — 35	Full open	1,000 — 1,300 (10.2 — 13.3, 145 — 189)
R	15 — 25	Full open	1,500 — 1,850 (15.3 — 18.9, 217 — 268)
D	35 — 43	Full closed	500 — 800 (5.1 — 8.2, 73 — 116)

8. Transfer Clutch Pressure Test

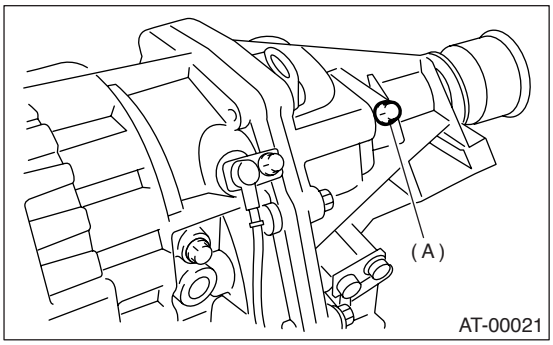
A: INSPECTION

Check the transfer clutch pressure in accordance with the following chart in the same manner as with line pressure. <Ref. to 4AT-38, Line Pressure Test.>

ST 498897700 OIL PRESSURE ADAPTER SET
ST 498575400 OIL PRESSURE GAUGE ASSY

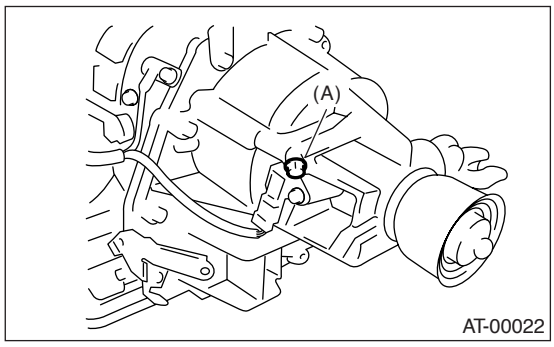
NOTE:
• Before setting in FWD mode, install the spare fuse on FWD mode switch. (MPT model)

• MTP model



(A) Test plug

• VTD model



(A) Test plug

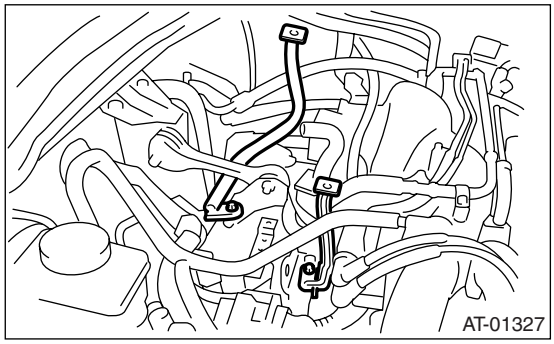
• If no oil pressure is produced or if it does not change in AWD mode, the control valve body may be malfunctioning. If oil pressure is produced in FWD mode, the same problem as AWD mode occurs.

Range position	ON Duty ratio (%)	Acceleration pedal position (%)	Standard transfer clutch pressure kPa (kg/cm^2, psi)	
			AWD mode	FWD mode
Manual mode (2nd)	95	Fully opened: 100	1,000 — 1,200 (10.2 — 12.2, 145 — 174)	—
	60	Adjust ON Duty ratio to 60%.	500 — 700 (5.1 — 7.1, 73 — 102)	—
	—	Fully closed: 0	—	0 (0, 0)
N or P	5	Fully closed: 0	0	—

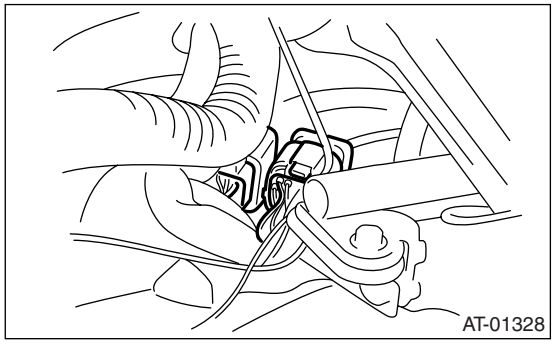
9. Automatic Transmission Assembly

A: REMOVAL

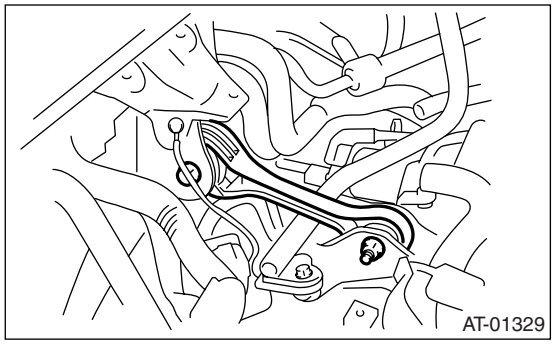
1) Set the vehicle on a lift.
2) Fully open the front hood and support with hood stay.
3) Disconnect the ground cable from battery.
4) Remove the air intake duct.
<Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
5) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
6) Remove the air cleaner case stay.



7) Disconnect the following connectors.
(1) Transmission harness connectors

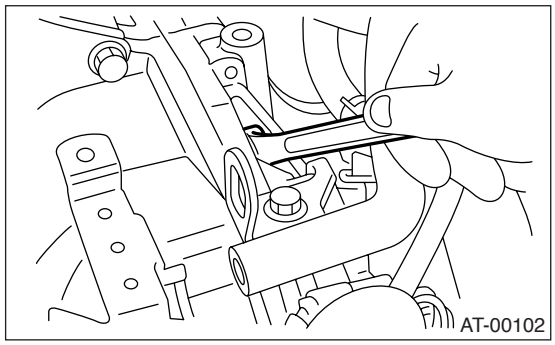


(2) Transmission ground terminal
8) Remove the starter.
<Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
9) Remove the pitching stopper.

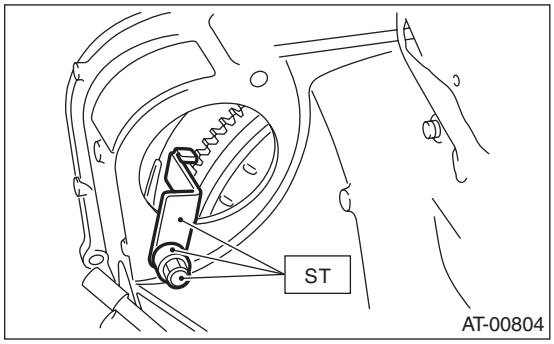


10) Separate the torque converter clutch from drive plate.
(1) Remove the V-belt covers.
(2) Remove the service hole plug.
(3) Remove the bolts which hold torque converter clutch to drive plate.
(4) Insert the wrench to crank pulley bolt, and then remove all the bolts with slightly rotating crank pulley.

CAUTION:
Be careful not to drop bolts into torque converter clutch housing.

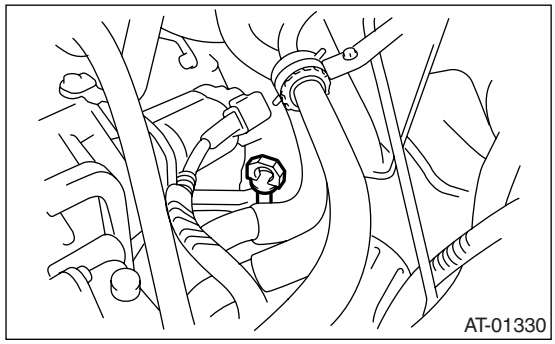


11) Install the ST to converter case.
ST 498277200 STOPPER SET



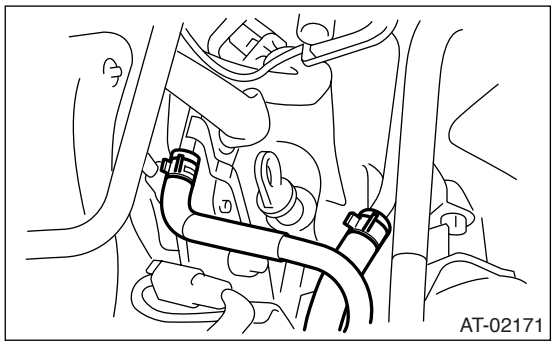
12) Remove the ATF level gauge.

NOTE:
Plug the opening to prevent entry of foreign particles into transmission fluid.

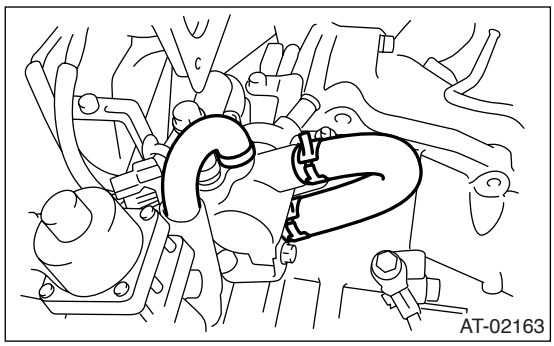


13) Remove the throttle body. <Ref. to FU(H4SO 2.0)-10, REMOVAL, Throttle Body.>

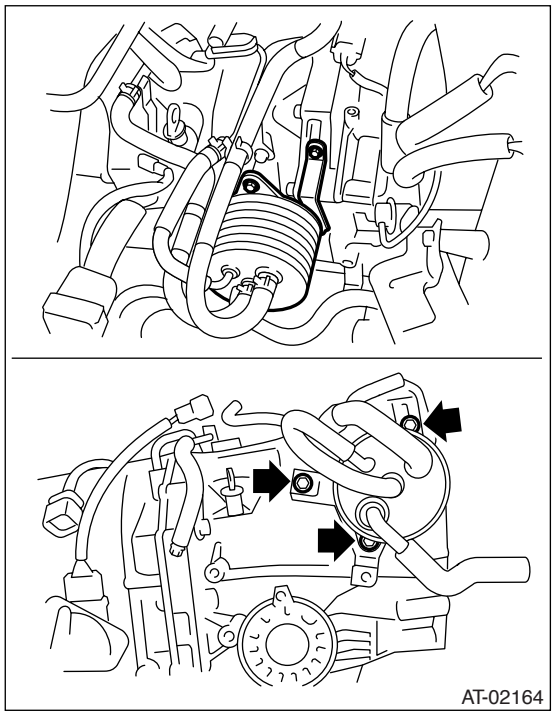
14) Drain the engine coolant by approx. 2 ℓ (2.1 US qt, 1.8 Imp qt). (Model with ATF cooler with warmer function)
15) Disconnect the ATF cooler inlet and outlet hoses from ATF cooler pipes.



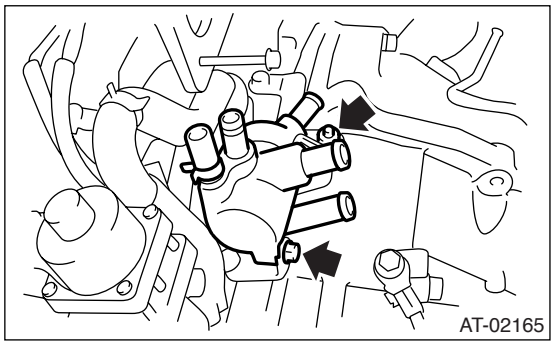
16) Disconnect each hose from warmer cock assembly.



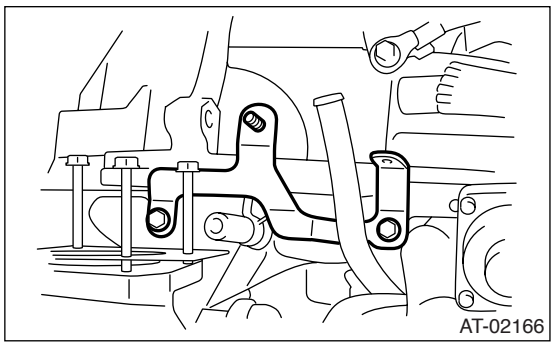
17) Remove the ATF cooler with warmer function from transmission body, and then secure it to vehicle body by wire, etc.. Select the place not to prevent transmission from being replaced. (Model with ATF cooler with warmer function)



18) Remove the warmer cock assembly. (Model with ATF cooler with warmer function)

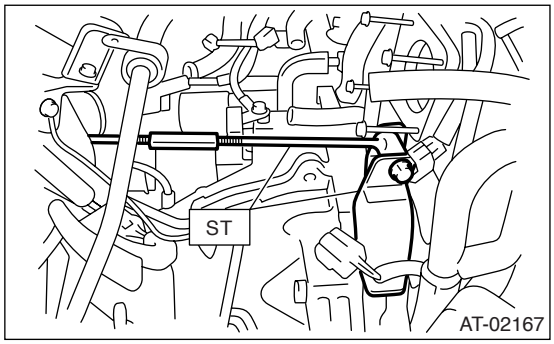


19) Remove the bracket for warmer cock assembly. (Model with ATF cooler with warmer function)

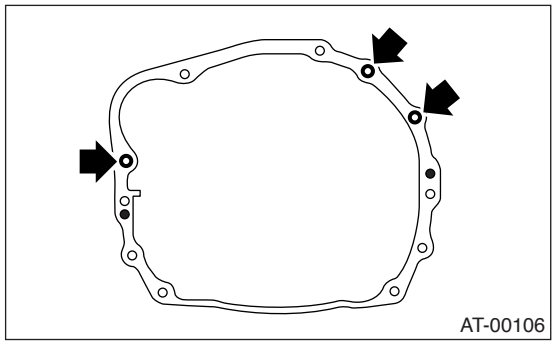


20) Remove the pitching stopper bracket.
21) Set the ST.

ST 41099AC000 ENGINE SUPPORT ASSEMBLY

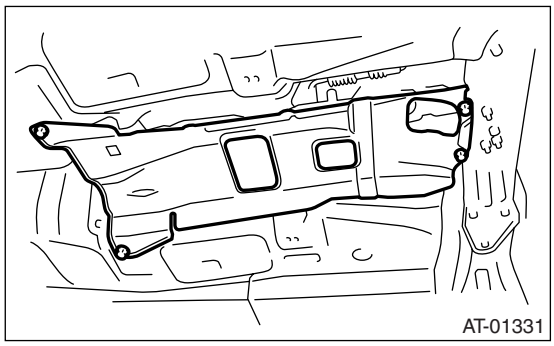


22) Remove the bolts which hold upper side of transmission to engine.

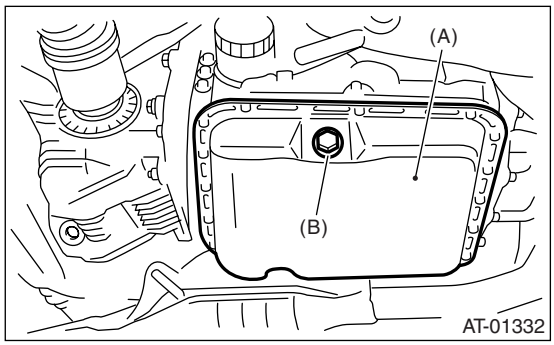


23) Lift-up the vehicle.
24) Remove the under cover.

25) Remove the front, center and rear exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
26) Remove the heat shield cover.

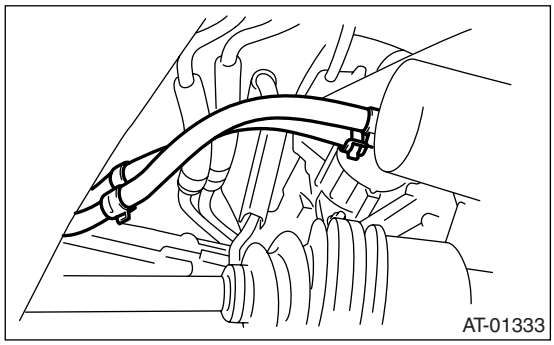


27) Remove the ATF drain plug to drain ATF.

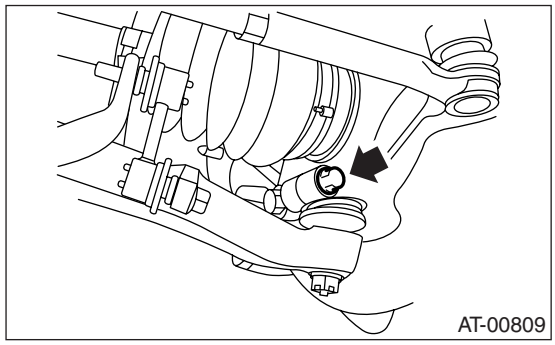


(A) Oil pan
(B) ATF drain plug

28) Disconnect the ATF cooler hoses from pipes of transmission side, and remove the oil charge pipe. (Model without ATF cooler with warmer function)



29) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
30) Remove the shift select cable.
<Ref. to CS-12, REMOVAL, Select Cable.>
31) Remove the brackets (two) which hold front stabilizer.
32) Remove the bolt securing ball joint of front arm to housing.

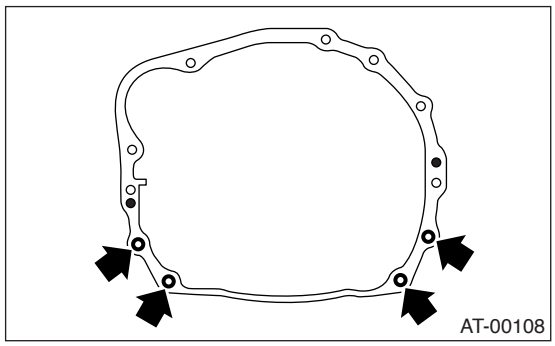


33) Pull out the front drive shaft from transmission.
(1) Using a tire lever or a pinch bar, etc., pull out the front drive shaft until its joint facing to transmission can move smoothly.

NOTE:
Place cloth between tire lever or pinch bar and transmission in order to avoid damaging the side retainer of transmission.

(2) Hold the transmission side joint portion of front drive shaft by hand and extract the housing from the transmission by pressing it outside so as not to stretch the boot.

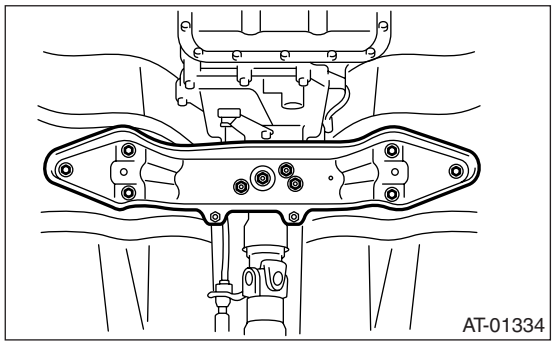
34) Remove the bolts which hold the clutch housing cover.
35) Remove the bolts which hold lower side of transmission to engine.



36) Place the transmission jack under transmission.

NOTE:
Make sure that the support plates of transmission jack don't touch the oil pan.

37) Remove the transmission rear crossmember from the vehicle.

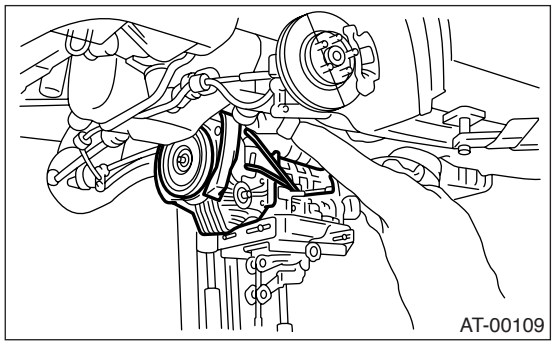


38) Fully contract the engine support while lowering the transmission jack gradually, and tilt the engine backward.

NOTE:
Contract the support until the clearance between front crossmember and torque converter case becomes approx. 10 mm (0.39 in).

39) Remove the transmission.

CAUTION:
Remove the transmission and torque converter as a unit from engine.



40) Remove the rear cushion rubber from transmission assembly.

B: INSTALLATION

1) Replace the differential side oil seal with a new one.

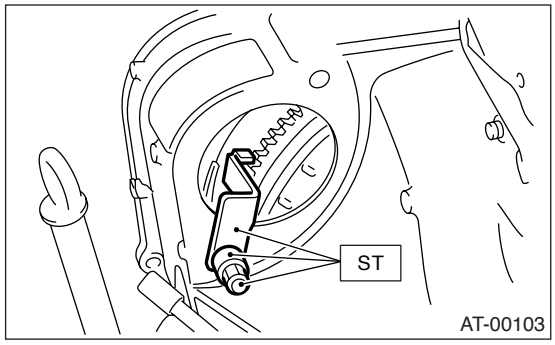
NOTE:
When a new oil seal has been installed, the replacement is not required.

2) Install the rear cushion rubber to transmission assembly.

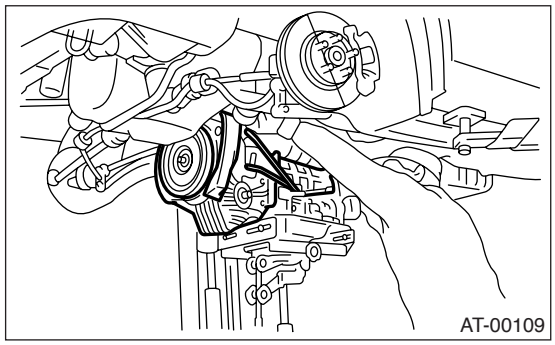
Tightening torque:
39 N·m (4.0 kgf-m, 29 ft-lb)

3) Install the ST to converter case.

ST 498277200 STOPPER SET



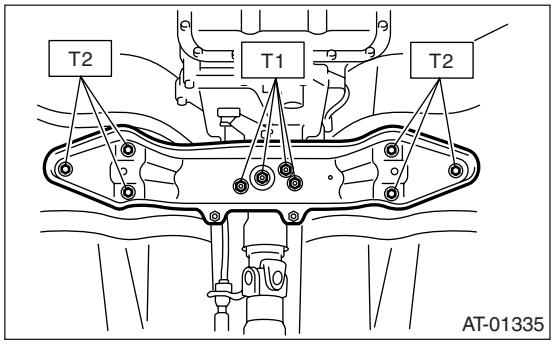
4) Install the transmission onto engine.
(1) Lift up the transmission gradually using a transmission jack.



(2) Engage them at splines.
(3) Turn the screws of engine support while raising the transmission jack gradually, and tilt the engine forward.

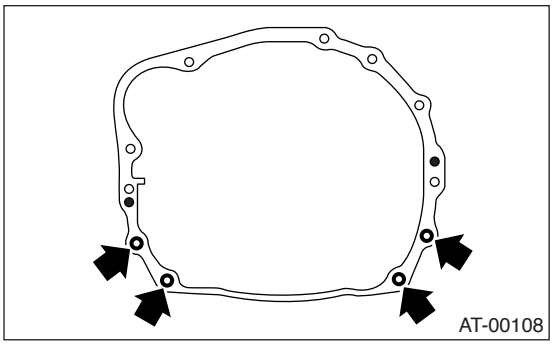
5) Install the transmission rear crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



6) Take off the transmission jack.
7) Tighten the bolts which hold the lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



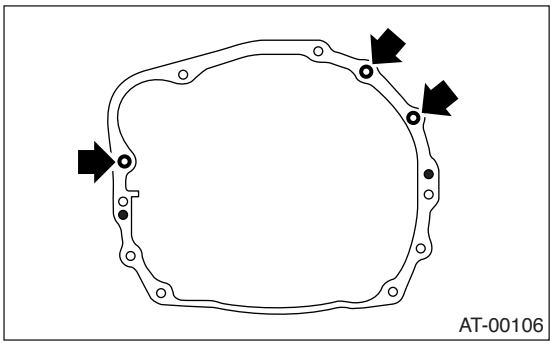
8) Screw the bolts for the clutch housing cover.
9) Lower the lift.
10) Connect the engine and transmission.
(1) Remove the ST from converter case.

NOTE:
When removing the ST, be careful not to drop it into converter case.

ST 498277200 STOPPER SET

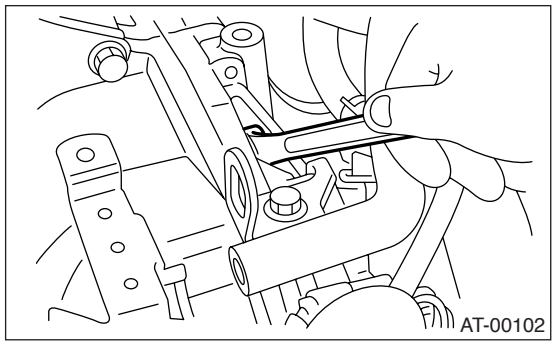
(2) Install the starter.
<Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
(3) Tighten the bolts which hold the upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

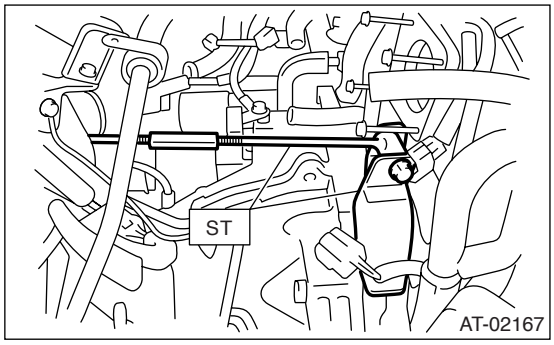


11) Install the torque converter clutch to drive plate.
(1) Tighten the bolts which hold torque converter clutch to drive plate.
(2) Insert the wrench to crank pulley bolt, and then tighten all bolts while slightly rotating the crank pulley.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

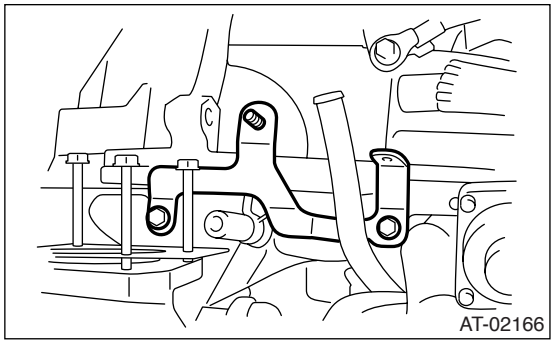


(3) Fit the plug to service hole.
(4) Install the V-belt cover.
12) Remove the ST.



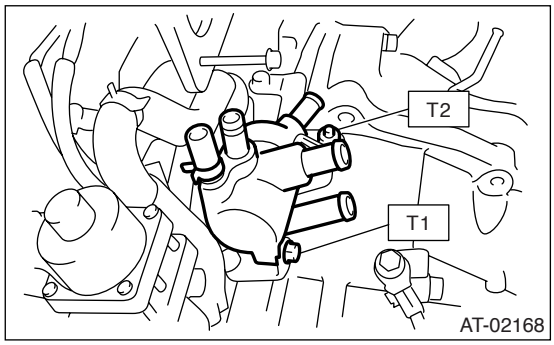
13) Install the warmer cock assembly bracket. (Model with ATF cooler with warmer function)

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

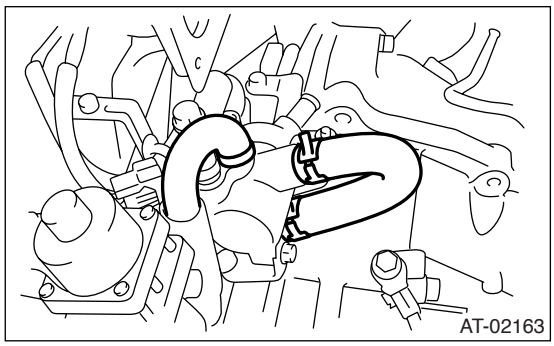


14) Install the warmer cock assembly. (Model with ATF cooler with warmer function)

Tightening torque:
T1: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
T2: 15 N·m (1.5 kgf-m, 10.8 ft-lb)

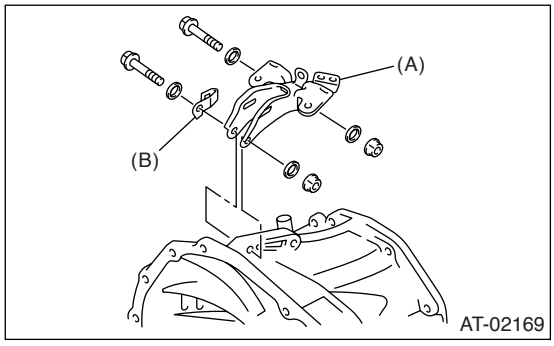


15) Connect each hose to warmer cock assembly. (Model with ATF cooler with warmer function)



16) Install the pitching stopper bracket and bracket (Model with ATF cooler with warmer function).

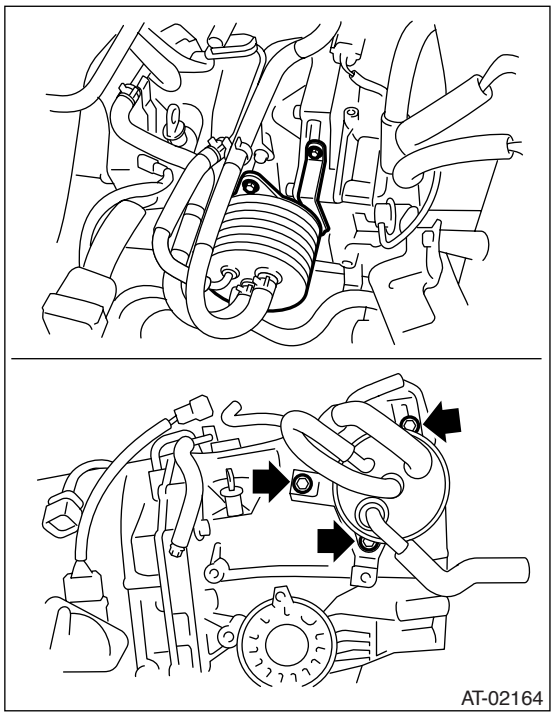
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



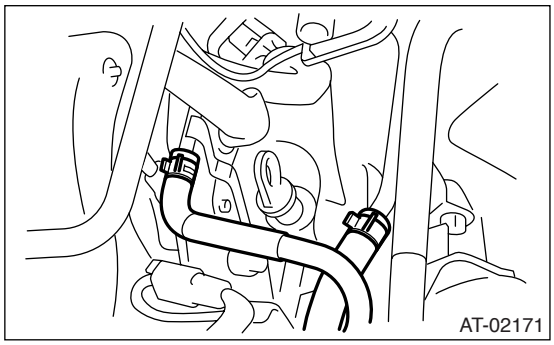
(A) Pitching stopper bracket
(B) Bracket (Model with ATF cooler with warmer function)

17) Install the ATF cooler with warmer function to transmission body. (Model with ATF cooler with warmer function)

Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)

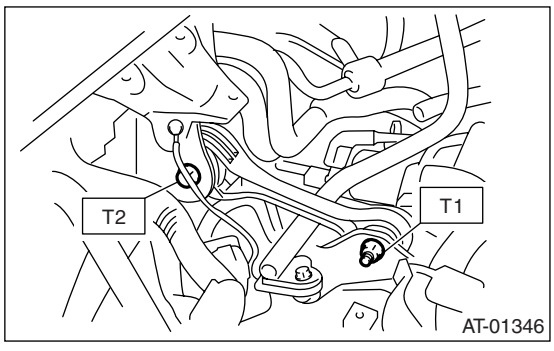


18) Connect the ATF cooler inlet and outlet hoses to ATF cooler pipes. (Model with ATF cooler with warmer function)

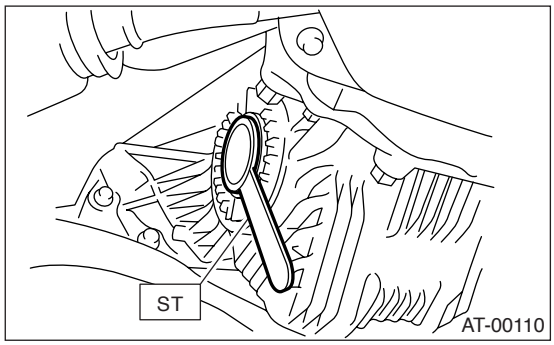


19) Install the throttle body. <Ref. to FU(H4SO 2.0)-10, INSTALLATION, Throttle Body.>
20) Install the pitching stopper.

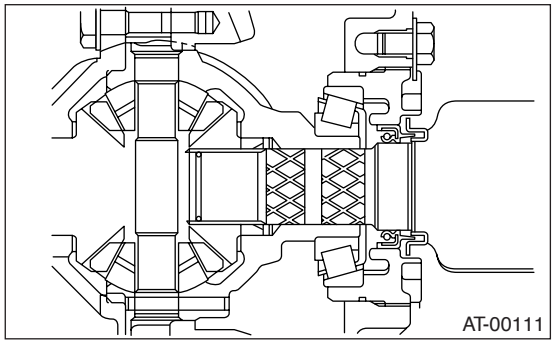
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



21) Lift-up the vehicle.
22) Replace the snap ring of front drive shaft with a new one.
23) Apply grease to the oil seal lips.
24) Install the ST to side retainer.
ST 28399SA010 OIL SEAL PROTECTOR

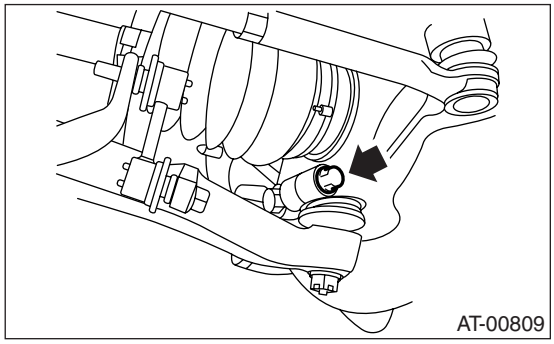


25) Align the spline of front differential shaft to that of differential bevel gear for insertion, and remove them using ST.
ST 28399SA010 OIL SEAL PROTECTOR
26) Insert the front drive shaft into transmission securely by pressing the front housing from outside.



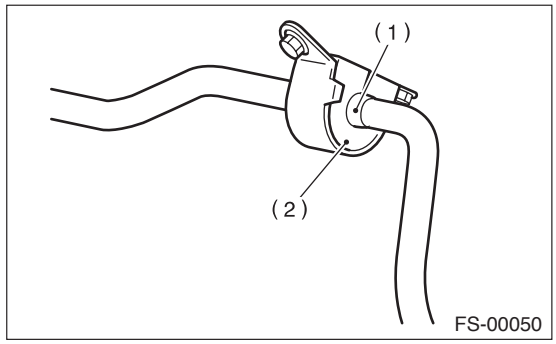
27) Install the ball joint into housing.
28) Tighten the attachment bolts.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)



29) Install the stabilizer to crossmember.

NOTE:
• Install the bushing (on front crossmember side) while aligning it with the paint mark on stabilizer.
• Ensure the bushing and stabilizer have the same identification colors when installing.

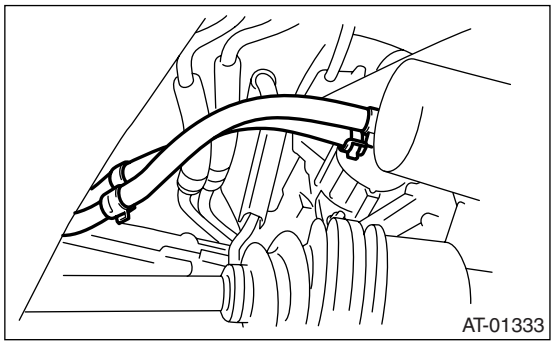


(1) Identification mark on stabilizer
(2) Bushing identification color

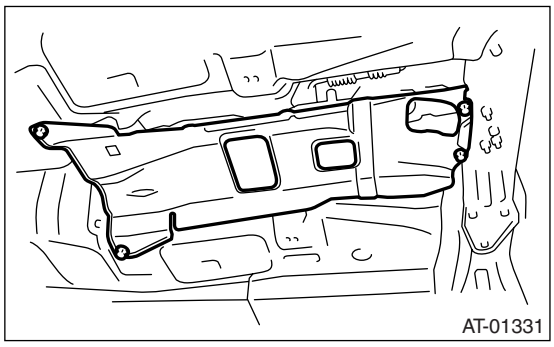
30) Always tighten the rubber bushing location when wheels are in full contact with the ground and vehicle is curb weight.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

31) Install the shift select cable onto select lever.
<Ref. to CS-13, INSTALLATION, Select Cable.>
32) Install the oil charge pipe, and connect the ATF cooler hoses to pipe. (Model without ATF cooler with warmer function)

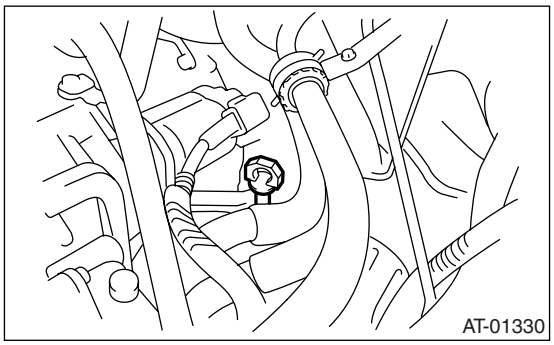


33) Install the oil charge pipe. (Model with ATF cooler with warmer function)
34) Install the propeller shaft.
<Ref. to DS-11, INSTALLATION, Propeller Shaft.>
35) Install the heat shield cover.



36) Install the rear exhaust pipe and muffler assembly.

<Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
37) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
38) Install the under cover.
39) Lower the lift.
40) Install the ATF level gauge.



41) Connect the following connectors.
(1) Transmission harness connectors
(2) Transmission ground terminal
42) Install the air cleaner case stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

43) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
44) Install the air intake duct.
<Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
45) Using a gauge hole, add the ATF until the fluid level is found at the center between upper and lower levels of level gauge “COLD” side. <Ref. to 4AT-31, Automatic Transmission Fluid.>
46) Take off the vehicle from a lift.
47) Check the level of differential gear oil. <Ref. to 4AT-33, Differential Gear Oil.>
48) Check the select lever operation.
<Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>
49) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>
50) Check the ATF level. <Ref. to 4AT-31, Automatic Transmission Fluid.>
51) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>
52) Perform the road test.
<Ref. to 4AT-34, Road Test.>

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION

4AT

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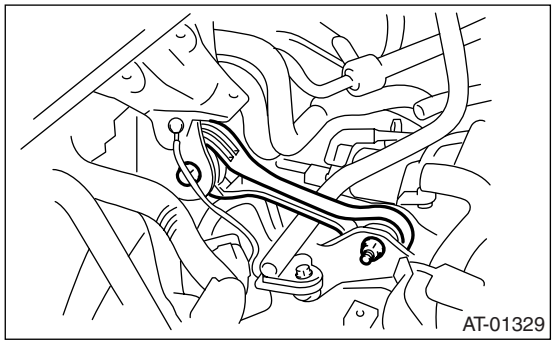
10. Transmission Mounting System

A: REMOVAL

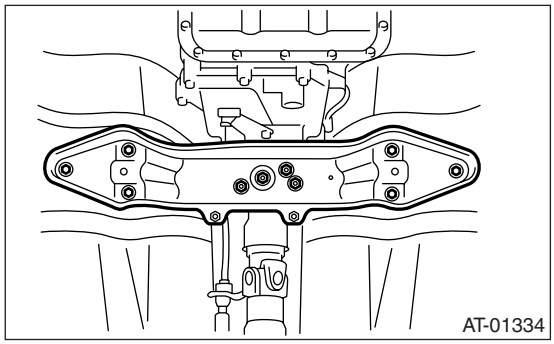
1. PITCHING STOPPER

1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with study racks.
3) Remove the front, center, rear, exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
4) Remove the heat shield cover.
5) Set the transmission jack under the transmission. Make sure that the support plate of transmission jack does not touch the oil pan.
6) Remove the transmission rear crossmember.



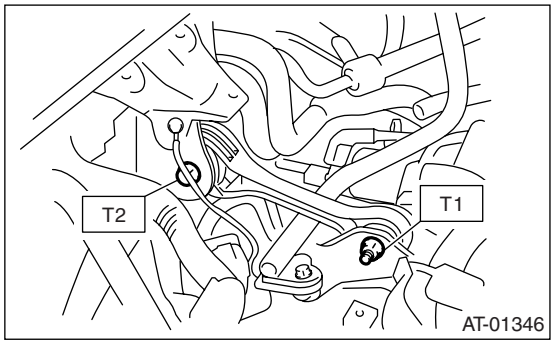
7) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

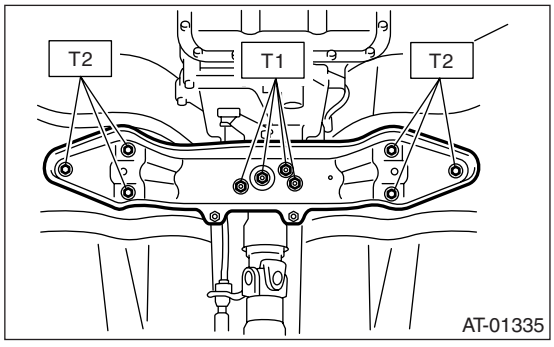
2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)

2) Install the crossmember.

Tightening torque:
T1: 35 N·m (3.6 kgf-m, 26 ft-lb)
T2: 70 N·m (7.1 kgf-m, 51 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the front, center and rear exhaust pipes and muffler.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfied.

1. PITCHING STOPPER

Make sure that the pitching stopper is not bent or damaged. Ensure there are no cracks, hardening, or damage on rubbers.

2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

Make sure that the crossmember is not bent or damaged. Ensure there are no cracks, hardening, or damage on cushion rubbers.

11.Extension Case Oil Seal

A: INSPECTION

Make sure that the ATF does not leak from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 4AT-50, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

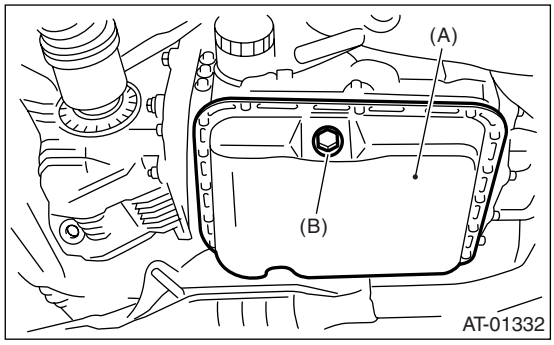
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
6) Remove the heat shield cover.
7) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
8) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
9) Using the ST, install the oil seal.
ST 498057300 INSTALLER
10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
11) Install the heat shield cover.
12) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
13) Pour ATF into the oil charge pipe.

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATFs above are not available, use Dexron III.

Capacity:
Fill the same amount of ATF drained.

14) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>
15) Check the level and leaks of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

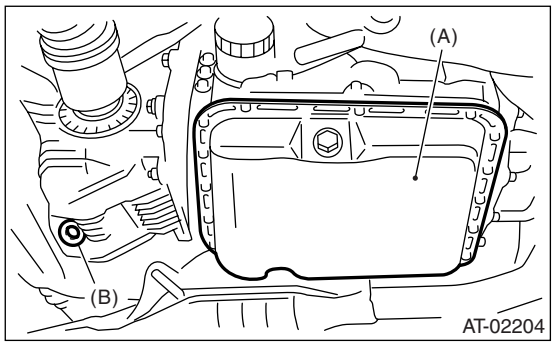
A: INSPECTION

Check the leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal.

B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>
3) Remove the differential gear oil drain plug using TORX® BIT T70, and drain the differential gear oil.

CAUTION:
• Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.



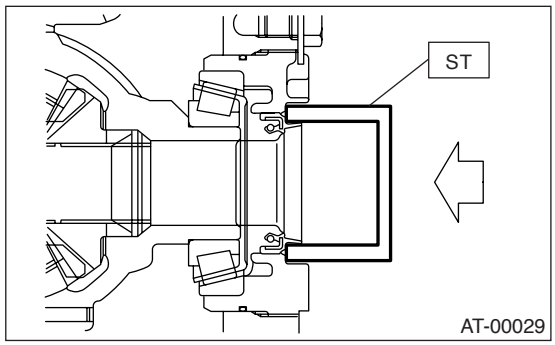
(A) Oil pan
(B) Differential gear oil drain plug

4) Tighten the differential gear oil drain plug.

NOTE:
Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

5) Separate the front drive shaft from transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal using a driver wrapped with vinyl tape or etc.
7) Using the ST, install the differential side retainer by slightly tapping with hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



8) Apply gear oil to the oil seal lips.
9) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
10) Install the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
11) Lower the vehicle.
12) Pour the gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 4AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Differential gear oil capacity:
1.1 — 1.3 ℓ (1.3 — 1.4 US qt, 1.0 — 1.1 Imp qt)

13) Check the level of differential gear oil. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

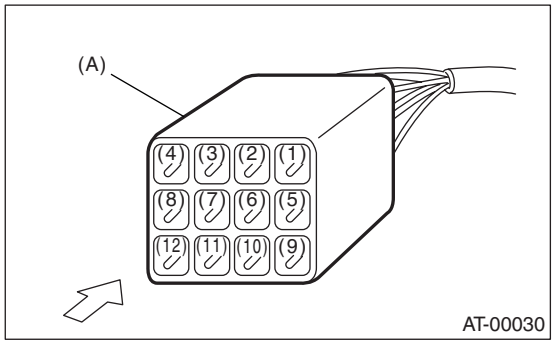
A: INSPECTION

When the driving condition or starter motor operation is erroneous, first check the shift linkage for improper operation. If the shift linkage is functioning properly, check the inhibitor switch.

1) Disconnect the inhibitor switch connector.
2) Check continuity in inhibitor switch circuits with the select lever moved to each position.

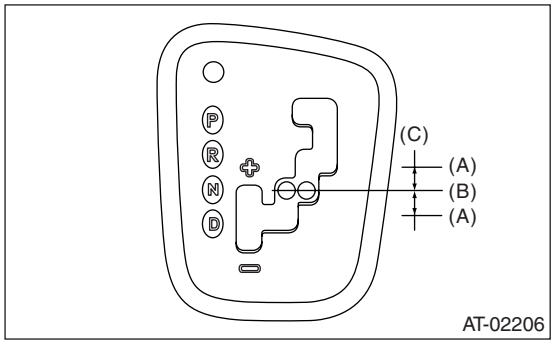
NOTE:
• Also check that continuity in ignition circuit does not exist when the select lever is in “R” and “D” ranges.
• If the inhibitor switch is inoperative, check for poor contact of connector on transmission side.

	Range	Pin No.
Signal sent to TCM	P	4 — 3
	R	4 — 2
	N	4 — 1
	D	4 — 8
Ignition circuit	P/N	12 — 11
Back-up light circuit	R	10 — 9



(A) Inhibitor switch connector

3) Check there is continuity at equal points when the select lever is turned 1.5° in both directions from “N” range.
If there is continuity in one direction or in other points, adjust the inhibitor switch. <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.>

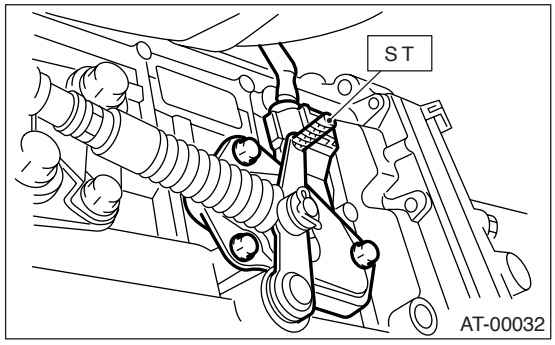


(A) Continuity does not exist.
(B) Continuity exists.
(C) 1.5°

4) Repeat the above checks. If there are abnormalities, adjust the select cable. <Ref. to CS-15, ADJUSTMENT, Select Cable.>

B: ADJUSTMENT

1) Set the select lever to “N” range.
2) Loosen the three inhibitor switch securing bolts.
3) Insert the ST as vertical as possible into the holes in the inhibitor switch lever and switch body.
ST 499267300 STOPPER PIN



4) Tighten the three inhibitor switch securing bolts.

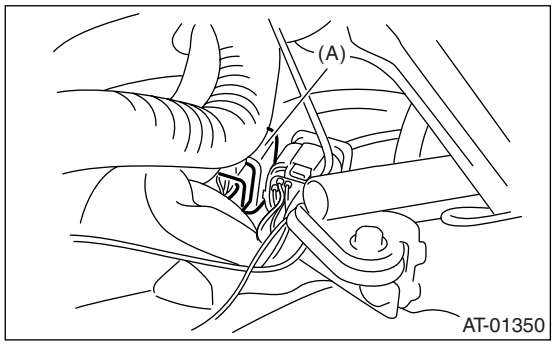
Tightening torque:
3.4 N·m (0.35 kgf-m, 2.5 ft-lb)

5) Repeat the above checks. If the inhibitor switch is determined to be “faulty”, replace it.

C: REMOVAL

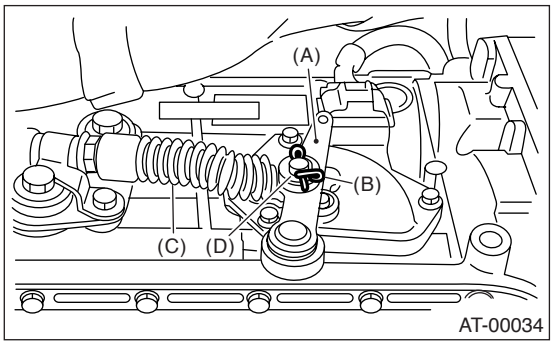
1) Set the vehicle on a lift.
2) Set the select lever to “N” range.
3) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>

4) Disconnect the inhibitor switch connector.



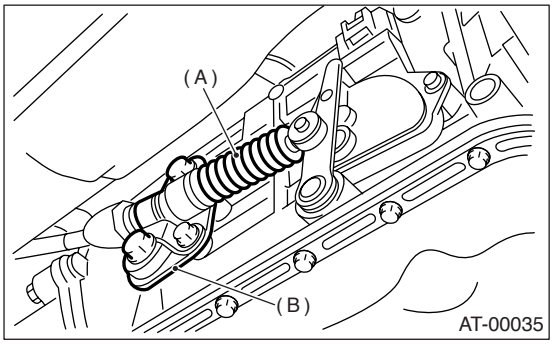
(A) Inhibitor switch connector

5) Remove the inhibitor switch connector from stay.
6) Lift-up the vehicle.
7) Remove the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>
8) Remove the snap pin and washers from range select lever.



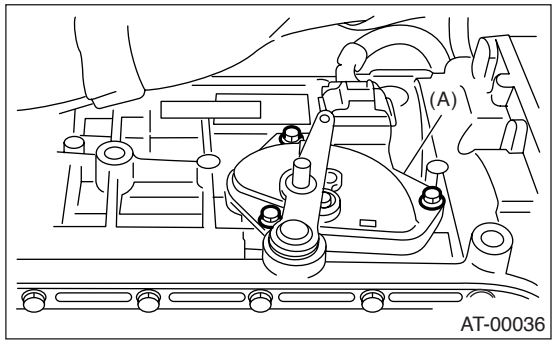
(A) Range select lever
(B) Snap pin
(C) Select cable
(D) Washer

9) Remove the plate assembly from transmission case.



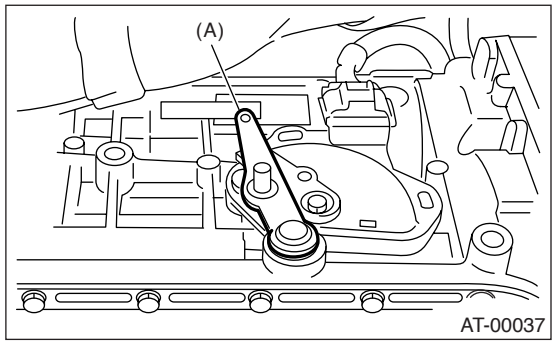
(A) Select cable
(B) Plate ASSY

10) Remove the three bolts which secure inhibitor switch.



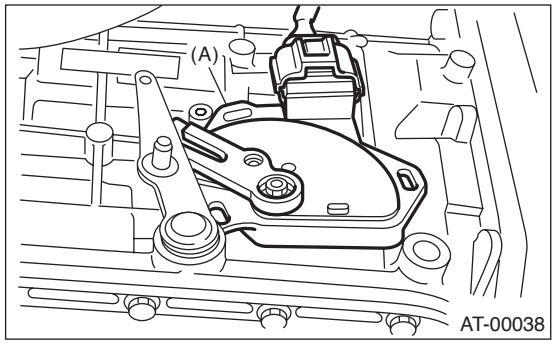
(A) Inhibitor switch

11) Shift the range select lever to parking position (left side).



(A) Range select lever

12) Remove the inhibitor switch from transmission.



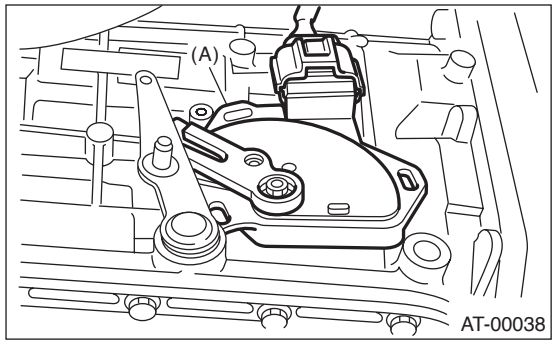
(A) Inhibitor switch

13) Disconnect the inhibitor switch harness connector from inhibitor switch.

D: INSTALLATION

1) Connect the inhibitor switch harness connector to inhibitor switch.

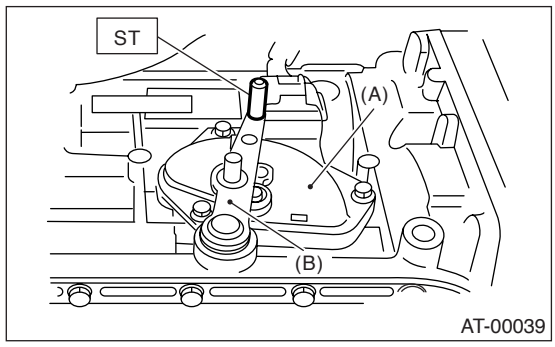
2) Install the inhibitor switch to transmission case.



(A) Inhibitor switch

3) Move the range select lever to neutral position.
4) Tighten the three inhibitor switch securing bolts using ST.
ST 499267300 STOPPER PIN

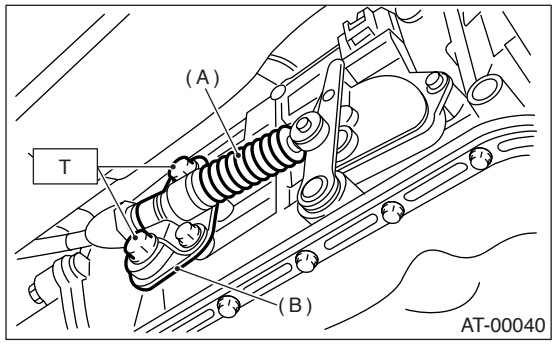
Tightening torque:
3.5 N·m (0.36 kgf-m, 2.6 ft-lb)



(A) Inhibitor switch
(B) Range select lever

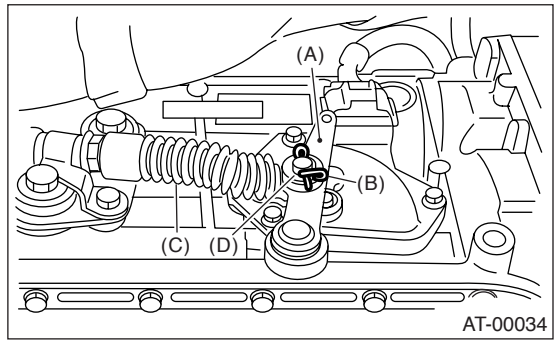
5) Install the select cable to range select lever.
6) Install the plate assembly to transmission.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



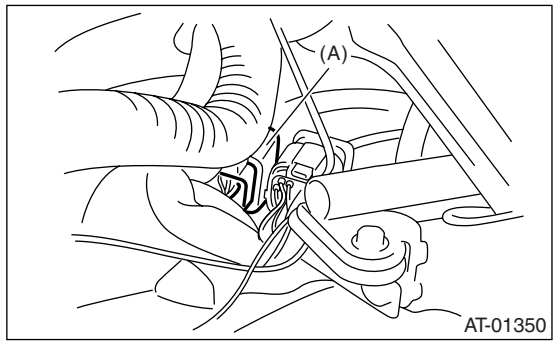
(A) Select cable
(B) Plate ASSY

7) Install the snap pin washers to range select lever.



(A) Range select lever
(B) Snap ring
(C) Select cable
(D) Washer

8) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
9) Lower the vehicle.
10) Install the inhibitor switch connector to the stay.
11) Connect the inhibitor switch connector.



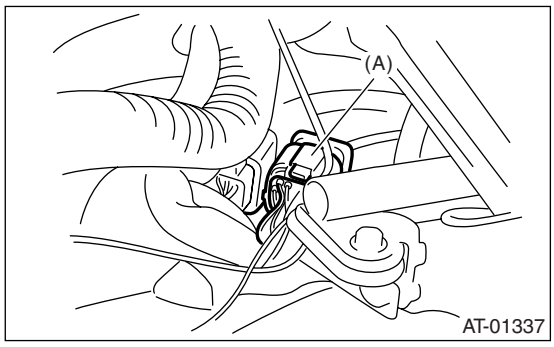
(A) Inhibitor switch connector

12) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
13) Inspect the inhibitor switch. <Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>

14.Front Vehicle Speed Sensor

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
4) Disconnect the transmission connector.



(A) Transmission connector

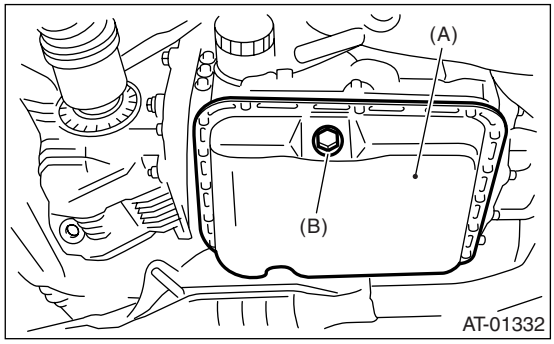
5) Remove the pitching stopper. <Ref. to 4AT-48, REMOVAL, Transmission Mounting System.>
6) Remove the transmission connector from the stay.
7) Lift-up the vehicle.
8) Clean the transmission exterior.
9) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

10) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

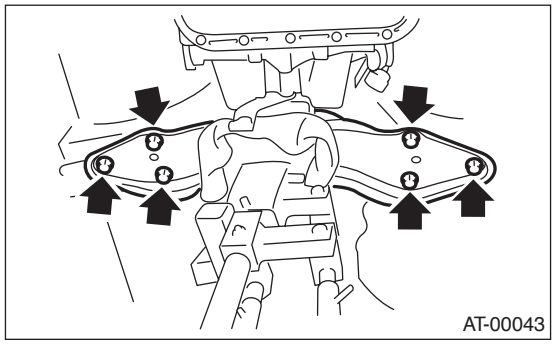


(A) Oil pan
(B) ATF drain plug

11) Remove the front and center exhaust pipe. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
12) Remove the shield cover.
13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
14) Place the transmission jack under transmission.

NOTE:
Make sure that the support plates of transmission jack does not touch the oil pan.

15) Remove the transmission rear crossmember bolt.



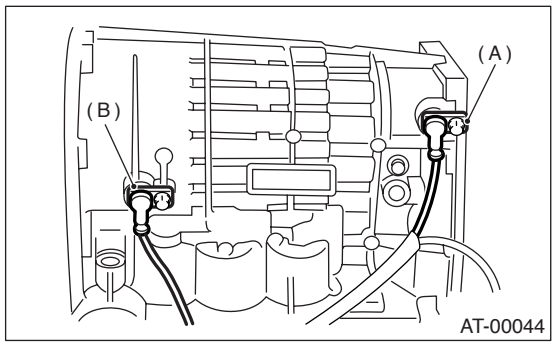
16) Lower the transmission jack.

NOTE:
Do not separate the transmission jack and transmission.

17) Remove the oil cooler inlet and outlet pipes.

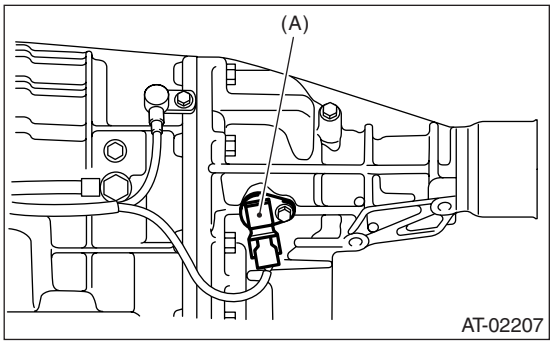
NOTE:
When removing the outlet pipe, be careful not to lose the ball and spring used with retaining screw.

18) Remove the front vehicle speed sensor and torque converter turbine speed sensor.



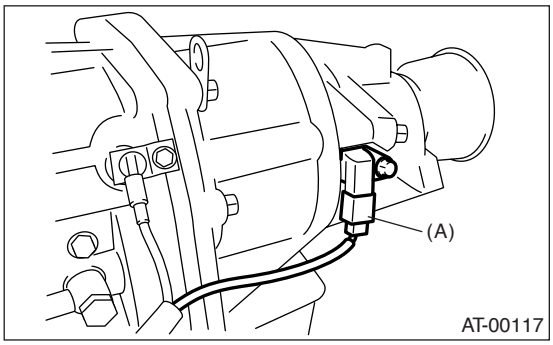
(A) Front vehicle speed sensor
(B) Torque converter turbine speed sensor

19) Disconnect the connector from rear vehicle speed sensor.
• MPT model



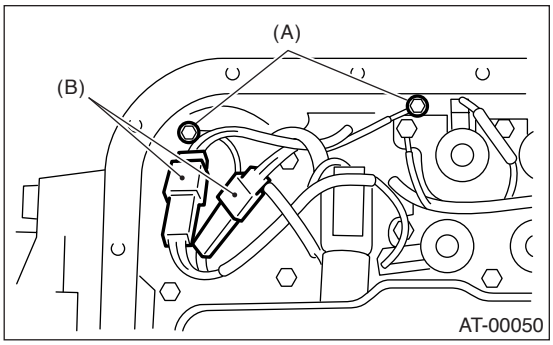
(A) Rear vehicle speed sensor

• VTD model



(A) Rear vehicle speed sensor

20) Remove the oil pan.
21) Disconnect the harness connector and transmission ground terminal.

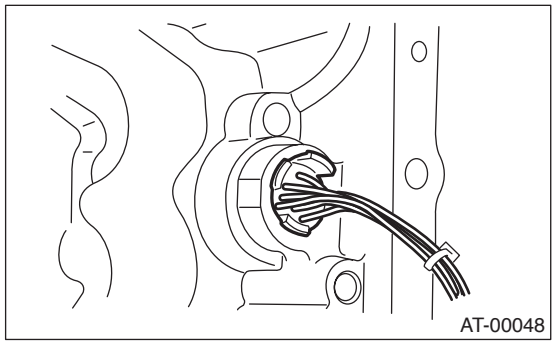


(A) Transmission ground
(B) Harness connector

22) Remove the harness assembly.

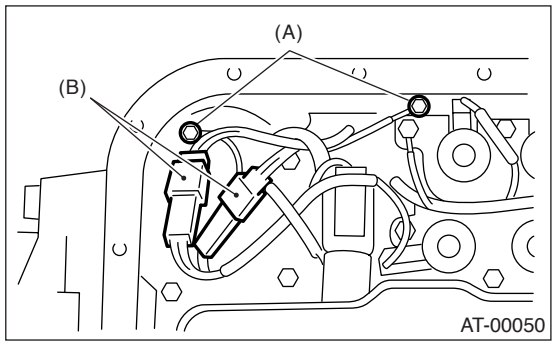
B: INSTALLATION

1) Pass the harness assembly through the hole in transmission case.



2) Connect the harness connector and transmission ground.

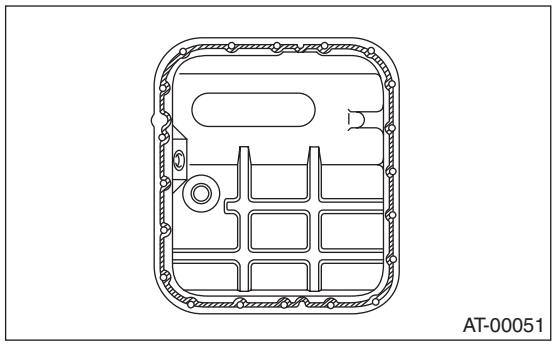
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Transmission ground
(B) Harness connector

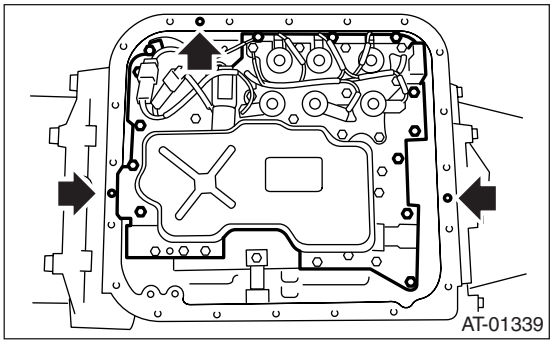
3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



4) Apply liquid gasket fully to the three holes other than screw holes on the transmission case

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



5) Install the oil pan.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

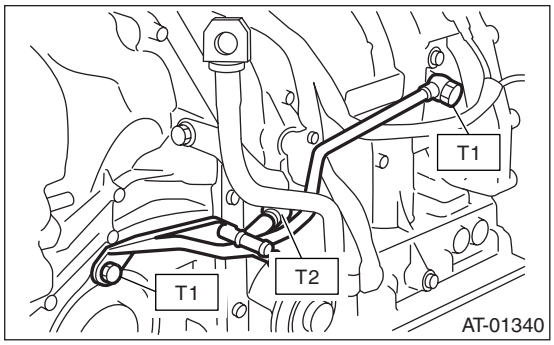
6) Install the front vehicle speed sensor and torque converter turbine speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

7) Connect the connector to rear vehicle speed sensor.
8) Install the oil cooler pipe.

NOTE:
Use a copper washer.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



9) Install the transmission rear crossmember bolt.

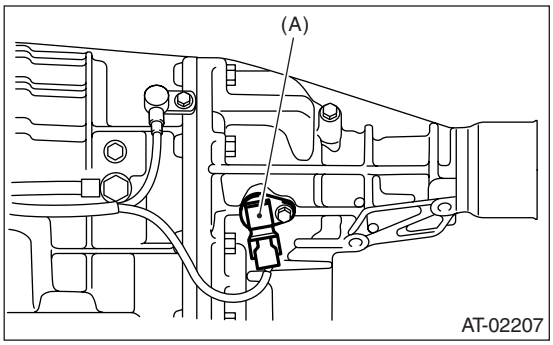
Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

10) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
11) Install the shield cover.
12) Install the front, center and rear exhaust pipes and muffler. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
13) Lower the vehicle.
14) Install the transmission connector to the stay.
15) Install the pitching stopper. <Ref. to 4AT-48, INSTALLATION, Transmission Mounting System.>
16) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
17) Fill the same amount of ATF drained.
18) Bleed the air of control valve.
<Ref. to 4AT-63, Air Bleeding of Control Valve.>
19) Check the level of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>
20) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

15.Rear Vehicle Speed Sensor

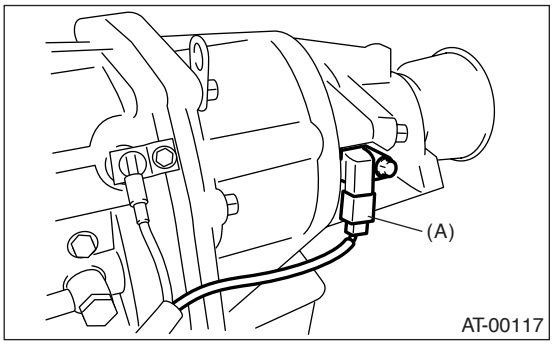
A: REMOVAL

1) Set the vehicle on a lift, and then lift-up the vehicle.
2) Disconnect the connector from rear vehicle speed sensor.
• MPT model



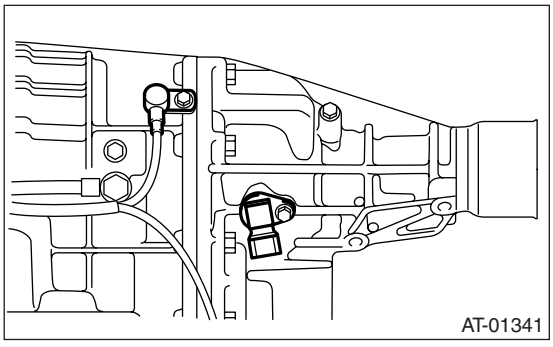
(A) Rear vehicle speed sensor

• VTD model

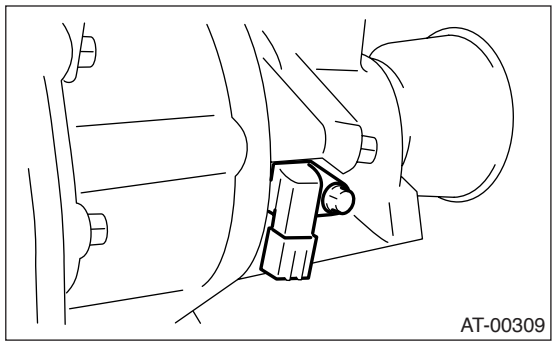


(A) Rear vehicle speed sensor

3) Remove the rear vehicle speed sensor.
• MPT model



• VTD model



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Replace O-ring with a new one.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

16. Torque Converter Turbine Speed Sensor

A: REMOVAL

For removal procedure of torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor”. <Ref. to 4AT-55, REMOVAL, Front Vehicle Speed Sensor.>

B: INSTALLATION

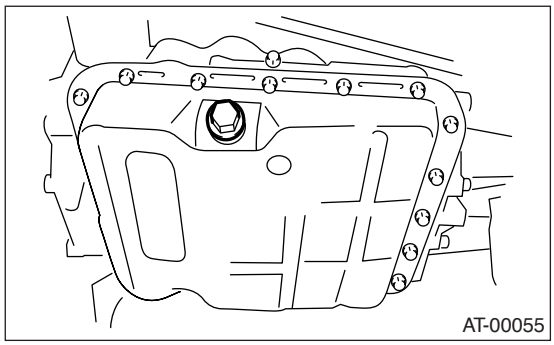
For installation procedure of torque converter turbine speed sensor, refer to “Front Vehicle Speed Sensor”. <Ref. to 4AT-56, INSTALLATION, Front Vehicle Speed Sensor.>

17.Control Valve Body

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Lift-up the vehicle.
4) Clean the transmission exterior.
5) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.



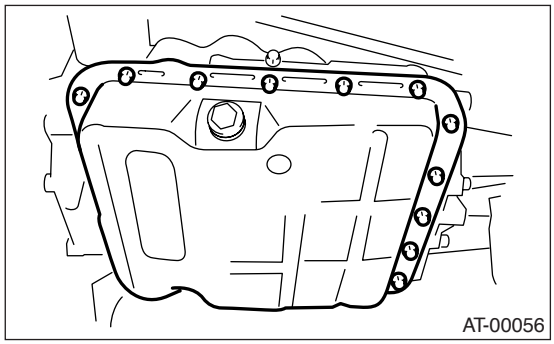
6) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

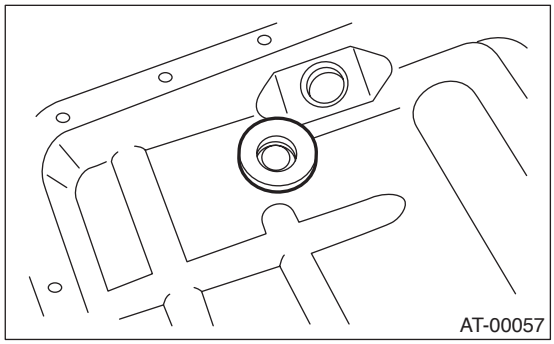
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

7) Remove the oil pan.

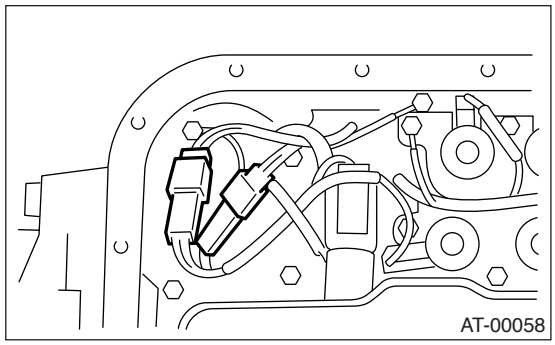
CAUTION:
Be sure to prevent the entering of dust and other foreign matters into oil pan.



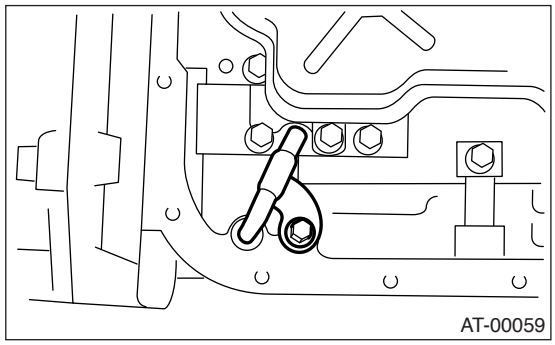
8) Remove the magnet.



9) Clean the magnet.
10) Completely remove the remaining liquid gasket on transmission case and oil pan.
11) Disconnect the control valve connector.

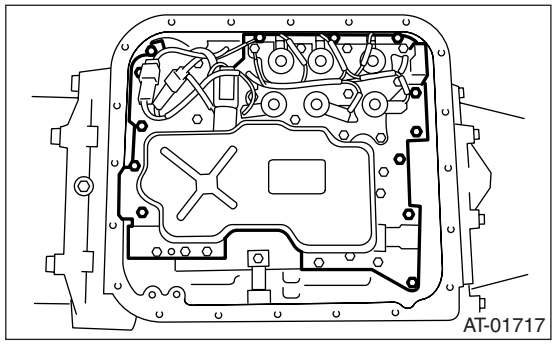


12) Remove the oil cooler pipe.



13) Remove the control valve body.

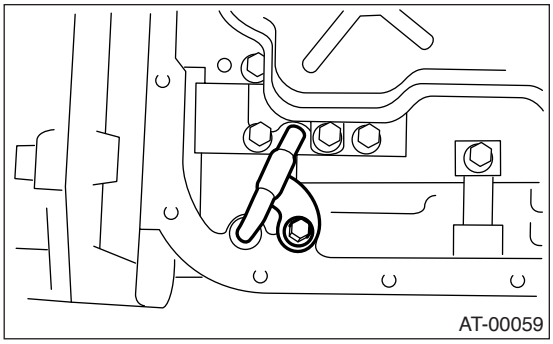
NOTE:
Replace the control valve body as assembly, because it is non-disassemble part.



B: INSTALLATION

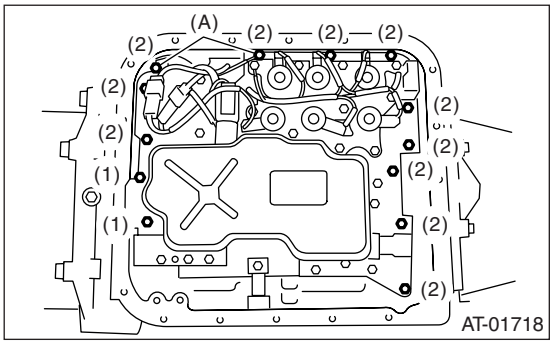
1) Check that the dust and other foreign matters are not on control valve body.
2) Temporarily install the control valve body to transmission.
3) Install the oil cooler pipe.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



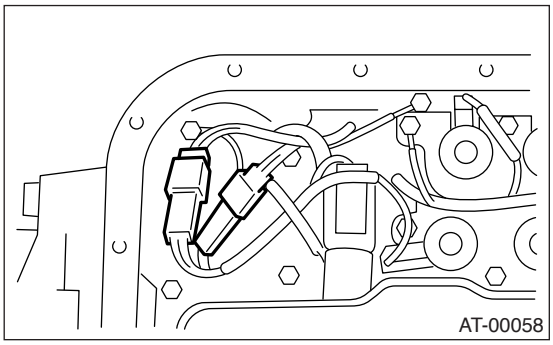
4) Tighten the bolts equally.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

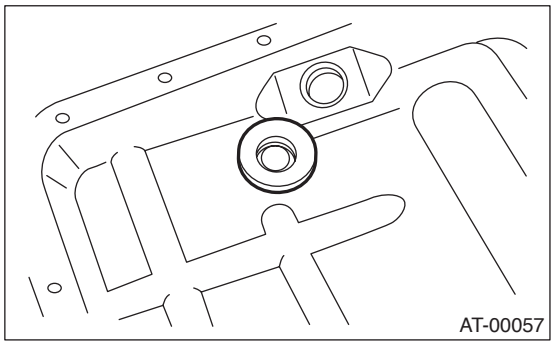


(A) Transmission ground
Bolt length mm (in)
(1) 35 (1.38)
(2) 30 (1.18)

5) Connect the control valve connector.

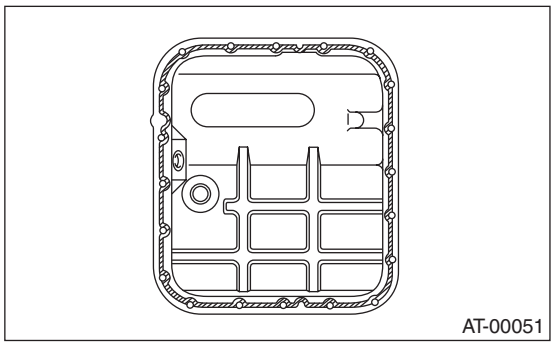


6) Attach the magnet at the specified position of oil pan.



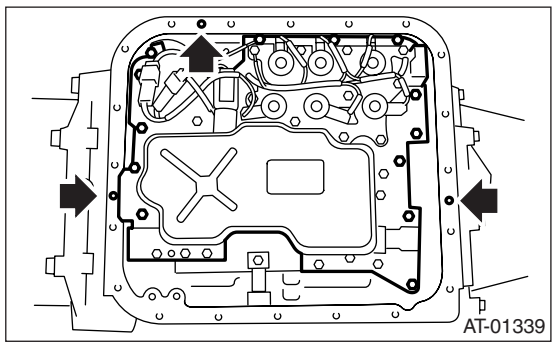
7) Apply liquid gasket to the oil pan.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



8) Fill liquid gasket to the holes except for bolt holes (three) of transmission case.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



9) Install the oil pan with equally tighten the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

10) Fill ATF from oil charge pipe.

Recommended fluid:
SUBARU ATF (Part No. K0410Y0700) or Idemitsu "Apolloil ATF HP", Castrol "Transmax J".

NOTE:
If the ATFs above are not available, use Dexron III.

Capacity:
Fill the same amount of ATF drained.

11) Bleed the air of control valve. <Ref. to 4AT-63, Air Bleeding of Control Valve.>
12) Check the ATF level.
<Ref. to 4AT-31, Automatic Transmission Fluid.>
13) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

C: INSPECTION

Check that the holes, damages or other foreign matters are not on each parts.

18. Air Bleeding of Control Valve

A: PROCEDURE

1) Lift-up the vehicle with setting the select lever to “P” range and applying the parking brake.
2) Connect the Subaru Select Monitor to the vehicle.
3) Using Subaru Select Monitor, check that the DTC is not output.
4) Using Subaru Select Monitor, check that the ATF temperature is less than 60°C (140°F). <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>
5) Turn the Subaru Select Monitor switch to OFF.
6) Release the manual mode, and then turn the ignition switch to OFF.
7) Set the select lever to “R” range.
8) Depress the brake pedal fully until the air bleeding is completed.
9) Turn the ignition switch to ON.
10) Set the select lever to “P” range, and then wait for more than 3 seconds.
11) Set the select lever to “R” range, and then wait for more than 3 seconds.
12) Set the select lever to “N” range, and then wait for more than 3 seconds.
13) Set the select lever to “D” range, and then wait for more than 3 seconds.
14) Set the select lever to “N” range, and then wait for more than 3 seconds.
15) Slowly depress the accelerator pedal fully.
16) Slowly release the accelerator pedal fully.
17) Start the engine.
18) Set the select lever to “D” range.
19) Turn the Subaru Select Monitor switch to ON.
20) Select {Each System Check} in «Main Menu» of Subaru Select Monitor.
21) On the «System Selection Menu» display screen, select “Transmission”. Air bleeding of control valve starts on transmission. At this time, the SPORT indicator light in combination meter blinks at 2 Hz. When the SPORT indicator light does not blink, repeat the procedures from step 4).
22) Air bleeding of control valve is finished when blinking of SPORT indicator light in combination meter goes off from 2 Hz.

NOTE:
When blinking of SPORT indicator light changes from 2 Hz to 4 Hz during air bleeding, repeat the procedure from step 4).

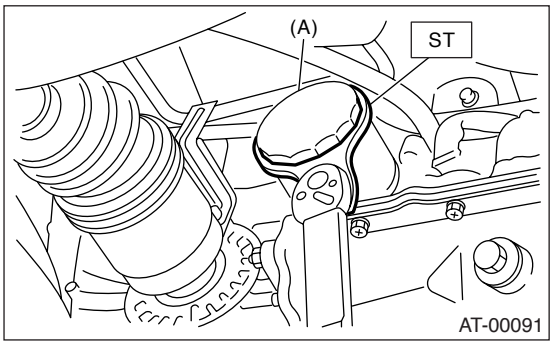
23) Set the select lever to “N” range, and then turn the ignition switch to OFF.
24) Set the select lever to “P” range, and then finish the air bleeding.

19.ATF Filter

A: REMOVAL

NOTE:
The ATF filter is maintenance free.

1) Lift-up the vehicle.
2) Using the ST, remove the ATF filter.
ST 498545400 OIL FILTER WRENCH



(A) ATF filter

B: INSTALLATION

1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Tighten the ATF filter using ST.
Calculate the ATF filter tightening torque using following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 78 mm (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:
Install the ST straightly to converter case.
ST 498545400 OIL FILTER WRENCH
4) Fill the ATF.
5) Inspect the level of ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

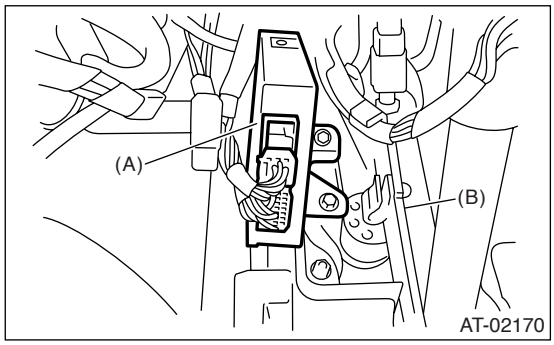
C: INSPECTION

Check for rust, hole, ATF leaks, and other damage.

20. Transmission Control Module (TCM)

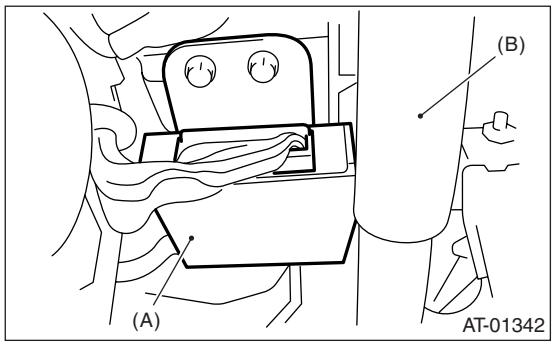
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lower cover and the connector.
3) Replace the body integrated unit. <Ref. to SL-46, REMOVAL, Body Integrated Unit.>
4) Disconnect the connector from TCM.
• LHD model



(A) Transmission control module (TCM)
(B) Brake pedal

• RHD model



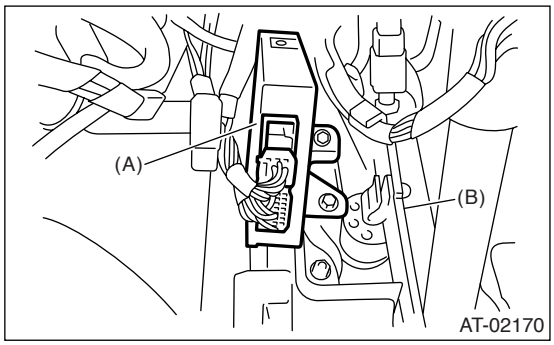
(A) Transmission control module (TCM)
(B) Steering column

5) Remove the TCM.

B: INSTALLATION

1) Install the TCM.
• LHD model

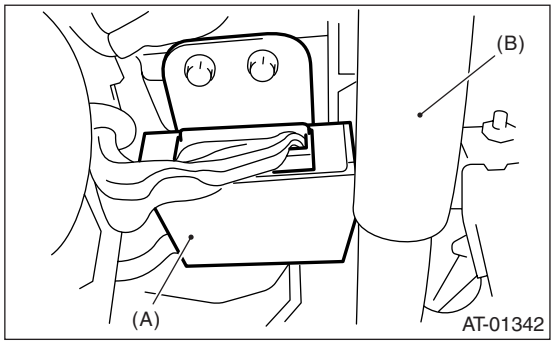
Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



(A) Transmission control module (TCM)
(B) Brake pedal

• RHD model

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



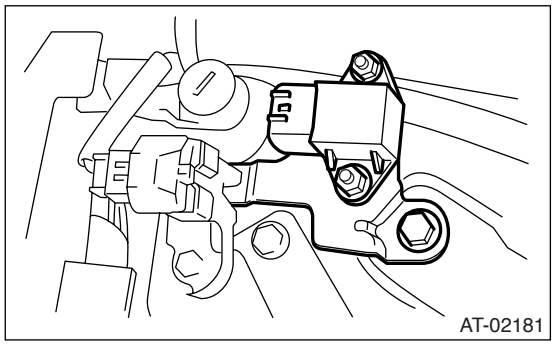
(A) Transmission control module (TCM)
(B) Steering column

2) Connect the connector to TCM.
3) Install in the reverse order of removal.
4) Execute the learning control promotion. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

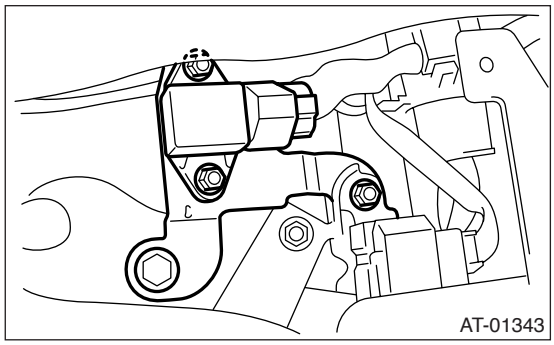
21.Lateral G Sensor

A: REMOVAL

1) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
2) Disconnect the connector from lateral G sensor.
• LHD model



• RHD model

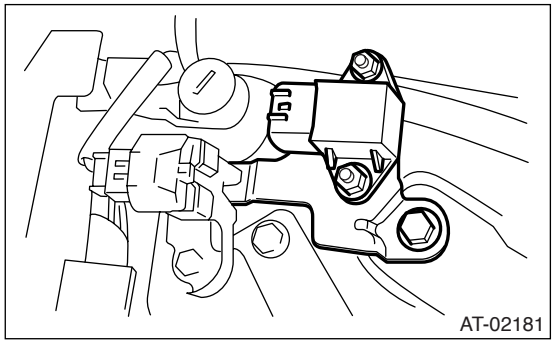


3) Remove the lateral G sensor.

B: INSTALLATION

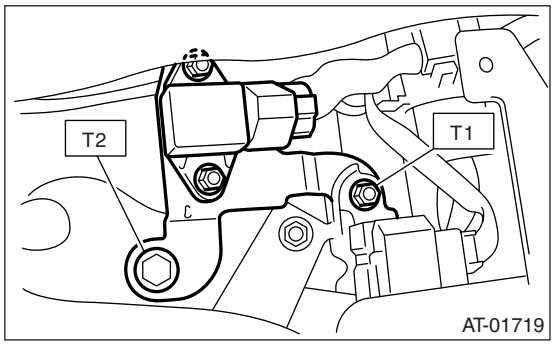
Install in the reverse order of removal.
• LHD model

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



• RHD model

Tightening torque:
T1: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
T2: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

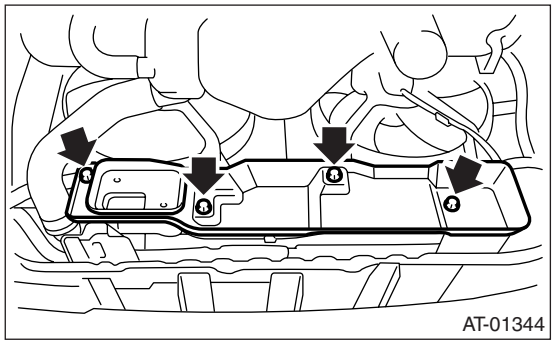


22.ATF Cooler Pipe and Hose

A: REMOVAL

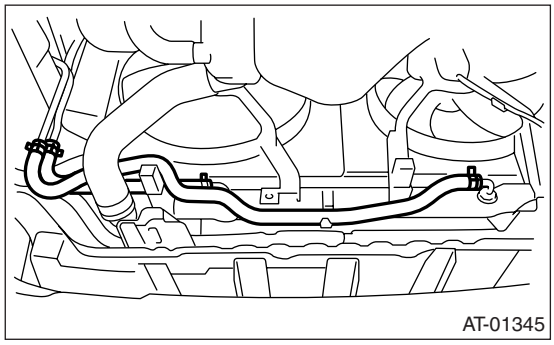
1. MODEL WITHOUT ATF COOLER WITH WARMER FUNCTION

1) Set the vehicle on a lift.
2) Remove the battery.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the radiator under cover.



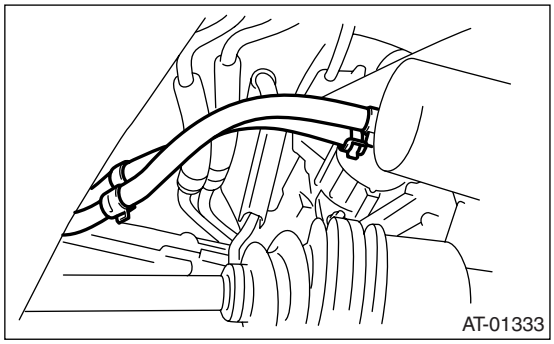
6) Disconnect the ATF cooler hose from radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

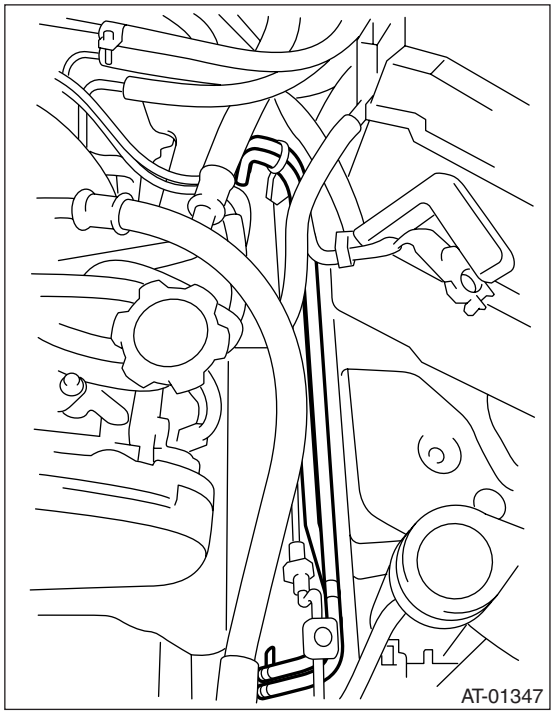


7) Disconnect the ATF cooler hoses from pipes.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

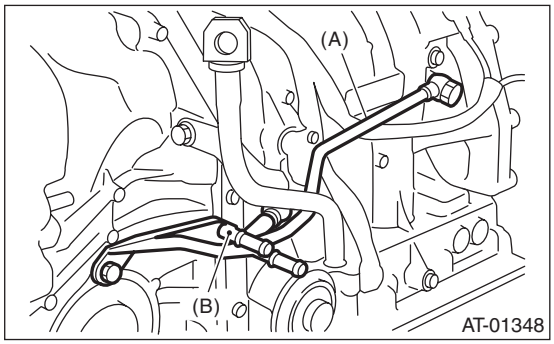


8) Disconnect the ATF cooler pipe from frame.



9) Remove the oil cooler inlet and outlet pipes.

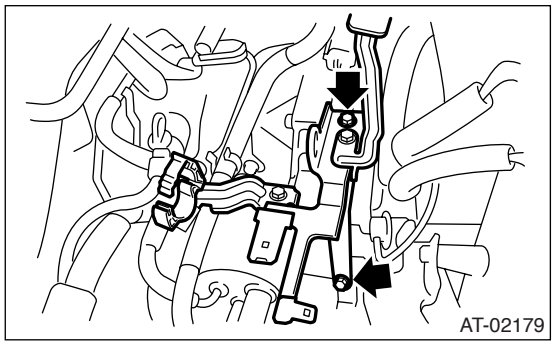
NOTE:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



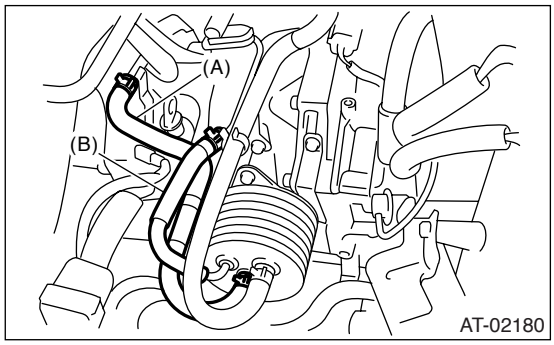
(A) Inlet pipe
(B) Outlet pipe

2. MODEL WITH ATF COOLER WITH WARMER FUNCTION

1) Set the vehicle on a lift.
2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the transmission harness connector and remove it from stay.
4) Remove the harness bracket.

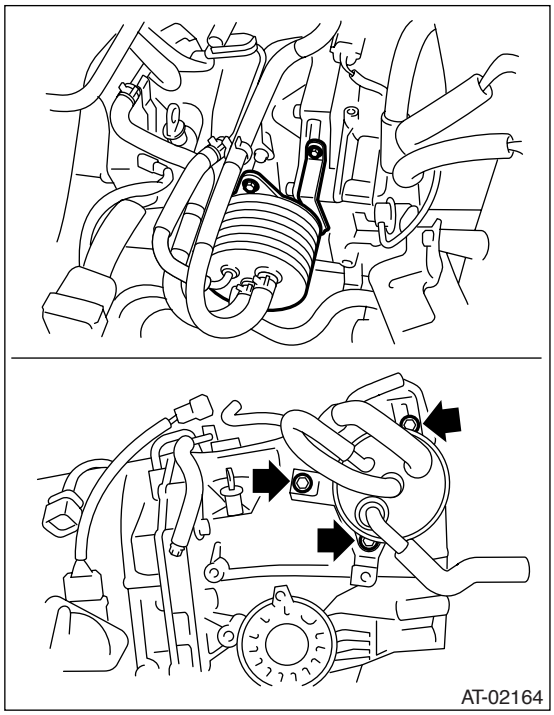


5) Disconnect the inlet and outlet hoses.



(A) Inlet hose
(B) Outlet hose

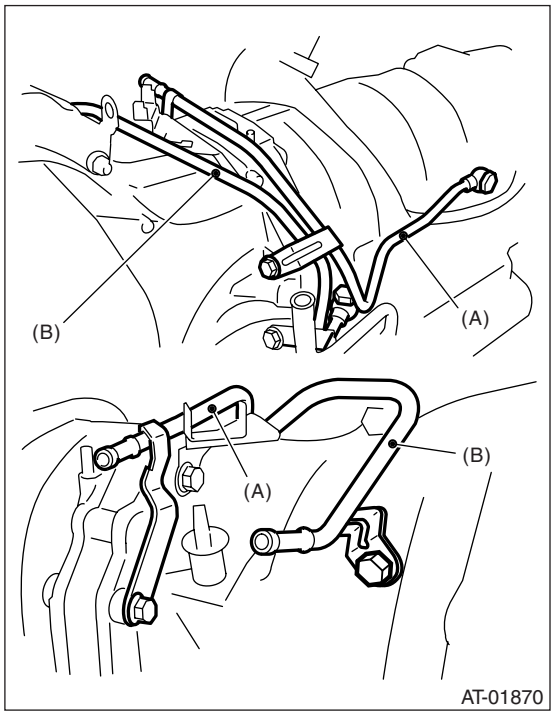
6) Remove the ATF cooler assembly from transmission body, and put it aside.



7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
8) Remove the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>

9) Remove the oil cooler inlet and outlet pipes.

CAUTION:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



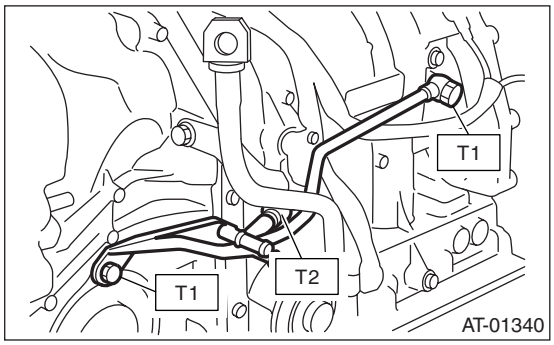
(A) ATF cooler outlet pipe
(B) ATF cooler inlet pipe

B: INSTALLATION

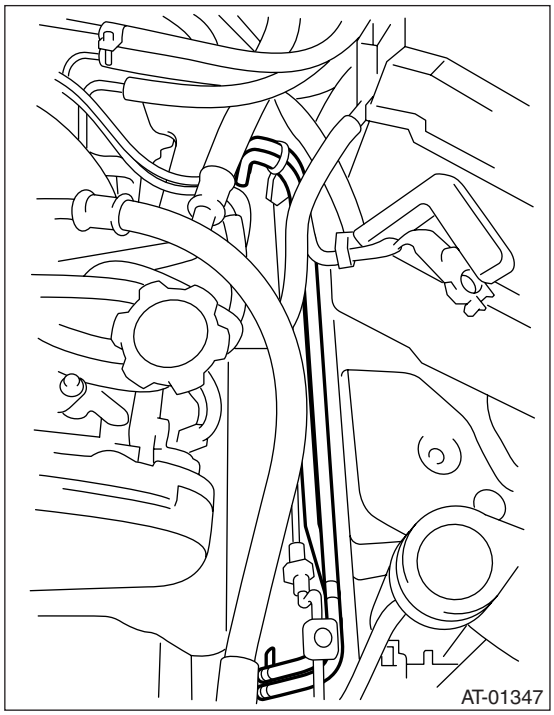
1. MODEL WITHOUT ATF COOLER WITH WARMER FUNCTION

1) Install the oil cooler inlet pipe and outlet pipe with new washer.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

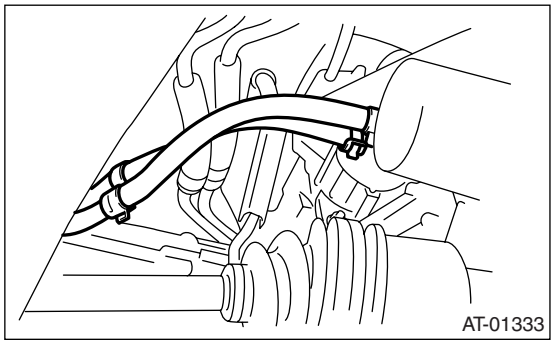


2) Install the ATF cooler pipe to frame.



3) Connect the ATF cooler hose to pipe on transmission side.

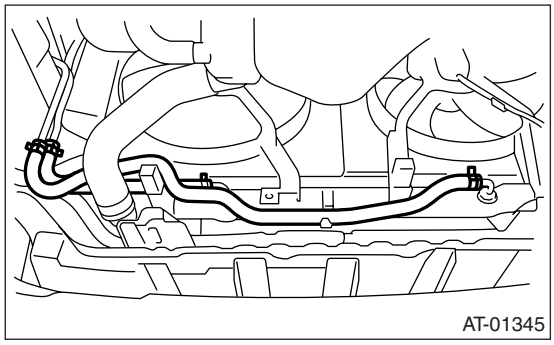
NOTE:
• Install so that the hose is not folded over, excessively bent, or twisted.
• Be careful to insert the hose to the specified position.



4) Connect the ATF cooler hose to pipe on radiator side.

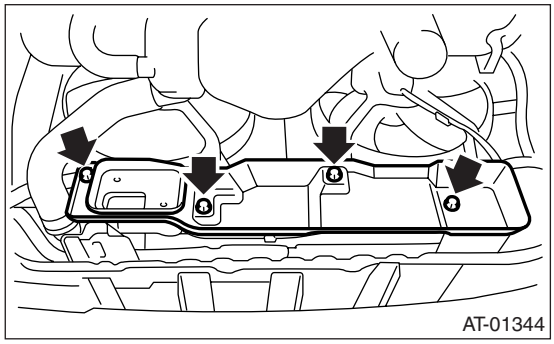
NOTE:
• Install so that the hose is not folded over, excessively bent, or twisted.

• Be careful to insert the hose to the specified position.



5) Install the radiator under cover.

Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



6) Install the under cover.
7) Install the battery.
8) Fill the ATF. <Ref. to 4AT-31, Automatic Transmission Fluid.>

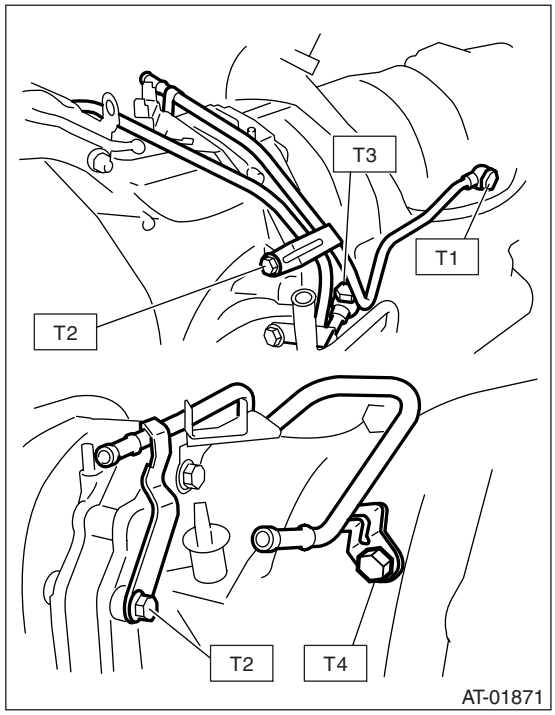
NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. MODEL WITH ATF COOLER WITH WARMER FUNCTION

1) Install the ATF cooler inlet pipe and outlet pipe.

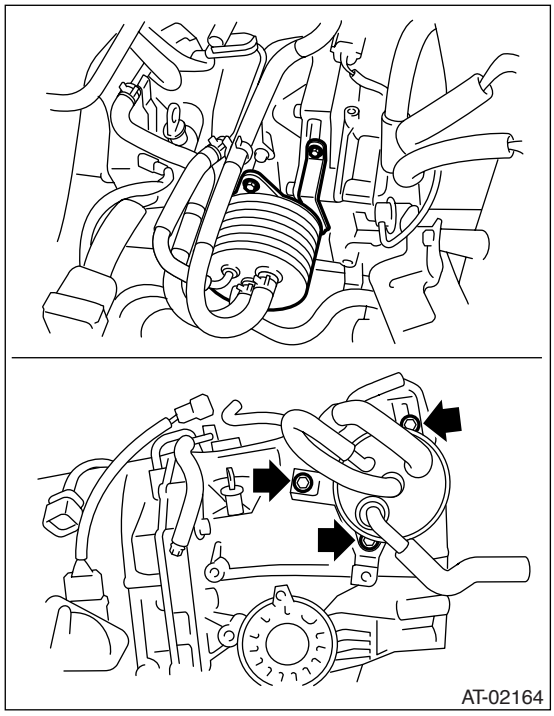
NOTE:
Use new washers.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 21 N·m (2.1 kgf-m, 15.5 ft-lb)
T3: 41 N·m (4.2 kgf-m, 30.4 ft-lb)
T4: 45 N·m (4.6 kgf-m, 33.2 ft-lb)

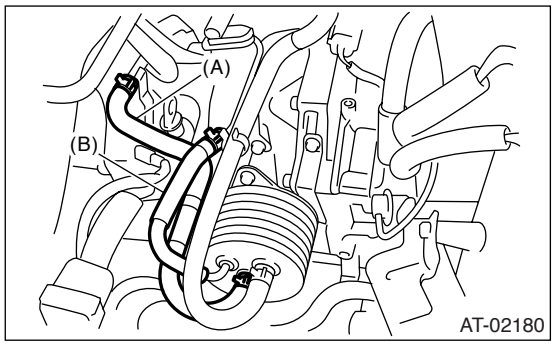


2) Install the ATF cooler assembly to transmission.

Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)



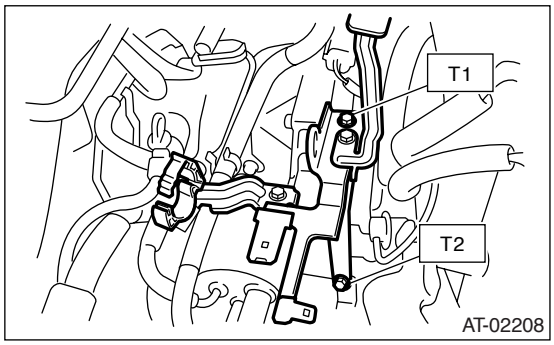
3) Install the oil charge pipe. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
4) Connect the inlet and outlet hoses.



(A) Inlet hose
(B) Outlet hose

5) Install the harness bracket.

Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.6 ft-lb)
T2: 36 N·m (3.6 kgf-m, 26.0 ft-lb)



6) Install the inhibitor switch and transmission harness connector to the stay, and then connect the harness connector.
7) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>
8) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
9) Check the ATF level. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

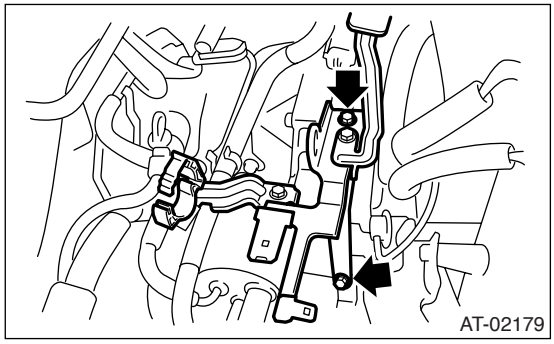
C: INSPECTION

Repair or replace any defective hoses, pipes, clamps, and washers found in the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
2) Check for deformed clamps.
3) Lightly bend the hose and check for cracks in the surface and other damage.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
5) Check for peeling, cracks and deformation at the tip of the hose.

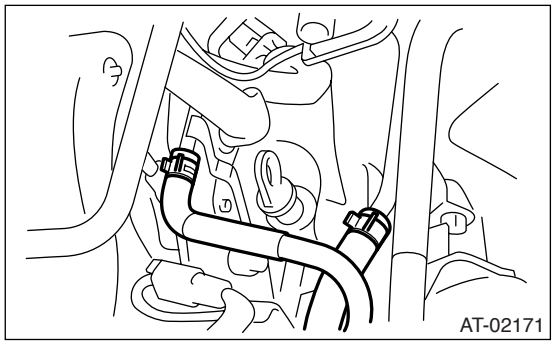
23. ATF Cooler (with warmer function)

A: REMOVAL

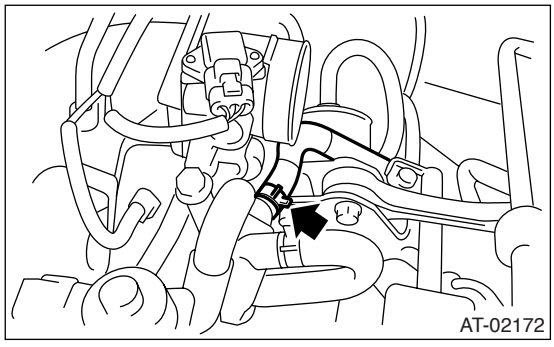
1) Drain the engine coolant. <Ref. to CO(H4SO 2.0)-13, REPLACEMENT, Engine Coolant.>
2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the engine harness, and then remove the engine harness connector from engine harness bracket.
4) Remove the engine harness bracket.



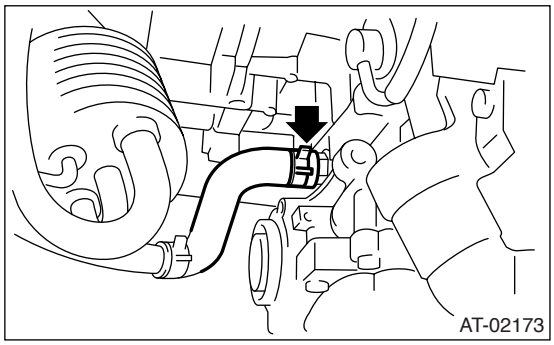
5) Disconnect the ATF cooler hose from the pipe on transmission side.



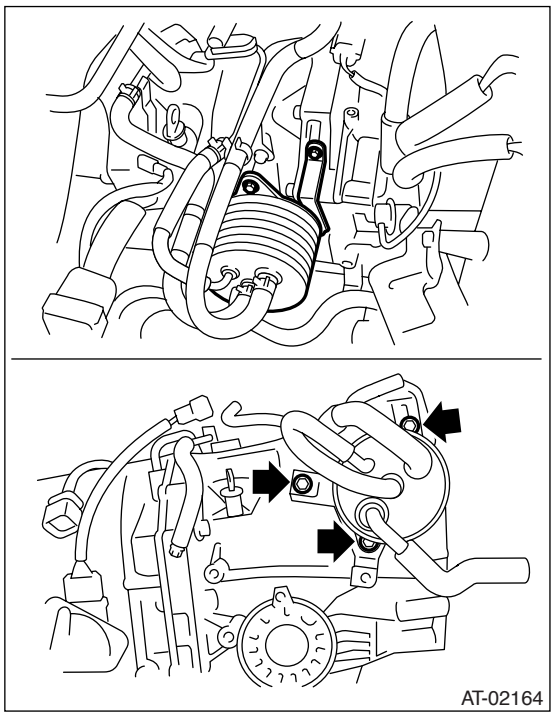
6) Disconnect the engine coolant outlet hose from warmer cock assembly.



7) Disconnect the engine coolant inlet hose from cylinder block.



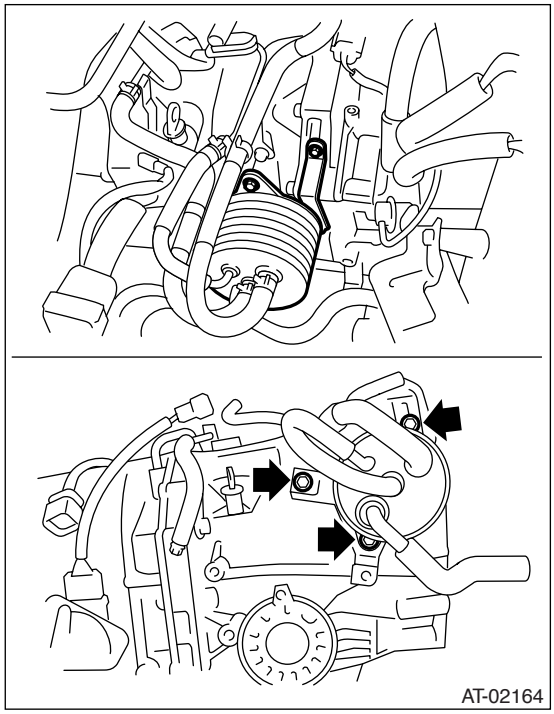
8) Remove the ATF cooler assembly from transmission.



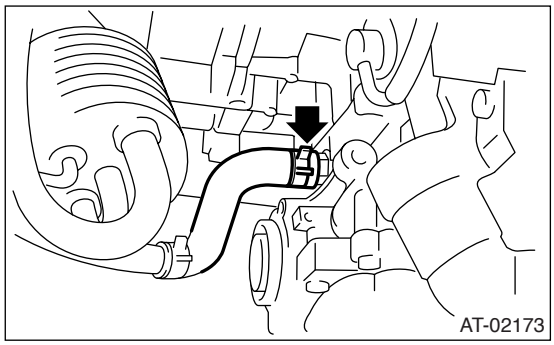
B: INSTALLATION

1) Install the ATF cooler assembly to transmission.

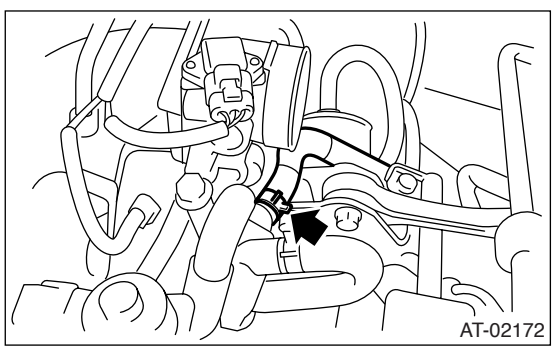
Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)



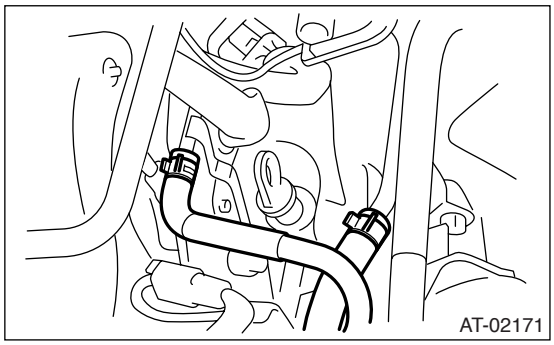
2) Connect the engine coolant inlet hose to cylinder block.



3) Connect the engine coolant outlet hose to warmer cock assembly.

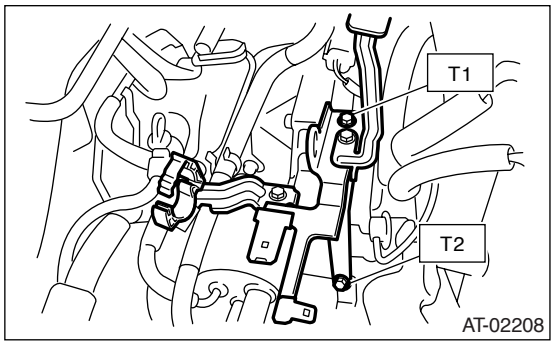


4) Connect the ATF cooler hose to pipe on transmission side.



5) Install the engine harness bracket.

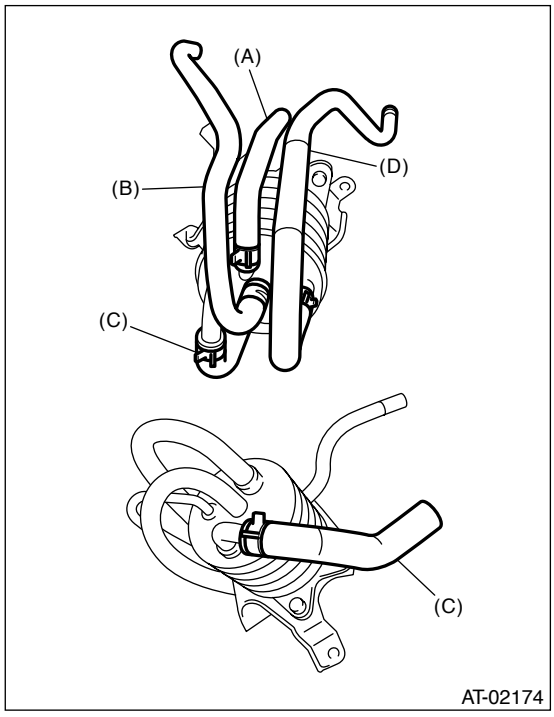
Tightening torque:
T1: 16 N·m (1.6 kgf-m, 11.6 ft-lb)
T2: 36 N·m (3.6 kgf-m, 26.0 ft-lb)



6) Install the harness connector to bracket, and then connect the harness.
7) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
8) Fill the engine coolant. <Ref. to CO(H4SO 2.0)-13, REPLACEMENT, Engine Coolant.>
9) Check the ATF level. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>

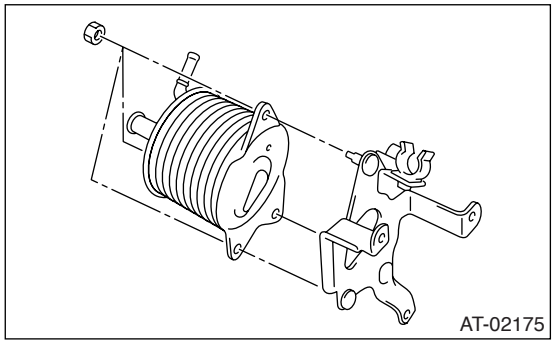
C: DISASSEMBLY

1) Remove each hose from ATF cooler.

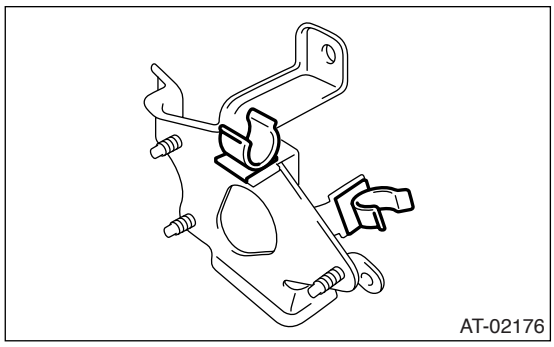


(A) ATF cooler inlet hose
(B) ATF cooler outlet hose
(C) Engine coolant inlet hose
(D) Engine coolant outlet hose

2) Remove the bracket from ATF cooler.

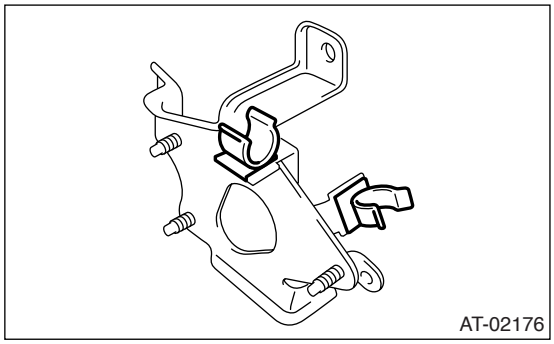


3) Remove the clip from bracket.



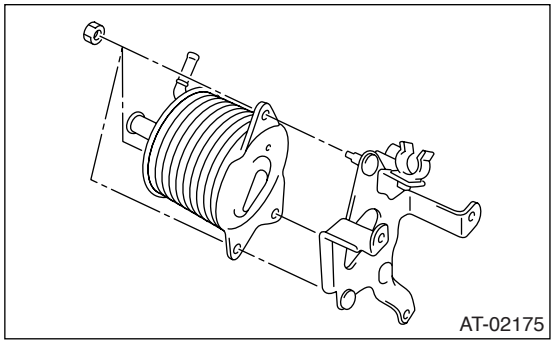
D: ASSEMBLY

1) Install the clip to bracket.



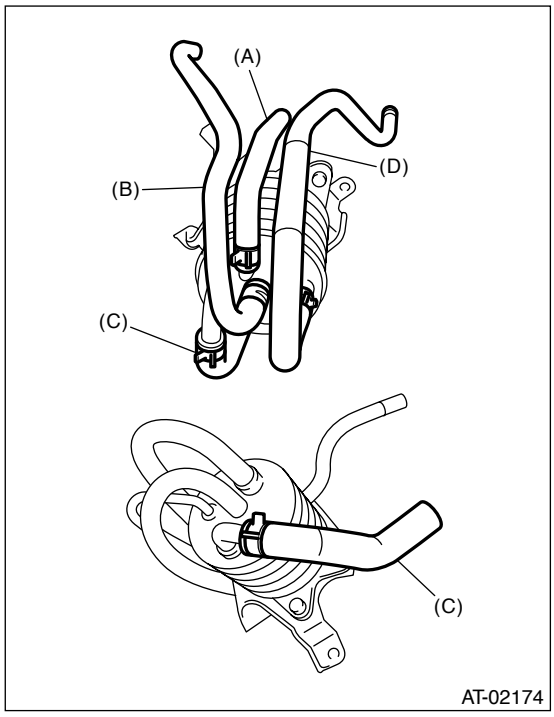
2) Install the bracket.

Tightening torque:
23 N·m (2.3 kgf-m, 16.6 ft-lb)



3) Install each hose to ATF cooler.

NOTE:
Pay attention to the orientation of hose.



(A) ATF cooler inlet hose
(B) ATF cooler outlet hose
(C) Engine coolant inlet hose
(D) Engine coolant outlet hose

E: INSPECTION

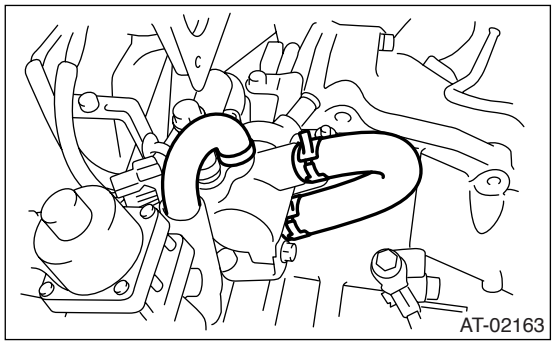
Repair or replace any defective hoses, pipes, clamps and washers found from the inspection below.

1) Check each connection for ATF or engine coolant leakage.
2) Check the clamp for deformation.
3) Lightly bend the hose and check for cracks in the surface and other damage.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
5) Check the end of each hose for peeling, cracks and deformation.
6) Check the ATF cooler for damage.

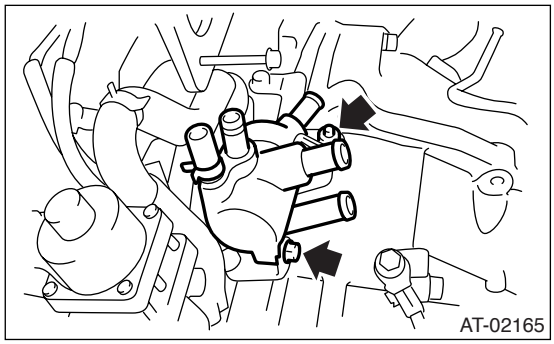
24.Warmer Cock

A: REMOVAL

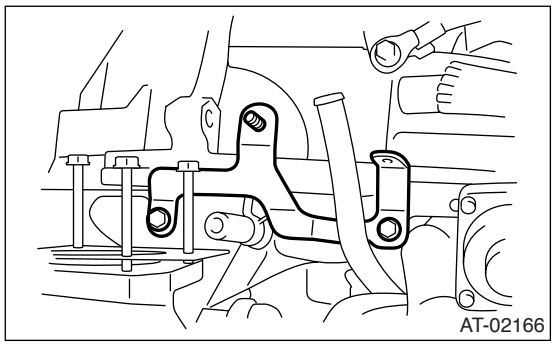
1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Remove all hoses from warmer cock.



3) Remove the warmer cock.



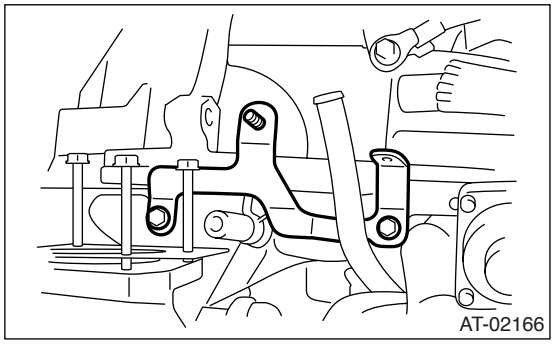
4) Remove the throttle body as necessary, and then remove the bracket.



B: INSTALLATION

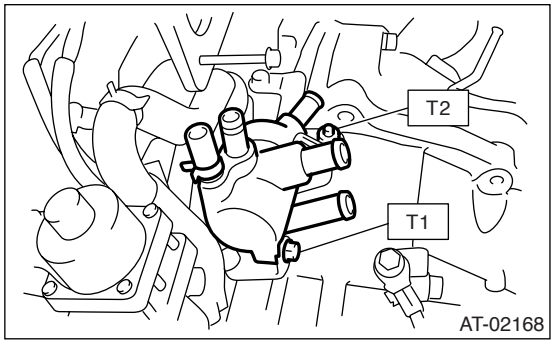
1) Install the bracket, and then install the throttle body.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

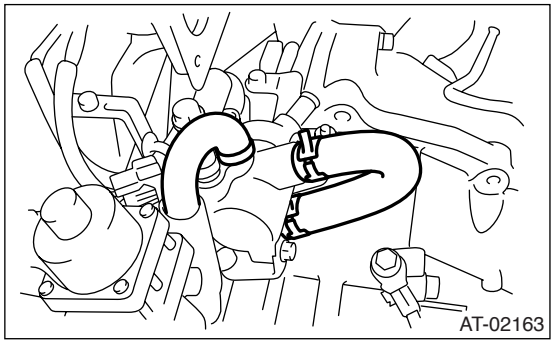


2) Install the warmer cock.

Tightening torque:
T1: 6.4 N·m (0.65 kgf-m, 4.7 ft-lb)
T2: 15 N·m (1.5 kgf-m, 10.8 ft-lb)



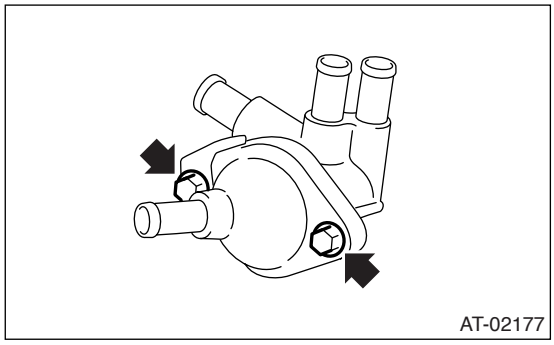
3) Connect the hoses to warmer cock.



4) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

C: DISASSEMBLY

Remove the bolt on warmer cock, and remove the thermostat.



D: ASSEMBLY

Assemble in the reverse order of disassembly.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

E: INSPECTION

Replace the thermostat if the valve does not close completely at an ambient temperature or if the following test shows unsatisfactory results.

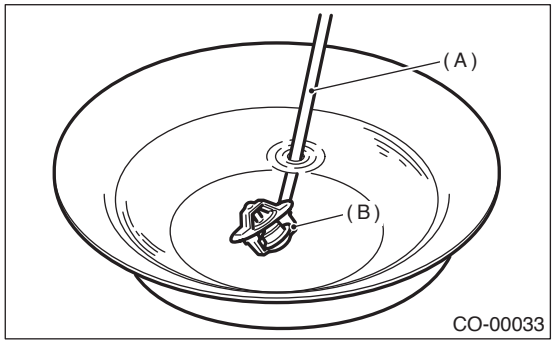
• Inspection method

Immerse the thermostat and a thermometer in water. Raise water temperature gradually, and measure the temperature and valve lift when the valve begins to open and when the valve is fully opened. During the test, agitate the water for even temperature distribution. The measurement should conform to the specification.

Starting temperature to open:
69 — 73°C (156 — 163°F)

Fully opens:
84°C (183°F)

Valve lift:
8.0 mm (0.315 in) or more

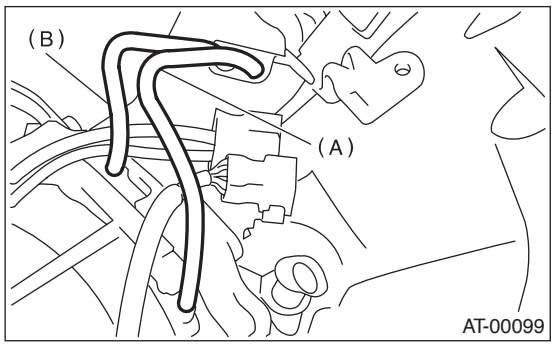


(A) Thermometer
(B) Thermostat

25.Air Breather Hose

A: REMOVAL

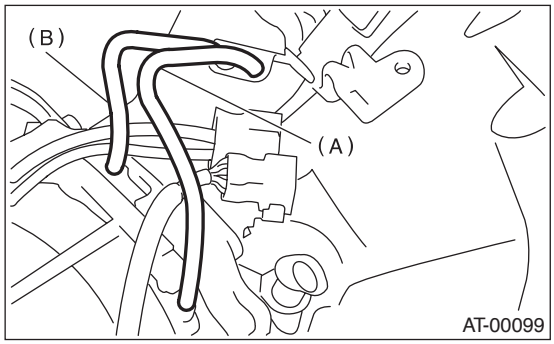
1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Disconnect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

B: INSTALLATION

1) Install the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump housing)

2) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

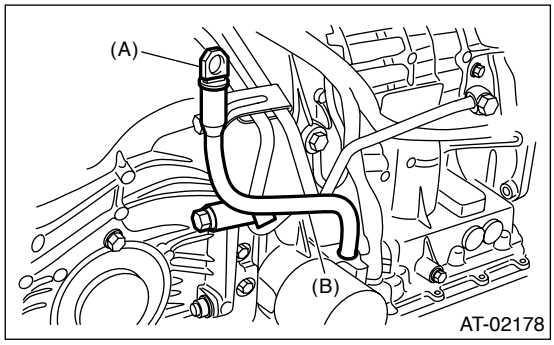
Make sure the hose is not cracked or clogged.

26.Oil Charge Pipe

A: REMOVAL

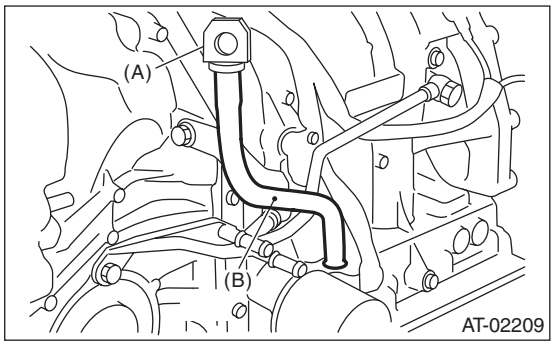
1) Remove the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Remove the oil charge pipe, and then remove the O-ring from flange side.

• Model with ATF cooler with warmer function



(A) Oil level gauge
(B) Oil charge pipe

• Model without ATF cooler with warmer function



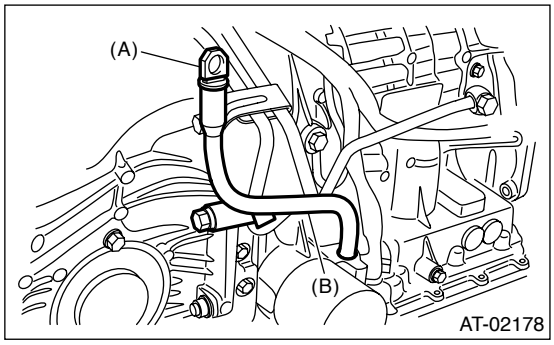
(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Install the oil charge pipe with a new O-ring applied with ATF.

• Model with ATF cooler with warmer function

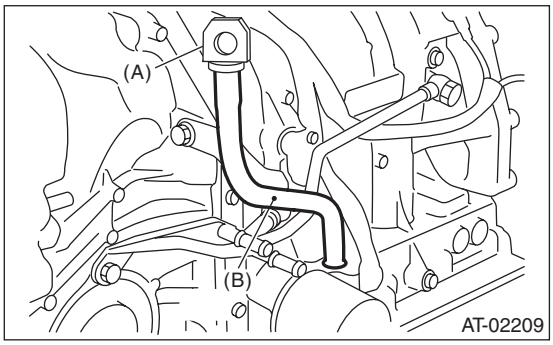
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



(A) Oil level gauge
(B) Oil charge pipe

• Model without ATF cooler with warmer function

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



(A) Oil level gauge
(B) Oil charge pipe

2) Install the air intake chamber.
<Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

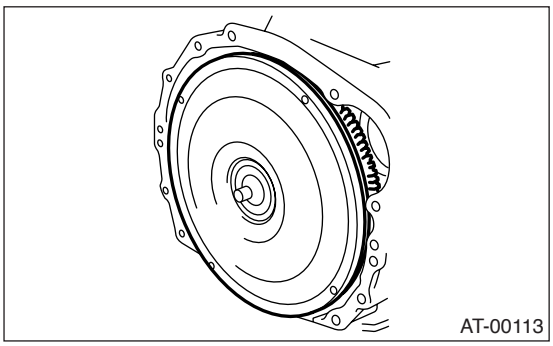
Make sure the oil charge pipe is not deformed or damaged.

27. Torque Converter Clutch Assembly

A: REMOVAL

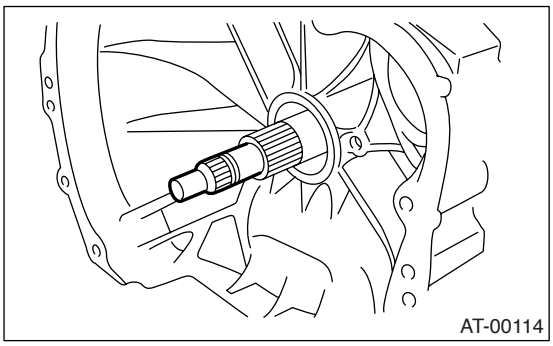
1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch and oil pump shaft horizontally.

NOTE:
Be sure not to scratch the inside of bushing in oil pump shaft.



3) Remove the input shaft.

NOTE:
When removing the torque converter clutch assembly, the input shaft is also removed.

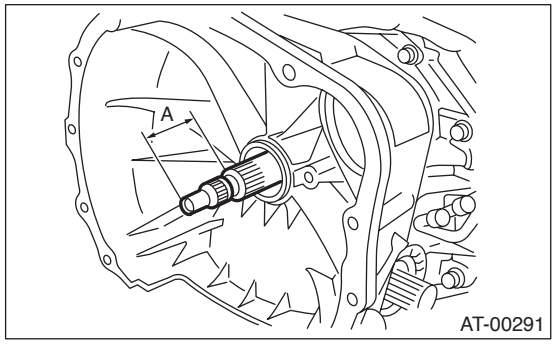


4) Remove the oil pump shaft from the torque converter clutch as necessary.

B: INSTALLATION

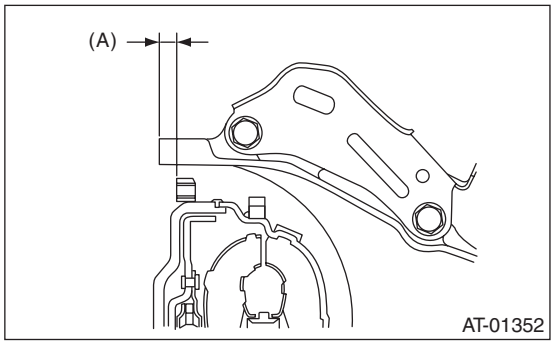
1) Install the shaft to the converter case when oil pump shaft is removed.
2) Install the oil pump shaft to torque converter clutch, and then make sure that the clip is secured on groove.
3) Apply ATF to O-ring and insert the input shaft with rotating it by hand lightly.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



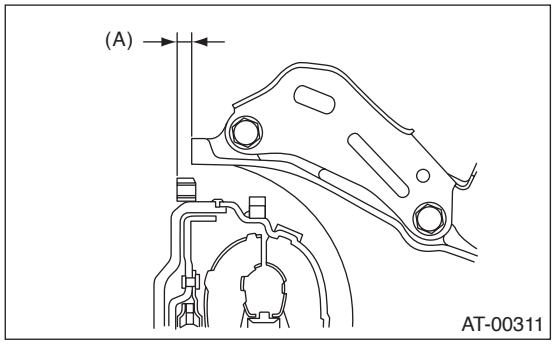
4) With holding the torque converter clutch assembly by hands, carefully install to the converter case. Take care not to damage the bushing. Do not contact the oil pump shaft bush with starter shaft part of oil pump cover inappropriately.
5) Lightly rotating the shaft by hands to engage the spline securely, and then check it is within the dimension A.

Dimension A:
2.0 L model
1.1 — 1.3 mm (0.043 — 0.051 in)



(A) Dimension A

2.5 L model
2.7 — 2.9 mm (0.106 — 0.114 in)



(A) Dimension A

6) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

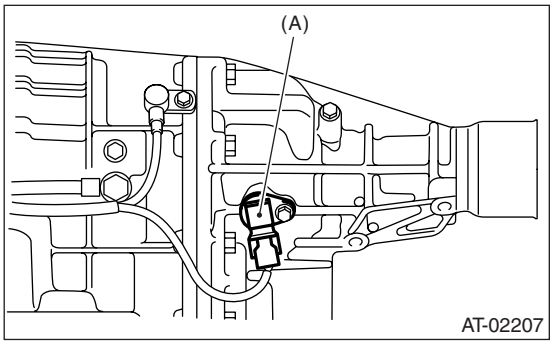
C: INSPECTION

Make sure the ring gear and protrusion of torque converter clutch end are not deformed or damaged.

28.Extension Case

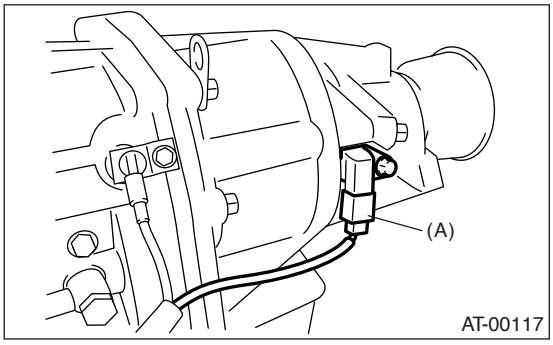
A: REMOVAL

1) Remove the transmission assembly.
<Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.
• MPT model



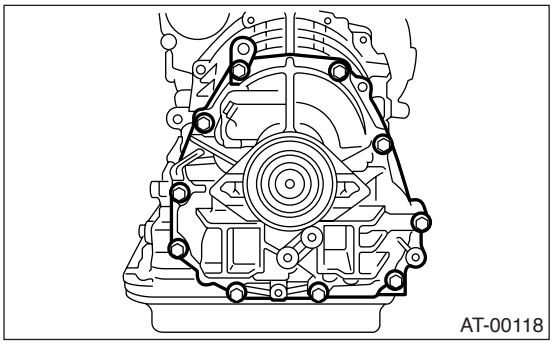
(A) Rear vehicle speed sensor

• VTD model



(A) Rear vehicle speed sensor

3) Separate the transmission case and extension case part.



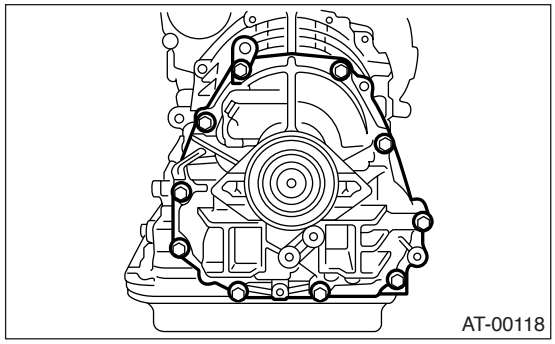
B: INSTALLATION

1) Attach the selected thrust needle bearing to the end surface of reduction drive gear with vaseline.

NOTE:
Install the thrust needle bearing in correct direction.

2) Install a new gasket.
3) Install the extension case to transmission case.
4) Tighten bolts to secure extension case.

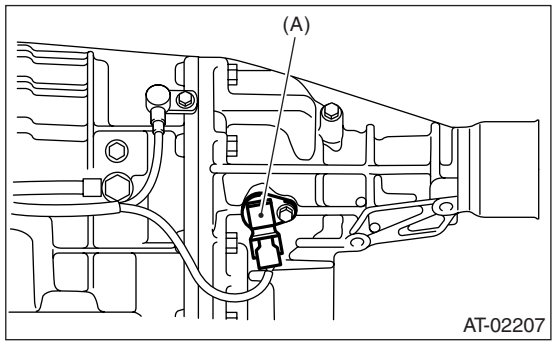
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



5) Install the rear vehicle speed sensor.

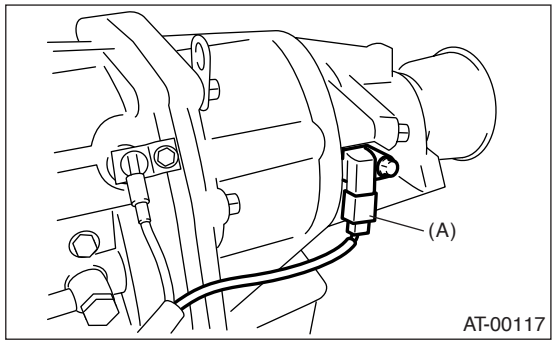
Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

• MPT model



(A) Rear vehicle speed sensor

• VTD model



(A) Rear vehicle speed sensor

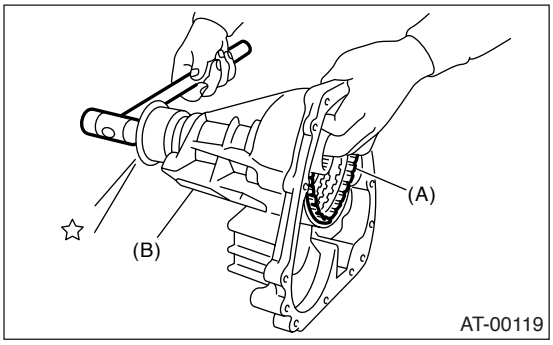
6) Install the transmission assembly.
<Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1. MPT MODEL

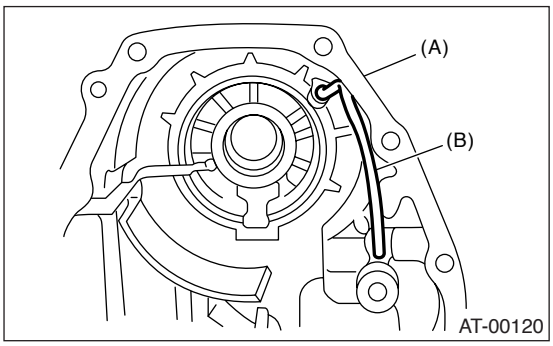
1) Take out the transfer clutch by lightly tapping the end of rear drive shaft.

NOTE:
Be careful not to damage the oil seal of extension case.



(A) Extension case
(B) Transfer clutch

2) Remove the transfer clutch pipe without deforming the pipe.



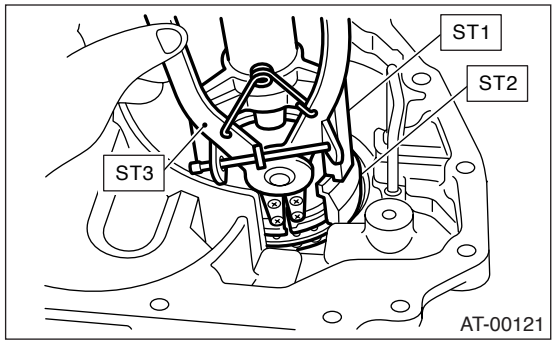
(A) Extension case
(B) Transfer clutch pipe

3) Remove the dust cover from extension case.
4) Remove the oil seal from extension case.

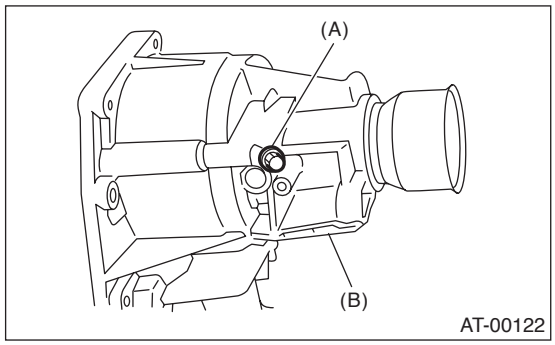
2. VTD MODEL

1) Remove the snap ring using ST1, ST2, ST3 and a press.

ST1	398673600	COMPRESSOR
ST2	498627100	SEAT
ST3	398663600	PLIERS

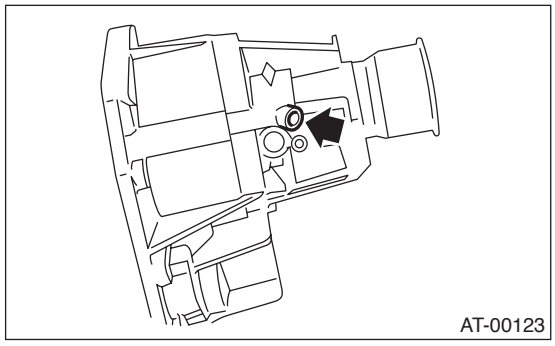


2) Remove the test plug.

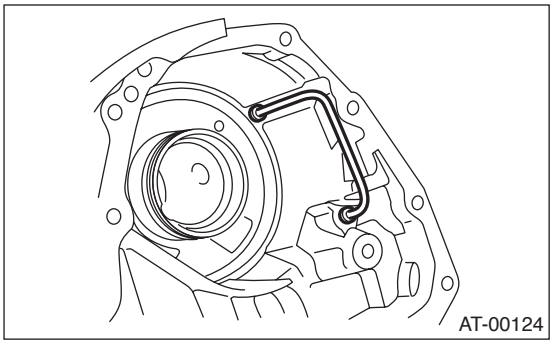


(A) Extension case
(B) Test plug

3) Remove the clutch piston using compressed air.



4) Remove transfer clutch pipe without deforming the pipe.

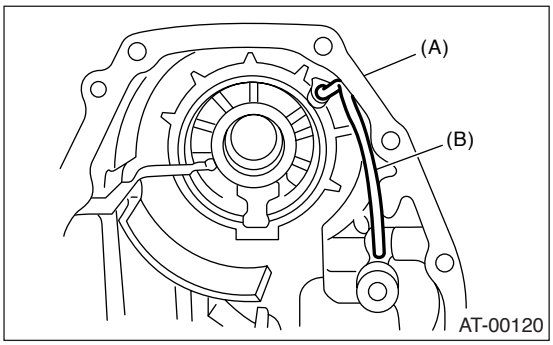


5) Remove the dust cover from extension case.
6) Remove the oil seal from extension case.

D: ASSEMBLY

1. MPT MODEL

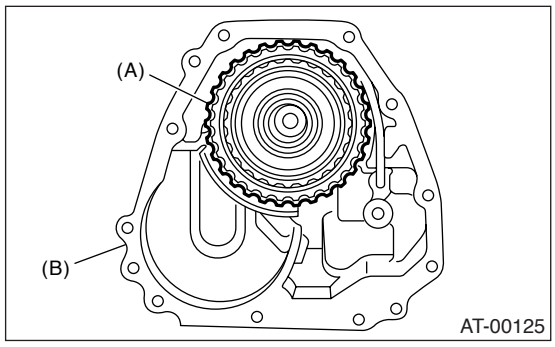
1) Press-fit new oil seal using ST and press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Install the transfer clutch pipe to extension case without deforming the pipe.



(A) Extension case
(B) Transfer pipe

4) Install the transfer clutch assembly to the case.

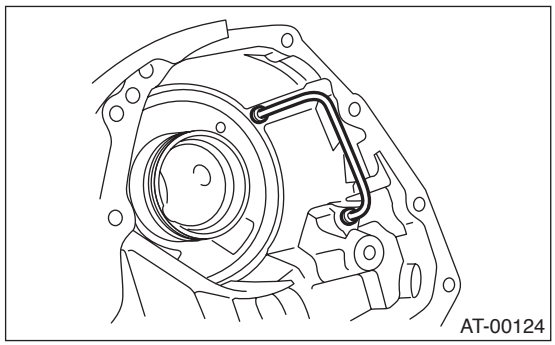
NOTE:
• Be careful not to damage the seal ring.
• Press-fit the clutch assembly to bottom of bearing shoulder completely.



(A) Transfer clutch
(B) Extension case

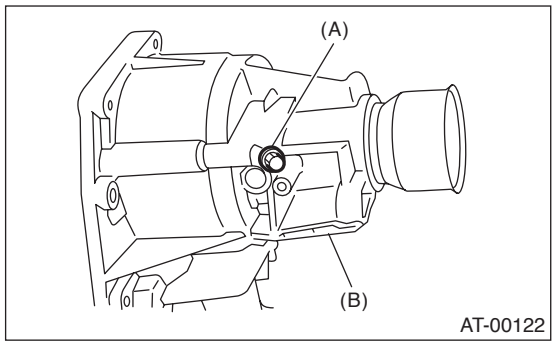
2. VTD MODEL

1) Press new oil seal using ST and press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Install the transfer clutch pipe to extension case without deforming the pipe.



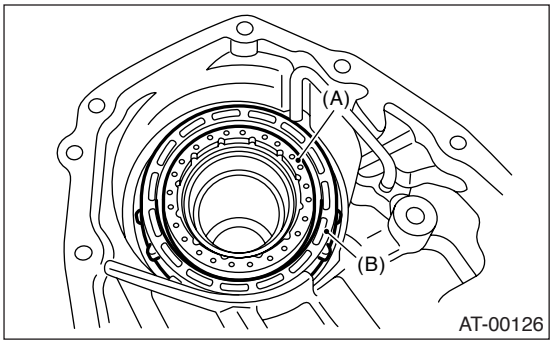
4) Apply ATF to a new O-ring and install the test plug.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(A) Test plug
(B) Extension case

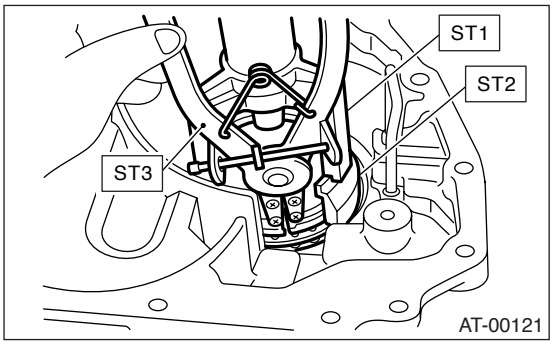
5) Insert the multi-plate clutch, drive plates, driven plates, and spring retainer.



(A) Spring retainer
(B) Multi-plate clutch (LSD) piston assembly

6) Install the snap ring using special tools 1, 2, and 3.

ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 398663600 PLIERS



E: INSPECTION

• Spray compressed air, and make sure the transfer pipe and extension case routes are not clogged and have no leaks.
• Measure the extension end play and adjust it to within specifications.
MPT model
<Ref. to 4AT-89, MPT MODEL, ADJUSTMENT, Transfer Clutch.>
VTD model
<Ref. to 4AT-90, VTD MODEL, ADJUSTMENT, Transfer Clutch.>

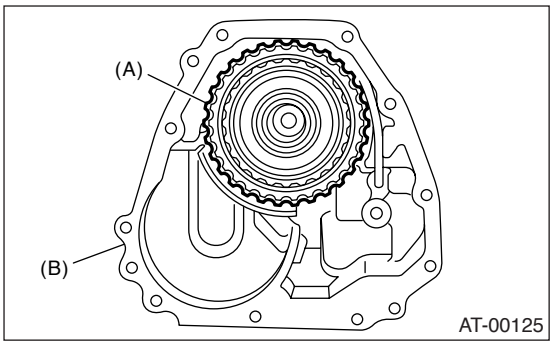
29.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 4AT-82, REMOVAL, Extension Case.> <Ref. to 4AT-83, DISASSEMBLY, Extension Case.>

B: INSTALLATION

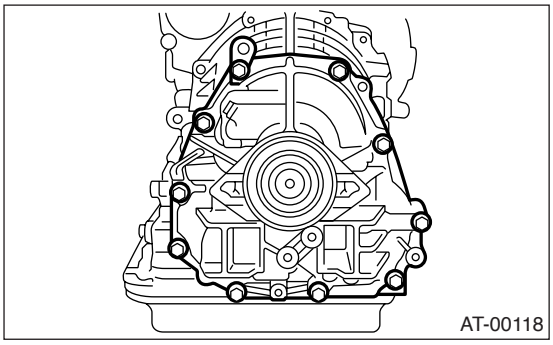
1) Select the thrust needle bearing. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>
2) Install the transfer clutch assembly to the case.



(A) Transfer clutch
(B) Extension case

3) Tighten the bolts to secure the case.

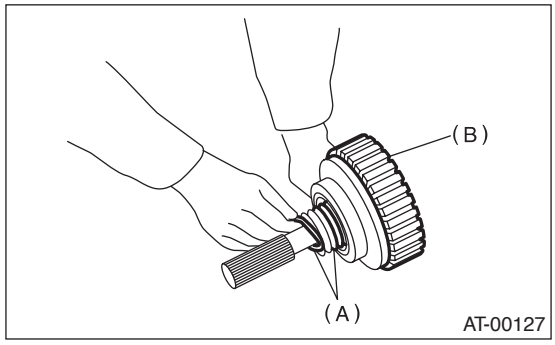
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



4) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

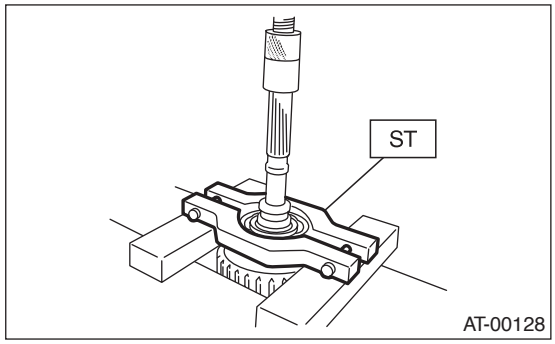
C: DISASSEMBLY

1) Remove the seal ring.

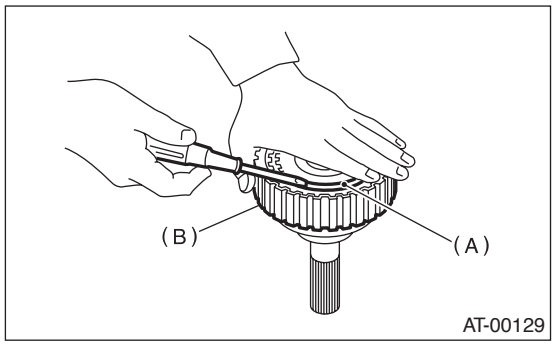


(A) Seal ring
(B) Transfer clutch

2) Remove the ball bearing using ST and press.
ST 498077600 REMOVER



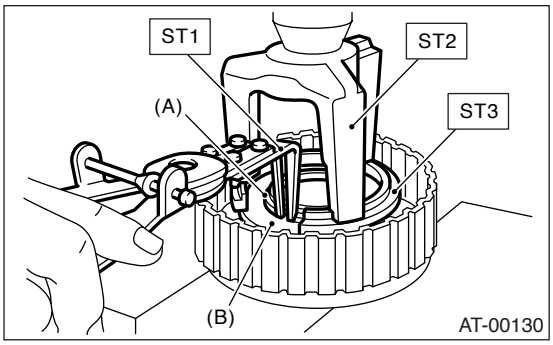
3) Remove the snap ring, and then take out the pressure plate, drive plate and driven plate.



(A) Snap ring
(B) Transfer clutch

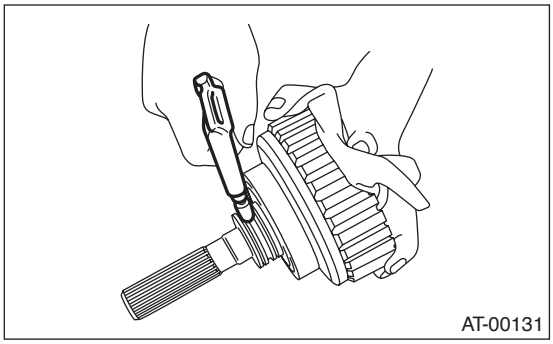
4) Using the ST1, ST2 and ST3, remove the snap ring, and then take out the return spring and transfer clutch piston seal.

ST1 399893600 PLIERS
ST2 398673600 COMPRESSOR
ST3 398623600 SEAT



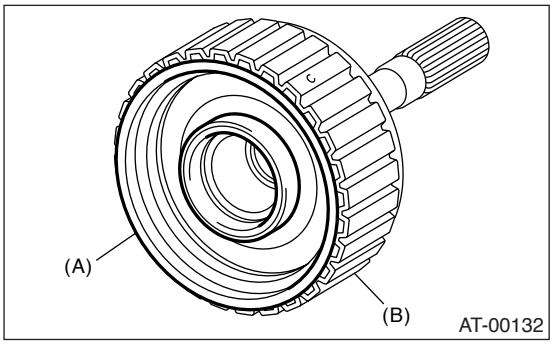
(A) Snap ring
(B) Transfer piston seal

5) Apply compressed air to the rear drive shaft to remove transfer clutch piston.



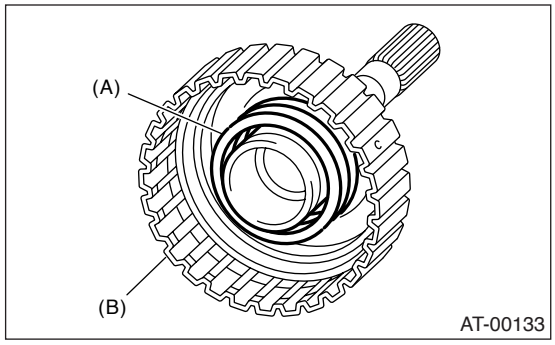
D: ASSEMBLY

1) Install the transfer clutch piston.



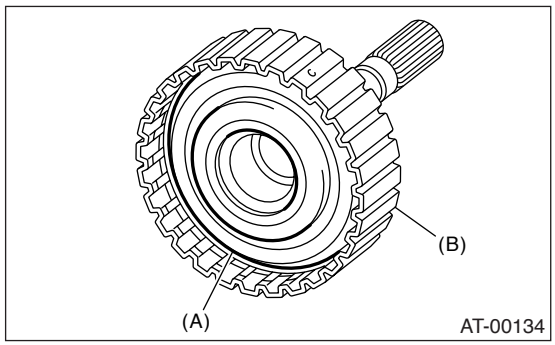
(A) Transfer clutch piston
(B) Rear drive shaft

2) Install the return spring to transfer clutch piston.



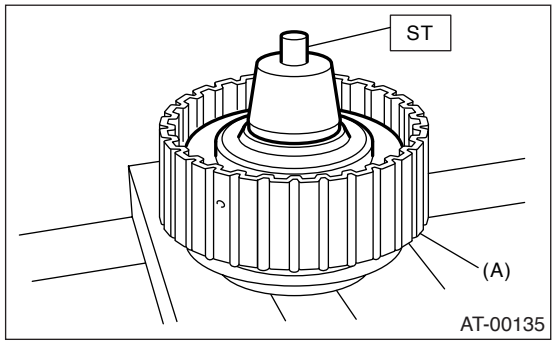
(A) Return spring
(B) Rear drive shaft

3) Apply ATF to the lip of transfer clutch piston seal and install it.



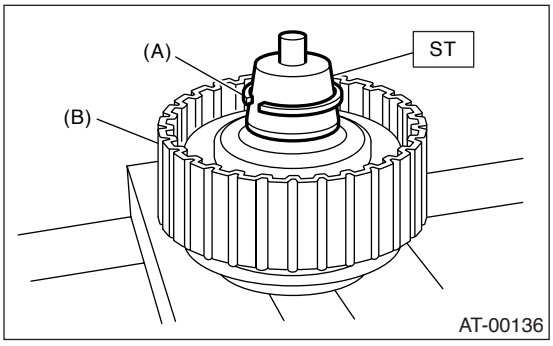
(A) Transfer clutch piston seal
(B) Rear drive shaft

4) Install the ST to the rear drive shaft.
ST 499257300 SNAP RING OUTER GUIDE



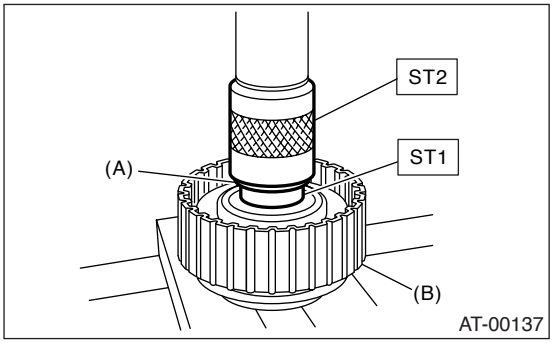
(A) Transfer clutch

5) Install the snap ring to ST.
ST 499257300 SNAP RING OUTER GUIDE



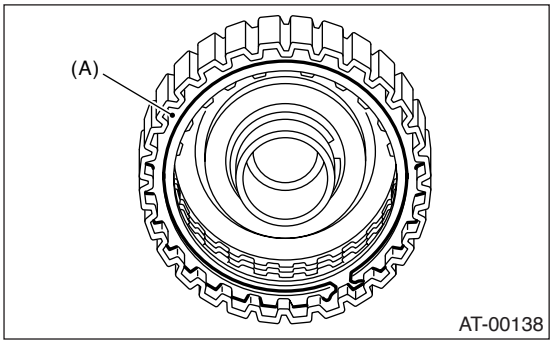
(A) Snap ring
(B) Transfer clutch

6) Install the snap ring to rear drive shaft using ST1 and ST2.
ST1 499257300 SNAP RING OUTER GUIDE
ST2 499247400 INSTALLER



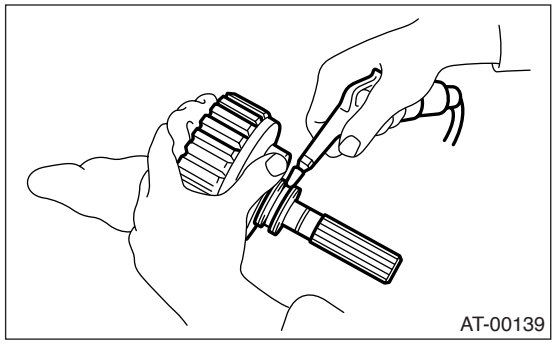
(A) Snap ring
(B) Transfer clutch

7) Install the driven plate, drive plate, pressure plate and snap ring.

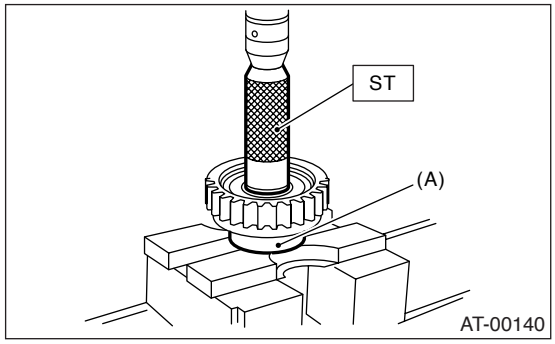


(A) Snap ring

8) Apply compressed air to see if the assembled parts move smoothly.



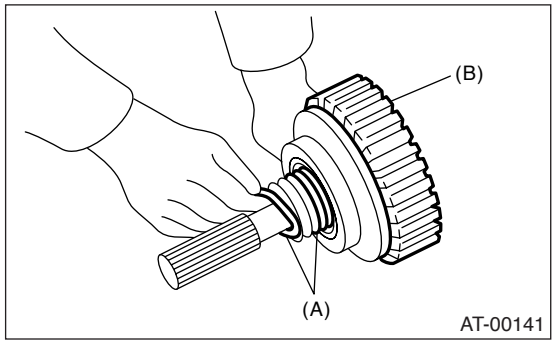
9) Check clearance between snap ring and pressure plate. <Ref. to 4AT-89, INSPECTION, Transfer Clutch.>
10) Press-fit new ball bearing using ST.
ST 899580100 INSTALLER



(A) Ball bearing

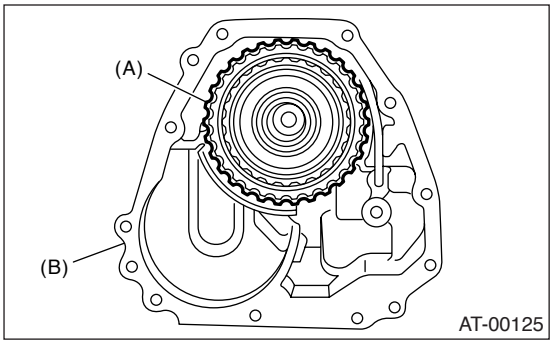
11) Apply vaseline to a new seal ring and attach to the seal ring groove of the shaft.

NOTE:
While installing the seal ring, not to expand the seal ring excessively.



(A) Seal ring
(B) Transfer clutch

12) Install the transfer clutch assembly without damaging seal ring.



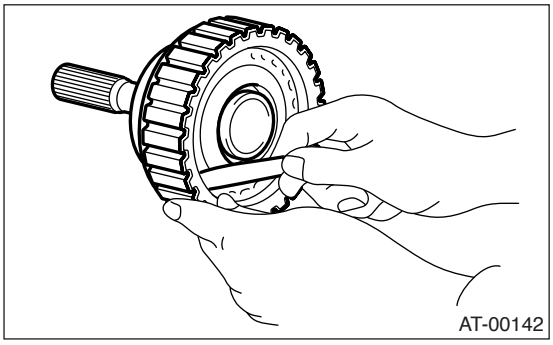
(A) Transfer clutch
(B) Extension case

E: INSPECTION

• Inspect the drive plate facing for wear and damage.
• Inspect the snap ring for wear, return spring for permanent distortion, breakage and deformation.
• Inspect the D-ring for damage.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>
1) Check clearance between snap ring and pressure gauge.
2) Before measuring clearance, place the same thickness of shim on both sides to prevent pressure plate from tilting.
3) If the clearance is not within specification, adjust it by selecting a suitable pressure plate on transfer clutch piston side.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.6 mm (0.063 in)



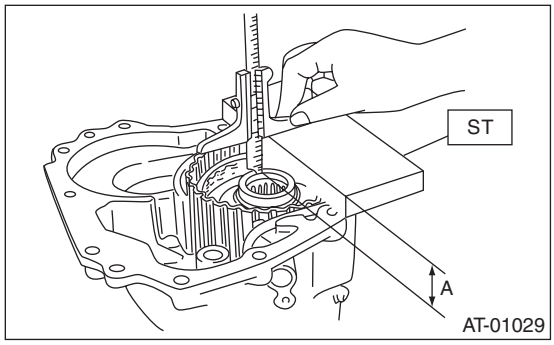
Pressure plate	
Part number	Thickness mm (in)
31593AA151	3.3 (0.130)
31593AA161	3.7 (0.146)
31593AA171	4.1 (0.161)
31593AA181	4.5 (0.177)

4) Check that the tight corner braking does not occur when the vehicle is started with steering wheel held at fully turned position. If tight corner braking occurs, perform the following procedures.
(1) With the steering wheel held at fully turned position, drive the vehicle in “D” range and with vehicle speed at approx. 5 km/h (3 MPH) in both clockwise and counterclockwise directions for approx. ten times each, while repeating acceleration and braking intermittently.
(2) If the tight corner braking still persists, drive the vehicle again in a circle for several laps.

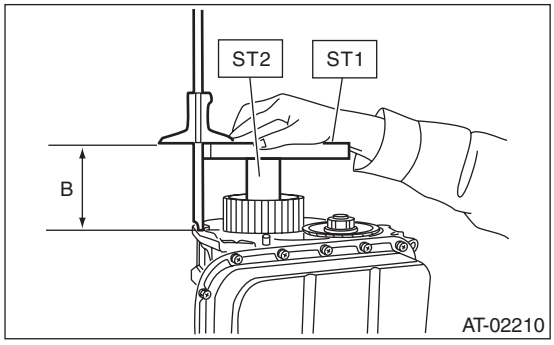
F: ADJUSTMENT

1. MPT MODEL

1) Measure the distance “A” from the end of extension case to rear drive shaft using ST.
ST 398643600 GAUGE



2) Measure the distance “B” from the transmission case mating surface to the reduction drive gear end surface using ST1 and ST2.
ST1 398643600 GAUGE
ST2 499577000 GAUGE



3) Calculation formula:

NOTE:
Calculate “T”:
T = A – B + 35.4 mm
[T = A – B + 1.3937 in]
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of rear drive shaft
B: Distance from end of transmission case to end of reduction drive gear
Example:
When, A = 33.6 mm (1.3228 in), B = 65.05 mm (2.5610 in)
T = 33.6 – 65.05 + 35.4 = 3.95
[T = 1.3228 – 2.5610 + 1.3937 = 0.1555]
After calculation, the value of “T” becomes 3.95, therefore select bearing thickness of 3.8 mm (0.150 in).

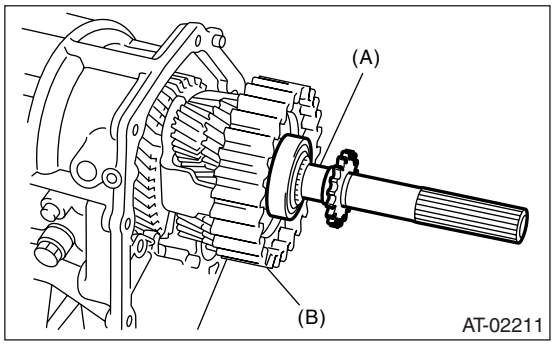
NOTE:
Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 499577000 GAUGE). When not using ST, apply
T = (A – α + 0.45 mm) – (B – β) – H
[T = (A – α + 0.0177 in) – (B – β) – H]

T: Thrust needle bearing thickness
A: Distance from end of extension case to end of reduction drive shaft
B: Distance from end of transmission case to end of rear drive shaft
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
0.0177: Gasket thickness (in)
H: Shim clearance

Thrust needle bearing	
Part number	Thickness mm (in)
806536020	3.8 (0.150)
806535030	4.0 (0.157)
806535040	4.2 (0.165)
806535050	4.4 (0.173)
806535060	4.6 (0.181)
806535070	4.8 (0.189)
806535090	5.0 (0.197)

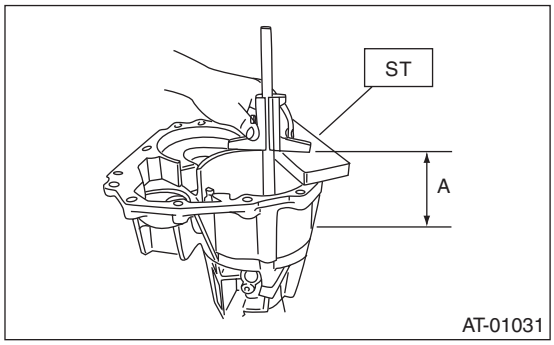
2. VTD MODEL

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.



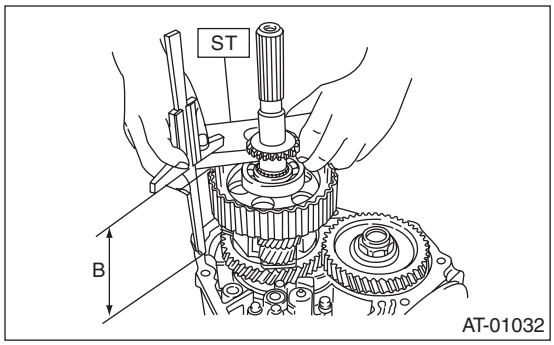
(A) Rear drive plate
(B) Center differential carrier

2) Using the ST, measure the distance “A” between the mating surface of extension case and the surface of rear drive shaft ball bearing outer race.
ST 398643600 GAUGE



A: Measured value

3) Using the ST, measure the distance “B” between the mating surface of transmission case and rear drive shaft ball bearing.
ST 398643600 GAUGE



B: Measured value

4) Formula:

NOTE:
• Calculation of “T”:
When clearances are 0.05 mm (0.0020 in), select up to four adjusting shims from the table, suitable for clearance value.
When clearances are 0.05 mm (0.0020 in)
T = A − B + 0.40 mm
[T = A − B + 0.0157 in]
When clearances are 0.25 mm (0.0098 in)
T = A − B + 0.20 mm
[T = A − B + 0.0079 in]
T: Shim clearance
A: Distance between extension case edge and rear driveshaft edge
B: Distance between transmission case edge and reduction drive gear edge
T: Shim thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)
Example:
When, A = 90.50 mm (3.5630 in), B = 90.35 mm (3.5571 in)
Calculation for 0.05 mm (0.0020 in) of clearance
T = 90.50 − 90.35 + 0.4 = 0.55
[T = 3.5630 − 3.5571 + 0.0157 = 0.0216]
Calculation when clearance is 0.25 mm (0.0098 in)
T = 90.50 − 90.35 + 0.2 = 0.35
[T = 3.5630 − 3.5571 + 0.0079 = 0.0138]
• Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE). When not using ST, apply
T = (A − α + 0.45 mm) − (B − β) − H
[T = (A − α + 0.0177 in) − (B − β) − H].
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of surface of rear drive shaft ball bearing outer race
B: Distance from end of transmission case to end of rear drive shaft ball bearing
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
H: Shim clearance
After calculation, the value of “T” becomes between 0.35 mm (0.0138 in) and 0.55 mm (0.0216 in), therefore select two shims with thickness of 0.2 mm (0.010 in) or one shim with thickness of 0.5 mm (0.020 in).

Adjusting shim	
Part No.	Thickness mm (in)
33281AA001	0.2 (0.008)
33281AA011	0.5 (0.020)

30.Multi-plate Clutch

A: REMOVAL

Remove the multi-plate clutch following the same instructions as for the extension case. **<Ref. to 4AT-82,** REMOVAL, Extension Case.>

B: INSTALLATION

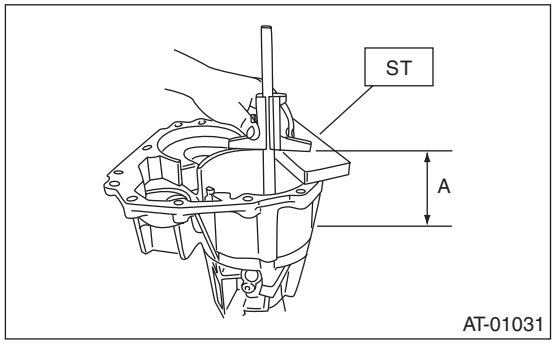
Install the multi-plate clutch following the same instructions as for the extension case. **<Ref. to 4AT-82,** INSTALLATION, Extension Case.>

C: INSPECTION

• Inspect the drive plate facing for wear and damage.
• Make sure the snap ring is not worn and the return spring has no permanent distortion, damage, or deformation.
• Inspect the lathe cut seal ring for damage.
• Measure the multi-plate clutch clearance and adjust it to within the specification range. **<Ref. to 4AT-92,** ADJUSTMENT**, Multi-plate Clutch.>**

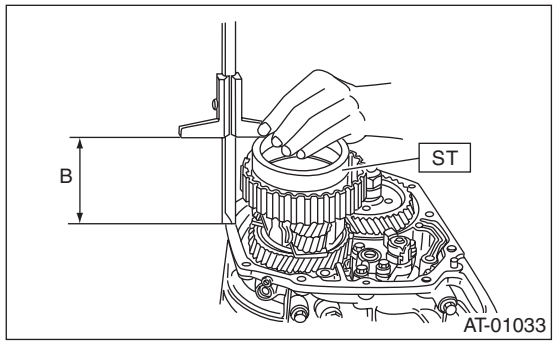
D: ADJUSTMENT

1) Remove the drive plate and driven plate from center differential carrier.
2) Using the ST, measure the distance “A” from the extension case joining surface to the multi-plate clutch piston.
ST 398643600 GAUGE



A: Measured value

3) Using the ST, measure the height “B” from the transmission case joining edge to the center differential clutch drum edge.
ST 398744300 GAUGE



B: Measured value

4) Calculation formula
$T = A - B + 0.45$ mm
[$T = A - B + 0.0177$ in]

NOTE:
• Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 GAUGE). When not using ST, apply
$T = (A - \alpha + 0.45 \text{ mm}) - (B - \beta)$
[$T = (A - \alpha + 0.0177 \text{ in}) - (B - \beta)$].
T: Thrust needle bearing thickness
A: Distance from end of extension case to end of reduction drive shaft
B: Distance from end of transmission case to end of rear drive shaft
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.45: Gasket thickness (mm)
• Measure the multi-plate clutch (LSD) driven and drive plate thickness to find the clearance between measurement value and “T”.

Initial standard:
0.2 — 0.6 mm (0.008 — 0.024 in)

Limit thickness:
1.6 mm (0.063 in)

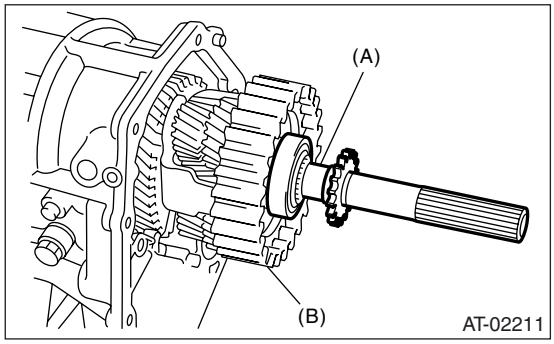
If the clearance exceeds the limit thickness, replace the plate set (drive and driven plate). Select a multi-plate clutch (LSD) piston driven plate that will bring clearance within the standard value.

Obtainable driven plates	
Part No.	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

31.Rear Drive Shaft

A: REMOVAL

1) Remove the transmission assembly. **<Ref. to 4AT-40,** REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. **<Ref. to 4AT-82,** REMOVAL, Extension Case.>
3) Pull out the rear driveshaft from center differential assembly.



(A) Rear driveshaft
(B) Center differential carrier

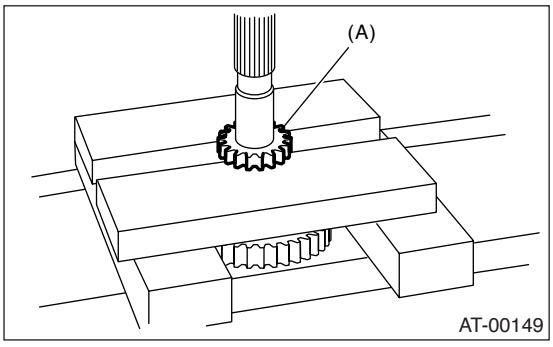
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select the appropriate shim. **<Ref. to 4AT-90,** VTD MODEL, ADJUSTMENT**, Transfer Clutch.>**
2) Install the drive plate and driven plate.
3) Insert the rear driveshaft into center differential assembly.
4) Combine the transmission case and extension case. Install the rear wheel speed sensor. **<Ref. to 4AT-82,** INSTALLATION, Extension Case.>
5) Install the transmission assembly. **<Ref. to 4AT-43,** INSTALLATION, Automatic Transmission Assembly.>

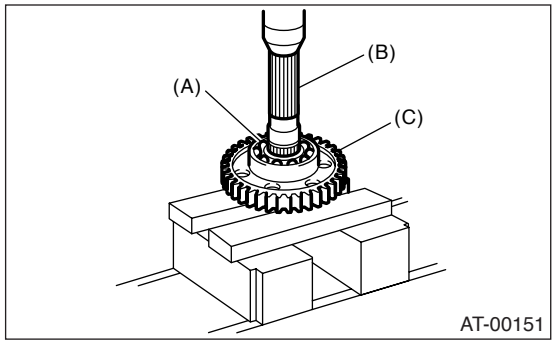
C: DISASSEMBLY

1) Using a press, remove the revolution gear.



(A) Revolution gear

2) Using a press, remove the front and rear side ball bearings and clutch hub.

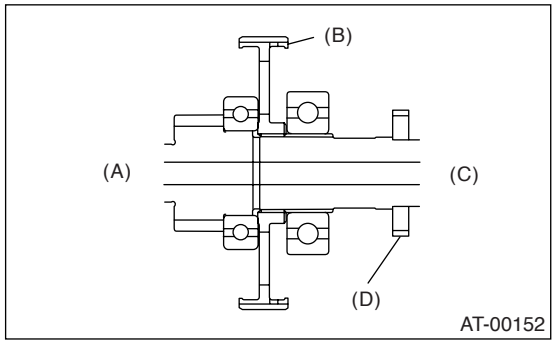


(A) Rear ball bearing
(B) Rear driveshaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
• Use a new revolution gear and ball bearings.
• Make sure the clutch hub is in the correct direction.



(A) Front side
(B) Clutch hub
(C) Rear side
(D) Revolution gear

E: INSPECTION

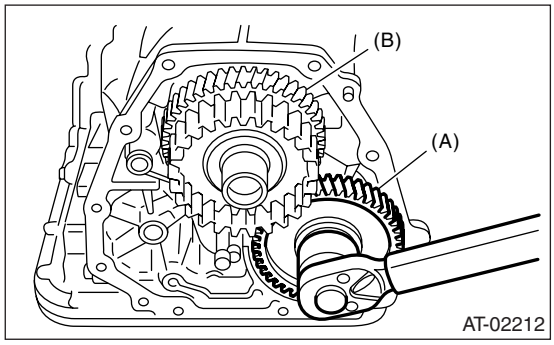
• Inspect the parts to make sure there are no holes, cuts, and that they are not dusty.
• Inspect the extension end play, and adjust it to within the standard value. **<Ref. to 4AT-90,** VTD MODEL, ADJUSTMENT**, Transfer Clutch.>**

32.Reduction Driven Gear

A: REMOVAL

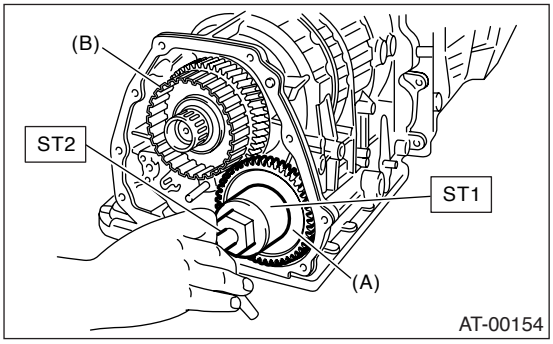
1. MPT MODEL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
3) Set the select lever to “P” range.
4) Remove the caulking part, and then remove the lock nut.



(A) Reduction driven gear
(B) Reduction drive gear

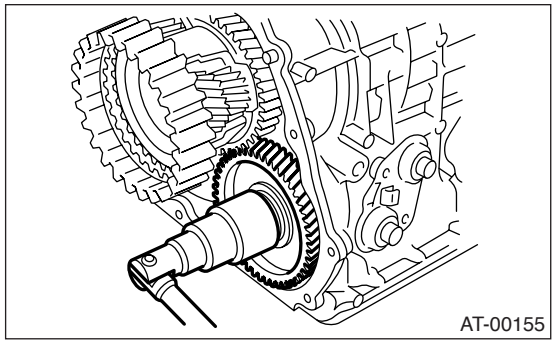
5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET



(A) Reduction driven gear
(B) Reduction drive gear

2. VTD MODEL

1) Remove the transmission assembly from vehicle. **<Ref. to 4AT-40,** REMOVAL, Automatic Transmission Assembly.>
2) Remove rear vehicle speed sensor, and separate the extension case from transmission case. **<Ref. to 4AT-82,** REMOVAL, Extension Case.>
3) Remove the rear drive shaft. **<Ref. to 4AT-93,** REMOVAL**, Rear Drive Shaft.>**
4) Set the range select lever to “P”.
5) Straighten the staked portion, and remove the lock nut.



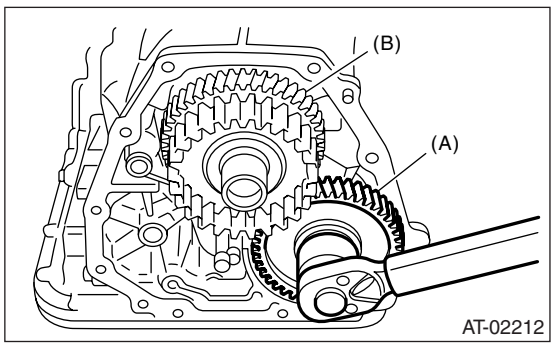
6) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737000 PULLER
ST2 899524100 PULLER SET
7) Pull out the center differential assembly. **<Ref. to 4AT-98,** REMOVAL**, Center Differential Carrier.>**

B: INSTALLATION

1. MPT MODEL

1) Set the select lever to “P” range.
2) Using a plastic hammer, install the reduction driven gear assembly and new washer, and tighten new drive pinion lock nut.

Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)



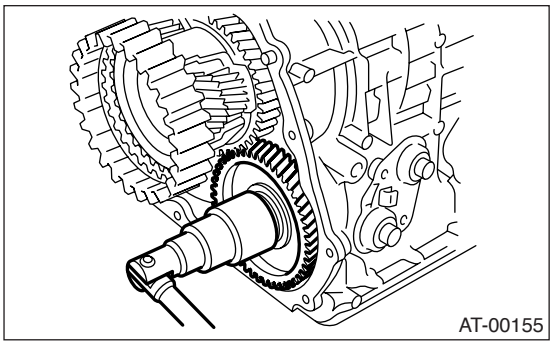
(A) Reduction driven gear
(B) Reduction drive gear

3) After tightening, stake the lock nut securely.
4) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
5) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

2. VTD MODEL

1) Set the select lever to “P” range.
2) Using a plastic hammer, install the reduction driven gear assembly.
3) Using a plastic hammer, install the center differential assembly.
4) Install a new self-lock nut and a washer.

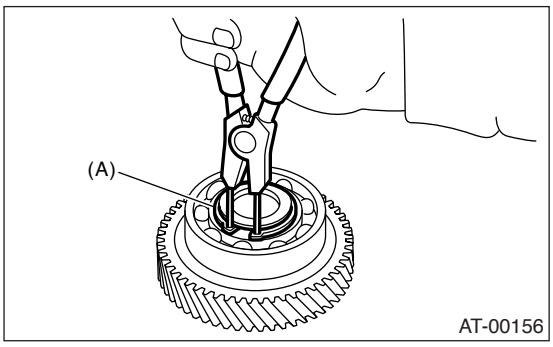
Tightening torque:
100 N·m (10.2 kgf-m, 73.8 ft-lb)



5) After tightening, stake the lock nut securely.
6) Insert the rear drive shaft assembly. **<Ref. to 4AT-93,** INSTALLATION**, Rear Drive Shaft.>**
7) Combine the transmission case with extension case, and install the rear vehicle speed sensor. **<Ref. to 4AT-82,** INSTALLATION, Extension Case.>
8) Install the transmission assembly to vehicle. **<Ref. to 4AT-43,** INSTALLATION, Automatic Transmission Assembly.>

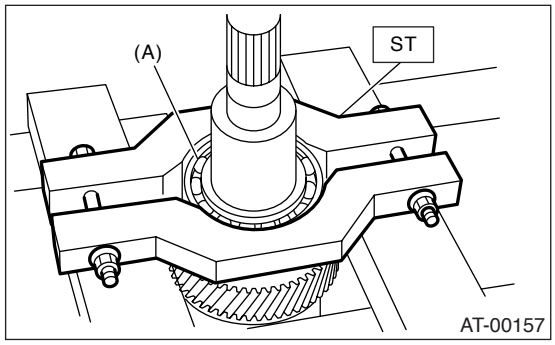
C: DISASSEMBLY

1) Remove the snap ring from reduction driven gear.



(A) Snap ring

2) Remove the ball bearing from reduction driven gear using ST.
ST 498077600 REMOVER

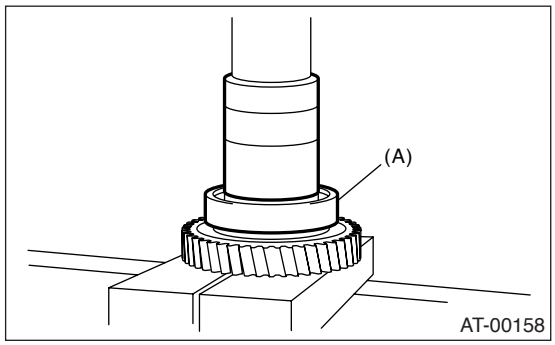


(A) Ball bearing

3) Remove the snap ring from reduction driven gear.

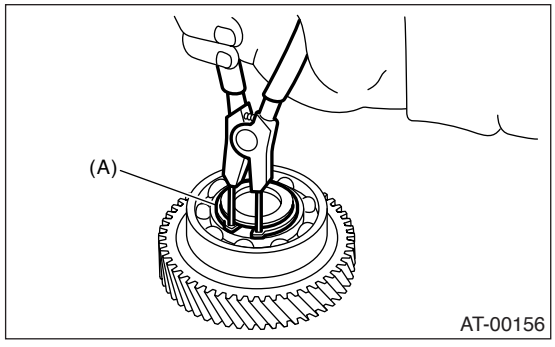
D: ASSEMBLY

1) Install the snap ring to reduction driven gear.
2) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

3) Install the snap ring to reduction driven gear.



(A) Snap ring

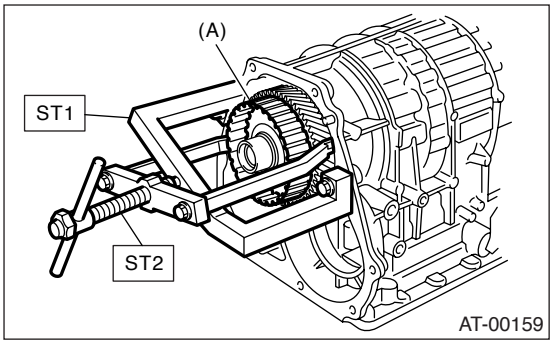
E: INSPECTION

Make sure the ball bearing and gear is not deformed or damaged.

33.Reduction Drive Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
3) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
4) Using the ST, extract the reduction drive gear.
ST1 499737100 PULLER
ST2 899524100 PULLER SET

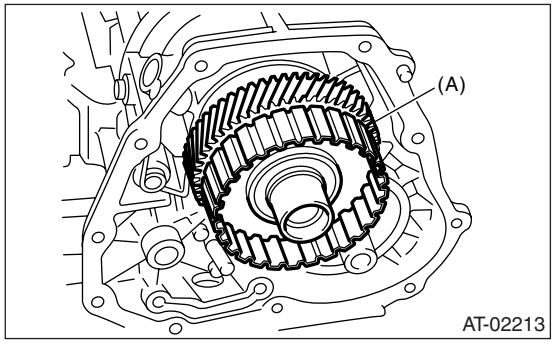


(A) Reduction drive gear

B: INSTALLATION

1) Install the reduction drive gear assembly.

NOTE:
Press-fit it to the bottom of bearing shoulder completely.

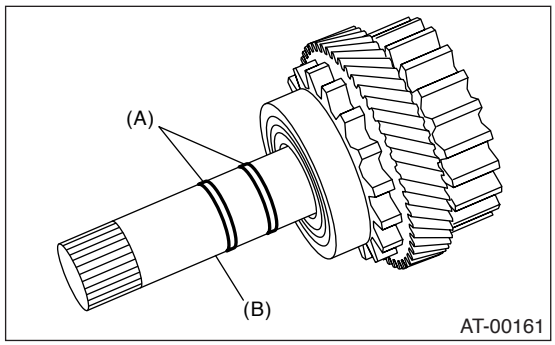


(A) Reduction drive gear

2) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
3) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
4) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

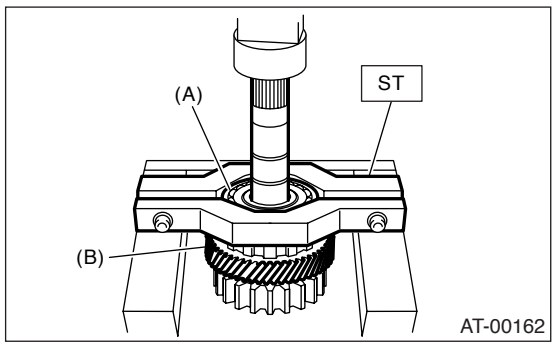
C: DISASSEMBLY

1) Take out the seal ring.



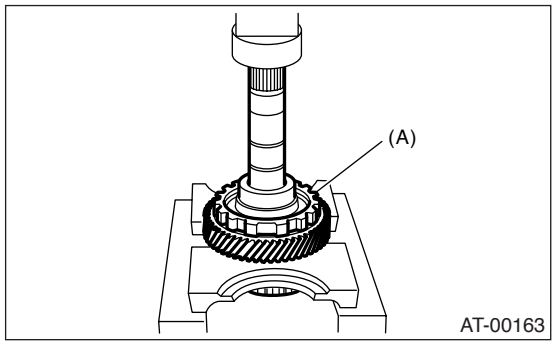
(A) Seal ring
(B) Reduction drive shaft

2) Remove the ball bearing using ST.
ST 498077600 REMOVER



(A) Ball bearing
(B) Reduction drive gear

3) Using the press, remove the reduction drive gear.

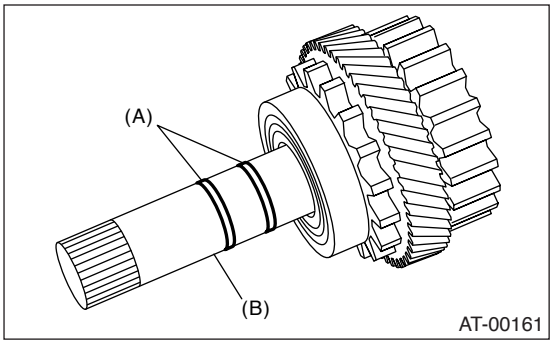


(A) Reduction drive gear

D: ASSEMBLY

1) Press-fit the reduction drive gear to shaft.
2) Press-fit the new ball bearing into reduction drive gear.
3) Apply vaseline to the outer surface of seal ring and shaft groove.

4) Apply ATF to new seal rings and install them.



(A) Seal ring
(B) Reduction drive shaft

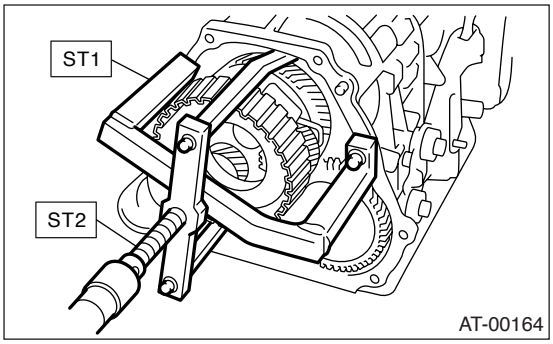
E: INSPECTION

• Rotate the bearing by hand, make sure it rotates smoothly.
• Check that the holes, damages or other foreign matters are not on each parts.
• Measure the extension end play and adjust it to within specifications. <Ref. to 4AT-89, ADJUSTMENT, Transfer Clutch.>

34.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle. **<Ref. to 4AT-40,** REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case from transmission case. **<Ref. to 4AT-82,** REMOVAL, Extension Case.>
3) Pull out the rear driveshaft. **<Ref. to 4AT-93,** REMOVAL**, Rear Drive Shaft.>**
4) Using the STs, pull out the center differential carrier assembly.
ST1 499737100 PULLER
ST2 899524100 PULLER SET

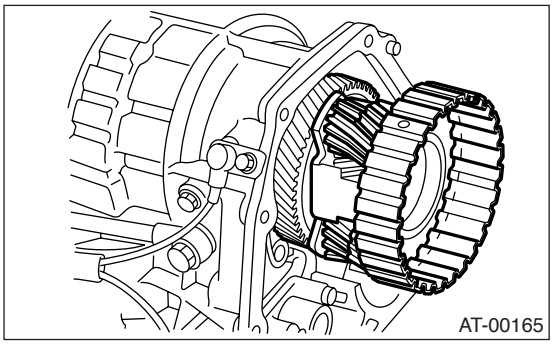


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

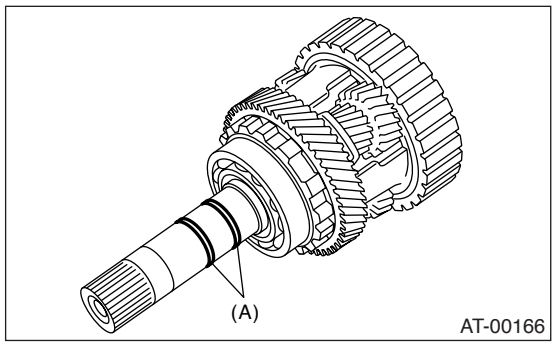
NOTE:
Insert the center differential assembly and shim(s) completely into bearing shoulder bottom.



2) Insert the rear driveshaft. **<Ref. to 4AT-93,** INSTALLATION**, Rear Drive Shaft.>**
3) Connect the transmission case and extension case, and install the rear wheel speed sensor. **<Ref. to 4AT-82,** INSTALLATION, Extension Case.>
4) Install the transmission assembly onto vehicle. **<Ref. to 4AT-43,** INSTALLATION, Automatic Transmission Assembly.>

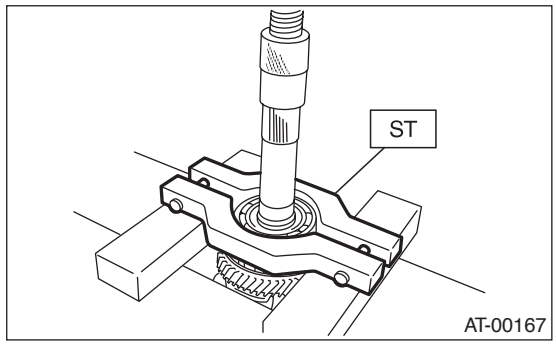
C: DISASSEMBLY

1) Remove the seal rings.

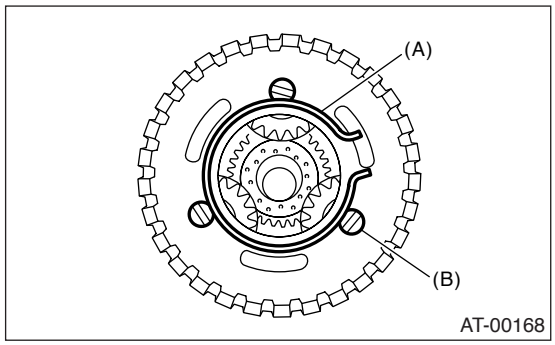


(A) Seal ring

2) Using a press and the ST, remove the ball bearing.
ST 498077600 REMOVER

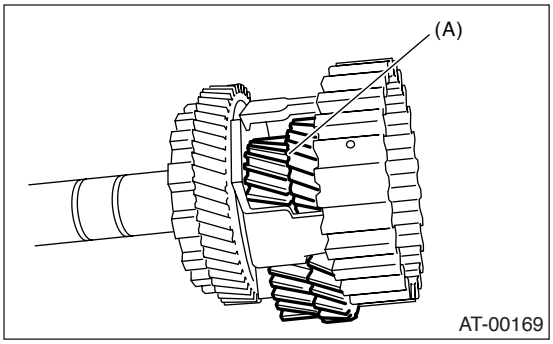


3) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring
(B) Shaft

4) Remove the thrust washers, pinion gears, and washers from center differential assembly.

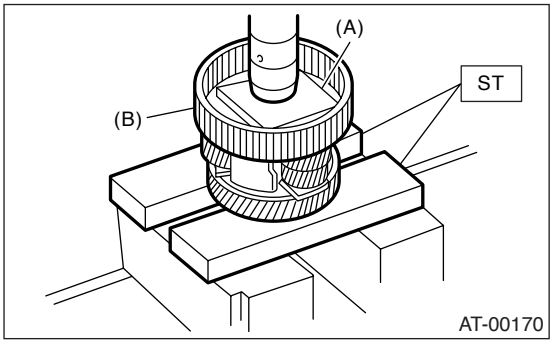


(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

1) Install the thrust washer onto intermediate shaft.
2) Install the thrust bearing onto the intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into center differential assembly.
5) Install the snap ring.
6) Using a press, install a new ball bearing into center differential assembly.
ST 498077000 REMOVER



(A) Plate
(B) Center differential carrier

7) Apply vaseline onto the seal ring outer surface and shaft grooves.
8) Install new seal rings.

E: INSPECTION

- Check all the parts for hole, score, or dirt.
- Check the play of the extension end, and if necessary, adjust it. **<Ref. to 4AT-90,** VTD MODEL, ADJUSTMENT**, Transfer Clutch.>**

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AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION

4AT

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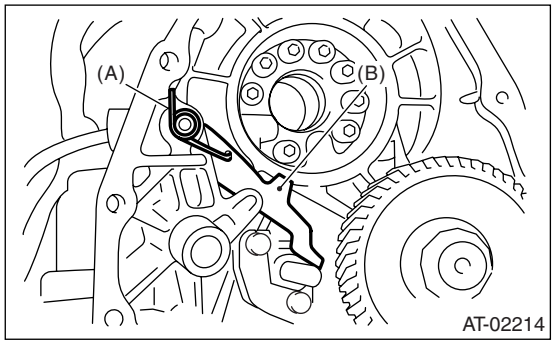
35.Parking Pawl

A: REMOVAL

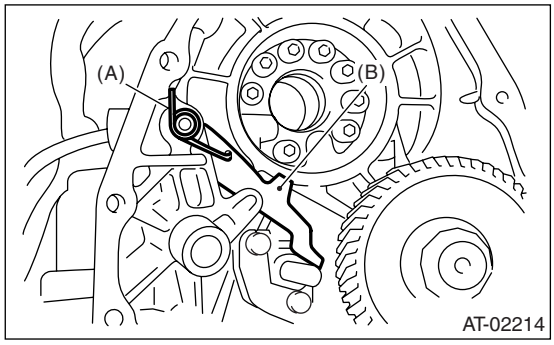
1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then separate the extension case from transmission case. <Ref. to 4AT-82, REMOVAL, Extension Case.>
3) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
4) Remove the parking pawl, return spring and shaft.



(A) Return spring
(B) Parking pawl

B: INSTALLATION

1) Install the parking pawl, return spring and shaft.



(A) Return spring
(B) Parking pawl

2) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
3) Install the extension case and rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
4) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

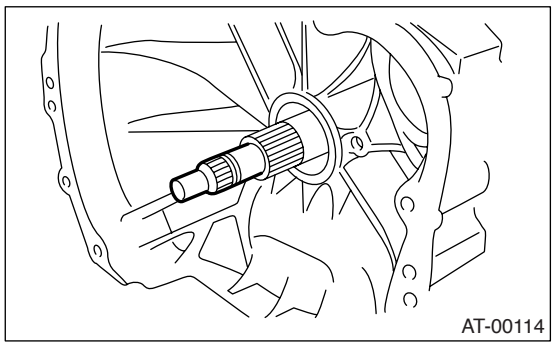
C: INSPECTION

Make sure that the tab of parking pawl on reduction gear is not worn or otherwise damaged.

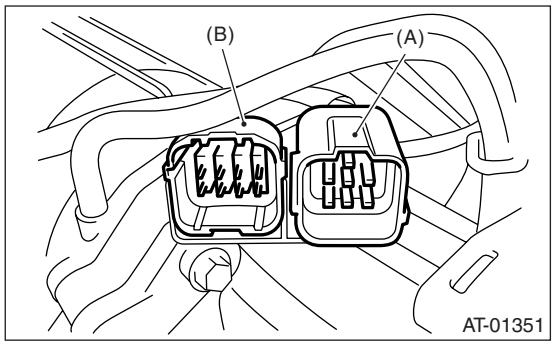
36.Converter Case

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.



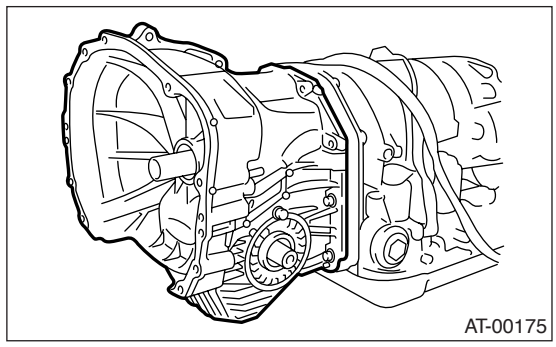
4) Lift-up the lever on the rear side of connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.



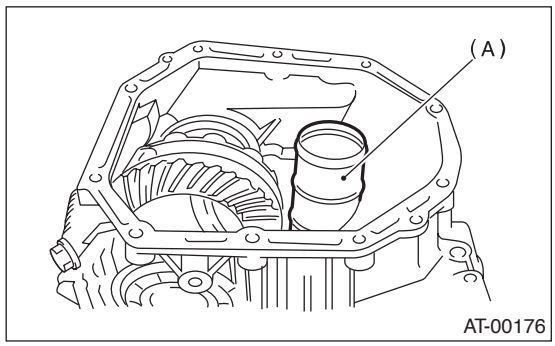
(A) Transmission connector
(B) Inhibitor switch connector

6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
8) Remove the converter case aligning bolt, and then separate the transmission case and converter case by lightly tapping with plastic hammer.

NOTE:
• Be careful not to damage the oil seal and bush inside the converter case by the oil pump cover.
• Be careful not to loosen the rubber seal.



9) Remove the seal pipe.

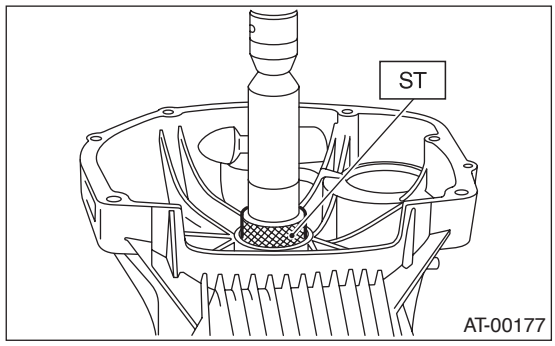


(A) Seal pipe

10) Remove the differential assembly. <Ref. to 4AT-113, REMOVAL, Front Differential Assembly.>
11) Remove the oil seal from converter case.

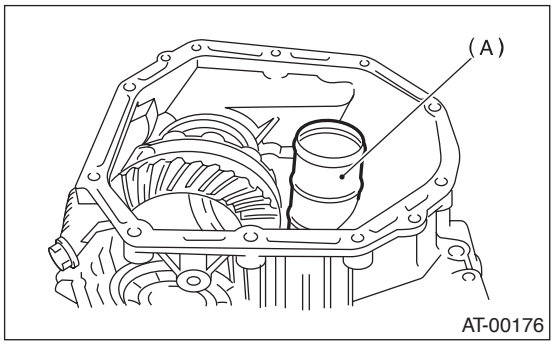
B: INSTALLATION

1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to converter case using ST.
ST 398437700 DRIFT



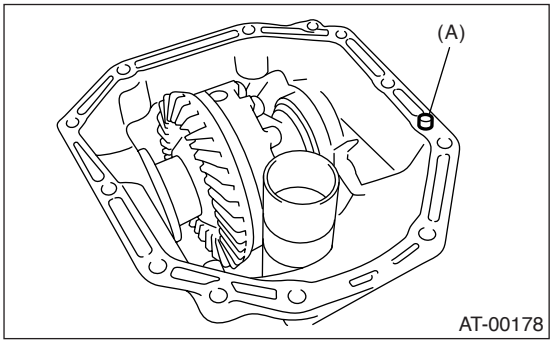
3) Install the differential assembly to case. <Ref. to 4AT-113, INSTALLATION, Front Differential Assembly.>
4) Install the left and right side retainers. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

5) Install the new seal pipe to converter case.



(A) Seal pipe

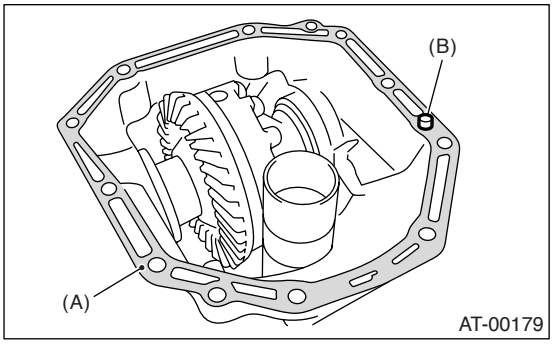
6) Install the rubber seal to converter case.



(A) Rubber seal

7) Apply proper amount of liquid gasket to the entire matching surface of converter case.

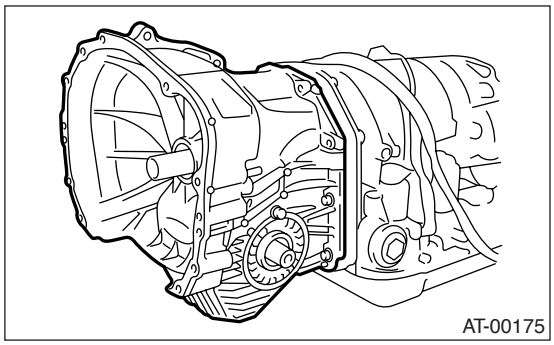
Liquid gasket:
THREE BOND 1215 (Part No. 004403007)



(A) THREE BOND 1215
(B) Rubber seal

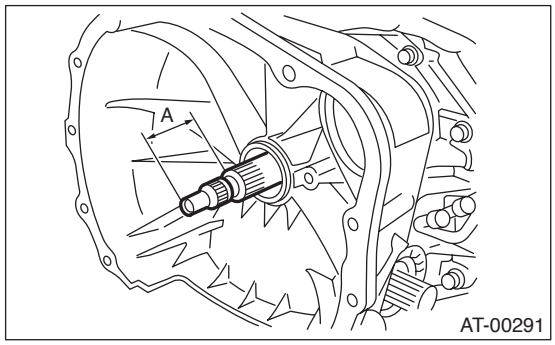
8) Install the converter case assembly without damaging bushing and oil seal.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



9) Insert the inhibitor switch and transmission connector to the stay.
10) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>
11) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
12) Install the oil charge pipe with O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
13) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



14) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
15) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

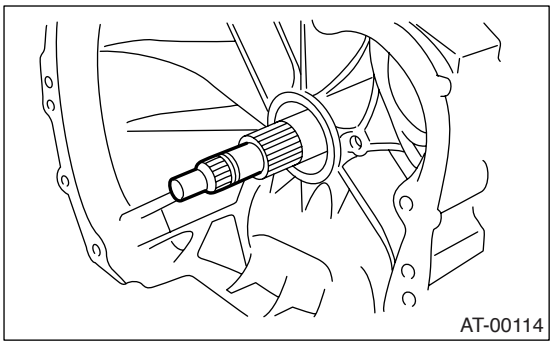
C: INSPECTION

Measure the backlash, and then adjust it within specification. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

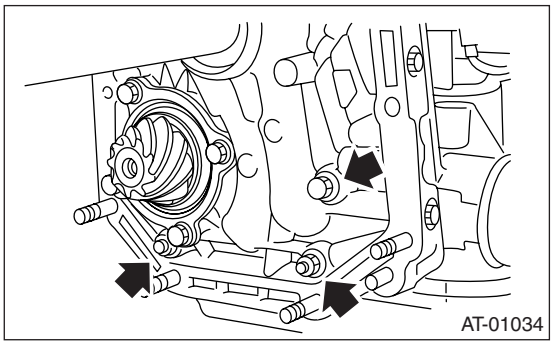
37.Oil Pump Housing

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

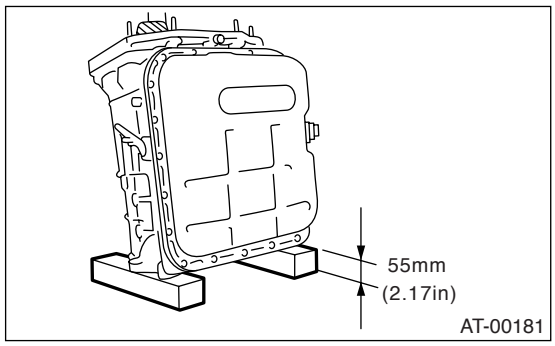


4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from stay.
5) Remove the inhibitor switch connector from stay.
6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separate the converter case and transmission case part. <Ref. to 4AT-101, REMOVAL, Converter Case.>
9) Separate the transmission case and extension case part. <Ref. to 4AT-82, REMOVAL, Extension Case.>
10) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
11) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
12) Loosen the oil pump housing mounting bolts.

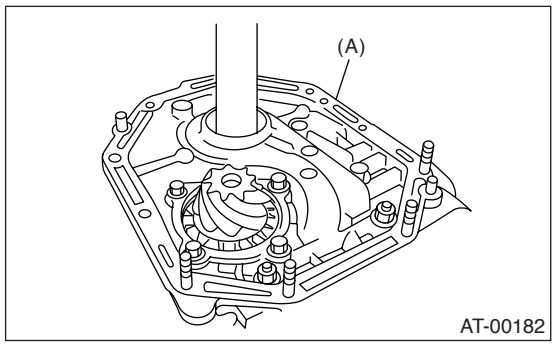


13) Place two wooden blocks on the workbench, and stand the transmission case with its rear end facing down.

NOTE:
• Be careful not to scratch the rear mating surface of transmission case.
• Note that the parking rod and drive pinion protrudes from mating surface.



14) Remove the oil pump housing and adjusting thrust washer.

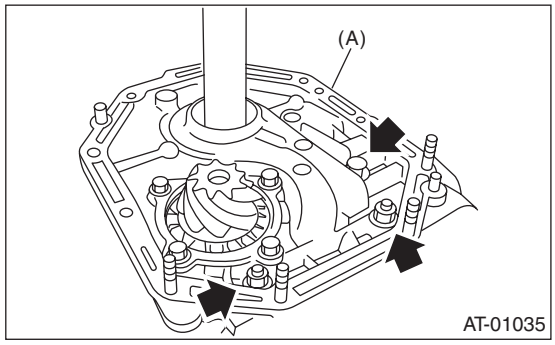


(A) Oil pump housing

B: INSTALLATION

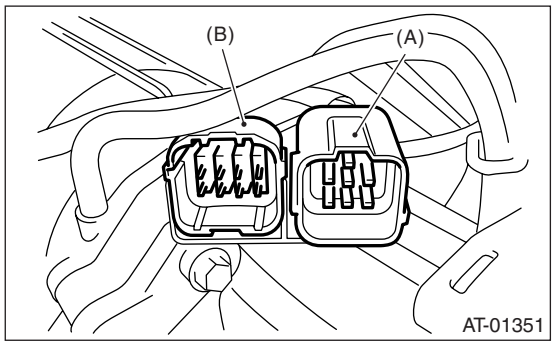
1) Secure the oil pump housing with two nuts and a bolt.

Tightening torque:
42 N·m (4.3 kgf-m, 31 ft-lb)



(A) Oil pump housing

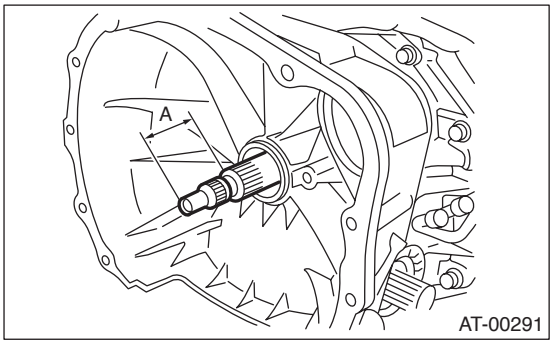
2) Install the converter case assembly into transmission case assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
3) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
5) Combine the transmission case with extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
6) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

7) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
8) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
9) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

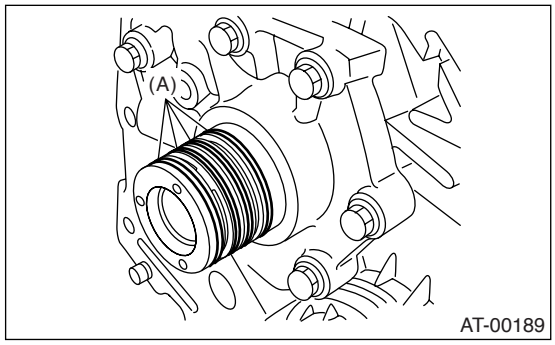


10) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
11) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

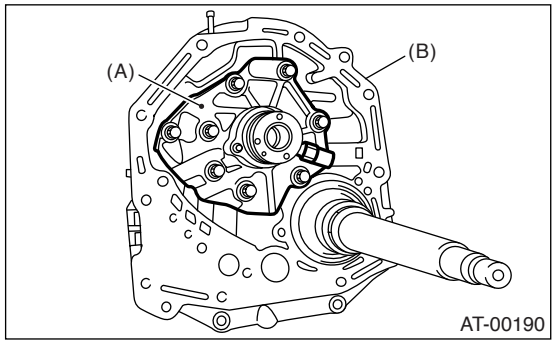
1. OIL PUMP COVER

1) Remove four seal rings.



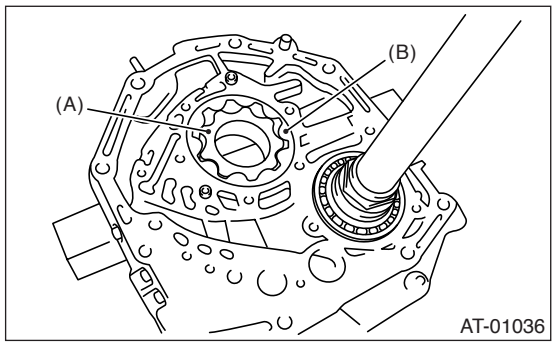
(A) Seal ring

2) Remove the cover by lightly tapping the end of stator shaft.



(A) Oil pump cover
(B) Oil pump housing

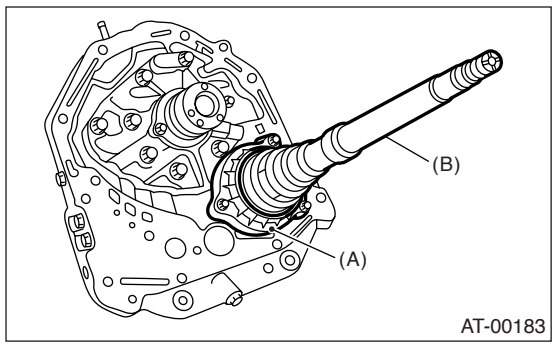
3) Remove the inner and outer rotor.



(A) Inner rotor
(B) Outer rotor

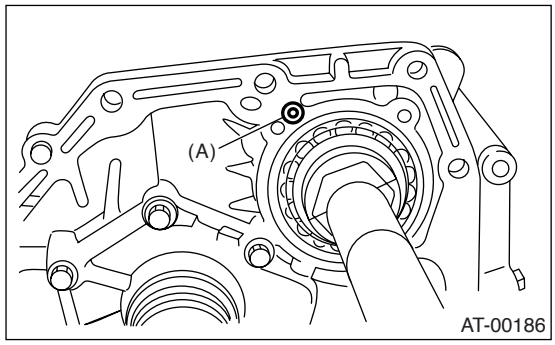
2. OIL SEAL RETAINER

1) Remove the oil seal retainer.



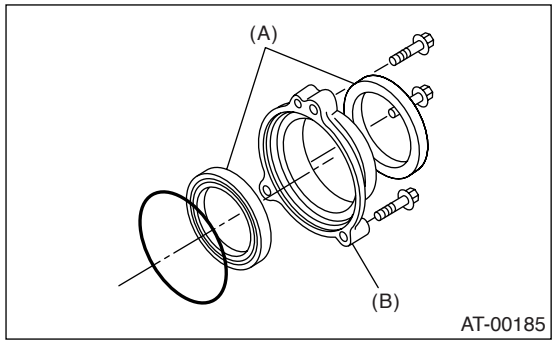
(A) Oil seal retainer
(B) Drive pinion shaft

2) Remove the O-ring.



(A) O-ring

3) Remove the oil seal from oil seal retainer.

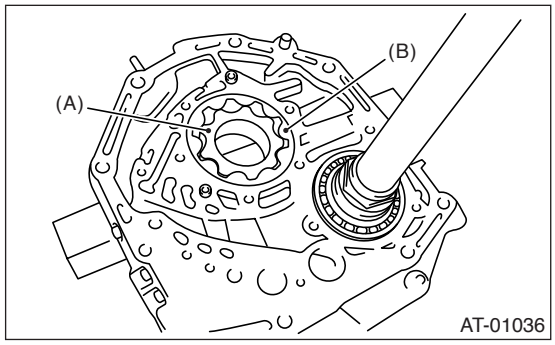


(A) Oil seal
(B) Oil seal retainer

D: ASSEMBLY

1. OIL PUMP COVER

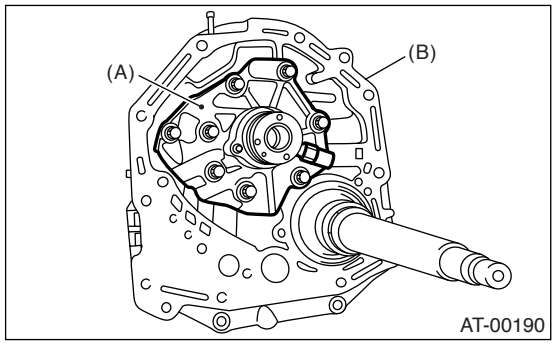
1) Install the oil pump rotor assembly to oil pump housing.



(A) Inner rotor
(B) Outer rotor

2) Align both pivots with the pivot holes of cover, and then install the oil pump cover being careful not to apply excessive force to the pivots.

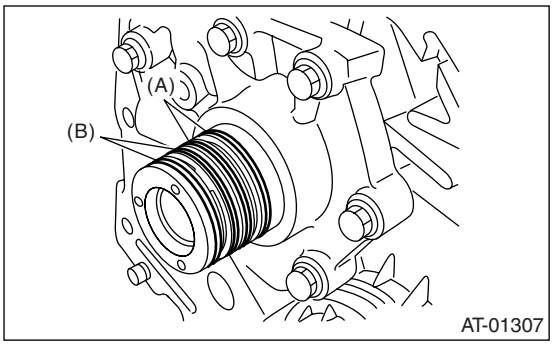
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Oil pump cover
(B) Oil pump housing

3) After assembling, turn the oil pump shaft to check the smooth rotation of rotor.

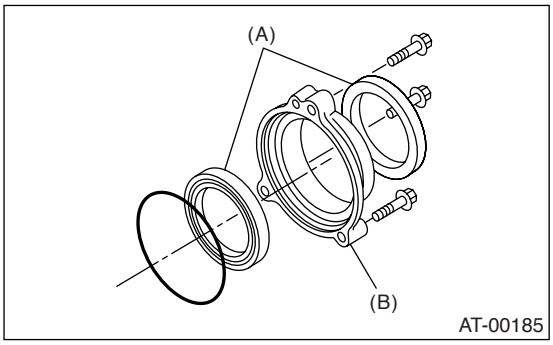
4) Apply vaseline to the oil seal retainer and new seal rings, and install them. After installing, adjust the tooth contact and backlash of drive pinion. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>



(A) Seal ring (Black)
(B) Seal ring (Brown)

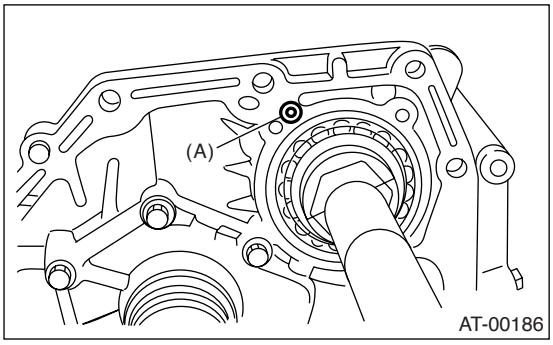
2. OIL SEAL RETAINER

1) Apply ATF to new oil seals (two), and install them to the oil seal retainer in proper direction using ST.
ST 499247300 INSTALLER



(A) Oil seal
(B) Oil seal retainer

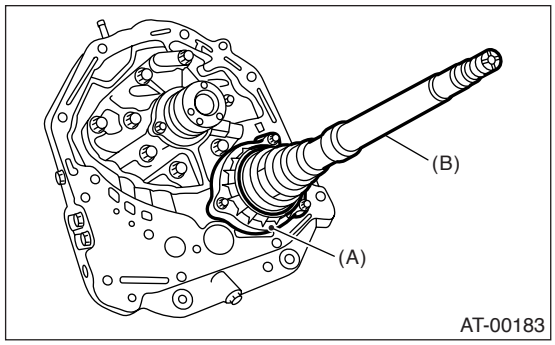
2) Apply ATF to a new O-ring and install it to the oil seal retainer. Install the seal to oil pump housing bore.



(A) O-ring

3) Install the oil seal and secure it using three bolts being careful not to damage oil seal lip.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

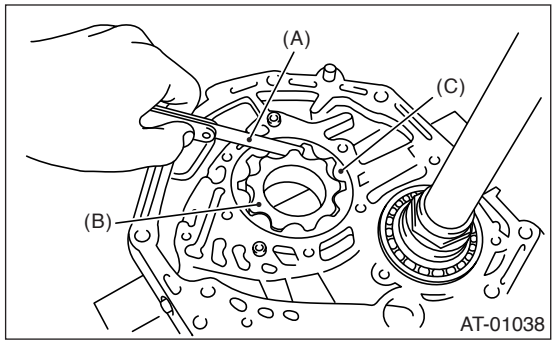


(A) Oil seal retainer
(B) Drive pinion shaft

E: INSPECTION

1) Check the seal ring and oil seal for breaks and damages.
2) Check other parts for dents or abnormalities.
3) Selection of oil pump rotor assembly
(1) Tip clearance
Install the inner rotor and outer rotor to oil pump. With rotor gears facing each other, measure the crest-to-crest clearance.

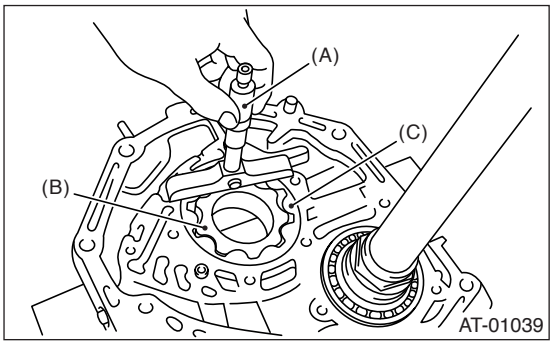
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(A) Thickness gauge
(B) Inner rotor
(C) Outer rotor

(2) Side clearance
Set a depth gauge to oil pump housing, then measure the oil pump housing-to-rotor clearance.

Side clearance:
0.02 — 0.04 mm (0.0008 — 0.0016 in)



(A) Depth gauge
(B) Inner rotor
(C) Outer rotor

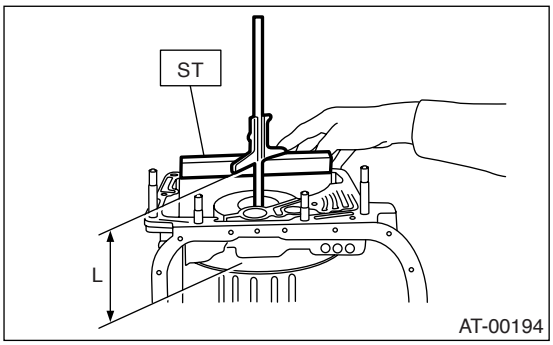
(3) If the depth and/or side clearance are not within the specifications, replace the rotor assembly.

Oil pump rotor ASSY	
Part number	Thickness mm (in)
15008AA060	11.37 — 11.38 (0.4476 — 0.4480)
15008AA070	11.38 — 11.39 (0.4480 — 0.4484)
15008AA080	11.39 — 11.40 (0.4484 — 0.4488)

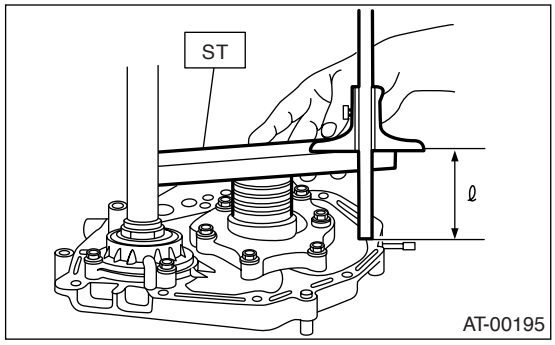
Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

F: ADJUSTMENT

1) Using the ST, measure the length “L”, which is from the mating surface of transmission to the recessed portion of high clutch drum.
ST 398643600 GAUGE

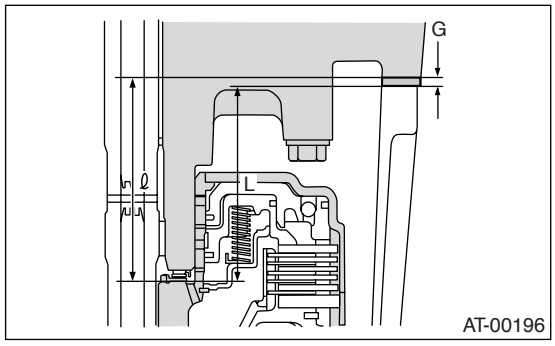


2) Using the ST, measure the length from oil pump housing mating surface to the top surface of oil pump cover with thrust needle bearing.
ST 398643600 GAUGE



3) Calculation of total end play
Select the suitable bearing race from among those listed in this table so that clearance C to be within 0.25 to 0.55 mm (0.0098 to 0.0217 in).
C = (L + G) − ℓ

C	Clearance between concave portion of high clutch and end of clutch drum support
L	Length from case mating surface to concave portion of high clutch
G	Gasket thickness [0.28 mm (0.0110 in)]
ℓ	Height from housing mating surface to upper surface of clutch drum support



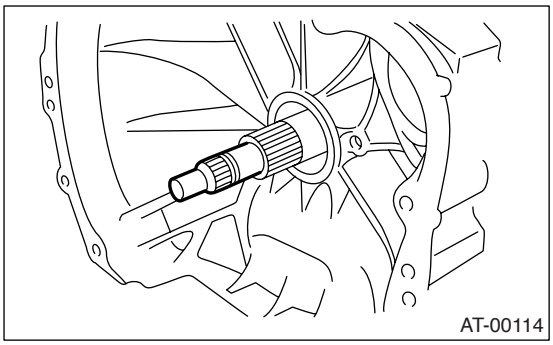
Thrust needle bearing	
Part number	Thickness mm (in)
806528050	4.1 (0.161)
806528060	4.3 (0.169)
806528070	4.5 (0.177)
806528080	4.7 (0.185)
806528090	4.9 (0.193)
806528100	5.1 (0.201)

4) After completing the end play adjustment, insert the bearing race in recess of the high clutch. Install the thrust needle bearing to oil pump cover using vaseline.
5) After correctly install the new gasket to the case mating surface, carefully install the oil pump housing assembly. Be careful to avoid hitting the drive pinion against the inside of case.
6) Install both parts with dowel pins aligned. Make sure no clearance at mating surface.

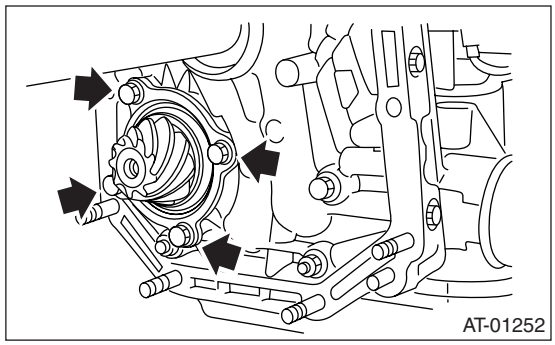
38.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.


AT-00114

4) Lift-up the lever on rear side of transmission harness connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.
6) Disconnect the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>
7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separate the converter case and transmission case part. <Ref. to 4AT-101, REMOVAL, Converter Case.>
10) Separate the transmission case and extension case part. <Ref. to 4AT-82, REMOVAL, Extension Case.>
11) Remove the reduction drive gear. <Ref. to 4AT-96, REMOVAL, Reduction Drive Gear.>
12) Remove the reduction driven gear. <Ref. to 4AT-94, REMOVAL, Reduction Driven Gear.>
13) Remove the drive pinion shaft mounting bolt and remove the drive shaft assembly from oil pump housing.

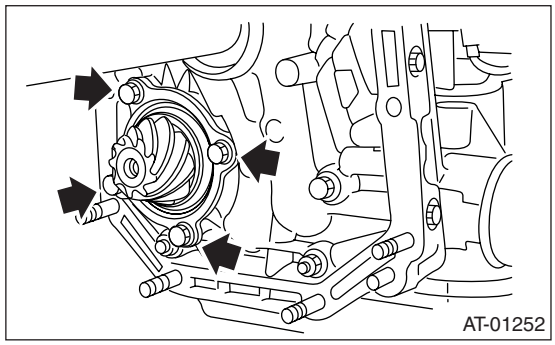

AT-01252

B: INSTALLATION

1) Assemble the drive pinion assembly to oil pump housing.

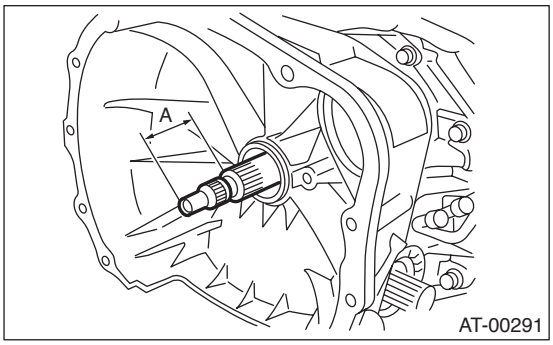
NOTE:
- Be careful not to bend the shim.
- Be careful not to press-fit the pinion into housing bore.

Tightening torque:
40 N·m (4.0 kgf-m, 30 ft-lb)


AT-01252

2) Combine the torque converter case with transmission case. <Ref. to 4AT-101, INSTALLATION, Converter Case.>
3) Install the reduction driven gear. <Ref. to 4AT-94, INSTALLATION, Reduction Driven Gear.>
4) Install the reduction drive gear. <Ref. to 4AT-96, INSTALLATION, Reduction Drive Gear.>
5) Combine the transmission case with the extension case, and then install the rear vehicle speed sensor. <Ref. to 4AT-82, INSTALLATION, Extension Case.>
6) Insert the inhibitor switch and transmission connector to the stay.
7) Install the oil cooler inlet and outlet pipes. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
8) Install the oil charge pipe with O-ring.
9) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

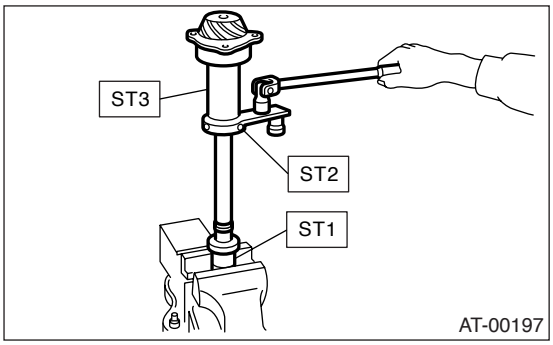
Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



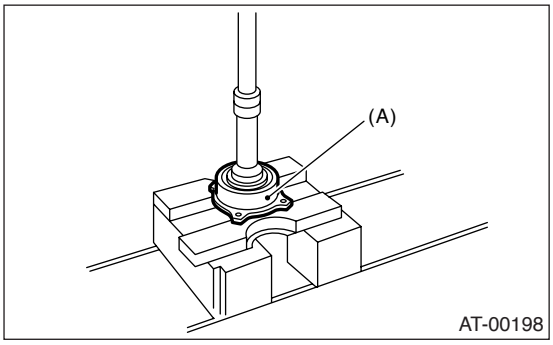
10) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
11) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

1) Remove the caulking part of lock nut, and then remove the lock nut with holding the rear spline part of shaft using ST1 and ST2. Pull out the drive pinion collar.
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

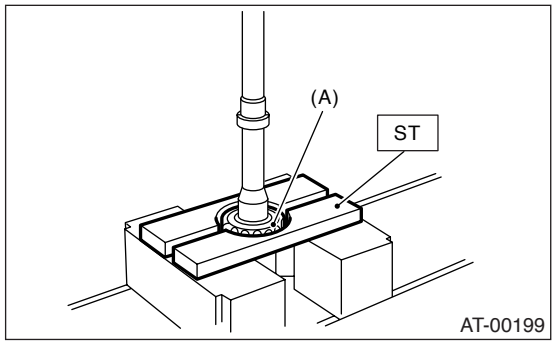


2) Remove the O-ring.
3) Separate the roller bearing and outer race from shaft using press.



(A) Outer race

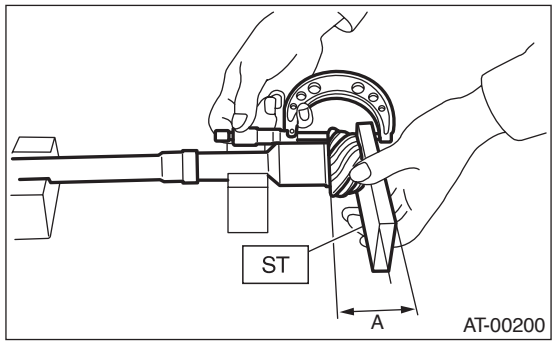
4) Separate the front roller bearing from shaft using a press and ST.
ST 498517000 REPLACER



(A) Front roller bearing

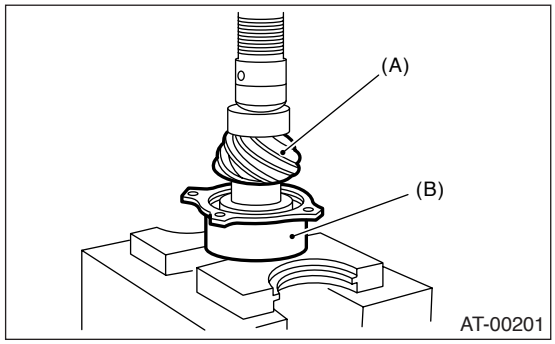
D: ASSEMBLY

1) Measure the dimension “A” of drive pinion shaft
ST 398643600 GAUGE



2) Using a press, press-fit the new roller bearing into specified position.

NOTE:
If excessive force is applied to roller bearing, the roller bearing will not turn easily.



(A) Drive pinion shaft
(B) Roller bearing

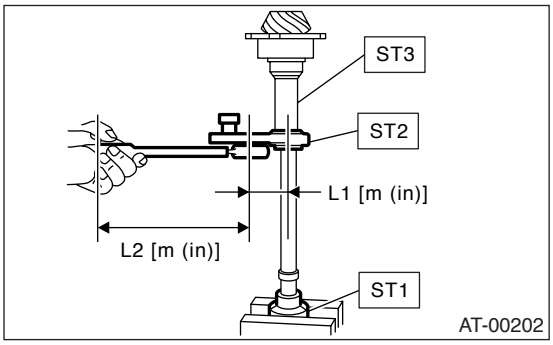
3) After applying ATF to a new O-ring and fitting it to the shaft, attach the drive pinion collar to shaft.
4) Install the lock washer to drive pinion shaft in proper direction.

5) Tighten the new lock nuts using ST1, ST2 and ST3.
Calculate the lock washer and lock nut specifications using following formula.
T2 = L2/(L1 + L2) × T1
T1: 116 N·m (11.8 kgf-m, 85.3 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST2 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	98 (10.0, 72)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75)

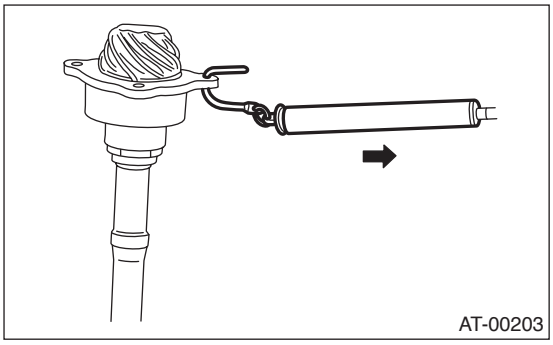
ST1 498937110 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Install the ST2 to torque wrench as straight as possible.



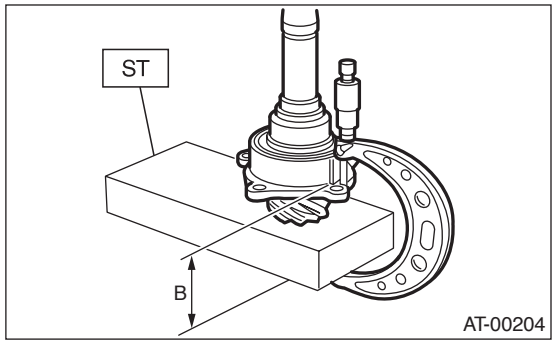
6) Measure the starting torque of bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 8.6 lb)



7) Stake the lock nut at two points.
8) Measure the dimension “B” of drive pinion shaft

ST 398643600 GAUGE



9) Calculate the thickness “t” (mm) of drive pinion shim.
t = 6.5 ± 0.0625 − (B − A)
10) Select three or less shims from following table.

Drive pinion shim	
Part number	Thickness mm (in)
31451AA050	0.150 (0.0059)
31451AA060	0.175 (0.0069)
31451AA070	0.200 (0.0079)
31451AA080	0.225 (0.0089)
31451AA090	0.250 (0.0098)
31451AA100	0.275 (0.0108)

E: INSPECTION

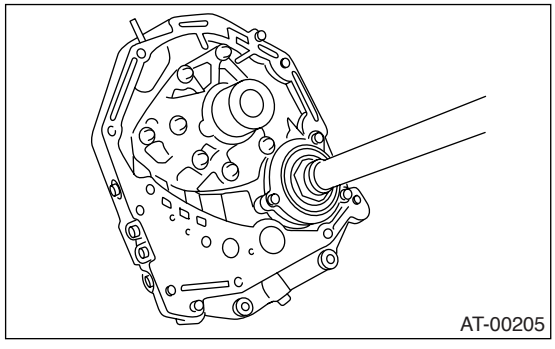
• Make sure that all component parts are free of harmful cut, gouges, and other faults.
• Adjust the teeth alignment. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

F: ADJUSTMENT

1) Remove the liquid gasket completely.
2) Install the oil pump housing assembly to converter case, and secure them with tightening four bolts evenly.

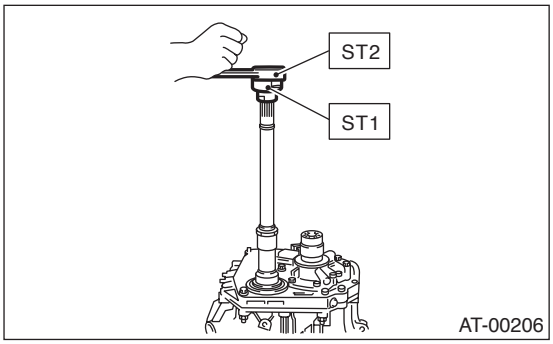
NOTE:
Use an old gasket or an aluminum washer so as not to damage the mating surface of housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



3) Rotate the drive pinion several times using ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH



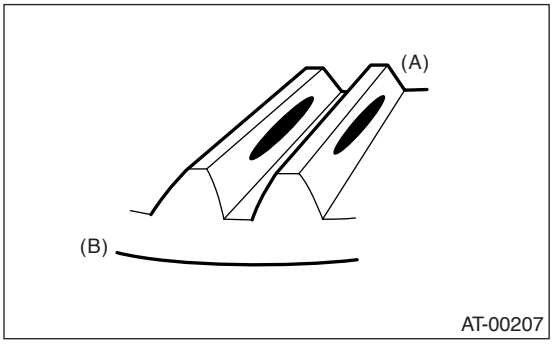
4) Adjust backlash between drive pinion and crown gear. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

5) Apply red lead evenly to the surfaces of three or four teeth on crown gear. Rotate the drive pinion in the forward and reverse directions for several times. Remove the oil pump housing, and check the tooth contact pattern.

If the tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

• Correct tooth contact

Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

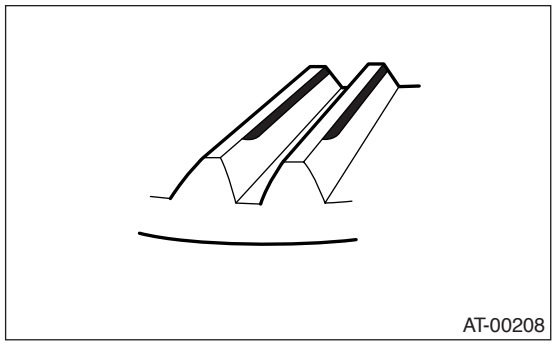


(A) Toe side
(B) Heel side

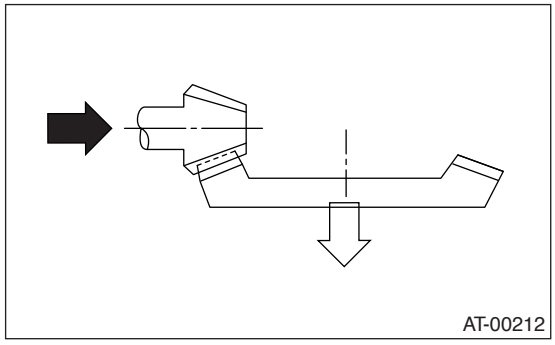
• Face contact

Checking item: Backlash is too large.

Contact pattern



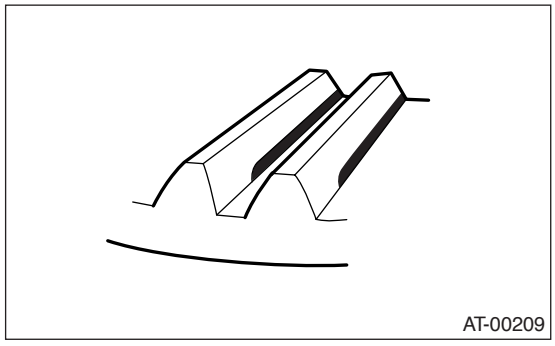
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion close to driven gear.



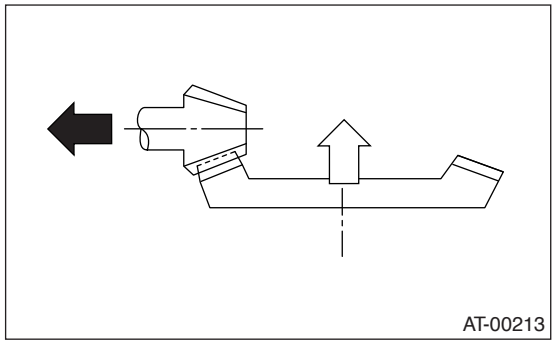
• Flank contact

Checking item: Backlash is too small.

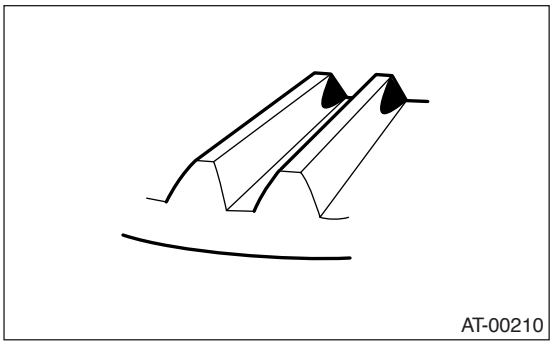
Contact pattern



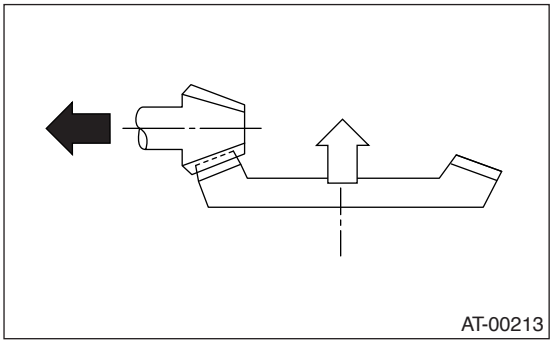
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



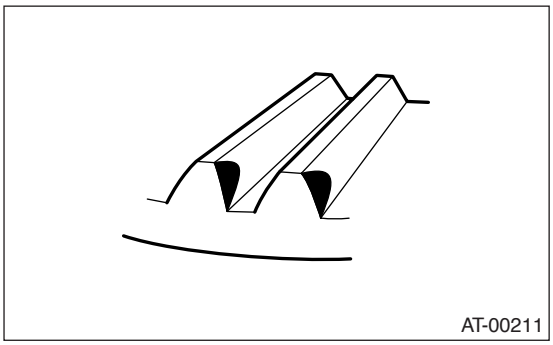
• Toe contact (inside end contact)
Checking item: Contact area is small.
Contact pattern



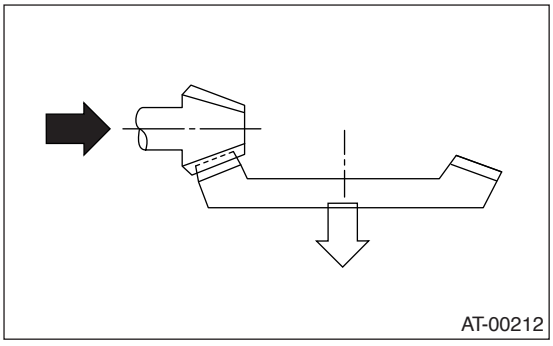
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



• Heel contact (outside end contact)
Checking item: Contact area is small.
Contact pattern

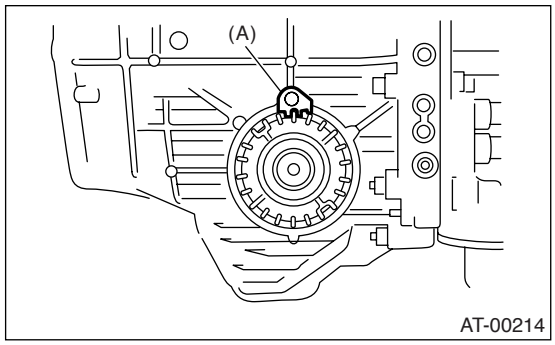


Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion close to driven gear.



6) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the retainer to the marked position. Tighten the lock plate with specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

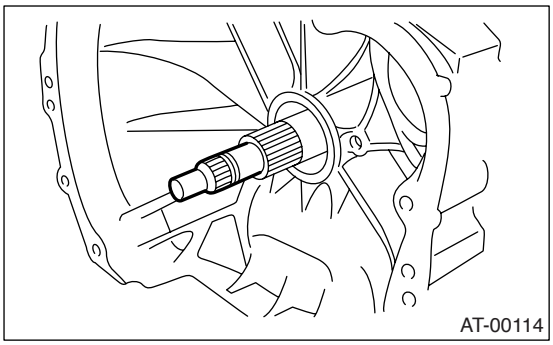


(A) Lock plate

39.Front Differential Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.



4) Lift-up the lever on rear side of transmission harness connector, and then remove it from the stay.
5) Remove the inhibitor switch from the stay.
6) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
7) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
8) Separate the converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
9) Remove the seal pipe.
10) Remove the differential side retainers using ST.

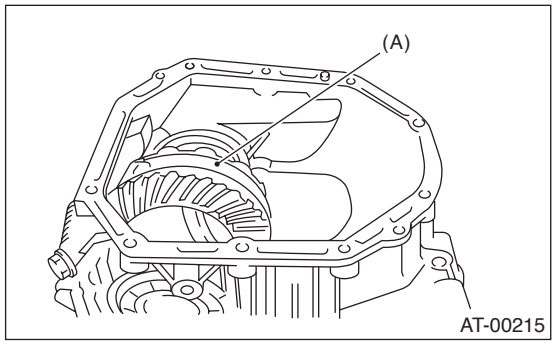
NOTE:
Hold the differential case assembly by hand to avoid damaging retainer mounting hole of converter case.

ST 499787000 WRENCH ASSY

11) Remove the differential assembly without damaging installation part of retainer.

B: INSTALLATION

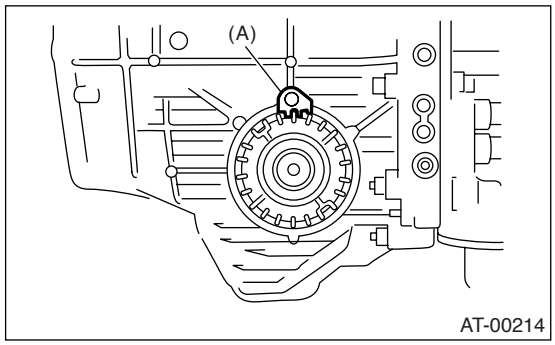
1) When installing the differential assembly to case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).



(A) Differential assembly

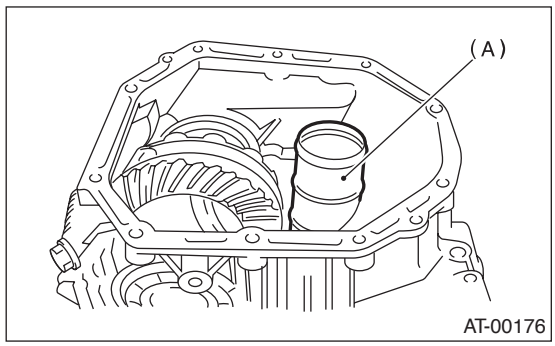
2) Install the O-ring to left and right side retainer.
3) Install the side retainers using ST. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>
ST 499787000 WRENCH ASSY
4) Adjust the front differential backlash. <Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>
5) Install the lock plate.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



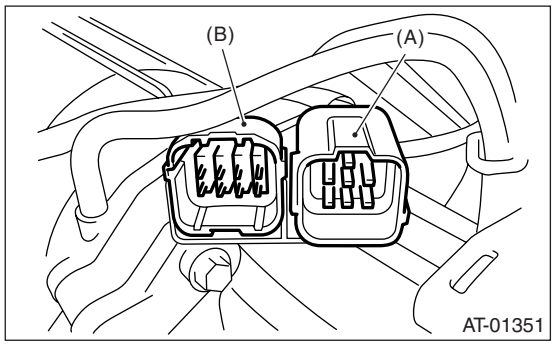
(A) Lock plate

6) Install the new seal pipe to converter case.



(A) Seal pipe

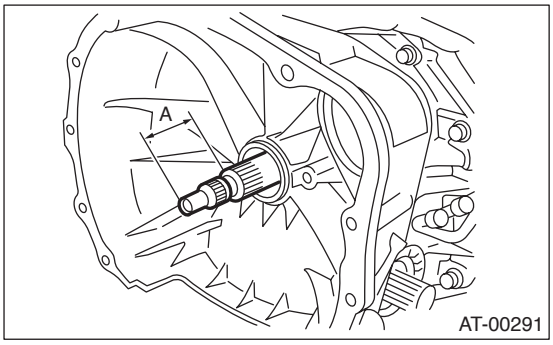
7) Install the converter case to transmission case. <Ref. to 4AT-101, INSTALLATION, Converter Case.>
8) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

9) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
10) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
11) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

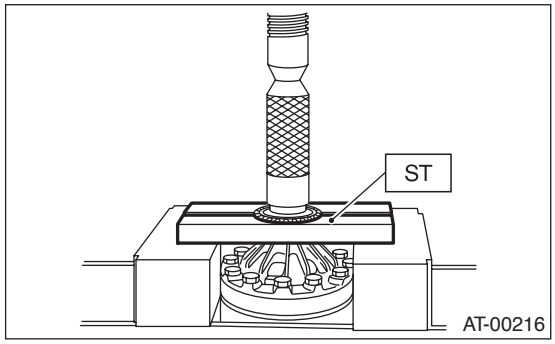


12) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

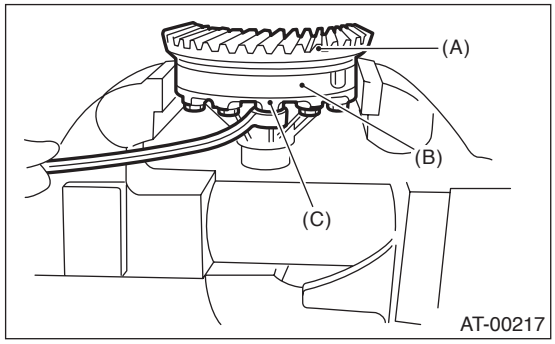
C: DISASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Remove taper roller bearing using ST and press.
ST 498077000 REMOVER

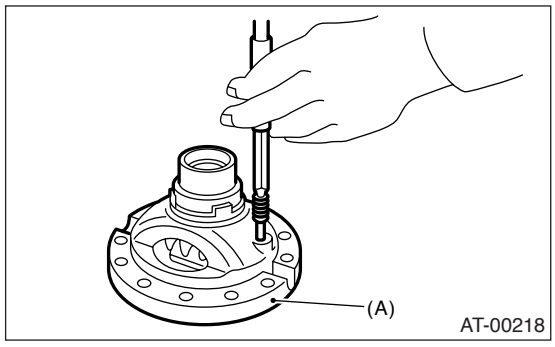


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear, case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.

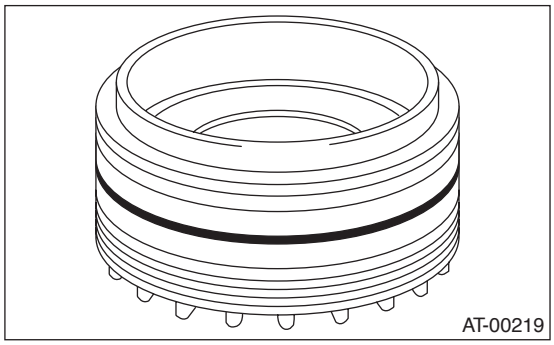


(A) Differential case (RH)

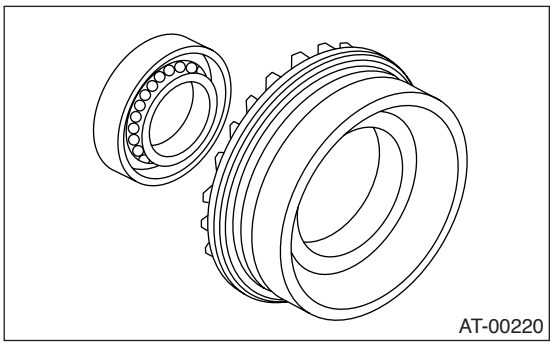
2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

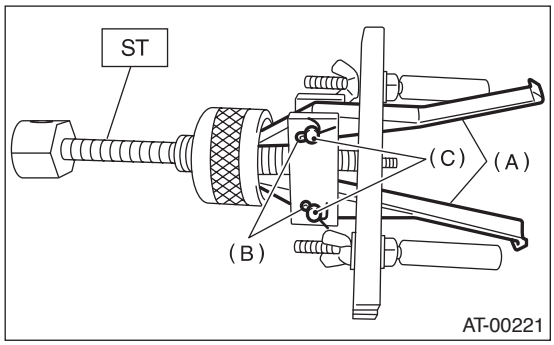
1) Remove the O-ring.



2) Remove the oil seal.

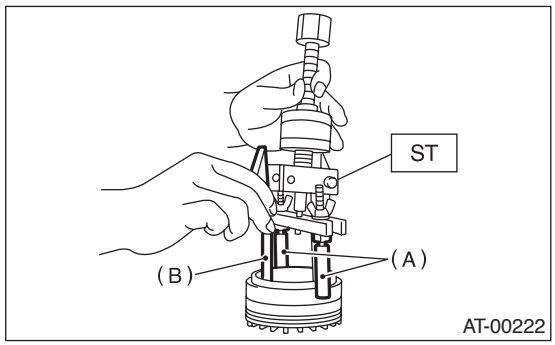


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



(A) Claw
(B) Split pin
(C) Pin

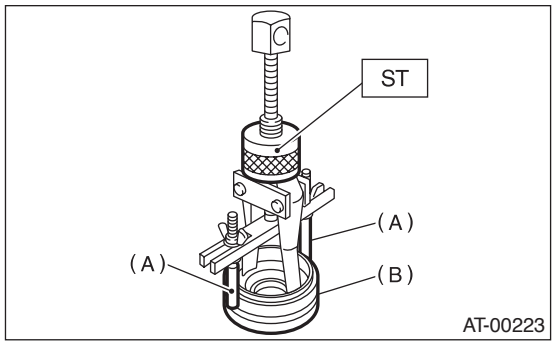
4) Attach two claws to the outer race, and set the ST to side retainer.
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.
6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

NOTE:
Replace the bearing inner and outer races as a single unit.

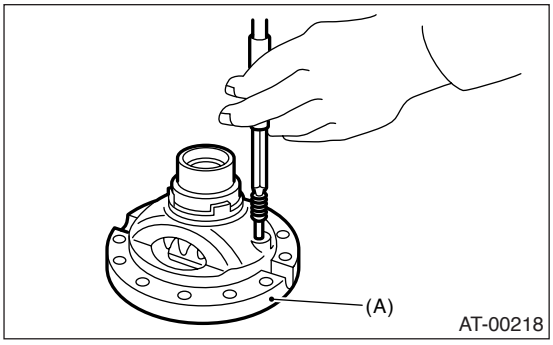


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

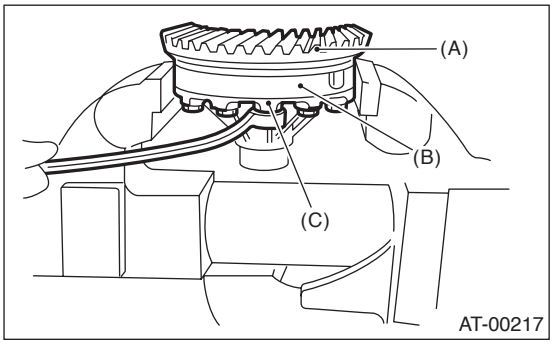
1) Install the washer, differential bevel gear and differential bevel pinion in differential case (RH). Insert the pinion shaft.
2) Install the straight pin in reverse direction.



(A) Differential case (RH)

3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (RH) on the case, and then combine the both cases.
4) Install the hypoid driven gear and secure by tightening the bolt.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

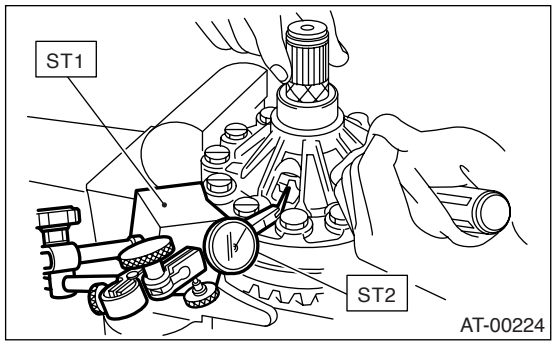


(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

5) Measurement of backlash (Selection of washer)
(1) Install the SUBARU genuine axle shaft to differential case.
Parts No. 38415AA070 AXLE SHAFT
(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 from the access window of case.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

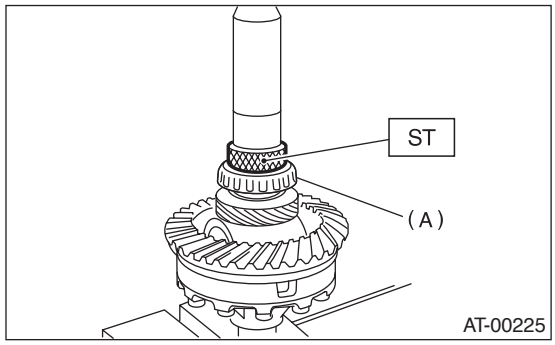
Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



(3) If the backlash is not within specified, select a washer from the table below.

Washer	
Part number	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

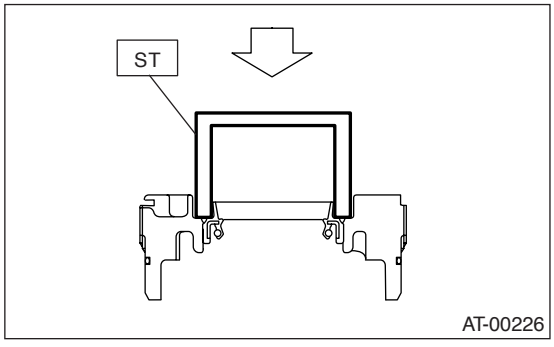
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT



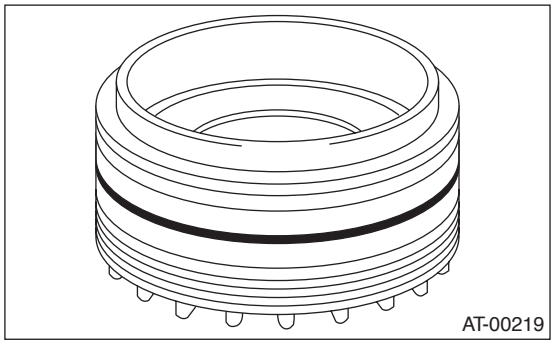
(A) Taper roller bearing

2. SIDE RETAINER

1) Install the bearing outer race to side retainer.
2) Install a new oil seal using ST and hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



3) Apply gear oil to a new O-ring and install it.



E: INSPECTION

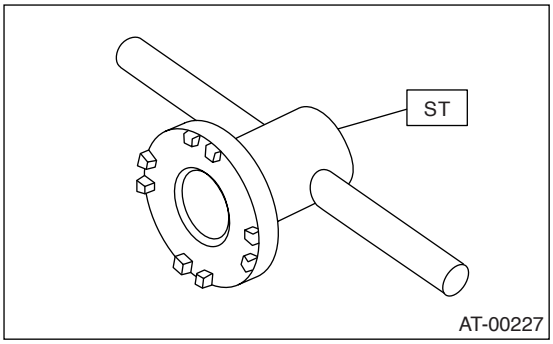
• Check each component for scratches, damage and other faults.
• Measure the backlash, and then adjust it within specification.
<Ref. to 4AT-117, ADJUSTMENT, Front Differential Assembly.>

F: ADJUSTMENT

1) Using the ST, screw-in the retainer until light contact is felt.

NOTE:
Screw-in the RH side slightly deeper than the LH side.

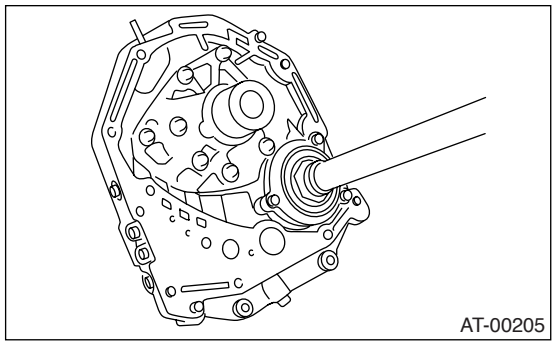
ST 499787000 WRENCH ASSY



2) Remove the oil pump housing.
3) Remove the liquid gasket completely.
4) Install the oil pump housing assembly to converter case, and secure them with tightening four bolts evenly.

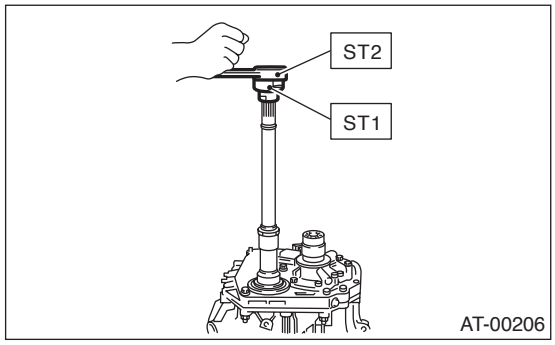
NOTE:
Use an old gasket or an aluminum washer so as not to damage the mating surface of housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

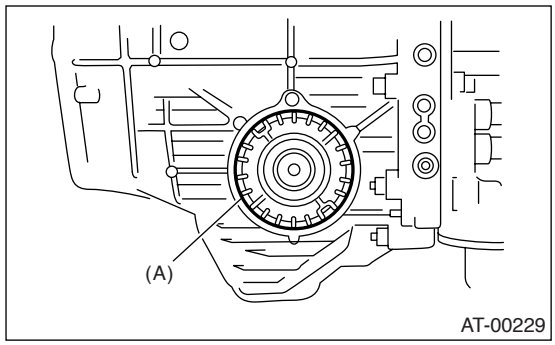


5) Rotate the drive pinion several times using ST1 and ST2.

ST1 498937110 HOLDER
ST2 499787700 WRENCH

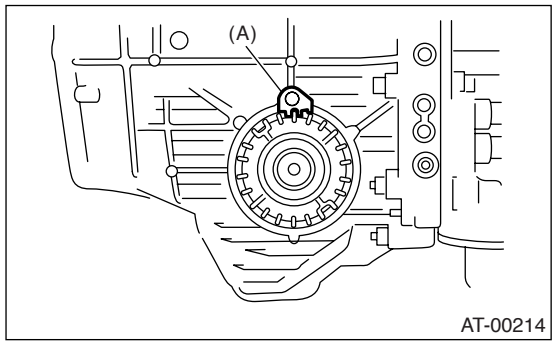


6) Tighten the retainer LH until contact is felt while rotating the shaft. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft cannot be turned. This is the “zero” state.



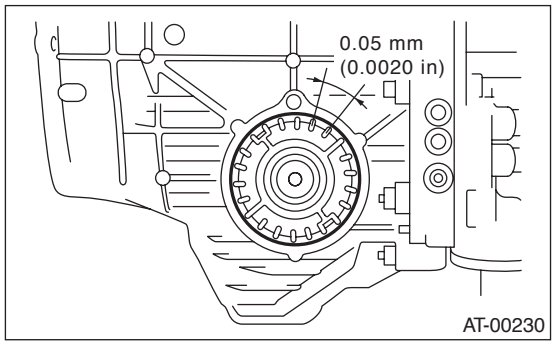
(A) Retainer

7) After the “zero” state is established, back off the retainer LH 3 notches and secure it with the lock plate. Then back off the retainer RH and retighten until it stops. Rotate the drive pinion few times. Tighten the retainer RH 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).

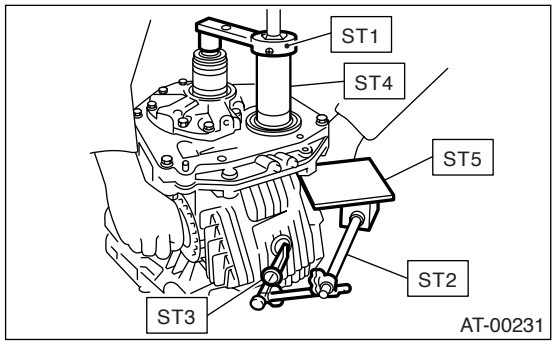


8) Install the SUBARU genuine axle shaft to both side of front differential part.
Parts No. 38415AA000 AXLE SHAFT

9) Turn the drive pinion several times with ST1 and check to see if the backlash is within the specified value with ST2, ST3, ST4 and ST5.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

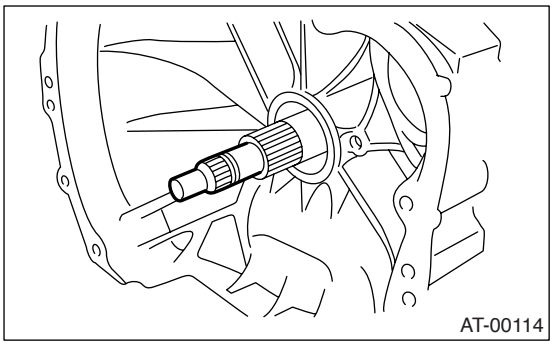


10) Adjust the tooth contact between front differential and drive shaft. <Ref. to 4AT-110, ADJUSTMENT, Drive Pinion Shaft Assembly.>

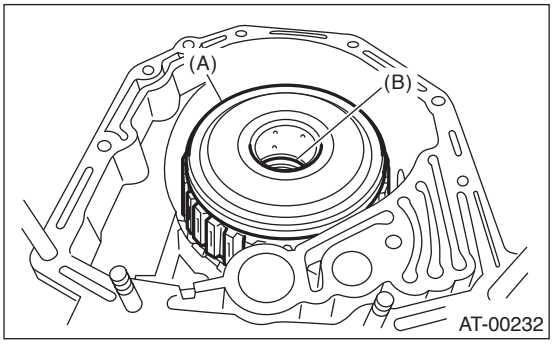
40.AT Main Case

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.

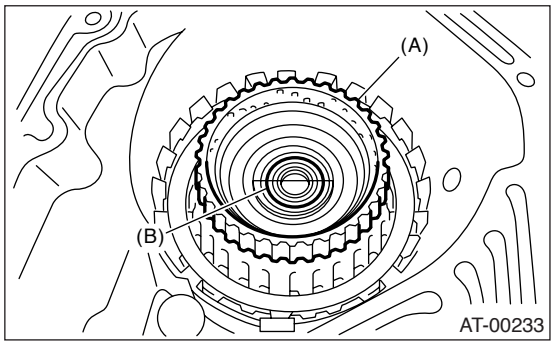


4) Lift-up the lever on the rear side of transmission harness connector, and then disconnect it from the stay.
5) Disconnect the inhibitor switch connector from the stay.
6) Disconnect the air breather hose.
7) Remove the oil charge pipe. <Ref. to 4AT-79, REMOVAL, Oil Charge Pipe.>
8) Remove the oil cooler inlet and outlet pipes. <Ref. to 4AT-67, REMOVAL, ATF Cooler Pipe and Hose.>
9) Separate the converter case and transmission case. <Ref. to 4AT-101, REMOVAL, Converter Case.>
10) Remove the oil pump housing.
<Ref. to 4AT-103, REMOVAL, Oil Pump Housing.>
11) Take out the high clutch, thrust needle bearing and reverse clutch assembly.



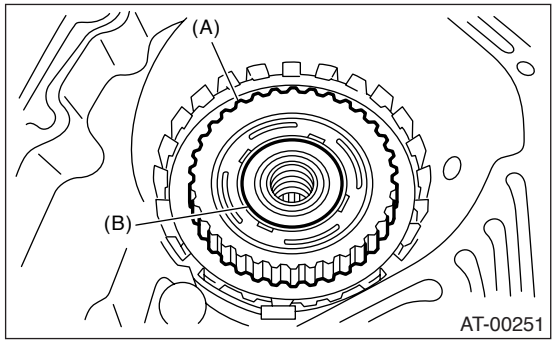
(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing

12) Take out the high clutch hub and thrust bearing.



(A) High clutch hub
(B) Thrust needle bearing

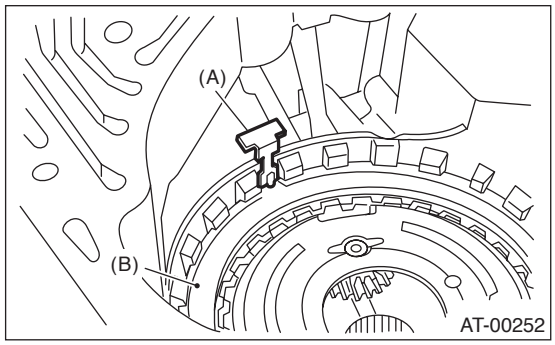
13) Take out the front sun gear and thrust needle bearing.



(A) Front sun gear
(B) Thrust needle bearing

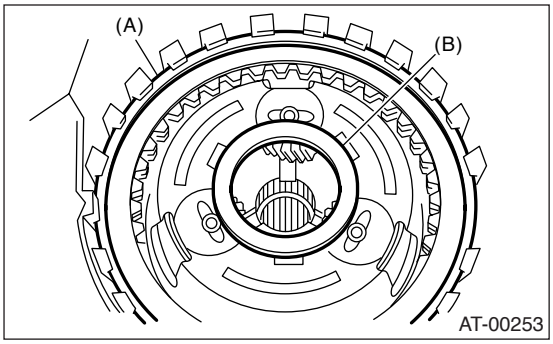
14) Pull out the leaf spring without folding.

NOTE:
Remove it while pressing down on lower leaf spring.



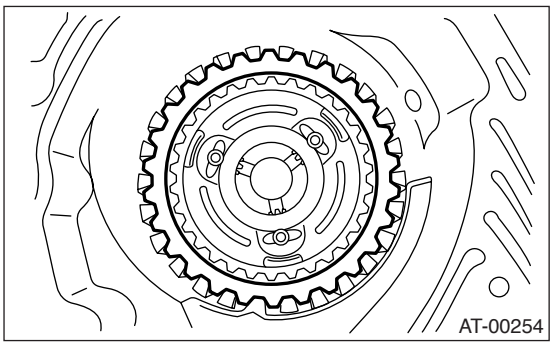
(A) Leaf spring
(B) Retaining plate

15) Remove the snap ring and thrust needle bearing.

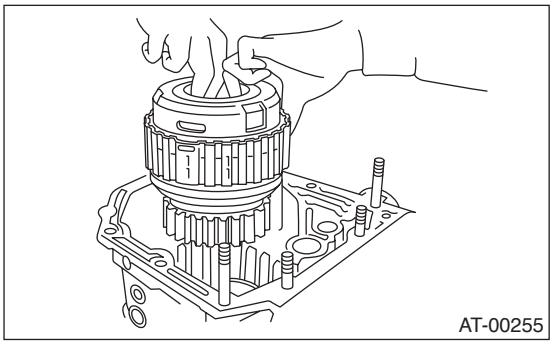


(A) Snap ring
(B) Thrust needle bearing

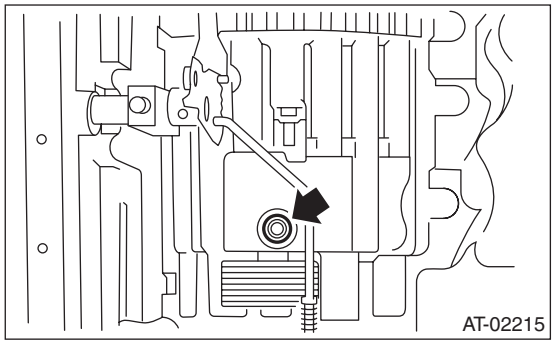
16) Take out the retaining plate, drive plate and driven plate of 2-4 brake.



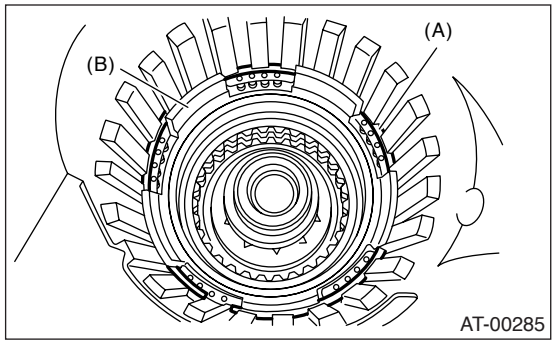
17) Take out the thrust needle bearing, planetary gear assembly and low clutch assembly.



18) Remove the 2-4 brake seal.

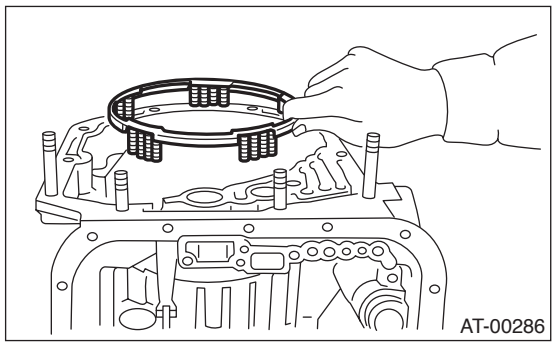


19) Remove the snap ring.

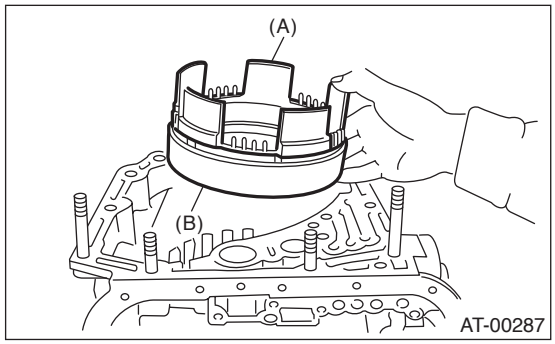


(A) Snap ring
(B) 2-4 brake piston

20) Take out the 2-4 brake return spring.

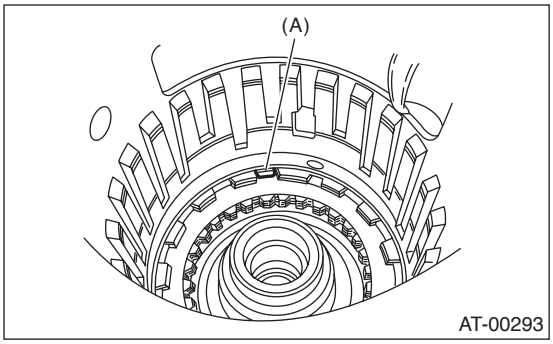


21) Remove the 2-4 brake piston and piston retainer without damaging.



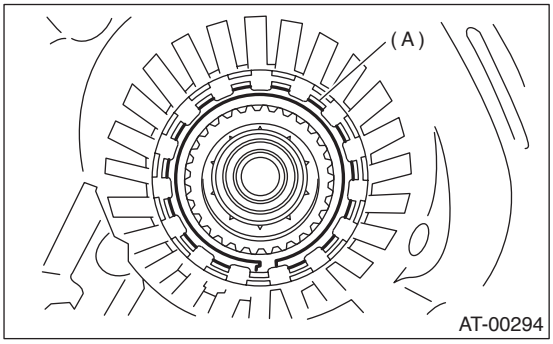
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

22) Pull out the leaf spring without folding.



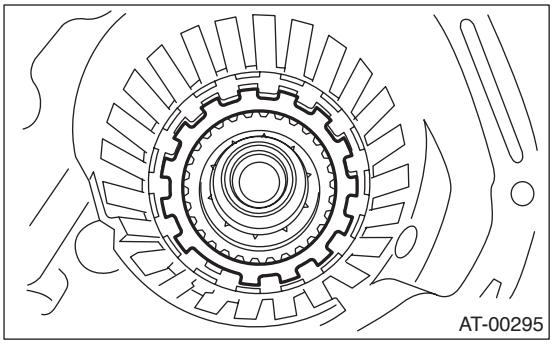
(A) Leaf spring

23) Remove the snap ring.

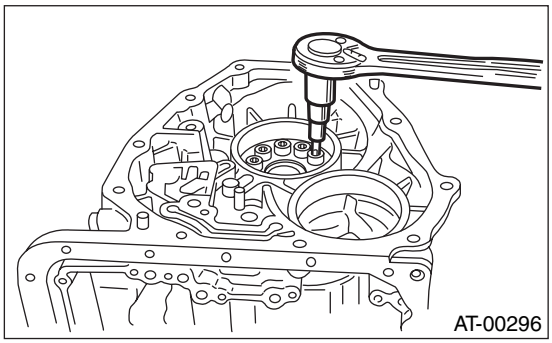


(A) Snap ring

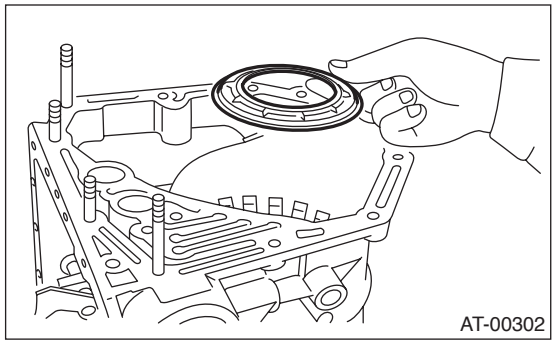
24) Take out the retaining plate, drive plate, driven plate and dish plate.



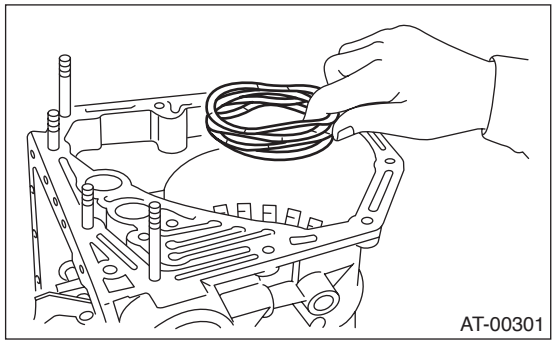
25) Turn the transmission case upside down, and then take out the socket bolts while holding the one-way clutch inner race with hand.



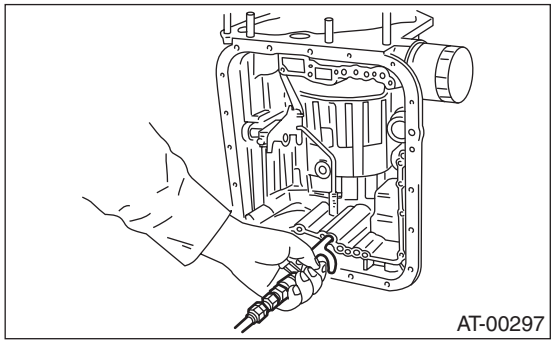
26) Remove the spring retainer.



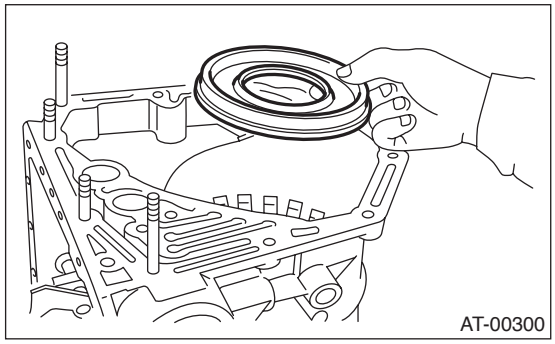
27) Take out the return spring.



28) Apply compressed air.



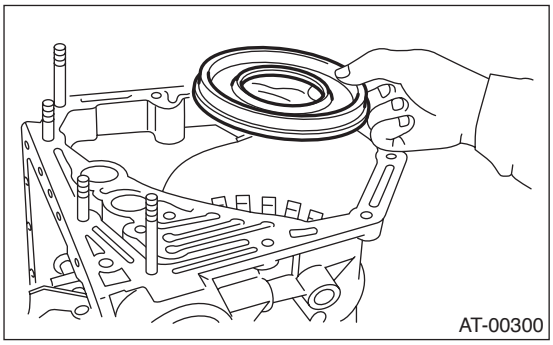
29) Take out the low & reverse piston.



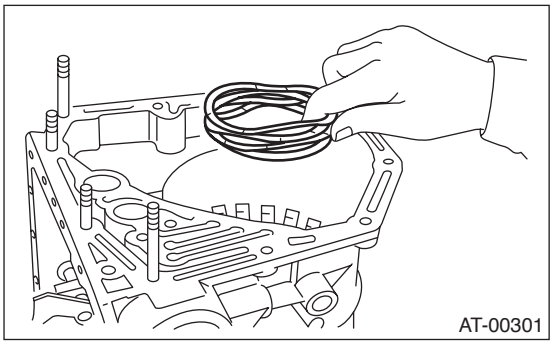
B: INSTALLATION

1) Install the low & reverse brake piston.

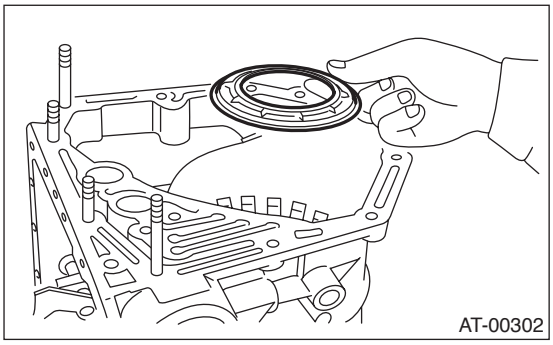
NOTE:
- Be careful not to damage the lip seal.
- Apply ATF to the lip.



2) Install the return spring.

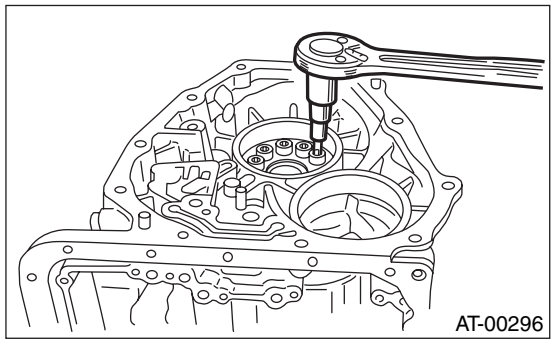


3) Install the spring retainer.



4) Install the one-way clutch inner race, spring retainer and return spring.
5) Tighten the socket bolts evenly from the rear side of transmission case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



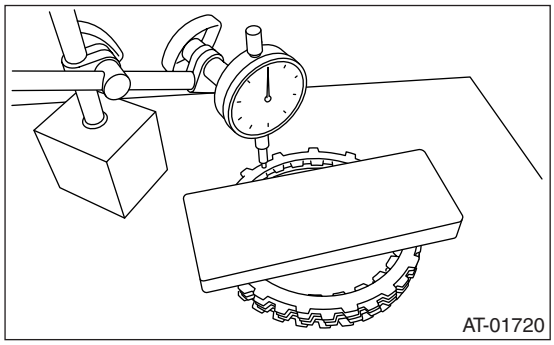
6) Place the front side of transmission body up.
7) Install the thrust needle bearing.
8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to clutch, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.

10) Scale and record the weight “Z” of a flat board which will be put on plates.

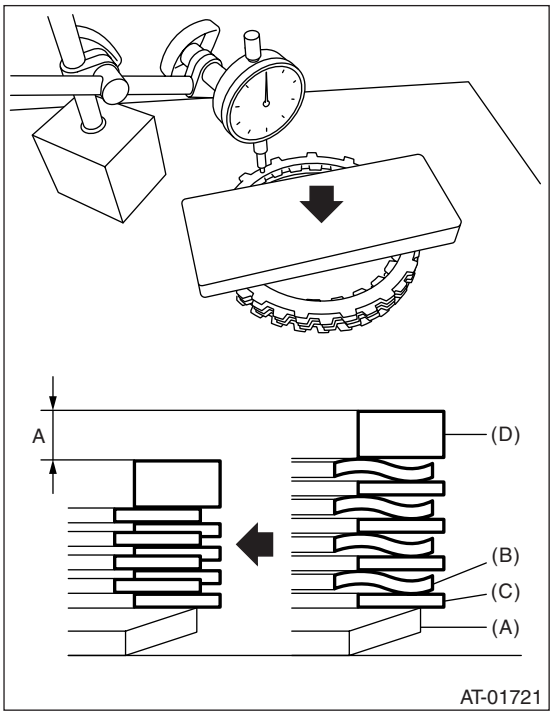
NOTE:
- Use a stiff flat board which does not bend against load.
- Use a flat board of its weight less than 83 N (8.5 kgf, 18.7 lb).

11) Put the flat board on retaining plate.



12) Using the following formula, calculate “N” indicated on the push/pull gauge.
N = 83 N (8.5 kgf, 18.7 lb) − Z
N: Value indicated on push/pull gauge
83 N (8.5 kgf, 18.7 lb): Load applied to clutch plate
Z: Flat board weight
13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

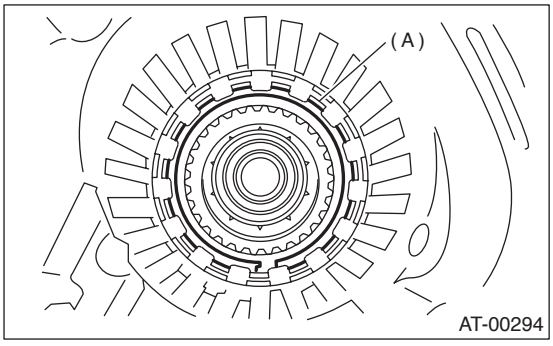
NOTE:
If three points, measure the height every 120°. If four points, measure the height every 90°.



(A) Dish plate
(B) Driven plate
(C) Drive plate
(D) Retaining plate

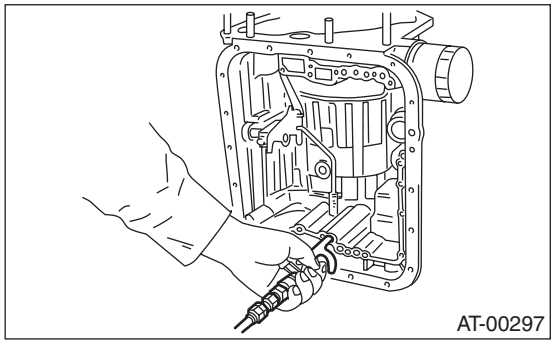
14) Installation of the low & reverse brake:
Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.

NOTE:
Pay attention to the orientation of dish plate.



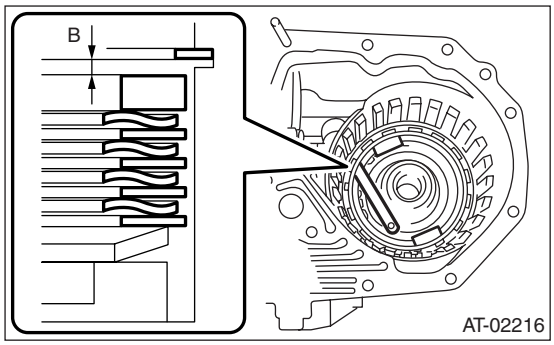
(A) Snap ring

15) Apply compressed air intermittently to check for operation.



16) Place the same thickness of shim on both sides to prevent the plate from tilting, and then measure and record the clearance B.

NOTE:
Do not press the shim downward with excessive force, or else the waveform of drive plates will be broken down.



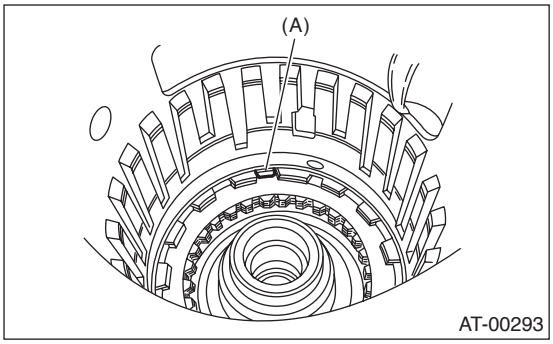
17) Piston stroke calculation
Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the service limit, replace the drive plate with a new one and adjust it within the specitication.
T = A + B
T: Piston stroke
A: Collapse amount of drive plate
B: Clearance between retaining plate and snap ring

Initial standard:
2.15 — 2.65 mm (0.085 — 0.104 in)

Limit thickness:
2.95 mm (0.116 in)

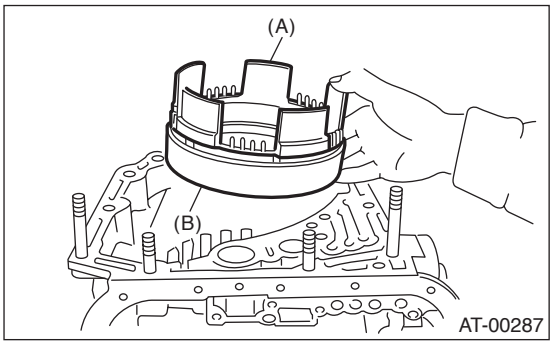
Retaining plate	
Part number	Thickness mm (in)
31667AA420	3.8 (0.150)
31667AA320	4.1 (0.161)
31667AA330	4.4 (0.173)
31667AA340	4.7 (0.185)
31667AA350	5.0 (0.197)
31667AA360	5.3 (0.209)
31667AA370	5.6 (0.220)
31667AA380	5.9 (0.232)

18) Install the leaf spring of low & reverse brake.



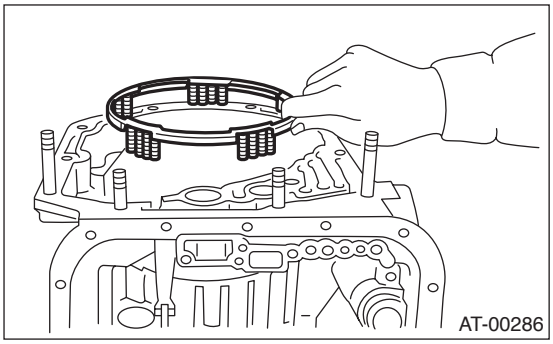
(A) Leaf spring

19) Install the 2-4 brake piston and 2-4 brake retainer by aligning the holes of 2-4 brake retainer and hole of transmission case.

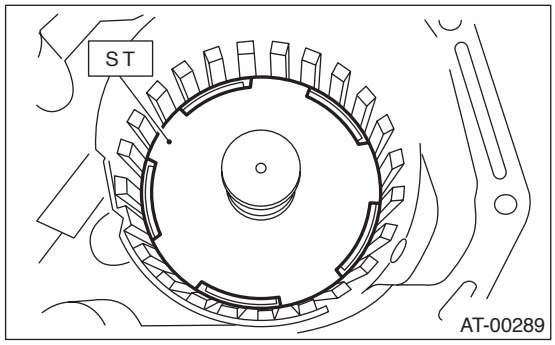


(A) 2-4 brake piston
(B) 2-4 brake piston retainer

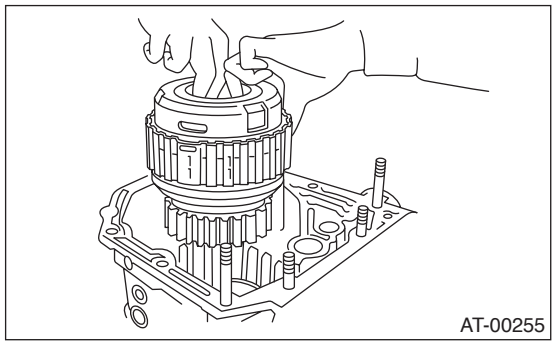
20) Install 2-4 brake piston return spring to transmission case.



21) Position the snap ring in transmission. Using the ST, press the snap ring into specified place.
ST 498677100 COMPRESSOR



22) Install the planetary gear and low clutch assembly to transmission case.
Install carefully while slowly rotating the low clutch and planetary gear assembly paying special attention not to damage the seal ring.



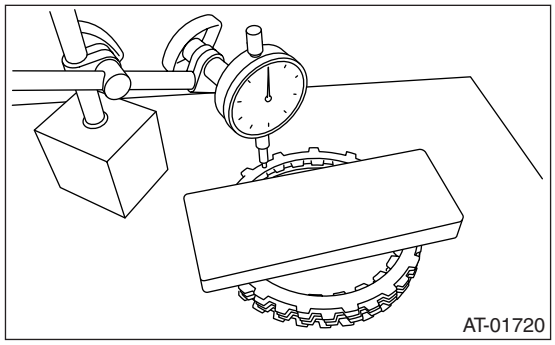
23) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
24) Set the micro gauge to clutch, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.

25) Scale and record the weight “Z” of a flat board which will be put on plates.

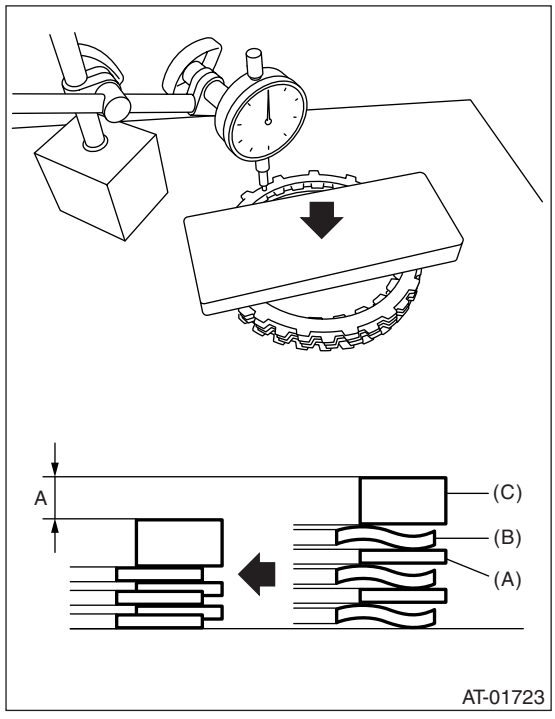
NOTE:
• Use a stiff flat board which does not bend against load.
• Use a flat board of its weight less than 100 N (10.2 kgf, 22.5 lb).

26) Put the flat board on retaining plate.



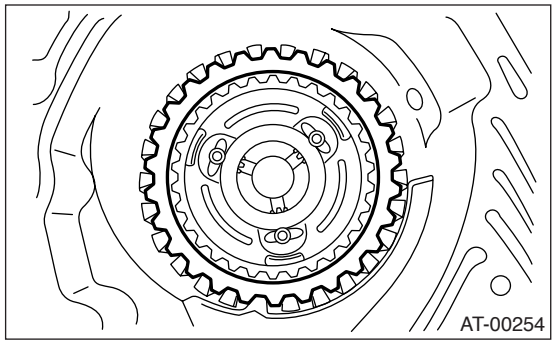
27) Using the following formula, calculate “N” indicated on the push/pull gauge.
N = 100 N (10.2 kgf, 22.5 lb) − Z
N: Value indicated on push/pull gauge
100 N (10.2 kgf, 22.5 lb): Load applied to clutch plate
Z: Flat board weight
28) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

NOTE:
If three points, measure the height every 120°. If four points, measure the height every 90°.

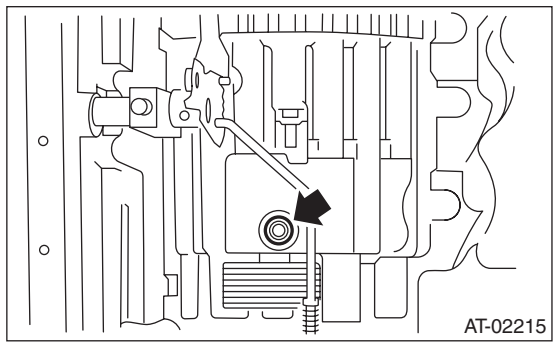


(A) Driven plate
(B) Drive plate
(C) Retaining plate

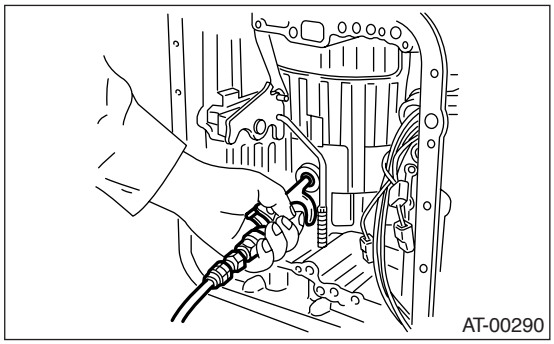
29) Install the pressure plate, drive plate, driven plate, retaining plate and snap ring.



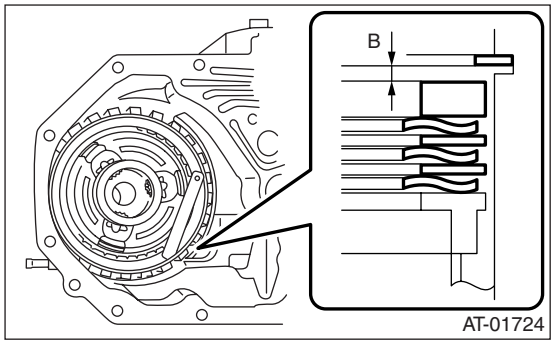
30) Install a new 2-4 brake oil seal to transmission case.



31) After all 2-4 brake component parts have been installed, blow air intermittently and confirm the operation of brake.



32) Measure and record the clearance B between the retaining plate and snap ring.



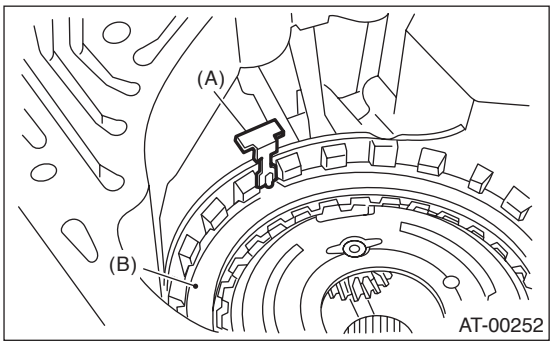
33) Piston stroke calculation
Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specitication.
T = A + B
T: Piston stroke
A: Collapse amount of drive plate
B: Clearance between retaining plate and snap ring

2.0 L SOHC model:
Initial standard:
1.4 — 1.8 mm (0.055 — 0.071 in)
Limit thickness:
1.95 mm (0.077 in)

Except for 2.0 L SOHC model:
Initial standard:
1.7 — 2.1 mm (0.067 — 0.083 in)
Limit thickness:
2.3 mm (0.091 in)

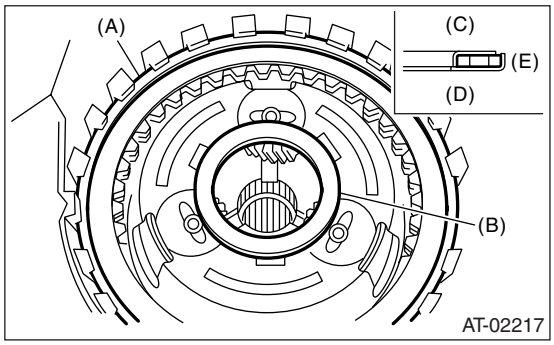
Retaining plate	
Part number	Thickness mm (in)
31567AA991	5.6 (0.220)
31567AB001	5.8 (0.228)
31567AB011	6.0 (0.236)
31567AB021	6.2 (0.244)
31567AB031	6.4 (0.252)
31567AB041	6.6 (0.260)

34) Be careful not to mistake the location of the leaf spring to be inserted.



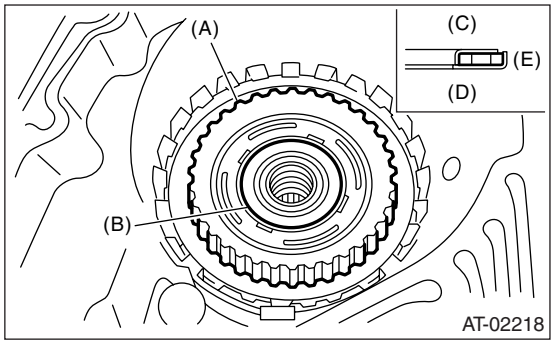
(A) Leaf spring
(B) Retaining plate

35) Install the thrust needle bearing in correct direction.



(A) Snap ring
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

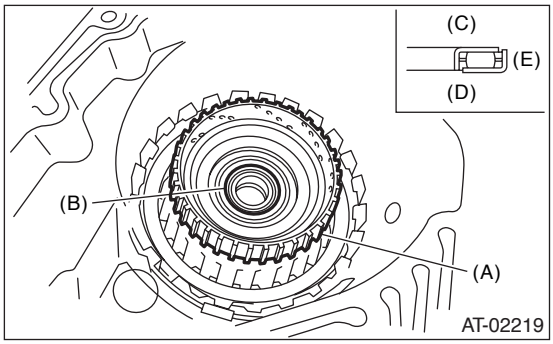
36) Install the front sun gear and thrust needle bearing.



(A) Front sun gear
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

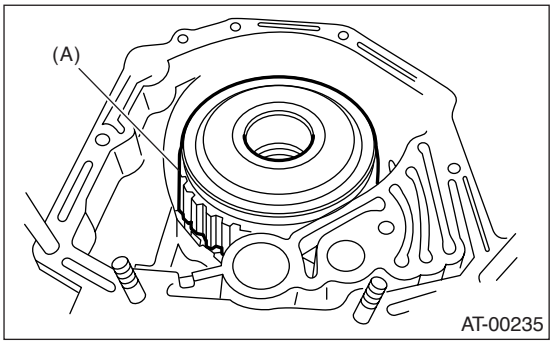
37) Install the high clutch hub.
Attach the thrust needle bearing to hub using vaseline, and then install the hub by correctly engaging the splines of the front planetary carrier.

38) Install the thrust needle bearing in proper direction.



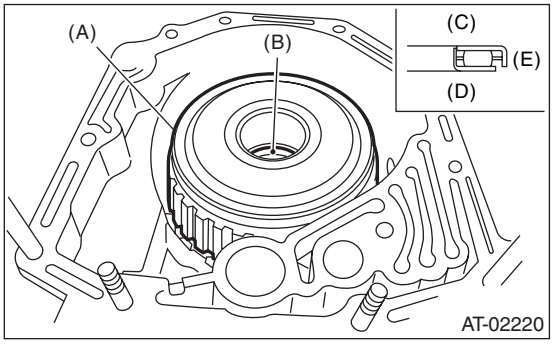
(A) High clutch hub
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

39) Install the high clutch assembly.



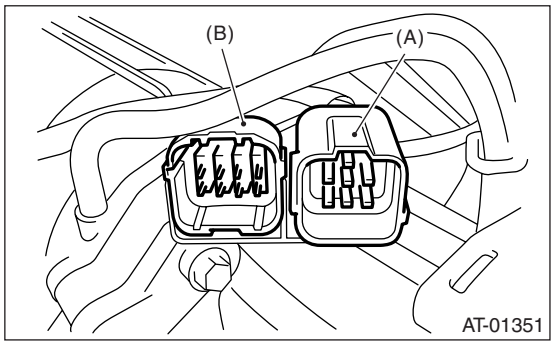
(A) High clutch and reverse clutch ASSY

40) Adjust the total end play. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>
41) Install the thrust needle bearing in proper direction.



(A) High clutch and reverse clutch ASSY
(B) Thrust needle bearing
(C) Upside
(D) Downside
(E) Outside

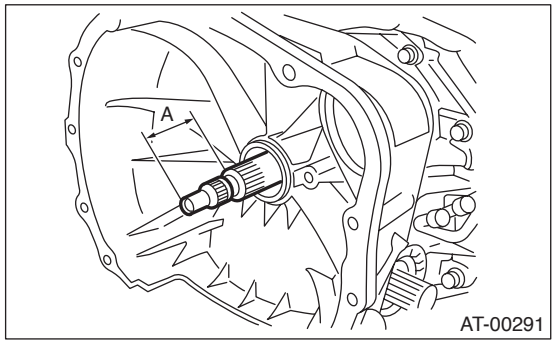
42) Install the oil pump housing assembly with a new gasket. <Ref. to 4AT-103, Oil Pump Housing.>
43) Install the converter case assembly into transmission case assembly. <Ref. to 4AT-101, INSTALLATION, Converter Case.>
44) Insert the inhibitor switch and transmission connector to the stay.
45) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>



(A) Transmission connector
(B) Inhibitor switch connector

46) Install the oil cooler pipe. <Ref. to 4AT-69, INSTALLATION, ATF Cooler Pipe and Hose.>
47) Install the oil charge pipe with a O-ring. <Ref. to 4AT-79, INSTALLATION, Oil Charge Pipe.>
48) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)

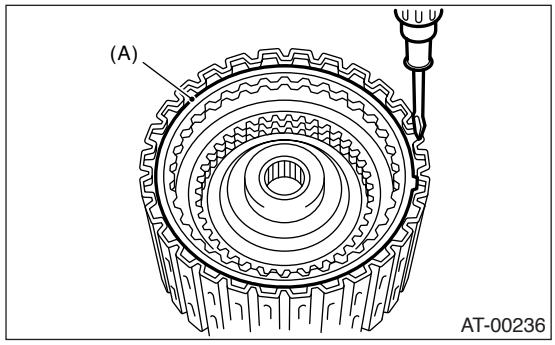


49) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
50) Install the transmission assembly into vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

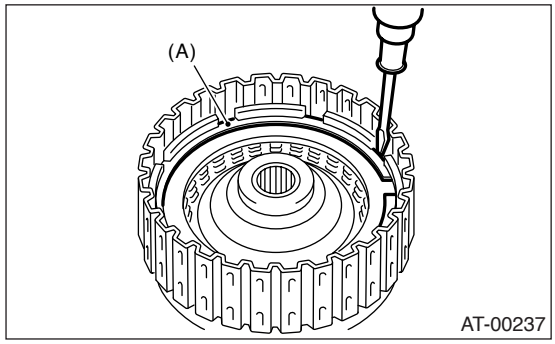
1. HIGH CLUTCH AND REVERSE CLUTCH

1) Remove the snap ring, and then take out the retaining plate, drive plate and driven plate.



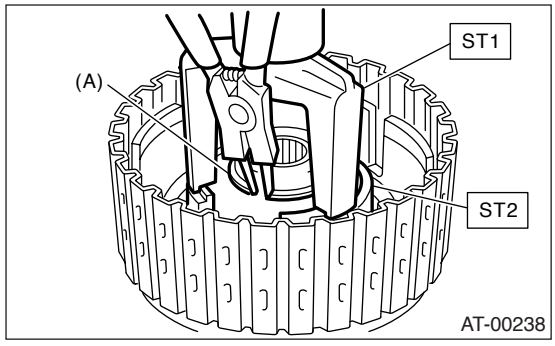
(A) Snap ring

2) Remove the snap ring, and then take out the retaining plate, drive plate and driven plate.



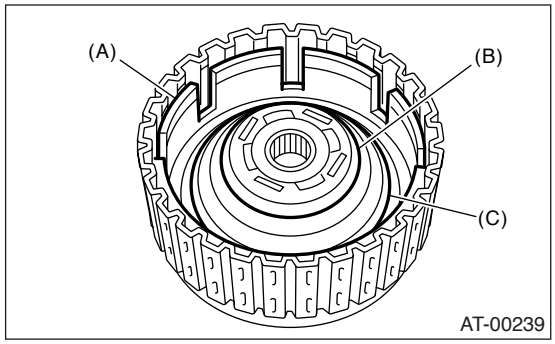
(A) Snap ring

3) Using the ST1 and ST2, remove the snap ring.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT



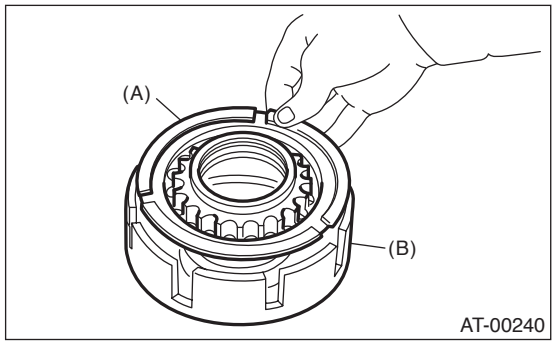
(A) Snap ring

4) Take out the clutch cover, spring retainer, high clutch piston and reverse clutch piston.



(A) Reverse clutch piston
(B) Cover
(C) Return spring

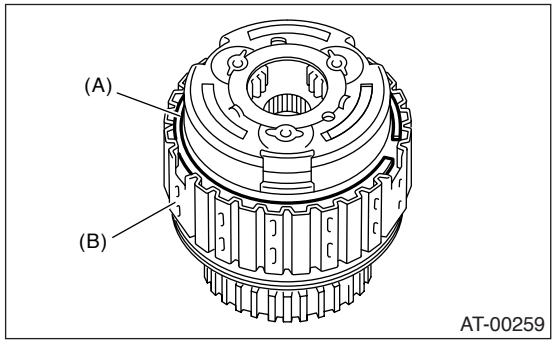
5) Remove the seal ring and lip seal from the high clutch piston and reverse clutch piston.



(A) High clutch piston
(B) Reverse clutch piston

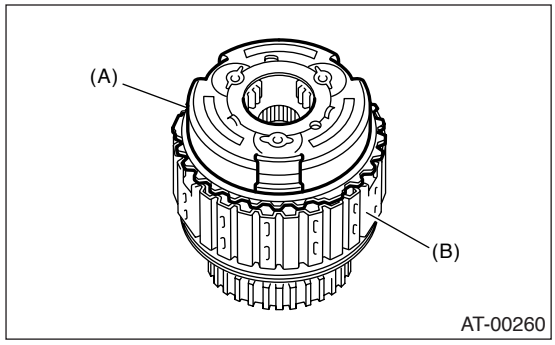
2. PLANETARY GEAR AND LOW CLUTCH

1) Remove the snap ring from low clutch drum.



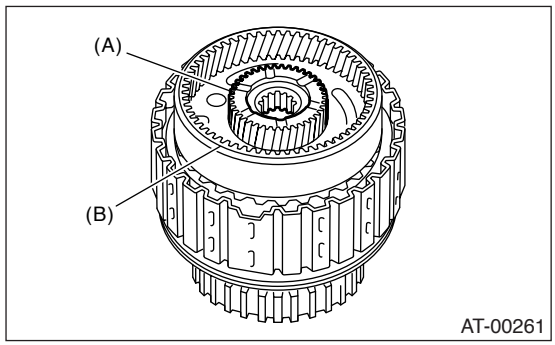
(A) Snap ring
(B) Low clutch dram

2) Take out the front planetary carrier.



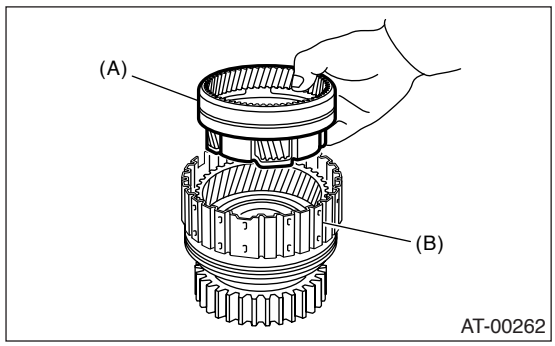
(A) Front planetary carrier
(B) Low clutch dram

3) Take out the rear sun gear.



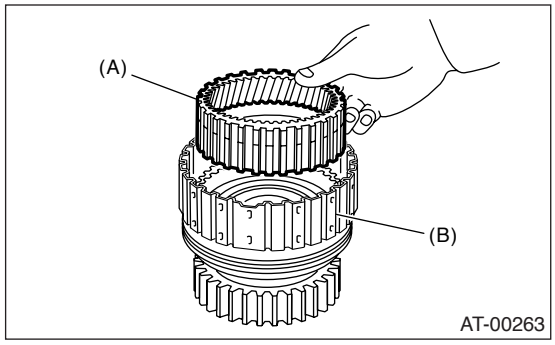
(A) Rear sun gear
(B) Rear planetary carrier

4) Take out the rear planetary carrier, washer and thrust needle bearing.



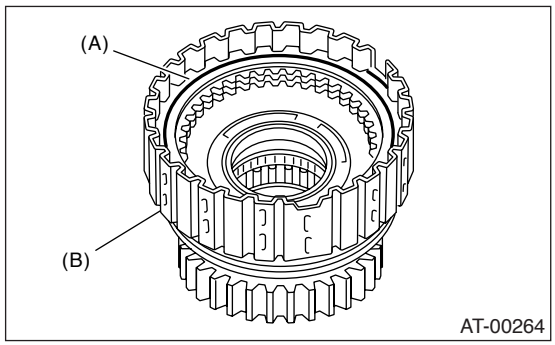
(A) Rear planetary carrier
(B) Low clutch dram

5) Take out the rear internal gear.



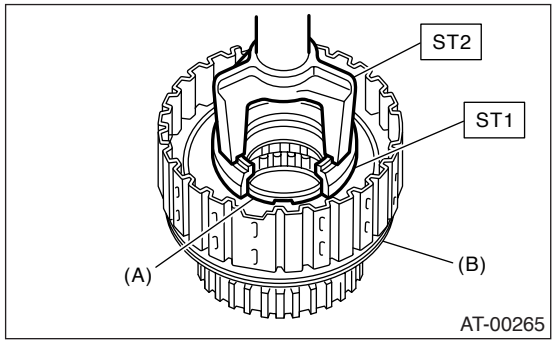
(A) Rear internal gear
(B) Low clutch dram

6) Remove the snap ring from low clutch drum.



(A) Snap ring
(B) Low clutch dram

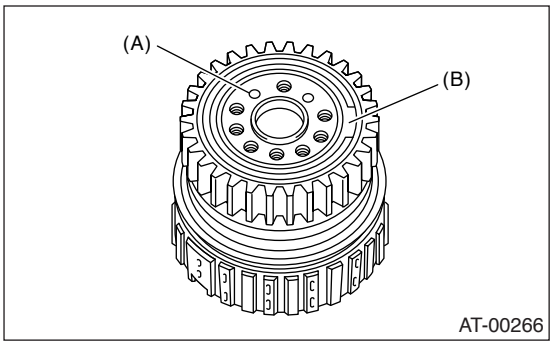
7) Compress the spring retainer, and remove the snap ring from low clutch drum using ST1 and ST2.
ST1 498627100 SEAT
ST2 398673600 COMPRESSOR



(A) Snap ring
(B) Low clutch dram

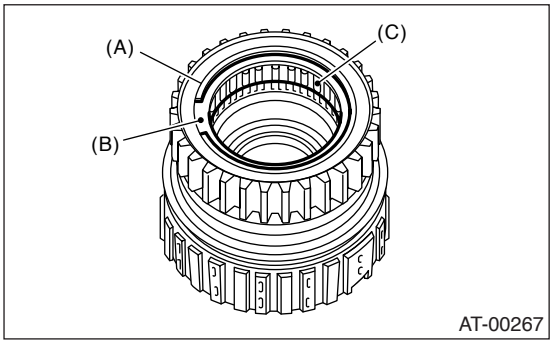
8) Remove the one-way clutch. <Ref. to 4AT-119, REMOVAL, AT Main Case.>

9) Install the one-way clutch inner race to low clutch drum, and then apply compressed air to remove the low clutch piston.



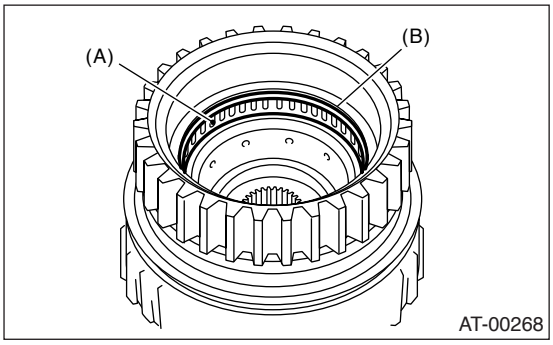
(A) Apply compressed air.
(B) One-way clutch inner race

10) Remove the one-way clutch inner race.
11) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

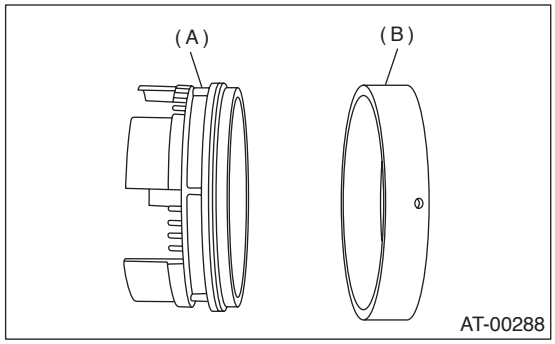
12) Remove the needle bearing after taking out the snap ring.



(A) Needle bearing
(B) Snap ring

3. 2-4 BRAKE

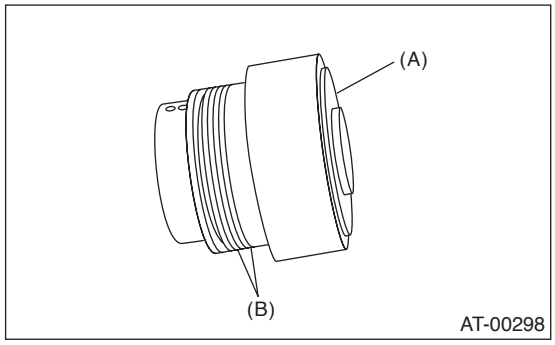
Separate the 2-4 brake piston and piston retainer.



(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Remove the seal ring.

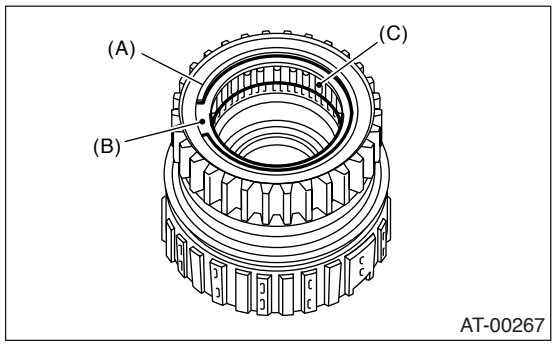


(A) One-way clutch inner race
(B) Seal ring

2) Remove the needle bearing using ST.
ST 398527700 PULLER ASSY

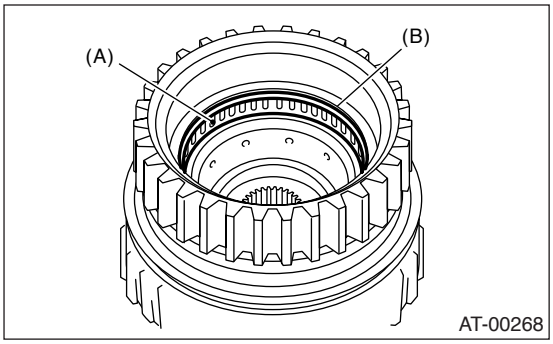
5. ONE-WAY CLUTCH OUTER RACE

1) Remove the one-way clutch after taking out the snap ring.



(A) Snap ring
(B) Plate
(C) One-way clutch

2) Remove the needle bearing after taking out the snap ring.

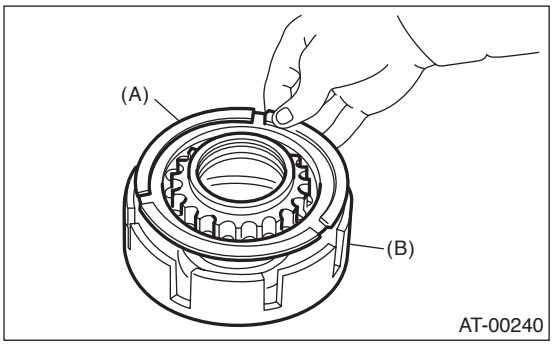


(A) Needle bearing
(B) Snap ring

D: ASSEMBLY

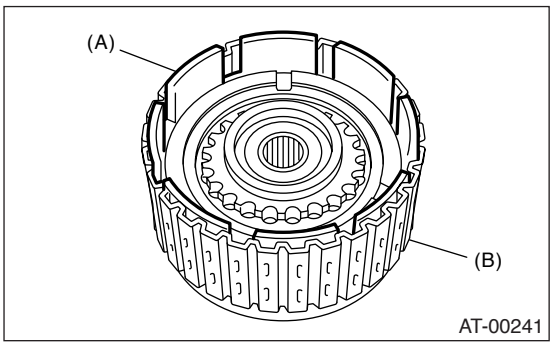
1. HIGH CLUTCH AND REVERSE CLUTCH

1) Install the seal ring and lip seal to the high clutch piston and reverse clutch piston.
2) Install the high clutch piston to reverse clutch piston.



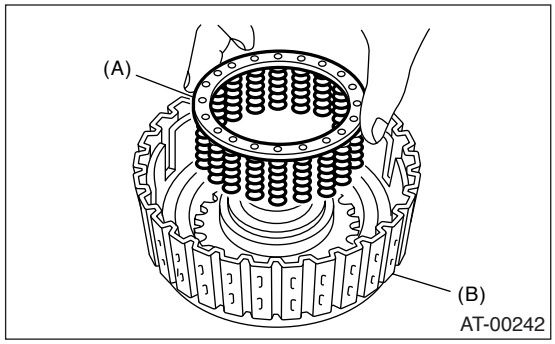
(A) High clutch piston
(B) Reverse clutch piston

3) Install the reverse clutch piston to high clutch drum. Align the groove on reverse clutch piston with the groove on high clutch drum during installation.



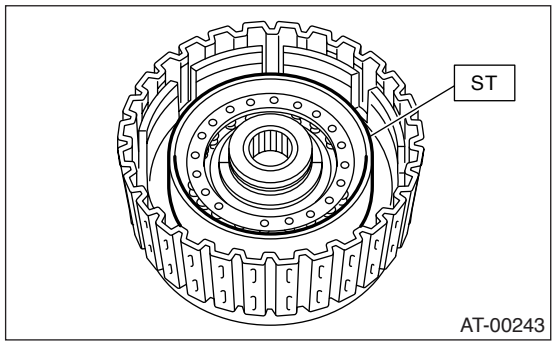
(A) Reverse clutch piston
(B) High clutch drum

4) Install the spring retainer to high clutch piston.

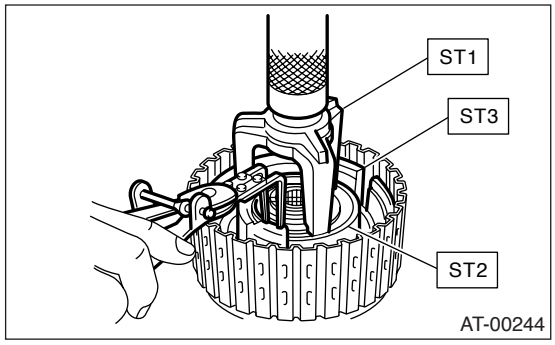


(A) Spring retainer
(B) High clutch drum

5) Install the ST to high clutch piston.
ST 498437000 HIGH CLUTCH PISTON GUIDE



6) Install the cover to high clutch piston without folding the high clutch piston seal.
7) Install the snap ring using ST1 and ST2.
ST1 398673600 COMPRESSOR
ST2 498627100 SEAT
ST3 498437000 HIGH CLUTCH PISTON GUIDE



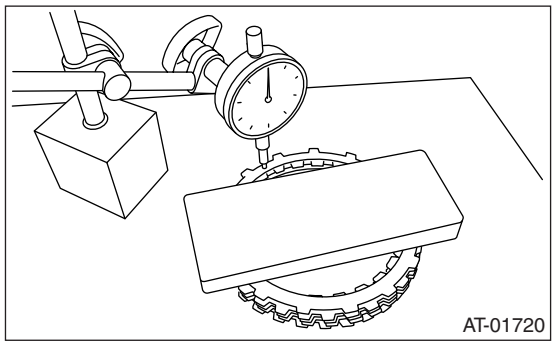
8) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
9) Set the micro gauge to clutch, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.

10) Scale and record the weight “Z” of a flat board which will be put on plates.

NOTE:
• Use a stiff flat board which does not bend against load.
• Use a flat board of its weight less than 250 N (25.5 kgf, 56.2 lb).

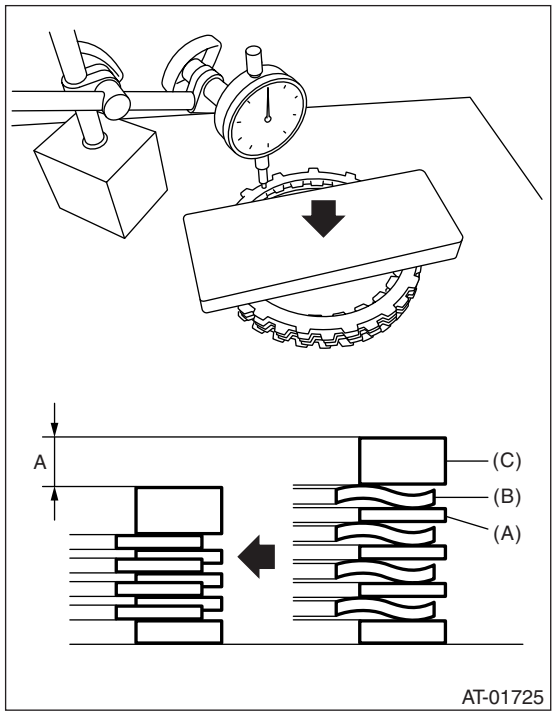
11) Put the flat board on retaining plate.



12) Using the following formula, calculate “N” indicated on the push/pull gauge.
N = 250 N (25.5 kgf, 56.2 lb) − Z
N: Value indicated on push/pull gauge
250 N (25.5 kgf, 56.2 lb): Load applied to clutch plate
Z: Flat board weight

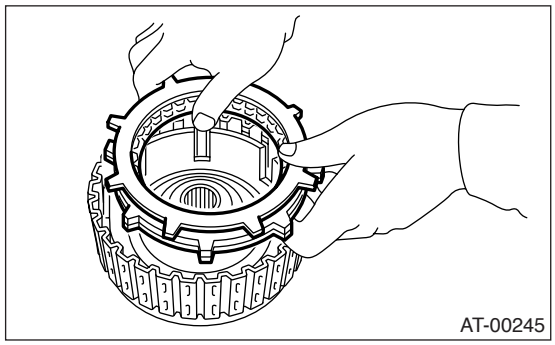
13) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

NOTE:
If three points, measure the height every 120°. If four points, measure the height every 90°.



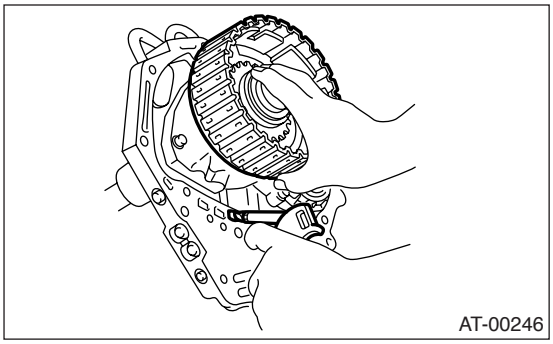
(A) Driven plate
(B) Drive plate
(C) Retaining plate

14) Install the thickest driven plate to piston side, and then install the driven plate, drive plate, retaining plate to high clutch drum.

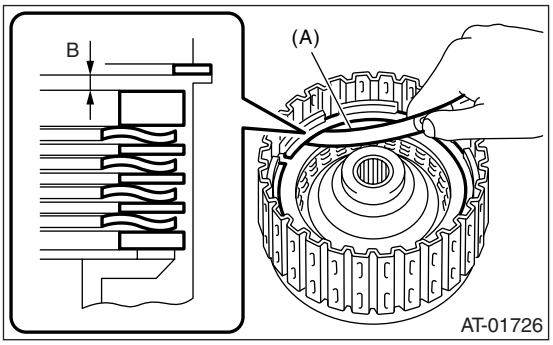


15) Install the snap ring to high clutch drum.

16) Apply compressed air intermittently to check for operation.



17) Measure and record the clearance B between the retaining plate and snap ring. (High clutch)
At this time, do not press down the retaining plate.



(A) Thickness gauge

18) Piston stroke calculation
Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specitication.
T = A + B
T: Piston stroke
A: Collapse amount of drive plate
B: Clearance between retaining plate and snap ring

Initial standard:
2.0 — 2.3 mm (0.079 — 0.091 in)

Limit thickness:
2.6 mm (0.102 in)

High clutch retaining plate	
Part number	Thickness mm (in)
31567AA670	5.1 (0.201)
31567AA680	5.2 (0.205)
31567AA690	5.3 (0.209)
31567AA700	5.4 (0.213)
31567AA710	5.5 (0.217)
31567AA720	5.6 (0.220)
31567AA730	5.7 (0.224)
31567AA740	5.8 (0.228)

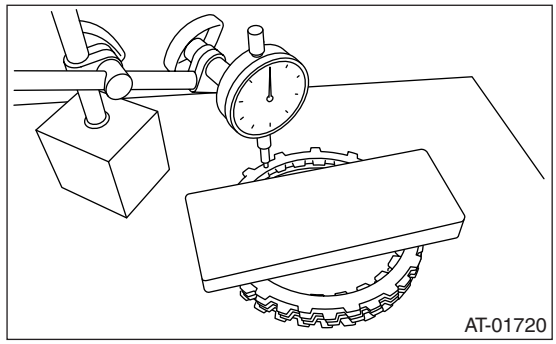
19) Place the dish plate, driven plate, drive plate and retaining plate neatly in this order on surface table.
20) Set the micro gauge to clutch, and read its scale.

NOTE:
The value, which is read in the gauge at this time, is zero point.

21) Scale and record the weight “Z” of a flat board which will be put on plates.

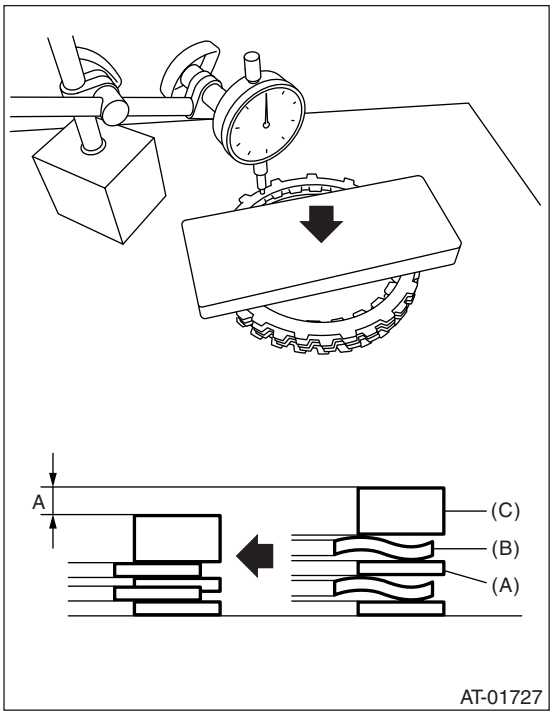
NOTE:
• Use a stiff flat board which does not bend against load.
• Use a flat board of its weight less than 150 N (15.3 kgf, 33.7 lb).

22) Put the flat board on retaining plate.



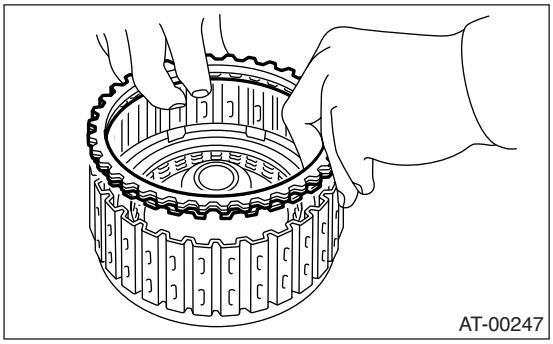
23) Using the following formula, calculate “N” indicated on the push/pull gauge.
N = 150 N (15.3 kgf, 33.7 lb) − Z
N: Value indicated on push/pull gauge
150 N (15.3 kgf, 33.7 lb): Load applied to clutch plate
Z: Flat board weight
24) Press the center of retaining plate applying force of N with push/pull gauge, and then measure and record the height A. Make more than three measurements at even distance and take the average value.

NOTE:
If three points, measure the height every 120°. If four points, measure the height every 90°.

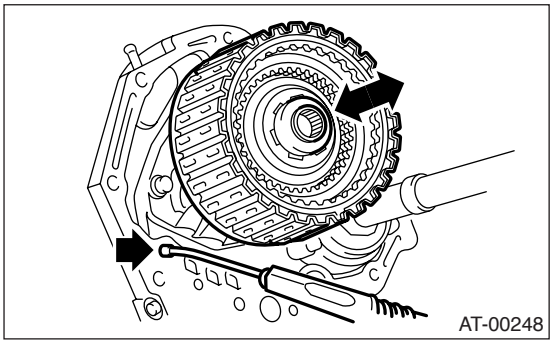


(A) Driven plate
(B) Drive plate
(C) Retaining plate

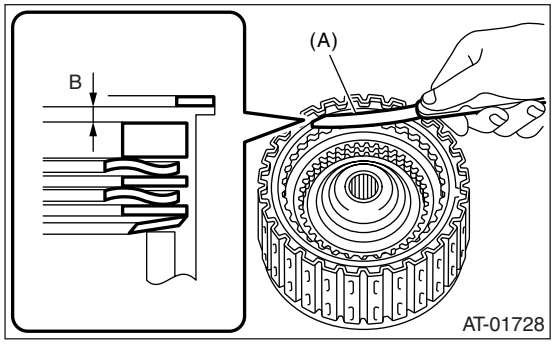
25) Install the driven plate, drive plate, retaining plate and snap ring.



26) Apply compressed air intermittently to check for operation.



27) Measure and record the clearance B between the retaining plate and snap ring. (Reverse clutch) At this time, do not press down the retaining plate.



(A) Thickness gauge

28) Piston stroke calculation
Select the retaining plate within the specification by calculating with A and B dimensions which have been recorded before. If the calculated value exceeds the usage limit, replace the drive plate with a new one and adjust it within the specitication.
T = A + B
T: Piston stroke
A: Collapse amount of drive plate
B: Clearance between retaining plate and snap ring

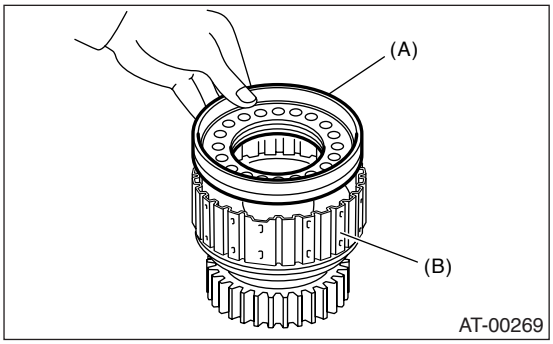
Initial standard:
1.1 — 1.4 mm (0.043 — 0.055 in)

Limit thickness:
1.6 mm (0.063 in)

Reverse clutch retaining plate	
Part number	Thickness mm (in)
31567AA910	4.0 (0.157)
31567AA920	4.2 (0.165)
31567AA930	4.4 (0.173)
31567AA940	4.6 (0.181)
31567AA950	4.8 (0.189)
31567AA960	5.0 (0.197)
31567AA970	5.2 (0.205)
31567AA980	5.4 (0.213)

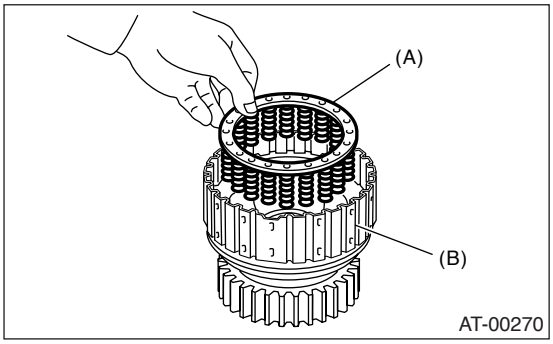
2. PLANETARY GEAR AND LOW CLUTCH

1) Apply ATF to D-ring and install it to low clutch piston.
2) Install the low clutch piston to low clutch drum.



(A) Low clutch piston
(B) Low clutch dram

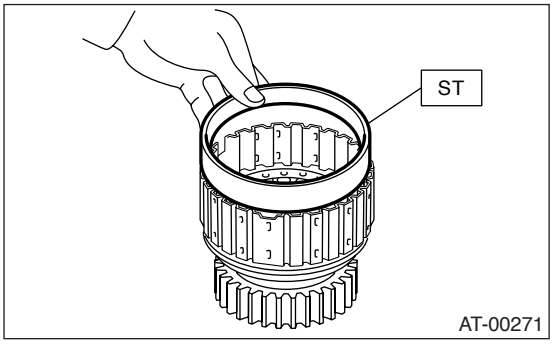
3) Install the spring retainer to low clutch piston.



(A) Spring retainer
(B) Low clutch dram

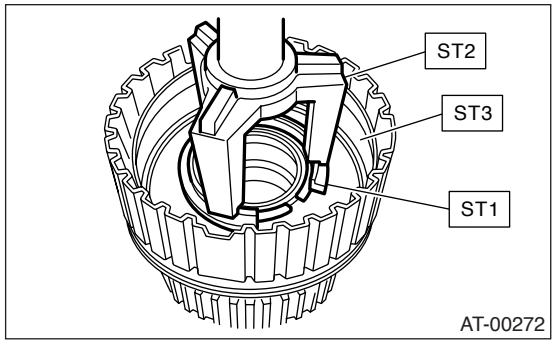
4) Install the ST to low clutch drum.

ST	498437100	LOW CLUTCH PISTON GUIDE

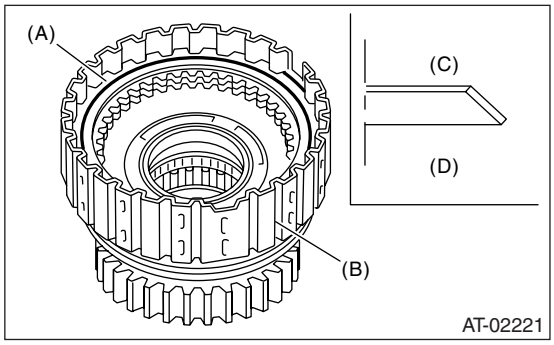


5) Set the cover on the piston with a press using ST1 and ST2, and attach the snap ring. At this time, be careful not to fold the cover seal during installation.

ST1	498627100	SEAT
ST2	398673600	COMPRESSOR
ST3	498437100	LOW CLUTCH PISTON GUIDE

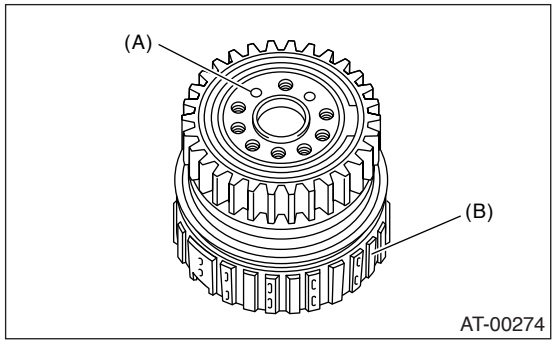


6) Install the dish plate, driven plate and retaining plate, and then secure them with snap ring.



(A) Snap ring
(B) Low clutch dram
(C) Dish plate
(D) Low clutch piston side

7) Check the low clutch for operation.
(1) Remove the one-way clutch. <Ref. to 4AT-119, REMOVAL, AT Main Case.>
(2) Set the one-way clutch inner race, and apply compressed air for checking.



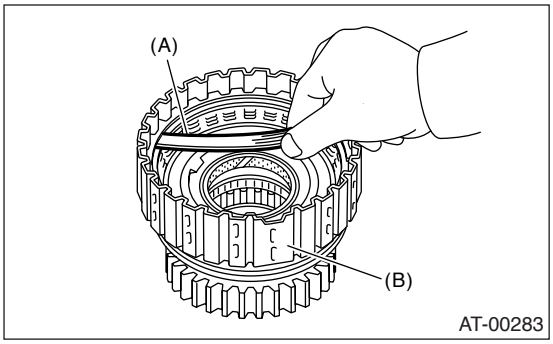
(A) Apply compressed air.
(B) Low clutch dram

8) Check the low clutch clearance.
(1) Place the same thickness of shim on both sides to prevent pressure plate from tilting.

(2) Check the clearance between retaining plate and low clutch operation.

Initial standard:
0.7 — 1.1 mm (0.028 — 0.043 in)

Limit thickness:
1.5 mm (0.059 in)

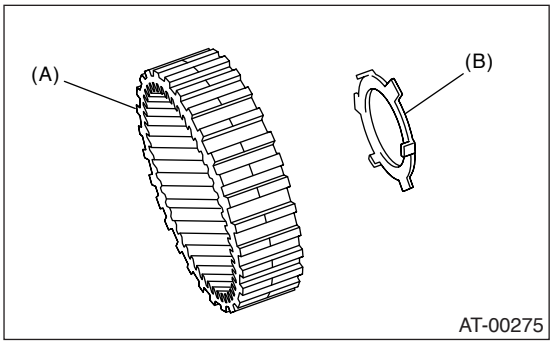


(A) Thickness gauge
(B) Low clutch dram

If the clearance is out of specification, select a suitable retaining plate.

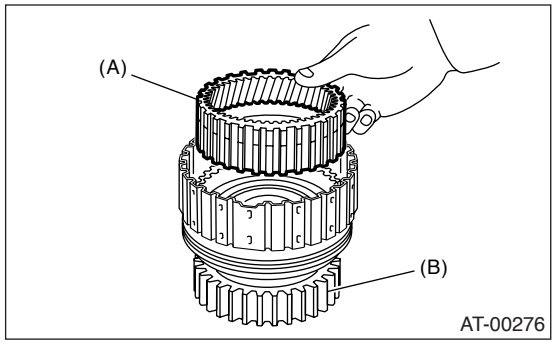
Retaining plate	
Part number	Thickness mm (in)
31567AB050	3.8 (0.150)
31567AB060	4.0 (0.157)
31567AB070	4.2 (0.165)
31567AB080	4.4 (0.173)
31567AB090	4.6 (0.181)

9) Install the washer to rear internal gear.



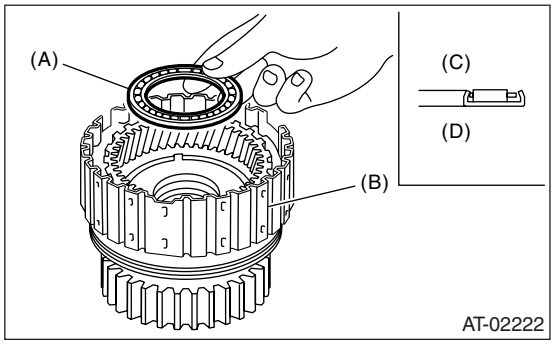
(A) Rear internal gear
(B) Washer

10) Install the rear internal gear.



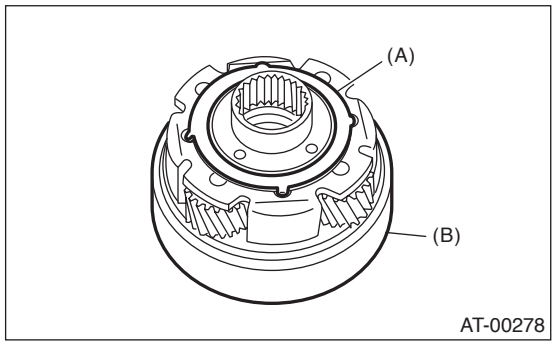
(A) Rear internal gear
(B) Low clutch dram

11) Install the thrust needle bearing in correct direction.



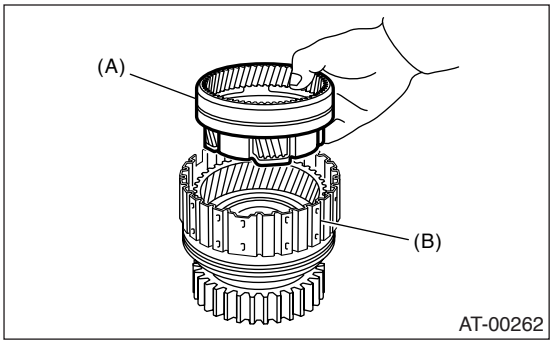
(A) Thrust needle bearing
(B) Low clutch dram
(C) Rear planetary carrier side
(D) Low clutch piston side

12) Install the washer by aligning protrusion of washer and hole of rear planetary carrier.



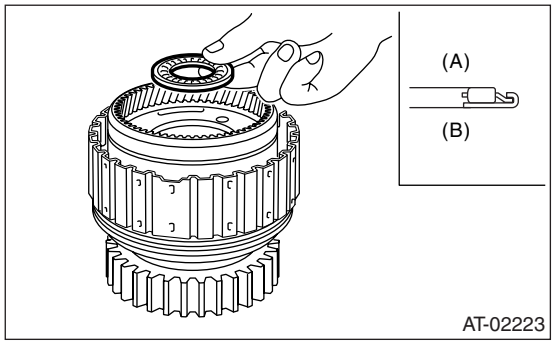
(A) Washer
(B) Rear planetary carrier

13) Install the rear planetary carrier to low clutch drum.



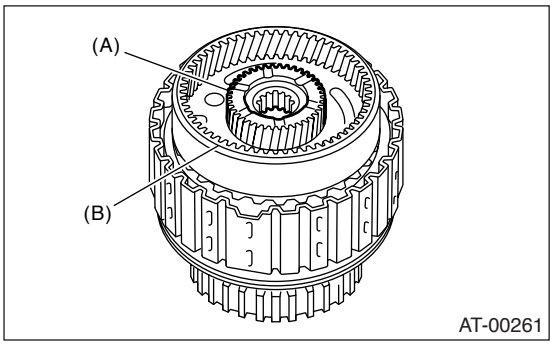
(A) Rear planetary carrier
(B) Low clutch dram

14) Install the thrust needle bearing in correct direction.



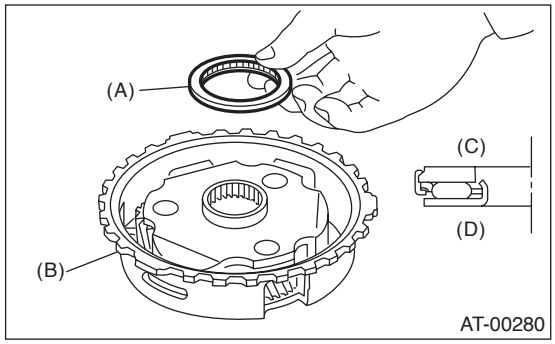
(A) Rear sun gear side
(B) Rear planetary carrier side

15) Install the rear sun gear in proper direction.



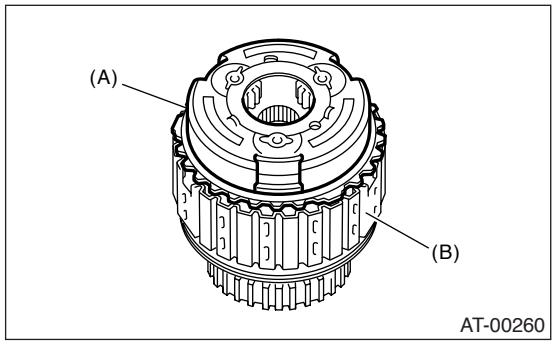
(A) Rear sun gear
(B) Rear planetary carrier

16) Install the thrust needle bearing in proper direction.



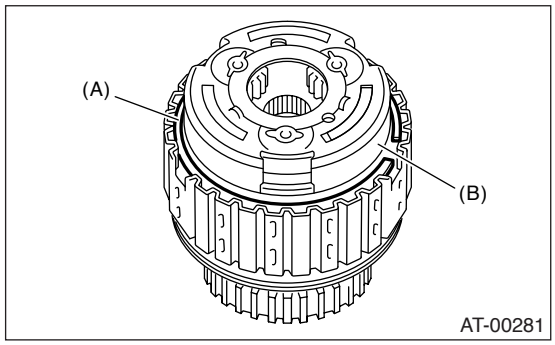
(A) Thrust needle bearing
(B) Front planetary carrier
(C) Rear sun gear side
(D) Front planetary carrier side

17) Install the front planetary carrier to low clutch drum.



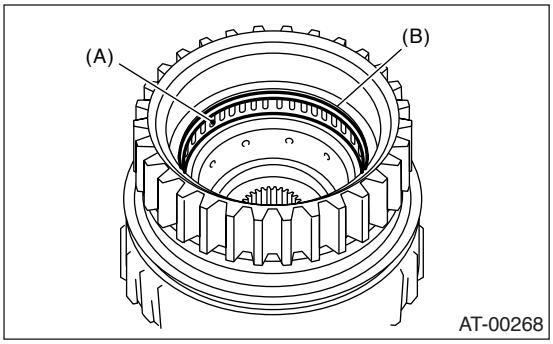
(A) Front planetary carrier
(B) Low clutch dram

18) Install the snap ring to low clutch drum.



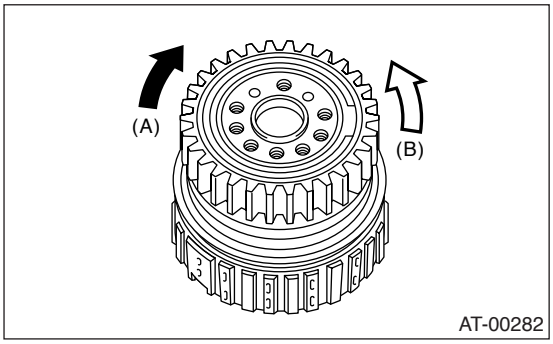
(A) Snap ring
(B) Front planetary carrier

19) Install the needle bearing, and then secure with the snap ring.



(A) Needle bearing
(B) Snap ring

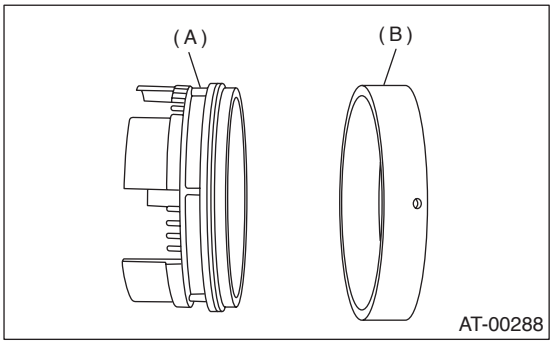
20) Install the one-way clutch and one-way clutch inner race, and then secure with the snap ring.
21) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.



(A) Locked
(B) Free

3. 2-4 BRAKE

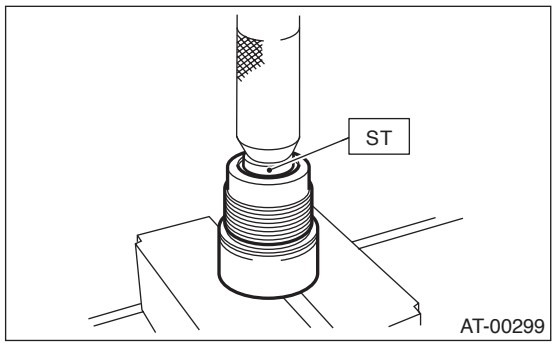
1) Apply ATF to D-ring, and install it to 2-4 brake piston.
2) Install the 2-4 brake piston to 2-4 brake piston retainer.



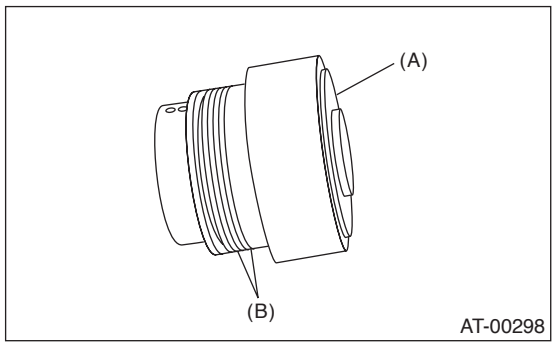
(A) 2-4 brake piston
(B) 2-4 brake piston retainer

4. ONE-WAY CLUTCH INNER RACE

1) Install the needle bearing to inner race using ST and press.
ST 398497701 SEAT



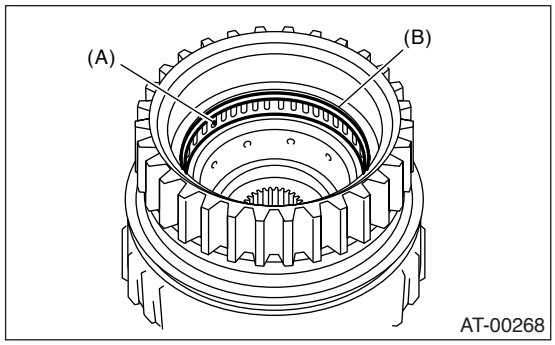
2) Apply vaseline to the groove of inner race and seal ring.
3) Install two seal rings to one-way clutch inner race.



(A) One-way clutch inner race
(B) Seal ring

5. ONE-WAY CLUTCH OUTER RACE

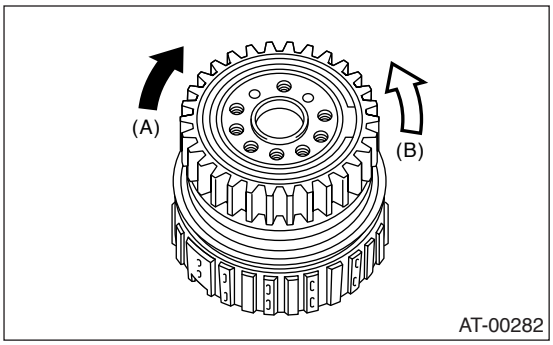
1) Install the needle bearing, and then secure with the snap ring.



(A) Needle bearing
(B) Snap ring

2) Install the one-way clutch and one-way clutch inner race, and then secure with the snap ring.

3) Set the inner race. Make sure that the clutch locks in the clockwise direction and rotates freely in the counterclockwise direction.



(A) Locked
(B) Free

E: INSPECTION

1. HIGH CLUTCH AND REVERSE CLUTCH

Check the following items:
• Drive plate facing for wear and damage
• Driven plate for discoloration (burned color)
• Snap ring for wear, return spring for setting and breakage, and snap ring retainer for deformation
• Lip seal and D-ring for damage
• Piston and drum check ball for operation
• Adjust the total end play. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

2. PLANETARY GEAR AND LOW CLUTCH

Check the following items:
• Drive plate facing for wear and damage
• Driven plate for discoloration (burned color)
• Snap ring for wear, return spring for setting and breakage, and spring retainer for deformation
• Lip seal and D-ring for damage
• Piston check ball for operation
• Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

3. 2-4 BRAKE

Check the following items:
• Drive plate facing for wear and damage
• Driven plate for discoloration (burned color)
• Snap ring for wear and spring retainer for deformation
• Lip seal and D-ring for damage
• Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

4. ONE-WAY CLUTCH

• Make sure the snap ring is not worn and the seal rings are not deformed.
• Measure the total end play and adjust it within specifications. <Ref. to 4AT-107, ADJUSTMENT, Oil Pump Housing.>

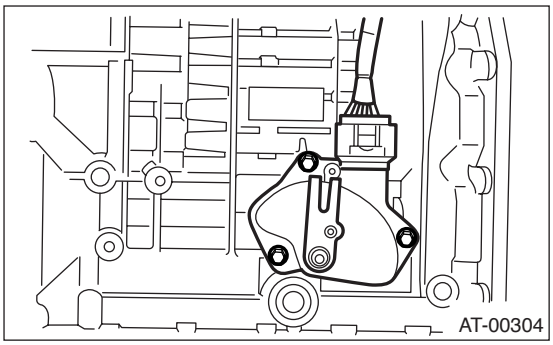
5. LOW & REVERSE BRAKE

Check the following items:
• Drive plate facing for wear and damage
• Driven plate for discoloration (burned color)
• Snap ring for wear and spring retainer for deformation

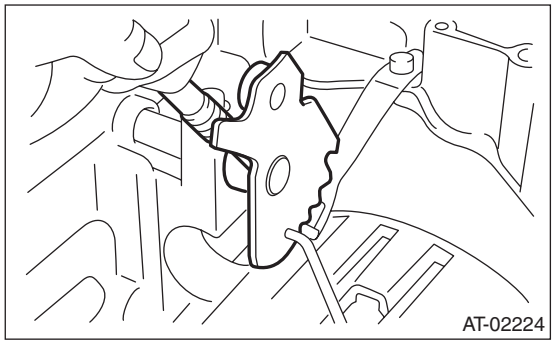
41.Transmission Control Device

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 4AT-40, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter clutch assembly. <Ref. to 4AT-80, REMOVAL, Torque Converter Clutch Assembly.>
3) Remove the input shaft.
4) Lift-up the lever on the rear side of transmission harness connector, and then remove it from stay.
5) Disconnect the air breather hose. <Ref. to 4AT-78, REMOVAL, Air Breather Hose.>
6) Remove the inhibitor switch connector from stay.
7) Wrap vinyl tape around the nipple attached to the air breather hose.
8) Remove the pitching stopper bracket.
9) Remove the inhibitor switch.

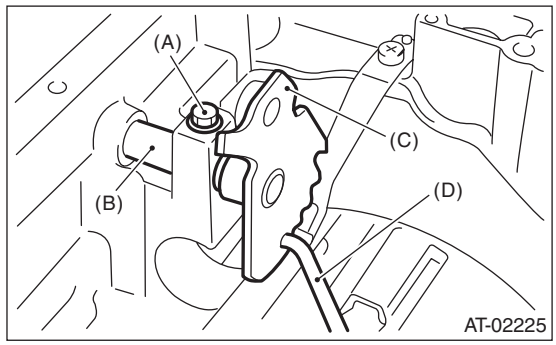

AT-00304

10) Remove the control valve body assembly. <Ref. to 4AT-60, REMOVAL, Control Valve Body.>
11) Pull out the straight pin of manual plate.


AT-02224

12) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

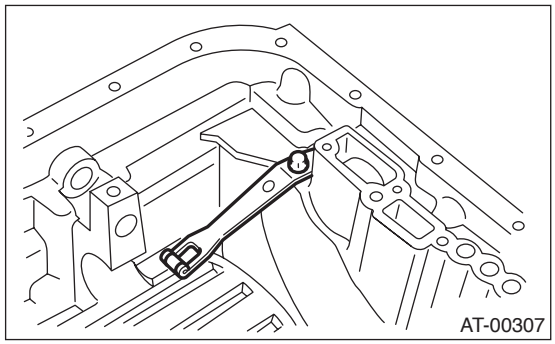
NOTE:
Be careful not to damage the lips of press-fitted oil seal in the case.



AT-02225

(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

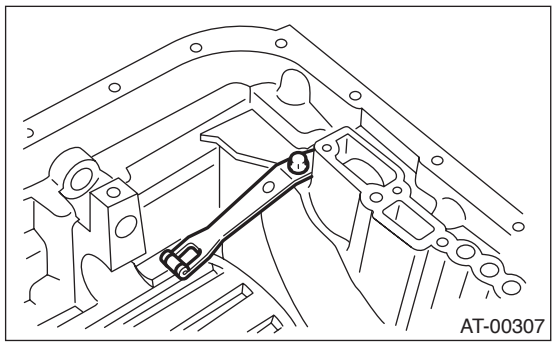
13) Remove the detention spring.


AT-00307

B: INSTALLATION

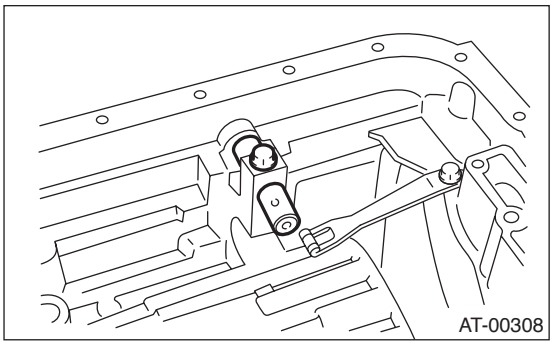
1) Install the detention spring to transmission case.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

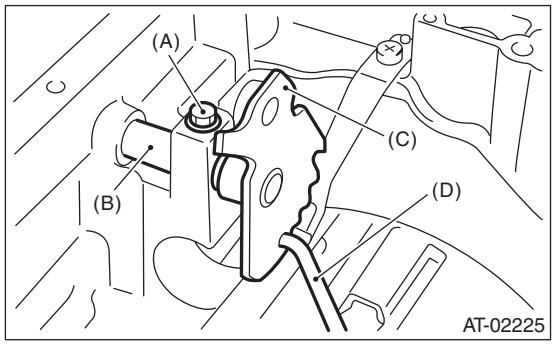

AT-00307

2) Insert the select lever, and then tighten the bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

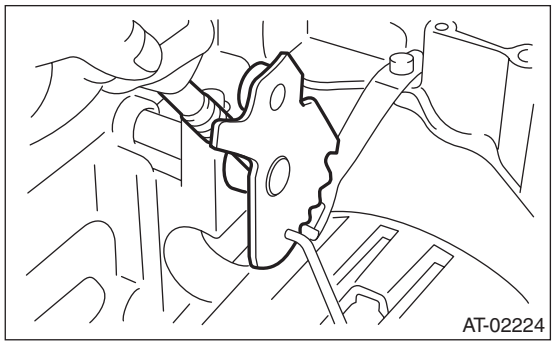


3) Insert the manual plate and parking rod.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

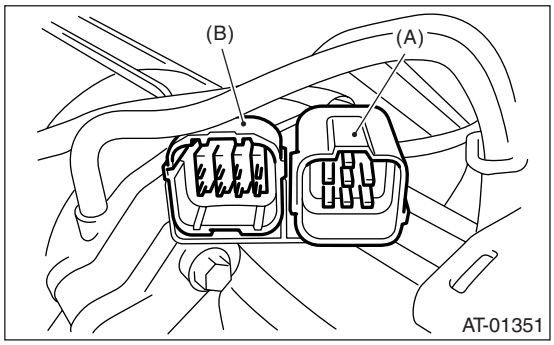
4) Insert a new straight pin to manual plate.



5) Install the oil pan and control valve assembly. <Ref. to 4AT-60, INSTALLATION, Control Valve Body.>
6) Turn over the transmission case to its original position.
7) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

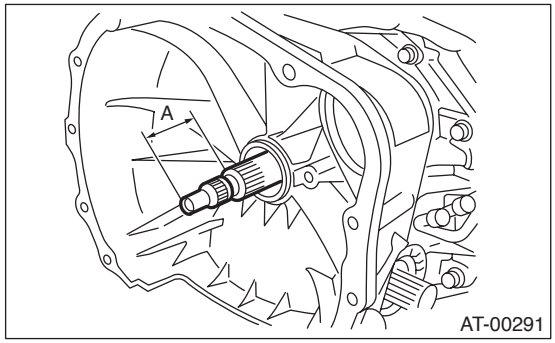
8) Install and adjust the inhibitor switch. <Ref. to 4AT-52, Inhibitor Switch.>
9) Insert the inhibitor switch and transmission connector to the stay.



(A) Transmission connector
(B) Inhibitor switch connector

10) Install the air breather hose. <Ref. to 4AT-78, INSTALLATION, Air Breather Hose.>
11) Insert the input shaft with rotating it by hand lightly, and then check the protrusion amount.

Normal protrusion A:
50 — 55 mm (1.97 — 2.17 in)



12) Install the torque converter clutch assembly. <Ref. to 4AT-80, INSTALLATION, Torque Converter Clutch Assembly.>
13) Install the transmission assembly into the vehicle. <Ref. to 4AT-43, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detention spring are not worn or otherwise damaged.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION (DIAGNOSTICS)

4AT(diag)

Page

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2. Check List for Interview 4
3. General Description 5
4. Electrical Component Location 7
5. Transmission Control Module (TCM) I/O Signal 14
6. Subaru Select Monitor 17
7. Read Diagnostic Trouble Code (DTC) 20
8. Inspection Mode 21
9. Clear Memory Mode 22
10. SPORT Indicator Light Display 23
11. Diagnostic Procedure for Select Monitor Communication 27
12. List of Diagnostic Trouble Code (DTC) 32
13. Diagnostic Procedure with Diagnostic Trouble Code (DTC) 34
14. Diagnostic Procedure without Diagnostic Trouble Code (DTC) 123
15. Diagnostics with Phenomenon 138

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview checklist. <Ref. to 4AT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. • General inspection <Ref. to 4AT(diag)-5, INSPECTION, General Description.> • Disconnection of harness connector • Visual check for harness damage • Oil Leaking • Stall speed test <Ref. to 4AT-35, Stall Test.> • Line pressure test <Ref. to 4AT-38, Line Pressure Test.> • Transfer clutch pressure test <Ref. to 4AT-39, Transfer Clutch Pressure Test.> • Time lag test <Ref. to 4AT-37, Time Lag Test.> • Road test <Ref. to 4AT-34, Road Test.> • Inhibitor switch <Ref. to 4AT-52, Inhibitor Switch.>	Is the unit that might influence the AT problem normal?	Go to step **2.**	Repair or replace each item.
2	**CHECK SPORT INDICATOR LIGHT.** After starting the engine, wait for at least 2 seconds.	Does the SPORT indicator light blink?	Go to step **4.**	Go to step **3.**
3	**CHECK SPORT INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Check the SPORT indicator light. <Ref. to 4AT(diag)-24, INSPECTION, SPORT Indicator Light Display.> 3) After the ignition switch is turned to “ON”, wait for at least 2 seconds. 4) Start the engine.	Does the SPORT indicator light blink?	Go to step **4.**	Go to step **5.**
4	**CHECK INDICATION OF DTC.** Display DTC. NOTE: If the communication function of Subaru Select Monitor cannot be executed normally, check communication circuit. <Ref. to 4AT(diag)-27, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is DTC displayed?	Go to step **6.** NOTE: Record all DTC.	Go to step **5.**
5	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-123, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Inspect using “General Diagnostic Chart”. <Ref. to 4AT(diag)-138, Diagnostics with Phenomenon.> 3) Perform the inspection mode. <Ref. to 4AT(diag)-21, Inspection Mode.> 4) Display DTC.	Is DTC displayed?	Go to step **6.**	Finish the diagnosis.

	Step	Check	Yes	No
6	**PERFORM DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-32, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform the clear memory mode. 4) Perform the inspection mode. <Ref. to 4AT(diag)-21, Inspection Mode.> 5) Display DTC.	Is DTC displayed?	Inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of sale			
Date of repair			
Trans. model	Transmission	V.I.N.	
Odometer reading	km (miles)		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others ( )		
Place	❑ Highland ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Ambient air temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT warning light (SPORT indicator light)	❑ Blinks continuously	❑ Not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ SPORT mode		
Driving condition	❑ Not affected ❑ At racing ❑ When decelerating	❑ At starting ❑ When accelerating ❑ While turning (❑ RH / ❑ LH)	❑ While idling ❑ While cruising
SPORT mode	❑ ON ❑ OFF		
Symptom	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		

3. General Description

A: CAUTION

• SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

The airbag system wiring harness is routed near the TCM.

CAUTION:

• All airbag system wiring harnesses and connectors are colored yellow. Do not use an electric test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness when performing diagnostics or servicing the TCM.

• MEASUREMENT

When measuring the voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert a pin of more than 0.65 mm (0.026 in) diameter.

B: INSPECTION

1. BATTERY

Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

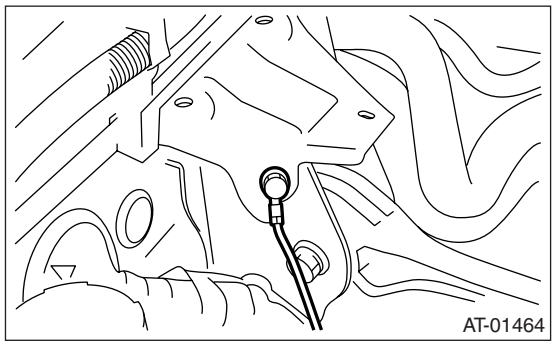
Specific gravity: More than 1.260

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

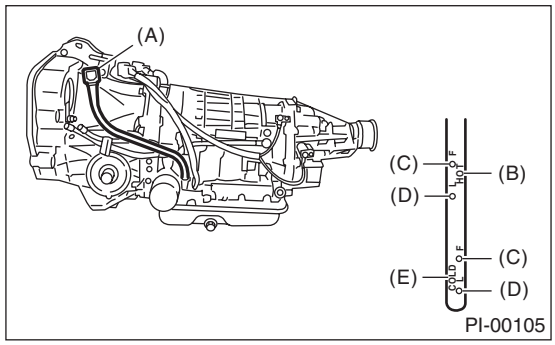
• Chassis side

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

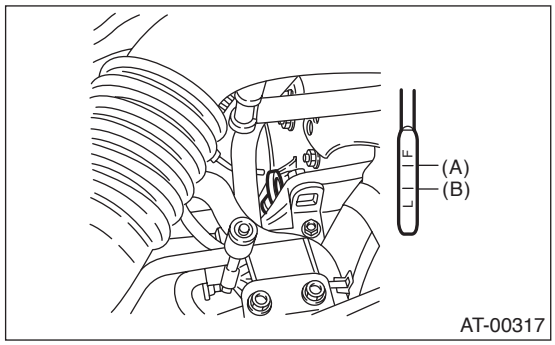
Make sure that ATF level is within the specification. <Ref. to 4AT-31, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) "HOT" side
(C) Upper level
(D) Lower level
(E) "COLD" side

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is within the specification. <Ref. to 4AT-33, INSPECTION, Differential Gear Oil.>

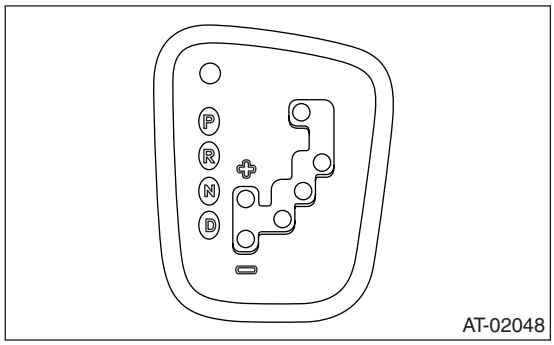


(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

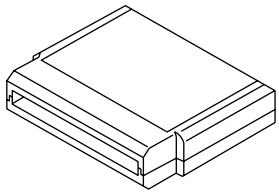
Make sure there is no noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of the selector lever.



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

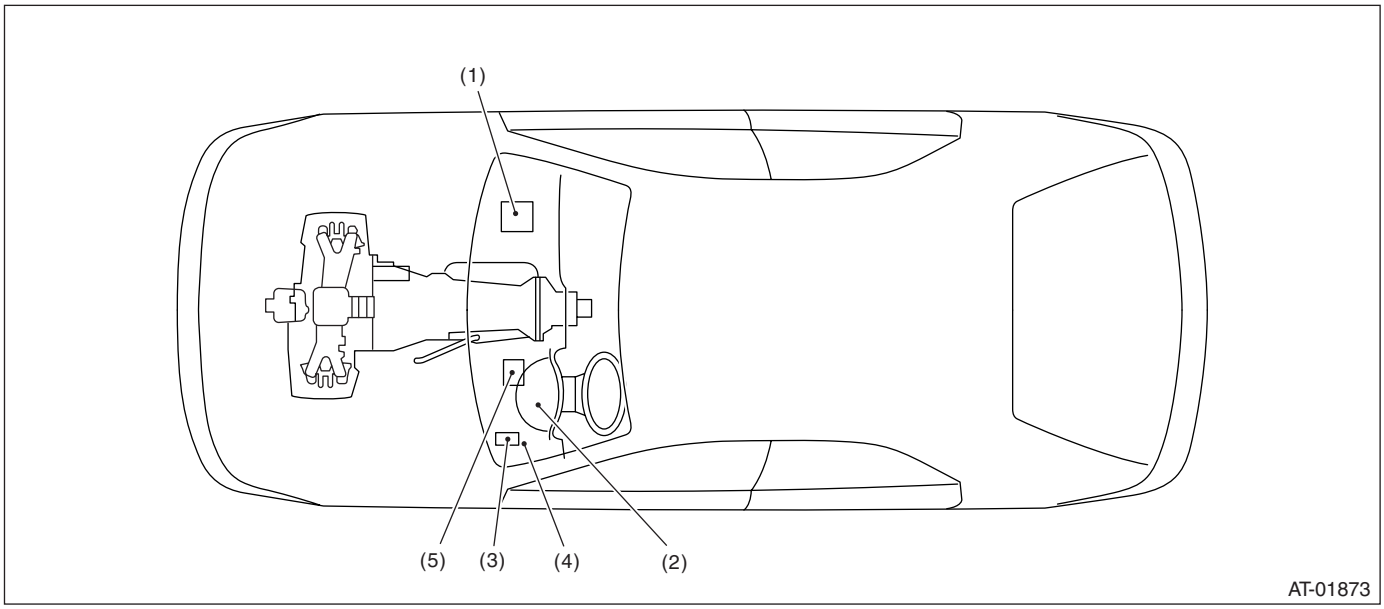
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

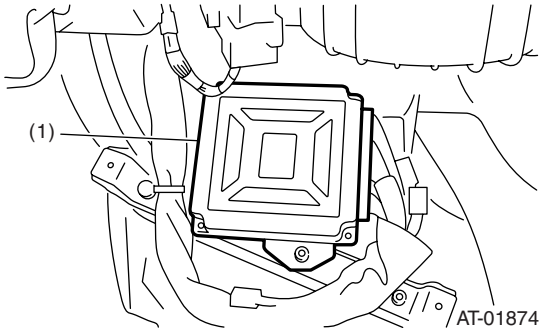
A: LOCATION

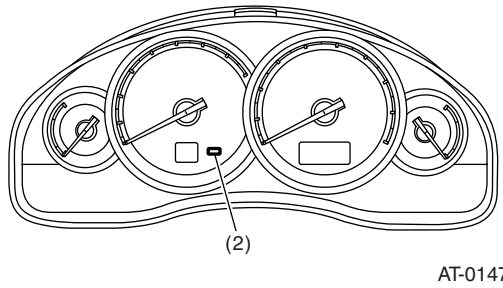
1. CONTROL MODULE

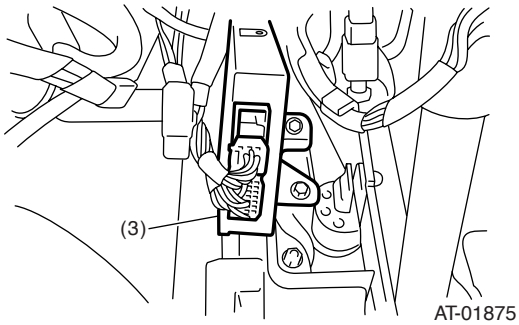
• LHD model



(1) Engine control module (ECM)
(2) SPORT indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit


(1)
AT-01874


(2)
AT-01470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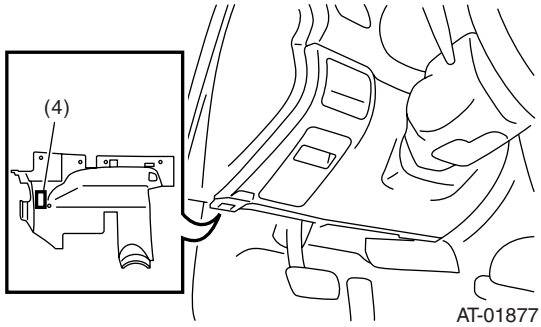
AT-01875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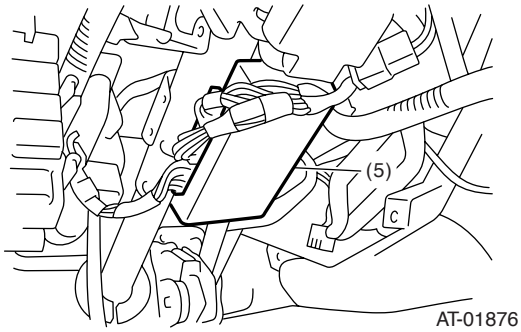
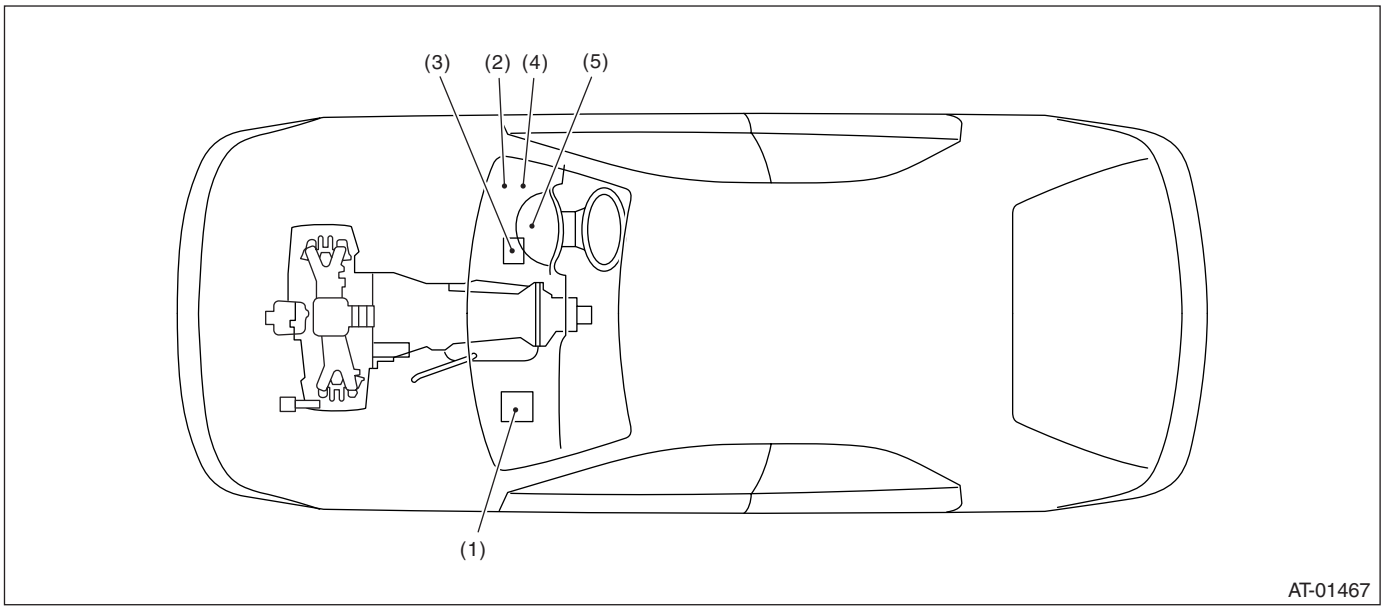
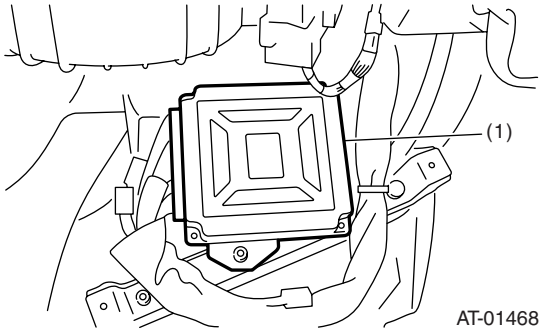

(5)
AT-01876

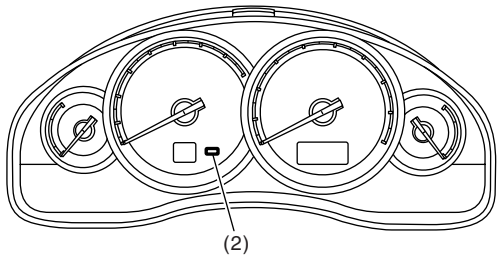
• RHD model



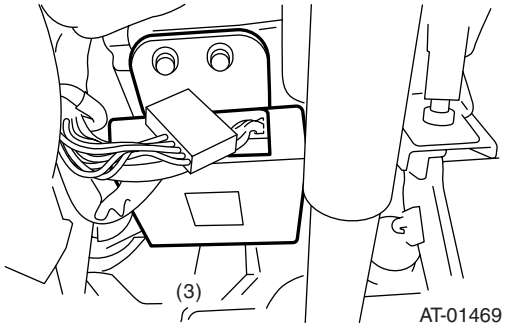
(1) Engine control module (ECM)
(2) SPORT indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit



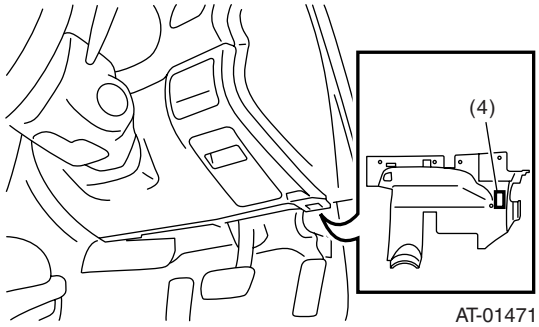
AT-01468



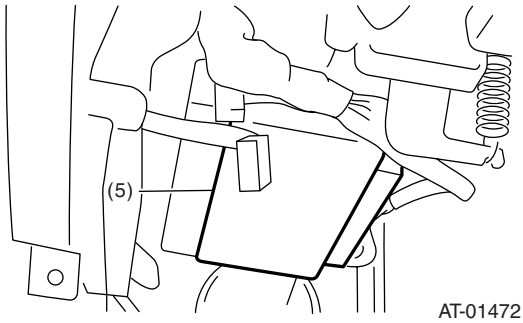
AT-01470



AT-01469



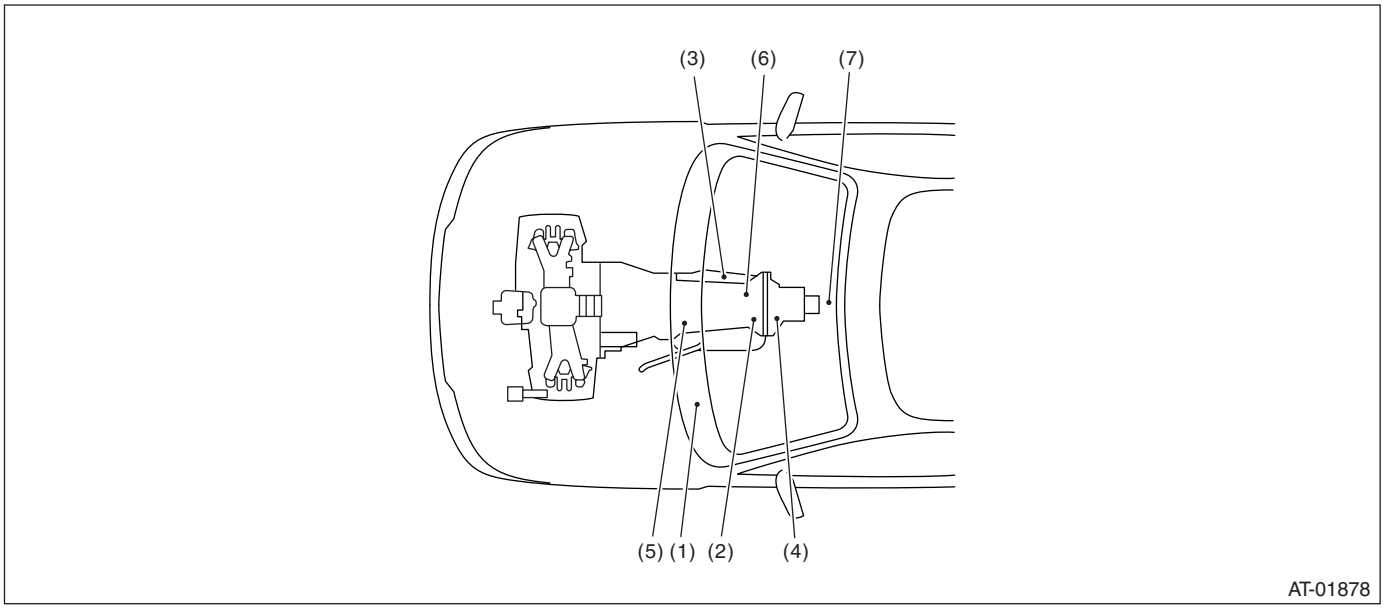
AT-01471



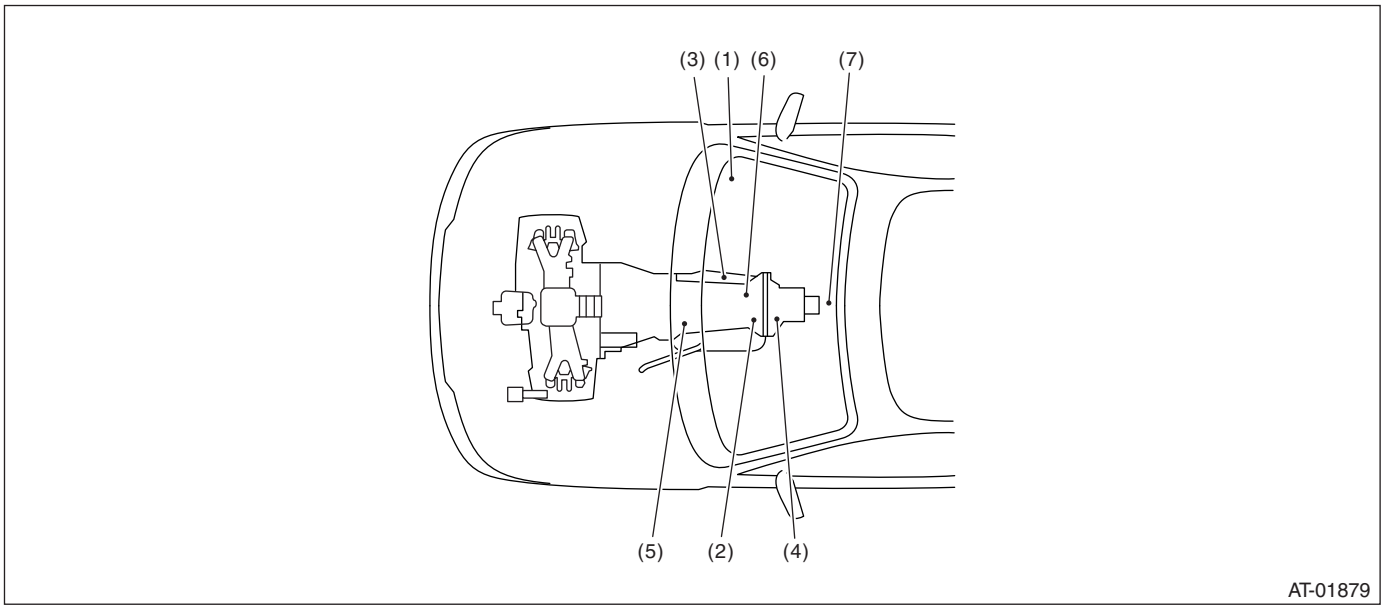
AT-01472

2. SENSOR

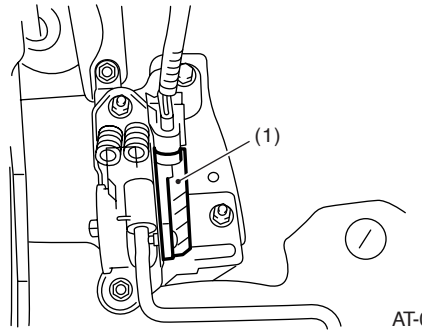
• LHD model



• RHD model

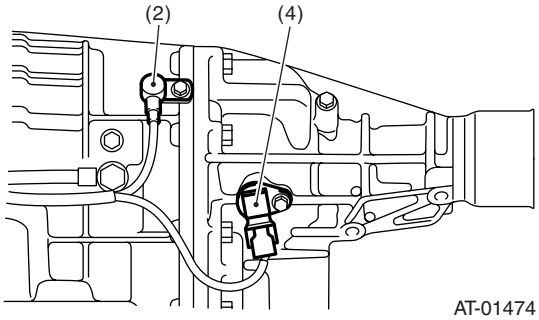


(1) Throttle position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Torque converter turbine speed sensor
(6) ATF temperature sensor
(7) Lateral G sensor



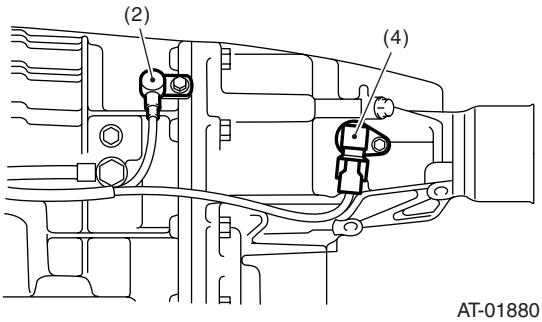
AT-00375

Model without vehicle dynamics control (VDC)

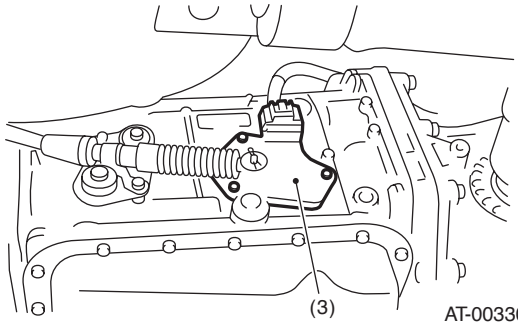


AT-01474

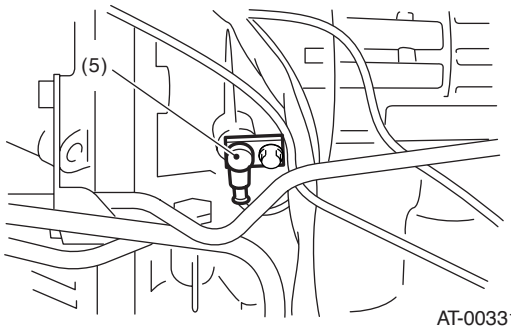
Model with vehicle dynamics control (VDC)



AT-01880



AT-00330



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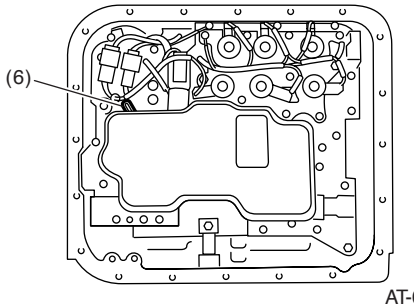
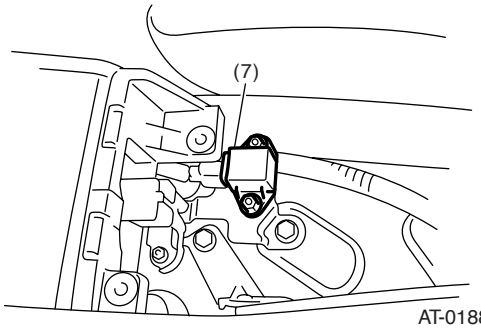


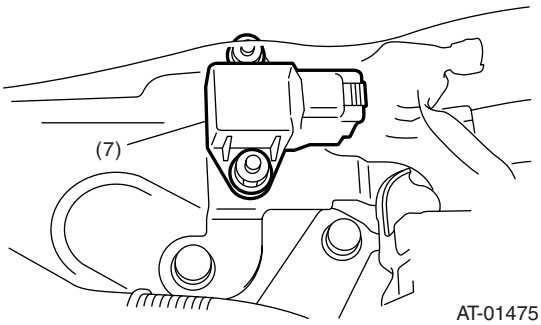
AT-00378

LHD model



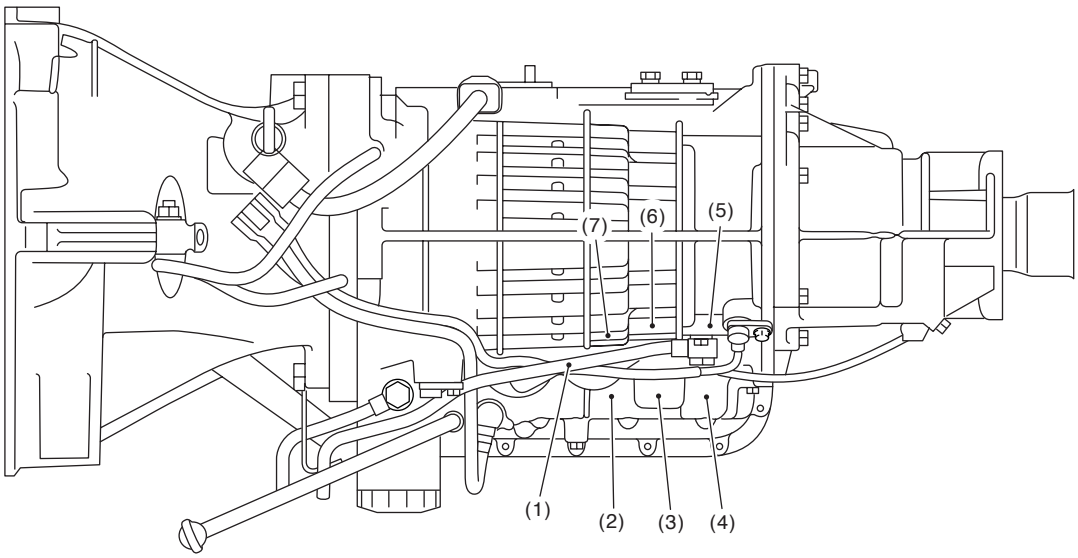
AT-01882

RHD model

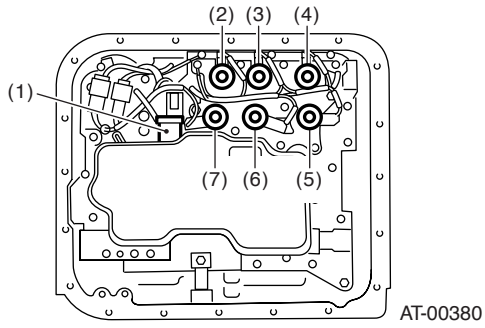


AT-01475

3. SOLENOID

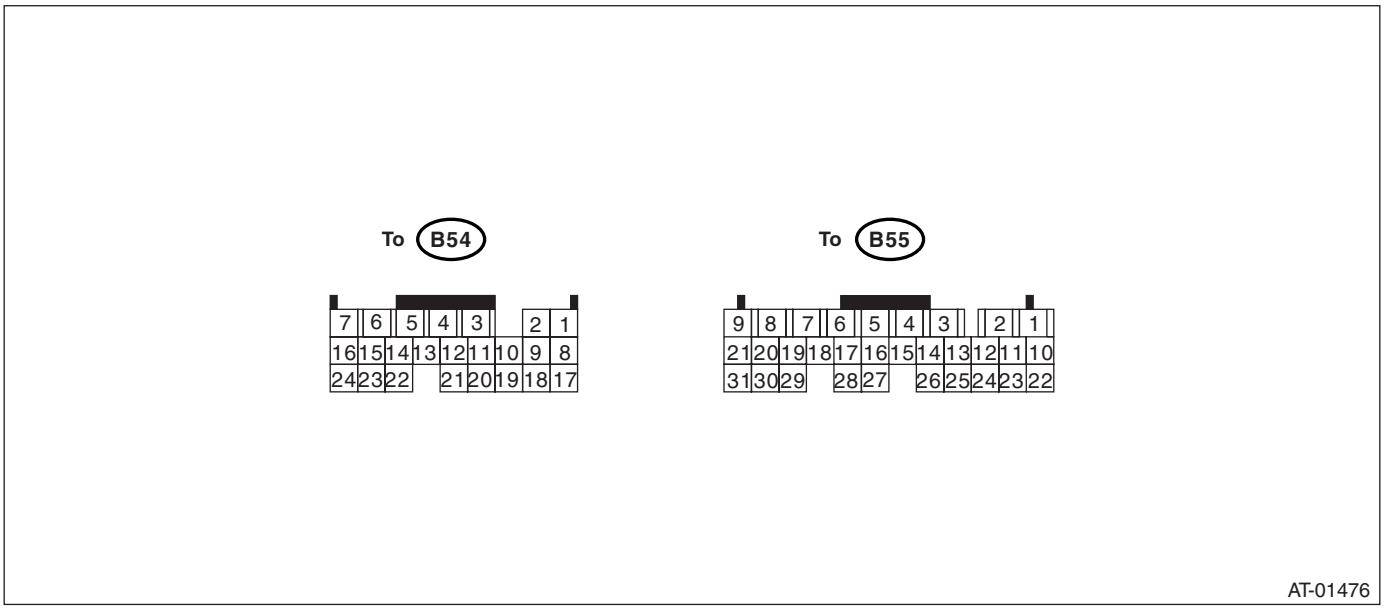


(1) Line pressure linear solenoid
(2) High clutch duty solenoid
(3) 2-4 brake duty solenoid
(4) Low & reverse duty solenoid
(5) Low clutch duty solenoid
(6) Transfer duty solenoid
(7) Lock-up duty solenoid



5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



Check with ignition switch ON.						
Item		Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (Ω)
Back-up power supply		B55	27	Ignition switch OFF	10 — 13	—
			28			
			29			
ACC power supply		B55	16	Ignition switch ACC	10 — 13	—
Ignition power supply		B55	21	Ignition switch ON (with engine OFF)	10 — 13	—
			31			
Inhibitor switch	"P" range switch	B54	5	Selector lever in "P" range	Less than 1	—
				Select lever in any other than "P" range (except "N" range)	More than 8	
	"N" range switch	B54	22	Selector lever in "N" range	Less than 1	—
				Selector lever in any other than "N" range	More than 8	
	"R" range switch	B54	14	Selector lever in "R" range	Less than 1	—
				Selector lever in any other than "R" range	More than 8	
	"D" range switch	B54	4	Selector lever in "D" range	Less than 1	—
				Selector lever in any other than "D" range	More than 8	
Accelerator pedal position sensor		B54	19	Throttle fully closed.	More than 0.2	—
				Throttle fully open.	4.6 or less	
Accelerator pedal position sensor power supply		B54	10	Ignition switch ON (with engine OFF)	4.6 — 5.4	—
ATF temperature sensor		B54	21	ATF temperature 20°C (68°F)	3.5 — 4.3	3.9 k — 4.7 k
				ATF temperature 80°C (176°F)	1.5 — 1.9	500 — 600
Rear vehicle speed sensor		B54	24	Vehicle speed at least 20 km/h (12 MPH)	More than 2 (AC range)	—

Check with ignition switch ON.					
Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (Ω)
Front vehicle speed sensor	B54	6	Vehicle stopped	0	450 — 750
			Vehicle speed at least 20 km/h (12 MPH)	More than 1 (AC range)	
Torque converter turbine speed sensor	B54	7	Engine idling after warm-up (“D” range)	0	450 — 750
			Engine idling after warm-up (“N” range)	More than 1 (AC range)	
Engine speed signal	B54	13	Ignition switch ON (with engine OFF)	Less than 1	—
			Ignition switch ON (engine ON)	More than 5 (AC range)	
Line pressure linear solenoid	B54	20	Ignition switch ON (with engine OFF) Throttle fully closed in “R” range after warm-up.	3.7 — 7.5	4.0 — 8.0
			Ignition switch ON (with engine OFF) Throttle fully open in “R” range after warm-up.	1.0 — 5.1	
Lock-up duty solenoid	B55	5	When lock up occurs.	More than 10.5	2.0 — 6.0
			When lock up is released.	Less than 1	
Transfer duty solenoid	B55	4	“P” or “N” range	Less than 1	2.0 — 6.0
			1st gear	1.7 — 4.0	
2-4 brake duty solenoid	B55	6	“P” or “N” range	More than 10.5	2.0 — 6.0
			2nd or 4th gear	Less than 1	
High clutch duty solenoid	B55	8	3rd or 4th gear	Less than 1	2.0 — 6.0
			“P” or “N” range	More than 10.5	
Low clutch duty solenoid	B55	9	1st or 2nd gear	Less than 1	2.0 — 6.0
			“P” or “N” range	More than 10.5	
Low & reverse duty solenoid	B55	7	“P” or “N” range	More than 10.5	2.0 — 6.0
			Driving at 1st on manual mode (15 km/h (9.3 MPH) or more)	5 — 10	
Front vehicle speed sensor ground	B54	15	—	0	Less than 1
Rear vehicle speed sensor ground	B54	24	—	0	Less than 1
Torque converter turbine speed sensor ground	B54	16	—	0	Less than 1
System ground circuit	B54	17	—	0	Less than 1
	B55	2			
	B55	3			
	B54	8			
Sensor ground line 3	B55	19	—	0	Less than 1
Sensor ground line 4	B54	9	—	0	Less than 1
Range lock signal	B55	18	Vehicle speed in “D” range 0 km/h (0 MPH)	More than 10.5	7 — 18
			Vehicle speed in “D” range 20 km/h (12 MPH)	Less than 1	
Data link signal (Subaru Select Monitor)	B55	12	—	—	—

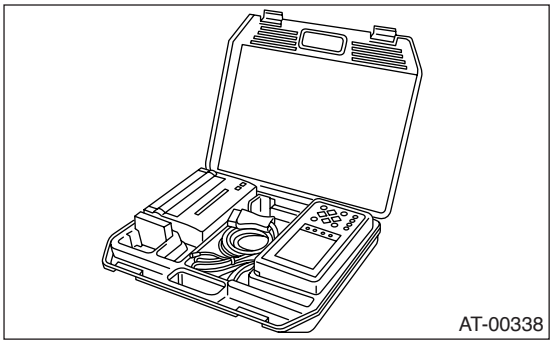
Check with ignition switch ON.					
Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Resistance to chassis ground (Ω)
CAN communication signal (+)	B54	3	Ignition switch ON	Pulse signal	—
CAN communication signal (–)	B54	12	Ignition switch ON	Pulse signal	—
FWD switch	B55	17	Fuse removed	10.5 or more	—
			Fuse installed	1 or less	
Lateral G sensor	B54	11	Ignition switch ON (Lateral G sensor in horizontal position)	2.0 — 3.0	—
Lateral G sensor power supply	B54	2	Ignition switch ON	4.75 — 5.25	—

6. Subaru Select Monitor

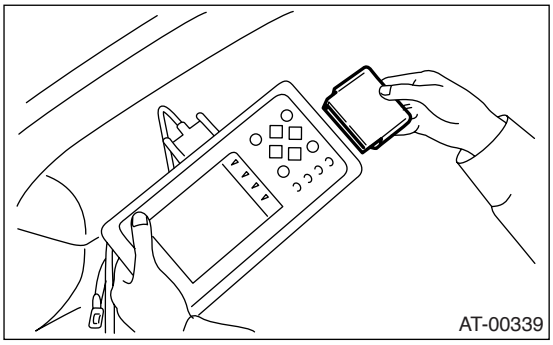
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.

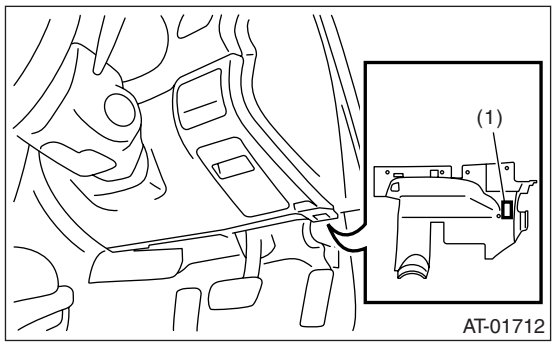


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to 4AT(diag)-6, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).

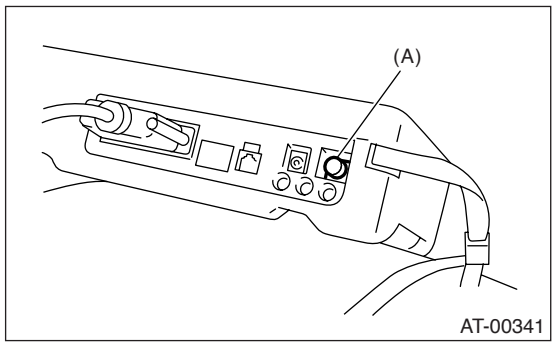


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
8) Press the [YES] key after the information of transmission type is displayed.
9) On the «Transmission Diagnosis» display screen, select the {Diagnosis Code(s) Display} and press [YES] key.

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTC, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to 4AT(diag)-32, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Item	Display	Unit of measure
Battery voltage	Battery Voltage	V
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h or MPH
Front vehicle speed sensor signal	Front Wheel Speed	km/h or MPH
Engine speed signal	Engine speed	rpm
Automatic transmission fluid temperature signal	ATF Temp.	°C or °F
Accelerator pedal position sensor	Throttle Sensor Voltage	V
Gear position	Gear position	—
Line pressure control duty ratio	Line pressure duty	%
Lock up clutch control duty ratio	L/U Duty	%
Transfer clutch control duty ratio	AWD duty	%
Accelerator pedal position sensor power supply	Throttle sensor power supply	V
Torque converter turbine speed signal	Turbine Revolution Speed	rpm
2-4 Brake timing pressure control duty ratio	2-4 B Pressure Duty	%
Low clutch duty ratio	L/C Duty	%
High clutch duty ratio	H/C Duty	%
Low & reverse brake duty ratio	L&R/B Duty	%
Throttle position	Throttle opening angle	%
FWD switch signal	FWD SW	ON or OFF
Stop light switch signal	Stop Light SW	ON or OFF
Anti lock brake system signal	ABS signal	ON or OFF
Parking range signal	P range	ON or OFF
Neutral range signal	N range	ON or OFF
Reverse range signal	R Range	ON or OFF
Drive range signal	D Range	ON or OFF
Automatic transmission diagnosis light output signal	Diagnosis Lamp	ON or OFF
Cruise control signal	Cruise control signal	ON or OFF
AT OIL TEMP warning light	ATF Temperature Lamp	ON or OFF
Up-shift signal	UP SW	ON or OFF
Down shift signal	Down SW	ON or OFF
Tip signal	Tip mode SW	ON or OFF
Shift lock solenoid signal	Shift lock solenoid	ON or OFF
Lateral G sensor	Lateral G sensor	V

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

NOTE:
When {Clear Memory 2} is selected and executed, DTC and learned control memory is cleared. If Clear Memory 2 has been performed, execute the learning control. <Ref. to 4AT(diag)-19, FACILITATION OF LEARNING CONTROL, OPERATION, Subaru Select Monitor.>

4. FACILITATION OF LEARNING CONTROL

1) Shift the select lever to “P” range, and apply parking brake.
2) Lift-up the vehicle.
3) Connect the Subaru Select Monitor to data link connector, and then turn the ignition switch to ON.
4) Perform the {Clear Memory 2} using Subaru Select Monitor. <Ref. to 4AT(diag)-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
5) Using Subaru Select Monitor, check that the DTC is not output. <Ref. to 4AT(diag)-17, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>
6) Warm-up the engine until the ATF temperature which is displayed on the Subaru Select Monitor reaches 60 — 90°C (140 — 194°F). <Ref. to 4AT(diag)-17, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Shift the select lever to “R” range.
8) Turn all switches including headlight, air conditioner, seat heater, rear defogger and etc. to OFF.
9) Wait for 30 seconds with turning ignition key to OFF until ACC goes OFF.
10) Depress the brake pedal fully until the facilitation of learning control is completed when the “Communication Failed!” is displayed on Subaru Select Monitor.
11) Turn the ignition switch to ON.
12) Check that the Subaru Select Monitor is returned to normal operation.
13) Shift the select lever to “P” range, and then wait for more than 3 seconds.
14) Shift the select lever to “R” range, and then wait for more than 3 seconds.
15) Shift the select lever to “N” range, and then wait for more than 3 seconds.
16) Shift the select lever to “D” range, and then wait for more than 3 seconds.
17) Shift the select lever to “N” range, and then wait for more than 3 seconds.
18) Slowly depress the accelerator pedal fully.
19) Slowly release the accelerator pedal fully.
20) Start the engine, and idle it.
21) Shift the select lever to “D” range.
22) Start the facilitation of learning control. At this time, the SPORT indicator light in the combination meter start blinking at 2 Hz. When the SPORT indicator light does not blink, turn the ignition switch to OFF and repeat the procedures from step 4). When the SPORT indicator light stop blinking at 2 Hz and goes OFF, facilitation of learning control is completed.

NOTE:
When blinking of SPORT indicator light changes from 2 Hz to 4 Hz during facilitation of learning control, repeat the procedure from step 4).

23) Shift the select lever to “N” range, and then turn the ignition switch to OFF.
24) Shift the select lever to “P” range to complete the facilitation of learning control.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to “Subaru Select Monitor” for information about how to display DTC. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>
For details concerning DTCs, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 4AT(diag)-32, List of Diagnostic Trouble Code (DTC).>

NOTE:
DTC can not be read by SPORT indicator light.

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the traffic law during actual driving.

1) Shift the select lever to “D” range, and then drive the vehicle at 60 km/h (37 MPH) for at least 10 seconds.
2) Drive the vehicle with manual mode.

9. Clear Memory Mode

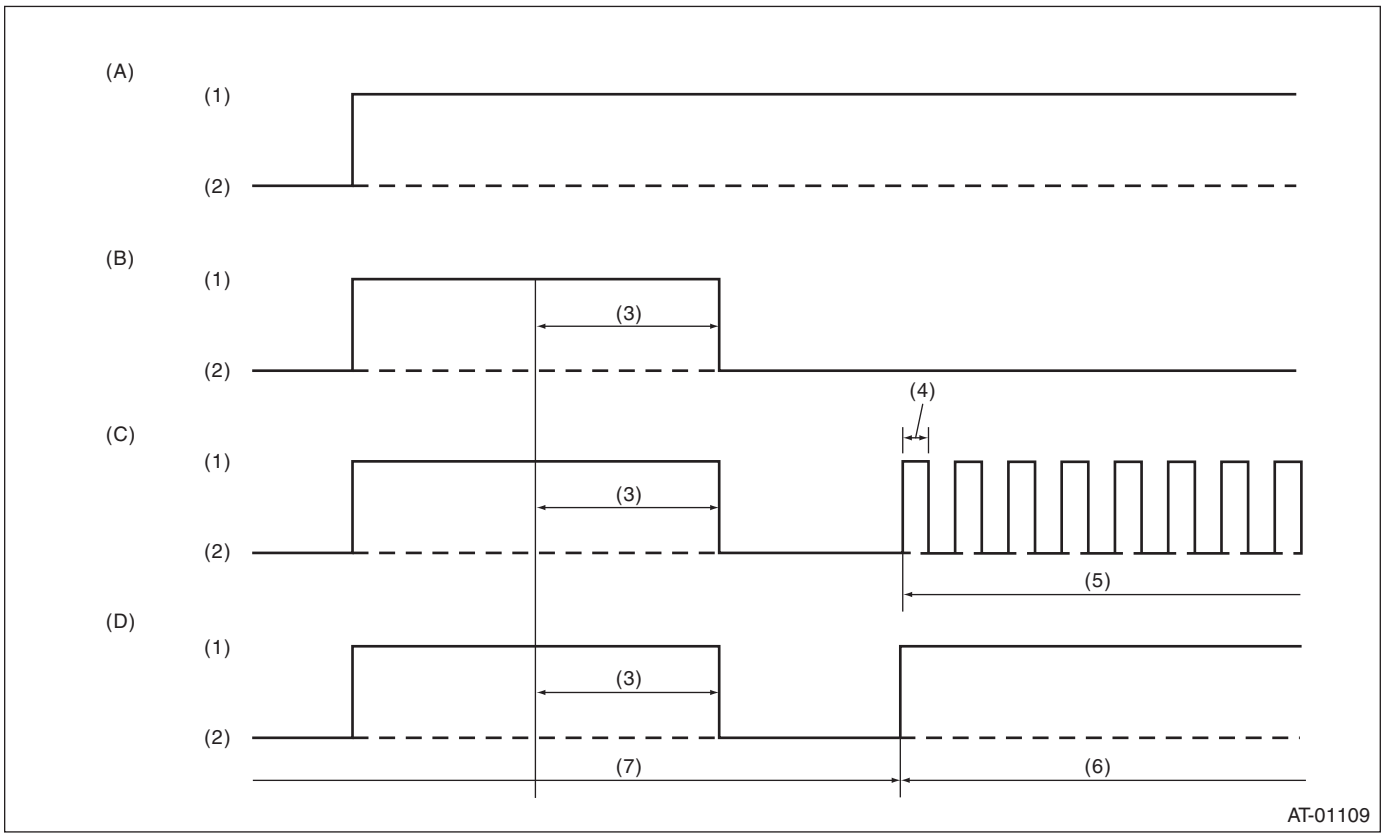
A: OPERATION

Refer to “Subaru Select Monitor” for information about how to clear DTC.
<Ref. to 4AT(diag)-19, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

10.SPORT Indicator Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the display on the SPORT indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the SPORT indicator light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using Subaru Select Monitor. Indicator light signal patterns are as shown in the figure.



(A) Ignition switch (Engine OFF)
(B) Normal (Engine ON)
(C) Faulty (Engine ON)
(D) Normal (SPORT mode ON)

(1) ON
(2) OFF
(3) 2 seconds
(4) 0.25 seconds
(5) Blink
(6) SPORT mode ON
(7) SPORT mode OFF

Perform the inspection when the SPORT indicator light does not operate correctly. <Ref. to 4AT(diag)-24, INSPECTION, SPORT Indicator Light Display.>

B: INSPECTION

DIAGNOSIS:

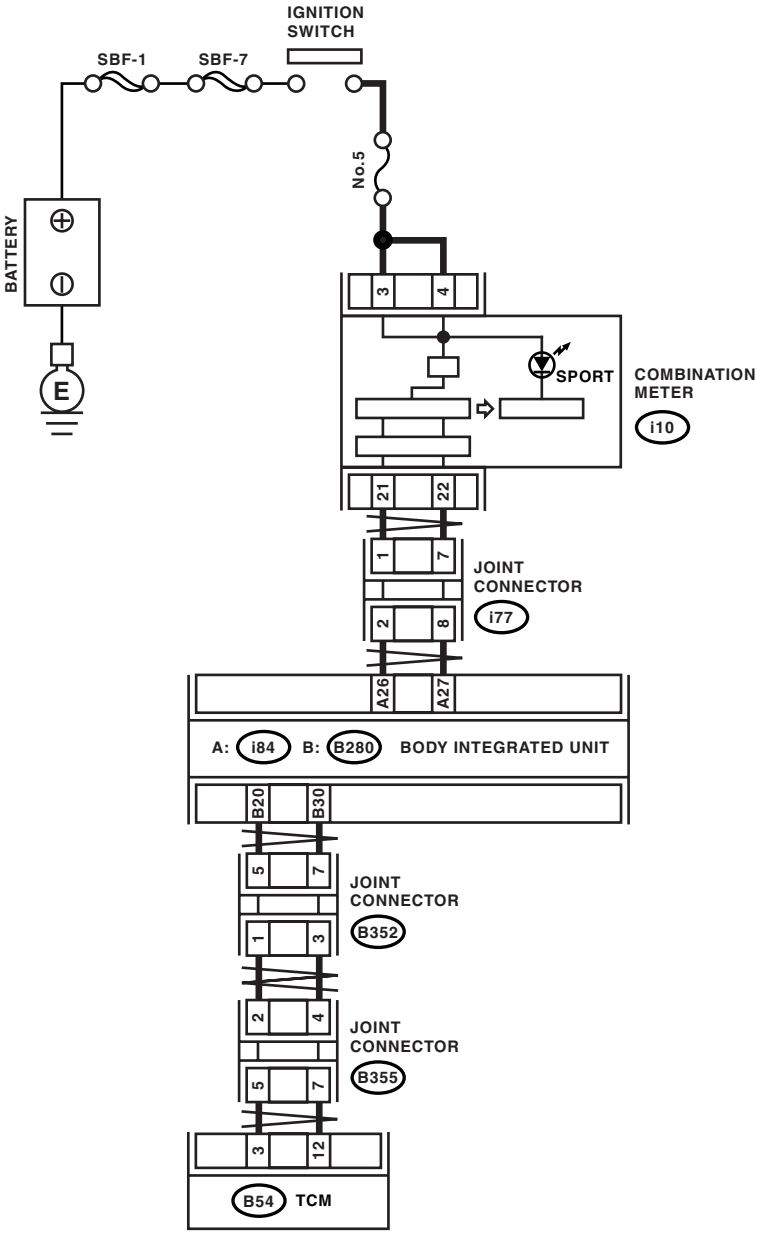
SPORT indicator light circuit is open or shorted.

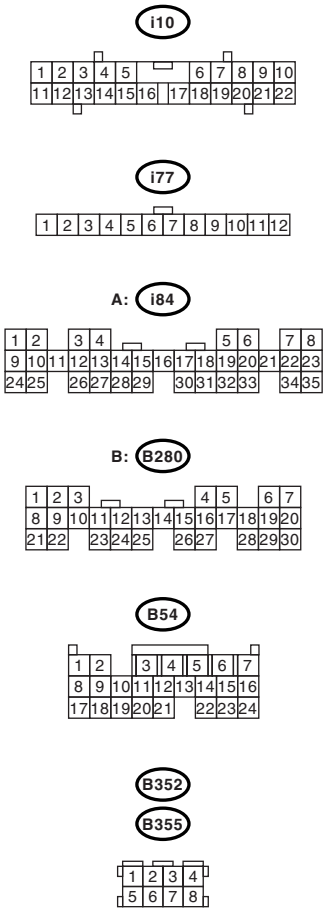
TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), SPORT indicator light does not illuminate.

WIRING DIAGRAM:

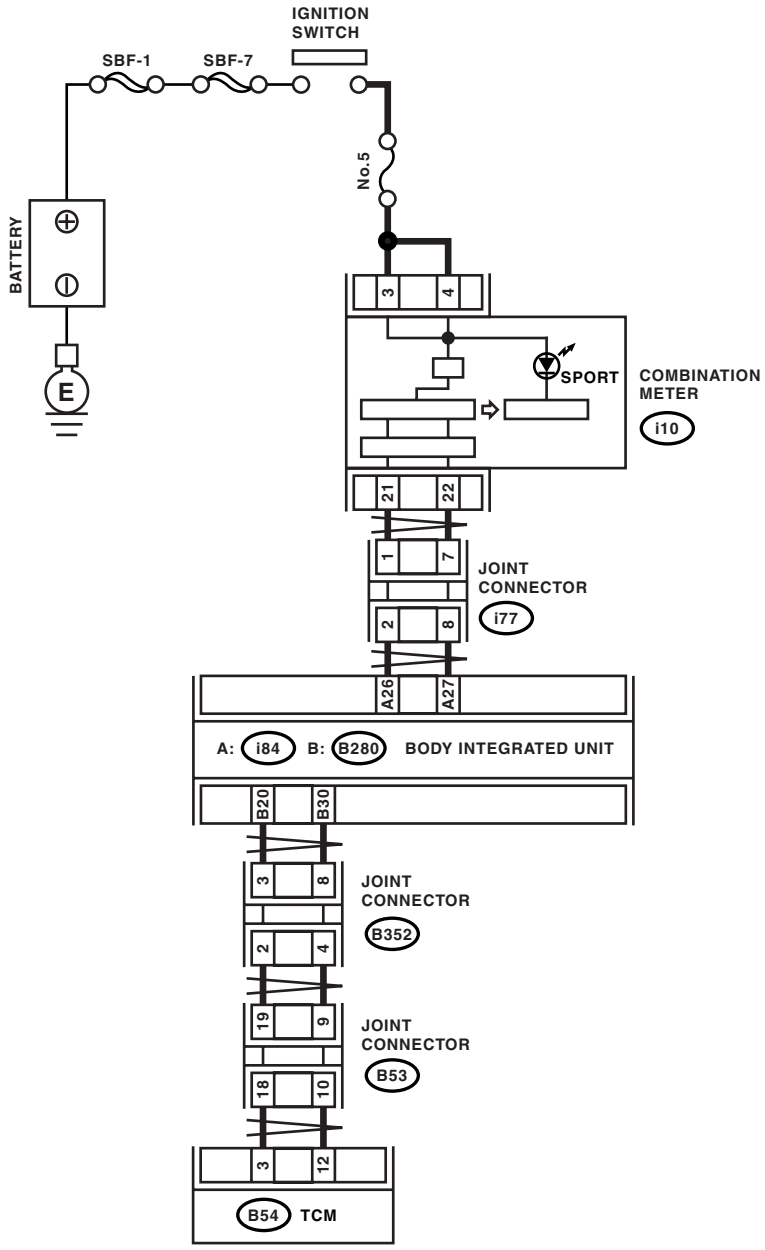
• LHD model

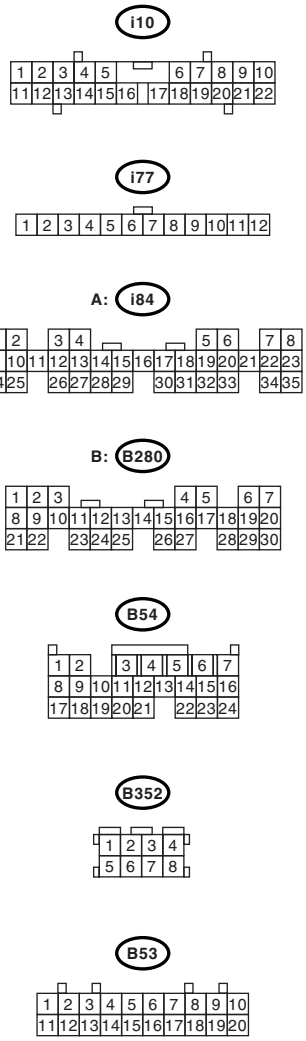




AT-01883

• RHD model





AT-01884

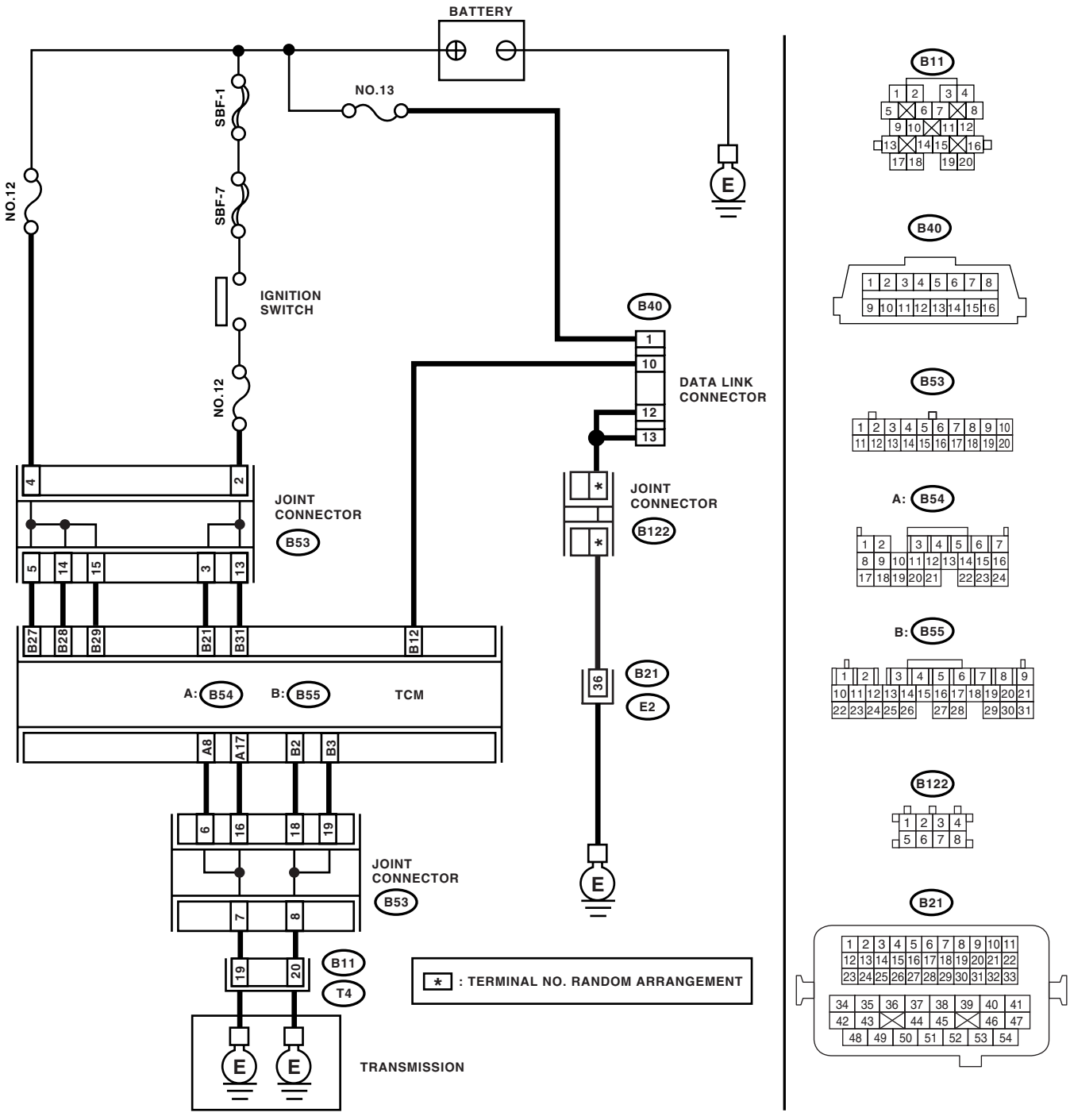
SPORT Indicator Light Display

	Step	Check	Yes	No
1	**CHECK SPORT INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the SPORT indicator light illuminate?	Go to step **2.**	Perform the self-diagnosis of combination meter.
2	**CHECK SPORT INDICATOR LIGHT.** After the ignition switch is “ON”, wait for at least 2 seconds.	Does the SPORT indicator light illuminate?	Go to step **3.**	Go to step **4.**
3	**CHECK SPORT INDICATOR LIGHT.** Start the engine.	Does the SPORT indicator light go off?	Normal. Return to Basic Diagnostic Procedure. <Ref. to 4AT(diag)-2, Basic Diagnostic Procedure.>	Go to step **7.**
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** Connect the Subaru Select Monitor to data link connector.	Is the communication between Subaru Select Monitor and TCM normal?	Go to step **5.**	Check the power supply ground circuit of TCM and Subaru Select Monitor communication. <Ref. to 4AT(diag)-27, Diagnostic Procedure for Select Monitor Communication.>
5	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor.	Is the “Diagnosis light” output signal “ON”?	Go to step **6.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
6	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the “SPORT light” input signal “Illuminate”?	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>
7	**CHECK TCM.** 1) Start the engine. 2) Display the current data of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>	Is the “Diagnosis light” output signal “ON”?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **8.**
8	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the “SPORT light” input signal “Illuminate”?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis for combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

11.Diagnostic Procedure for Select Monitor Communication

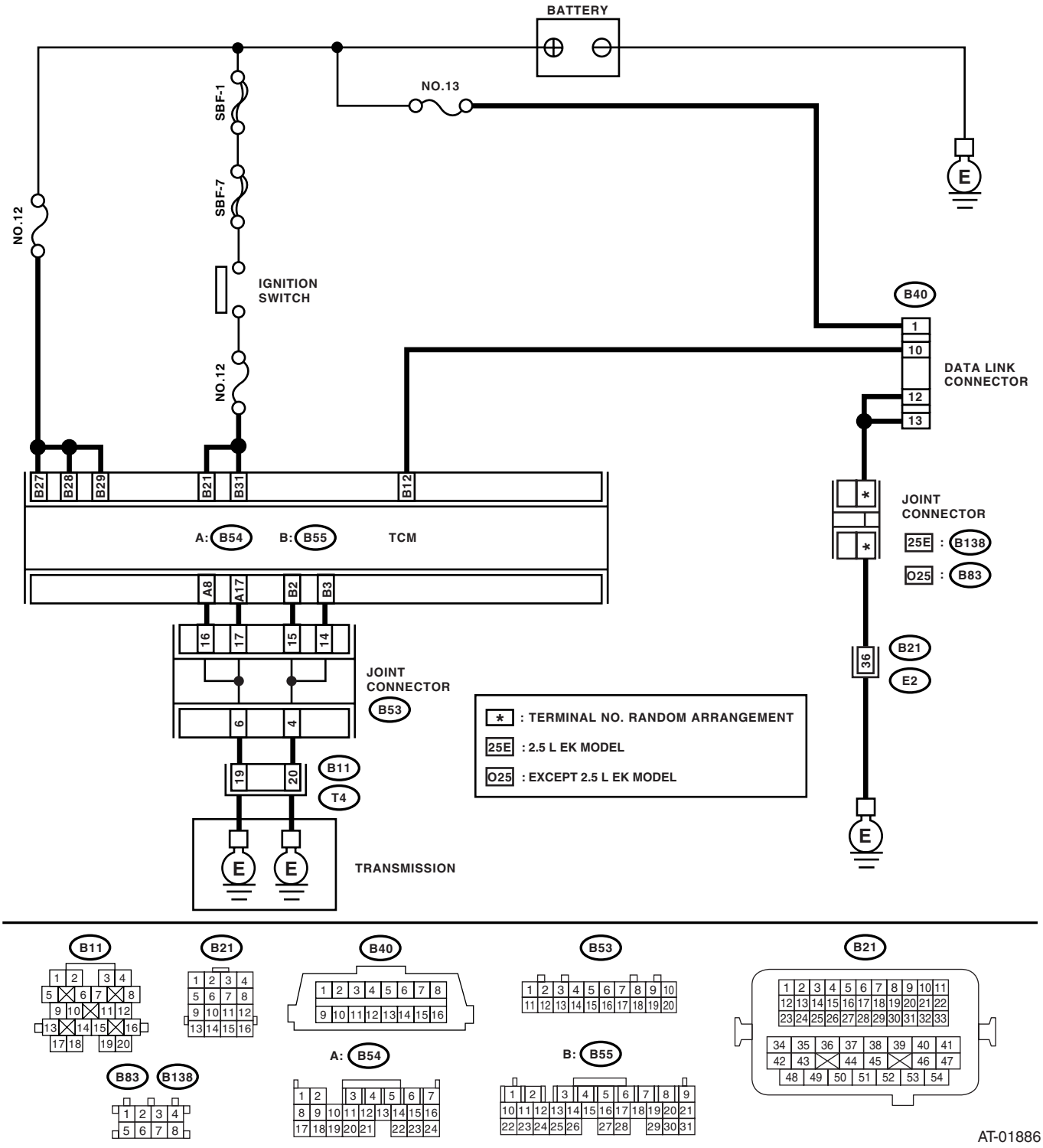
A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:
Faulty harness connector
TROUBLE SYMPTOM:
Subaru Select Monitor communication failure
WIRING DIAGRAM:
• LHD model



AT-01885

• RHD model


BATTERY
NO.13
SBF-1
SBF-7
NO.12
NO.12
IGNITION SWITCH
B40
DATA LINK CONNECTOR
JOINT CONNECTOR
25E : B138
O25 : B83
B21
E2
B27 B28 B29 B21 B31 B12
A: B54 B: B55 TCM
A8 A17 B2 B3
16 17 15 14
JOINT CONNECTOR B53
6 4
19 20
B11
T4
TRANSMISSION
: TERMINAL NO. RANDOM ARRANGEMENT
25E : 2.5 L EK MODEL
O25 : EXCEPT 2.5 L EK MODEL
B11
B21
B40
B53
B21
B83
B138
A: B54
B: B55
AT-01886

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness connector and connector between battery and data link connector, and poor contact in coupling connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** 1) Disconnect the connectors from ECM. 2) Measure the resistance of harness connector between data link connector and ECM. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between data link connector and ECM.
3	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness connector between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between data link connector and ground terminal.
4	**CHECK ENGINE GROUND CIRCUIT.** Check engine ground circuit. <Ref. to 4AT(diag)-92, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Is the engine ground circuit normal?	Go to step **5.**	Repair the ground circuit of ECM.
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to transmission systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step **10.**	Go to step **6.**
6	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Check whether communication to engine systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **7.**
7	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Check whether communication to transmission systems can be executed normally.	Are the name of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **8.**
8	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL UNIT AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connector. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Check harness and connector between each control unit and data link connector.

	Step	Check	Yes	No
9	**CHECK OUTPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 1 V?	Check harness and connector between each control unit and data link connector.	Go to step **10.**
10	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B55) No. 12 — (B40) No. 10:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the harness and connector between TCM and data link connector.
11	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is TCM connector inserted into TCM?	Go to step **12.**	Connect the TCM connector to TCM.
12	**CHECK TRANSMISSION HARNESS CONNECTOR.**	Is the transmission harness connector connected to bulkhead harness connector?	Go to step **13.**	Connect the bulkhead harness connector to transmission harness connector.
13	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control unit power supply and data link connector?	Repair the poor contact.	Go to step **14.**
14	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 27 (+) — Chassis ground (−):*** ***(B55) No. 28 (+) — Chassis ground (−):*** ***(B55) No. 29 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **16.**	Go to step **15.**
15	**CHECK FUSE (No. 12).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 12).	Is the fuse (No. 12) blown?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blown out easily, repair the short circuit in harness between fuse (No. 12) and TCM.	Repair the open circuit in harness between fuse (No. 12) and TCM, or fuse (No. 12) and battery, and poor contact in coupling connector.
16	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B56) No. 21 (+) — Chassis ground (−):*** ***(B56) No. 31 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **18.**	Go to step **17.**
17	**CHECK FUSE (No. 12).** Remove the fuse (No. 12).	Is the fuse (No. 12) blown?	Replace the fuse (No. 12). If the replaced fuse (No. 12) blown out easily, repair the short circuit in harness between fuse (No. 12) and TCM.	Repair the open circuit in harness between fuse (No. 12) and TCM, or fuse (No. 12) and battery, and poor contact in connector.

	Step	Check	Yes	No
18	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 8 — (B11) No. 19:*** ***(B54) No. 17 — (B11) No. 19:*** ***(B55) No. 2 — (B11) No. 20:*** ***(B55) No. 3 — (B11) No. 20:***	Is the resistance less than 1 Ω?	Go to step **19.**	Repair the open circuit in harness between TCM and transmission harness connector, and poor contact in connector.
19	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND TRANSMISSION GROUND.** Measure the resistance of harness between transmission and transmission ground. ***Connector & terminal*** ***(T4) No. 19 — Transmission ground:*** ***(T4) No. 20 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **20.**	Repair the open circuit in harness between transmission and transmission ground.
20	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference target
P0705	Transmission Range Sensor Circuit (PRNDL INPUT)	Inhibitor switch malfunction short circuit	<Ref. to 4AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor is faulty or input signal circuit is open.	<Ref. to 4AT(diag)-42, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor is faulty or input signal circuit is shorted.	<Ref. to 4AT(diag)-45, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Torque Converter Turbine Speed Signal Circuit Malfunction	Torque converter turbine speed sensor malfunction, short input signal circuit	<Ref. to 4AT(diag)-48, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/Brake Switch “B” Circuit Low	Brake switch malfunction, open input signal circuit	<Ref. to 4AT(diag)-50, DTC P0719 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	AT Vehicle Speed Sensor Circuit Malfunction	Front vehicle speed sensor malfunction, open or short input signal circuit	<Ref. to 4AT(diag)-53, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/Brake Switch “B” Circuit High	Brake switch malfunction, short input signal circuit	<Ref. to 4AT(diag)-56, DTC P0724 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit Malfunction	Open or short engine speed output signal circuit	<Ref. to 4AT(diag)-59, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(diag)-61, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(diag)-61, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(diag)-61, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(diag)-61, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle sensor, torque converter turbine speed sensor, or control valve malfunction	<Ref. to 4AT(diag)-62, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Lock-up clutch is faulty or valve is stuck.	<Ref. to 4AT(diag)-64, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0743	Torque Converter Clutch Circuit Electrical	Lock-up solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-65, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0748	Pressure Control Solenoid “A” Electrical	Line pressure linear solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-68, DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	Low clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-71, DTC P0753 SHIFT SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	2-4 brake duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-74, DTC P0758 SHIFT SOLENOID “B” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid “C” Electrical	High clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-77, DTC P0763 SHIFT SOLENOID “C” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid “D” Electrical	Low & reverse clutch duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-80, DTC P0768 SHIFT SOLENOID “D” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	Range lock solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-83, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear vehicle speed sensor is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-86, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve	Transfer duty solenoid is faulty or output signal circuit is open or shorted.	<Ref. to 4AT(diag)-89, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1708	Throttle Position Sensor Circuit Low Input	Accelerator pedal position sensor is faulty or input signal circuit is open.	<Ref. to 4AT(diag)-92, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1709	Throttle Position Sensor Circuit High Input	Accelerator pedal position sensor is faulty or input signal circuit is shorted.	<Ref. to 4AT(diag)-98, DTC P1709 THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1714	Throttle Position Sensor Power Supply Circuit	Accelerator pedal position sensor is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-104, DTC P1714 THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	CAN Communication Circuit	CAN communication circuit is open or shorted.	<Ref. to 4AT(diag)-109, DTC P1718 CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1760	Lateral Acceleration Sensor Performance Problem	Lateral G sensor is faulty.	<Ref. to 4AT(diag)-110, DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1761	Lateral Acceleration Sensor Circuit Low	Lateral G sensor is faulty or input signal circuit is open.	<Ref. to 4AT(diag)-113, DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1762	Lateral Acceleration Sensor Circuit High	Lateral G sensor is faulty or input signal circuit is shorted.	<Ref. to 4AT(diag)-116, DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	Sports Mode Switch Circuit	manual mode switch is faulty or input signal circuit is open or shorted.	<Ref. to 4AT(diag)-119, DTC P1817 SPORTS MODE SWITCH CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

13.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

DTC DETECTING CONDITION:

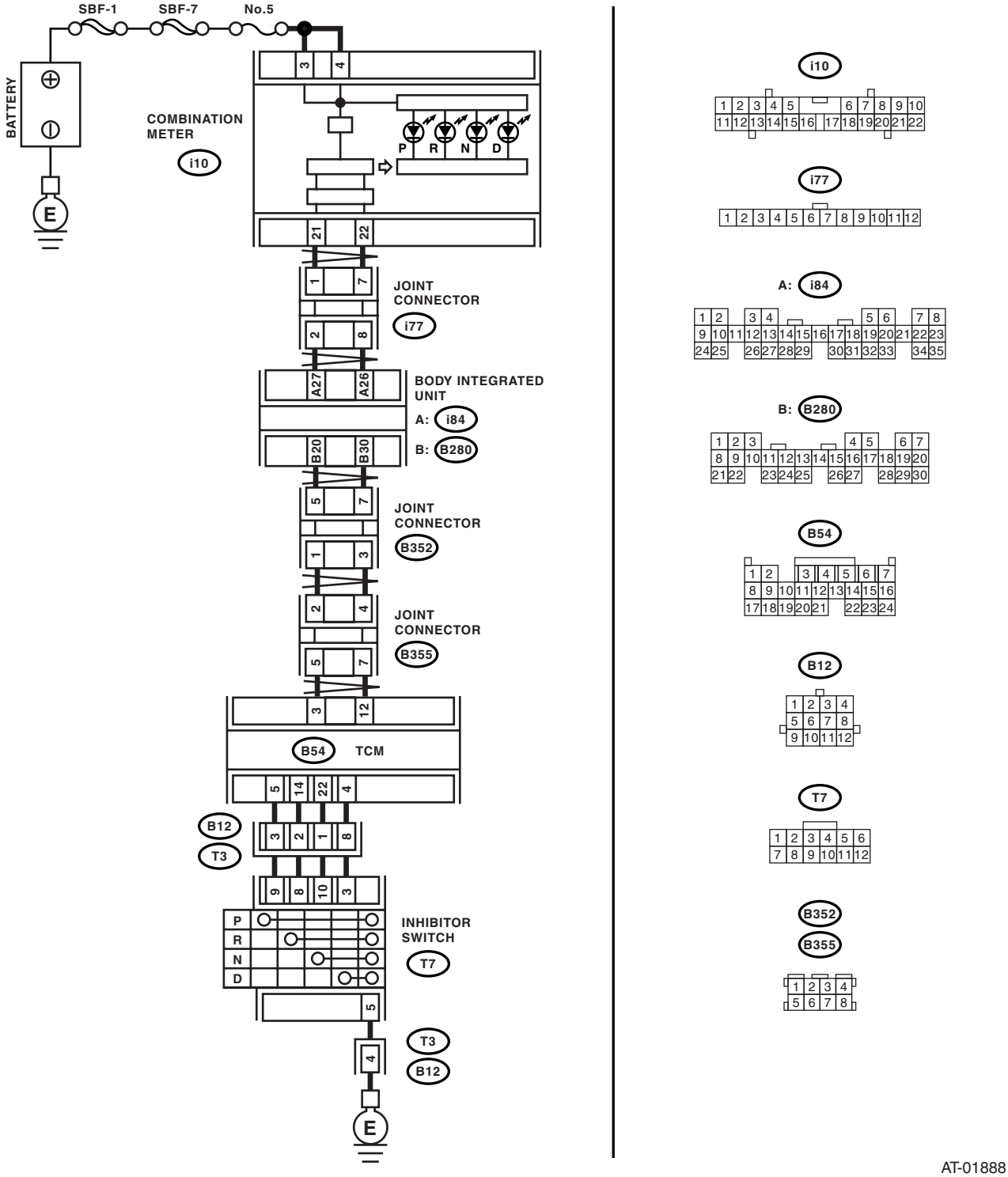
- Inhibitor switch is faulty.
- More than 2 range signal is input.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Range position of select lever and AT select lever position indicator light on the combination meter is not matched.

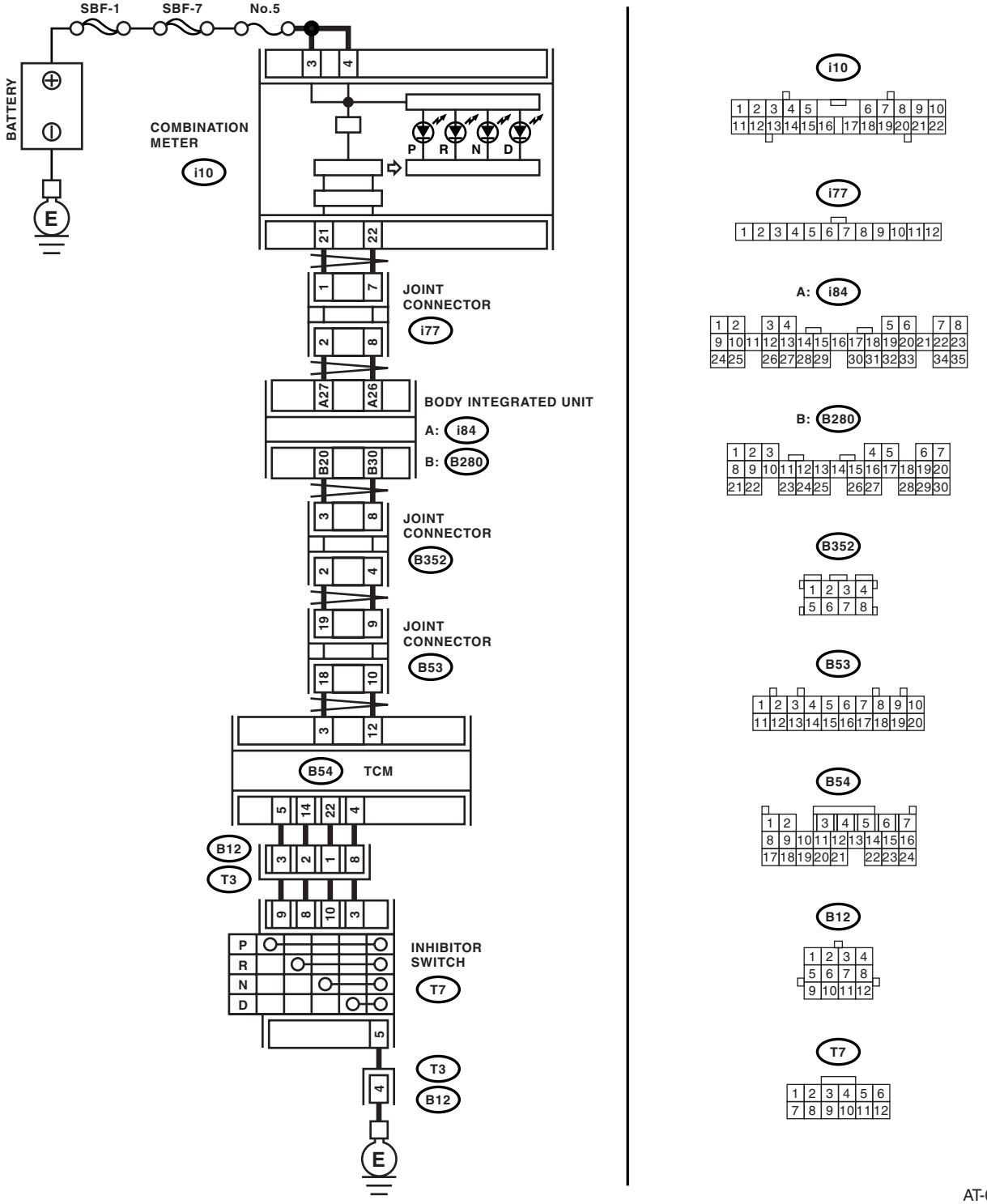
WIRING DIAGRAM:

- LHD model



AT-01888

• RHD model



AT-02356

Step		Check	Yes	No
1	**CHECK INDICATOR LIGHT.** 1) Turn the ignition switch to ON. 2) Shift the select lever to “P” range.	Does the “P” range indicator light on combination meter illuminate?	Go to step **2.**	Go to step **12.**
2	**CHECK INDICATOR LIGHT.**	Does the “R” range indicator light on combination meter illuminate?	Go to step **26.**	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK INDICATOR LIGHT.**	Does the “N” range indicator light on combination meter illuminate?	Go to step **33.**	Go to step **4.**
4	**CHECK INDICATOR LIGHT.**	Does the “D” range indicator light on combination meter illuminate?	Go to step **40.**	Go to step **5.**
5	**CHECK “P” RANGE SWITCH.** 1) Connect the Subaru Select Monitor to data link connector. 2) Shift the select lever to “R” range.	Does the “P” range LED of Subaru Select Monitor illuminate?	Go to step **19.**	Go to step **6.**
6	**CHECK INDICATOR LIGHT.**	Does the “R” range indicator light on combination meter illuminate?	Go to step **8.**	Go to step **7.**
7	**CHECK “R” RANGE SWITCH.**	Does the “R” range LED of Subaru Select Monitor illuminate?	Go to step **23.**	Go to step **20.**
8	**CHECK INDICATOR LIGHT.** Shift the select lever to the “N” range.	Does the “P” range indicator light on combination meter illuminate?	Go to step **10.**	Go to step **9.**
9	**CHECK “N” RANGE SWITCH.**	Does the “N” range LED of Subaru Select Monitor illuminate?	Go to step **30.**	Go to step **27.**
10	**CHECK INDICATOR LIGHT.** Shift the select lever to “D” range.	Does the “D” range indicator light on combination meter illuminate?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **11.**
11	**CHECK “D” RANGE SWITCH.**	Does the “D” range LED of Subaru Select Monitor illuminate?	Go to step **37.**	Go to step **34.**
12	**CHECK HARNESS CONNECTOR BETWEEN INHIBITOR SWITCH AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from inhibitor switch. 3) Measure the resistance of harness between inhibitor switch and chassis ground. ***Connector & terminal*** ***(T7) No. 5 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **13.**	Repair the open circuit in harness between inhibitor switch connector and chassis ground, and poor contact in coupling connector.
13	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 5 — (T7) No. 9:***	Is the resistance less than 1 Ω?	Go to step **14.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.

	Step	Check	Yes	No
14	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "P" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **15.**	Go to step **41.**
15	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to any range other than "P". 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 5 (+) — Chassis ground (–):***	Is the voltage more than 8 V?	Go to step **41.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
16	**CHECK BODY INTEGRATED UNIT.** Read the data of the inhibitor switch from Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is "7" displayed?	Go to step **17.**	Check the body integrated unit.
17	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **18.**
18	**CHECK COMBINATION METER.** Check the "P" range indicator light. <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the "P" range indicator light OK?	Go to step **41.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
19	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 5 — Chassis ground:***	Is the resistance less than 1 MΩ?	Go to step **42.**	Repair the ground short circuit in "P" range circuit.
20	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 14 — (T7) No. 8:***	Is the resistance less than 1 Ω?	Go to step **21.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
21	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "R" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **22.**	Go to step **41.**

	Step	Check	Yes	No
22	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to other than "R" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 14 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **41.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
23	**CHECK BODY INTEGRATED UNIT.** Read the data of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is "6" displayed?	Go to step **24.**	Check the body integrated unit.
24	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **25.**
25	**CHECK COMBINATION METER.** Check the "R" range indicator light. <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the "R" range indicator light OK?	Go to step **41.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
26	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **41.**	Repair the ground short circuit in "R" range circuit.
27	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 22 — (T7) No. 10:***	Is the resistance less than 1 Ω?	Go to step **28.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
28	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to "N" range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **29.**	Go to step **41.**
29	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to other than "N" range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 22 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **41.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
30	**CHECK BODY INTEGRATED UNIT.** Read the data of shift position from Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is "5" displayed?	Go to step **31.**	Check the body integrated unit.

	Step	Check	Yes	No
31	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **32.**
32	**CHECK COMBINATION METER.** Check the “N” range indicator light. <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the “N” range indicator light OK?	Go to step **41.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
33	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **41.**	Repair the ground short circuit in “N” range circuit.
34	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and inhibitor switch. 3) Measure the resistance of harness between TCM and inhibitor switch connector. ***Connector & terminal*** ***(B54) No. 4 — (T7) No. 3:***	Is the resistance less than 1 Ω?	Go to step **35.**	Repair the open circuit in harness between TCM and inhibitor switch connector, and poor contact in coupling connector.
35	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM and inhibitor switch. 3) Turn the ignition switch to ON. 4) Shift the select lever to “D” range. 5) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 4 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **36.**	Go to step **41.**
36	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift the select lever to other than “D” range. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 8 V?	Go to step **41.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
37	**CHECK BODY INTEGRATED UNIT.** Read the data of inhibitor switch from Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is “4” displayed?	Go to step **38.**	Check the body integrated unit.
38	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to the DTC.	Go to step **39.**
39	**CHECK COMBINATION METER.** Check the “D” range indicator light. <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the “D” range indicator light OK?	Go to step **41.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>

	Step	Check	Yes	No
40	**CHECK HARNESS CONNECTOR BETWEEN TCM AND INHIBITOR SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM, inhibitor switch and combination meter. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **41.**	Repair the ground short circuit in "D" range circuit.
41	**CHECK POOR CONTACT.**	Is there poor contact in inhibitor switch circuit?	Repair the poor contact.	Go to step **42.**
42	**CHECK INHIBITOR SWITCH.**	Is the inhibitor switch in normal position?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Adjust inhibitor switch and select cable. <Ref. to 4AT-52, Inhibitor Switch.> and <Ref. to CS-12, Select Cable.>

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

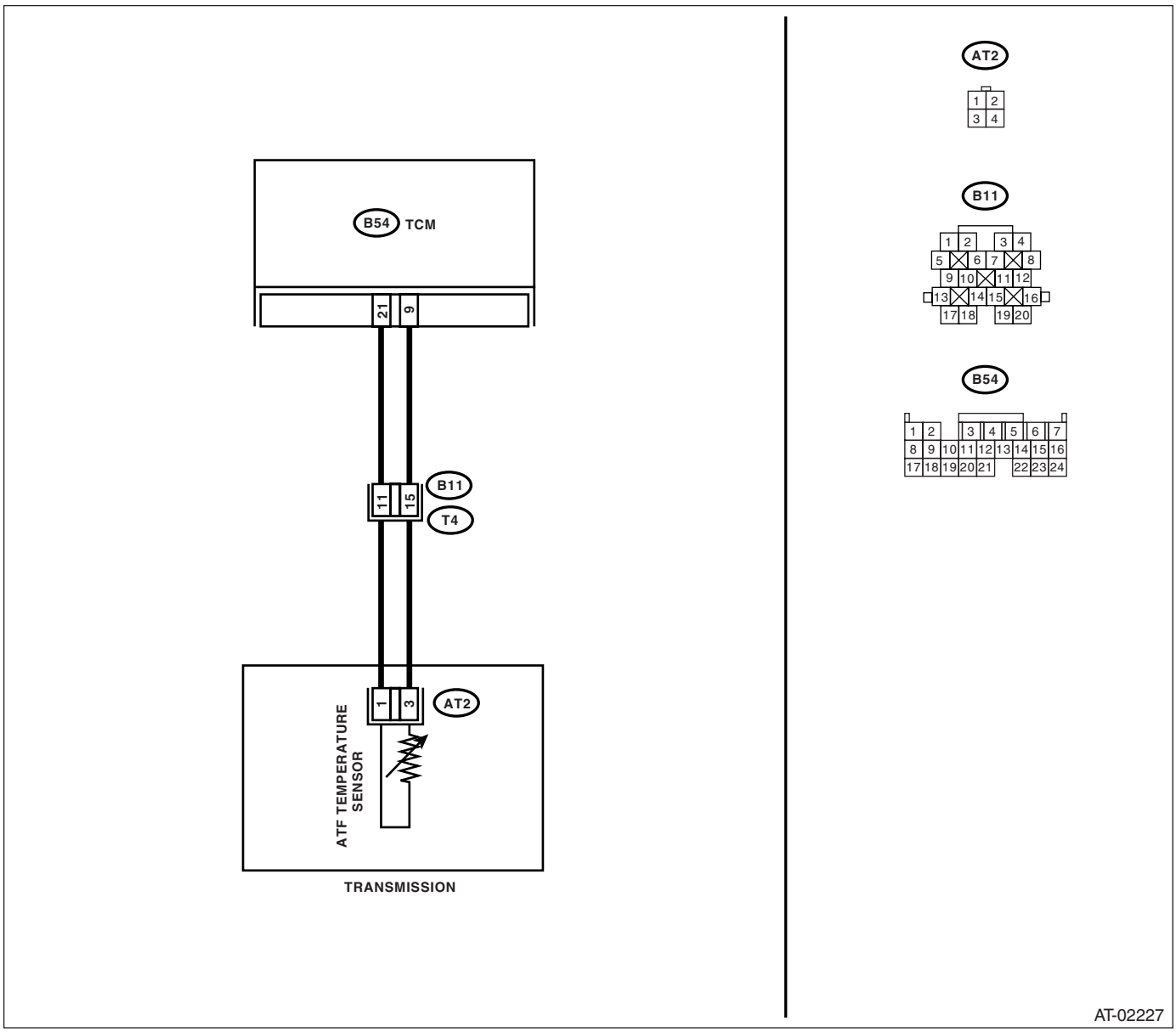
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 21 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 15:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Is the resistance 500 — 600 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **5.**	Go to step **7.**
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector to transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Read the data of ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or contact in the ATF temperature sensor and transmission connector.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve. 7) Measure the resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 11 — (AT2) No. 1:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between ATF temperature sensor and transmission connector.
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between ATF temperature sensor and transmission connector. ***Connector & terminal*** ***(T4) No. 15 — (AT2) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between ATF temperature sensor and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between ATF temperature sensor and transmission connector.
10	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 15 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>	Repair the short circuit in harness between ATF temperature sensor and transmission connector.

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

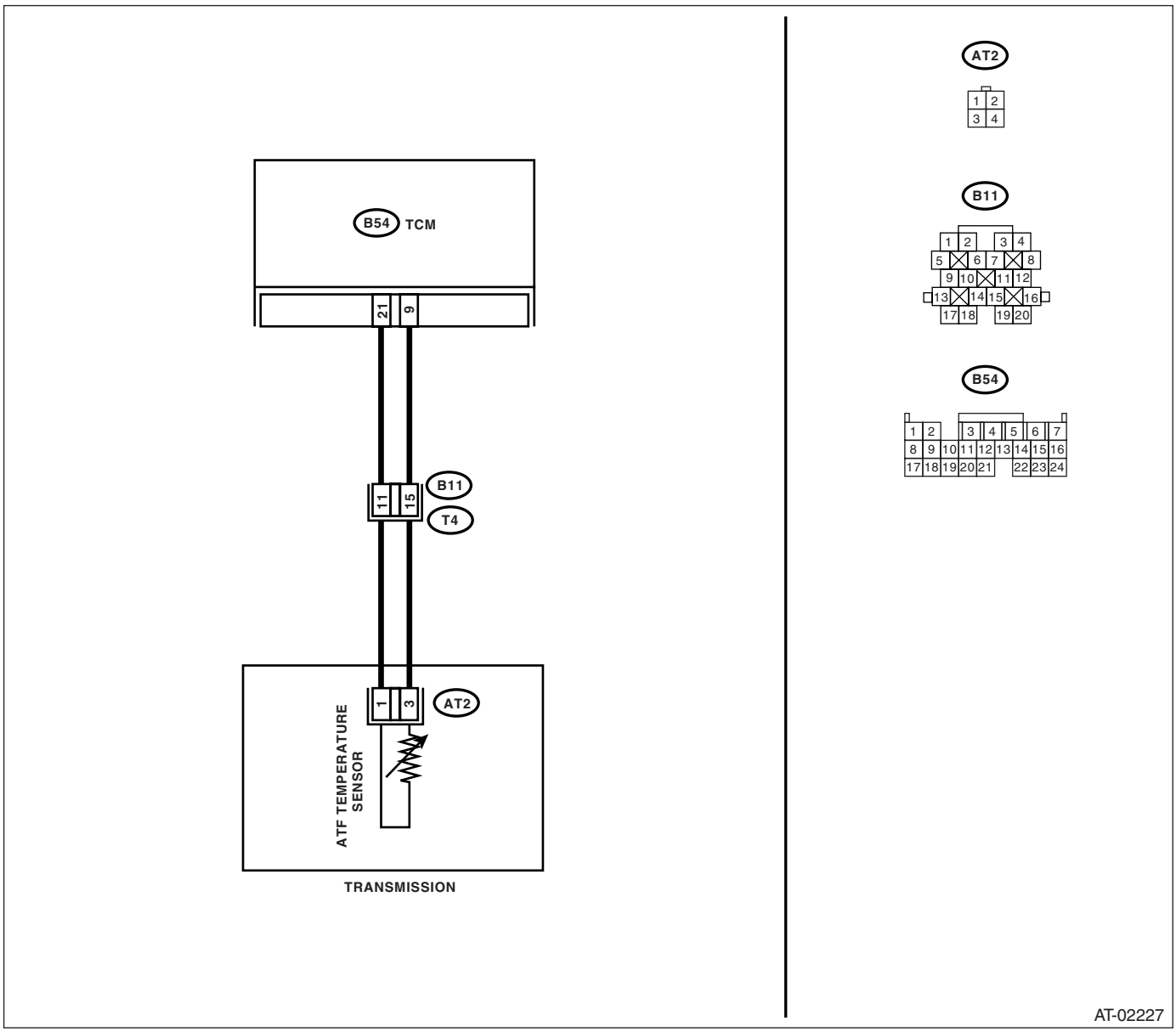
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor is shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 21 — No. 9:***	Is the resistance more than 500 Ω?	Go to step **2.**	Go to step **4.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Go to step **4.**
3	**CHECK HARNESS.** Measure the resistance between TCM connector terminals while shaking the harness. ***Connector & terminal*** ***(B54) No. 21 — No. 9:***	Does the resistance change?	Go to step **4.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission harness.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ATF TEMPERATURE SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and transmission harness.
6	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 11 — No. 15:***	Is the resistance more than 500 Ω?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK TRANSMISSION HARNESS.** 1) Lift-up the vehicle and place it on rigid racks. 2) Drain the ATF. NOTE: Do not drain the ATF until it cools down. 3) Remove the oil pan. 4) Disconnect the harness connector from control valve. 5) Measure the resistance between ATF temperature sensor connector terminals 6) Measure the resistance between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Replace the transmission harness.
8	**CHECK TRANSMISSION HARNESS.** Measure the resistance between transmission connector and transmission ground, ***Connector & terminal*** ***(T4) No. 15 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Replace the transmission harness.
9	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between control valve connector terminals ***Terminal*** ***No. 1 — No. 3:***	Is the resistance more than 500 Ω?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

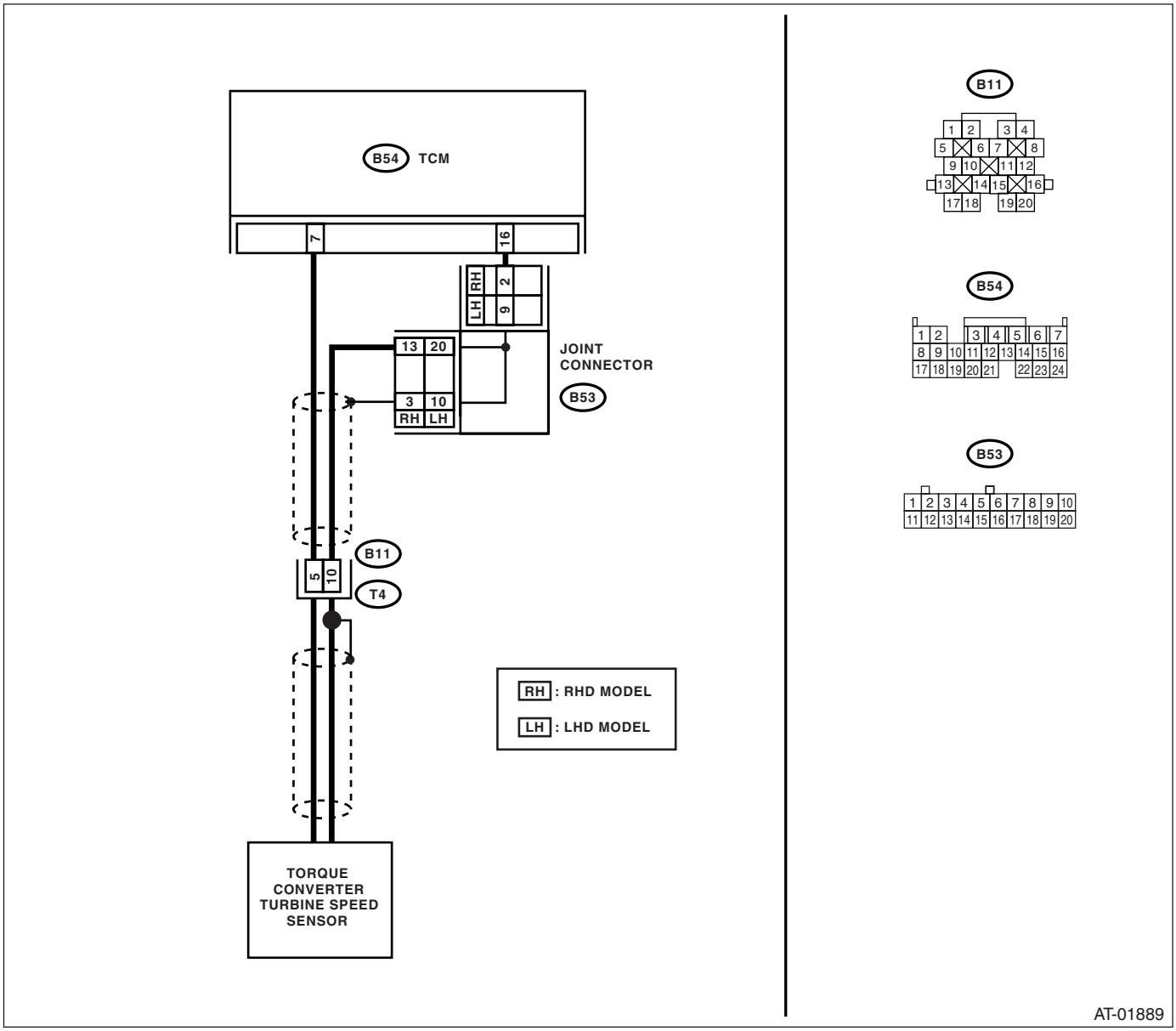
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 5 — No. 10:***	Is the resistance 450 — 650 Ω?	Go to step **2.**	Replace the torque converter turbine speed sensor. <Ref. to 4AT-59, Torque Converter Turbine Speed Sensor.>

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 7 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 10:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in connector.
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Start the engine. 5) Shift the select lever to “P” or “N” range. 6) Read the data of turbine speed using Subaru Select Monitor. • Compare the tachometer with Subaru Select Monitor indications.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in torque converter turbine speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

E: DTC P0719 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT LOW

DTC DETECTING CONDITION:

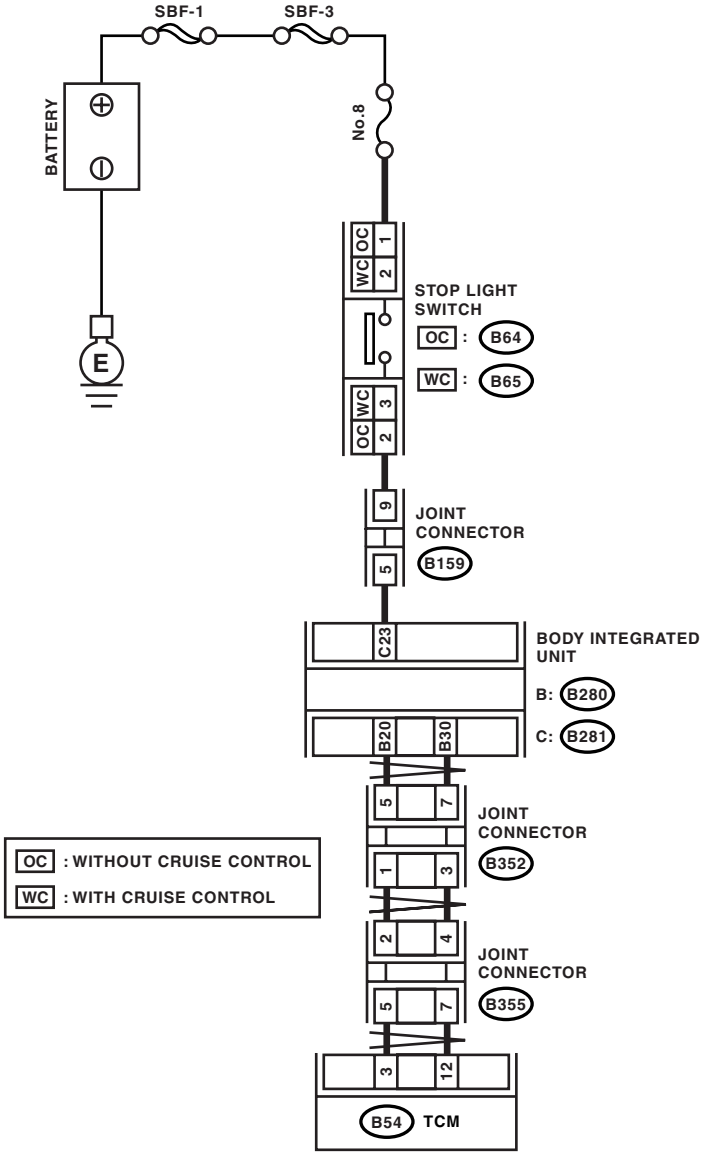
Brake switch malfunction, open input signal circuit

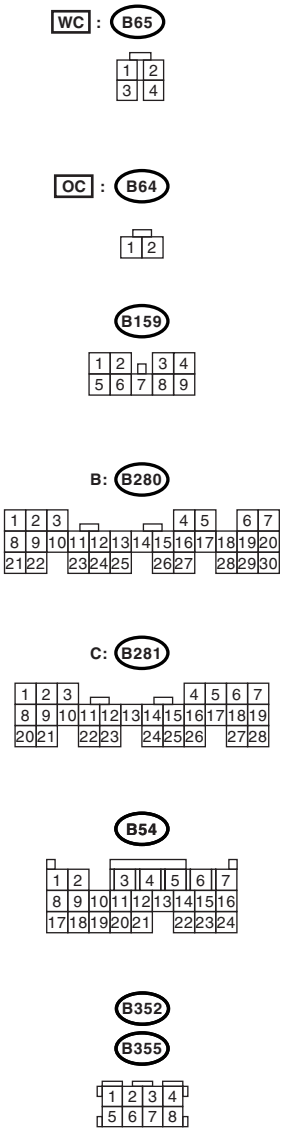
TROUBLE SYMPTOM:

- Gear is not shifted down when driving a down hill.
- The neutral control does not operate.

WIRING DIAGRAM:

- LHD model





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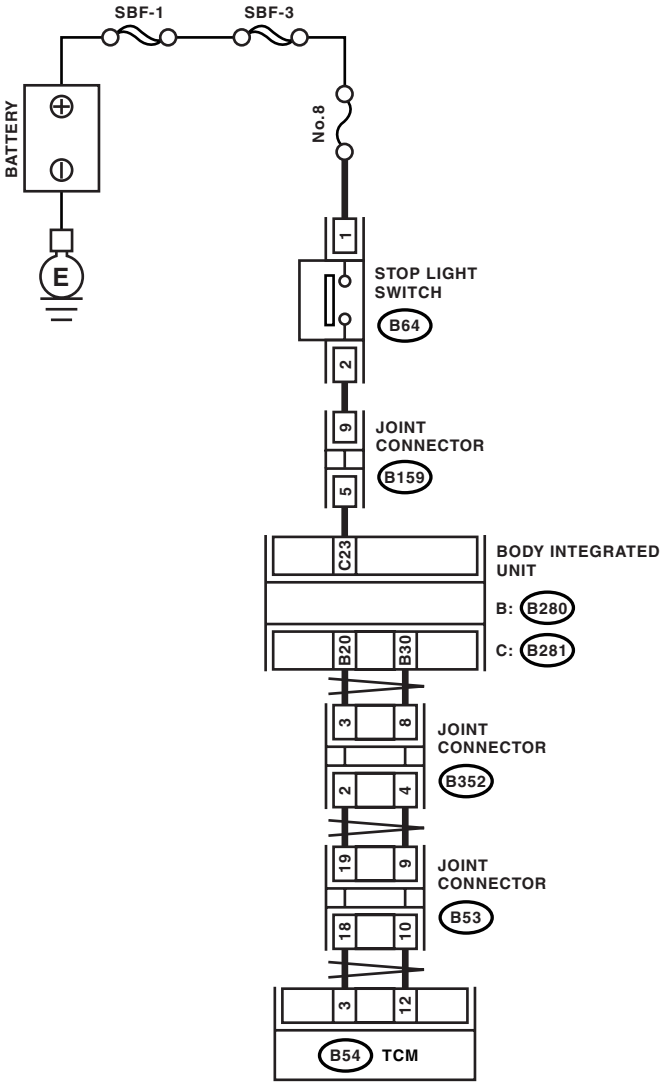
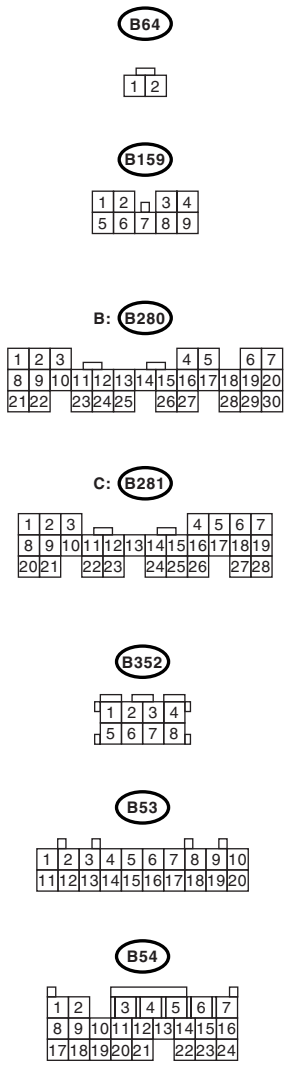
• RHD model





AT-02357

	Step	Check	Yes	No
1	**CHECK DTC.**	Does the DTC of CAN communication appear in the on-board diagnostics test mode?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Depress the brake pedal. 6) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **3.**	Go to step **4.**
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>	Is ON displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Depress the brake pedal. 2) Disconnect the connector from body integrated unit. 3) Measure the voltage of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **5.**
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***Model with cruise control*** ***(B281) No. 23 — (B65) No. 3:*** ***Model without cruise control*** ***(B281) No. 23 — (B64) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness between the body integrated unit and stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** Measure the resistance of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit of harness between the body integrated unit and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

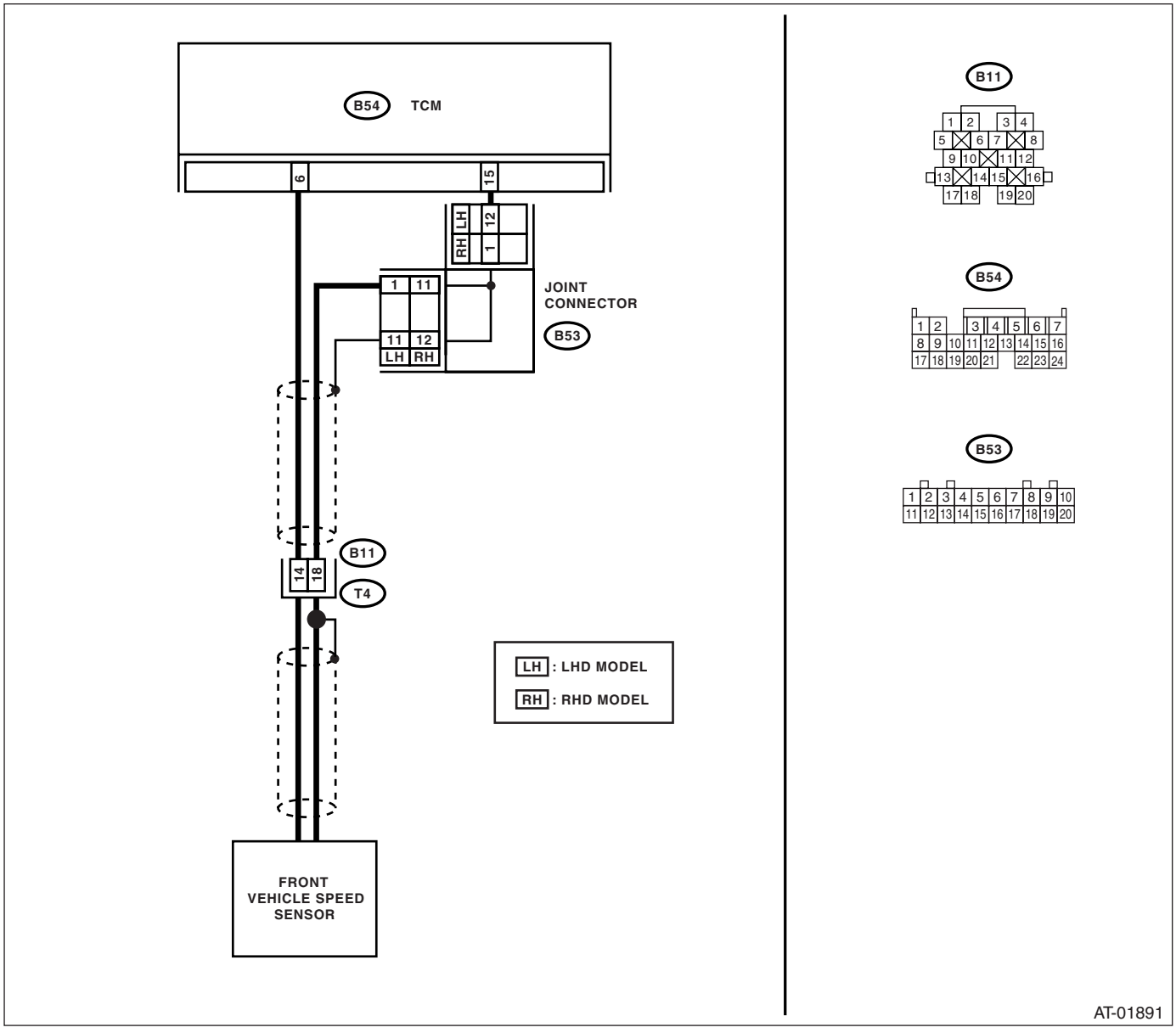
DTC DETECTING CONDITION:

- The vehicle speed signal is abnormal.
- The harness connector between TCM and vehicle speed sensor is shorted or open.

TROUBLE SYMPTOM:

- The neutral control does not operate.
- The slip lock up control does not operate.
- Poor driving performance

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 6 — (B11) No. 14:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 18:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK FRONT VEHICLE SPEED SENSOR.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 14 — No. 18:***	Is the resistance 450 — 650 Ω?	Go to step **6.**	Replace the front vehicle speed sensor. <Ref. to 4AT-55, Front Vehicle Speed Sensor.>

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 4) Turn the ignition switch to ON, and Subaru Select Monitor switch to ON. 5) Start the engine. 6) Read the data of vehicle speed using Subaru Select Monitor. • Compare the speedometer with Subaru Select Monitor indications. • Vehicle speed is indicated either in “km/h” or “MPH”. 7) Slowly increase the vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Does the speedometer indication increase as the Subaru Select Monitor data increases?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness in the front vehicle speed sensor circuit.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in front vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

G: DTC P0724 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT HIGH

DTC DETECTING CONDITION:

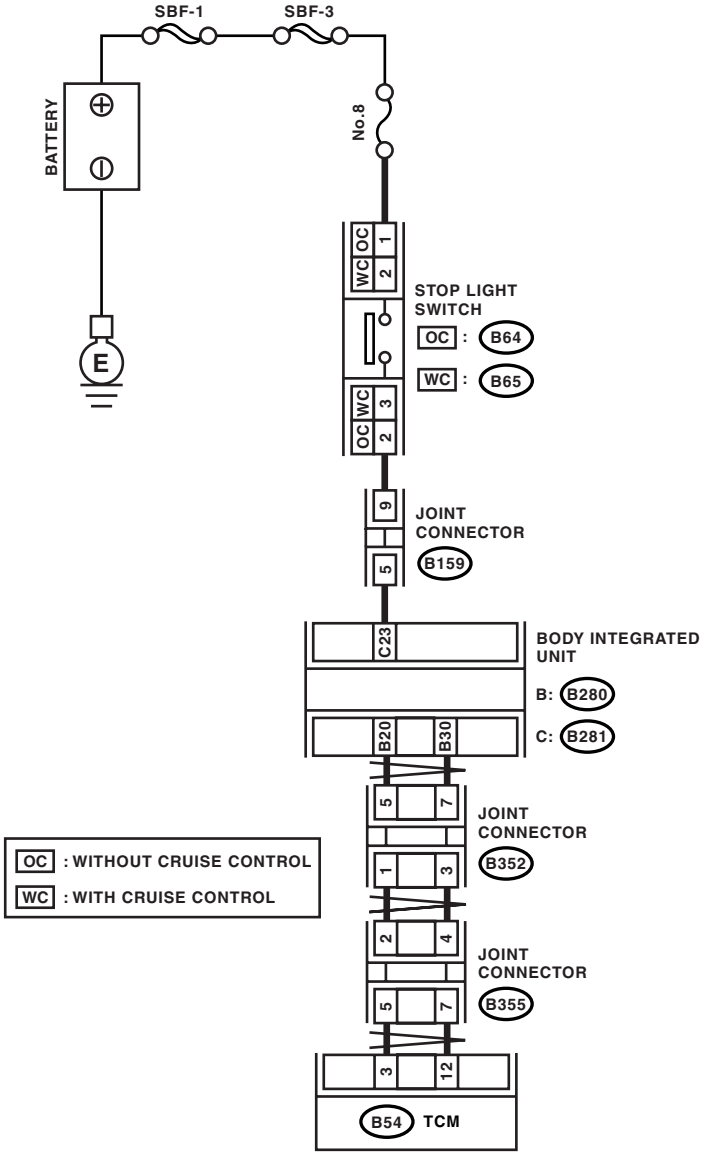
Brake switch malfunction, open input signal circuit

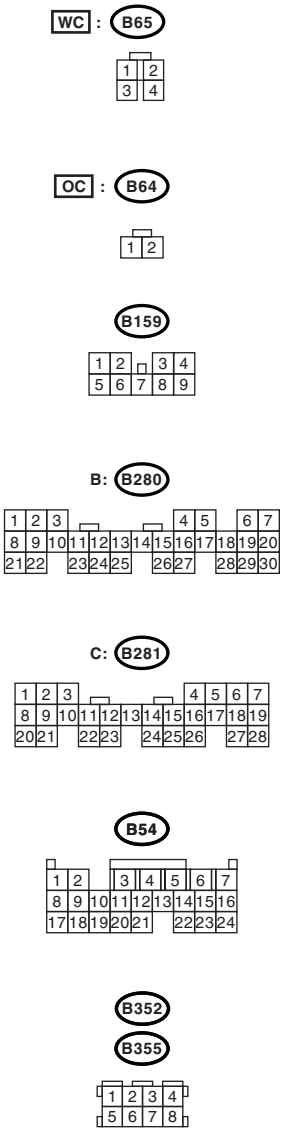
TROUBLE SYMPTOM:

- Gear is not shifted down when driving a down hill.
- The neutral control does not operate.

WIRING DIAGRAM:

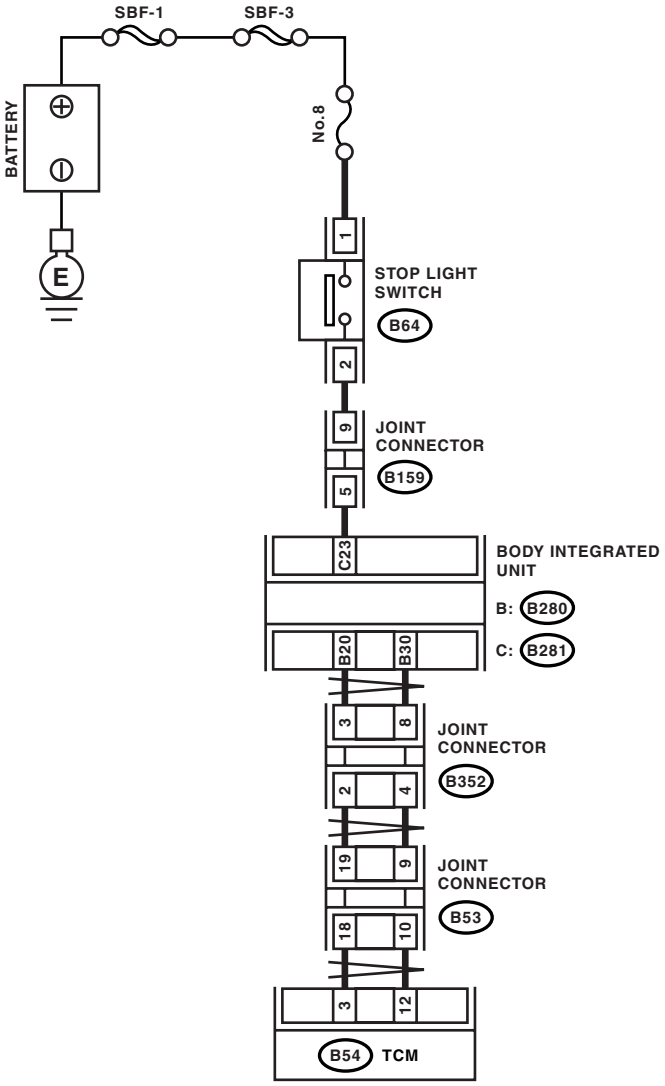
- LHD model

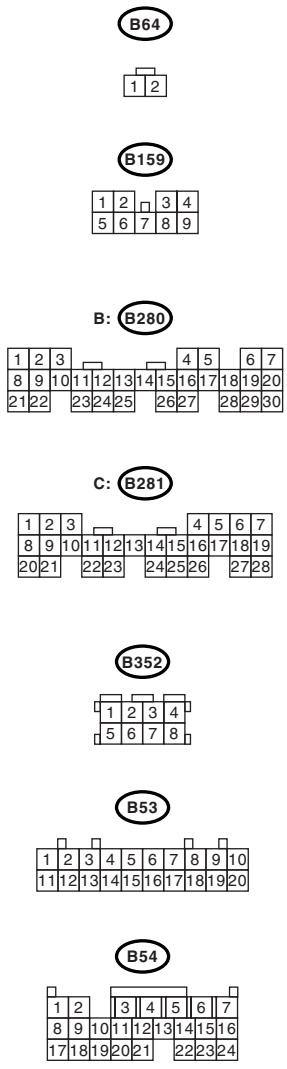




AT-01890

• RHD model





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	Step	Check	Yes	No
1	**CHECK DTC.**	Does the DTC of CAN communication appear in the on-board diagnostics test mode?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3.**	Go to step **4.**
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect harness connector of body integrated unit. 2) Measure the voltage of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **7.**
5	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connectors. ***Terminals*** ***MODEL WITH CRUISE CONTROL*** ***No. 2 — No. 3:*** ***MODEL WITHOUT CRUISE CONTROL*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Repair the short circuit in harness between TCM and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

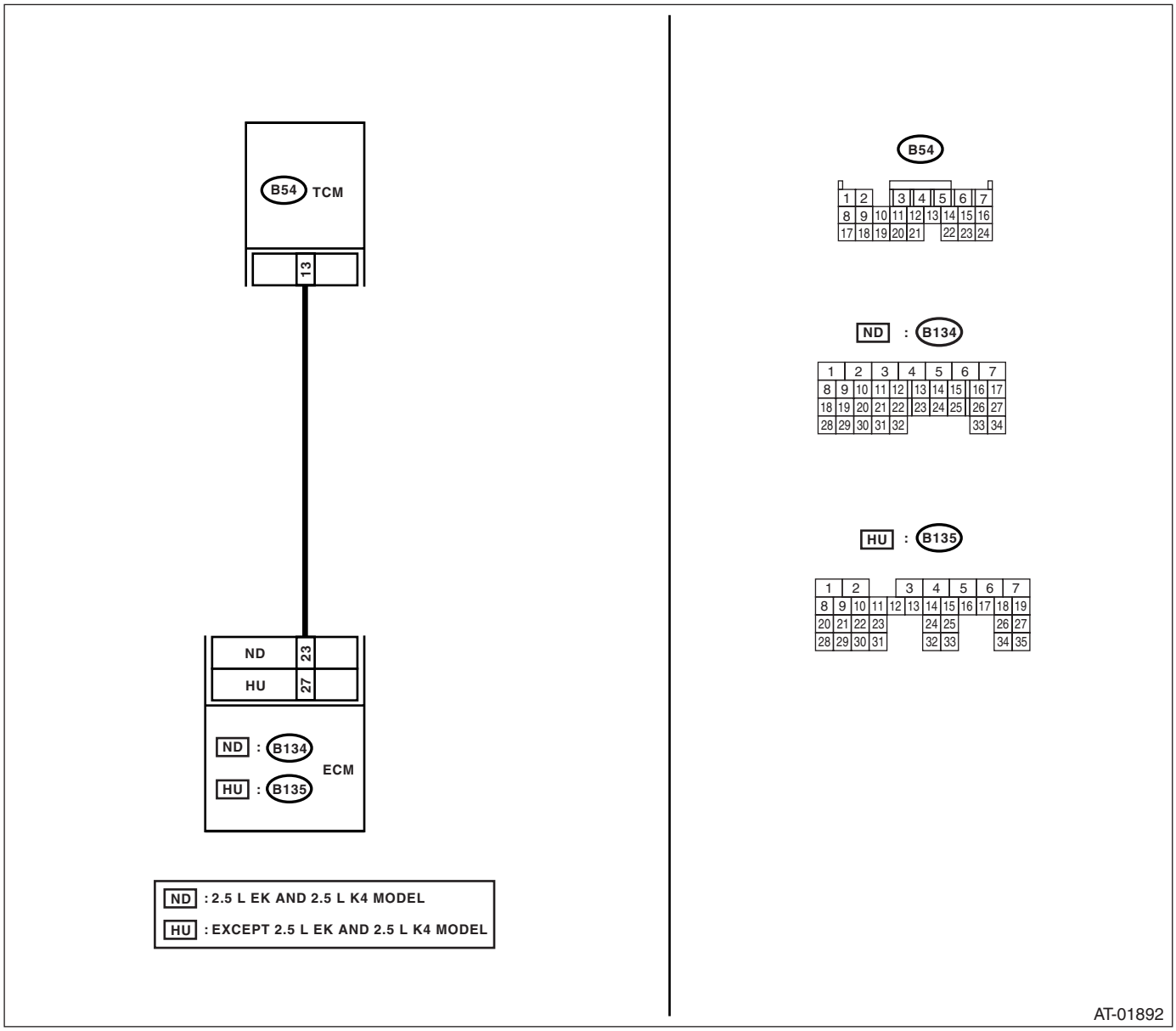
DTC DETECTING CONDITION:

Engine speed input signal circuit is open or shorted.

TROUBLE SYMPTOM:

- No lock-up occurs. (After engine is warmed-up)
- SPORT indicator light remains on when the vehicle speed is “0”.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and ECM. 3) Measure the resistance of harness between TCM and ECM. ***Connector & terminal*** ***2.5 L EK and 2.5 L K4 model*** ***(B54) No. 13 — (B134) No. 23:*** ***Except for 2.5 L EK and 2.5 L K4 model*** ***(B54) No. 13 — (B135) No. 27:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and ECM connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and ECM connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Run the engine at idle. 5) Read the data of engine speed using Subaru Select Monitor. • Display shows the engine speed signal value sent from ECM.	Is the revolution value same as the tachometer reading shown on the combination meter?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in the TCM and ECM.	Go to step **4.**
4	**CHECK POOR CONTACT.**	Is there poor contact in engine speed signal circuit?	Repair the poor contact.	Go to step **5.**
5	**CONFIRM DTC P0725.** Replace the ECM with a new one.	Does the DTC appear again, after the memory has been cleared?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Replace the ECM.

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-62, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-62, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-62, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 4AT(diag)-62, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC P0736 REVERSE INCORRECT RATIO

DTC DETECTING CONDITION:

Vehicle sensor, torque converter turbine speed sensor or control valve malfunction

TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon is occurred.
- Gear is not shifted to reverse.
- Gear position is held by fail safe function.

	Step	Check	Yes	No
1	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **2.**	Go to step **5.**
2	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor on Subaru Select Monitor display.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle was operated from fully closing to fully opening?	Go to step **3.**	Check the accelerator position sensor circuit. <Ref. to 4AT(diag)-92, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
3	**CHECK FRONT VEHICLE SPEED SENSOR.** 1) Lift-up the vehicle and support with rigid racks. 2) Start the engine. 3) Shift the select lever to “D” range and slowly increase vehicle speed. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Does the vehicle speed displayed by Subaru Select Monitor almost correspond with vehicle speed indicated by combination meter?	Go to step **4.**	Check the front vehicle speed sensor circuit.
4	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Shift the select lever to “P” or “N” range. 2) Idle the engine.	Does the turbine speed sensor revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Check the torque converter turbine speed sensor circuit.
5	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Turn the ignition switch to ON. 2) Fully close the throttle. 3) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 19 (+) — Chassis ground (−):***	Is the voltage 0.8 — 1.2 V?	Go to step **6.**	Check the accelerator pedal position sensor circuit. <Ref. to 4AT(diag)-92, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

	Step	Check	Yes	No
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Fully open the throttle. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 19 (+) — Chassis ground (−):***	Is the voltage 3.3 — 4.6 V?	Go to step **7.**	Check the accelerator pedal position sensor circuit. <Ref. to 4AT(diag)-92, DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
7	**CHECK FRONT VEHICLE SPEED SENSOR.** Diagnose according to DTC P0720 procedure.	Is the front vehicle speed sensor OK?	Go to step **8.**	Repair or replace the front vehicle speed sensor circuit.
8	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** Diagnose according to DTC P0715 procedure.	Is the torque converter turbine speed sensor OK?	There are malfunctions in TCM, TCM connector poor contact, or transmission assembly mechanical malfunction.	Repair or replace the torque converter turbine speed sensor circuit.

N: DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Locking of bulb

TROUBLE SYMPTOM:

No lock-up occurs.

	Step	Check	Yes	No
1	**CHECK LOCK-UP DUTY SOLENOID CIRCUIT.** Diagnose according to DTC P0743 procedure.	Is there any trouble?	Repair or replace the lock-up duty solenoid circuit.	Go to step **2.**
2	**CHECK INHIBITOR SWITCH CIRCUIT.** Diagnose according to DTC P0705 procedure.	Is there any trouble?	Repair or replace the inhibitor switch circuit.	Go to step **3.**
3	**CHECK STOP LIGHT SWITCH CIRCUIT.** Diagnose according to DTC P0719 and P0724 procedure.	Is there any trouble?	Repair or replace the stop light switch circuit.	Go to step **4.**
4	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Diagnose according to DTC P0712 and P0713 procedure.	Is there any trouble?	Repair or replace the ATF temperature sensor circuit.	Go to step **5.**
5	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **9.**
6	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Read the value of accelerator pedal position sensor on Subaru Select Monitor display.	Does the value of accelerator pedal position sensor change from 0% to 100% smoothly when throttle was operated from fully closing to fully opening?	Go to step **7.**	Check the accelerator pedal position sensor circuit.
7	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** 1) Shift the select lever to “P” or “N” range. 2) Idle the engine.	Does the turbine revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	Go to step **8.**	Check the torque converter turbine speed sensor circuit.
8	**CHECK ENGINE SPEED SIGNAL.** Idle the engine.	Does the turbine revolution displayed by Subaru Select Monitor almost correspond with engine revolution indicated by tachometer?	There is transmission assembly mechanical malfunction.	Check the engine speed signal circuit.
9	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Diagnose according to DTC P1708, P1709, P1714 procedure.	Is there any trouble?	Go to step **10.**	Repair or replace the accelerator pedal position sensor circuit.
10	**CHECK TORQUE CONVERTER TURBINE SPEED SENSOR.** Diagnose according to DTC P0715 procedure.	Is there any trouble?	Go to step **11.**	Repair or replace the torque converter turbine speed sensor circuit.
11	**CHECK ENGINE SPEED SIGNAL.** Diagnose according to DTC P0725 procedure.	Is there any trouble?	Repair or replace the engine speed input circuit.	There is transmission assembly mechanical malfunction.

O: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

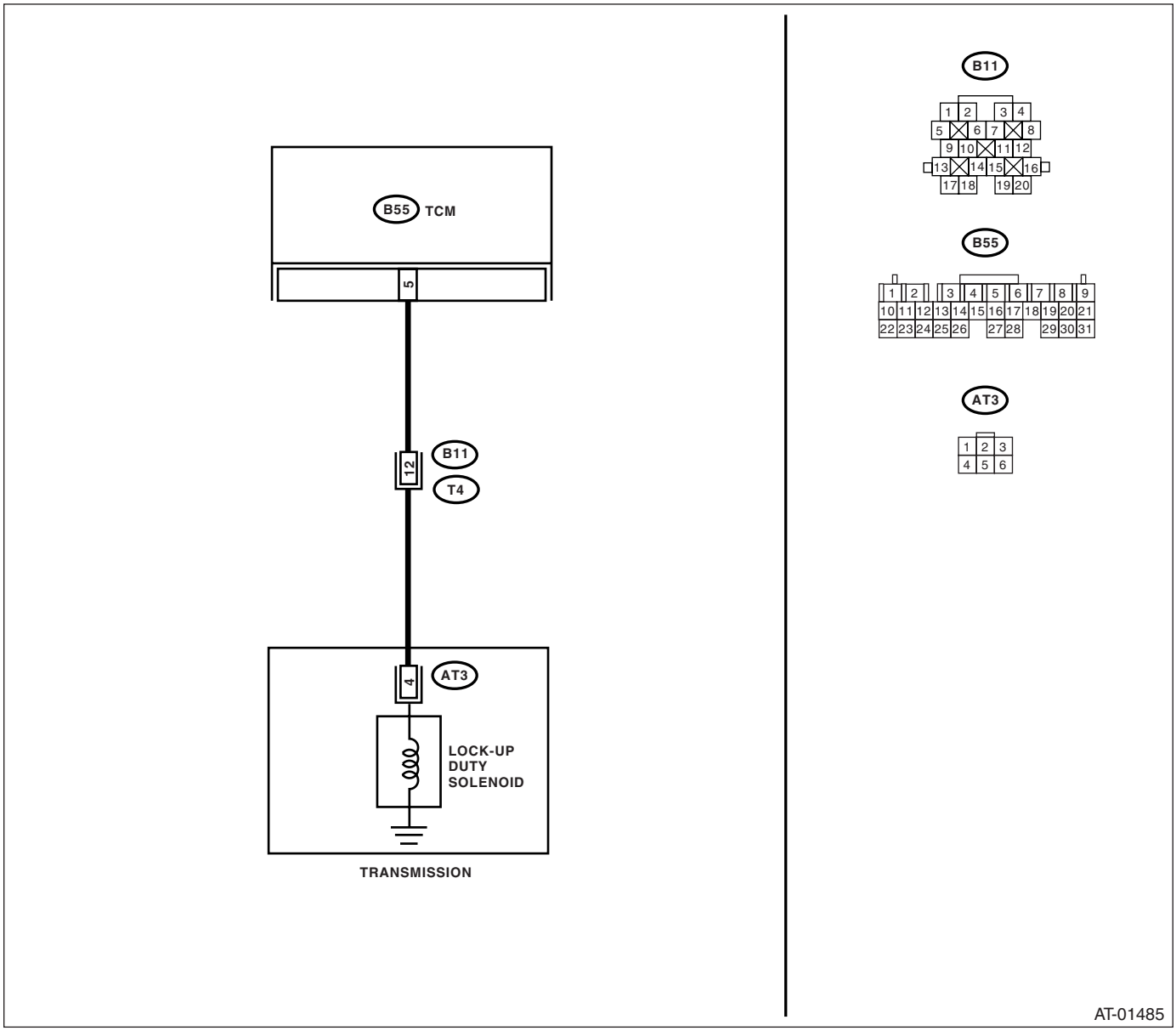
DTC DETECTING CONDITION:

Output signal circuit of lock-up duty solenoid is open or shorted.

TROUBLE SYMPTOM:

No lock-up occurs. (After engine is warmed-up)

WIRING DIAGRAM:



Step	Check	Yes	No
1 **CHECK DTC.**	Do multiple DTC appear in the on-board diagnostics test mode?	Go to another DTC.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 5 — (B11) No. 12:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK LOCK-UP DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 12 — No. 19:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **5.**	Go to step **8.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine, and turn the Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the engine until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of lock-up duty solenoid using Subaru Select Monitor. • Lock-up duty solenoid is indicated in "%". 7) Shift the select lever to "D", and slowly increase vehicle speed to 60 km/h (37 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Is the value 95%?	Go to step **6.**	Go to step **7.**

	Step	Check	Yes	No
6	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed, shift the select lever to "N" range and read data. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Is the value 5%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **7.**
7	**CHECK POOR CONTACT.**	Is there poor contact in lock-up duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
8	**CHECK LOCK-UP DUTY SOLENOID (IN TRANSMISSION).** 1) Disconnect the transmission connector. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between lock-up duty solenoid and transmission ground. ***Connector & terminal*** ***(AT3) No. 4 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **9.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>
9	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between lock-up duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 12 — (AT3) No. 4:***	Is the resistance less than 1 Ω?	Go to step **10.**	Repair the open circuit in harness between TCM and transmission connector.
10	**CHECK HARNESS CONNECTOR BETWEEN LOCK-UP DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 12 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in lock-up duty solenoid and transmission.	Repair the short circuit in harness between lock-up duty solenoid and transmission connector.

P: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

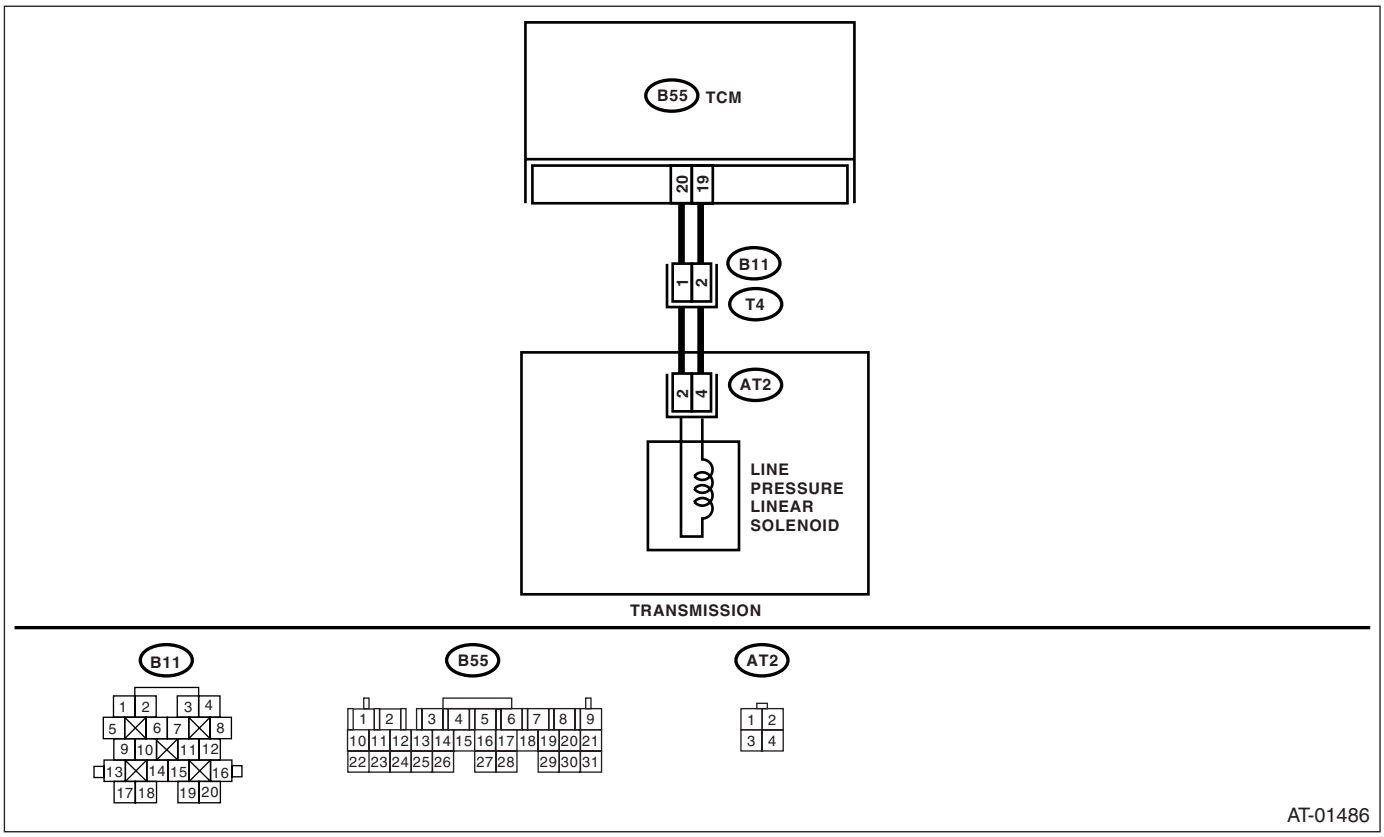
DTC DETECTING CONDITION:

Output signal circuit of line pressure linear solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 19 — (B11) No. 2:*** ***(B55) No. 20 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 — Chassis ground:*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LINE PRESSURE LINEAR SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 1 — No. 2:***	Is the resistance 4 — 8 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature exceeds approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Shift the select lever to "R" range. 7) Read the data of line pressure linear solenoid using Subaru Select Monitor. • Line pressure linear solenoid is indicated in "%". 8) Fully close the throttle.	Is the value 45 — 50%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Fully open the throttle.	Is the value 20 — 40%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in line pressure linear solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
7	**CHECK LINE PRESSURE LINEAR SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between line pressure linear solenoid connector terminals. ***Connector & terminal*** ***(AT2) No. 2 — No. 4:***	Is the resistance 4 — 8 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID.** Measure the resistance of harness between line pressure linear solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 2 — (AT2) No. 4:*** ***(T4) No. 1 — (AT2) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between line pressure linear solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LINE PRESSURE LINEAR SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 1 — Transmission ground:*** ***(T4) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in line pressure linear solenoid and transmission.	Repair the short circuit in harness between line pressure linear solenoid and transmission connector.

Q: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

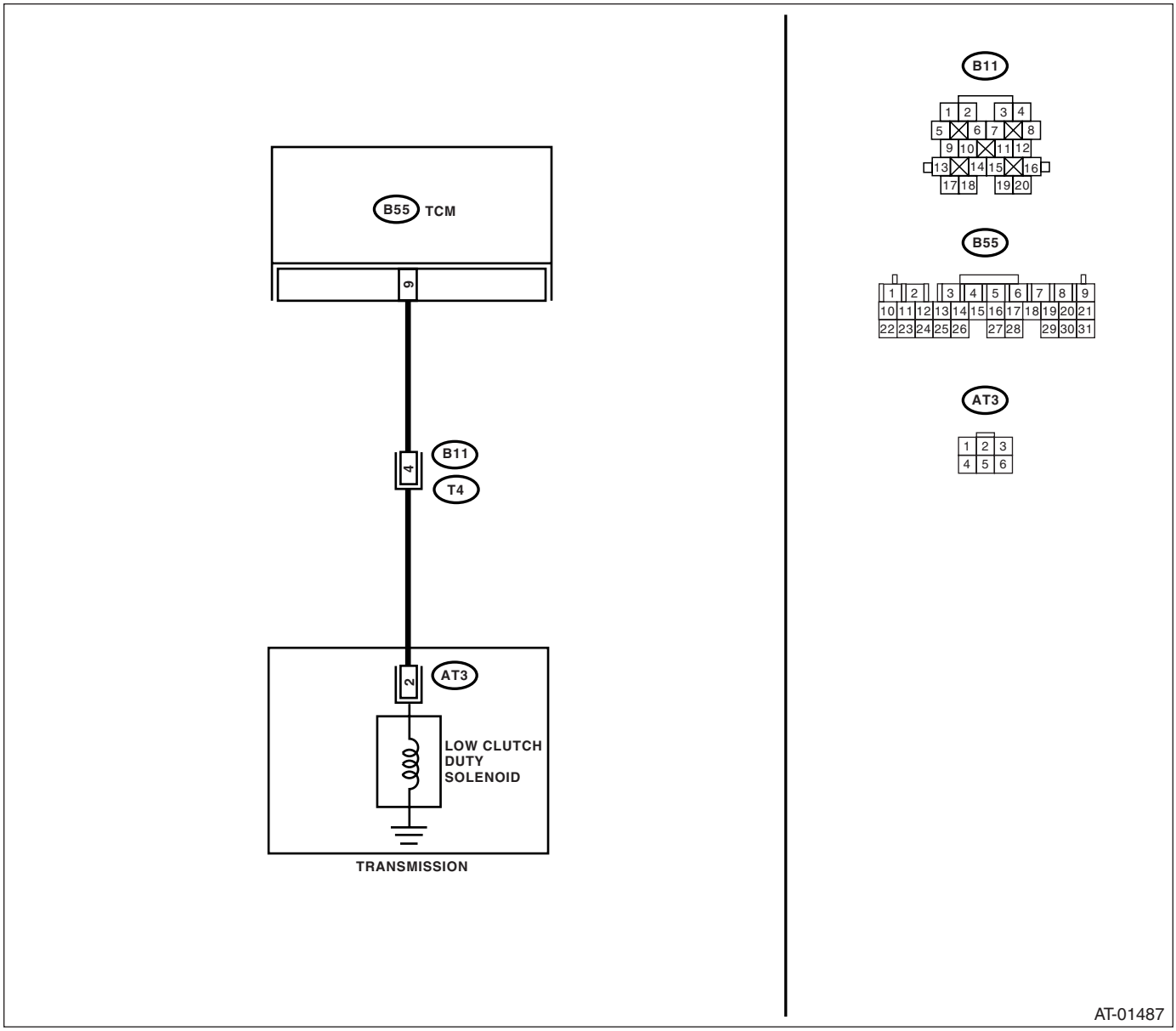
DTC DETECTING CONDITION:

Output signal circuit of low clutch duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 9 — (B11) No. 4:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and transmission ground. ***Connector & terminal*** ***(B55) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LOW CLUTCH DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 4 — No. 20:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **4.**	Go to step **7.**
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature exceed approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Shift the select lever to “P” or “N” range, and depress the accelerator pedal. 7) Read the data of low clutch duty solenoid using Subaru Select Monitor. • Low clutch duty solenoid is indicated in “%”.	Is the value 100%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON (engine OFF). 2) Shift the select lever to “D” range. 3) Read the data of low clutch duty solenoid.	Is the value 0%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in low clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK LOW CLUTCH DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between low clutch duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 2 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID.** Measure the resistance of harness between low clutch duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 4 — (AT3) No. 2:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between low clutch duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW CLUTCH DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 4 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in low clutch duty solenoid and transmission.	Repair the short circuit of harness between low clutch duty solenoid and transmission connector.

R: DTC P0758 SHIFT SOLENOID "B" ELECTRICAL

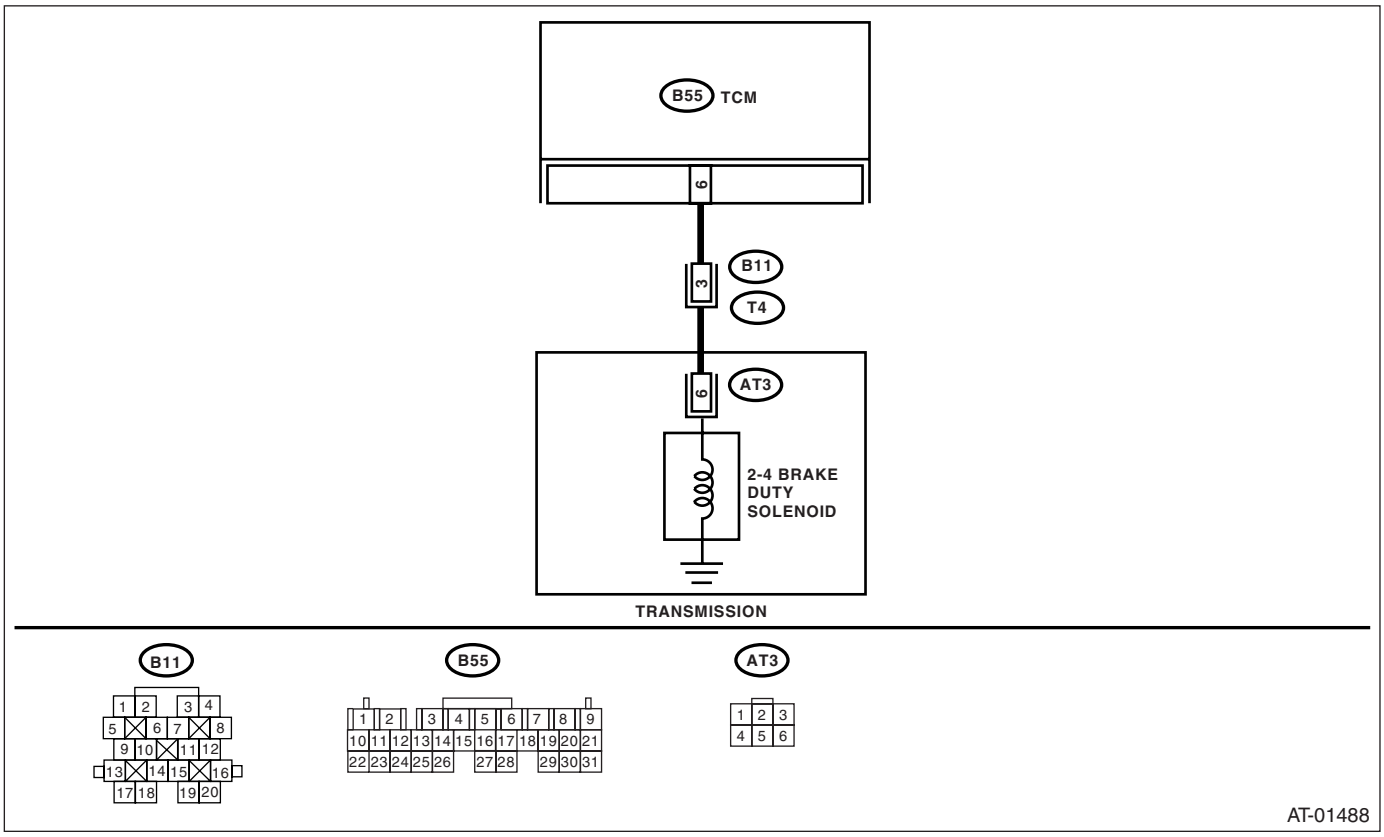
DTC DETECTING CONDITION:

Output signal circuit of 2-4 brake duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 6 — (B11) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK 2-4 BRAKE DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 3 — No. 20:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature exceed approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Shift the select lever to "N" range, and depress the accelerator pedal. 7) Read the data of 2-4 brake duty solenoid using Subaru Select Monitor. • 2-4 brake duty solenoid is indicated in "%".	Is the value 100%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Shift the select lever to 2nd on manual mode.	Is the value 0%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in 2-4 brake duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
7	**CHECK 2-4 BRAKE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from 2-4 brake duty solenoid. 4) Measure the resistance of harness between 2-4 brake duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 6 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between 2-4 brake duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 3 — (AT12) No. 6:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between 2-4 brake duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN 2-4 BRAKE DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 3 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in 2-4 brake duty solenoid and transmission.	Repair the short circuit in harness between 2-4 brake duty solenoid and transmission connector.

S: DTC P0763 SHIFT SOLENOID "C" ELECTRICAL

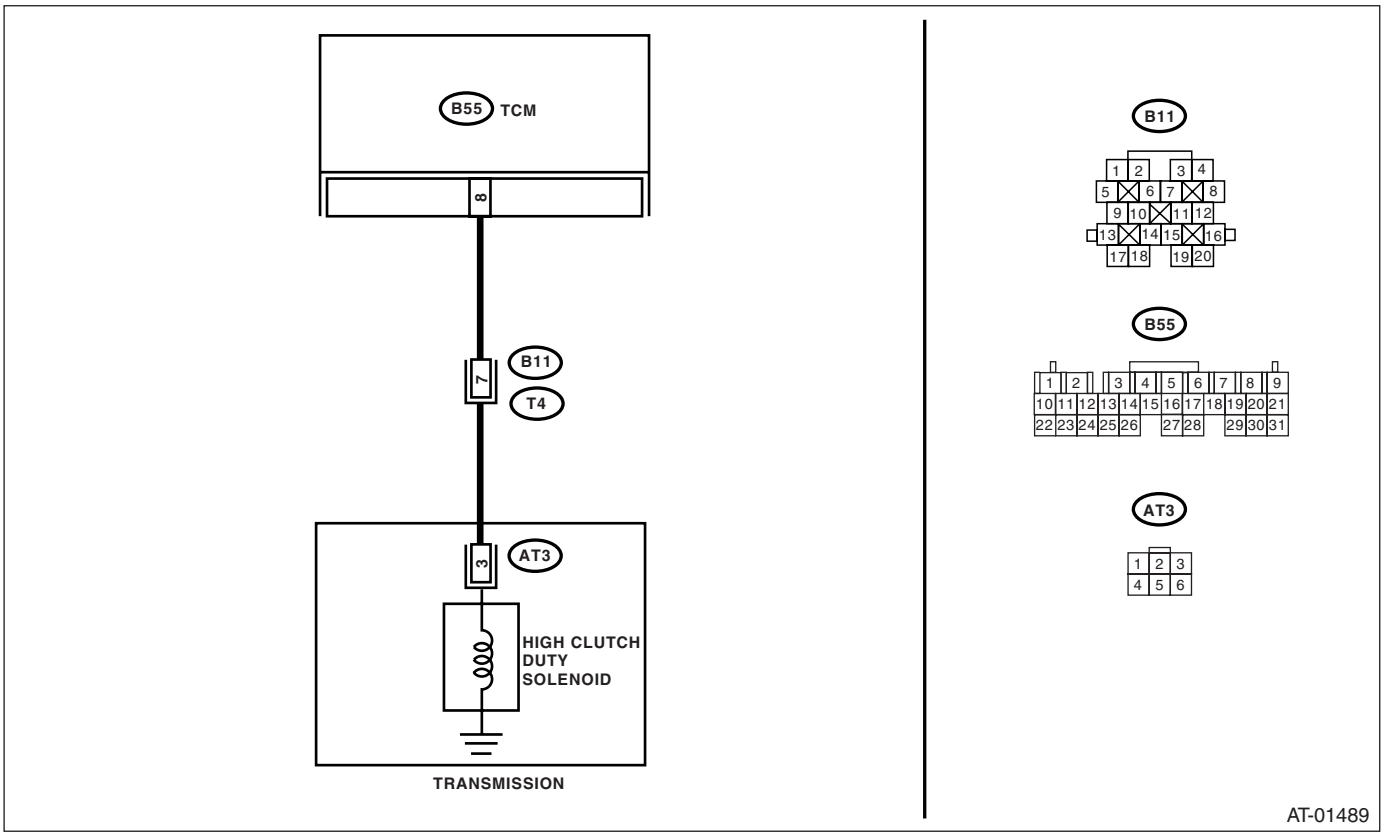
DTC DETECTING CONDITION:

Output signal circuit of high clutch duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 8 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK HIGH CLUTCH DUTY SOLENOID.** Measure the resistance between transmission connector receptacle's terminals. ***Connector & terminal*** ***(T4) No. 7 — No. 20:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Connect the Subaru Select Monitor to data link connector. 4) Start the engine, and turn the Subaru Select Monitor switch to ON. 5) Start the engine and warm-up the engine until the ATF temperature is above 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 6) Read the data of high clutch duty solenoid using Subaru Select Monitor. • High clutch duty solenoid is indicated in "%". 7) Shift the select lever to "D", and slowly increase vehicle speed at 3rd or 4th to measure. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Is the value 0%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** Return the engine to idling speed and shift the select lever to "N" range. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.>	Is the value 100%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in high clutch duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK HIGH CLUTCH DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between high clutch duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 3 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between high clutch duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 7 — (AT3) No. 3:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between TCM and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN HIGH CLUTCH DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 7 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in high clutch duty solenoid and transmission.	Repair the short circuit of harness between high clutch duty solenoid and transmission connector.

T: DTC P0768 SHIFT SOLENOID "D" ELECTRICAL

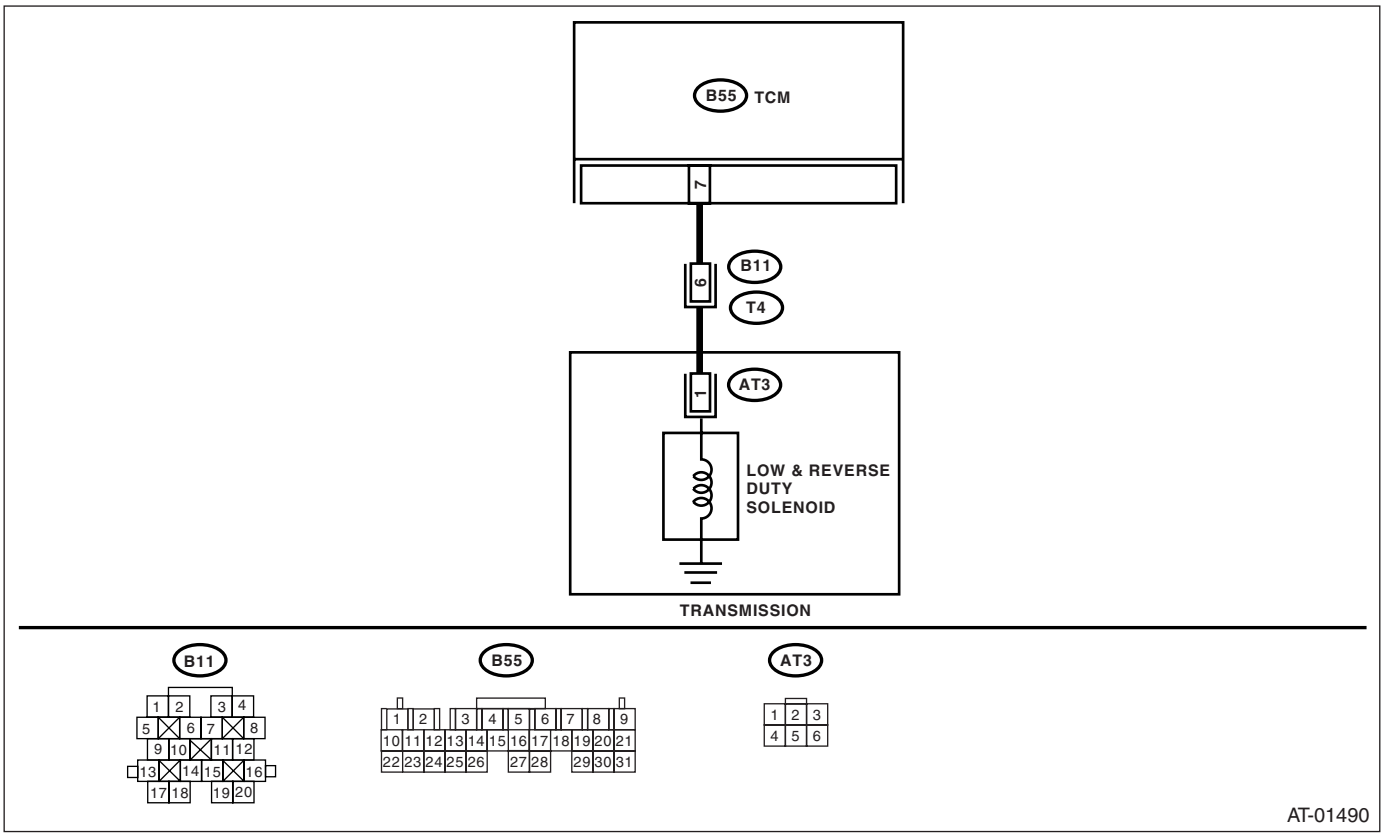
DTC DETECTING CONDITION:

The output signal circuit of low & reverse duty solenoid is open or shorted.

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission and TCM. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 7 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK LOW & REVERSE DUTY SOLENOID.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — No. 20:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Connect the Subaru Select Monitor to data link connector. 3) Start the engine, and turn the Subaru Select Monitor switch to ON. 4) Warm-up the transmission until the ATF temperature is above approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Stop the engine and turn the ignition switch to ON (engine OFF). 6) Shift the select lever to the "N" range. 7) Read the data of low & reverse duty solenoid using Subaru Select Monitor. • Low & reverse duty solenoid is indicated in "%".	Is the value 100%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Shift the select lever to manual mode, and then hold it on 1st. Slowly increase the vehicle speed up to 15 km/h (9 MPH), and then return the accelerator pedal. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.> 3) Read the data of low & reverse duty solenoid.	Is the value 55%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in low & reverse duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK LOW & REVERSE DUTY SOLENOID (IN TRANSMISSION).** 1) Remove the transmission connector from bracket. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the oil pan, and disconnect the connector from control valve body. 4) Measure the resistance between low & reverse duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 1 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE DUTY SOLENOID.** Measure the resistance of harness between low & reverse duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 6 — (AT3) No. 1:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between low & reverse duty solenoid and transmission connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND LOW & REVERSE DUTY SOLENOID.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 6 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in low & reverse duty solenoid and transmission.	Repair the short circuit in harness between low & reverse brake solenoid and transmission connector.

U: DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

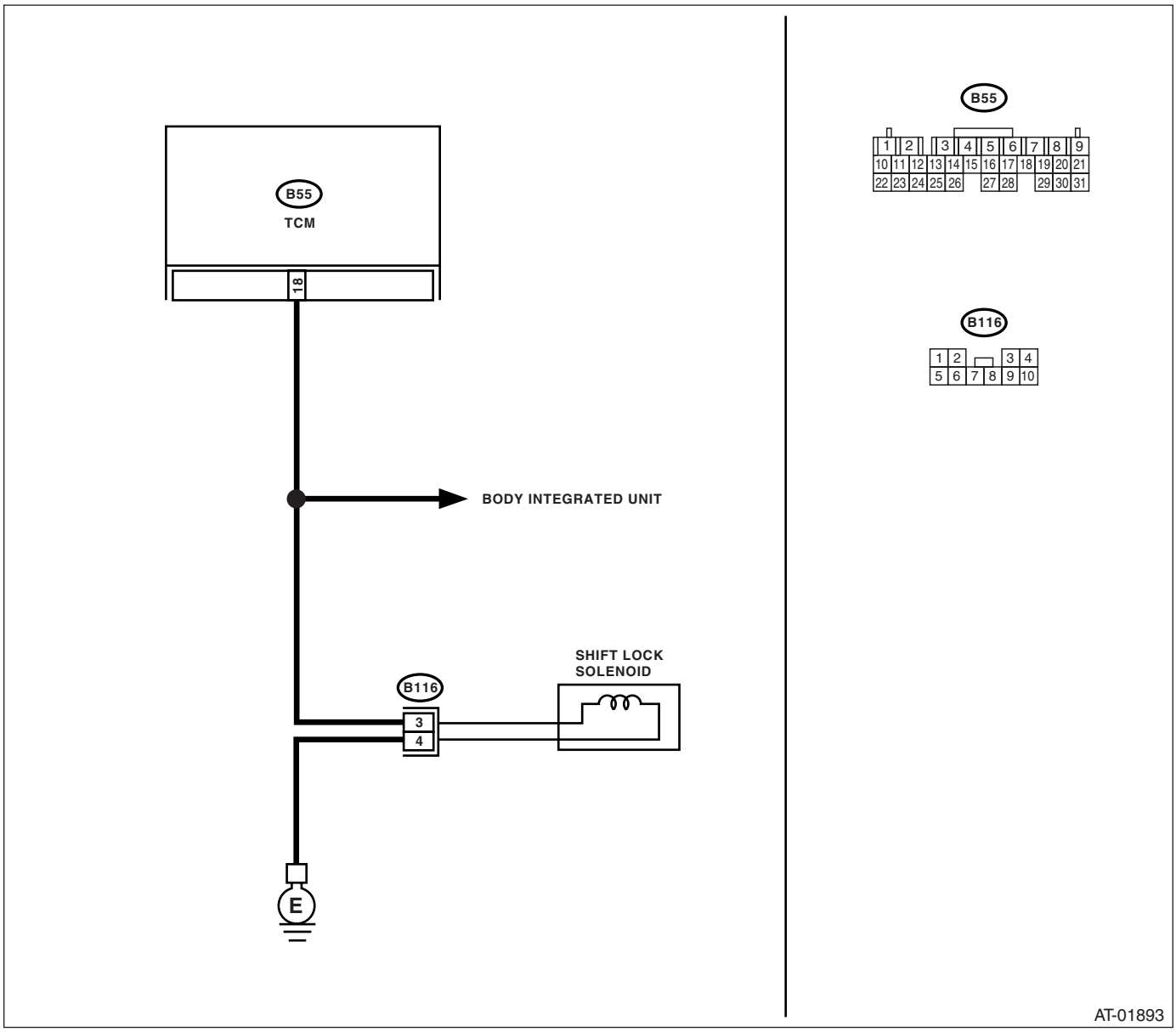
DTC DETECTING CONDITION:

Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

TROUBLE SYMPTOM:

- Gear is shifted from “N” range to “R” range during driving at 20 km/h (12 MPH) or more.
- Gear cannot be shifted from “N” range to “R” range.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. ***Connector & terminal*** ***(B55) No. 18 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and shift lock solenoid connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** Measure the resistance of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and shift lock solenoid connector.
3	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between chassis ground and shift lock solenoid connector.
4	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance 12 — 18 Ω?	Go to step **5.**	Replace the shift lock solenoid.
5	**CHECK OUTPUT SIGNAL FOR TCM.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Shift the select lever to “D” range. 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 (+) — Chassis ground (−):***	Is the voltage more than 10.5 V?	Go to step **6.**	Go to step **7.**
6	**CHECK OUTPUT SIGNAL FOR TCM.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Start the engine. 3) Shift the select lever to “D” range and slowly increase vehicle speed to 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.> 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 18 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in reverse inhibitor control circuit.	Go to step **7.**

Step		Check	Yes	No
7	CHECK POOR CONTACT.	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

V: DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL)

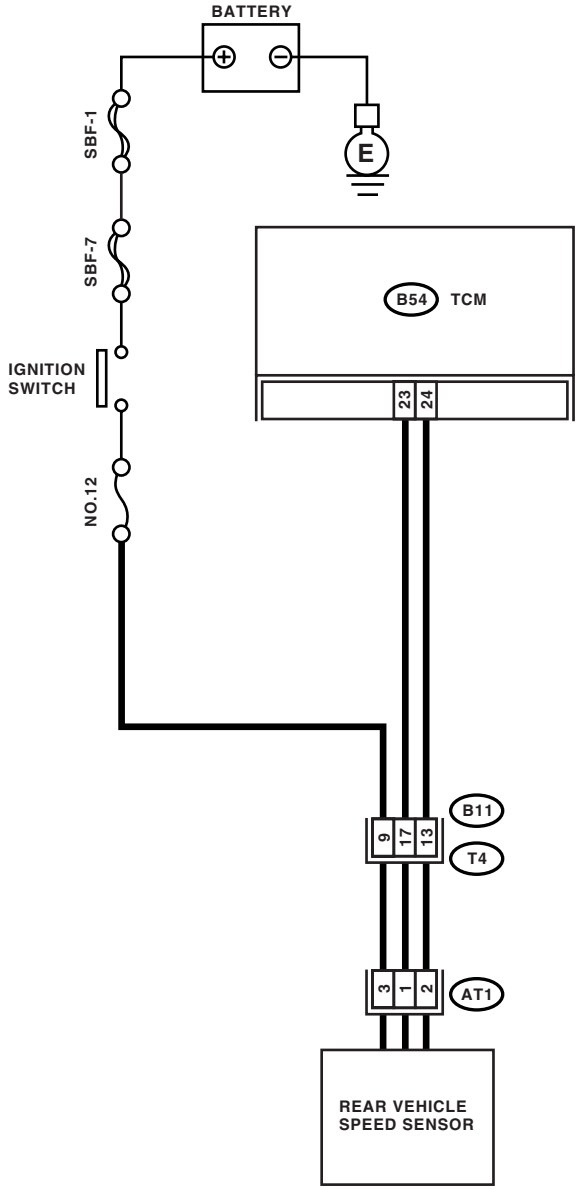
DTC DETECTING CONDITION:

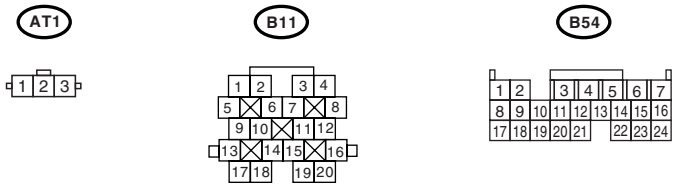
Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

No lock-up or occurring tight corner braking phenomenon

WIRING DIAGRAM:





AT-01492

	Step	Check	Yes	No
1	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from rear vehicle speed sensor. Turn the ignition switch to ON. 3) Measure the ignition power supply voltage between rear vehicle speed sensor connector and transmission ground. ***Connector & terminal*** ***(AT1) No. 3 (+) — Transmission ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness between rear vehicle speed sensor and battery for open circuit, short or poor contact. Repair the harness if required.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between TCM and rear vehicle speed sensor connector. ***Connector & terminal*** ***(B54) No. 23 — (AT1) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit or poor contact of connector in harness between TCM and rear vehicle speed sensor connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM and rear vehicle speed sensor connector. ***Connector & terminal*** ***(B54) No. 24 — (AT1) No. 2:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit or poor contact of connector in harness between TCM and rear vehicle speed sensor connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and rear vehicle speed sensor connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and rear vehicle speed sensor connector.
6	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **8.**	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.> 4) Measure the AC voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 24 (+) — No. 23 (–):***	Is the voltage approx. 5 V?	Go to step **9.**	Replace the rear vehicle speed sensor.
8	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect the connectors to TCM and transmission. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B54) No. 24:*** ***Ground lead; (B54) No. 23:*** 4) Start the engine and set vehicle in 20 km/h (12 MPH) condition. NOTE: The speed difference between front and rear wheels may light the ABS warning light or VDC warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure or VDC memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> <Ref. to VDC(diag)-24, Clear Memory Mode.> 5) Measure the signal voltage indicated on oscilloscope.	Is the pulse voltage approx. 5 V?	Go to step **9.**	Replace the rear vehicle speed sensor.
9	**CHECK POOR CONTACT.**	Is there poor contact in rear vehicle speed sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

W: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

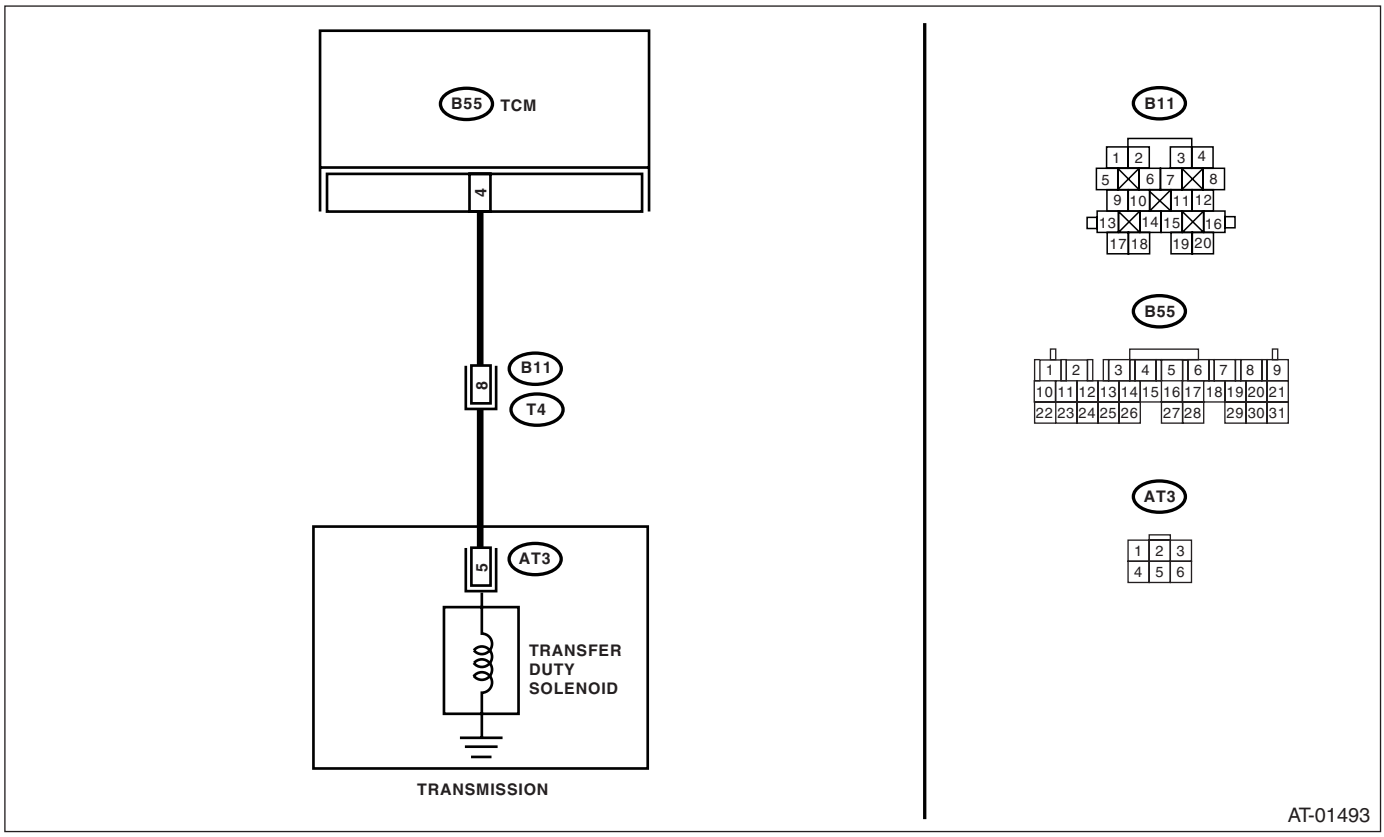
DTC DETECTING CONDITION:

Output signal circuit of transfer duty solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon is occurred.
- Front wheel slips on the slippery road.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 4 — (B11) No. 8:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance harness connector between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK TRANSFER DUTY SOLENOID.** Measure the resistance between transmission connector and transmission terminals. ***Connector & terminal*** ***(T4) No. 8 — No. 20:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **4.**	Go to step **7.**

	Step	Check	Yes	No
4	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM and transmission. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF) and Subaru Select Monitor switch to ON. 4) Shift the select lever to "N" range, and fully close the throttle pedal. (Vehicle speed is 0 km/h (0 MPH)) 5) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%".	Is the value approx. 5%?	Go to step **5.**	Go to step **6.**
5	**CHECK OUTPUT SIGNAL EMITTED FROM TCM USING SUBARU SELECT MONITOR.** 1) Shift the select lever to "D" range. 2) Read the data of transfer duty solenoid using Subaru Select Monitor. • Transfer duty solenoid is indicated in "%".	Is the value 18 — 35%?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in TCM and transmission.	Go to step **6.**
6	**CHECK POOR CONTACT.**	Is there poor contact in transfer duty solenoid circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
7	**CHECK TRANSFER DUTY SOLENOID (IN TRANSMISSION).** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 3) Remove the extension case, and disconnect the connector from transfer duty solenoid. 4) Measure the resistance between transfer duty solenoid connector and transmission ground. ***Connector & terminal*** ***(AT3) No. 5 — Transmission ground:***	Is the resistance 2.0 — 6.0 Ω?	Go to step **8.**	Replace the control valve body. <Ref. to 4AT-60, Control Valve Body.>
8	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transfer duty solenoid and transmission connector. ***Connector & terminal*** ***(T4) No. 8 — (AT3) No. 5:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between transfer duty solenoid and transmission connector.

	Step	Check	Yes	No
9	**CHECK HARNESS CONNECTOR BETWEEN TRANSFER DUTY SOLENOID AND TRANSMISSION.** Measure the resistance of harness between transmission connector and transmission ground. ***Connector & terminal*** ***(T4) No. 8 — Transmission ground:***	Is the resistance more than 1 MΩ?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or poor contact in the transfer duty solenoid and transmission.	Repair the short circuit in harness between transfer duty solenoid and transmission connector.

X: DTC P1708 THROTTLE POSITION SENSOR CIRCUIT LOW INPUT

DTC DETECTING CONDITION:

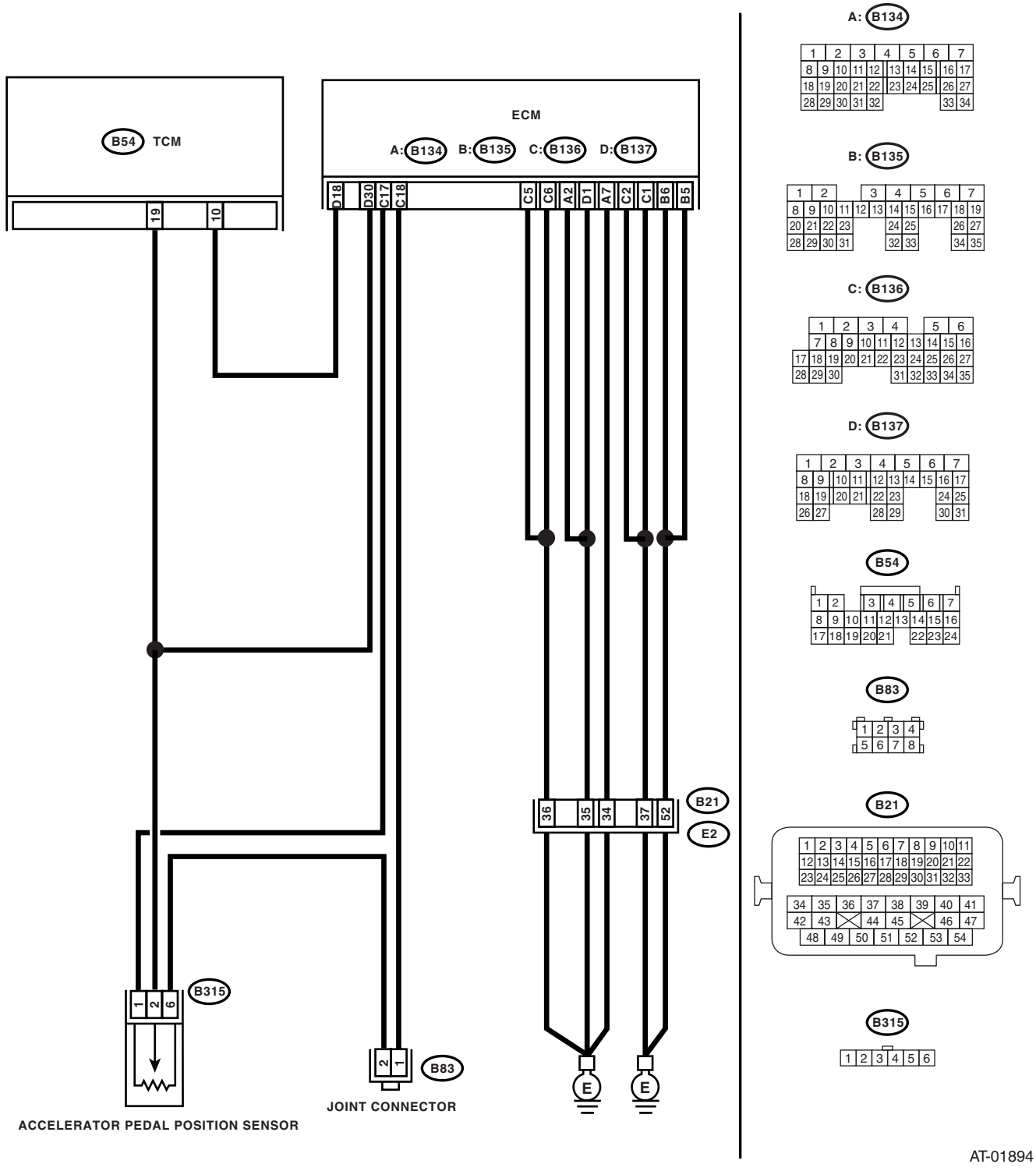
The input signal circuit of accelerator pedal position sensor is open or shorted.

TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon is occurred.

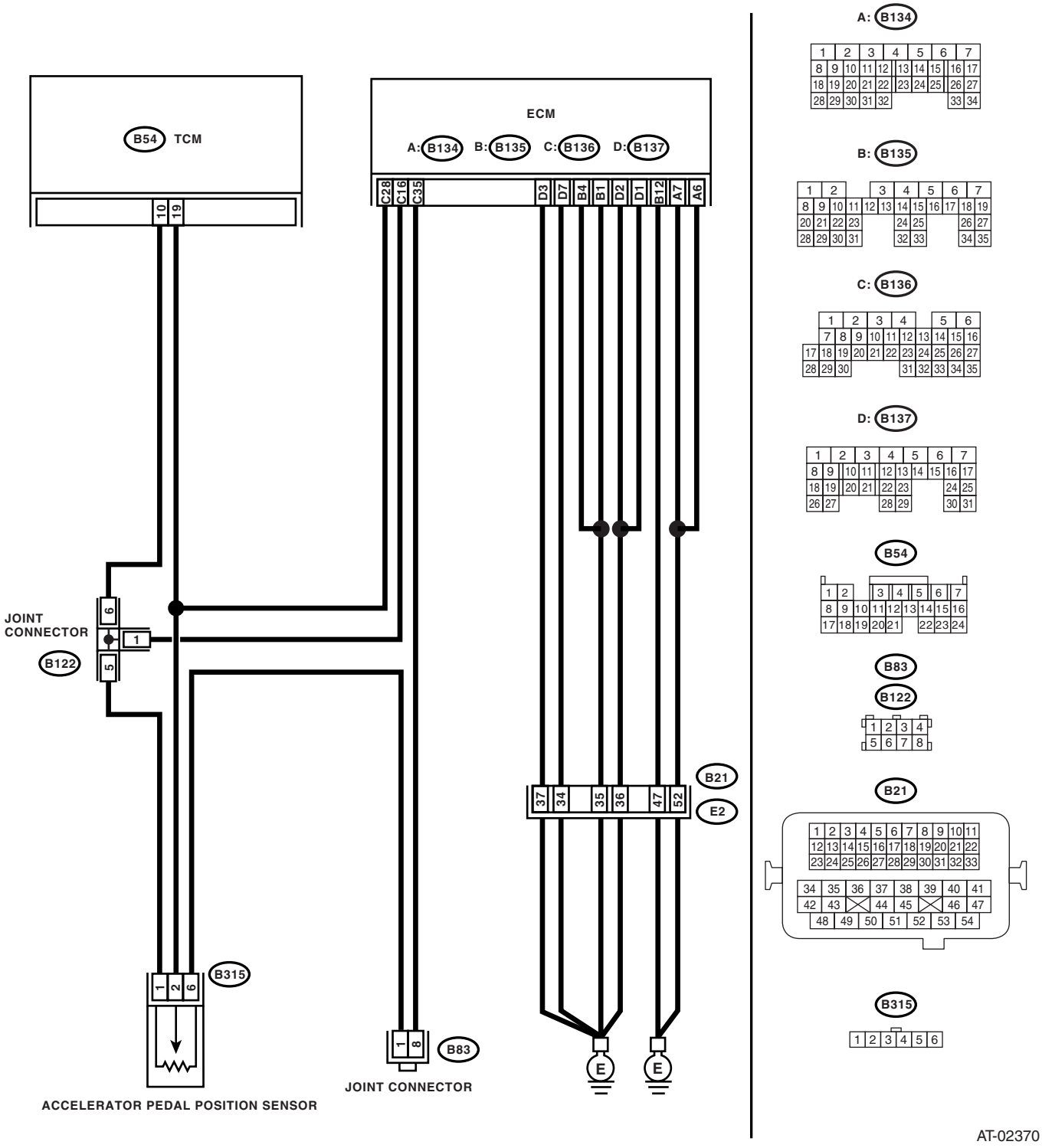
WIRING DIAGRAM:

- 2.0 L LHD and 2.5 L KS model



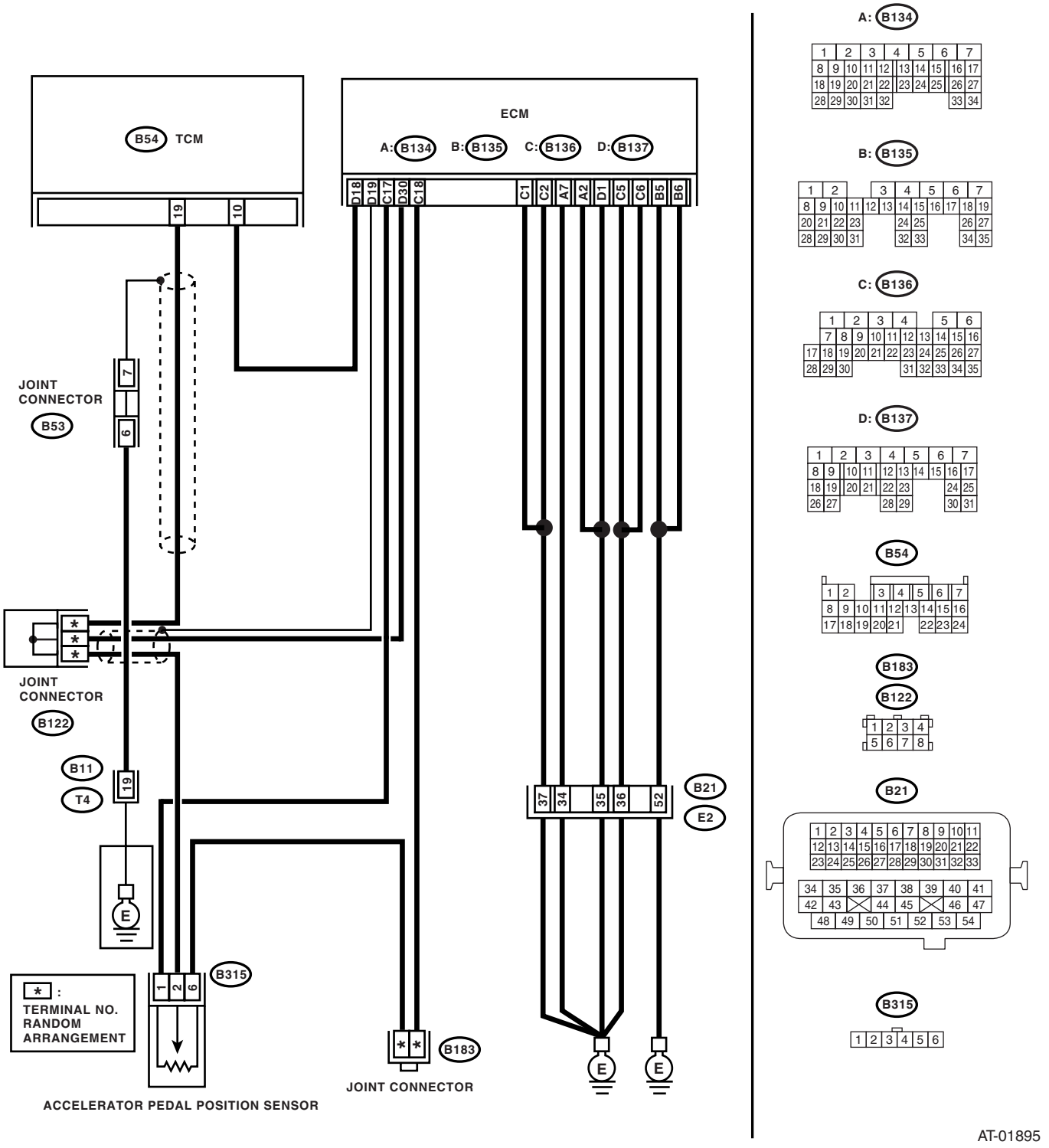
AT-01894

• 2.5 L EC, K4 model



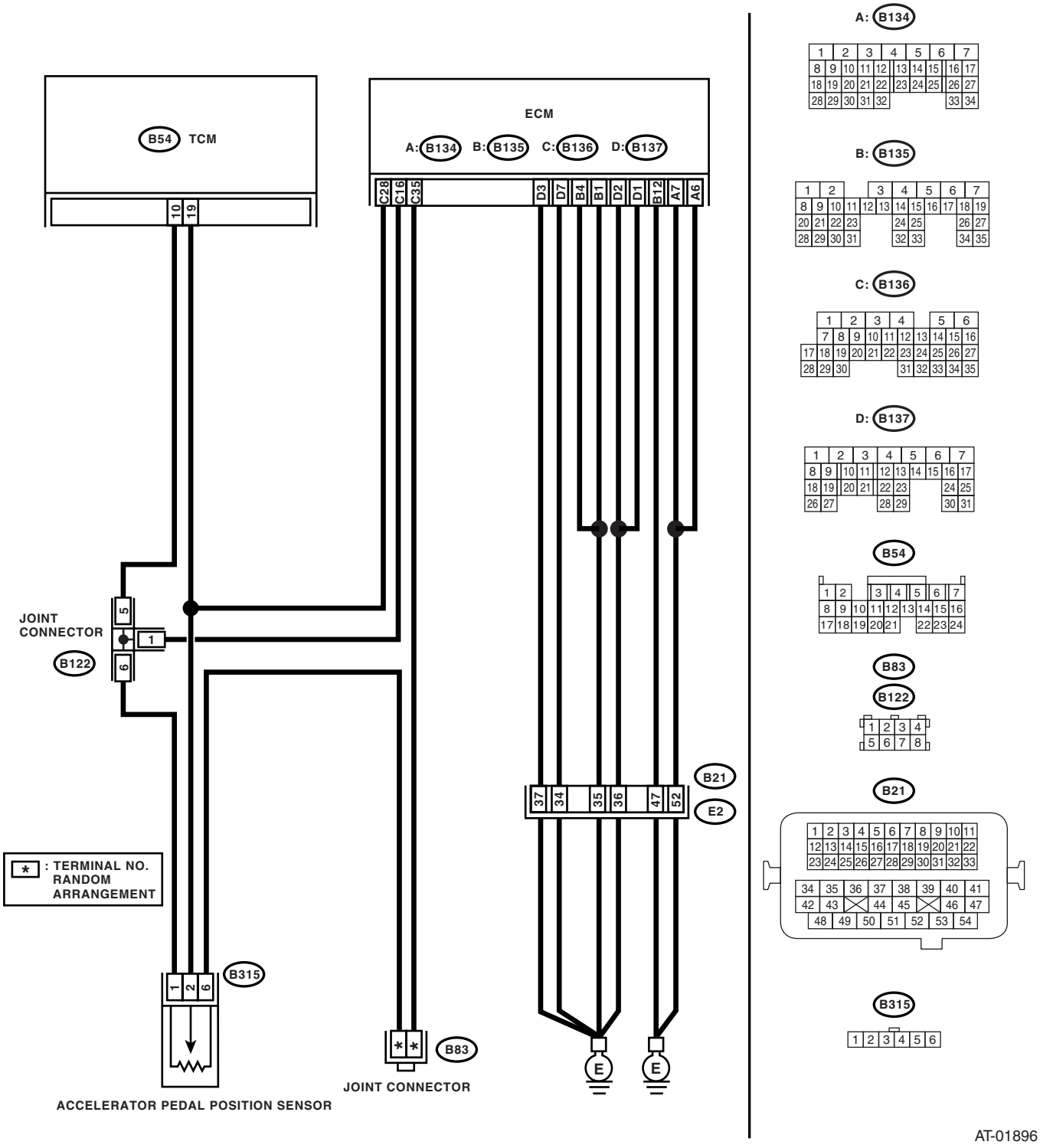
AT-02370

- 2.0 L RHD and 2.5 L KA model



AT-01895

• 2.5 L EK model



Step		Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS.**	Have engine ground terminals been tightened securely?	Go to step **2.**	Tighten the engine ground terminals.

	Step	Check	Yes	No
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***2.0 L model and 2.5 L KS, KA model*** ***(B134) No. 2 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B135) No. 5 — Engine ground:*** ***(B135) No. 6 — Engine ground:*** ***(B136) No. 1 — Engine ground:*** ***(B136) No. 2 — Engine ground:*** ***(B136) No. 5 — Engine ground:*** ***(B136) No. 6 — Engine ground:*** ***(B137) No. 1 — Engine ground:*** ***2.5 L EC, EK, K4 model*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 6 — Engine ground:*** ***(B135) No. 1 — Engine ground:*** ***(B135) No. 12 — Engine ground:*** ***(B137) No. 1 — Engine ground:*** ***(B137) No. 2 — Engine ground:*** ***(B137) No. 3 — Engine ground:*** ***(B137) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Disconnect the connectors from accelerator pedal position sensor. 2) Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. ***Connector & terminal*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **4.**	Replace the accelerator pedal position sensor.
4	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. ***Connector & terminal*** ***No. 6 — No. 2:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **5.**	Replace the accelerator pedal position sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and accelerator pedal position sensor connector. ***Connector & terminal*** ***(B54) No. 19 — (B315) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and accelerator pedal position sensor connector, and poor contact in coupling connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit in harness between TCM and accelerator pedal position sensor connector.

	Step	Check	Yes	No
7	**CHECK HARNESS CONNECTOR BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Remove the connector from ECM. 2) Measure the resistance of harness between the accelerator pedal position sensor connector and chassis ground. ***Connector & terminal*** ***(B315) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between ECM and accelerator pedal position sensor.
8	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM, accelerator pedal position sensor, and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Turn the Subaru Select Monitor switch to ON. 5) Fully close the throttle. 6) Read the data of accelerator pedal position sensor using Subaru Select Monitor. • Accelerator pedal position sensor input signal is indicated.	Is the voltage more than 0.2 V?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in accelerator pedal position sensor circuit.	Go to step **9.**
9	**CHECK POOR CONTACT.**	Is there poor contact in accelerator pedal position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

Y: DTC P1709 THROTTLE POSITION SENSOR CIRCUIT HIGH INPUT

DTC DETECTING CONDITION:

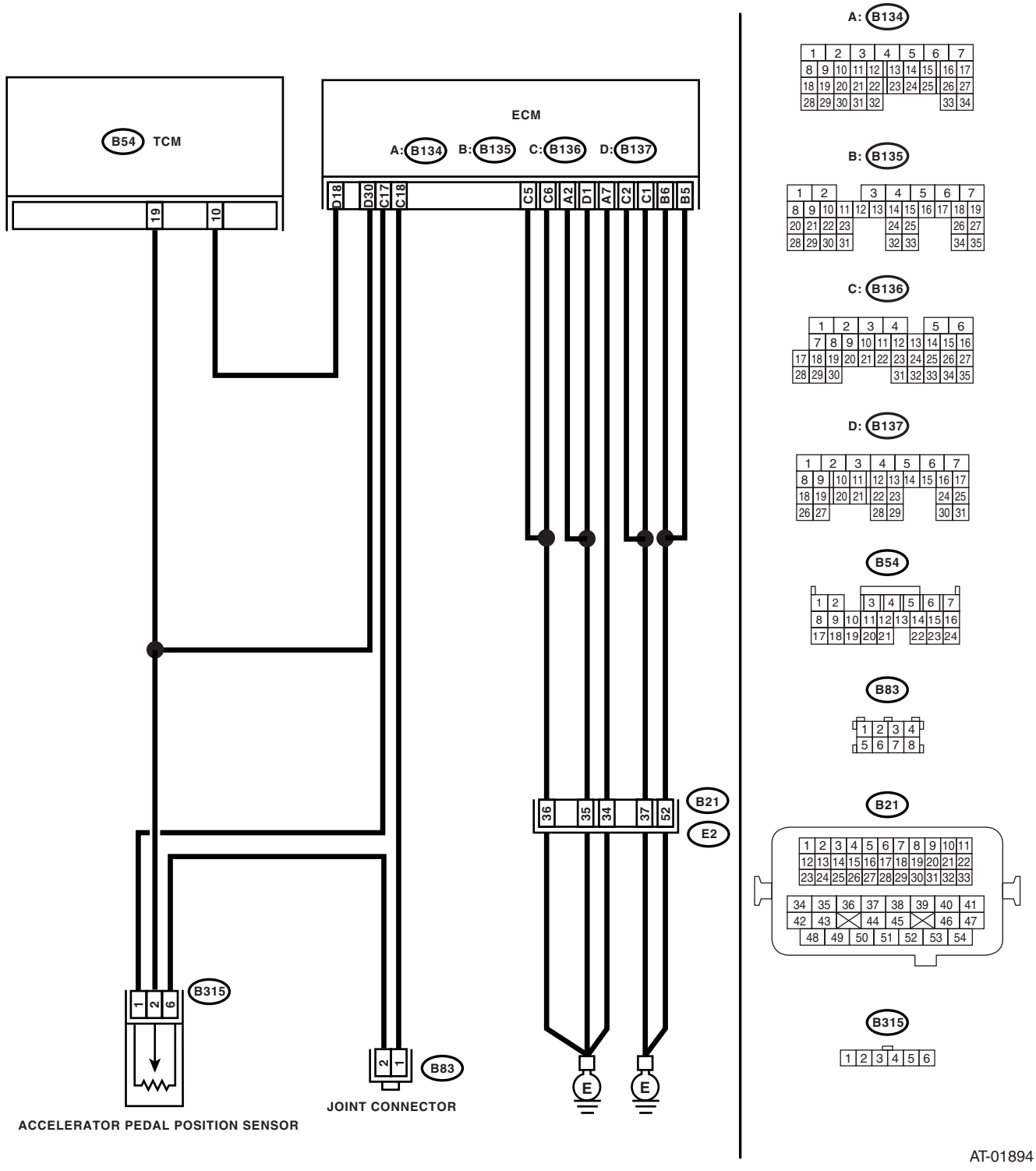
The input signal circuit of accelerator pedal position sensor is shorted.

TROUBLE SYMPTOM:

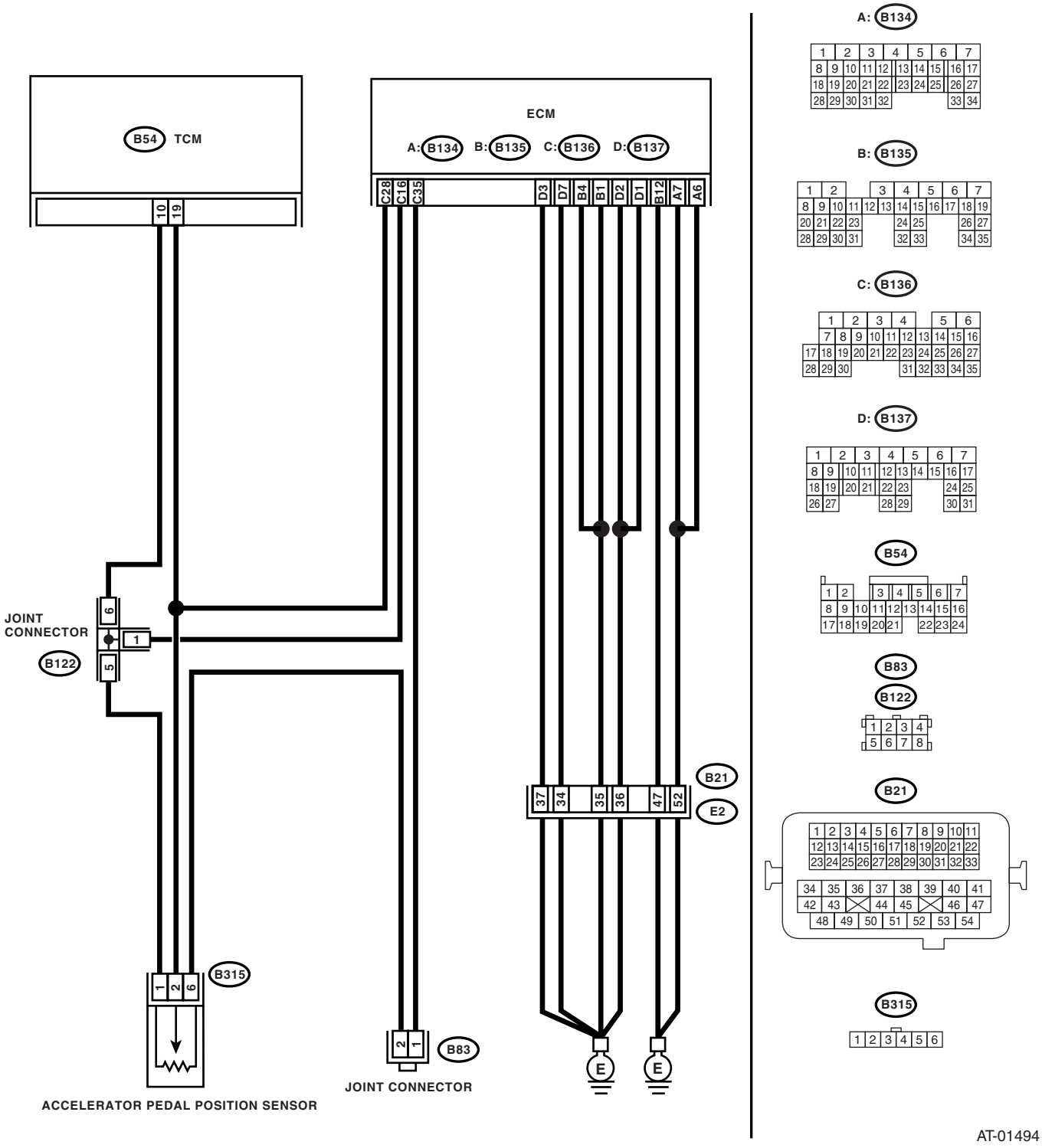
- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon is occurred.

WIRING DIAGRAM:

- 2.0 L LHD and 2.5 L KS model



• 2.5 L EC, K4 model



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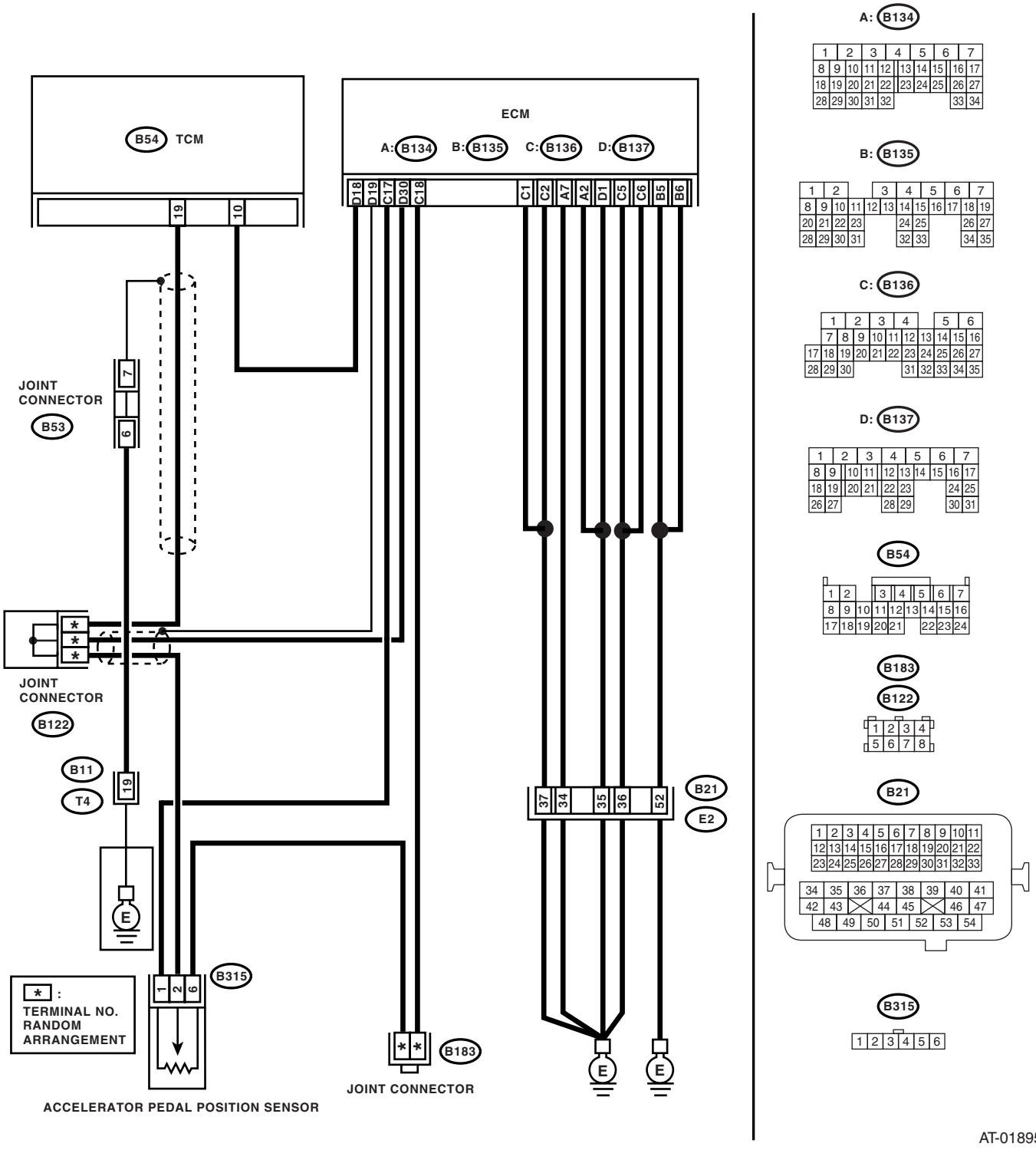
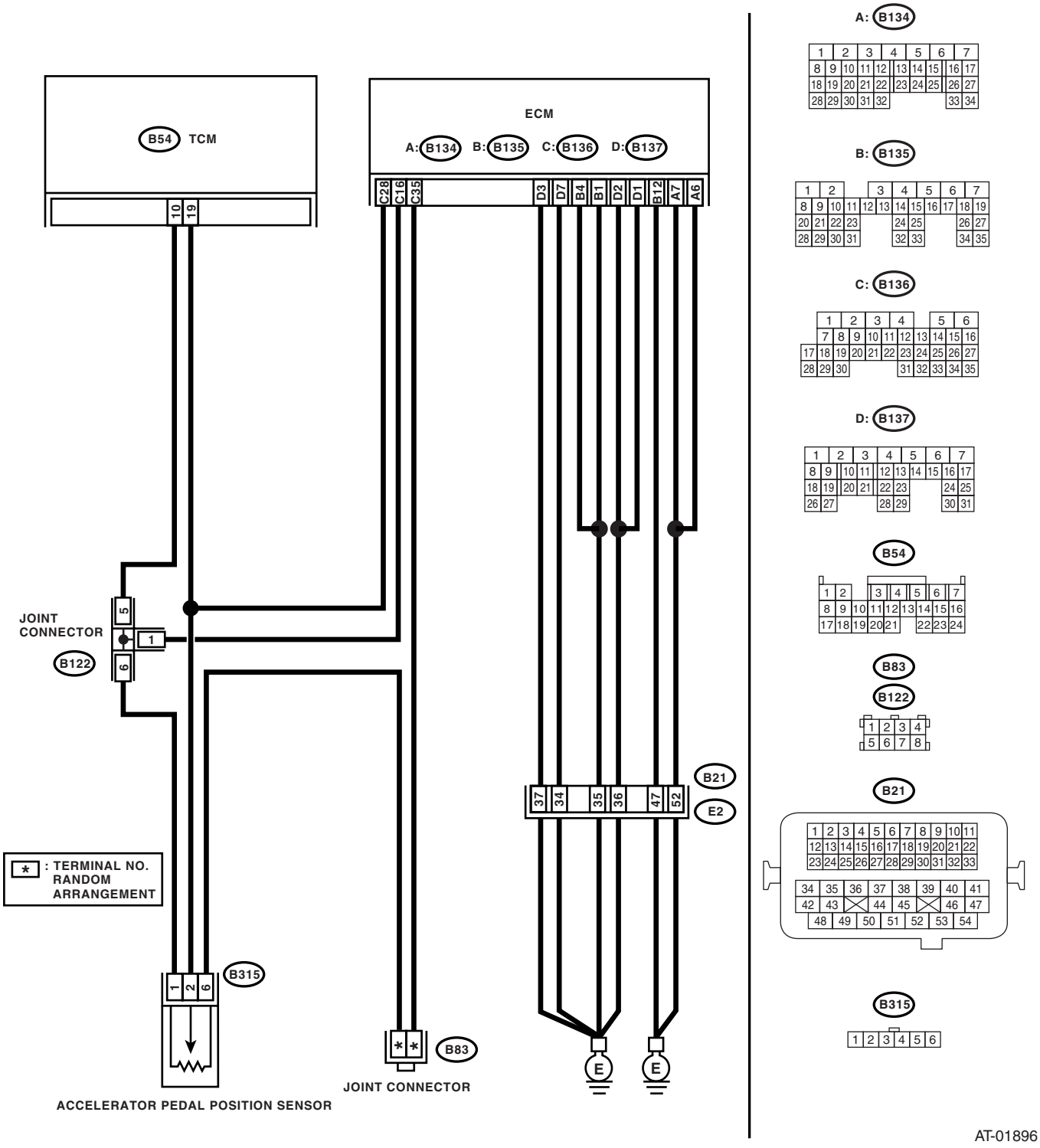
• 2.0 L RHD and 2.5 L KA model



AT-01895

• 2.5 L EK model



AT-01896

Step		Check	Yes	No
1	**CHECK ENGINE GROUND TERMINALS.**	Have engine ground terminals been tightened securely?	Go to step **2.**	Tighten the engine ground terminals.

	Step	Check	Yes	No
2	**CHECK GROUND CIRCUIT FOR ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM. 3) Measure the resistance of harness between ECM and engine ground. ***Connector & terminal*** ***2.0 L model and 2.5 L KS, KA model*** ***(B134) No. 2 — Engine ground:*** ***(B134) No. 7 — Engine ground:*** ***(B135) No. 5 — Engine ground:*** ***(B135) No. 6 — Engine ground:*** ***(B136) No. 1 — Engine ground:*** ***(B136) No. 2 — Engine ground:*** ***(B136) No. 5 — Engine ground:*** ***(B136) No. 6 — Engine ground:*** ***(B137) No. 1 — Engine ground:*** ***2.5 L EC, EK, K4 model*** ***(B134) No. 7 — Engine ground:*** ***(B134) No. 6 — Engine ground:*** ***(B135) No. 1 — Engine ground:*** ***(B135) No. 12 — Engine ground:*** ***(B137) No. 1 — Engine ground:*** ***(B137) No. 2 — Engine ground:*** ***(B137) No. 3 — Engine ground:*** ***(B137) No. 7 — Engine ground:***	Is the resistance less than 5 Ω?	Go to step **3.**	Repair the open circuit in harness between ECM connector and engine grounding terminal.
3	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** 1) Disconnect the connectors from accelerator pedal position sensor. 2) Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. ***Connector & terminal*** ***No. 1 — No. 6:***	Is the resistance 0.75 — 3.15 kΩ?	Go to step **4.**	Replace the accelerator pedal position sensor.
4	**CHECK ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance between accelerator pedal position sensor connector receptacle's terminals. ***Connector & terminal*** ***No. 2 — No. 6:***	Is the resistance 0.15 — 0.63 kΩ?	Go to step **5.**	Replace the accelerator pedal position sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and accelerator pedal position sensor connector.

	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Remove the connector from ECM. 2) Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector. ***Connector & terminal*** ***2.0 L model and 2.5 L KS, KA model (B135) No. 6 — (B136) No. 18:*** ***2.5 L EC, EK, K4 model (B135) No. 6 — (B136) No. 35:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between ECM and accelerator pedal position sensor.
7	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connectors to TCM, accelerator pedal position sensor and ECM. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON (engine OFF). 4) Turn the Subaru Select Monitor switch to ON. 5) Fully open the throttle. 6) Read the data of accelerator pedal position sensor using Subaru Select Monitor. • Accelerator pedal position sensor input signal is indicated.	Is the voltage less than 4.6 V?	Go to step **8.**	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in accelerator pedal position sensor circuit.
8	**CHECK POOR CONTACT.**	Is there poor contact in accelerator pedal position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

Z: DTC P1714 THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

DTC DETECTING CONDITION:

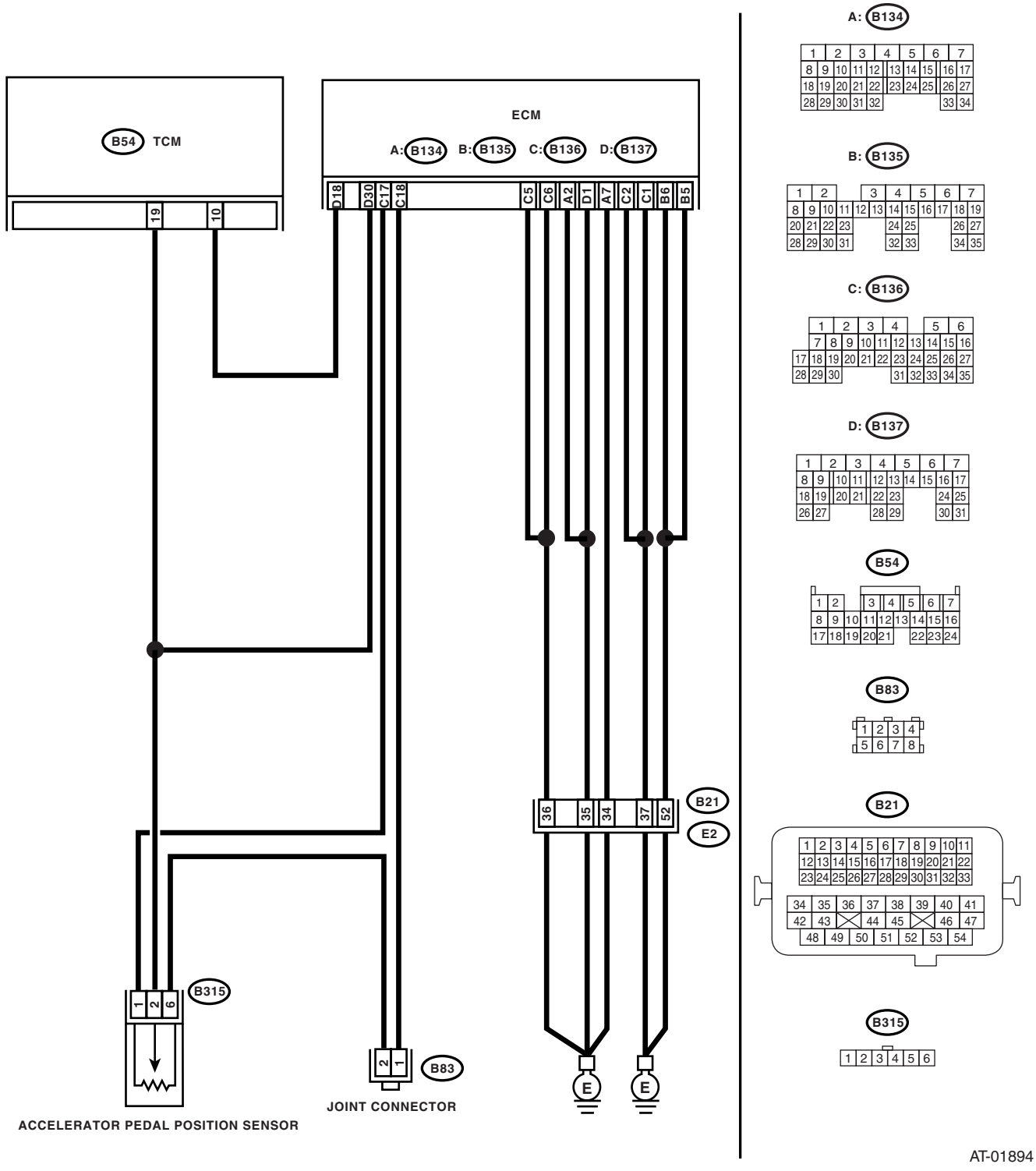
The power supply circuit of accelerator pedal position sensor is open or shorted.

TROUBLE SYMPTOM:

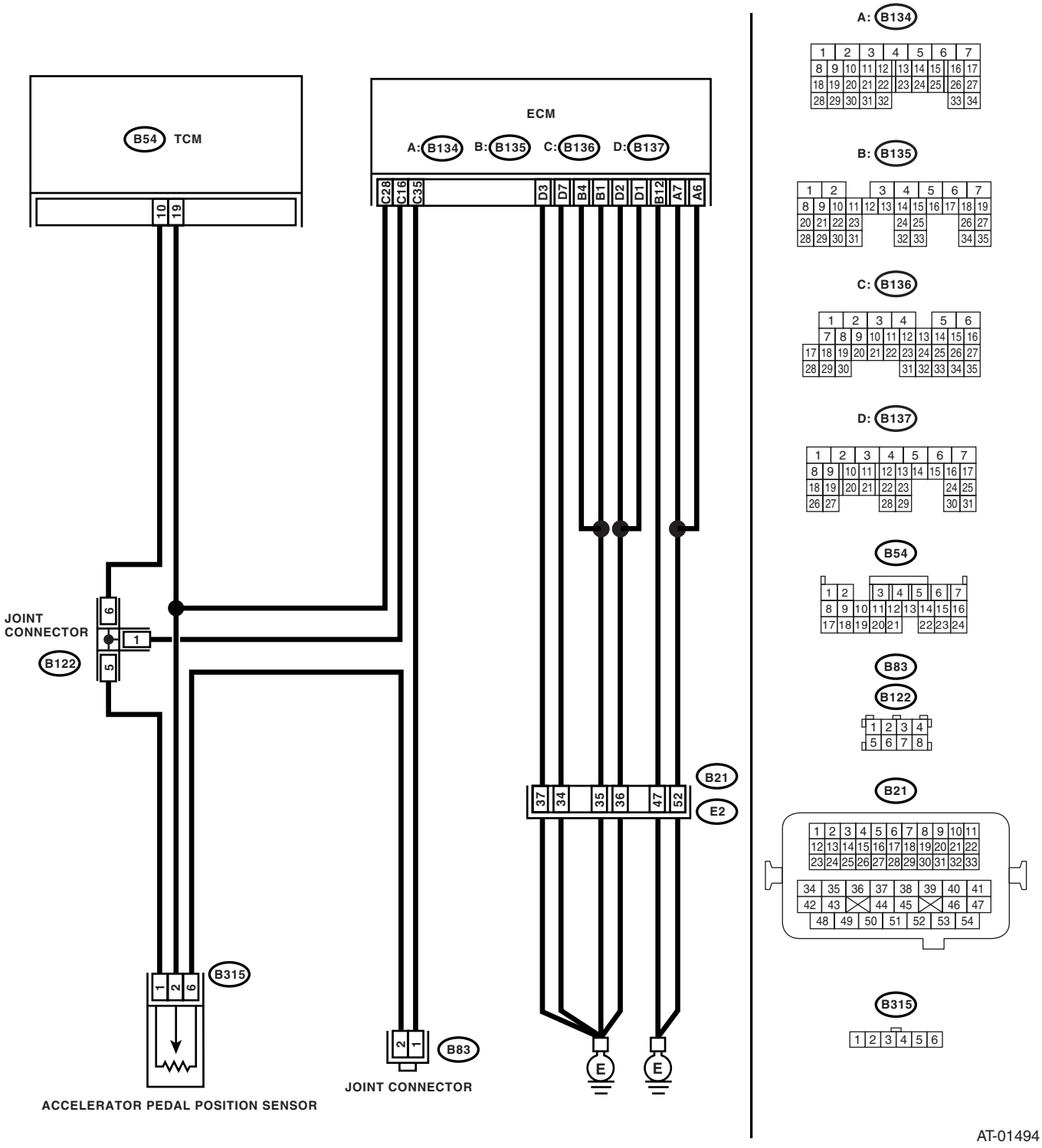
- Shift point is too high or too low.
- Excessive shift shock
- Tight corner braking phenomenon is occurred.

WIRING DIAGRAM:

- 2.0 L LHD and 2.5 L KS model



• 2.5 L EC, K4 model



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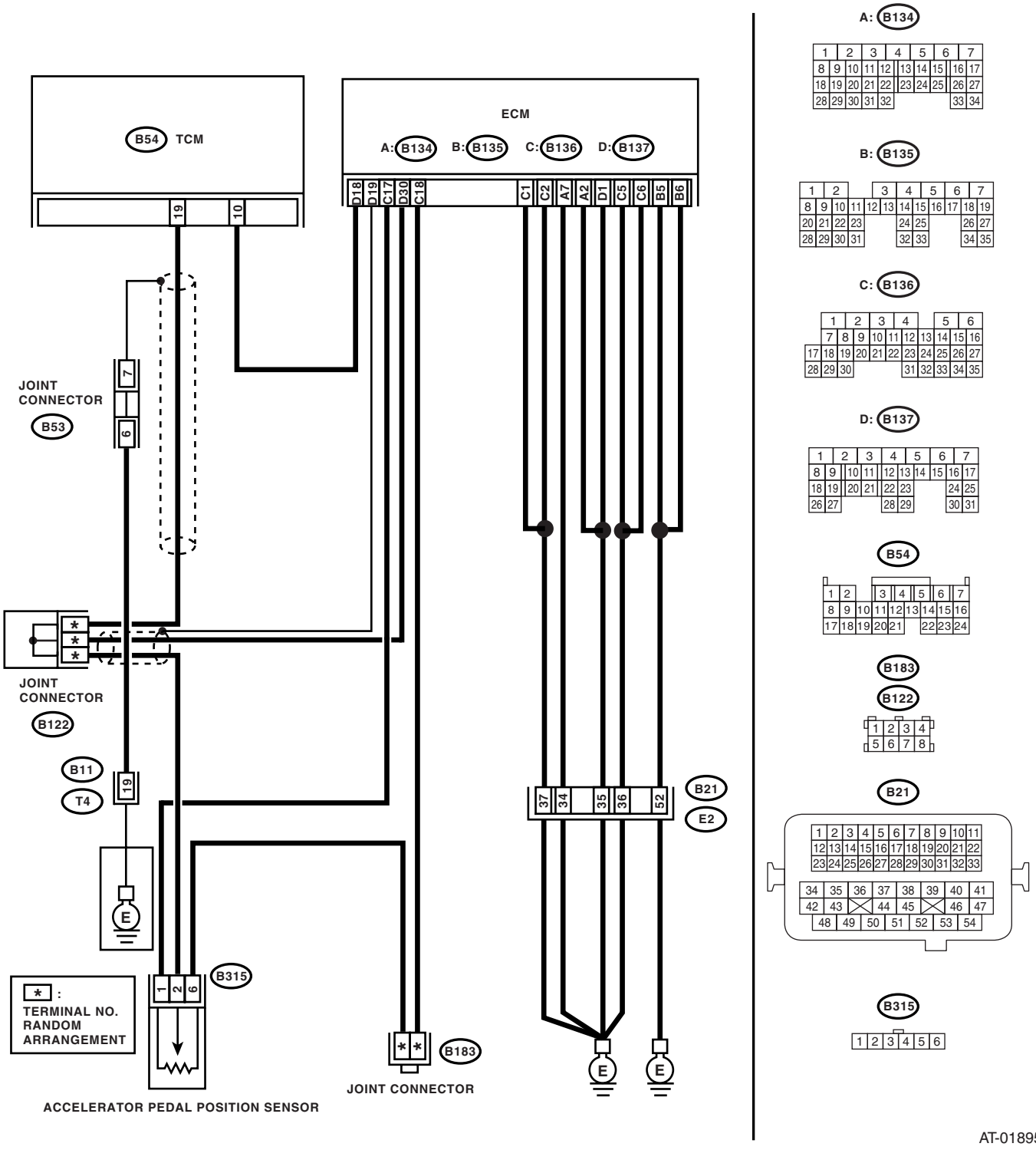
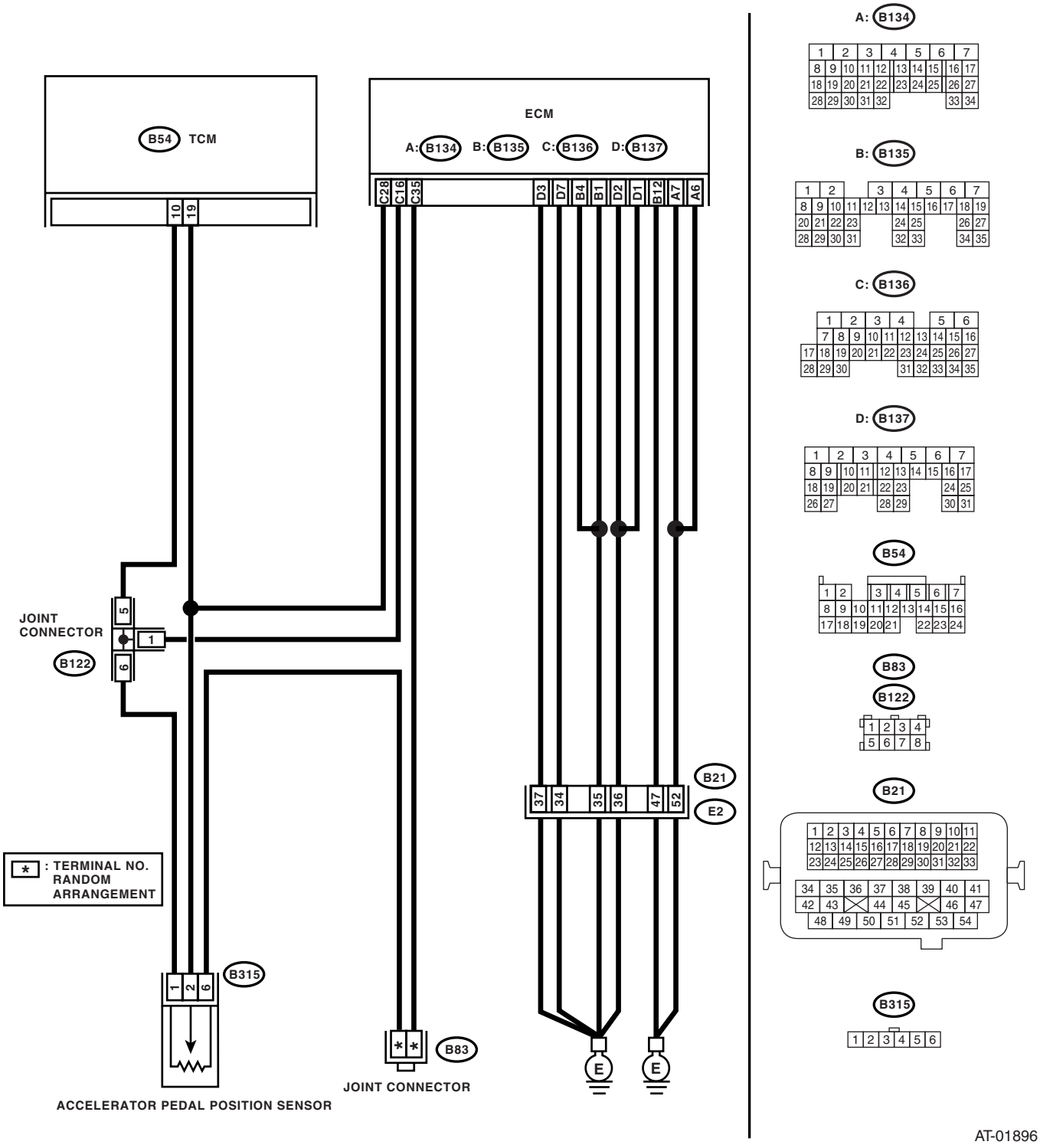
• 2.0 L RHD and 2.5 L KA model



AT-01895

• 2.5 L EK model



AT-01896

	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR.** 1) Disconnect the connector from TCM. 2) Measure the resistance of harness between TCM and accelerator pedal position sensor connector. ***Connector & terminal*** ***2.0 L model and 2.5 L KS, KA model*** ***(B54) No. 10 — (B137) No. 18:*** ***2.5 L EC, EK, K4 model*** ***(B54) No. 10 — (B315) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and accelerator pedal position sensor connector, and poor contact in coupling connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ACCELERATOR PEDAL POSITION SENSOR.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and accelerator pedal position sensor connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Measure the voltage of harness between TCM and chassis ground. ***Connector & terminal*** ***(B54) No. 10 (+) — Chassis ground (−):***	Is the voltage 4.6 — 5.4 V?	Go to step **4.**	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair the harness or connector in accelerator pedal position sensor circuit.
4	**CHECK POOR CONTACT.**	Is there poor contact in accelerator pedal position sensor circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

AA:DTC P1718 CAN COMMUNICATION CIRCUIT

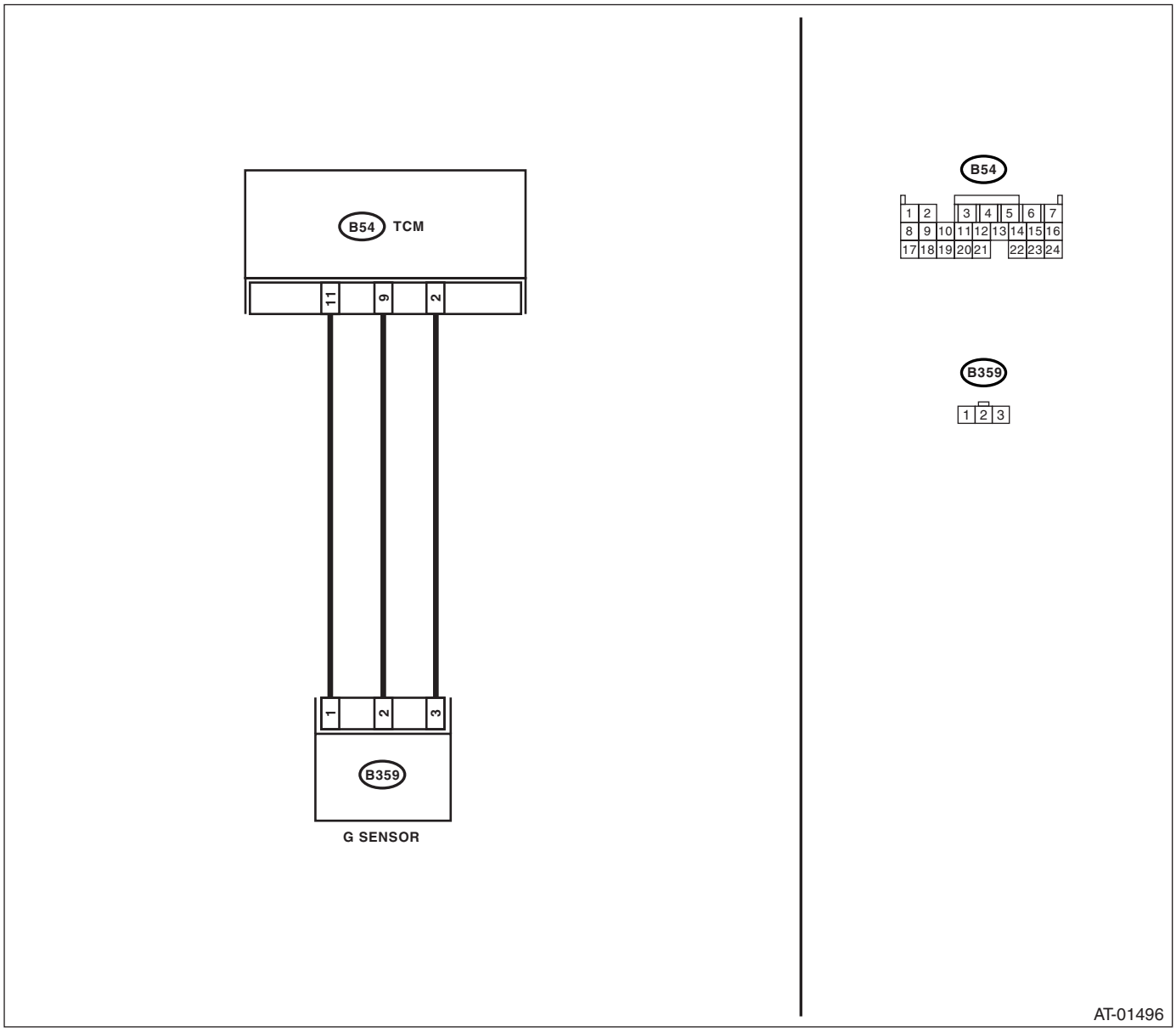
NOTE:
Refer to “Body Integrated Unit” for diagnosis of P1718. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

AB:DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the reading on display 2.3 — 2.7 V when the vehicle is on a level?	Go to step **2.**	Go to step **7.**
2	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Select {Current Data Display & Save} in Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the value on the monitor display 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **3.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
3	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the value on the monitor display 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **4.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
4	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
7	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 — No. 9:***	Is the resistance 5.0 — 6.0 kΩ?	Go to step **8.**	Repair the harness connector between lateral G sensor and TCM.
8	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 2.3 — 2.7 V when the lateral G sensor is horizontal?	Go to step **9.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
10	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **11.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>

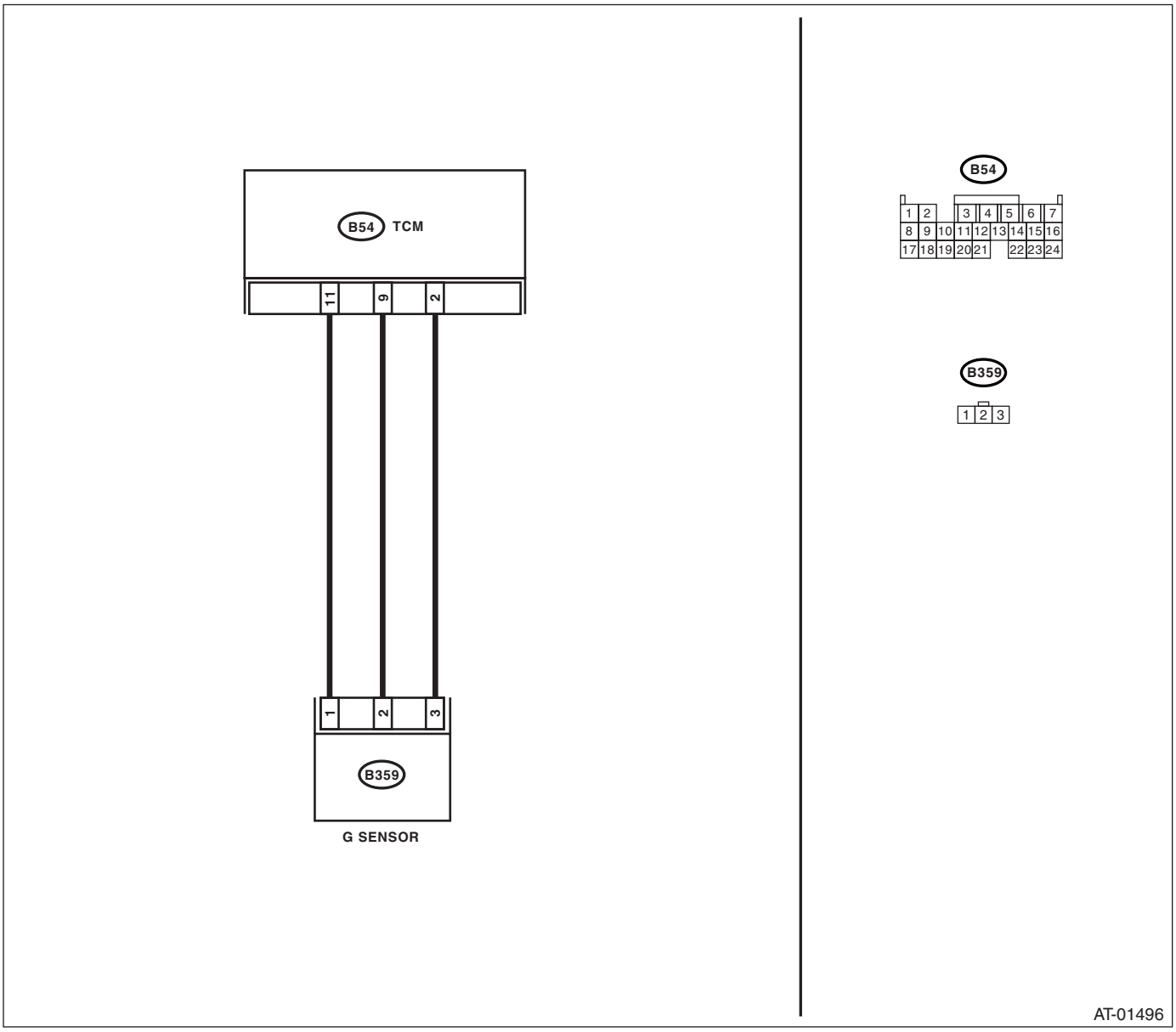
	Step	Check	Yes	No
11	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **12.**
12	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AC:DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the lateral G sensor output on the Subaru Select Monitor display.	Is the value on the monitor display 2.3 — 2.7 V when the lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in the connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK TCM.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
5	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 — No. 9:***	Is the resistance 5.0 — 6.0 kΩ?	Go to step **6.**	Repair the harness connector between lateral G sensor and TCM.
6	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness between lateral G sensor and TCM. Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
7	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to the TCM. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.3 — 2.7 V when the lateral G sensor is horizontal?	Go to step **8.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
8	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **9.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>

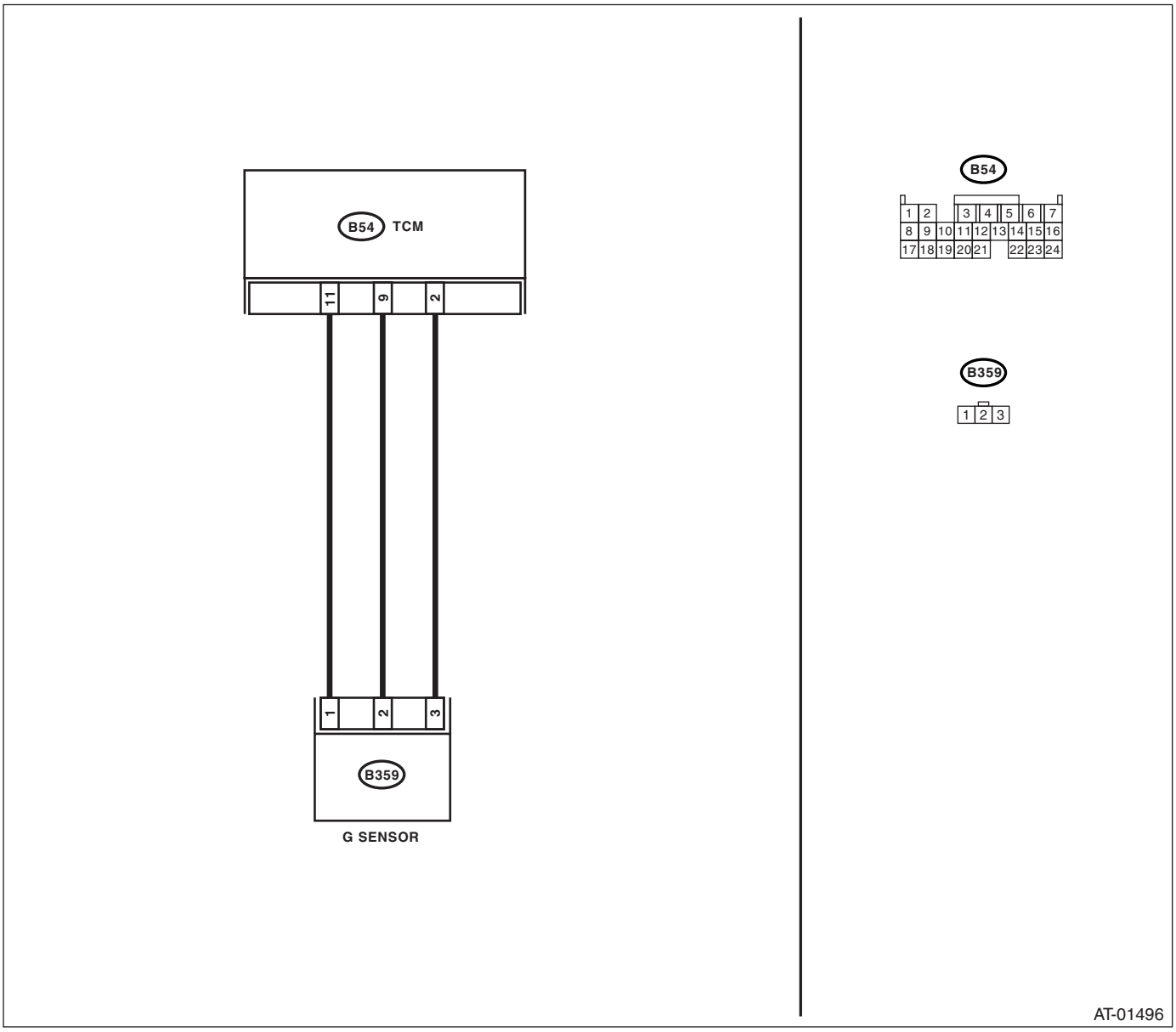
	Step	Check	Yes	No
10	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AD:DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the lateral G sensor output on the Subaru Select Monitor display.	Is the value on the monitor display between 2.3 and 2.7 V when the lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in the connector between TCM and lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
5	**CHECK CONDITIONAL INFORMATION WHEN FAULTY.** Read the lateral G sensor output on Subaru Select Monitor display.	Is the reading on monitor display 4.65 V or more?	Go to step **6.**	Go to step **12.**
6	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 — No. 9:***	Is the resistance 4.3 — 4.9 kΩ?	Go to step **7.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
7	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Disconnect the connector from lateral G sensor. 4) Disconnect the connector from TCM. 5) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness between lateral G sensor and TCM.
8	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 2 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **9.**	Repair the harness between lateral G sensor and TCM.
9	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **10.**
10	**CHECK TCM.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

	Step	Check	Yes	No
12	**CHECK INPUT VOLTAGE OF LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect the connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 1 (+) — No. 2 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **13.**	Repair the harness connector between lateral G sensor and TCM.
13	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 — No. 9:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **14.**	Repair the harness connector between lateral G sensor and TCM.
14	**CHECK LATERAL G SENSOR.** 1) Connect the connector to lateral G sensor. 2) Connect the connector to the TCM. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.3 — 2.7 V when lateral G sensor is in horizontal?	Go to step **15.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
15	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **16.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
16	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **17.**	Replace the lateral G sensor. <Ref. to 4AT-66, Lateral G Sensor.>
17	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and lateral G sensor?	Repair the connector.	Go to step **18.**
18	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC still output?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **19.**
19	**CHECK OTHER DTC DETECTION.**	Is any other DTC detected?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AE:DTC P1817 SPORTS MODE SWITCH CIRCUIT

DTC DETECTING CONDITION:

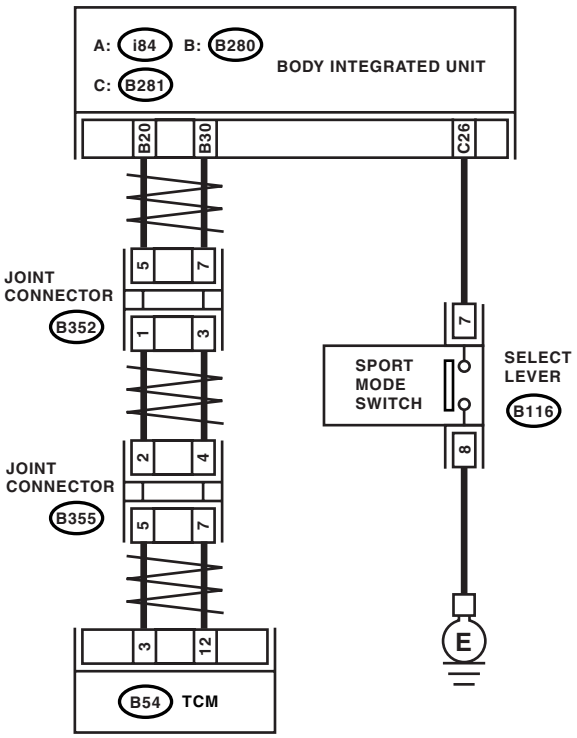
Input signal circuit of SPORT shift switch is open or shorted.

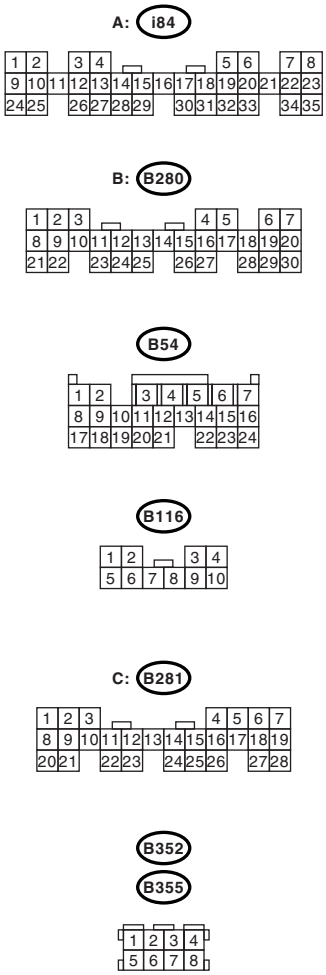
TROUBLE SYMPTOM:

- The manual mode is not engaged.
- The SPORT indicator light does not illuminate.
- No SPORT mode occurs.

WIRING DIAGRAM:

- LHD model





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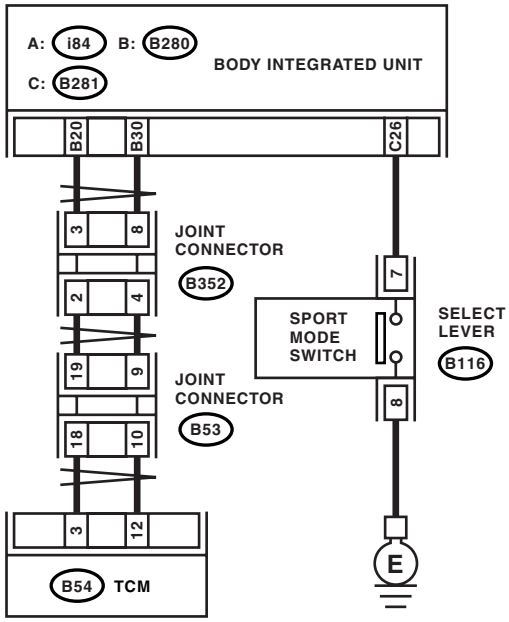
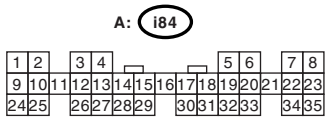
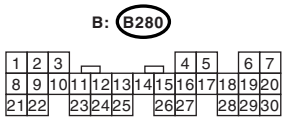
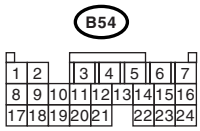
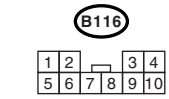
• RHD model

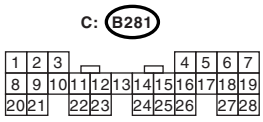


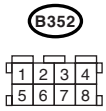


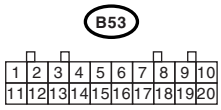












AT-02200

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. (Engine OFF) 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift the select lever to "P" range. 2) Read the Tiptronic Mode Switch data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the OFF displayed?	Go to step **3.**	Go to step **7.**
3	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift the select lever from "P" to "D" range. 2) Read the Tiptronic Mode Switch data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the indication per range OFF?	Go to step **4.**	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>
4	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift the select lever to SPORT mode. 2) Shift the select lever to any other than "D" range. 3) Read the Tiptronic Mode Switch data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the OFF displayed?	Go to step **5.**	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>
5	**CHECK INHIBITOR SWITCH.** Shift the select lever from "P" to "D" range.	Is the indication of range position indicator light in combination meter synchronized with position of select lever?	Go to step **6.**	Adjust the inhibitor switch and select cable. <Ref. to 4AT-52, ADJUSTMENT, Inhibitor Switch.> <Ref. to CS-15, ADJUSTMENT, Select Cable.>
6	**CHECK INPUT SIGNAL TO TCM.** 1) Shift the select lever from "P" to "D" range. 2) Read the Tiptronic Mode Switch data of TCM unit using Subaru Select Monitor. <Ref. to 4AT(diag)-17, OPERATION, Subaru Select Monitor.>	Is the indication per range OFF?	Even if the SPORT indicator light is blinking, the circuit has returned to normal condition at this time. A temporary short circuit of connector or harness may be the cause. Repair the harness or connector.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
7	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit and select lever. 3) Measure the resistance of body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 26 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between body integrated unit and SPORT shift switch.
8	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to “P” range. 2) Measure the resistance of SPORT shift switch connector terminals. ***Terminals*** ***No. 7 — No. 8***	Is the resistance more than 1 MΩ?	Check the body integrated unit.	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>

14.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

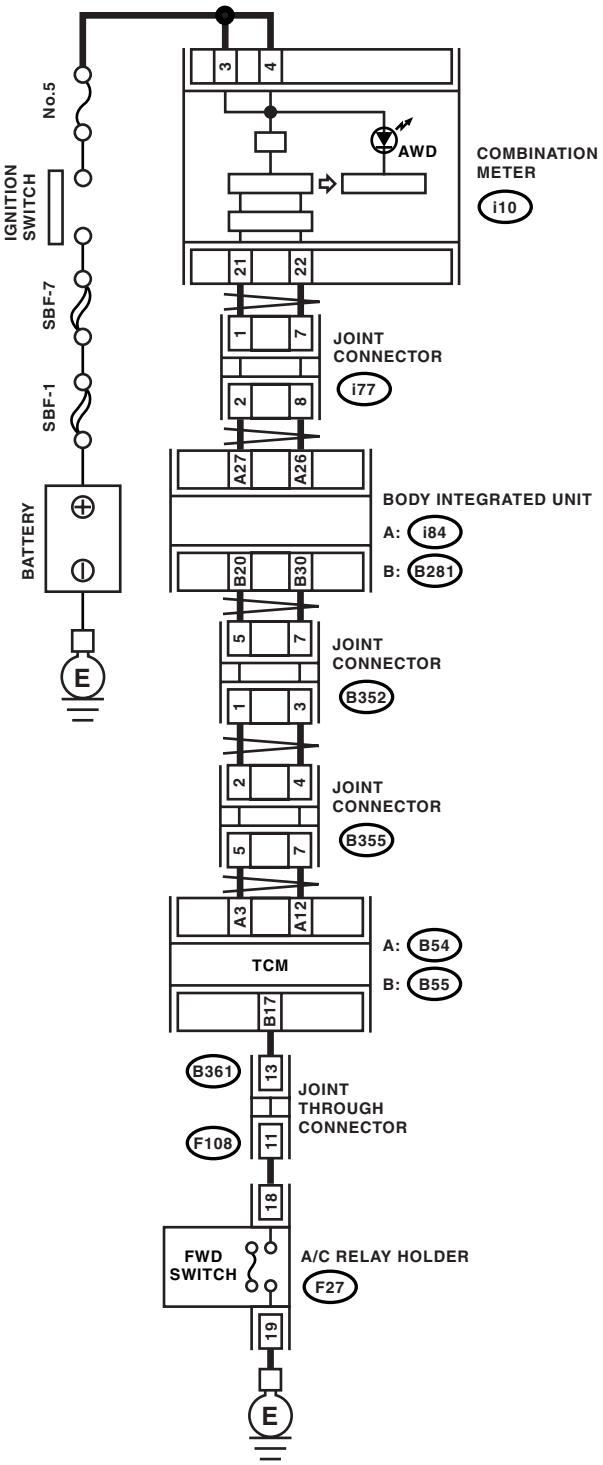
A: CHECK FWD SWITCH

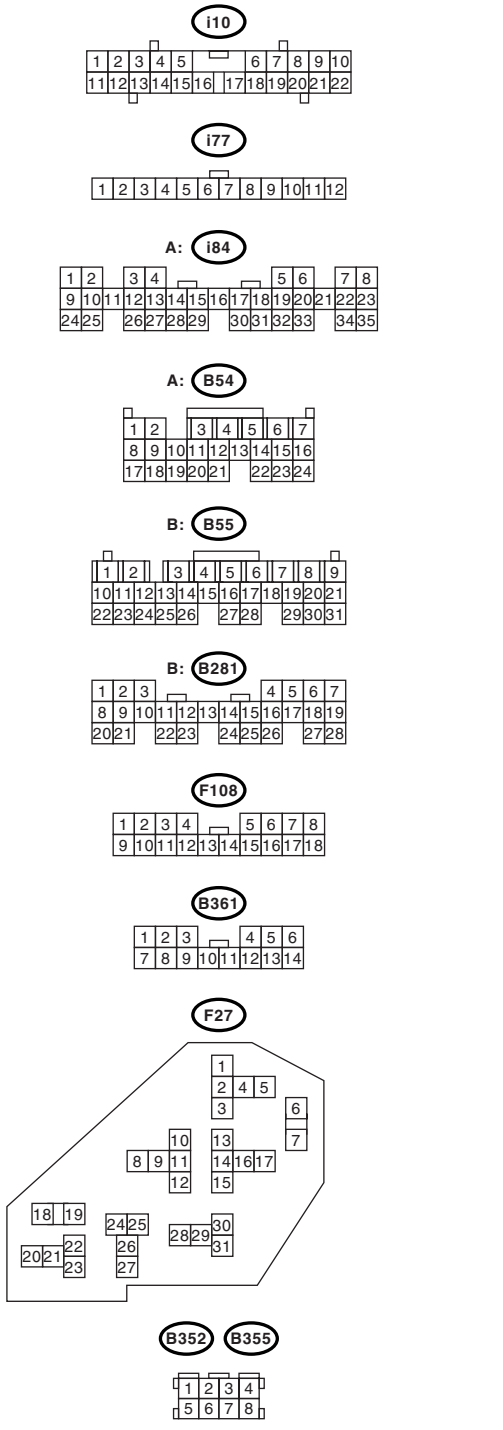
DIAGNOSIS:

- The LED does not come on even if FWD switch is ON.
- The FWD signal circuit is open or shorted.

WIRING DIAGRAM:

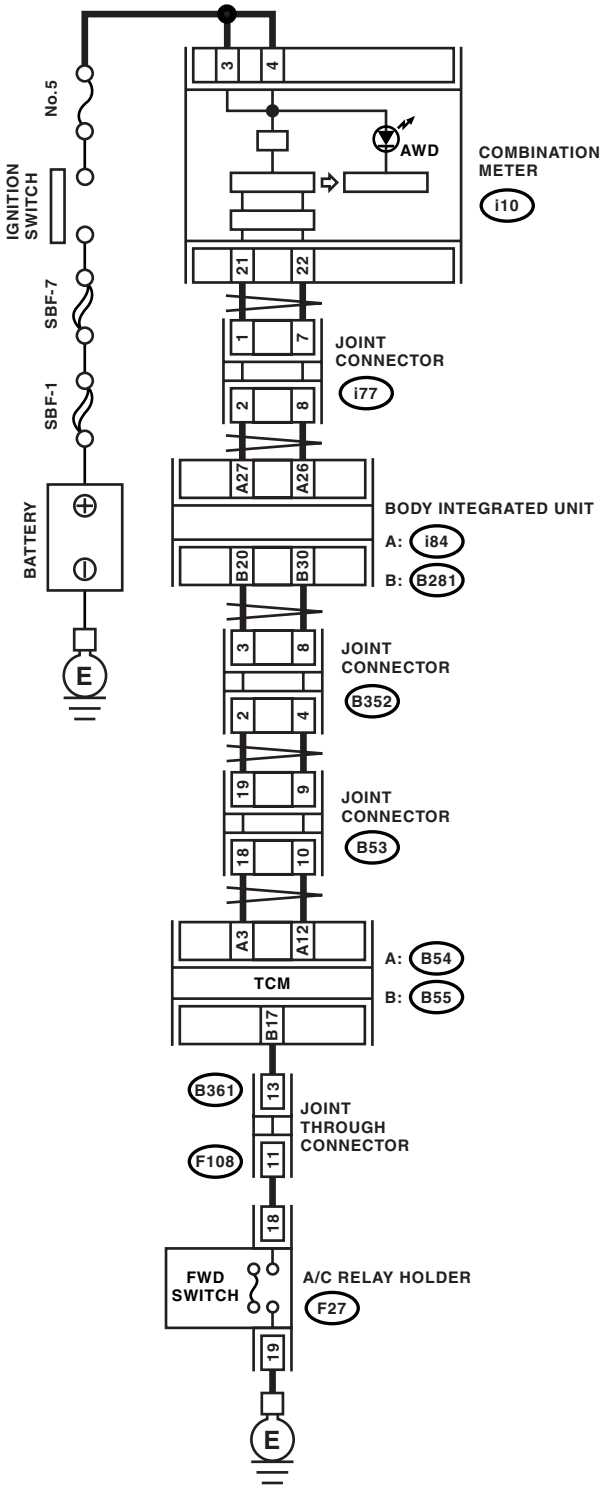
- LHD model

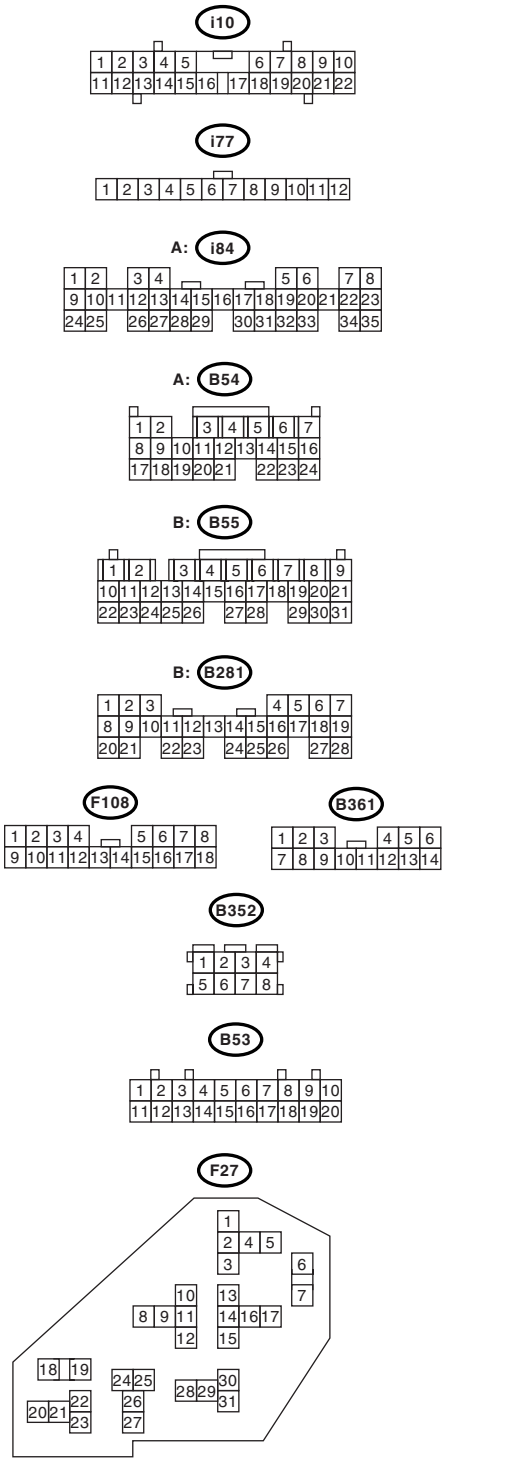




AT-01898

• RHD model





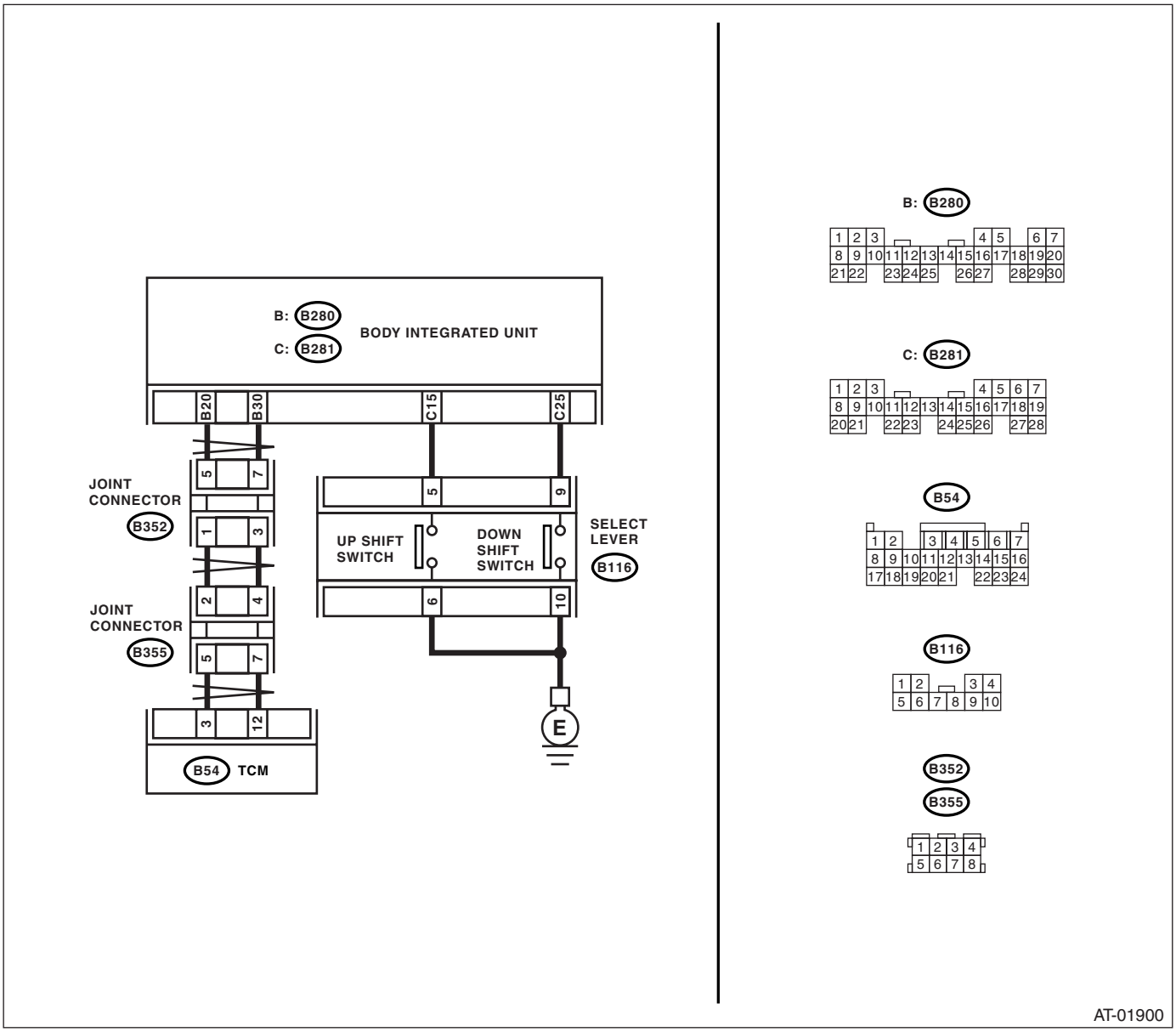
AT-02201

	Step	Check	Yes	No
1	**CONFIRM EQUIPMENT OF VEHICLE.**	Is the vehicle equipped with VDC?	Go to INSPECTION FOR SPORT SHIFT SWITCH. <Ref. to 4AT(diag)-127, CHECK SPORT SHIFT SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **2.**
2	**CHECK SPARE FUSE.**	Is the spare fuse OK?	Go to step **3.**	Replace the fuse.
3	**CHECK FWD SWITCH.** Connect the Subaru Select Monitor to data link connector.	When the fuse is inserted to FWD switch, does the LED light up?	Go to step **4.**	Go to step **5.**
4	**CHECK COMBINATION METER.**	Does the AWD warning light illuminate?	Go to INSPECTION FOR SPORT SHIFT SWITCH. <Ref. to 4AT(diag)-127, CHECK SPORT SHIFT SWITCH, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **10.**
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance of harness between TCM and FWD switch connector. ***Connector & terminal*** ***(B55) No. 17 — (F27) No. 18:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between TCM and FWD switch connector.
6	**CHECK HARNESS CONNECTOR BETWEEN FWD SWITCH AND CHASSIS GROUND.** Measure the resistance of harness between FWD switch and chassis ground. ***Connector & terminal*** ***(F27) No. 19 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between FWD switch connector and chassis ground.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND FWD SWITCH.** Measure the resistance of harness connector between TCM and body to make sure that circuit does not short. ***Connector & terminal*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between TCM and FWD switch connector.
8	**CHECK INPUT SIGNAL FOR TCM.** 1) Turn the ignition switch to OFF. 2) Connect the connector to TCM. 3) Turn the ignition switch to ON. 4) Measure the signal voltage for TCM while installing the fuse to FWD switch connector. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **9.**	Go to step **11.**

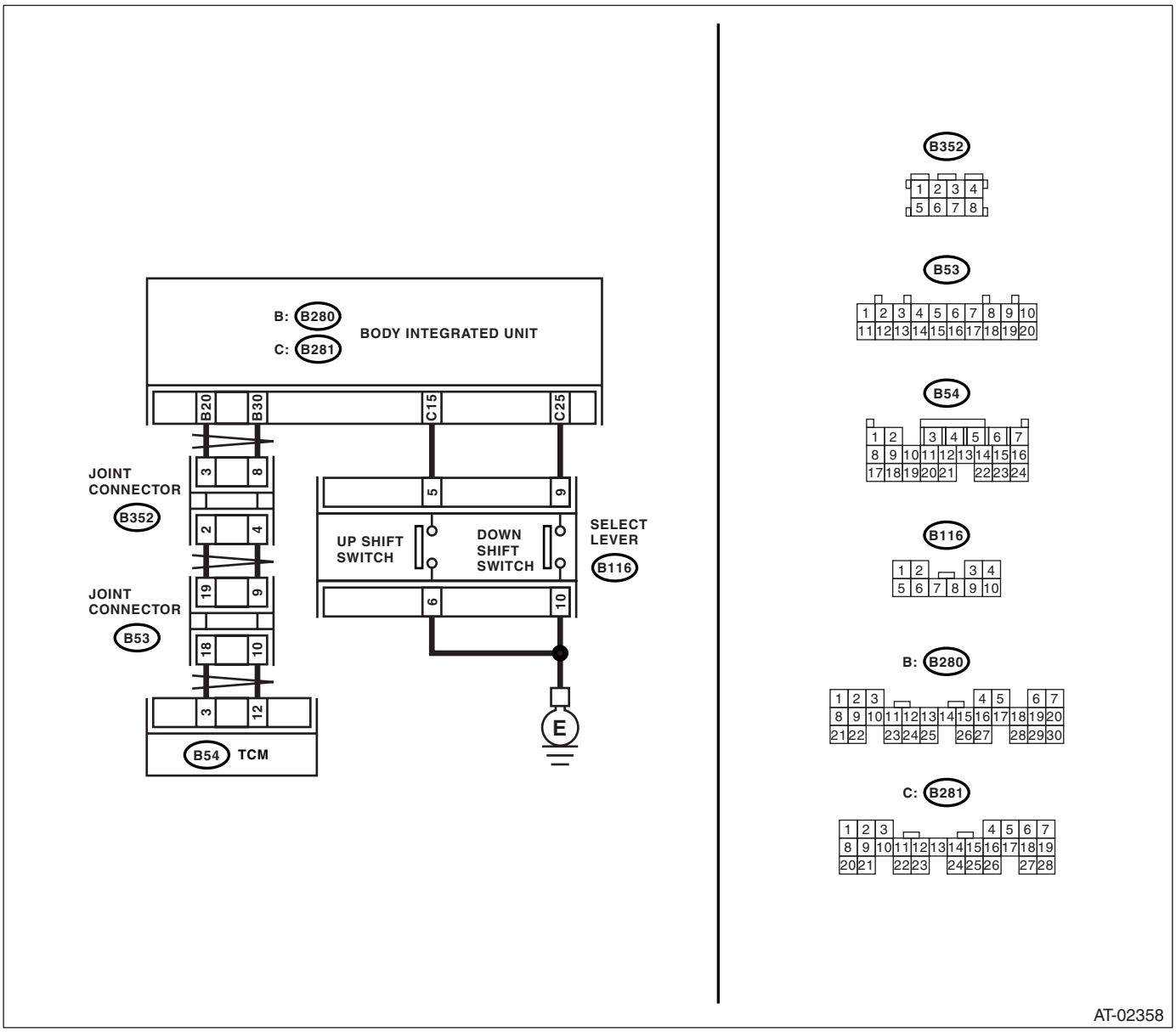
	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM.** Measure the signal voltage for TCM while removing the fuse from FWD switch connector. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 10.5 V?	Go to step **10.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
10	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **11.**
11	**CHECK COMBINATION METER.** Check the AWD warning light. <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the AWD warning light OK?	Go to step **12.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
12	**CHECK POOR CONTACT.**	Is there poor contact in FWD switch circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

B: CHECK SPORT SHIFT SWITCH

DIAGNOSIS:
Input signal circuit of SPORT shift switch is open or shorted.
TROUBLE SYMPTOM:
Does not shift gears in manual mode.
WIRING DIAGRAM:
• LHD model



• RHD model



Step		Check	Yes	No
1	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to manual mode. 2) Shift and hold the select lever to up side.	Does the LED light up?	Go to step **2.**	Go to step **3.**
2	**CHECK SPORT SHIFT SWITCH.** Shift and hold the select lever to down side.	Does the LED light up?	Go to the procedure “INSPECTION FOR SPORT SHIFT INDICATOR LIGHT”. <Ref. to 4AT(diag)-132, CHECK SPORT SHIFT INDICATOR, Diagnostic Procedure without Diagnostic Trouble Code (DTC).>	Go to step **12.**

	Step	Check	Yes	No
3	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to up side. 3) Read the data of up-shift switch using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **4.**	Go to step **5.**
4	**CHECK BODY INTEGRATED UNIT.** Check the DTC of body integrated unit. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
5	**CHECK SPORT SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
6	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 5:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Replace the guide plate assembly.
7	**CHECK SPORT SHIFT SWITCH.** 1) Shift and hold the select lever to up side. 2) Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **8.**	Replace the guide plate assembly.
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 5 — (B281) No. 15:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between SPORT shift switch connector and TCM connector, or poor contact in coupling connector.
9	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SPORT SHIFT SWITCH.** Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.
10	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (−):***	Is the voltage 1.5 — 8 V?	Go to step **11.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>

	Step	Check	Yes	No
11	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **12.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
12	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Shift and hold the select lever to down side. 3) Read the data of up-shift switch using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is ON displayed?	Go to step **13.**	Go to step **14.**
13	**CHECK BODY INTEGRATED UNIT.** Check the DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Check the TCM.
14	**CHECK SPORT SHIFT SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 10 (+) — Chassis ground (−):***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
15	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 9:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Replace the guide plate assembly.
16	**CHECK SPORT SHIFT SWITCH.** 1) Shift and hold the select lever to down side. 2) Measure the resistance between SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 9:***	Is the resistance less than 1 Ω?	Go to step **17.**	Replace the guide plate assembly.
17	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between body integrated unit and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 9 — (B281) No. 25:***	Is the resistance less than 1 Ω?	Go to step **18.**	Repair the open circuit in harness between SPORT shift switch connector and TCM connector, or poor contact in coupling connector.
18	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.

	Step	Check	Yes	No
19	**CHECK THE INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (−):***	Is the voltage 1.5 — 8 V?	Go to step **20.**	Go to step **21.**
20	**CHECK THE INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **21.**	Replace the body integrated unit. <Ref. to 4AT-65, Transmission Control Module (TCM).>
21	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift switch circuit?	Repair the poor contact.	A temporary poor contact of SPORT shift switch connector or harness.

C: CHECK SPORT SHIFT INDICATOR

DIAGNOSIS:

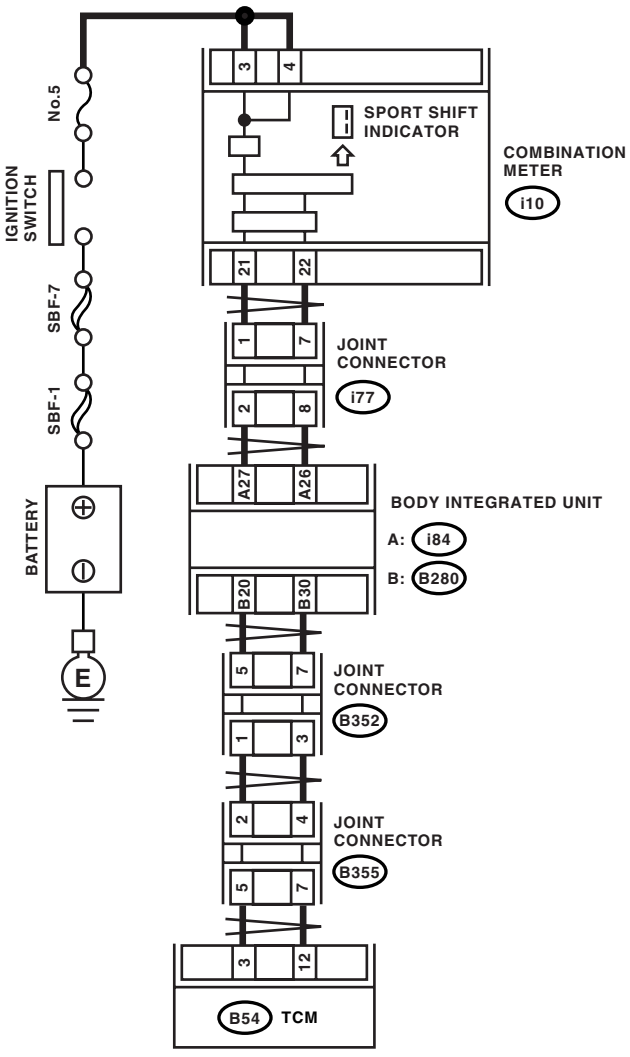
Output signal circuit of SPORT shift indicator is open or shorted.

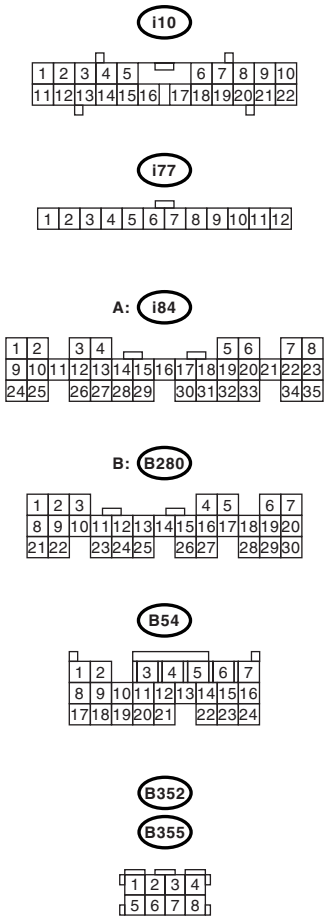
TROUBLE SYMPTOM:

- SPORT shift indicator does not display or remains displayed.
- SPORT shift indicator display does not change.

WIRING DIAGRAM:

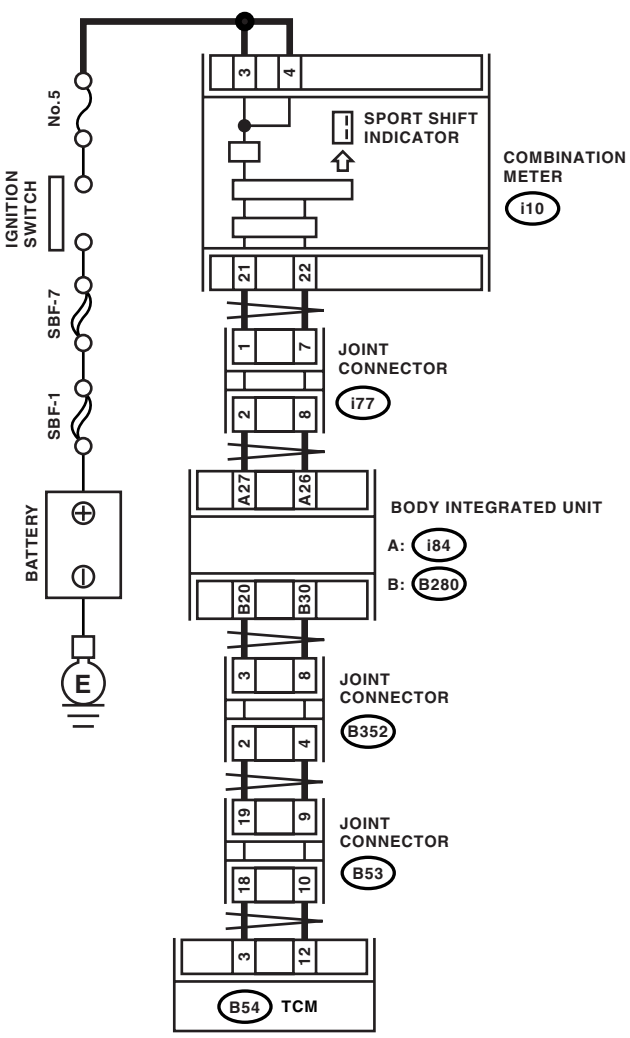
- LHD model

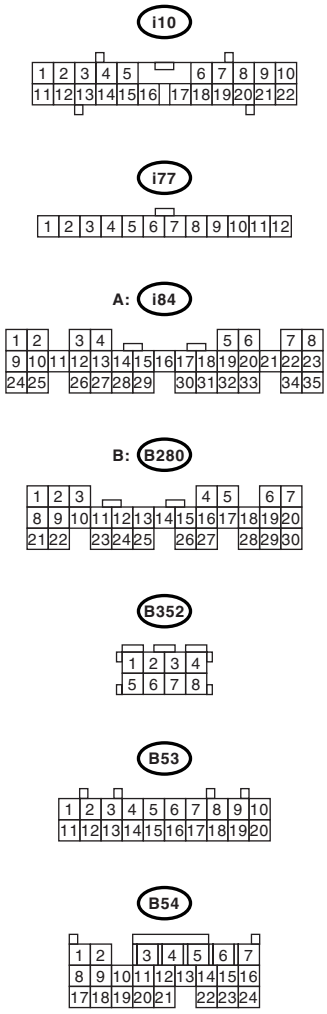




AT-01901

• RHD model





AT-02359

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (Engine OFF) 4) Turn Subaru Select Monitor switch to ON. 5) Shift the select lever to manual mode side. 6) Read the data of gear position using Subaru Select Monitor.	Is the gear position 1?	Go to step **3.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
3	**CHECK TCM.** 1) Up-shift the select lever. 2) Read the data of gear position using Subaru Select Monitor.	Is the gear position 2?	Go to step **4.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT.** Read the data of SPORT shift gear position using Subaru Select Monitor.	Is the SPORT shift gear position 2?	Go to step **5.**	Check the body integrated unit.
5	**CHECK COMBINATION METER.** <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the SPORT shift indicator OK?	Check the buzzer. <Ref. to 4AT(diag)-138, Diagnostics with Phenomenon.>	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>

D: CHECK BUZZER

DIAGNOSIS:

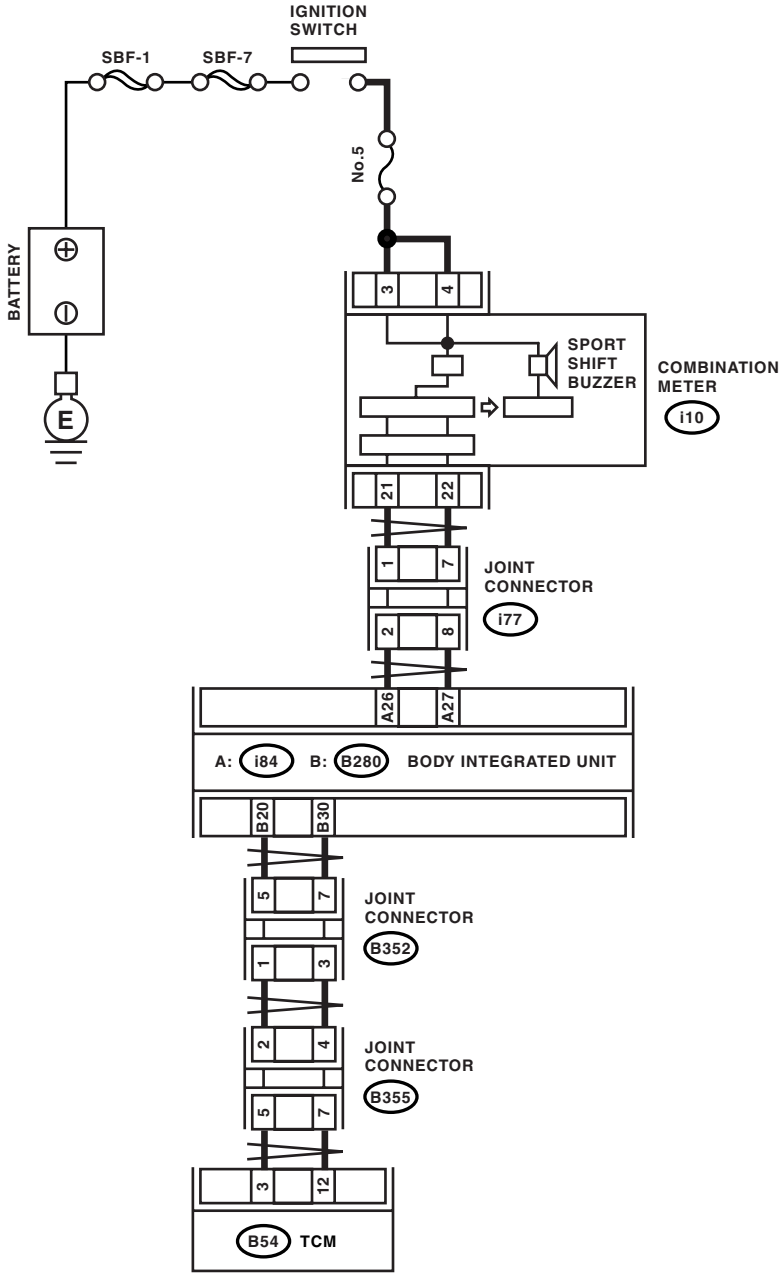
Output signal circuit of buzzer is open or shorted.

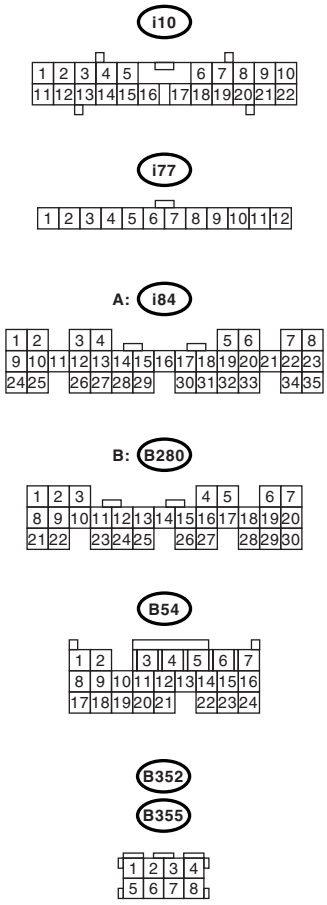
TROUBLE SYMPTOM:

Buzzer remains sounded.

WIRING DIAGRAM:

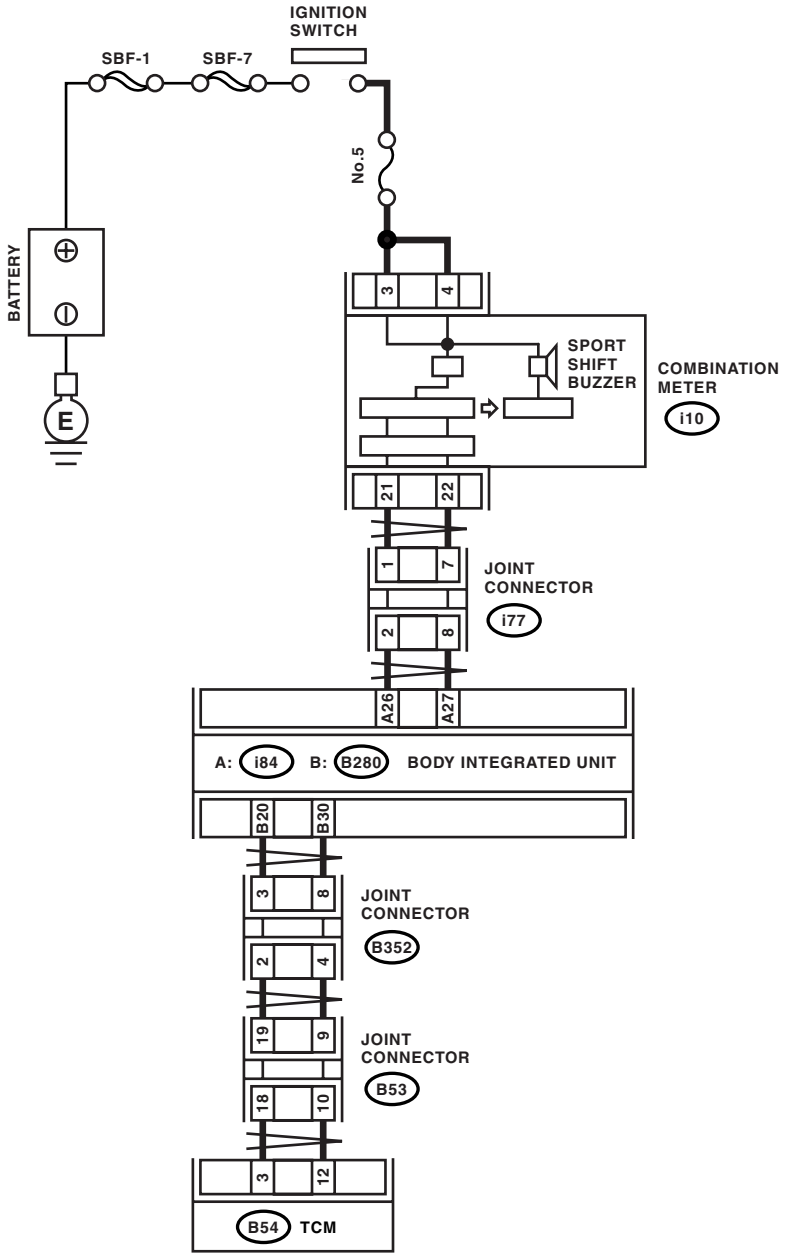
• LHD model

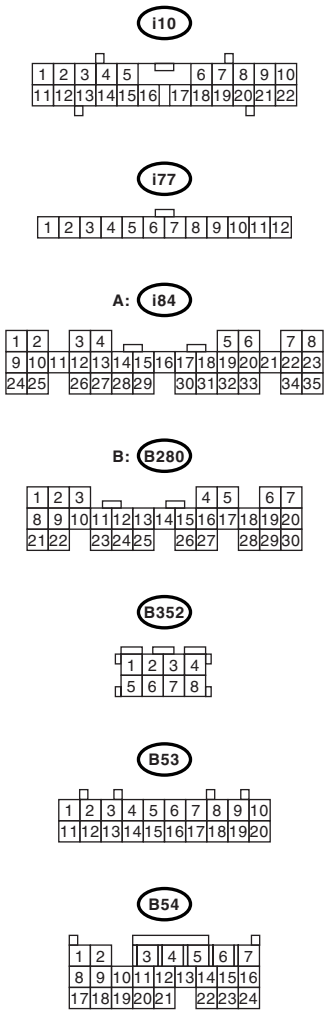




AT-01902

• RHD model





AT-02360

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (Engine OFF) 4) Turn Subaru Select Monitor switch to ON. 5) Read the data of sport shift buzzer using Subaru Select Monitor.	Is the SPORT shift buzzer display “ON”?	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).>	Go to step **2.**
2	**CHECK COMBINATION METER.** <Ref. to IDI-3, INSPECTION, Combination Meter System.>	Is the buzzer OK?	Perform Diagnostics with Phenomenon. <Ref. to 4AT(diag)-138, Diagnostics with Phenomenon.>	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>

15.Diagnostics with Phenomenon

A: INSPECTION

Symptom	Problem parts
Starter does not operate when select lever is in “P” or “N” range. Starter operates when select lever is in “R” or “D” range.	• Inhibitor switch • Select cable • Select lever • Starter motor and harness
Abnormal noise when select lever is in “P” or “N”.	• Strainer • Transfer duty solenoid • Oil pump • Drive plate • ATF level too high or too low
Hissing noise occurs during standing start.	• Strainer • ATF level too high or too low
Noise occurs while driving in “D1”.	• Final gear • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D2”.	
Noise occurs while driving in “D3”.	• Final gear • Low & reverse brake • Reduction gear • Differential gear oil level too high or too low
Noise occurs while driving in “D4”.	• Final gear • Low & reverse brake • Planetary gear • Reduction gear • Differential gear oil level too high or too low
Vehicle moves when select lever is in “N”.	• Select cable • Inhibitor switch • TCM • Low clutch
Shock occurs when select lever is shifted from “N” to “D” range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Low clutch duty solenoid • Low clutch • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is shifted from “N” to “D” range.	• Control valve • Low clutch • Line pressure linear solenoid • Seal ring • Front gasket of transmission case
Shock occurs when select lever is shifted from “N” to “R” range.	• Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • TCM • Harness • Control valve • ATF deterioration
Excessive time lag occurs when select lever is shifted from “N” to “R” range.	• Control valve • Low & reverse clutch • Reverse clutch • Line pressure linear solenoid • Seal ring • Front gasket of transmission case

Symptom	Problem parts
Vehicle does not start in any shift range. (Engine stalls)	• Parking brake mechanism • Planetary gear
Vehicle does not start in any shift range. (Engine operates)	• Strainer • Line pressure linear solenoid • Control valve • Drive pinion • Hypoid gear • Axle shaft • Differential gear • Oil pump • Input shaft • Output shaft • Planetary gear • Drive plate • ATF level too low. • Front gasket of transmission case
Vehicle does not start in “R” range only. (Engine operates)	• Select cable • Select lever • Line pressure linear solenoid • Control valve • Low & reverse clutch • Reverse clutch
Vehicle does not start in “R” range only. (Engine stalls)	• Low clutch • 2-4 brake • Planetary gear • Parking brake mechanism
Vehicle does not start in “D” range. (Engine operates)	• Low clutch • One-way clutch
Vehicle does not start in “D” range. (Engine stalls)	• Reverse clutch
Vehicle does not start in “R” range only. (Engine operates)	• Control valve
Acceleration during standing start is poor. (High rpm stall)	• Control valve • Low clutch • Reverse clutch • ATF level too low. • ATF deterioration • Front gasket of transmission case • Differential gear oil level too high or too low
Acceleration during standing start is poor. (Low rpm stall)	• Oil pump • Torque converter one-way clutch • Engine performance
Acceleration is poor when select lever is in “D” range. (Normal rpm stall)	• TCM • Control valve • High clutch • 2-4 brake • Planetary gear
Acceleration is poor when select lever is in “R” range. (Normal rpm stall)	• Control valve • High clutch • 2-4 brake • Planetary gear
No shift occurs from 1st to 2nd gear.	• TCM • Rear vehicle speed sensor • Front vehicle speed sensor • Throttle position sensor • Control valve • 2-4 brake
No shift occurs from 2nd to 3rd gear.	• TCM • Control valve • High clutch

Symptom	Problem parts
No shift occurs from 3rd to 4th gear.	• TCM • ATF temperature sensor • Control valve • 2-4 brake
Engine brake is not effected when select lever is shifted from 4th gear to 3rd gear.	• Inhibitor switch • TCM • Throttle position sensor • Control valve
Engine brake is not effected when select lever is shifted from 3rd gear to 2nd gear.	• Control valve
Engine brake is not effected when select lever is shifted from 2nd gear to 1st gear.	• Control valve • Low & reverse brake
Shift characteristics are erroneous.	• Inhibitor switch • TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Throttle position sensor • Control valve • Ground
No lock-up occurs.	• TCM • Throttle position sensor • ATF temperature sensor • Control valve • Lock-up facing • Engine speed signal
Parking brake is not effected.	• Select cable • Select lever • Parking mechanism
Shift lever cannot be moved or is hard to move from “P” range.	
ATF spurts out.	• ATF level too high.
Differential oil spurts out.	• Differential gear oil level too high.
Differential oil level changes excessively.	• Seal pipe • Double oil seal
Odor is produced from ATF supply pipe.	• High clutch • 2-4 brake • Low & reverse clutch • Reverse clutch • Lock-up facing • ATF deterioration
Shock occurs from 1st to 2nd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake • ATF deterioration • Engine performance • Low & reverse duty solenoid
Slippage occurs from 1st to 2nd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake

Symptom	Problem parts
Shock occurs from 2nd to 3rd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Low & reverse duty solenoid • Control valve • High clutch • 2-4 brake • ATF deterioration • Engine performance • High clutch duty solenoid
Slippage occurs from 2nd to 3rd gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • High clutch • 2-4 brake • Low & reverse duty solenoid
Shock occurs from 3rd to 4th gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low clutch duty solenoid • 2-4 brake • ATF deterioration • Engine performance
Slippage occurs from 3rd to 4th gear.	• TCM • Accelerator pedal position sensor • 2-4 brake duty solenoid • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake
Shock occurs when select lever is shifted from 3rd gear to 2nd gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • 2-4 brake duty solenoid • 2-4 brake • ATF deterioration • High clutch duty solenoid
Shock occurs when select lever is shifted from 2nd gear to 1st gear.	• TCM • Torque converter turbine speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Low & reverse clutch • ATF deterioration • 2-4 brake duty solenoid • Low & reverse brake duty solenoid

Symptom	Problem parts
Shock occurs when accelerator pedal is released at medium speeds.	• TCM • Accelerator pedal position sensor • ATF temperature sensor • Line pressure linear solenoid • Control valve • Lock-up damper • Engine performance
Vibration occurs during straight-forward operation.	• TCM • Lock-up duty solenoid • Lock-up facing • Lock-up damper
Vibration occurs during turns. (tight corner braking phenomenon)	• TCM • Front vehicle speed sensor • Rear vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Transfer clutch • Transfer valve • Transfer duty solenoid • ATF deterioration • Harness
Front wheel slippage occurs during standing starts.	• TCM • Front vehicle speed sensor • Accelerator pedal position sensor • ATF temperature sensor • Control valve • Transfer clutch • Transfer valve • Transfer pipe • Transfer duty solenoid
Vehicle is not set in FWD mode.	• TCM • Transfer clutch • Transfer valve • Transfer duty solenoid
Select lever is hard to move.	• Select cable • Select lever • Detent spring • Manual plate
Select lever is excessively hard to move. (Unreasonable resistance)	• Detent spring • Manual plate
Select lever slips out of operation during acceleration or while driving on rough terrain.	• Select cable • Select lever • Detent spring • Manual plate
Manual mode is not engaged.	• SPORT shift switch • TCM • Body integrated unit
Gear does not change though the select lever is operated in manual mode.	• Up shift switch • Down shift switch • TCM • Body integrated unit

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION

5AT

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1. General Description

A: SPECIFICATION

1. TORQUE CONVERTER CLUTCH

Model	Turbo	Non-turbo
Type	Symmetric, 3 element, single stage, 2 phase torque converter	
Stall torque ratio	2.1	
Nominal diameter	250 mm (9.84 in)	
Stall speed (at sea level)	3,100 — 3,500 rpm	2,400 — 2,800 rpm
One-way clutch	Sprague type one-way clutch	

2. OIL PUMP

Type	Internal gear fixed displacement pump	
Driving method	Driven by engine	
Number of teeth	Inner rotor	9
	Outer rotor	10

3. TRANSMISSION CONTROL ELEMENT

Type	5-forward, 1-reverse, double-row planetary gears
Multi-plate clutch	3 sets
Multi-plate brake	4 sets
One-way clutch (sprague type)	3 sets

4. TRANSMISSION GEAR RATIO

1st	3.540
2nd	2.264
3rd	1.471
4th	1.000
5th	0.834
Rev	2.370

5. PLANETARY GEAR AND PLATE

Model	Turbo	Non-turbo
Tooth number of front internal gear	106	
Tooth number of front carrier	28	
Tooth number of front sun gear	50	
Tooth number of mid internal gear	78	
Tooth number of mid carrier	18	
Tooth number of mid sun gear	42	
Tooth number of rear internal gear	110	
Tooth number of rear carrier	24	
Tooth number of rear sun gear	62	
Drive plate number of front brake	2	
Drive plate number of input clutch	6	5
Drive plate number of high & low reverse clutch	4	4
Drive plate number of direct clutch	5	
Drive plate number of reverse brake	5	6
Drive plate number of forward brake	5	4
Drive plate number of low coast brake	3	

6. SELECTOR POSITION

P (Park)	Transmission in neutral, output member immovable, and engine start possible
R (Reverse)	Transmission in reverse for backing
N (Neutral)	Transmission in neutral and engine start possible
D (Drive)	Automatic gear change 1st $\leftarrow_{\rightarrow}$ 2nd $\leftarrow_{\rightarrow}$ 3rd $\leftarrow_{\rightarrow}$ 4th $\leftarrow_{\rightarrow}$ 5th
Manual mode (+)	Manual gear change 1st → 2nd → 3rd → 4th → 5th
Manual mode (–)	Manual gear change 1st ← 2nd ← 3rd ← 4th ← 5th
Control method	Wire cable type

7. HYDRAULIC CONTROL & LUBRICATION

Type	Electronic/hydraulic control [5 forward speed changes by electrical signals of vehicle speed and accelerator (throttle) opening]
Fluid	Specified fluid: SUBARU ATF (Part No. K0140Y0700) Recommended fluid: IDEMITSU ATF HP Castrol Transmax J NOTE: Using of recommended fluid is permitted only on the area where the specified is not available.
Fluid capacity ℓ (US qt, Imp qt)	9.6 — 10.0 (10.1 — 10.6, 8.4 — 8.8)
Lubrication system	Forced feed lubrication with oil pump

8. COOLING & HARNESS

Cooling system	Liquid-cooled cooler incorporated in radiator or ATF liquid-cooled cooler
Transmission harness	20+ 8 poles

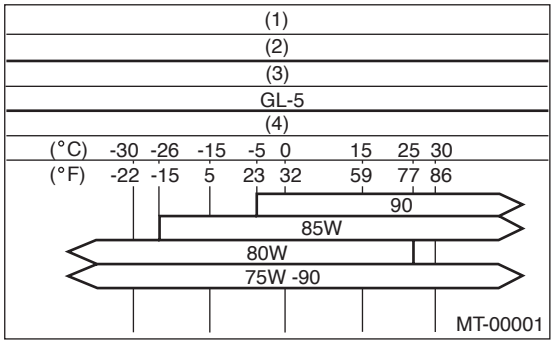
9. TRANSFER

Model	Turbo	Non-turbo
Transfer type	Variable torque distribution (VTD)	
Drive & driven plate number of transfer clutch	4	3
Reduction gear ratio	1.000 (41/41)	

10.FINAL REDUCTION

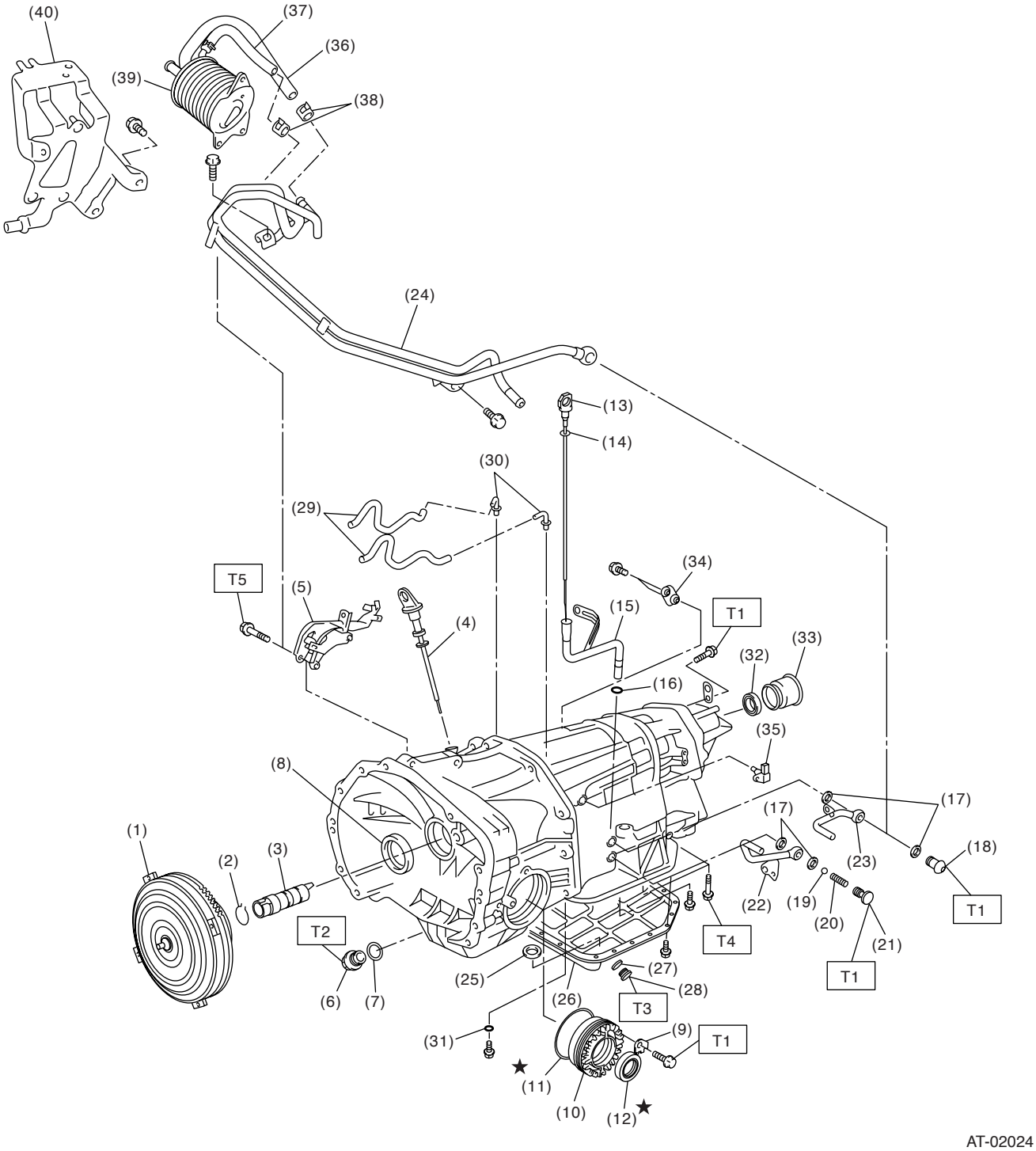
Model	Turbo	NA (OUTBACK)	NA (except for OUTBACK)
Front final reduction gear ratio	3.272		3.083

11.RECOMMENDED GEAR OIL

Lubrication oil	 (1) Item (2) Front differential gear oil (3) API classification (4) SAE viscosity No. and applicable temperature
Front differential gear oil capacity ℓ (US qt, Imp qt)	1.3 — 1.5 (1.4 — 1.6, 1.1 — 1.3)

B: COMPONENT

1. TORQUE CONVERTER CLUTCH & TRANSMISSION ASSEMBLY

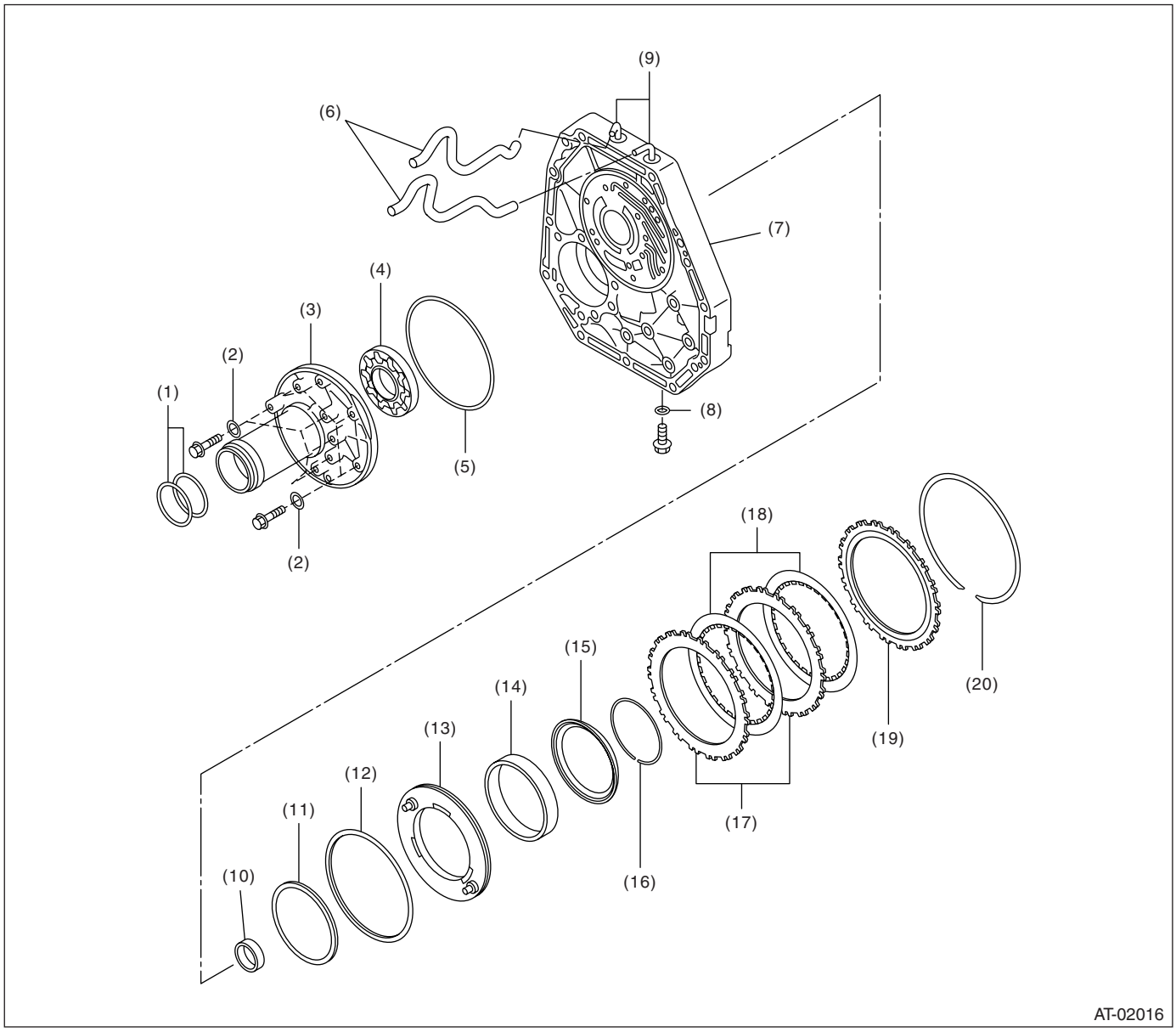


AT-02024

(1) Torque converter ASSY
(2) Circlip
(3) Oil pump shaft
(4) Differential oil level gauge
(5) Pitching stopper bracket
(6) Differential oil drain plug
(7) Gasket
(8) Oil seal
(9) Lock plate
(10) Side retainer
(11) O-ring
(12) Oil seal
(13) ATF level gauge
(14) O-ring
(15) Oil charge pipe
(16) O-ring
(17) Gasket
(18) Union screw
(19) Ball
(20) Spring
(21) Union screw
(22) ATF outlet pipe
(23) ATF inlet pipe (model without ATF warmer)
(24) ATF inlet pipe (model with ATF warmer)
(25) Magnet
(26) Oil pan
(27) Gasket
(28) ATF drain plug
(29) Breather hose
(30) Nipple
(31) O-ring
(32) Oil seal
(33) Dust cover
(34) Floating bracket
(35) Turbine speed sensor 1
(36) ATF cooler inlet hose
(37) ATF cooler outlet hose
(38) Hose clamp (model with ATF warmer)
(39) ATF cooler ASSY (model with ATF warmer)
(40) ATF cooler bracket (model with ATF warmer)

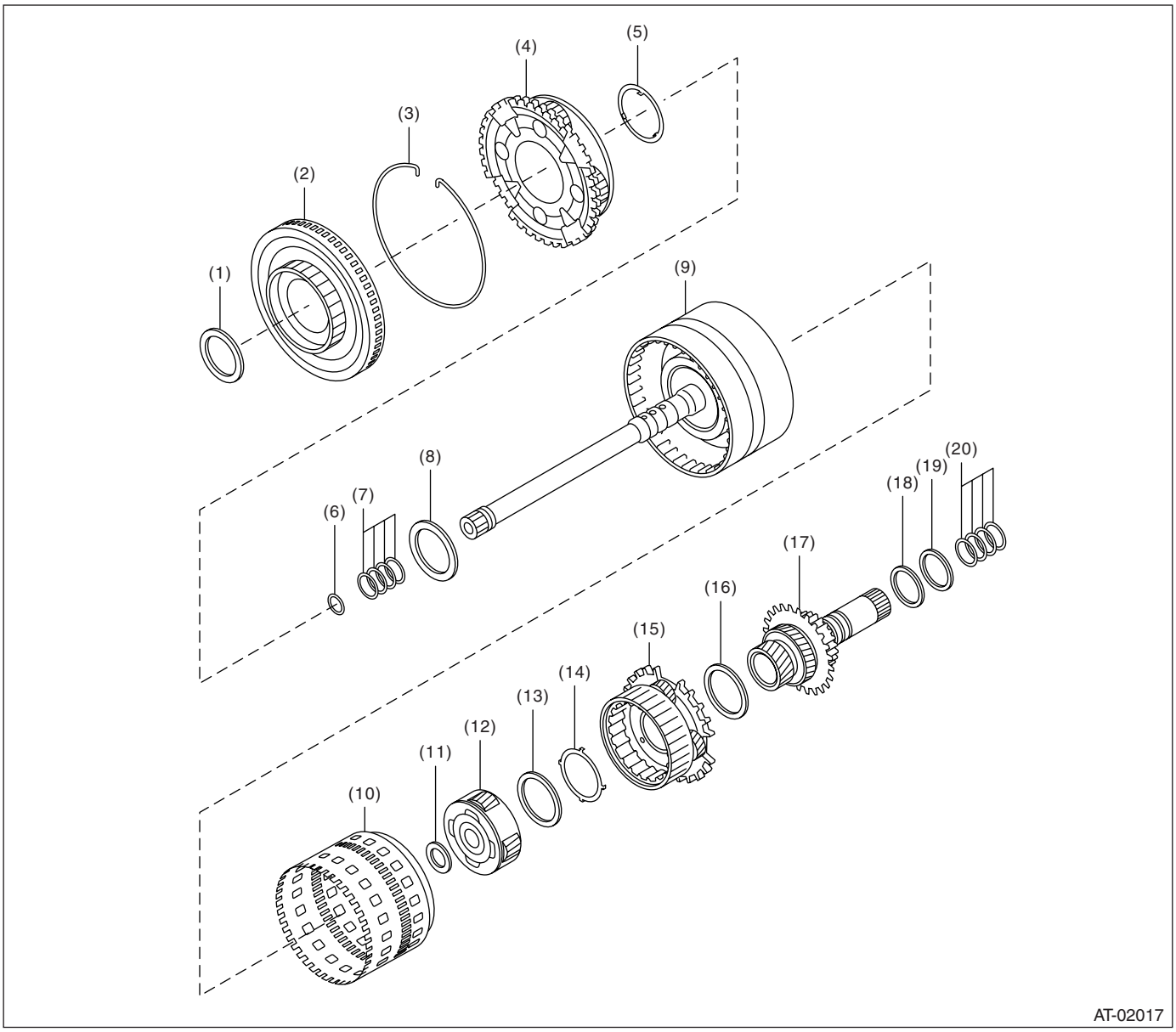
Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 70 (7.1, 51.6)
T3: 20 (2.0, 14.8)
T4: 5 (0.5, 3.7)
T5: 40 (4.1, 29.5)

2. OIL PUMP & FRONT BRAKE



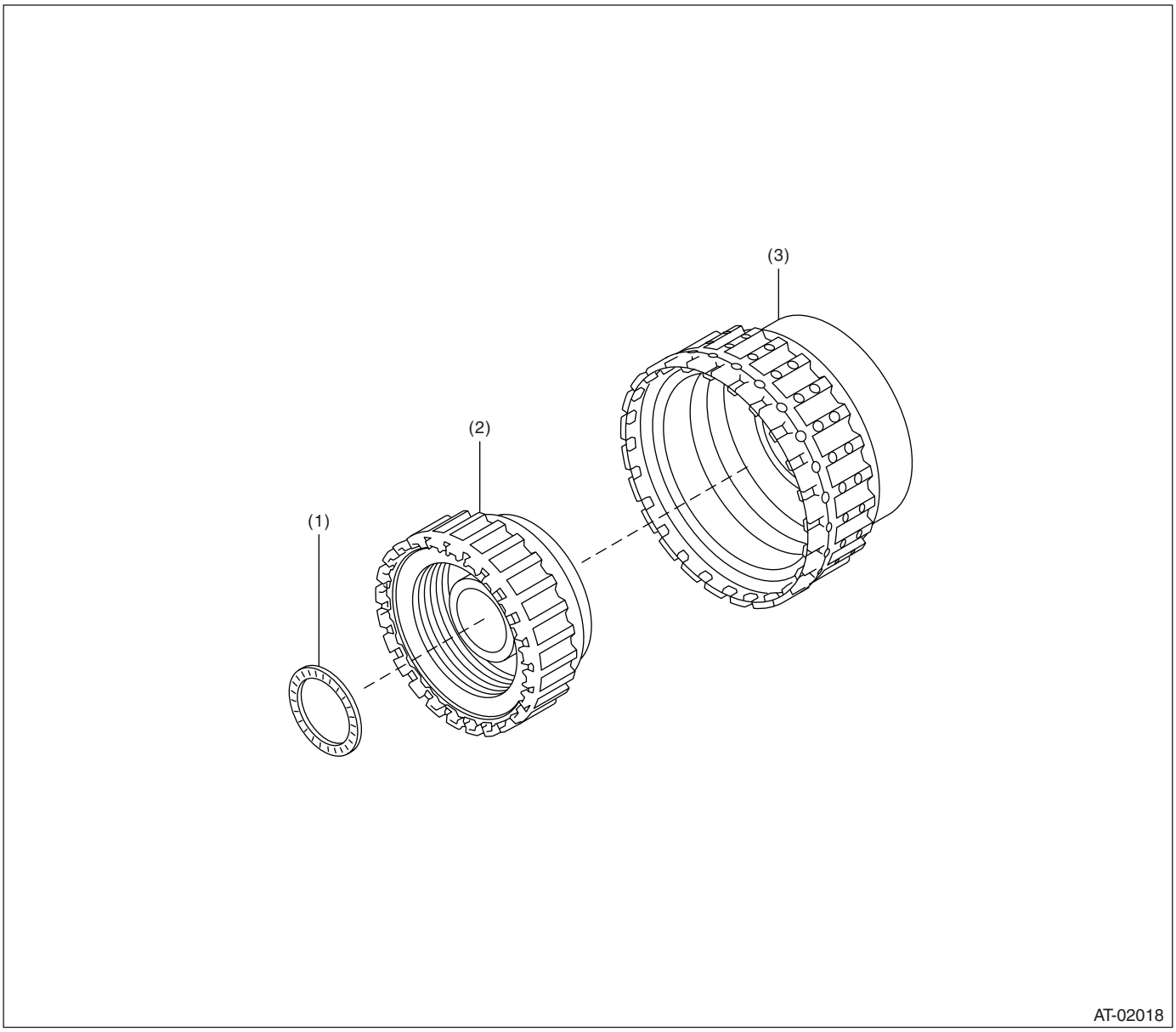
(1) O-ring
(2) Washer
(3) Oil pump housing
(4) Oil pump rotor
(5) O-ring
(6) Air breather hose
(7) Oil pump cover
(8) O-ring
(9) Nipple
(10) Needle bearing
(11) D-ring (Inner)
(12) D-ring (Outer)
(13) Front brake piston
(14) Return spring
(15) Retainer
(16) Snap ring
(17) Driven plate
(18) Drive plate
(19) Retaining plate
(20) Snap ring

3. FRONT PLANETARY CARRIER and MIDDLE & REAR PLANETARY CARRIER



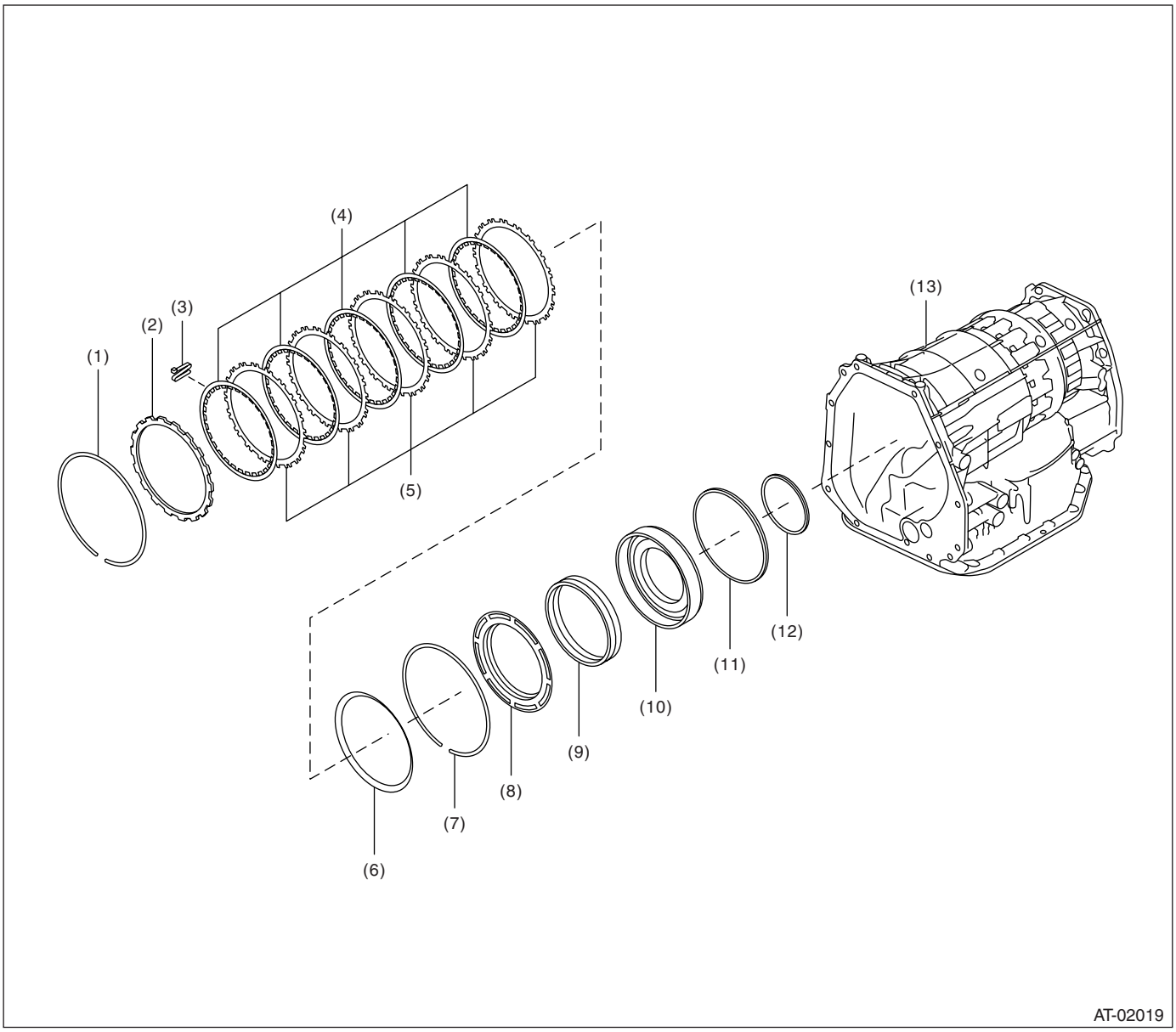
(1) Thrust bearing
(2) Front sun gear ASSY
(3) Snap ring
(4) Front carrier ASSY
(5) Race bearing
(6) O-ring
(7) Seal ring
(8) Thrust bearing
(9) Input clutch ASSY
(10) Rear internal gear ASSY
(11) Thrust bearing
(12) Middle carrier ASSY
(13) Thrust bearing
(14) Race bearing
(15) Rear carrier ASSY
(16) Thrust bearing
(17) Middle & Rear sun gear ASSY
(18) Washer
(19) Thrust bearing
(20) Seal ring

4. DIRECT CLUTCH and HIGH & LOW REVERSE CLUTCH



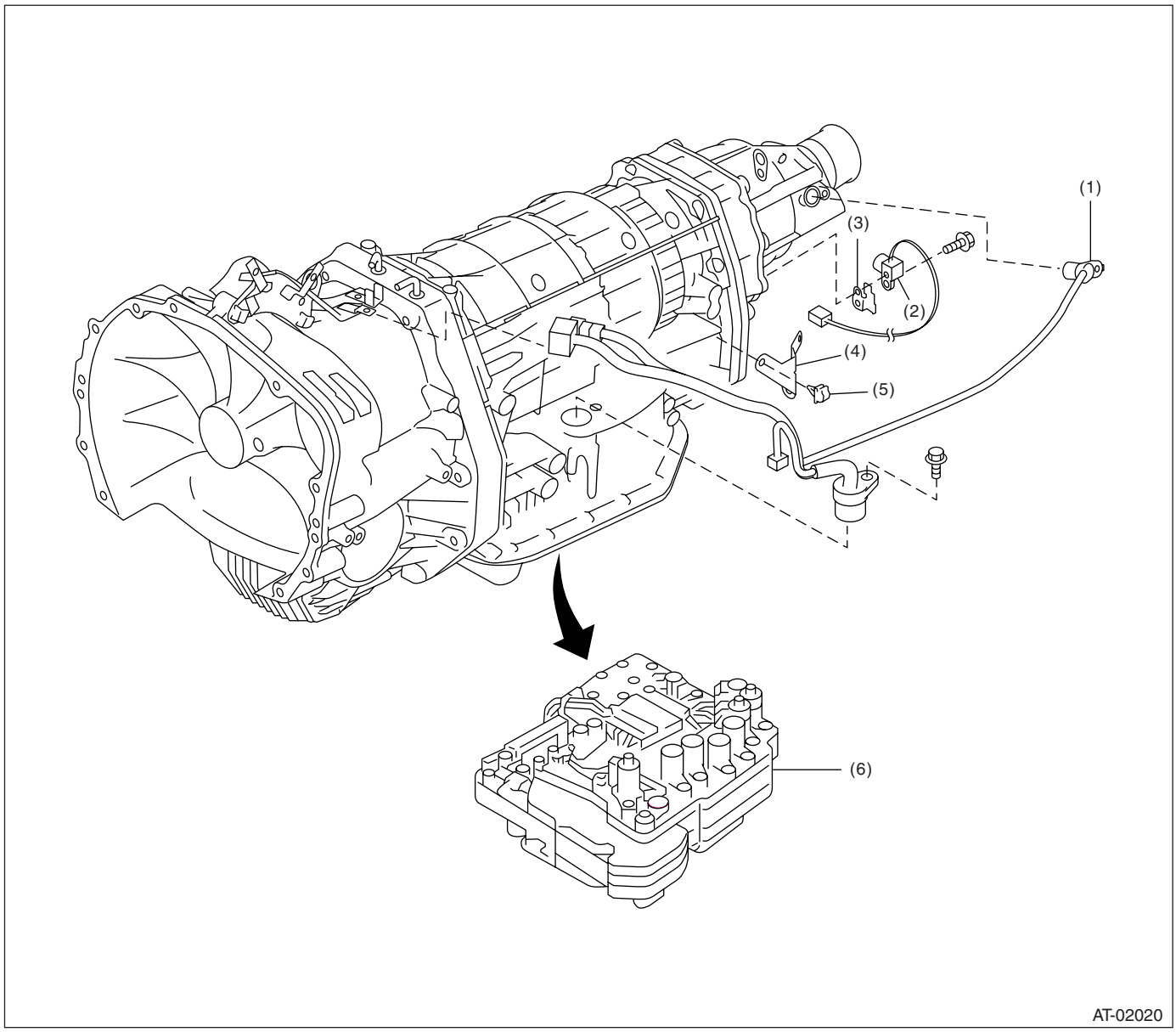
(1) Thrust bearing (2) High & low reverse clutch ASSY (3) Direct clutch ASSY

5. REVERSE BRAKE



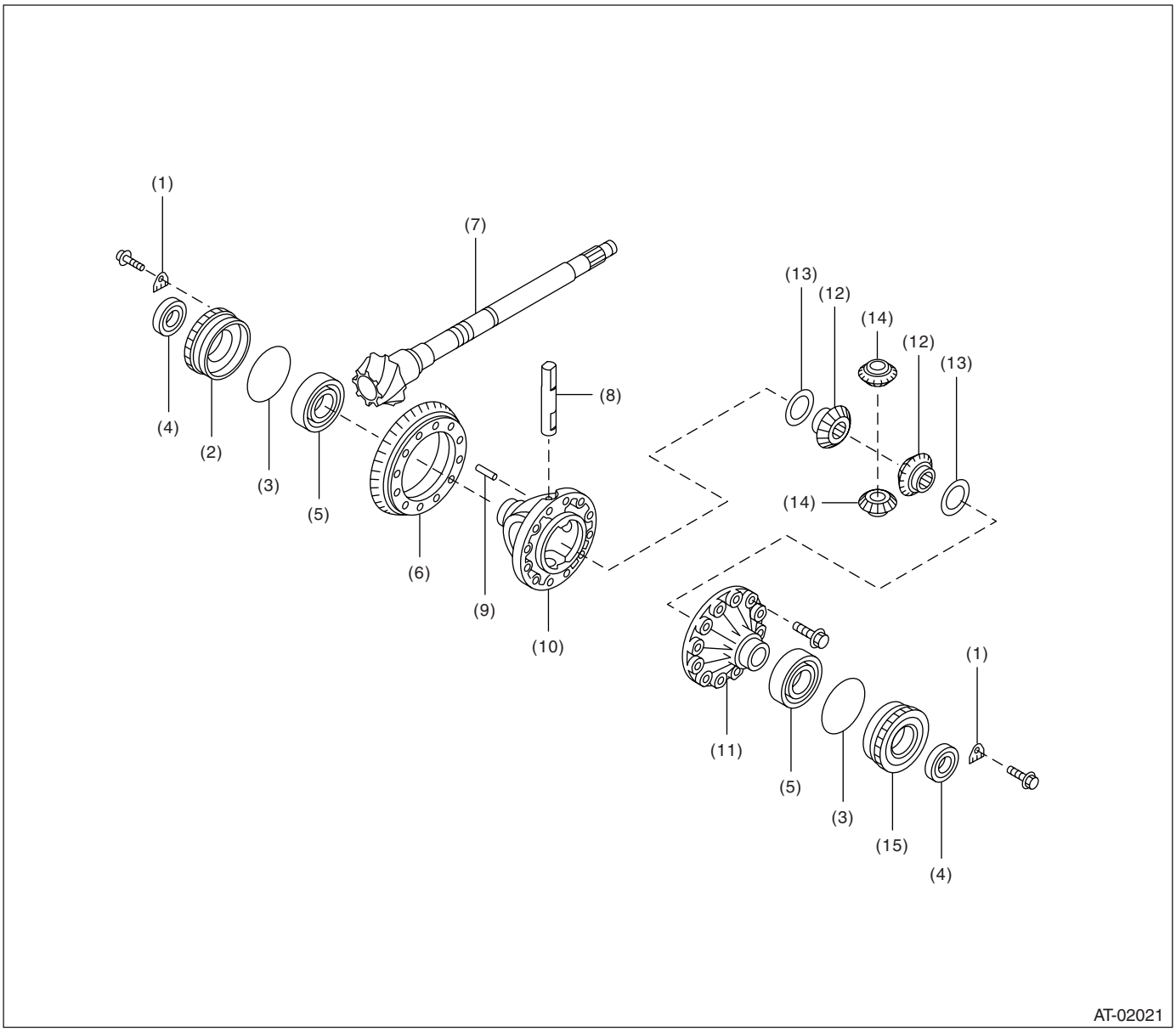
(1) Snap ring
(2) Retainer plate
(3) Leaf spring
(4) Drive plate
(5) Driven plate
(6) Dish plate
(7) Snap ring
(8) Retainer
(9) Leaf spring
(10) Reverse brake piston
(11) D-ring (Outer)
(12) D-ring (Inner)
(13) AT main case

6. CONTROL VALVE & TRANSMISSION HARNESS



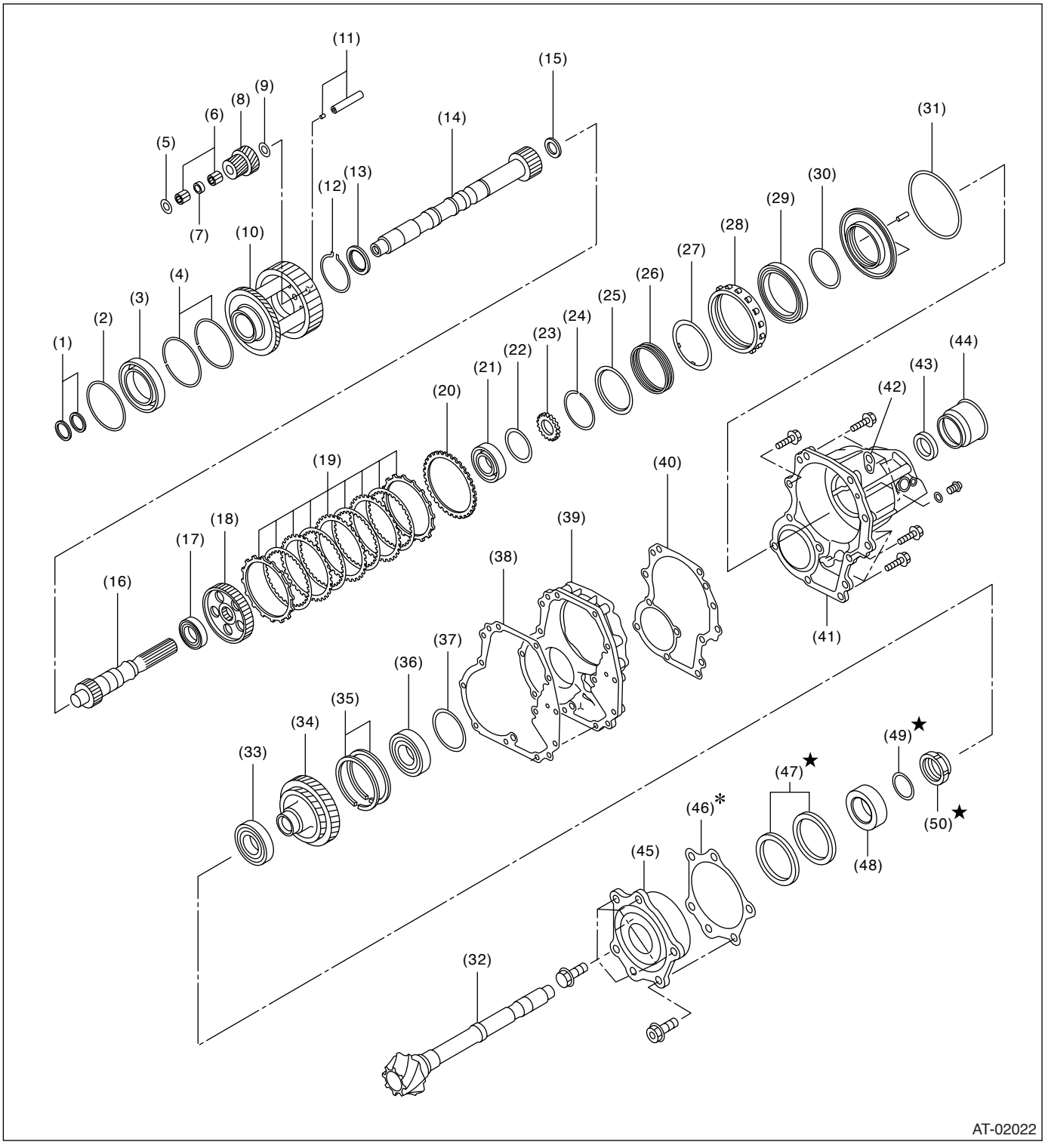
(1) Transmission harness ASSY
(2) Front vehicle speed sensor
(3) Sensor cover
(4) Harness bracket
(5) Clip
(6) Control valve ASSY

7. DIFFERENTIAL GEAR



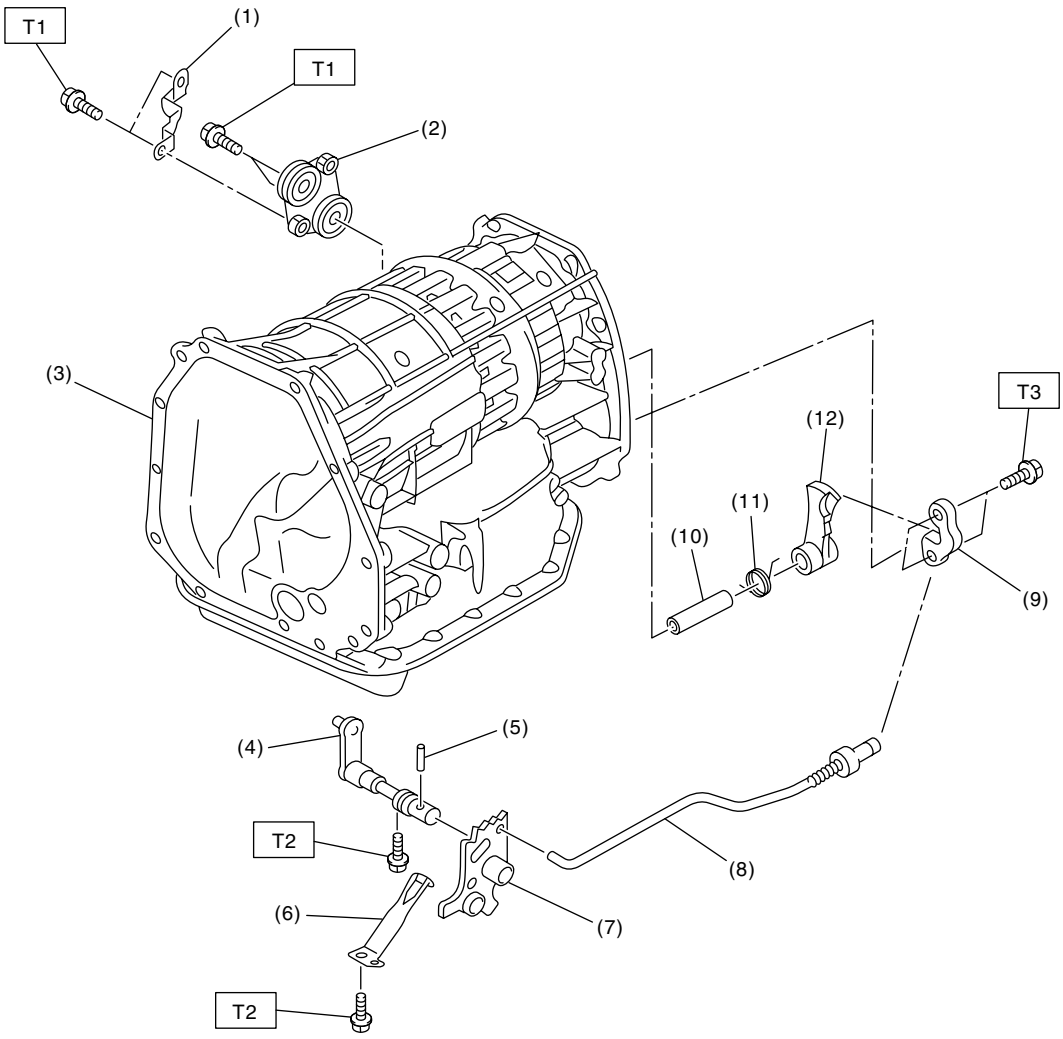
(1) Retainer plate RH
(2) Differential side retainer RH
(3) O-ring
(4) Oil seal
(5) Taper roller bearing
(6) Hypoid driven gear
(7) Drive pinion shaft
(8) Pinion shaft
(9) Straight pin
(10) Differential case RH
(11) Differential case LH
(12) Differential bevel gear
(13) Washer
(14) Differential bevel pinion
(15) Differential side retainer LH

8. TRANSFER CASE, EXTENSION CASE & REDUCTION GEAR



(1) Seal ring
(2) Reduction gear shim
(3) Ball bearing
(4) Snap ring
(5) Planetary pinion washer
(6) Needle bearing
(7) Spacer
(8) Pinion gear
(9) Washer
(10) Planetary carrier ASSY
(11) Planetary pinion shaft ASSY
(12) Snap ring
(13) Thrust bearing
(14) Intermediate shaft
(15) Thrust washer
(16) Rear drive shaft
(17) Ball bearing
(18) Transfer clutch hub
(19) Transfer clutch plate
(20) Driven plate No. 3.
(21) Ball bearing
(22) Rear drive shaft shim
(23) Revolution gear
(24) Snap ring
(25) Clutch spring retainer
(26) Return spring
(27) Spring retainer
(28) Pressure plate
(29) Ball bearing
(30) O-ring
(31) C-ring
(32) Drive pinion shaft
(33) Ball bearing
(34) Reduction driven gear
(35) Snap ring
(36) Ball bearing
(37) Shim
(38) Gasket
(39) Intermediate case
(40) Shim
(41) Extension case
(42) Transmission hanger
(43) Oil seal
(44) Dust cover
(45) Taper roller bearing
(46) Drive pinion shim
(47) Oil seal
(48) Drive pinion collar
(49) O-ring
(50) Lock nut

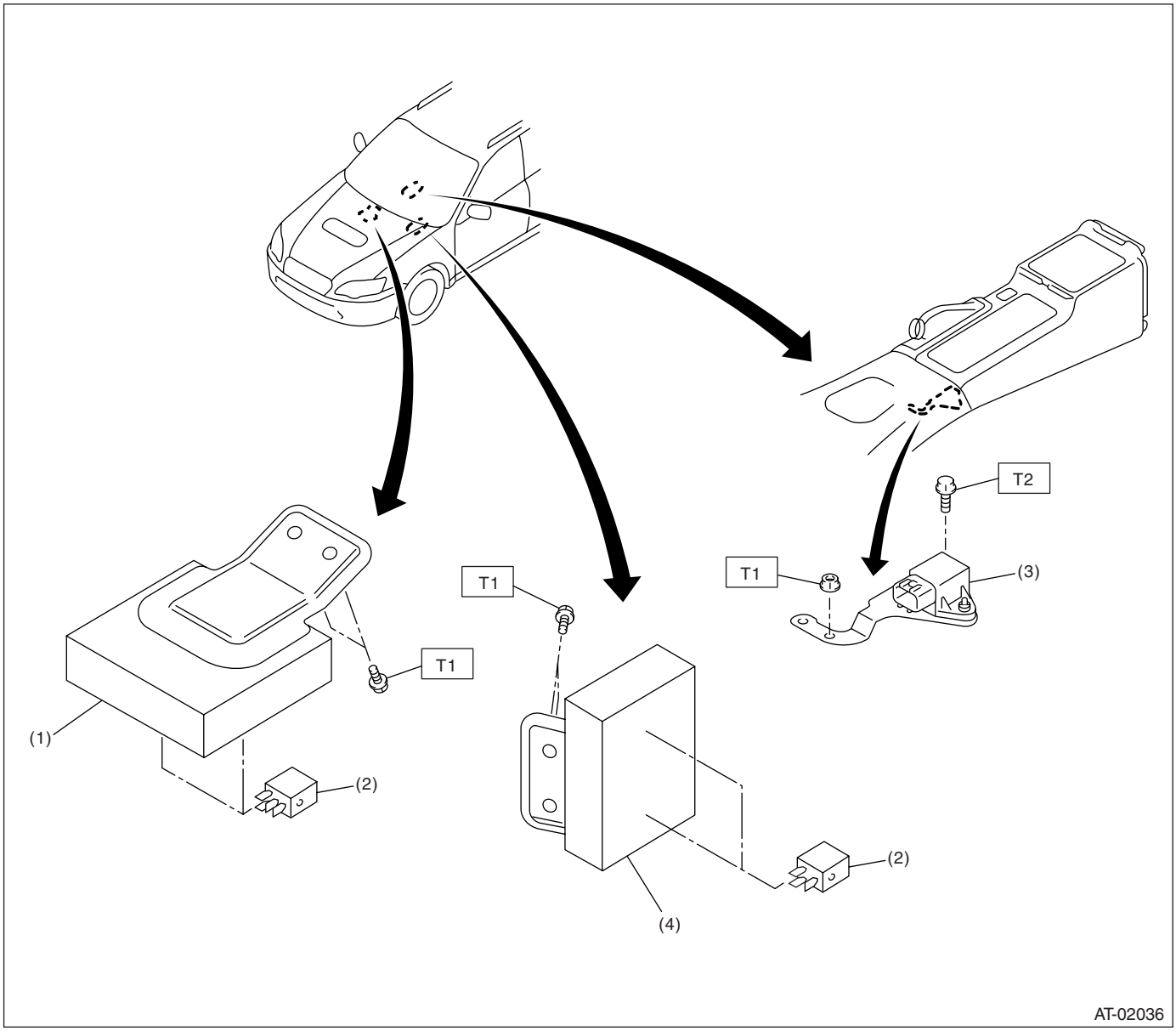
9. TRANSMISSION CONTROL DEVICE & PARKING SUPPORT



(1) Bracket
(2) Floating bracket
(3) AT main case
(4) Range select lever
(5) Straight pin
(6) Dimension spring
(7) Manual plate
(8) Parking rod
(9) Parking support actuator
(10) Parking pawl shaft
(11) Return spring
(12) Parking pawl

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.4)
T2: 6 (0.6, 4.4)
T3: <Ref. to 5AT-82, Parking Pawl.>

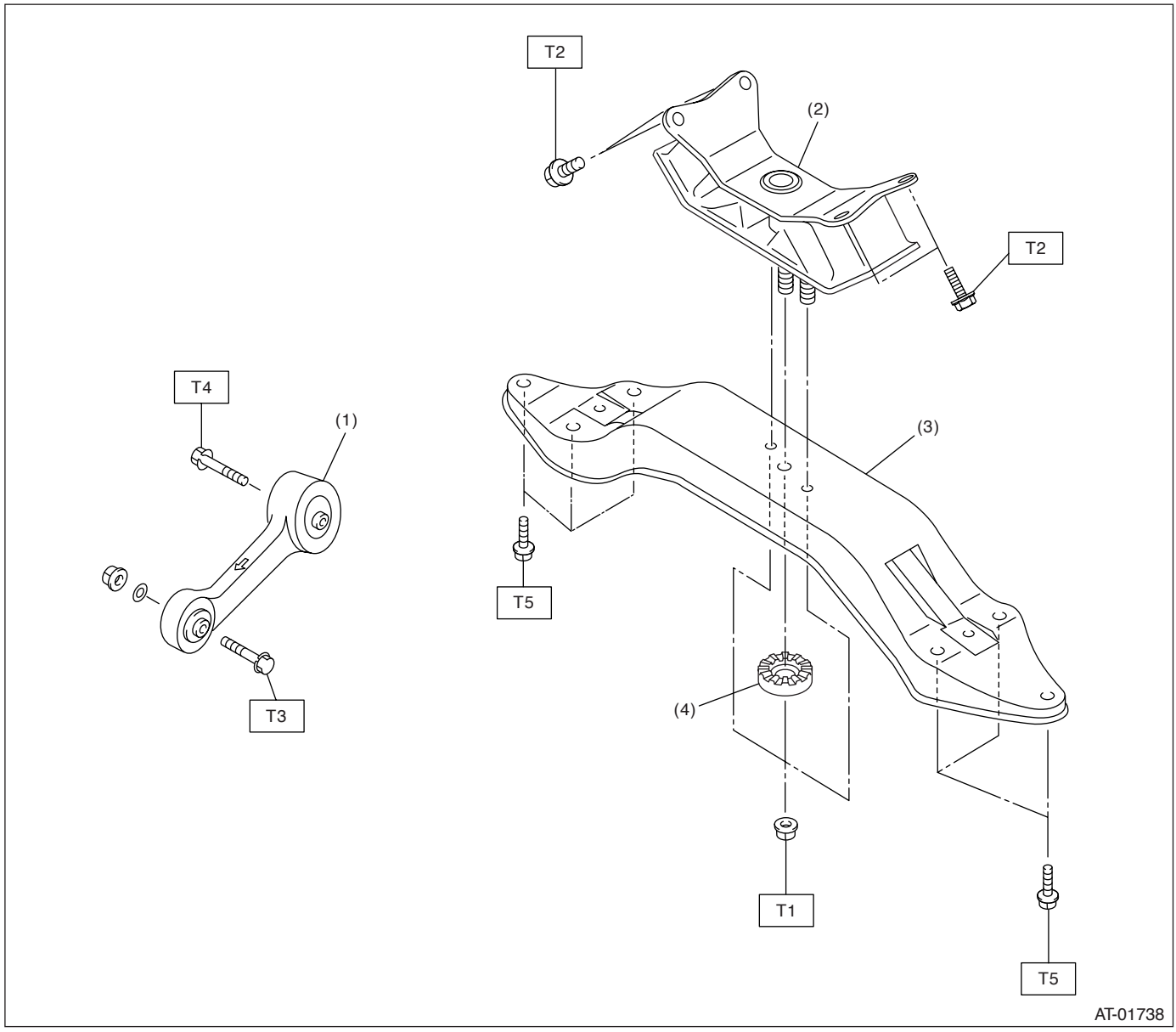
10.TRANSMISSION CONTROL MODULE



(1) Transmission control module (TCM) (RHD model)
(2) Relay
(3) Lateral G sensor
(4) Transmission control module (TCM) (LHD model)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 24.5 (2.5, 18.1)

11.TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Rear cushion rubber
(3) Crossmember
(4) Stopper

Tightening torque: N·m (kgf-m, ft-lb)
T1: 35 (3.6, 26)
T2: 40 (4.1, 29.5)
T3: 50 (5.1, 36.9)
T4: 58 (5.9, 42.8)
T5: 70 (7.1, 51.6)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Until the oil pan is removed, do not place with the oil pan side facing up to prevent foreign matter from entering the valve body.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, disassembly and replacement.
• When disassembling the case and other light alloy parts, disassemble them by slightly tapping with a plastic hammer. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix them with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil onto sliding or revolution surfaces before installation.
• Replace deformed or otherwise damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of ATF fluid to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vice.
• Avoid damaging the mating surface of the case.
• Before applying liquid gasket, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

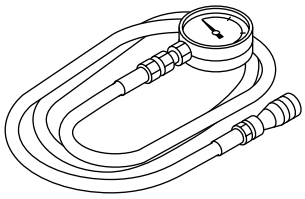
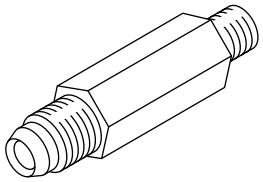
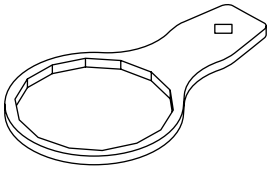
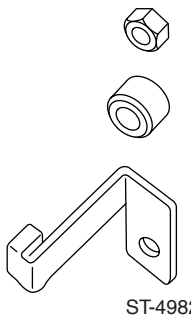
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498575400	498575400	OIL PRESSURE GAUGE ASSY	Used for measuring oil pressure.
 ST-498897200	498897200	ADAPTER	• Used with oil pump cover installed on when measuring line pressure. • Used with extension case installed on when measuring transfer clutch pressure.
 ST-498545400	498545400	FILTER WRENCH	Used for removing and installing ATF filter.
 ST-498277200	498277200	STOPPER SET	Used for removing and installing automatic transmission assembly to engine.

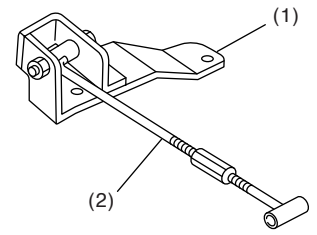
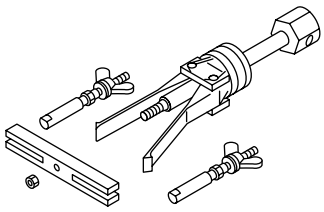
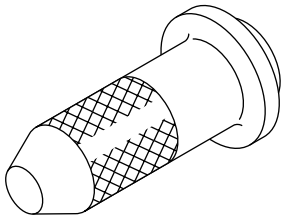
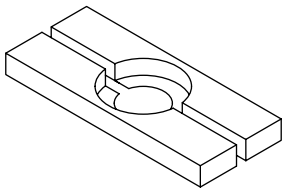
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST41099AC000	41099AC000	ENGINE SUPPORT ASSEMBLY	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AC010) (2) ENGINE SUPPORT ROD (41099AC020)
 ST-398527700	398527700	PULLER ASSY	• Used for removing extension case roller bearing. • Used for removing extension oil seal. • Used for removing front differential side retainer bearing outer race. • Used for removing front differential side retainer oil seal.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498077000	498077000	REMOVER	Used for removing differential taper roller bearing.

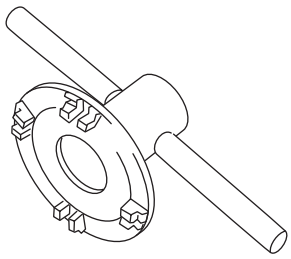
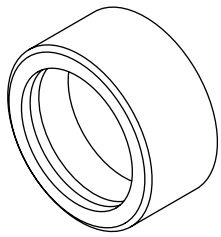
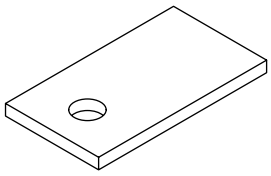
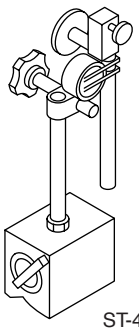
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18630AA010	18630AA010 (Newly adopted tool)	WRENCH COMPL RETAINER	Used for removing and installing differential side retainer.
 ST-398487700	398487700	DRIFT	Used for installing front differential taper roller bearing.
 ST-498255400	498255400	PLATE	Used for measuring backlash of hypoid gear.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring gear backlash. • Used with DIAL GAUGE (498247100).

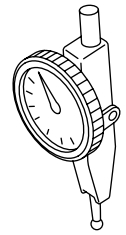
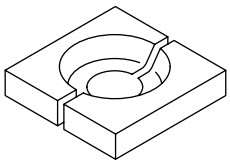
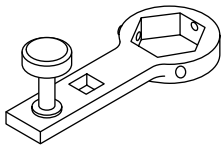
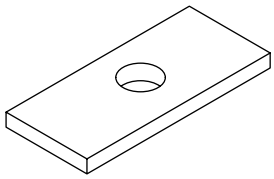
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring gear backlash. • Used with MAGNET BASE (498247001).
 ST-498517000	498517000	REPLACER	Used for removing front roller bearing.
 ST-499787700	499787700	WRENCH	Used for removing and installing drive pinion lock nut.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

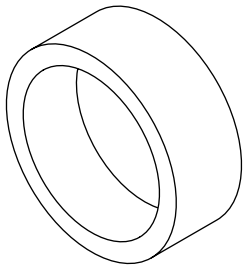
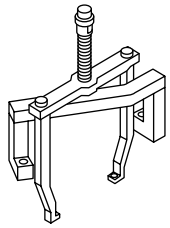
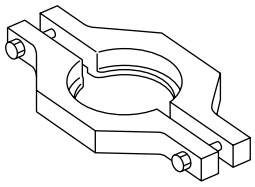
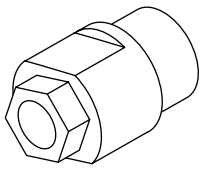
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398744300	398744300	GAUGE	Used for measuring contact surface between multi-plate clutch end and transmission.
 ST-499737100	499737100	PULLER SET	Used for removing reduction drive gear assembly.
 ST-498077600	498077600	REMOVER	Used for removing ball bearing.
 ST18667AA010	18667AA010 (Newly adopted tool)	HOLDER	• Used for removing and installing drive pinion lock nut. • Used as a handle to rotate gear when checking tooth contact.

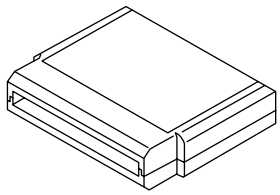
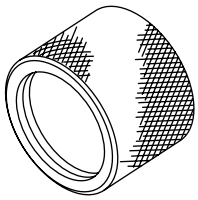
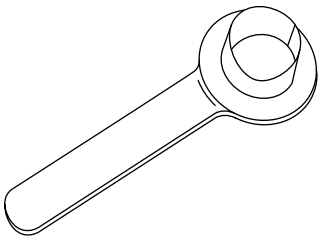
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	Used for protecting oil seal when installing front drive shaft.

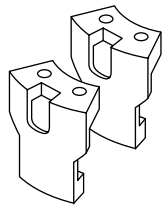
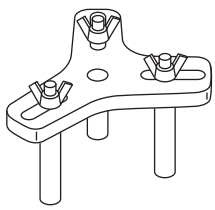
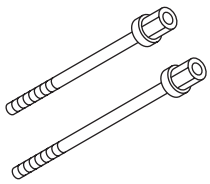
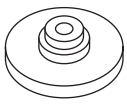
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18680AA000	18680AA000 (Newly adopted tool)	HOLDER GEAR	Used for removing reduction driven gear assembly. (2-piece)
 ST18762AA000	18762AA000 (Newly adopted tool)	COMPRESSOR SPECIAL TOOL	Used for disassembling multiplate clutch for shift transmission.
 ST18673AA000	18673AA000 (Newly adopted tool)	COMPRESSOR SHAFT	Used for disassembling multiplate clutch for shift transmission.
 ST18765AA000	18765AA000 (Newly adopted tool)	COMPRESSOR SUPPORT	Used for disassembling multiplate clutch for shift transmission.

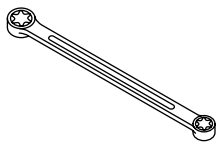
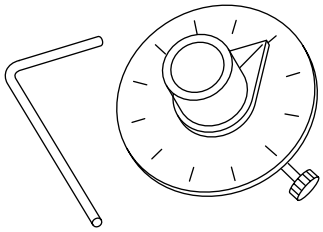
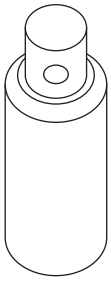
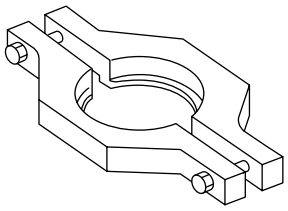
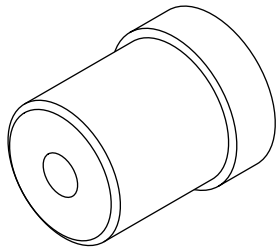
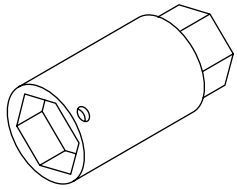
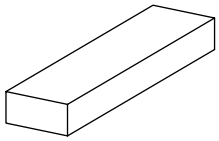
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18676AA020	18676AA020 (Newly adopted tool)	TORX® WRENCH	Used for disassembling torque converter case.
 ST18854AA000	18854AA000 (Newly adopted tool)	ANGLE GAUGE	Used for tightening parking support.
 ST18679AA000	18679AA000 (Newly adopted tool)	ADJUSTER	Used for adjusting position when tightening parking support.
 ST-498077310	498077310	REMOVER	Used for removing ball bearing of reduction driven gear.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499587100	499587100	OIL SEAL INSTALLER	Used for installing oil seal.
 ST-499787500	499787500	ADAPTER	Used for removing and installing drive pinion lock nut.
 ST-499575400	499575400	GAUGE	Used for measuring height of total end play.

2. GENERAL TOOL

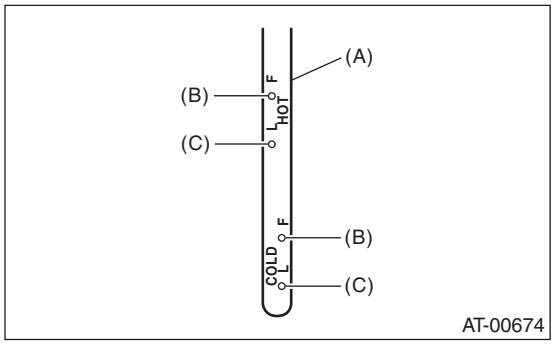
TOOL NAME	REMARKS
Depth gauge	Used for measuring transmission end play.
Thickness gauge	Used for measuring clearance of clutch, brake and oil pump.
Micro meter	Used for measuring thickness of drive pinion.
Spring balance	Used for measuring starting torque of drive pinion.
Circuit tester	Used for measuring resistance and voltage.
TORX® T70	Used for removing and installing differential gear oil drain plug.
Snap ring pliers	Used for removing and installing each snap ring.

2. Automatic Transmission Fluid

A: INSPECTION

NOTE:
The level of ATF varies with fluid temperature. Pay attention to the ATF temperature when checking ATF level.

1) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 to 80°C (158 to 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
2) Park the vehicle on a level surface.
3) After selecting all positions (P, R, N, D), set the select lever in "P" range. Measure the ATF level with engine idling for one or two minutes.



(A) ATF level gauge
(B) Upper level
(C) Lower level

4) Make sure that ATF level is above the center between upper and lower marks at HOT side.
5) If the ATF level is below the center between upper and lower marks, add the recommended ATF until the fluid level is found above the center between upper and lower marks.

CAUTION:
- **Use care not to exceed the upper level.**
- **When the transmission is cold, be careful not to add ATF to the upper level on HOT side. Overfilling of ATF may cause oil splashing.**

6) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 to 80°C (158 to 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Check the ATF for leaks.
Visually check for leaks in the transmission. If there are leaks, replace the gasket, oil seals, plugs or other parts.

B: REPLACEMENT

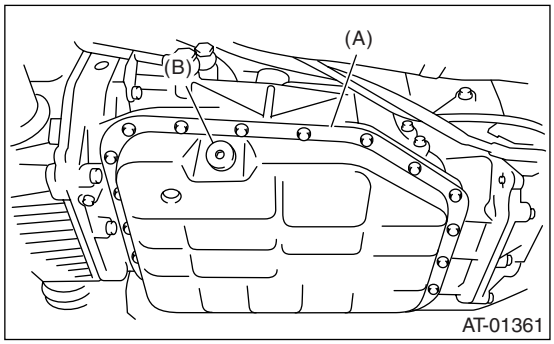
1) Lift-up the vehicle.
2) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

3) Check the condition of ATF.
<Ref. to 5AT-28, CONDITION CHECK, Automatic Transmission Fluid.>
4) Tighten the ATF drain plug.

NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)



(A) Oil pan
(B) ATF drain plug

5) Lower the vehicle.
6) Pour ATF from the oil charge pipe.

Specified fluid:
SUBARU ATF (Part No. K0140Y0700)

Recommended fluid:
IDEMITSU ATF HP
Castrol Transmax J

NOTE:
Using of recommended fluid is permitted only on the area where the specified is not available.

Capacity:
Fill the same amount of ATF drained.

Capacity when transmission is overhauled:
9.6 — 10.0 ℓ (10.1 — 10.6 US qt, 8.4 — 8.8 Imp qt)

7) Check the level and leaks of ATF.
<Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>

C: CONDITION CHECK

NOTE:
When replacing ATF, check the inside condition of transmission body by inspecting the drained ATF.

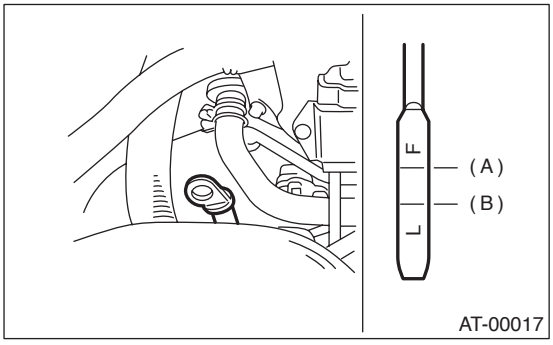
Fluid condition	Trouble and possible cause	Corrective action
Large amount of metallic pieces are found.	Excessive wear of the internal of the transmission body	Replace ATF and check if AT operates correctly.
Thick and varnish-form fluid.	Burned clutch and etc.	Replace ATF and check if AT or vehicle for faulty.
Clouded fluid or bubbles are found in fluid.	Water mixed in fluid	Replace ATF and check the water entering point.

3. Differential Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Remove the collector cover.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper orientation.
5) Remove the oil level gauge again, and check the level of differential gear oil. If the differential gear oil level is below “L” line, add oil to bring the level up to “F” line.

NOTE:
To prevent overfilling the differential gear oil, do not add oil above “F” line.



(A) Upper level
(B) Lower level

B: REPLACEMENT

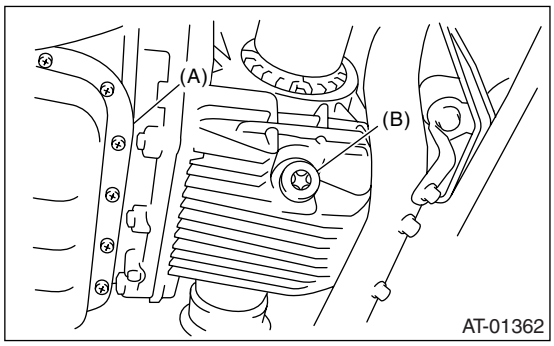
1) Lift-up the vehicle.
2) Remove the differential gear oil drain plug using TORX® BIT T70, and the drain the differential gear oil.

CAUTION:
• Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.

3) Tighten the differential gear oil drain plug using TORX® BIT T70.

NOTE:
Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



(A) Oil pan
(B) Differential gear oil drain plug

4) Lower the vehicle.
5) Pour gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 5AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
1.3 — 1.5 ℓ (1.3 — 1.6 US qt, 1.1 — 1.3 Imp qt)

6) Check the level of differential gear oil.
<Ref. to 5AT-29, INSPECTION, Differential Gear Oil.>

4. Road Test

A: INSPECTION

1. GENERAL PRECAUTION

Road tests should be conducted to properly diagnose the condition of automatic transmission.

NOTE:
When performing the test, do not exceed posted speed limit.

2. D RANGE SHIFT FUNCTION

Check shifting between 1st ←→ 2nd ←→ 3rd ←→ 4th ←→ 5th while driving on normal city streets.

3. D RANGE SHIFT SHOCK

Check the shock level when shifting up during normal driving.

4. KICK-DOWN FUNCTION

Check kick-down for each gear. Also check the kick-down shock level.

5. ENGINE BRAKE OPERATION

• Check the 4th gear engine brake when shifting down from 5th to 4th range while driving in 5th gear of manual mode [50 to 60 km/h (31 to 37 MPH)].
• Check the 3rd gear engine brake when shifting down from 4th to 3rd range while driving in 4th gear of manual mode [50 to 60 km/h (31 to 37 MPH)].
• Check the 2nd gear engine brake when shifting down from 3rd to 2nd range while driving in 3rd gear of manual mode [40 to 50 km/h (25 to 31 MPH)].
• Check the 1st gear engine brake when shifting down from 2nd to 1st range while driving in 2nd gear of manual mode [20 to 30 km/h (12 to 19 MPH)].

6. LOCK-UP FUNCTION

Check that engine speed does not change sharply when the accelerator pedal is lightly depressed while driving on flat roads at normal speed in the lock-up range.

7. P RANGE OPERATION

Stop the vehicle on an uphill grade of 5% or more and shift to “P” range. Check that the vehicle does not move when the parking brake is released.

8. NOISE & VIBRATION

Check for unusual sounds and vibration while driving and during shifting.

9. OIL LEAKAGE

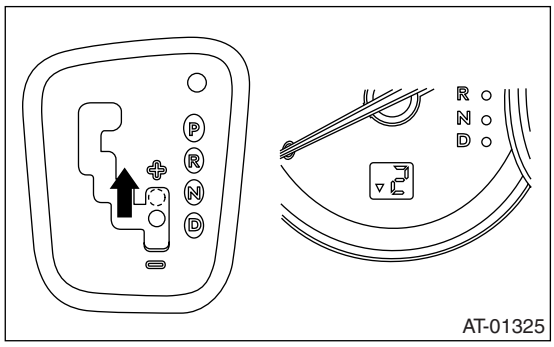
After the driving test, inspect for oil leaks from the transmission body.

5. Stall Test

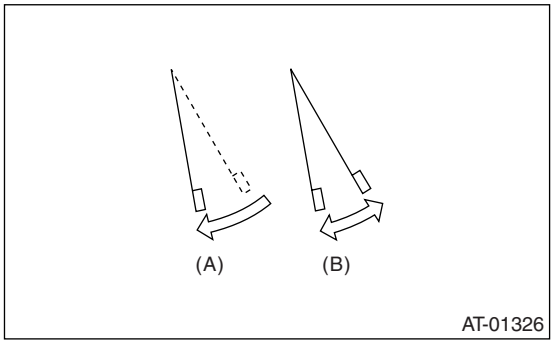
A: INSPECTION

NOTE:
The stall test is of extreme importance in diagnosing the condition of automatic transmission and engine. It should be conducted to measure the engine stall speeds in “R” and “2nd of manual mode”.
Purposes of the stall test:
• To check the operation of automatic transmission clutch.
• To check the operation of torque converter clutch.
• To check engine performance.

1) Check that the throttle valve opens fully.
2) Check that the engine oil level is correct.
3) Check that the coolant level is correct.
4) Check that the ATF level is correct.
5) Check that the differential gear oil level is correct.
6) Raise the ATF temperature by driving a distance of 5 to 10 km (3 to 6 miles). Otherwise, idle the engine to raise ATF temperature to 70 to 80°C (158 to 176°F) on Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
7) Place the wheel chocks at the front and rear of all wheels and engage the parking brake.
8) Move the manual linkage to ensure it operates properly, and then set “2nd on manual mode”.



9) While forcibly depressing the foot brake pedal, gradually depress the accelerator pedal until the engine operates at full throttle.



(A) Brake pedal
(B) Accelerator pedal

10) When the engine speed is stabilized, quickly record that speed and release the accelerator pedal.
11) Shift the select lever to “N” range, and cool down the engine by idling it for more than one minute.
12) Perform the procedure for “R” range in the same way as “2nd on manual mode”.

NOTE:
• Do not continue the stall test for MORE THAN FIVE SECONDS at a time (from fully closed throttle to fully open throttle until stall speed reading). Engine oil and ATF to deteriorate and the clutch and brake to be adversely affected.
• Be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range and with the idle speed lower than 1,200 rpm after performing stall test.
• If the stall speed is higher than the specified range, attempt to finish the stall test in as short a time as possible, in order to prevent the automatic transmission from sustaining damage.

Stall speed (at sea level):
TURBO MODEL
3,100 — 3,500 rpm
NON-TURBO MODEL
2,400 — 2,800 rpm

Stall Test

Stall speed (at sea level)	Range	Possible faulty part
Less than standard	R	• Engine • One-way clutch of the torque converter clutch
More than standard	2nd gear of manual mode	• Line pressure too low • Forward brake • Forward brake one-way clutch • Direct clutch • 3rd one-way clutch
	R	• Line pressure too low • Reverse clutch
Within specifications	2nd gear of manual mode	• Reverse clutch • One-way clutch of the torque converter
	R	• Forward brake • Forward brake one-way clutch • Direct clutch • 3rd one-way clutch • One-way clutch of the torque converter

6. Time Lag Test

A: INSPECTION

NOTE:
When the select lever is shifted while the engine is idling, there will be a certain time elapse or lag before the shock can be felt. Using this, check the condition of forward brake, reverse brake, 1st one-way clutch, forward one-way clutch and 3rd one-way clutch.

• Perform the test at normal operation fluid temperature 70 — 80°C (158 — 176°F).
• Be sure to allow a one minute interval between tests.
• Make three measurements and take the average value.

1) Fully apply the parking brake.
2) Start the engine.
Check the idling speed (A/C OFF).
3) Shift the select lever from “N” to “D” range. Using a stop watch, measure the time-lag which takes from shifting the lever until the shock is felt.

Time-lag
Standard: 1.2 sec. or less

If “N” → “D” time-lag is longer than specified:
• Line pressure too low
• Forward brake worn
• One-way clutch not operating properly

4) In the same manner, measure the time lag for “N” → “R”.

Time-lag
Standard: 1.5 sec. or less

If “N” → “R” time lag is longer than specified:
• Line pressure too low
• Reverse brake worn

7. Line Pressure Test

A: MEASUREMENT

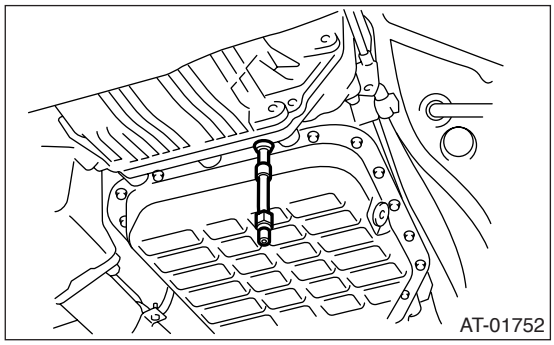
NOTE:
If the clutch or brake shows a sign of slippage, or shifting interval is not correct, the line pressure should be checked.

• Excessive shocks during up-shift or shifting takes place at a higher point than under normal circumstances, may be due to the line pressure being too high.

• Slippage or inability to operate the vehicle may, in most cases, be due to loss of oil pressure for the operation of the clutch, brake or control valve.

1) Set the vehicle on a lift.
2) Remove the under cover.
3) Remove the test plug and install the ST.

ST 498897200 OIL PRESSURE ADAPTER



4) Set the ST1 and ST2.

ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

5) Lower the vehicle, and pull the ST1 and ST2 into vehicle.

ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

6) Connect the Subaru Select Monitor to data link connector and read the current data. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>

(1) Start the engine.
(2) Turn the Subaru Select Monitor switch to ON.
(3) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
(4) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
(5) Press the [YES] key after the information of transmission type has been displayed.
(6) On the «Transmission Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
(7) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.
(8) Using the scroll key, display the “P/L solenoid target oil pressure”.

7) Perform the line pressure test.

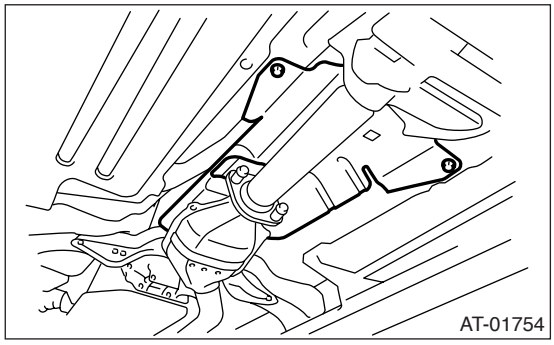
NOTE:
• Do not perform the line pressure test for more than 5 seconds at a time. It makes engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
• Be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range and with the idle speed lower than 1,200 rpm after performing line pressure test.
• Adjust the throttle valve angle in order to obtain the “P/L solenoid target pressure” displayed on the Subaru Select Monitor.

Range of the selector lever	Throttle valve angle	ATF temperature condition	“P/L Solenoid Target Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full closed	45 — 55°C (104 — 131 °F)	490	385 — 555 (3.93 — 5.66, 55.8 — 80.5)
	Full open		1,370	1,235 — 1,475 (12.59 — 15.04, 179.1 — 213.9)
R	Full closed		1,370	1,530 — 1,925 (15.60 — 19.6, 221.9 — 279.2)

8. Transfer Clutch Pressure Test

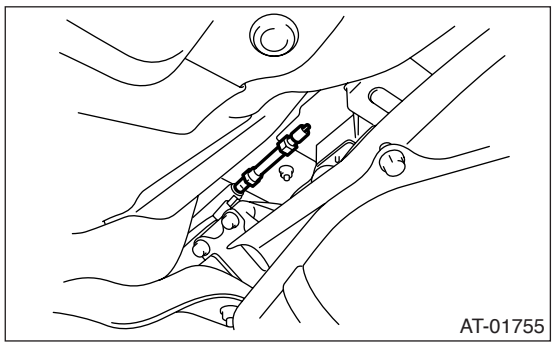
A: INSPECTION

1) Lift-up the vehicle.
2) Remove the heat shield cover securing bolts to slide the heat shield cover.

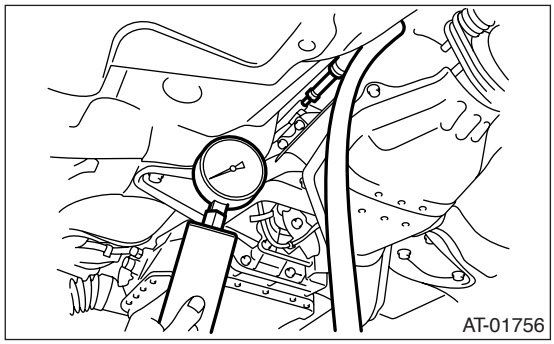


3) Remove the test plug and install the ST.
ST 498897200 OIL PRESSURE ADAPTER

CAUTION:
Be careful not to cut your arm with the heat shield cover when removing the test plug and installing the ST.



4) Set the ST1 and ST2.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY



5) Lower the vehicle, and pull the ST1 and ST2 into vehicle.
ST1 498897200 OIL PRESSURE ADAPTER
ST2 498575400 OIL PRESSURE GAUGE ASSY

6) Connect the Subaru Select Monitor to data link connector and read the current data. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
(1) Start the engine.
(2) Turn the Subaru Select Monitor switch to ON.
(3) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
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(5) Press the [YES] key after the information of transmission type has been displayed.
(6) On the «Transmission Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
(7) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.
(8) Using the scroll key, display the “T/F solenoid target oil pressure”.

7) Perform the transfer clutch pressure test.

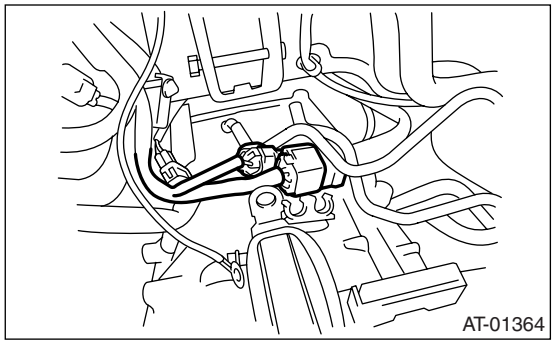
NOTE:
• Do not perform the transfer clutch pressure test for more than 5 seconds at a time. It makes engine oil and ATF deteriorate and the clutch and brake to be adversely affected.
• Be sure to cool down the engine for at least one minute with the select lever set in “P” or “N” range and with the idle speed lower than 1,200 rpm after performing transfer clutch pressure test.
• Adjust the throttle valve angle in order to obtain the “T/F solenoid target pressure” displayed on the Subaru Select Monitor.

Range of the selector lever	Throttle valve angle	ATF temperature condition	“T/F Solenoid Target Pressure” displayed on the Subaru Select Monitor kPa	Standard line pressure kPa (kg/cm^2, psi)
D	Full open	45 — 55°C (104 — 131 °F)	900	800 — 915 (8.16 — 9.33, 116.0 — 132.7)
	Partial throttle		500	400 — 535 (4.08 — 5.46, 58.0 — 77.6)
N	Full closed		0	0 — 50 (0 — 0.51, 0 — 7.3)

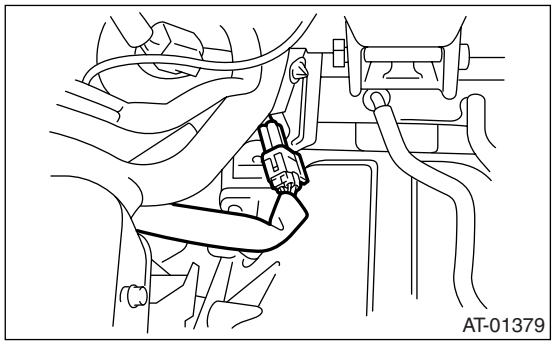
9. Automatic Transmission Assembly

A: REMOVAL

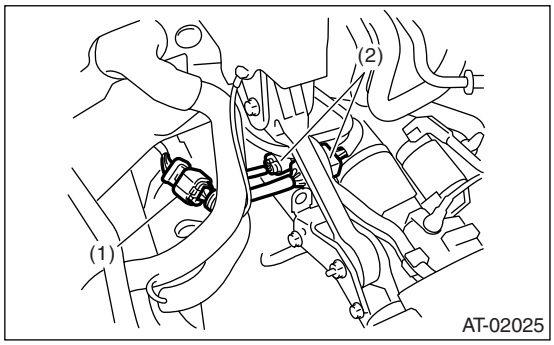
1) Set the vehicle on a lift.
2) Fully open the front hood and support with the hood stay.
3) Disconnect the ground cable from battery.
4) Remove the collector cover.
5) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
6) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
7) Remove the air cleaner case. (Non-turbo model) <Ref. to IN(H6DO)-5, REMOVAL, Air Cleaner Case.>
8) Remove the air breather hose. <Ref. to 5AT-69, REMOVAL, Air Breather Hose.>
9) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
10) Disconnect the following connectors.
• Turbo model
(1) Transmission harness connectors



(2) Front oxygen (A/F) sensor

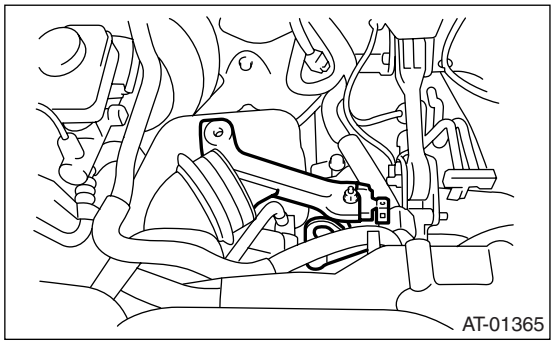


• Non-turbo model

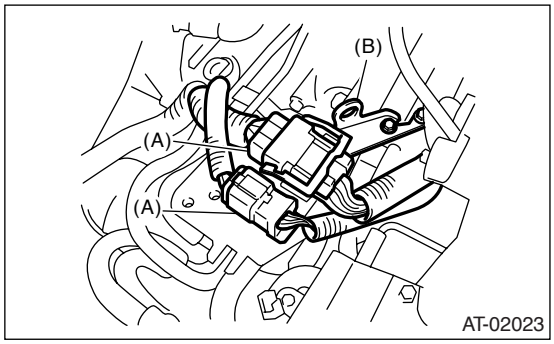


(1) Front oxygen (A/F) sensor
(2) Transmission harness connector

11) Remove the intercooler stay and engine hanger rear. (Turbo model)

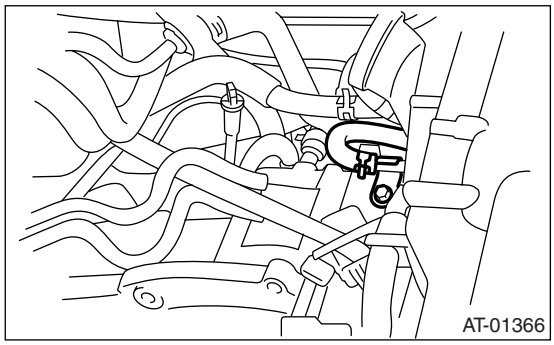


12) Disconnect the engine harness connectors, and then remove the engine hanger rear. (Non-turbo model)



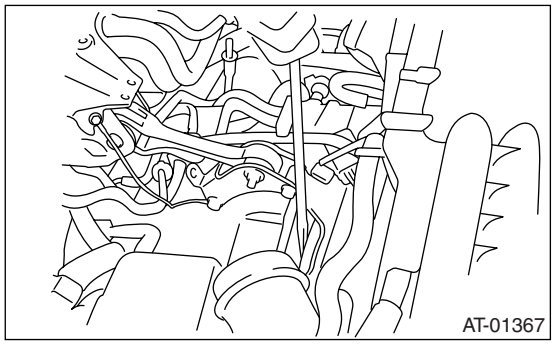
(A) Engine harness connectors
(B) Engine hanger rear

13) Remove the water by-pass pipe. (Turbo model)

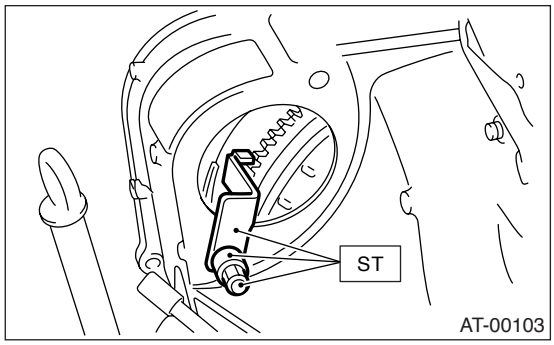


14) Separate the torque converter from drive plate.
(1) Remove the service hole plug.
(2) Remove the bolts which hold torque converter to drive plate.
(3) Remove the four bolts by rotating the clamp pulley a little at a time.
(4) Make sure the torque converter moves freely by rotating with finger through the starter installation hole.

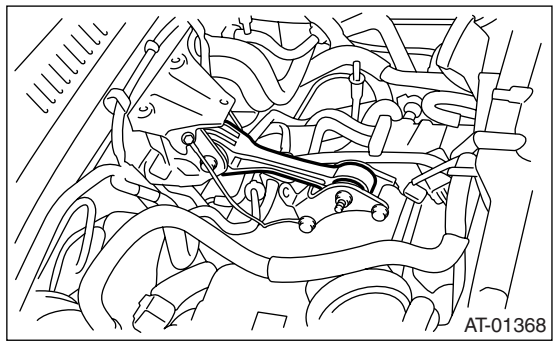
CAUTION:
Be careful not to drop bolts into converter housing.



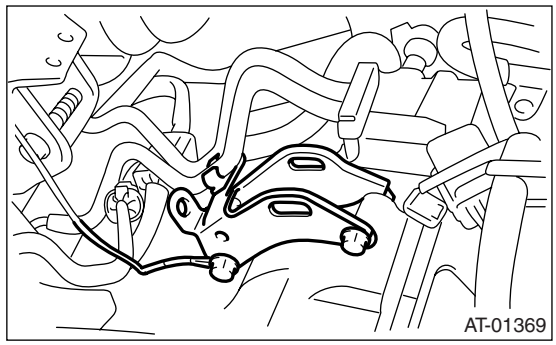
15) Install the ST to converter case.
ST 498277200 STOPPER SET



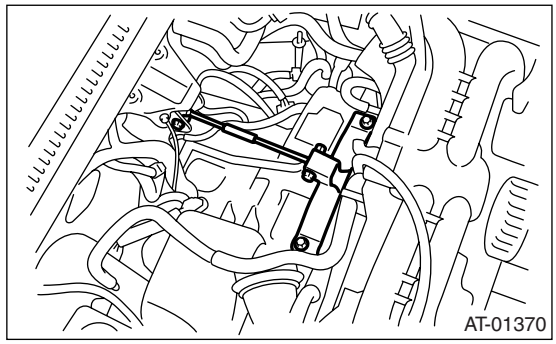
16) Lift-up the vehicle.
17) Remove the under cover. (Non-turbo model)
18) Remove the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
19) Remove the ATF cooler inlet and outlet pipes. (Non-turbo model) <Ref. to 5AT-64, REMOVAL, ATF Cooler Pipe & Hose.>
20) Remove the pitching stopper.



21) Remove the pitching stopper bracket.

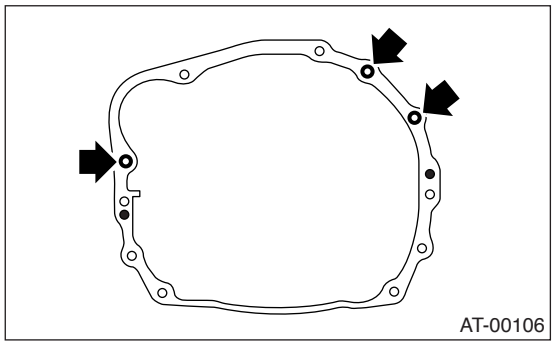


22) Set the ST.
ST 41099AC000 ENGINE SUPPORT ASSEMBLY

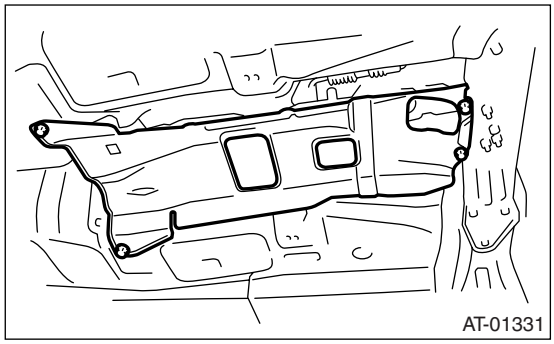


23) Remove the air intake duct. (Turbo model) <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.>
24) Remove the air cleaner case. (Turbo model) <Ref. to IN(H4DOTC)-8, REMOVAL, Air Cleaner Case.>
25) Remove the linear motion mounting. (Turbo model) <Ref. to ME(H4DOTC)-37, REMOVAL, Linear Motion Mounting.>

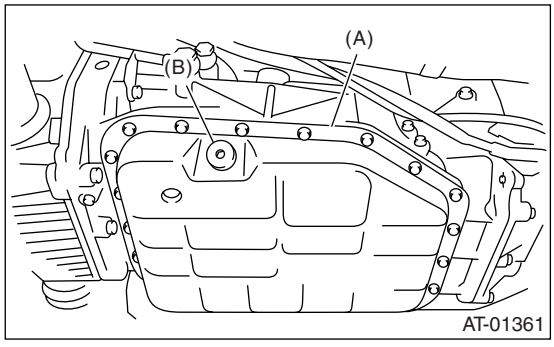
26) Remove the transmission mounting bolt (upper side).



27) Lift-up the vehicle. (Turbo model)
28) Remove the under cover. (Turbo model)
29) Remove the center exhaust pipe, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
30) Remove the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
31) Remove the heat shield cover.

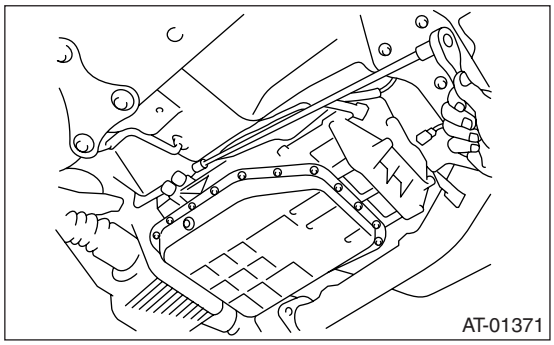


32) Remove the ATF drain plug to drain ATF.

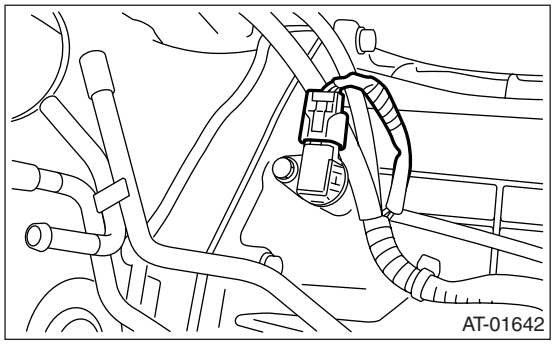


(A) Oil pan
(B) Drain plug

33) Remove the oil charge pipe.

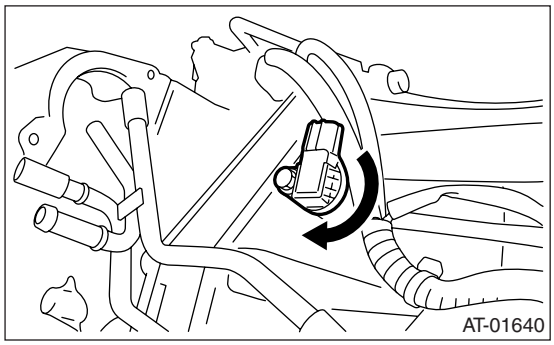


34) Disconnect the connector from turbine speed sensor 1.



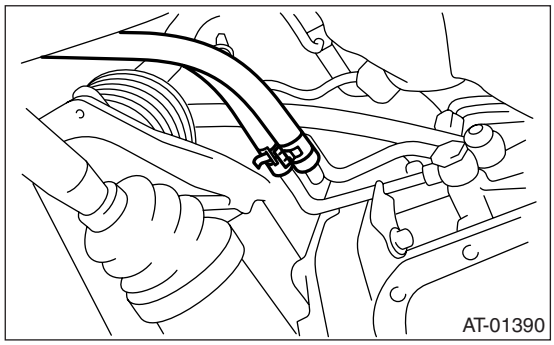
35) Remove the turbine speed sensor 1 connector mounting bolt and rotate the sensor by 180°.

CAUTION:
Failure to follow this procedure may cause the interference between vehicle body and sensor while removing/installing transmission, resulting in damage.



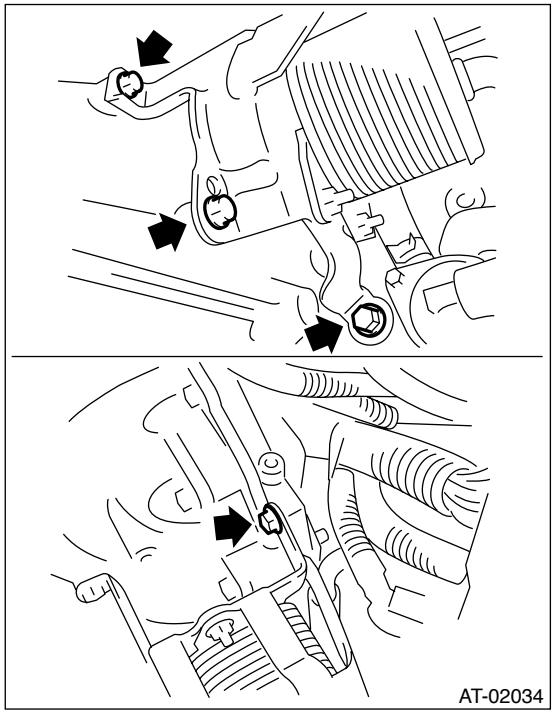
36) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
37) Remove the shift select cable. <Ref. to CS-12, REMOVAL, Select Cable.>

38) Disconnect the hose from the ATF inlet and outlet pipes.



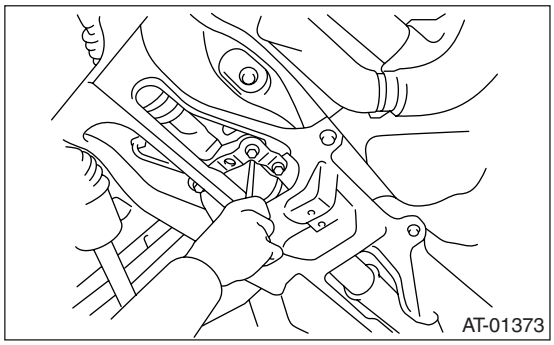
39) Remove the ATF cooler bracket from transmission body. (ATF cooler model with warmer function)

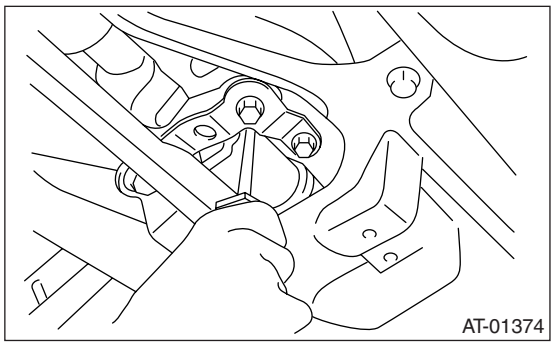
• Non-turbo model



40) Remove the front crossmember support plate. <Ref. to FS-15, REMOVAL, Front Crossmember Support Plate.>

41) Remove the two clutch housing cover securing bolts.



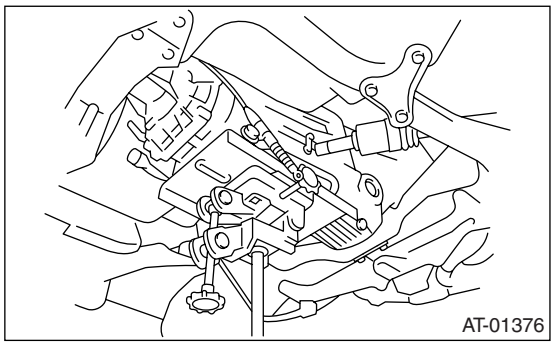


42) Remove the front stabilizer bracket. <Ref. to FS-16, REMOVAL, Front Stabilizer.>

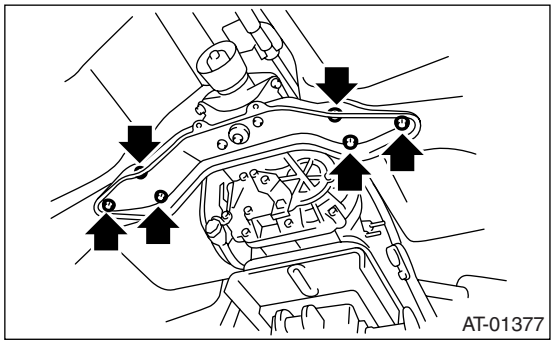
43) Remove the bolts which secure front ball joint to the housing. <Ref. to FS-17, REMOVAL, Front Ball Joint.>

44) Pull out the drive shaft from transmission.

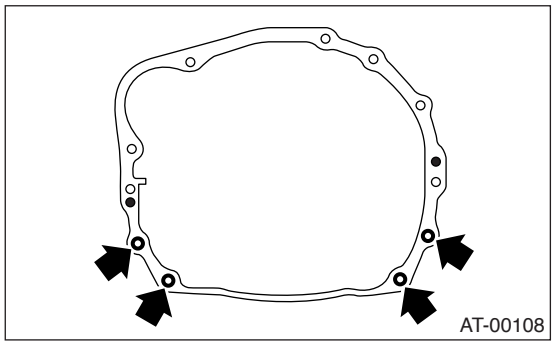
45) Set the transmission jack under the transmission.



46) Remove the rear crossmember.



47) Remove the transmission mounting bolt (lower side).

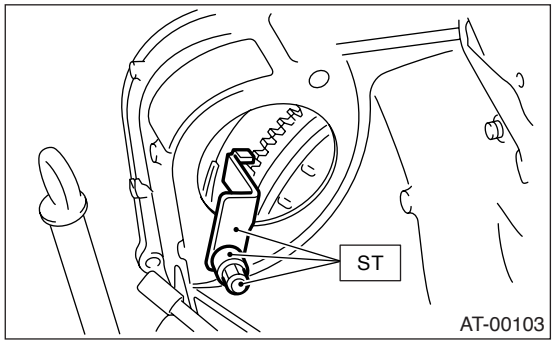


48) Remove the transmission.

NOTE:
• Turn the engine support assembly from the vehicle under body to the left (to shorten the engine support length), and lower the rear of the engine for easy disassembly.
• Be careful not to allow breather pipe and etc. to touch the vehicle body when detaching the automatic transmission assembly by pulling it backward.

B: INSTALLATION

1) Install the ST to torque converter case.
ST 498277200 STOPPER SET

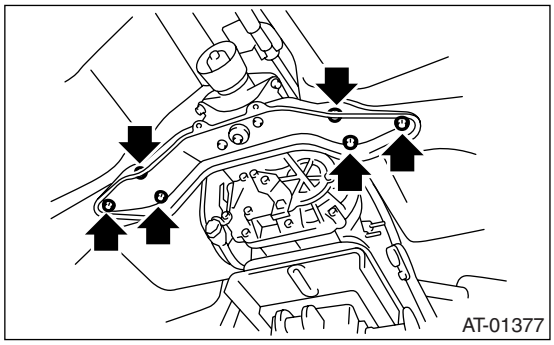


2) Install the transmission onto engine.
   (1) Lift up the transmission gradually using a transmission jack.
   (2) Engage them at splines.
3) Install the engine mounting bolt (lower side).

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

4) Install the transmission rear crossmember.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



5) Take off the transmission jack.
6) Lower the vehicle.
7) Install the engine mounting bolt (upper side).

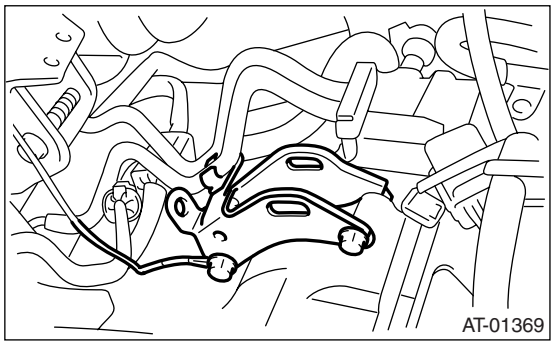
Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

8) Remove the ST from converter case.
ST 498277200 STOPPER SET
9) Install the starter. <Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
10) Install the torque converter to drive plate.
   (1) Install the bolts which hold torque converter to drive plate.
   (2) Install all four bolts by rotating the crank pulley a little at a time.
   (3) Install the service hole.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

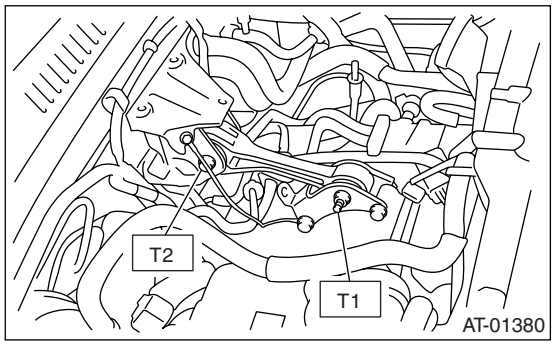
11) Remove the ST and install the pitching stopper bracket.

Tightening torque:
40 N·m (4.1 kgf-m, 29.5 ft-lb)



12) Install the pitching stopper.

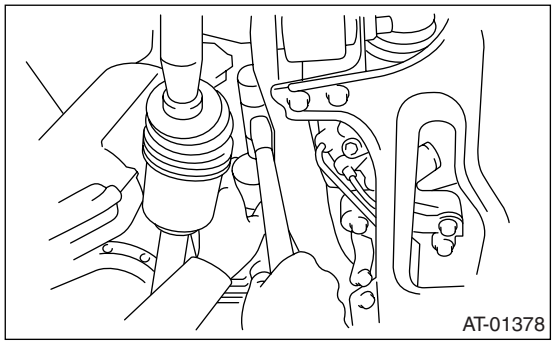
Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



13) Lift-up the vehicle.
14) Replace the front differential side retainer oil seal.
(1) Remove the oil seal by using flat tip screwdriver and etc.
(2) Fit a new oil seal using ST.

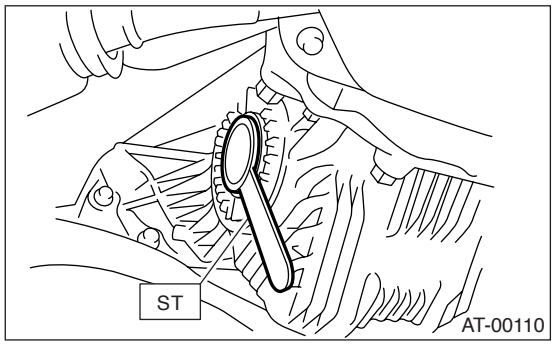
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
• Apply oil to the oil seal lips.
• Always replace the differential side oil seal after extracting front drive shaft from the transmission.



15) Apply grease to the oil seal lips.
16) Set the ST to the side retainer.

ST 28399SA000 OIL SEAL PROTECTOR



17) Install the front drive shaft into transmission.

NOTE:
Replace the circlip of drive shaft with a new one.

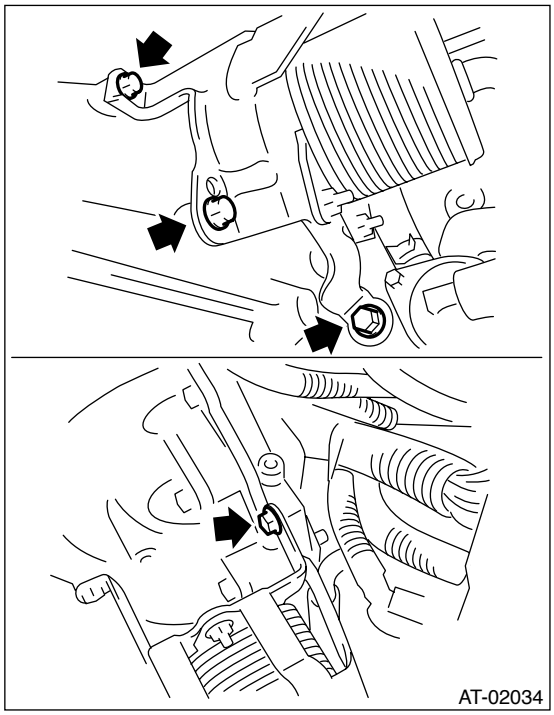
18) Install the front drive shaft into transmission, remove the ST and insert the drive shaft securely.

ST 28399SA000 OIL SEAL PROTECTOR

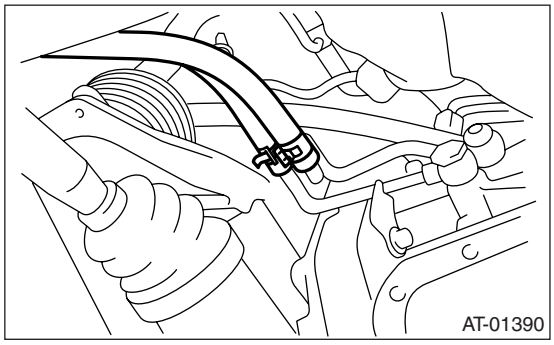
19) Install the ATF cooler inlet and outlet pipes. (Non-turbo model) <Ref. to 5AT-66, INSTALLATION, ATF Cooler Pipe & Hose.>
20) Install the ATF cooler bracket to transmission proper. (ATF cooler model with warmer function)

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

• Non-turbo model

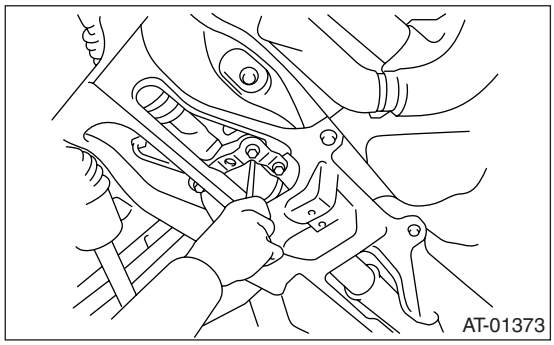


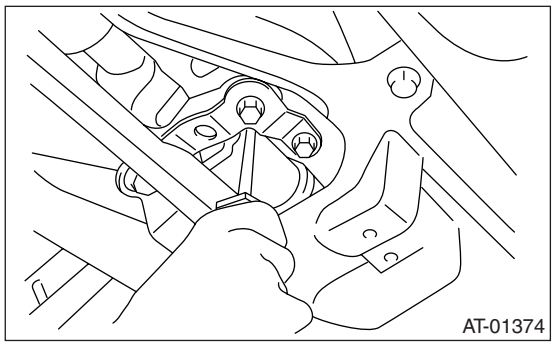
21) Install the inlet and outlet hoses to the ATF inlet and outlet pipes.



22) Insert the ball joint into housing.<Ref. to FS-17, INSTALLATION, Front Ball Joint.>
23) Install the front stabilizer bracket. <Ref. to FS-16, INSTALLATION, Front Stabilizer.>

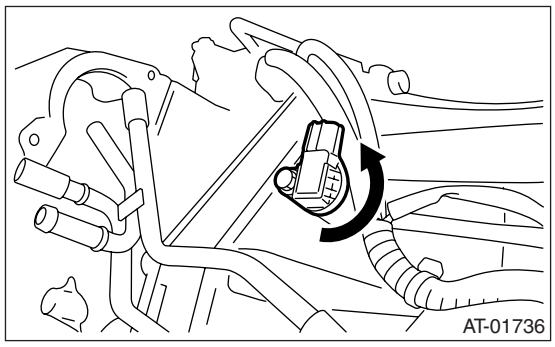
24) Screw the securing bolts for clutch housing cover.





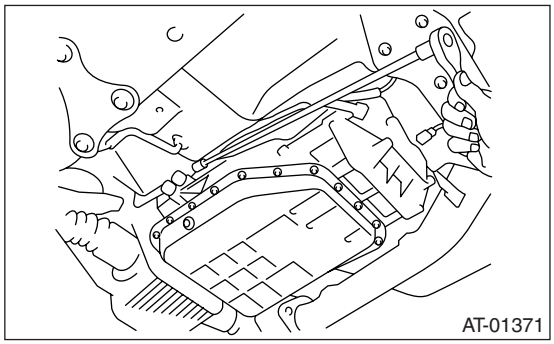
25) Install the front crossmember support plate. <Ref. to FS-15, INSTALLATION, Front Crossmember Support Plate.>
26) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
27) Install the shift select cable. <Ref. to CS-13, INSTALLATION, Select Cable.>
28) Install the turbine speed sensor 1 and harness, and then connect the connector.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

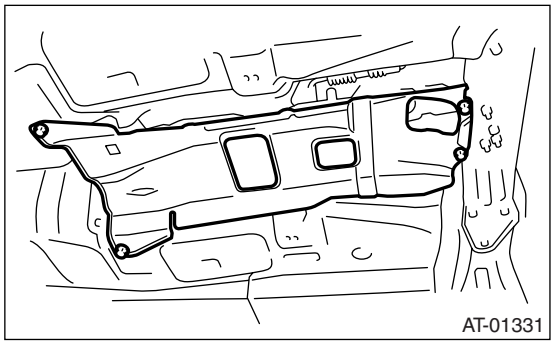


29) Install the oil charge pipe.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)

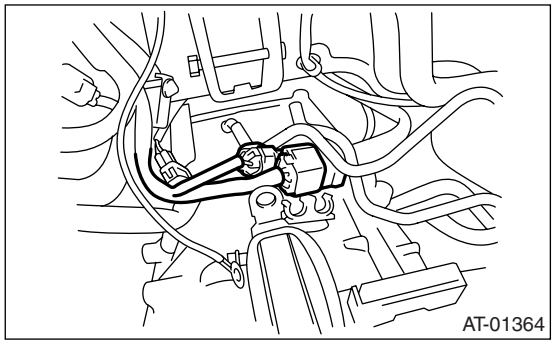


30) Install the heat shield cover.

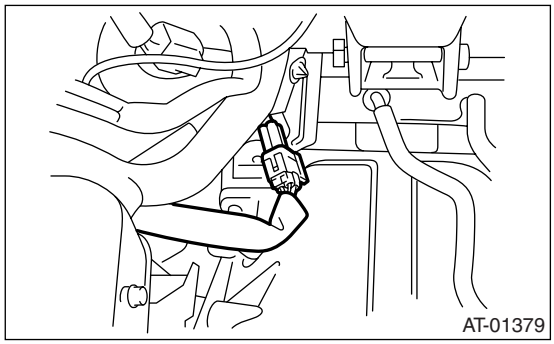


31) Install the center exhaust pipe, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
32) Install the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
33) Install the under cover.
34) Lower the vehicle.
35) Install the linear motion mounting. (Turbo model) <Ref. to ME(H4DOTC)-37, INSTALLATION, Linear Motion Mounting.>
36) Install the air cleaner hose.
<Ref. to IN(H4DOTC)-8, INSTALLATION, Air Cleaner Case.>
37) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.>

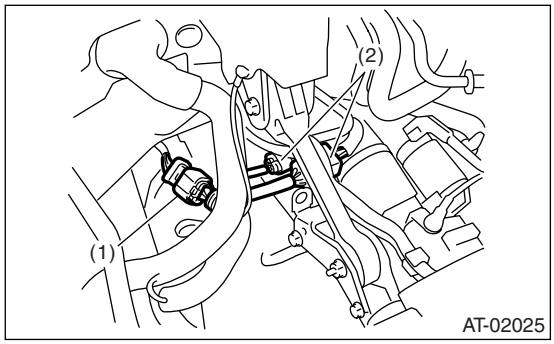
38) Connect the following connectors.
• Turbo model
(1) Transmission harness connectors



(2) Front oxygen (A/F) sensor

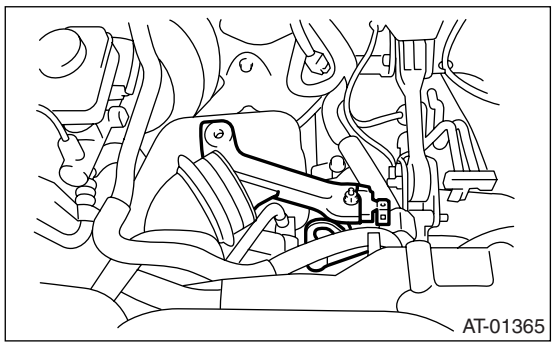


• Non-turbo model

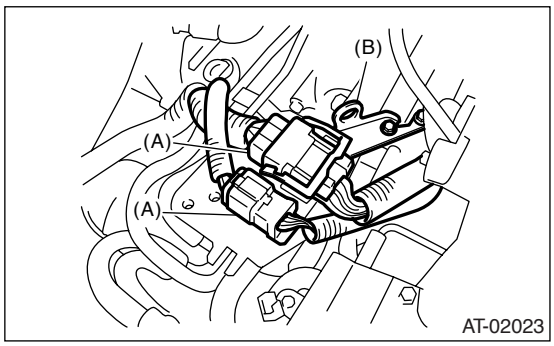


(1) Front oxygen (A/F) sensor
(2) Transmission harness connector

39) Install the intercooler stay RH and engine hanger rear. (Turbo model)

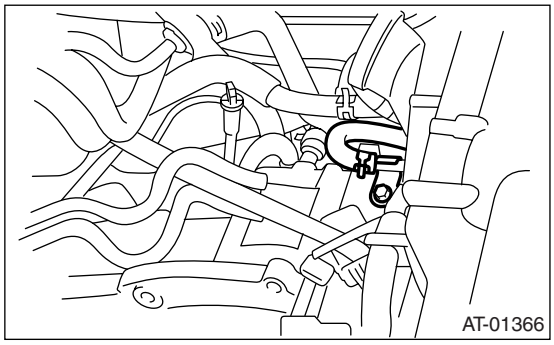


40) Install the engine hanger rear, and then connect the engine harness connector. (Non-turbo model)



(A) Engine harness connectors
(B) Engine hanger rear

41) Install the water by-pass pipe. (Turbo model)



42) Pour ATF from the oil charge pipe. <Ref. to 5AT-27, REPLACEMENT, Automatic Transmission Fluid.>
43) Install the air breather hose. <Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
44) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
45) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
46) Install the air cleaner case. (Non-turbo model) <Ref. to IN(H6DO)-6, INSTALLATION, Air Cleaner Case.>
47) Install the collector cover.
48) Connect the battery ground cable to battery.
49) Perform the Clear Memory 2. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
(1) Connect the Subaru Select Monitor to data link connector.
(2) Turn the ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.
(3) Ensure that the select lever is in “P” range.
(4) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.

(5) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
(6) Press the [YES] key after the information of transmission type has been displayed.
(7) On the «Transmission Diagnosis» display screen, select the {Clear Memory 2} and press the [YES] key.

50) Perform the inspection with driving the vehicle at the end of repair work and make sure there is no faulty as below;
- Excessive shift shock
- Oil leakage from transmission proper and etc.
- Occurrence of noise caused by interference etc.

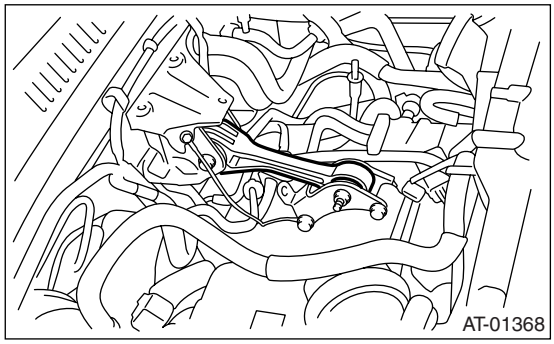
NOTE:
If excessive shift shock is felt, execute the advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

10. Transmission Mounting System

A: REMOVAL

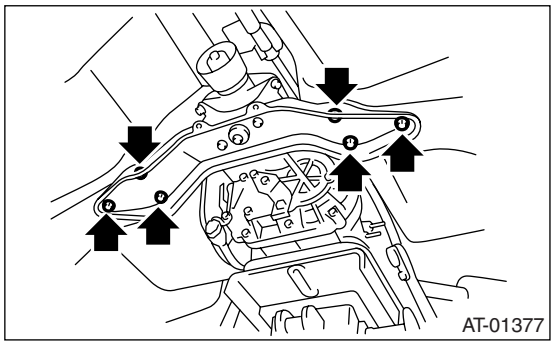
1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Remove the pitching stopper.



2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with rigid racks.
3) Remove the center exhaust pipe, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
4) Remove the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
5) Remove the heat shield cover.
6) Set the transmission jack under the transmission. Make sure that the support plate of transmission jack does not touch the oil pan.
7) Remove the transmission rear crossmember.



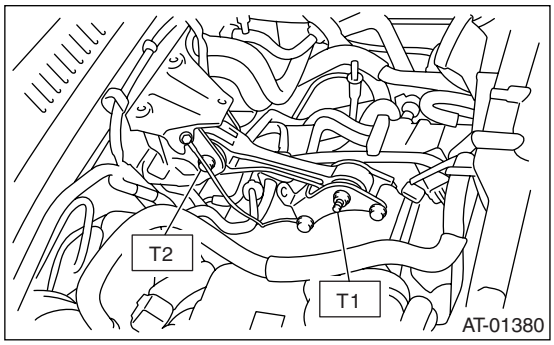
8) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 36.9 ft-lb)
T2: 58 N·m (5.9 kgf-m, 42.8 ft-lb)



2) Install the intercooler. (Turbo model)
<Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
4) Connect the battery ground cable to battery.

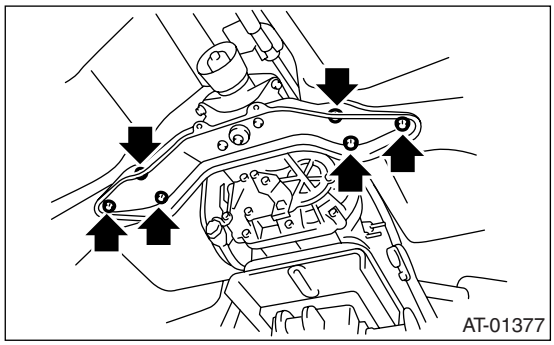
2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the crossmember.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover.
5) Install the center exhaust pipe, rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
6) Install the front exhaust pipe, rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
7) Connect the battery ground cable to battery.

C: INSPECTION

Repair or replace parts if the results of the inspection below are not satisfied.

1. PITCHING STOPPER

Check pitching stopper for bends or damage. Ensure there are no cracks, hardening or damage on rubbers.

2. TRANSMISSION REAR CROSSMEMBER & REAR CUSHION RUBBER

Check the crossmember for bends or damage. Ensure there are no cracks, hardening, or damage on cushion rubbers.

11.Extension Case Oil Seal

A: INSPECTION

Inspect there is no ATF leakage from the joint of transmission and propeller shaft. If so, replace the oil seal. <Ref. to 5AT-49, REPLACEMENT, Extension Case Oil Seal.>

B: REPLACEMENT

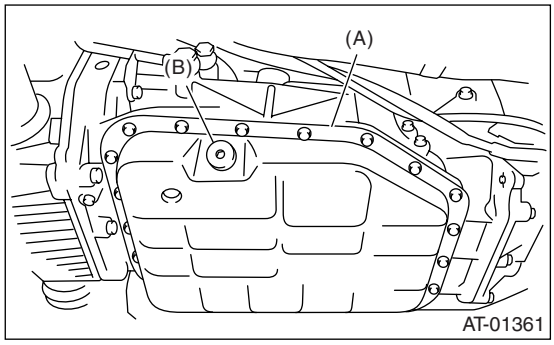
1) Lift-up the vehicle.
2) Clean the transmission exterior.
3) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

4) Tighten the ATF drain plug.

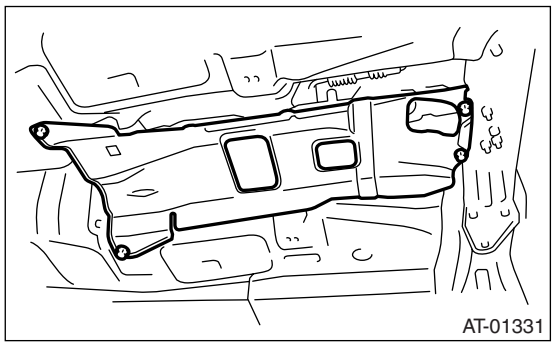
NOTE:
Use a new gasket.

Tightening torque:
20 N·m (2.0 kgf-m, 14.8 ft-lb)

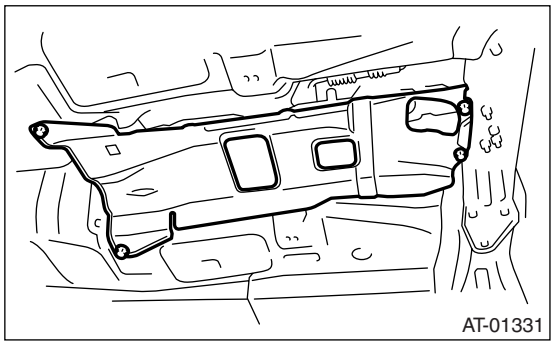


(A) Oil pan
(B) ATF drain plug

5) Remove the rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
6) Remove the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
7) Remove the heat shield cover.



8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
9) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY
10) Using the ST, install the oil seal.
ST 498057300 INSTALLER
11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
12) Install the heat shield cover.



13) Install the rear exhaust pipe and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
14) Install the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
15) Pour ATF into the oil charge pipe.

Specified fluid:
SUBARU ATF (Part No. K0140Y0700)

Recommended fluid:
IDEMITSU ATF HP
Castrol Transmax J

NOTE:
Use of recommended fluid is permitted only on the area where the specified is not available.

Capacity:
Fill the same amount of ATF drained.

16) Check the level and leaks of ATF. <Ref. to 5AT-27, Automatic Transmission Fluid.>

12. Differential Side Retainer Oil Seal

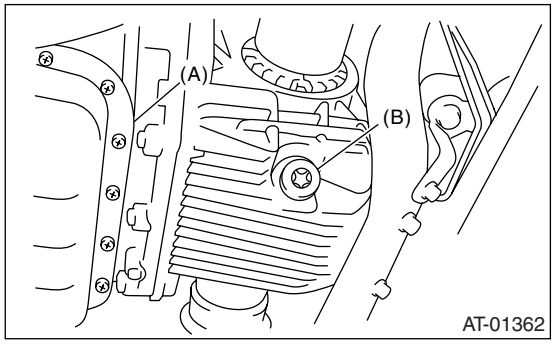
A: INSPECTION

Check the leakage of gear oil from differential side retainer oil seal part. If there is oil leakage, replace the oil seal.

B: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the front exhaust pipe and center exhaust pipe. (Turbo model) <Ref. to EX(H4DOTC)-5, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.>
3) Remove the front exhaust pipe. (Non-turbo model) <Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
4) Remove the differential gear oil drain plug using TORX® BIT T70 to drain differential gear oil.

CAUTION:
• Directly after the engine has been running, the differential gear oil is hot. Be careful not to burn yourself.
• Be careful not to spill the differential gear oil on exhaust pipe to prevent it from emitting smoke or fire. When the differential gear oil is spilled on exhaust pipe, wipe it away completely.



(A) Oil pan
(B) Differential gear oil drain plug

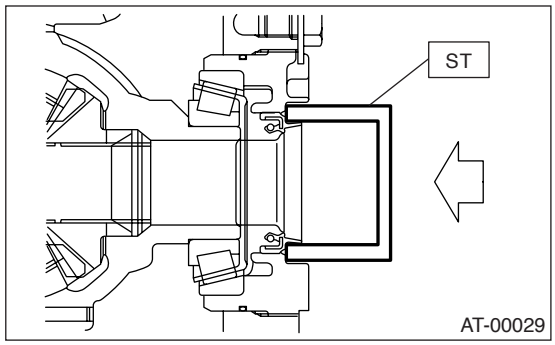
5) Tighten the differential gear oil drain plug.

NOTE:
Use a new gasket.

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

6) Separate the front drive shaft from transmission. <Ref. to DS-22, REMOVAL, Front Drive Shaft.>
7) Remove the differential side retainer oil seal using driver wrapped with vinyl tape or etc.
8) Using the ST, install the differential side retainer oil seal by slightly tapping with hammer.

ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



9) Apply oil to the oil seal lips.
10) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
11) Install the front and center exhaust pipes. (Turbo model) <Ref. to EX(H4DOTC)-5, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.>
12) Install the front exhaust pipe. (Non-turbo model) <Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>
13) Lower the vehicle.
14) Pour gear oil into the gauge hole.

Recommended gear oil:
<Ref. to 5AT-3, RECOMMENDED GEAR OIL, SPECIFICATION, General Description.>

Gear oil capacity:
1.3 — 1.5 ℓ (1.4 — 1.6 US qt, 1.1 — 1.3 Imp qt)

15) Check the level of differential gear oil. <Ref. to 5AT-29, INSPECTION, Differential Gear Oil.>

13.Inhibitor Switch

A: INSPECTION

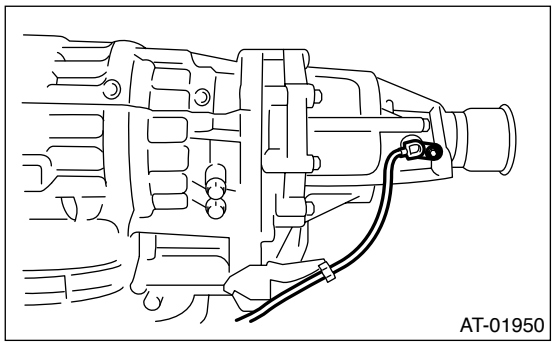
Inhibitor switch cannot be checked, because the inhibitor switch is installed on control valve assembly. When the malfunction occurs, refer to 5AT (Diagnosis) section. <Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Front Vehicle Speed Sensor

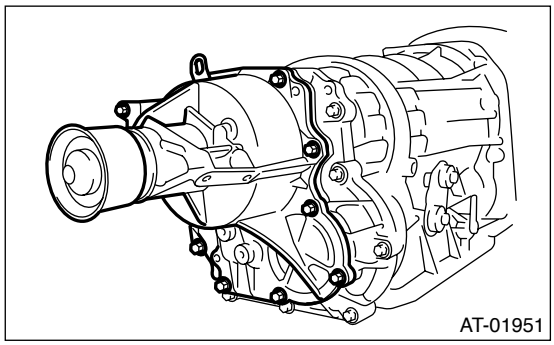
A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.

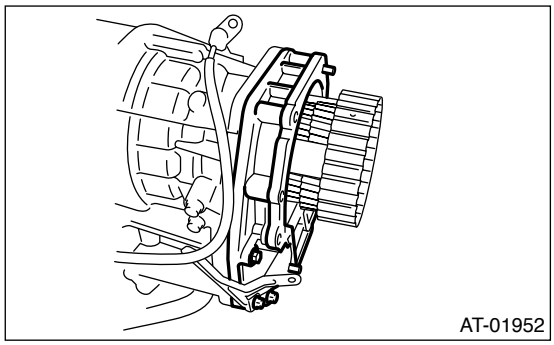
NOTE:
Secure the harness of the rear vehicle speed sensor to the transmission proper using wire etc.


AT-01950

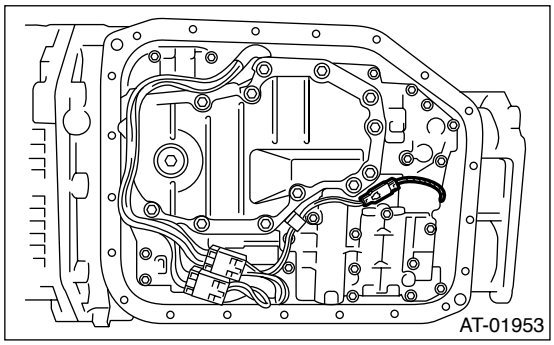
3) Remove the extension case.


AT-01951

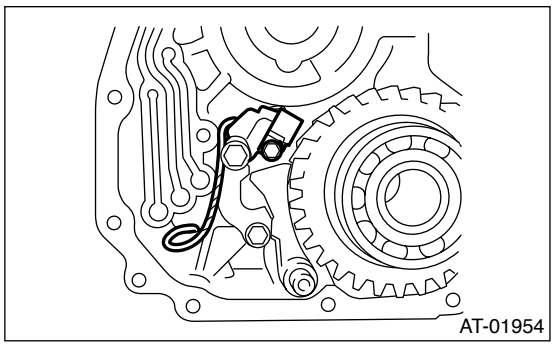
4) Remove the intermediate case.


AT-01952

5) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
6) Lay along the transmission case, and then remove the oil pan.
7) Remove the old gasket on the oil pan and transmission case completely.
8) Disconnect the front vehicle speed sensor connector.


AT-01953

9) Remove the front vehicle speed sensor securing bolt.

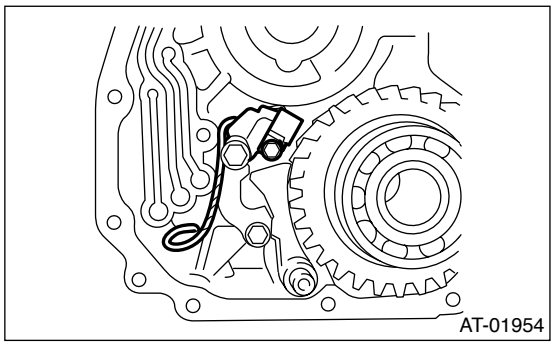

AT-01954

10) Remove the front vehicle speed sensor through the hole of the AT transmission main case.

B: INSTALLATION

1) Install the front vehicle speed sensor.

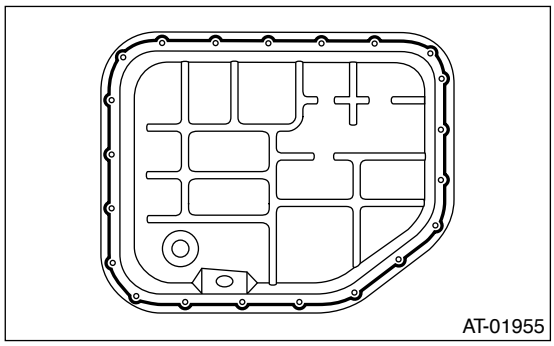
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)


AT-01954

2) Connect the front vehicle speed sensor connector.

3) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)

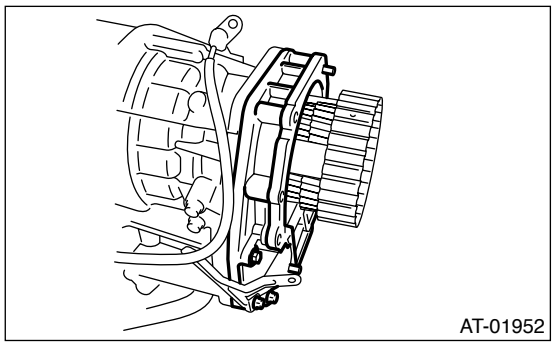


4) Install the oil pan by equally tightening the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)

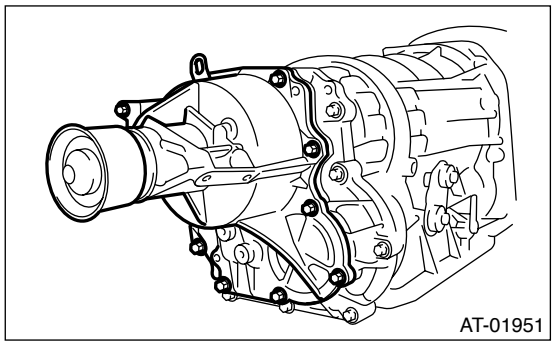
5) Install the center differential carrier. <Ref. to 5AT-80, INSTALLATION, Center Differential Carrier.>
6) Install the intermediate case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



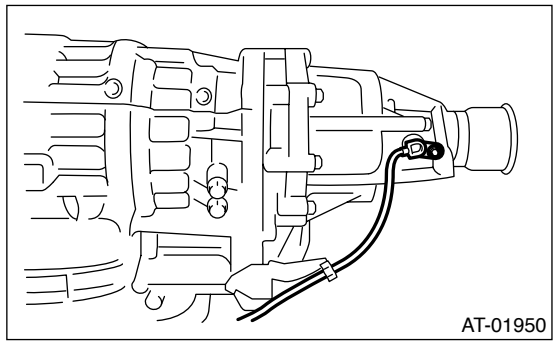
7) Install the extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



8) Install the rear vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

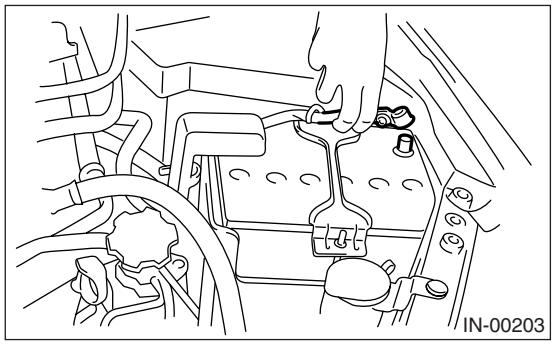


9) Install the transmission assembly into the vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>
10) Pour ATF from the oil charge pipe. <Ref. to 5AT-27, REPLACEMENT, Automatic Transmission Fluid.>
11) Check the level and leaks of the ATF. <Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>

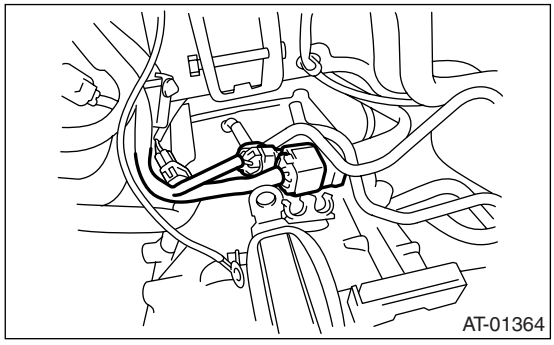
15.Rear Vehicle Speed Sensor

A: REMOVAL

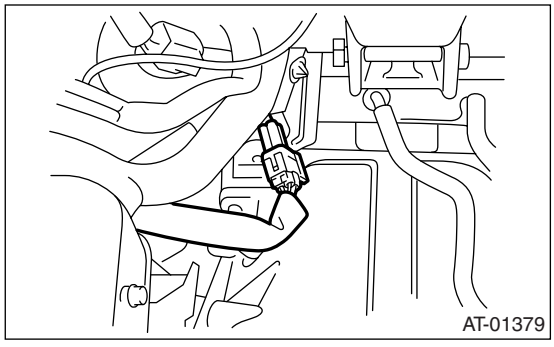
1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.



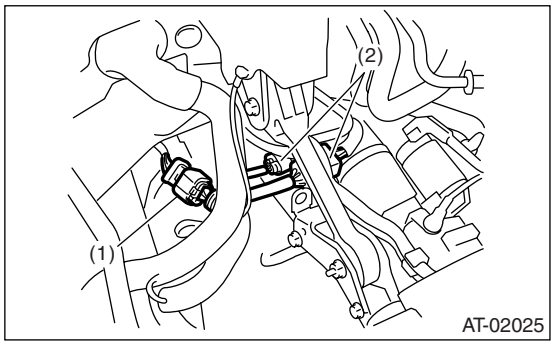
3) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
4) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
5) Disconnect the following connectors.
• Turbo model
(1) Transmission harness connectors



(2) Front oxygen (A/F) sensor



• Non-turbo model

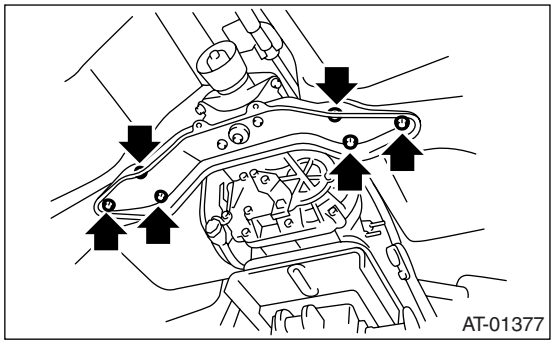


(1) Front oxygen (A/F) sensor
(2) Transmission harness connector

6) Remove the transmission harness connector and front oxygen (A/F) sensor connector from the stay.
7) Lift-up the vehicle.
8) Clean the transmission exterior.
9) Drain ATF completely. <Ref. to 5AT-27, REPLACEMENT, Automatic Transmission Fluid.>
10) Remove the center exhaust pipe, rear exhaust pipe and muffler. (Turbo model) <Ref. to EX(H4DOTC)-6, REMOVAL, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
11) Remove the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-8, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H6DO)-10, REMOVAL, Muffler.>
12) Remove the heat shield cover.
13) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
14) Place the transmission jack under transmission.

NOTE:
Make sure that the support plate of transmission jack does not touch the crossmember.

15) Remove the transmission rear crossmember bolt.



16) Lower the transmission jack.

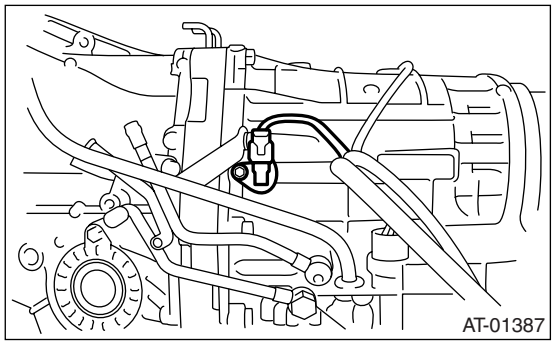
NOTE:
Do not separate the transmission jack and transmission.

17) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>

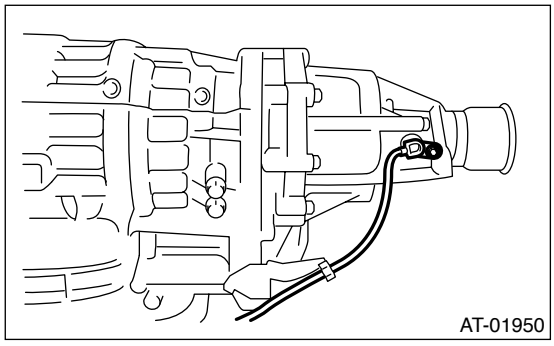
18) Remove the ATF cooler inlet and outlet pipes.

NOTE:
When removing the outlet pipe, be careful not to lose the ball and spring used with retaining screw.

19) Disconnect the connector from turbine speed sensor 1.

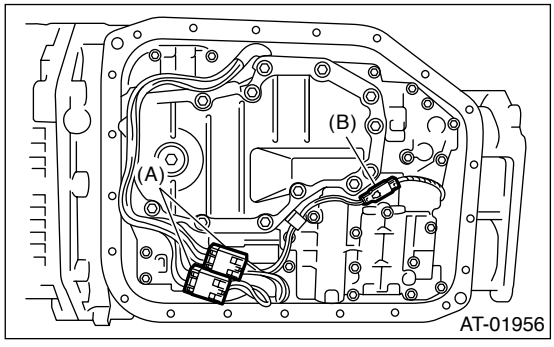

AT-01387

20) Remove the rear vehicle speed sensor.


AT-01950

21) Remove the oil pan.

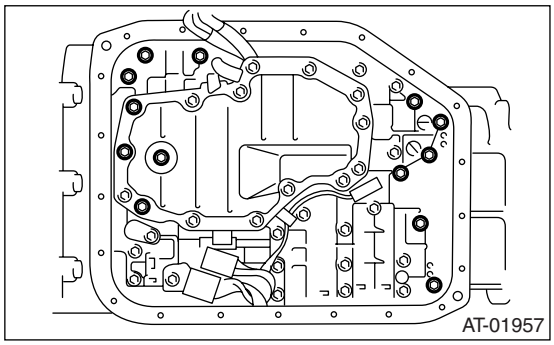
22) Disconnect the control valve connector and front vehicle speed sensor connector.



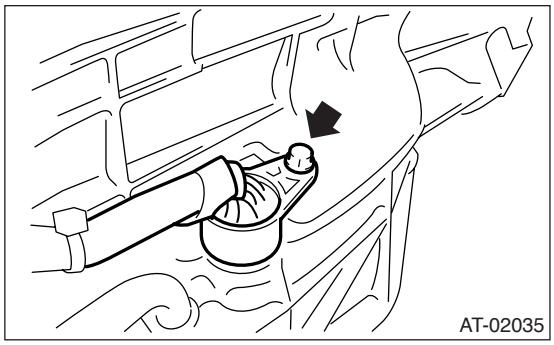
AT-01956

(A) Control valve connector
(B) Front vehicle speed sensor connector

23) Remove the control valve body.


AT-01957

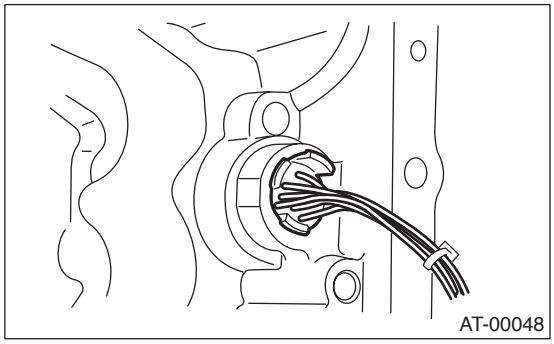
24) Remove the bolt securing harness of transmission main case.


AT-02035

25) Remove the harness assembly.

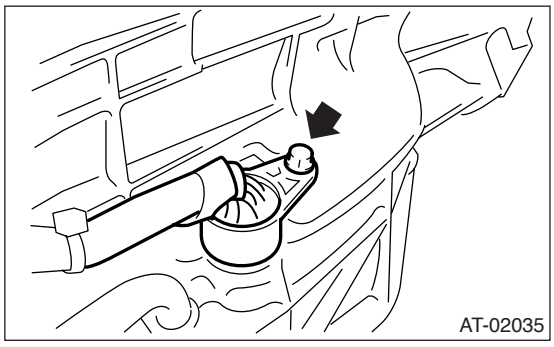
B: INSTALLATION

1) Pass the harness assembly through the hole in transmission case.


AT-00048

2) Install the securing bolt of transmission main case.

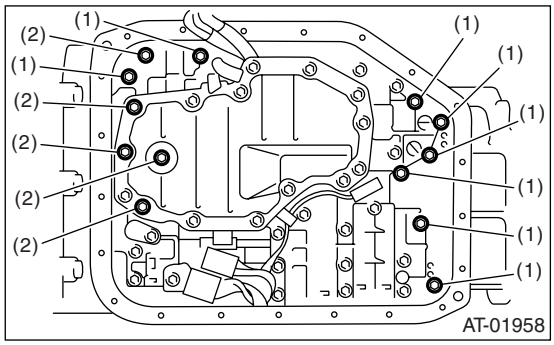
Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)


AT-02035

3) Install the control valve body.

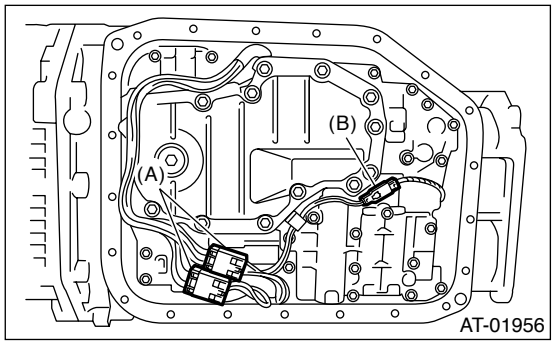
Tightening torque:
8 N·m (0.8 kgf-m, 58 ft-lb)

NOTE:
Be careful not to catch harness in.



(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

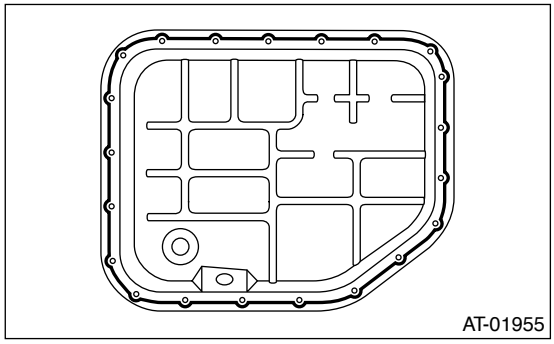
4) Connect the control valve connector and front vehicle speed sensor connector.



(A) Control valve connector
(B) Front vehicle speed sensor connector

5) Apply proper amount of liquid gasket to the entire oil pan mating surface.

Liquid gasket
THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan by equally tightening the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

7) Install the rear vehicle speed sensor and turbine speed sensor 1, and then fasten the harness.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)

8) Install a new aluminum washer and oil cooler pipe.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

9) Install the oil charge pipe. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
10) Install the transmission rear crossmember bolt.

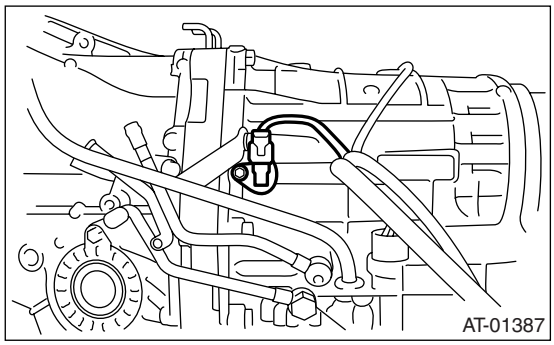
Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

11) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
12) Install the heat shield cover.
13) Install the center exhaust pipe, rear exhaust pipes and muffler. (Turbo model)
<Ref. to EX(H4DOTC)-7, INSTALLATION, Center Exhaust Pipe.> <Ref. to EX(H4DOTC)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4DOTC)-12, INSTALLATION, Muffler.>
14) Install the rear exhaust pipe and muffler. (Non-turbo model) <Ref. to EX(H6DO)-8, INSTALLATION, Rear Exhaust Pipe.><Ref. to EX(H6DO)-10, INSTALLATION, Muffler.>
15) Lower the vehicle.
16) Install the transmission connector to the stay, and then connect the connector.
17) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
18) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
19) Pour ATF through the oil charge pipe. <Ref. to 5AT-27, REPLACEMENT, Automatic Transmission Fluid.>
20) Check the level and leaks of ATF. <Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>
21) Execute the learning control promotion. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

16. Turbine speed sensor 1

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
3) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
4) Disconnect the turbine speed sensor 1 connector.



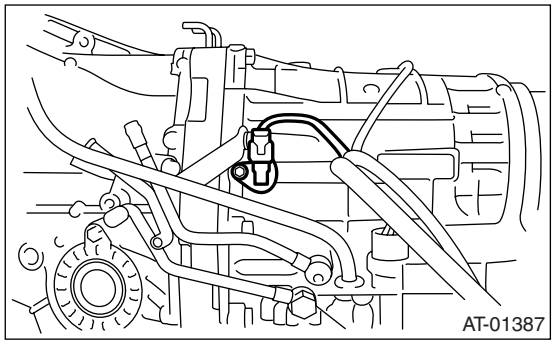
5) Remove the turbine speed sensor 1.

B: INSTALLATION

1) Install the turbine speed sensor 1.

Tightening torque:
7 N·m (0.7 kgf-m, 5.2 ft-lb)

2) Connect the turbine speed sensor 1 connector.



3) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
4) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

17.Control Valve Body

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Lift-up the vehicle.
4) Clean the transmission exterior.
5) Remove the ATF drain plug to drain ATF.

CAUTION:
Directly after the engine has been running, the ATF is hot. Be careful not to burn yourself.

6) Tighten the ATF drain plug.

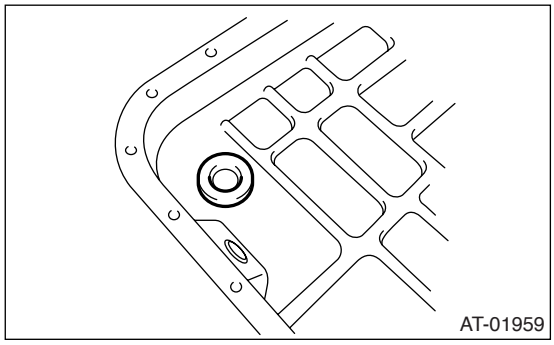
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

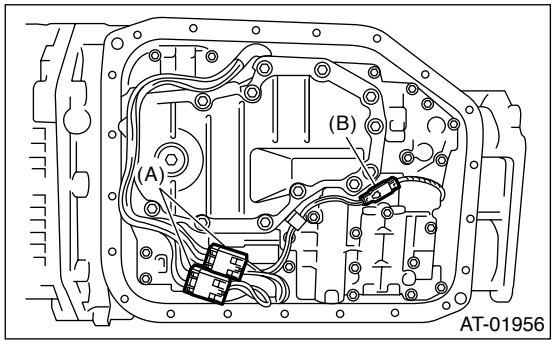
7) Remove the oil pan.

CAUTION:
Be sure to prevent the entering of dust and other foreign matters into oil pan.

8) Remove the magnet.



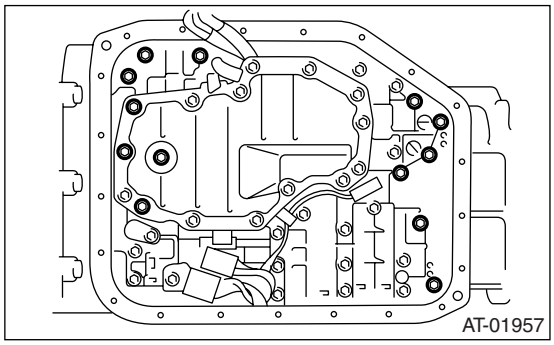
9) Clean the magnet.
10) Completely remove the remaining liquid gasket on the transmission case and oil pan.
11) Disconnect the control valve connector and front vehicle speed sensor connector.



(A) Control valve connector
(B) Front vehicle speed sensor connector

12) Remove the control valve body.

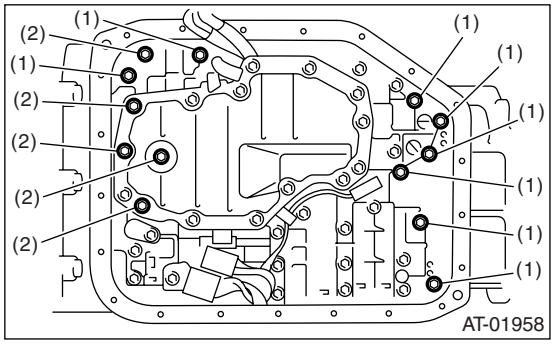
NOTE:
Replace the control valve body as assembly, because it is non-disassemble part.



B: INSTALLATION

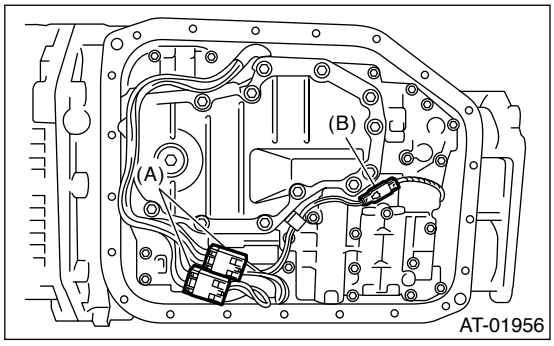
1) Check the control valve body for dust and other foreign matters.
2) Install the control valve body to transmission by equally tightening the bolts.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



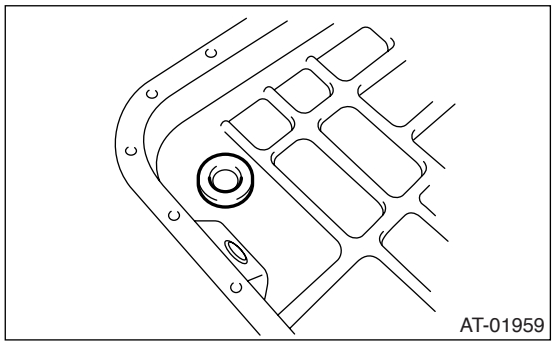
(1) 58 mm (2.28 in)
(2) 65 mm (2.56 in)

3) Connect the control valve connector.



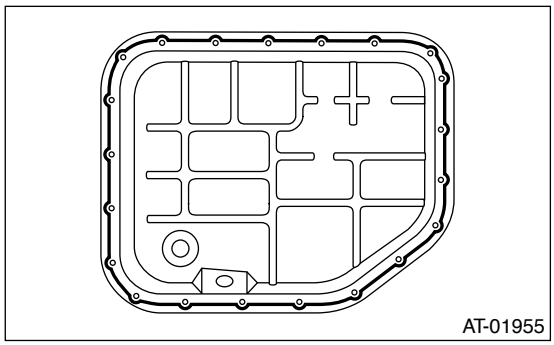
(A) Control valve connector
(B) Front vehicle speed sensor connector

4) Attach the magnet at the specified position of oil pan.



5) Apply liquid gasket to the oil pan.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)



6) Install the oil pan by equally tightening the bolts.

Tightening torque:
5 N·m (0.5 kgf-m, 3.6 ft-lb)

7) Pour ATF through the oil charge pipe.

Specified and recommended fluid:
<Ref. to 5AT-2, SPECIFICATION, General Description.>

Capacity:
Fill the same amount of the drained ATF.

8) Check the ATF level.
<Ref. to 5AT-27, Automatic Transmission Fluid.>
9) Execute the learning control promotion. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

C: INSPECTION

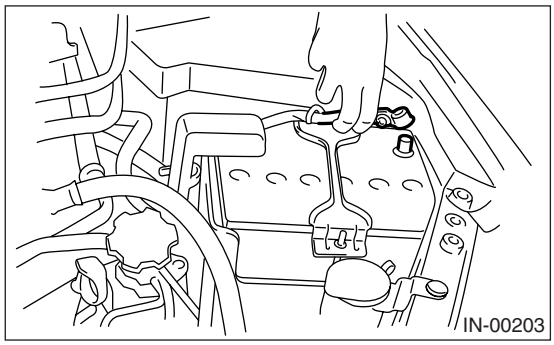
Check each parts for holes, damages or other foreign matters.

18.ATF Filter

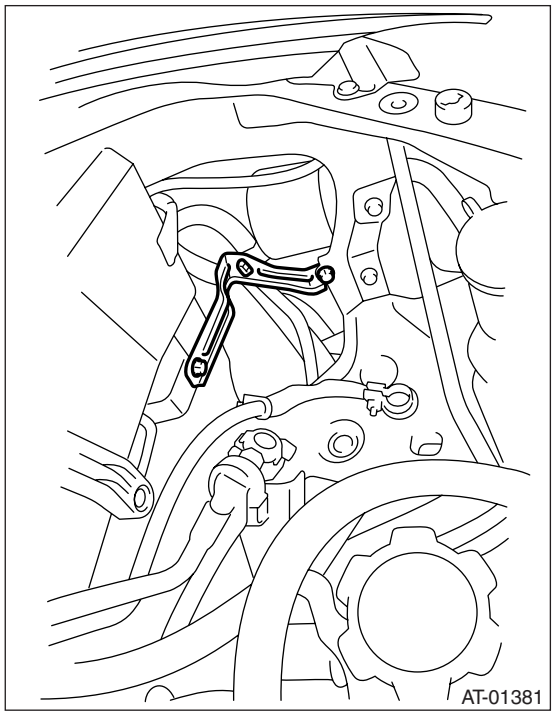
A: REMOVAL

NOTE:
ATF filter is maintenance free.

1) Disconnect the ground cable from battery and remove the battery from vehicle.



2) Remove the harness securing bracket.



3) Using the ST, remove the ATF filter.
ST 498545400 OIL FILTER WRENCH

B: INSTALLATION

1) Apply a thin coat of ATF to the oil seal part of new ATF filter.
2) Install the ATF filter. Turn it by hand, being careful not to damage oil seal.
3) Tighten the ATF filter using ST.
Calculate the ATF filter tightening torque using following formula.
$T2 = L2/(L1 + L2) \times T1$
T1: 14 N·m (1.4 kgf-m, 10.1 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST length 78 mm (3.07 in)
L2: Torque wrench length
Example:

Torque wrench length mm (in)	Tightening torque N·m (kgf-m, ft-lb)
100 (3.94)	7.7 (0.79, 5.7)
150 (5.91)	9.0 (0.92, 6.7)
200 (7.87)	10 (1.0, 7.2)

NOTE:
Align the ST with torque wrench while tightening the ATF filter.

ST 498545400 OIL FILTER WRENCH
4) Fill ATF.
5) Inspect the level of ATF. <Ref. to 5AT-27, Automatic Transmission Fluid.>
6) Install the harness securing bracket.
7) Install the battery.

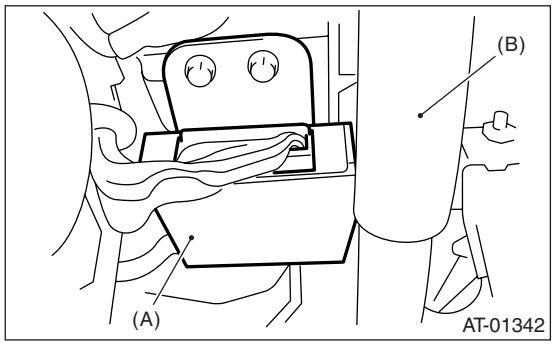
C: INSPECTION

Check for rust, hole, ATF leaks and other damage. Replace the part if any defect is found from the inspection.

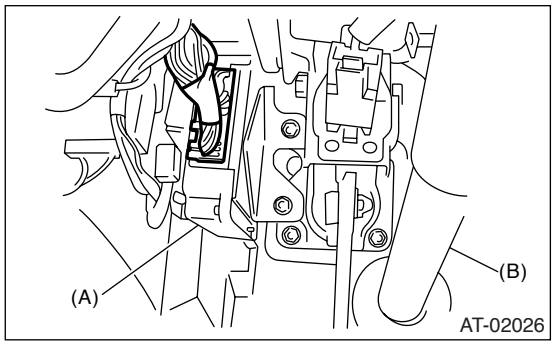
19. Transmission Control Module (TCM)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lower cover and then disconnect the connector.
3) Remove the body integrated unit. (RHD model) <Ref. to SL-46, REMOVAL, Body Integrated Unit.>
4) Disconnect the connector from TCM.
• RHD model



• LHD model



(A) Transmission control module (TCM)
(B) Steering column

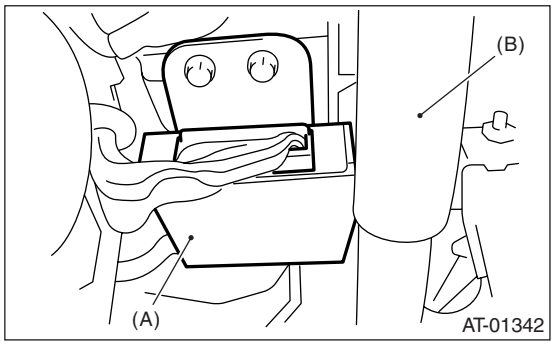
5) Remove the relay from TCM body.
6) Remove the TCM.

B: INSTALLATION

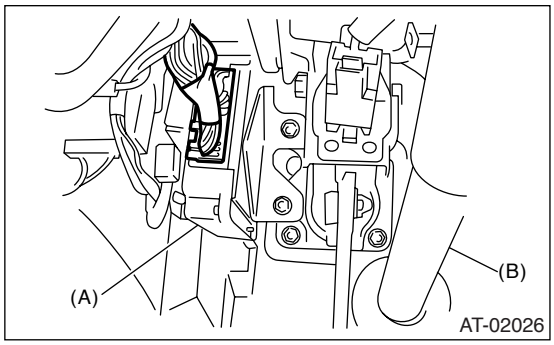
1) Install the relay to TCM body.
2) Install the TCM.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

• RHD model



• LHD model



(A) Transmission control module (TCM)
(B) Steering column

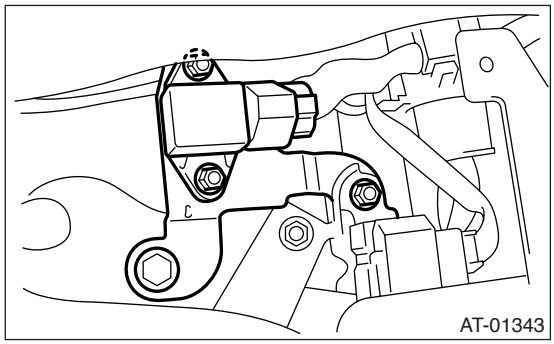
3) Connect the connector to TCM.
4) Install in the reverse order of removal.
5) Perform the Clear Memory 2. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>
(1) Connect the Subaru Select Monitor to data link connector.
(2) Turn ignition switch to ON (engine OFF) and turn Subaru Select Monitor switch to ON.
(3) Ensure that the select lever is in “P” range.
(4) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
(5) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
(6) Press the [YES] key after the information of transmission type has been displayed.
(7) On the «Transmission Diagnosis» display screen, select the {Clear Memory 2} and press the [YES] key.
6) Perform the inspection with driving the vehicle at the end of repair work, and make sure there is no faulty as below;
• Excessive shift shock
• Oil leakage from transmission proper and etc.
• Occurrence of noise caused by interference etc.

NOTE:
If excessive shift shock is felt, execute the advance operation of learning control. <Ref. to 5AT(diag)-22, PROCEDURE, Learning Control.>

20.Lateral G Sensor

A: REMOVAL

1) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
2) Disconnect the connector from lateral G sensor.

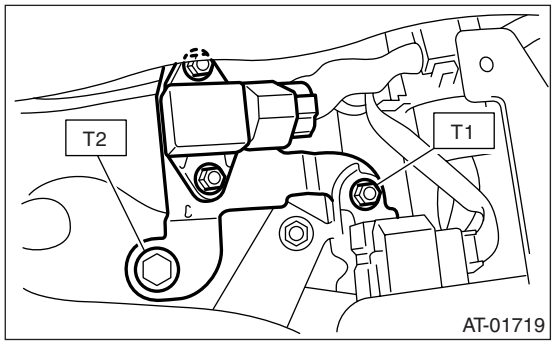


3) Remove the lateral G sensor.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
T1: 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
T2: 24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION

5AT

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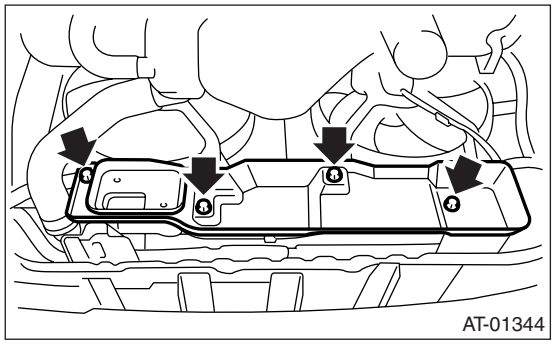
21.ATF Cooler Pipe & Hose

A: REMOVAL

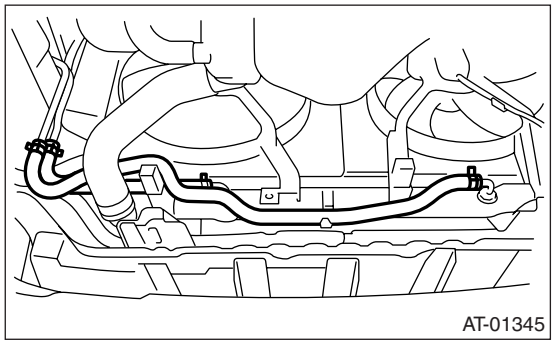
1. EXCEPT FOR ATF COOLER MODEL WITH WARMER FUNCTION

1) Set the vehicle on a lift.
2) Remove the battery.
3) Lift-up the vehicle.
4) Remove the under cover.
5) Remove the radiator under cover.



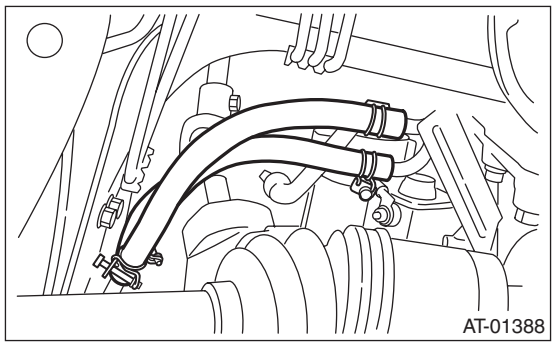
6) Disconnect the ATF cooler hose from radiator.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

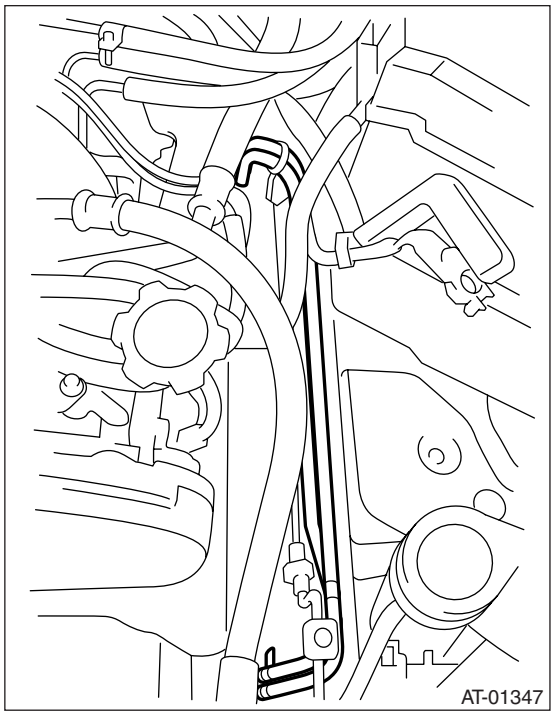


7) Disconnect the ATF cooler hoses from pipes.

NOTE:
• Do not use a screwdriver or other pointed tools.
• When hard to remove the hose, wrap the hose with cloth to prevent from damaging, and then turn with pliers and pull out with hand straightly.

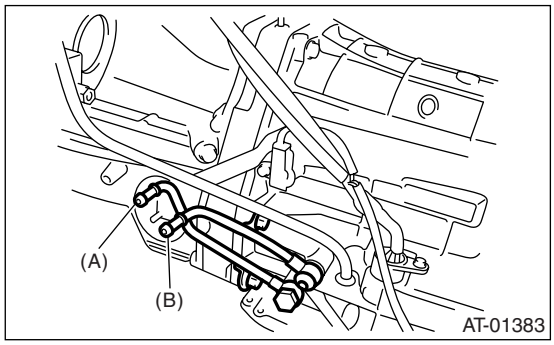


8) Disconnect the ATF cooler pipe from frame.



9) Remove the oil cooler inlet and outlet pipes.

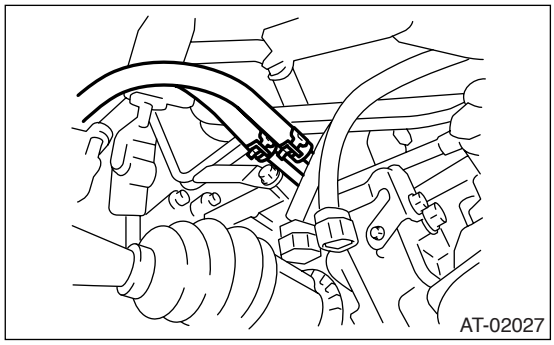
NOTE:
When disconnecting the outlet pipe, be careful not to lose the ball and spring used with retaining screw.



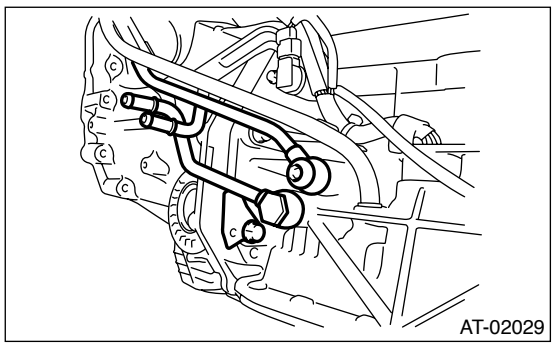
(A) Outlet pipe
(B) Inlet pipe

2. ATF COOLER MODEL WITH WARMER FUNCTION

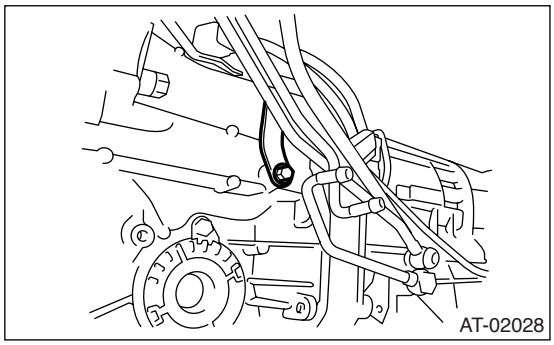
1) Lift-up the vehicle.
2) Remove the front exhaust pipe.
<Ref. to EX(H6DO)-5, REMOVAL, Front Exhaust Pipe.>
3) Disconnect the inlet and outlet hoses of the ATF cooler pipe from oil cooler pipe.



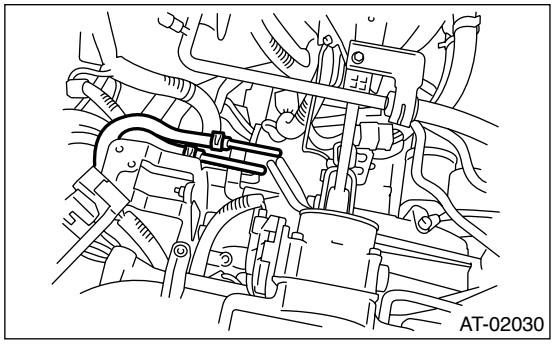
4) Remove the union screw of oil cooler inlet and outlet pipes.



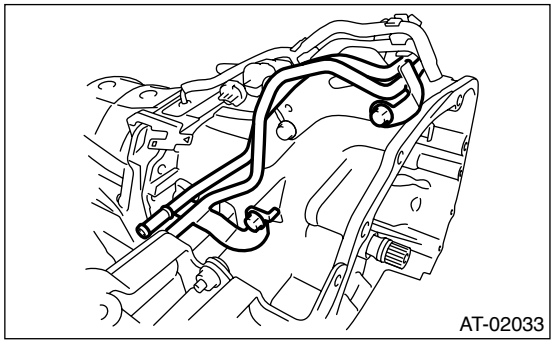
5) Remove the pipe securing bolts on the side of transmission.



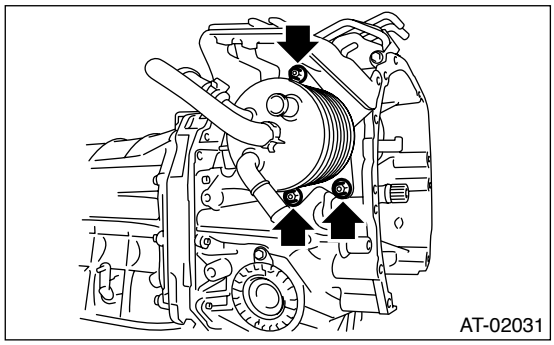
6) Lower the vehicle.
7) Remove the air intake chamber.
<Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
8) Remove the resonator chamber.
<Ref. to IN(H6DO)-9, REMOVAL, Resonator Chamber.>
9) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
10) Disconnect the ATF cooler hoses and pipes.



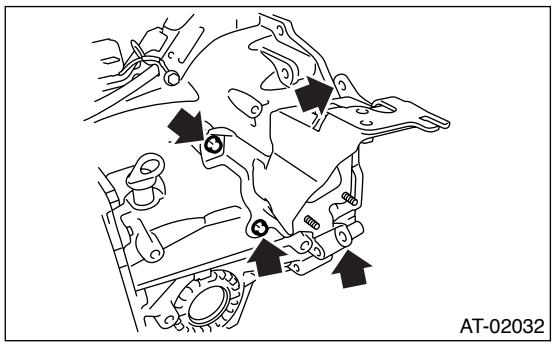
11) Remove the pitching stopper bracket securing bolt and bolt on the side of transmission, and then remove ATF cooler pipe.



12) Remove the ATF cooler from the installation bracket as necessary.



13) Remove the ATF cooler bracket from transmission body as necessary.

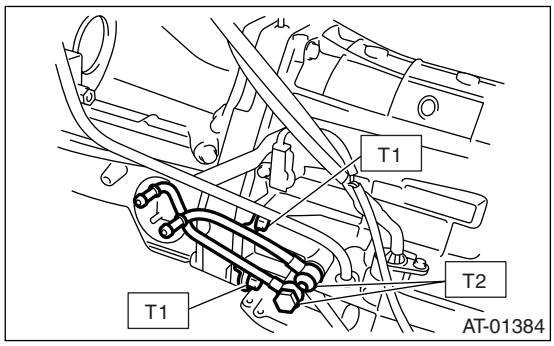


B: INSTALLATION

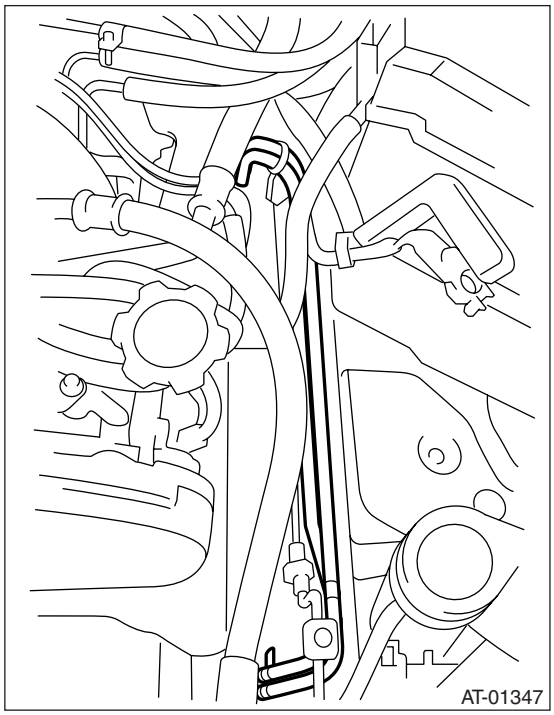
1. EXCEPT FOR ATF COOLER MODEL WITH WARMER FUNCTION

1) Install the oil cooler inlet and outlet pipes with new washer.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)

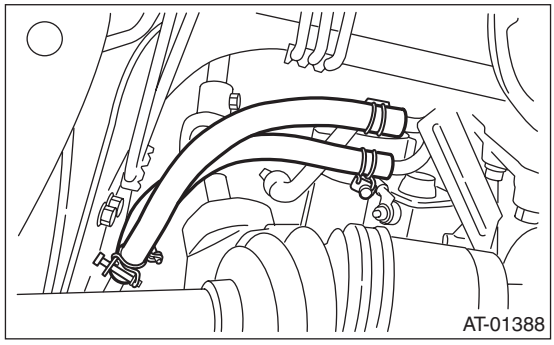


2) Install the ATF cooler pipe to frame.



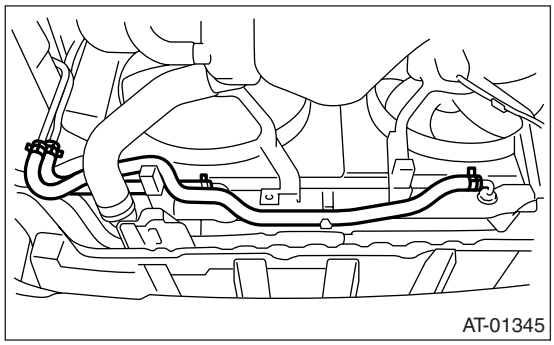
3) Connect the ATF cooler hose to pipe on the transmission side.

NOTE:
• Install so that the hose is not folded over, excessively bent or twisted.
• Be careful to insert the hose to the specified position.

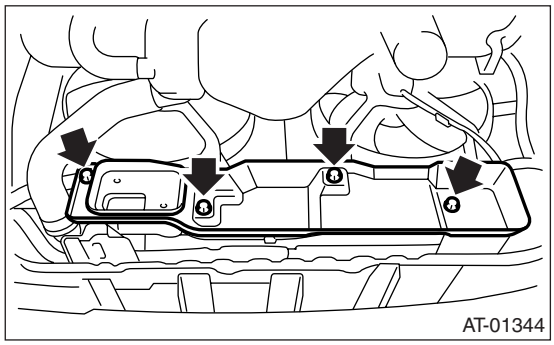


4) Connect the ATF cooler hose to pipe on radiator side.

NOTE:
• Install so that the hose is not folded over, excessively bent, or twisted.
• Be careful to insert the hose to the specified position.



5) Install the radiator under cover.
Tightening torque:
4.9 N·m (0.5 kgf-m, 3.6 ft-lb)



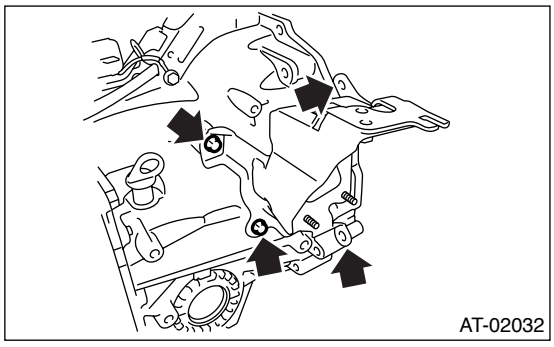
6) Install the under cover.
7) Install the battery.
8) Fill ATF. <Ref. to 5AT-27, Automatic Transmission Fluid.>

NOTE:
Make sure there are no ATF leaks in joints between the transmission, radiator, pipes, and hoses.

2. ATF COOLER MODEL WITH WARMER FUNCTION

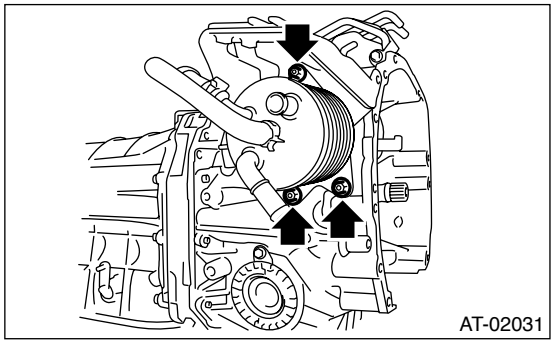
1) Install the ATF cooler bracket if it is removed from transmission body.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

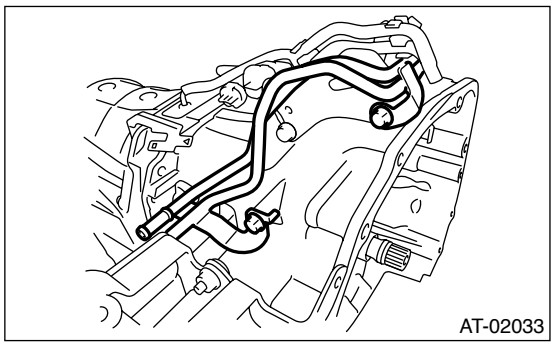


2) Install the ATF cooler if it is removed from installation bracket.

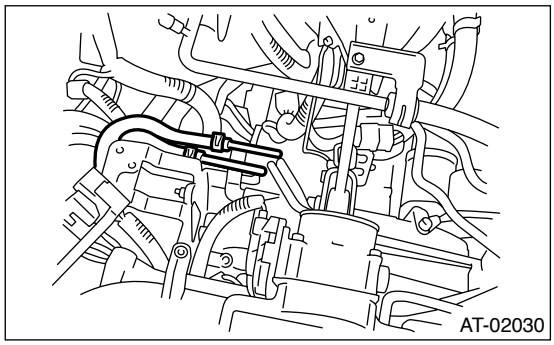
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



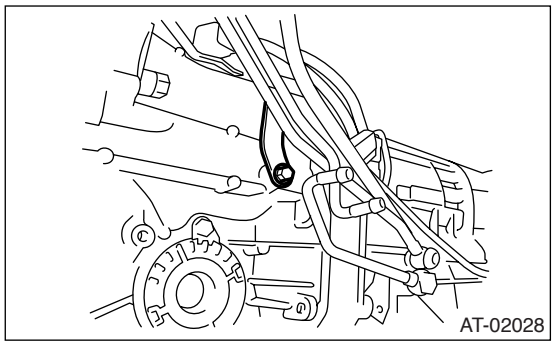
3) Install the pitching stopper securing bracket and bolt on the side of transmission.



4) Install the ATF cooler hoses and pipes.

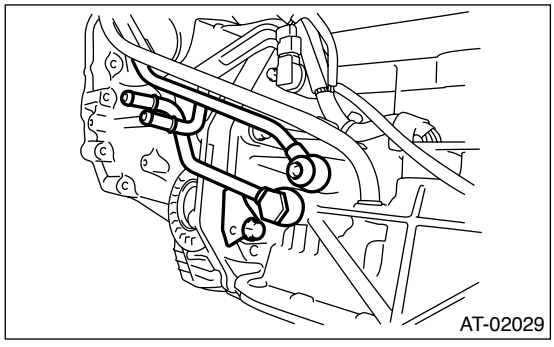


5) Connect the engine harness connectors, and then install the engine hanger rear.
6) Install the oil charge pipe. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
7) Install the resonator chamber.
<Ref. to IN(H6DO)-9, INSTALLATION, Resonator Chamber.>
8) Install the air intake chamber.
<Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>
9) Lift-up the vehicle.
10) Install the pipe securing bolts on the side of transmission.

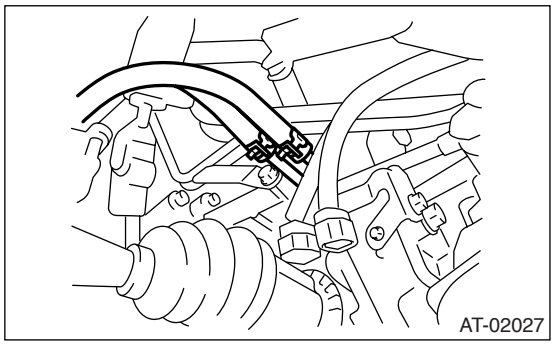


11) Install the union screw of oil cooler inlet and outlet pipes.

Tightening torque:
T1: 25 N·m (2.5 kgf-m, 18.1 ft-lb)
T2: 44 N·m (4.5 kgf-m, 32.5 ft-lb)



12) Install the inlet and outlet pipes of the ATF oil cooler hose to oil cooler pipe.



13) Install the front exhaust pipe.
<Ref. to EX(H6DO)-6, INSTALLATION, Front Exhaust Pipe.>

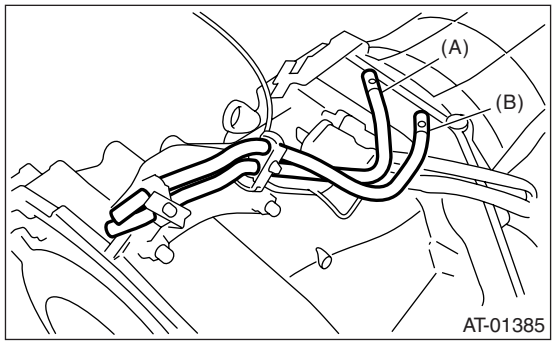
C: INSPECTION

Repair or replace any defective hoses, pipes, clamps, and washers found from the inspection below.
1) Check for ATF leaks in joints between the transmission, radiator, pipes, and hoses.
2) Check for deformed clamps.
3) Lightly bend the hose and check for cracks in the surface and other damages.
4) Pinch the hose with your fingers and check for poor elasticity. Also check for poor elasticity in the parts where the clamp was installed by pressing with your fingernail.
5) Check for peeling, cracks, and deformation at the tip of the hose.
6) Check the ATF cooler for cracks or deformation. (ATF cooler model with warmer function)

22. Air Breather Hose

A: REMOVAL

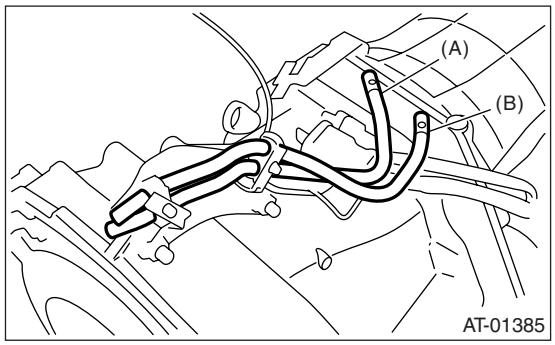
1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
3) Disconnect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump cover)

B: INSTALLATION

1) Connect the air breather hose.



(A) Air breather hose (Transmission case)
(B) Air breather hose (Oil pump cover)

2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

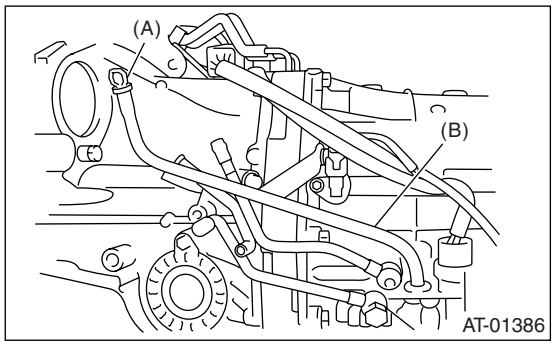
C: INSPECTION

Make sure the hose is not cracked or clogged.

23.Oil Charge Pipe

A: REMOVAL

1) Remove the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, REMOVAL, Intercooler.>
2) Remove the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, REMOVAL, Air Intake Chamber.>
3) Remove the oil charge pipe, and then remove the O-ring from flange side.

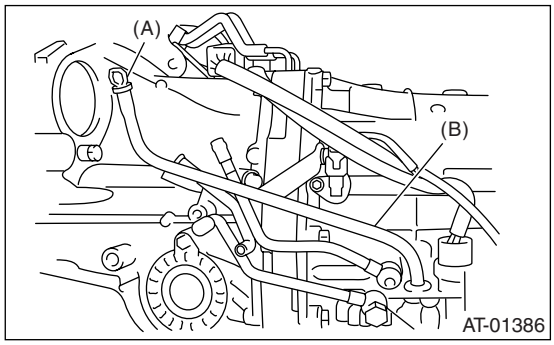


(A) Oil level gauge
(B) Oil charge pipe

B: INSTALLATION

1) Install the oil charge pipe with a new O-ring.

Tightening torque:
41 N·m (4.2 kgf-m, 30.2 ft-lb)



(A) Oil level gauge
(B) Oil charge pipe

2) Install the intercooler. (Turbo model) <Ref. to IN(H4DOTC)-12, INSTALLATION, Intercooler.>
3) Install the air intake chamber. (Non-turbo model) <Ref. to IN(H6DO)-7, INSTALLATION, Air Intake Chamber.>

C: INSPECTION

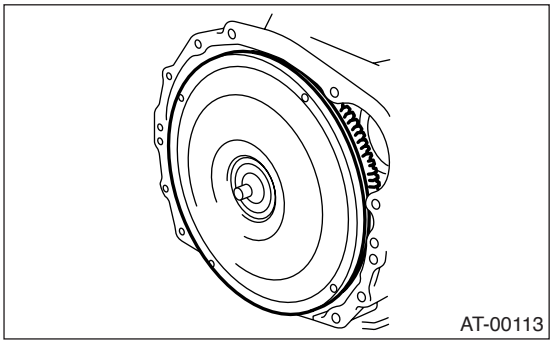
Make sure the oil charge pipe is not deformed or damaged.

24.Torque Converter Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter and oil pump shaft horizontally.

NOTE:
• Be sure not to scratch the inside of bush in oil pump shaft.
• Be careful that the oil pump shaft may drawn out simultaneously.



3) Remove the oil pump shaft from torque converter as necessary.

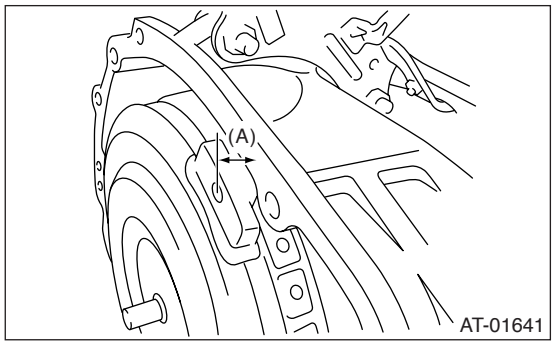
B: INSTALLATION

1) When the oil pump shaft is removed, install the shaft to torque converter.

NOTE:
Make sure the clip is firmly inserted.

2) Install the oil pump shaft to torque converter, and then make sure that the clip is secured on groove.
3) Apply ATF to the revolution and sliding surface oil pump shaft.
4) Holding the torque converter assembly by hand, lightly rotate the torque converter assembly to engage the oil pump rotor.
5) Check the protruding dimension of the torque converter assembly.

Dimension A:
Less than 8 mm (0.31 in)



(A) Dimension A

6) Install the transmission assembly into the vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

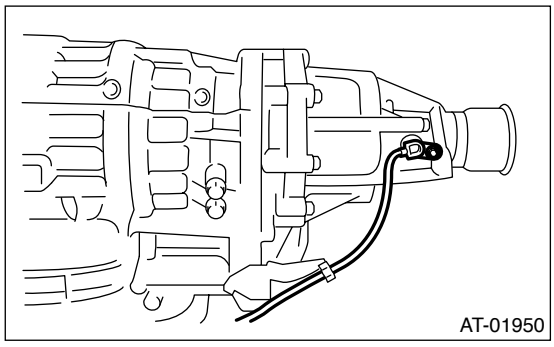
C: INSPECTION

Make sure the ring gear and protrusion of torque converter end are not deformed or damaged.

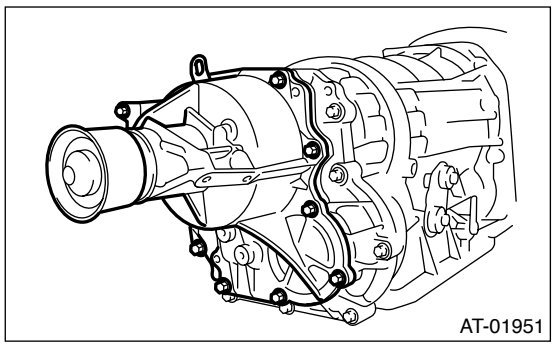
25. Extension Case & Intermediate Case

A: REMOVAL

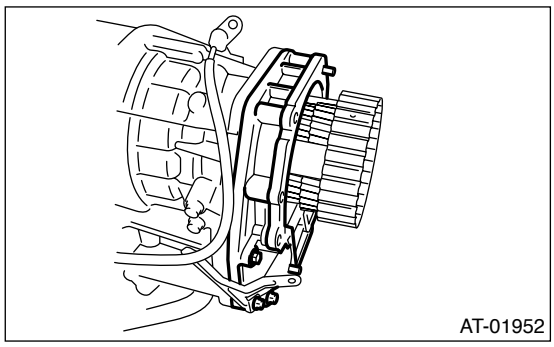
1) Remove the transmission assembly.
<Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor.


AT-01950

3) Separate the extension case and intermediate case.


AT-01951

4) Separate the intermediate case and transmission main case.

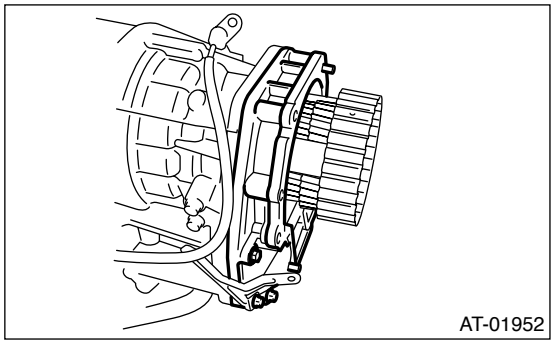

AT-01952

B: INSTALLATION

1) Secure the intermediate case to transmission main case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

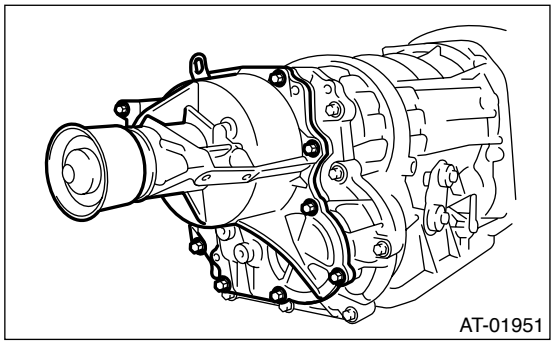
NOTE:
Use a new gasket.


AT-01952

2) Attach the selected reduction driven gear shim to end surface of reduction driven gear with vaseline. <Ref. to 5AT-79, ADJUSTMENT, Reduction Driven Gear.>
3) Install the extension case to intermediate case.

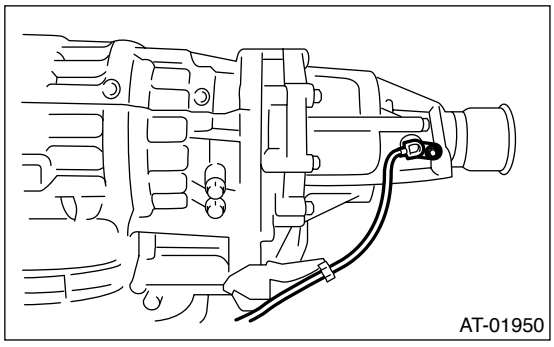
NOTE:
Use a new gasket.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)


AT-01951

4) Install the rear vehicle speed sensor.

Tightening torque:
7 N·m (0.7 kgf-m, 5.1 ft-lb)


AT-01950

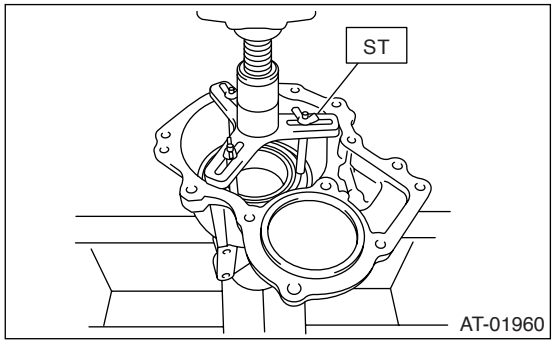
5) Install the transmission assembly.
<Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

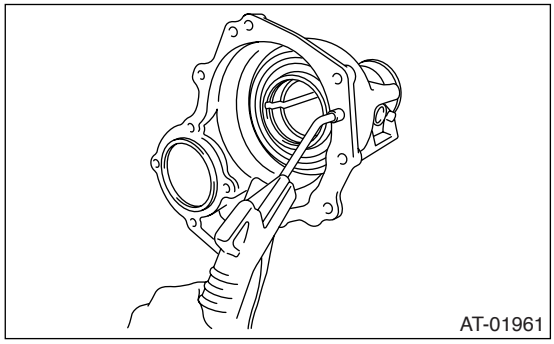
1) Take out the transfer clutch and multi-plate clutch hub assembly by lightly tapping the end of rear drive shaft.

NOTE:
Be careful not to damage the oil seal of extension.

2) Remove snap ring using ST and press.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



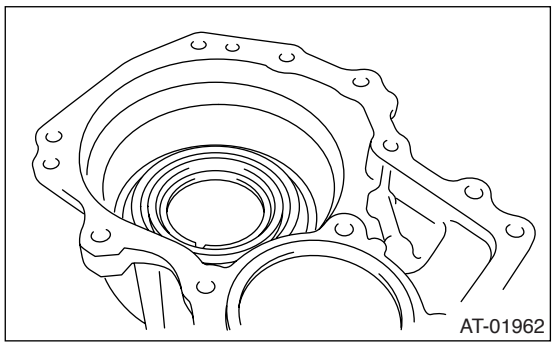
3) Supply compressed air to remove the clutch piston.



4) Remove the dust cover from extension case.
5) Remove the oil seal from extension case.

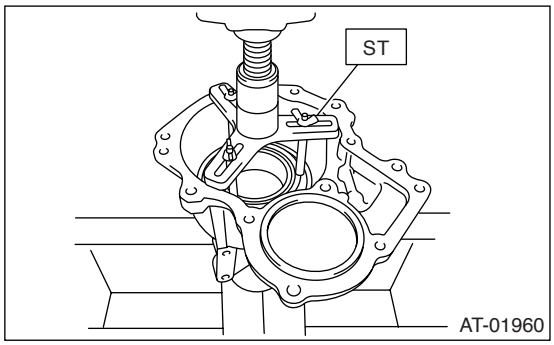
D: ASSEMBLY

1) Press-fit new oil seal using ST and press.
ST 498057300 INSTALLER
2) Press-fit the dust cover.
3) Insert the multi-plate clutch, drive plate, driven plate and spring retainer.



(A) Spring retainer
(B) Multi-plate clutch (LSD) piston assembly

4) Using the ST and compressor, install the snap ring.
ST 18762AA000 COMPRESSOR SPECIAL TOOL



5) Install the transfer clutch. <Ref. to 5AT-74, INSTALLATION, Transfer Clutch.>

NOTE:
For 3-transfer clutch model, make sure the press plate is included.

6) Install the multi-plate hub assembly.

E: INSPECTION

• Use compressed air to make sure the extension case routes are not clogged and not leaks.
• Measure the extension end play and adjust it to within specifications.
<Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

26.Transfer Clutch

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case, and then remove the transfer clutch. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.> <Ref. to 5AT-73, DISASSEMBLY, Extension Case & Intermediate Case.>

B: INSTALLATION

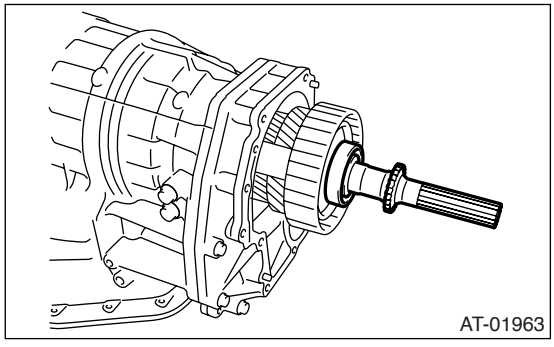
1) Select the rear drive shaft shim. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
2) Select the driven plate No. 3. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
3) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
4) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

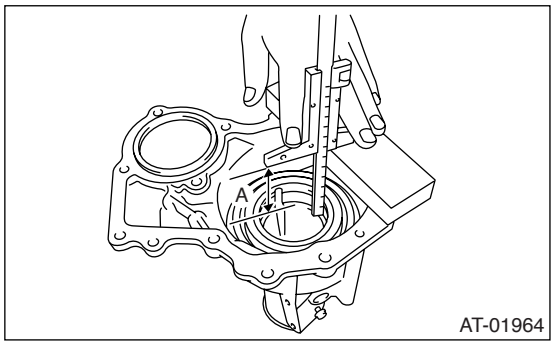
• Inspect the drive plate facing for wear and damage.
• Inspect the snap ring for wear; return spring for permanent distortion, breakage and deformation.
• Check that the D-ring is not damaged.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

D: ADJUSTMENT

1) Insert the rear drive shaft into the reduction drive gear and center differential assembly.


AT-01963

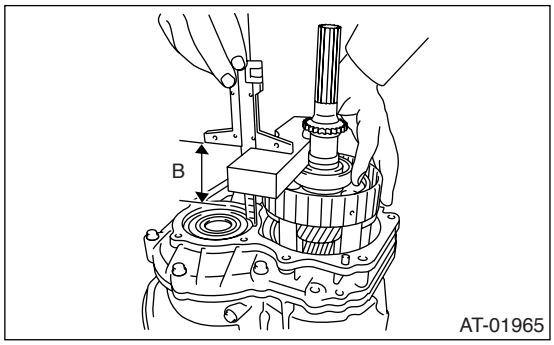
2) Using the ST, measure the depth “A”, which is from mating surface of extension case to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-01964

A Measured value

3) Using the ST, measure the height “B” from the intermediate case mating surface to ball bearing outer ring contact surface.
ST 398643600 GAUGE



AT-01965

B Measured value

4) Calculation formula:
When clearances are 0.05 mm (0.0020 in):
T (mm) = A – (B – 0.28) – 0.05
[T (in) = A – (B – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A – (B – 0.28) – 0.25
[T (in) = A – (B – 0.011) – 0.0098]
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of intermediate case to ball bearing outer ring contact surface
T: Shim thickness
0.05 — 0.25 mm (0.0020 — 0.0098 in)

NOTE:
Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE). When not using ST, apply following.
When clearances are 0.05 mm (0.0020 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.05
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0020]
When clearances are 0.25 mm (0.0098 in):
T (mm) = (A – α) – ((B – β) – 0.28) – 0.25
[T (in) = (A – α) – ((B – β) – 0.011) – 0.0098]

T: Shim thickness
A: Depth from end of extension case to ball bearing outer ring contact surface
B: Height from end of intermediate case to ball bearing outer ring contact surface
α: Collar thickness used when measuring “A”
β: Collar thickness used when measuring “B”
0.28 (0.011): Gasket thickness (Unit mm (in))

Adjustment shim	
Part Number	Thickness mm (in)
33281AA040	0.2 (0.008)
33281AA050	0.5 (0.020)
33281AA060	0.3 (0.012)

27.Multi-Plate Clutch

A: REMOVAL

Remove the multi-plate clutch following the same instructions as for the extension case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>

B: INSTALLATION

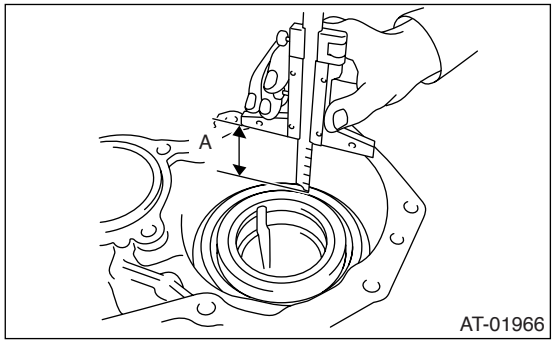
Install the multi-plate clutch following the same instructions as for the extension case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>

C: INSPECTION

• Inspect the drive plate facing for wear and damage.
• Inspect the snap ring for wear; return spring for permanent distortion, breakage and deformation.
• Inspect the damage for D-ring.
• Measure the multi-plate clutch clearance and adjust it within specification. <Ref. to 5AT-76, ADJUSTMENT, Multi-Plate Clutch.>

D: ADJUSTMENT

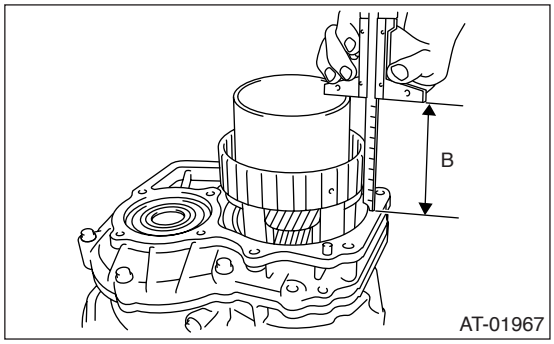
1) Remove drive plate and driven plate from center differential carrier.
2) Measure the depth “A” from mating surface of extension case to multi-plate clutch (LSD) piston.



A Measured value

3) Using the ST, measure the height “B” from intermediate case mating surface to end of center differential clutch drum, and then subtract the thickness of ST gauge (50 mm (1.97 in)) from measured value.
ST 378744300 GAUGE

NOTE:
Measure with driven plate No. 3 removed.



B Measured value

4) Calculation formula:
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – 0.28) – 0.2
[T (in) = A – (B – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – 0.28) – 0.6
[T (in) = A – (B – 0.011) – 0.024]

NOTE:
• Calculation formula for “T” is applied when measuring using ST (398643600 GAUGE, 398744300 GAUGE). When not using ST, apply following.
When clearances are 0.2 mm (0.008 in):
T (mm) = A – (B – α – 0.28) – 0.2
[T (in) = A – (B – α – 0.011) – 0.008]
When clearances are 0.6 mm (0.024 in):
T (mm) = A – (B – α – 0.28) – 0.6
[T (in) = A – (B – α – 0.011) – 0.024]
T: Thickness of driven plate No. 3
A: Measure the depth from mating surface of extension case to multi-plate clutch (LSD) piston
B: Height from end of intermediate case to center differential clutch drum
α: Collar thickness used when measuring “B”
0.28 (0.011): Gasket thickness (Unit mm (in))
• Measure multi-plate clutch (LSD) driven and drive plate thickness to find the clearance between measurement value and “T”.

Standard value:
0.2 — 0.6 mm (0.008 — 0.024 in)

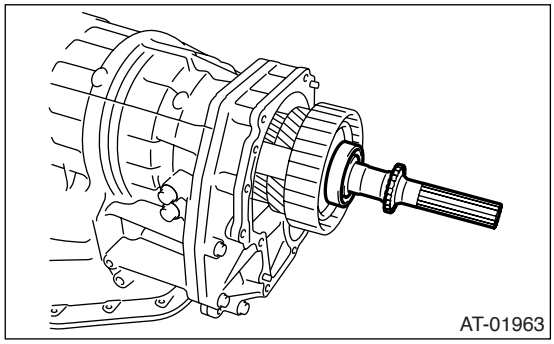
If outside the standard value, replace the plate set (drive and driven plate) and select the driven plate No. 3 to bring clearance within the standard value.

Driven plate No. 3	
Part Number	Thickness mm (in)
31589AA041	1.6 (0.063)
31589AA050	2.0 (0.079)
31589AA060	2.4 (0.094)
31589AA070	2.8 (0.110)

28.Rear Drive Shaft

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then remove the extension case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Pull out the rear drive shaft from center differential assembly.



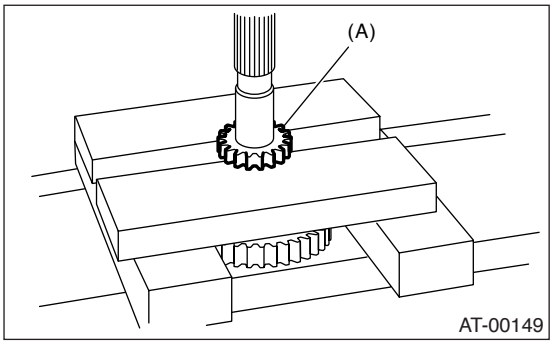
4) Remove the drive plate and driven plate.

B: INSTALLATION

1) Select the appropriate shim. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>
2) Install drive plate and driven plate.
3) Insert the rear drive shaft into the center differential assembly.
4) Combine the extension case, and then install the rear vehicle speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
5) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

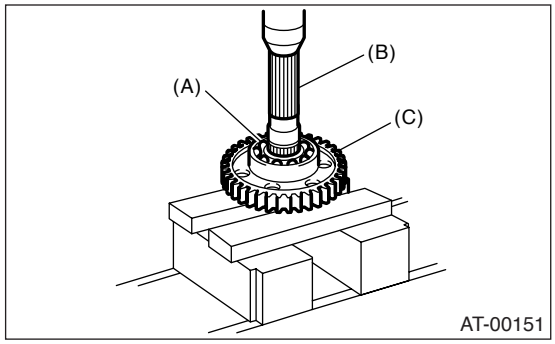
C: DISASSEMBLY

1) Using a press, remove the revolution gear.



(A) Revolution gear

2) Using a press, remove the front and rear side ball bearings, and clutch hub.

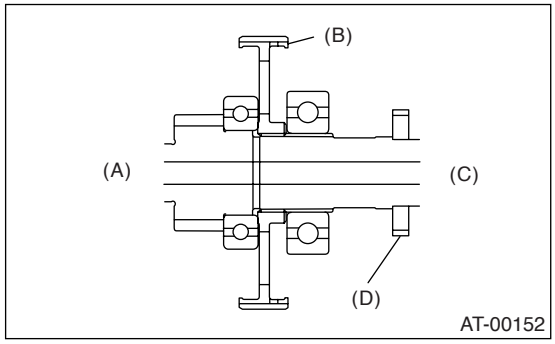


(A) Rear ball bearing
(B) Rear drive shaft
(C) Clutch hub

D: ASSEMBLY

Assemble in the reverse order of disassembly.

NOTE:
• Use new ball bearings and revolution gear.
• Make sure the clutch hub is oriented in the correct direction.



(A) Front side
(B) Clutch hub
(C) Rear side
(D) Revolution gear

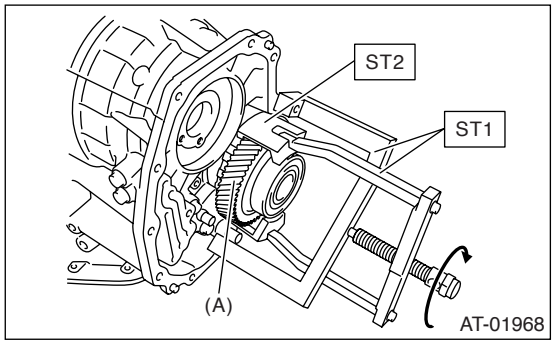
E: INSPECTION

• Check each parts for holes, damages or other foreign matters.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

29.Reduction Driven Gear

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear vehicle speed sensor, and then separate the extension case and intermediate case from transmission case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
4) Set the select lever to “P” range.
5) Using the ST1 and ST2, extract the reduction driven gear.
ST1 499737100 PULLER SET
ST2 18680AA000 GEAR HOLDER



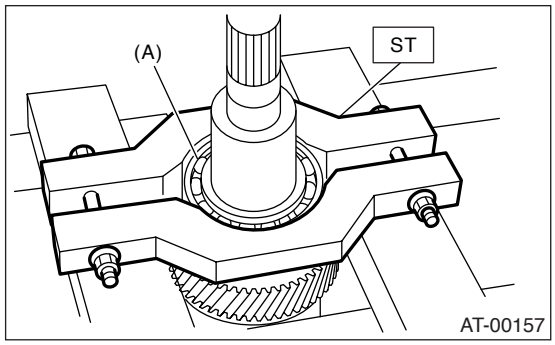
(A) Reduction driven gear

B: INSTALLATION

1) Set the select lever to “P” range.
2) Use a plastic hammer to install reduction driven gear assembly.
3) Select the reduction gear shim. <Ref. to 5AT-79, ADJUSTMENT, Reduction Driven Gear.>
4) Connect the transmission case, extension case and intermediate case, and install the rear wheel speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
5) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

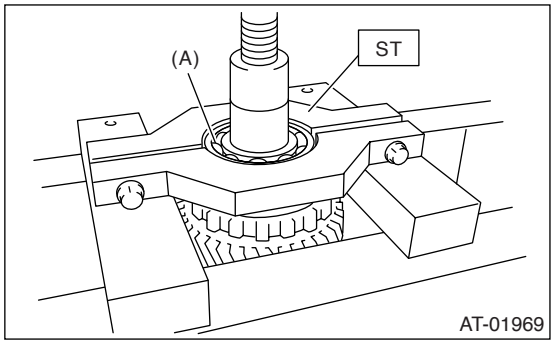
C: DISASSEMBLY

1) Remove the ball bearing from reduction driven gear using ST.
ST 498077310 REMOVER



(A) Ball bearing

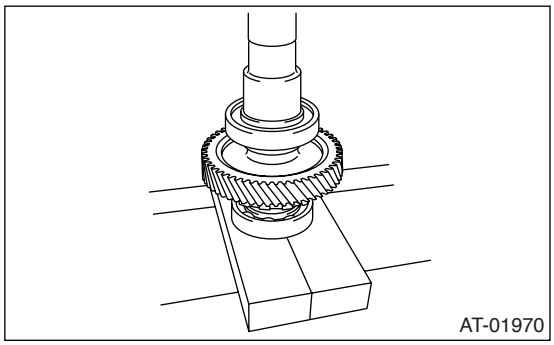
2) Remove the ball bearing on reverse side with the same procedure in step 1).



3) Remove the snap ring from reduction driven gear.

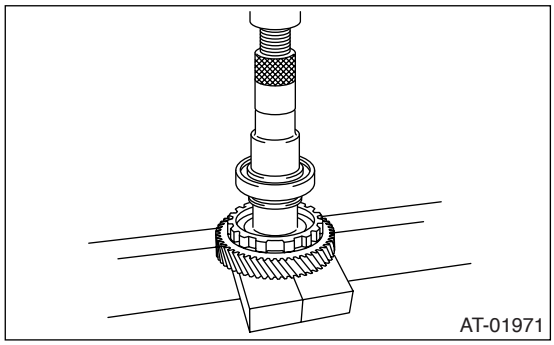
D: ASSEMBLY

1) Install the snap ring to reduction driven gear.
2) Install the new ball bearing to reduction driven gear using press.



(A) Ball bearing

3) Install the ball bearing on reverse side with the same procedure in step 2).

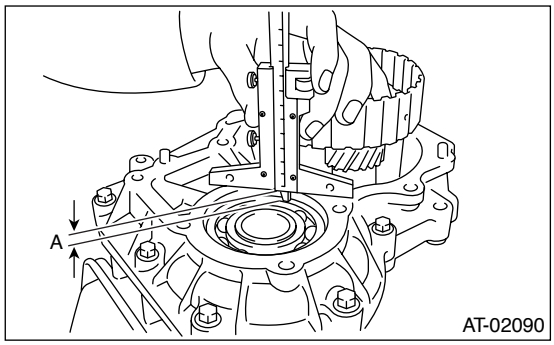


E: INSPECTION

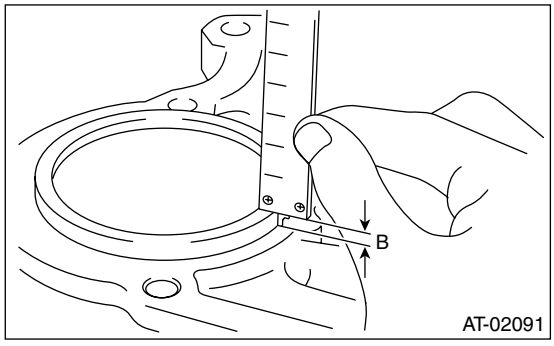
Make sure the ball bearing and gear are not deformed or damaged.

F: ADJUSTMENT

1) Using depth gauge, measure depth “A” from mating surface of extension case to ball bearing on rear end of reduction driven gear.



2) Using a depth gauge, measure the height “B” from mating surface of extension case to ball bearing inside low part of extension case.



3) Calculation formula:
Select the ball bearing from the table to adjust clearances within 0.05 — 0.25 mm (0.0020 — 0.098 in).
When clearances are 0.05 mm (0.0020 in):
T (mm) = A − B + 0.23
[T (in) = A − B + 0.0091]
When clearances are 0.25 mm (0.0098 in):
T (mm) = A − B + 0.03
[T (in) = A − B +0.0011]

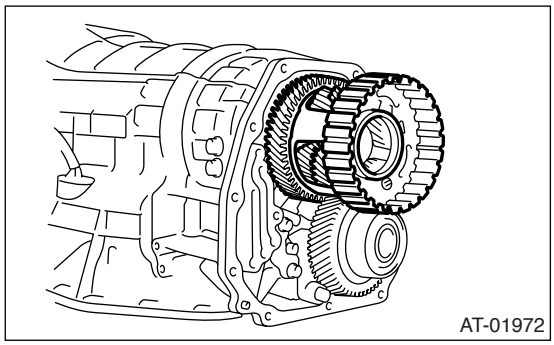
T: Shim clearance
A: Depth from mating surface of extension case to ball bearing outer ring end surface
B: Height from mating surface of extension case to ball bearing inside low part

Reduction gear shim	
Part Number	Thickness mm (in)
31288AA030	0.2 (0.008)
31288AA050	0.5 (0.020)
31288AA060	0.3 (0.012)

30.Center Differential Carrier

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the rear wheel speed sensor, and separate the extension case and intermediate case from transmission case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Pull out the rear drive shaft. <Ref. to 5AT-77, REMOVAL, Rear Drive Shaft.>
4) Pull out the center differential carrier assembly.

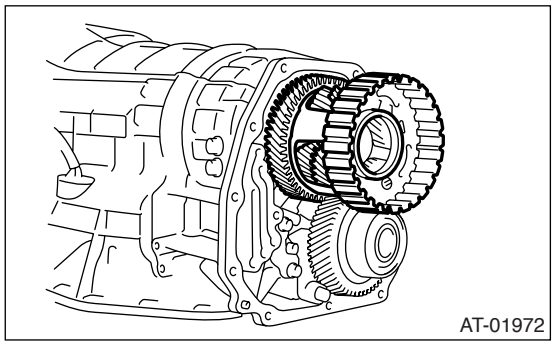


5) Pull out the shim(s) from transmission case.

B: INSTALLATION

1) Install the center differential assembly with the shim(s).

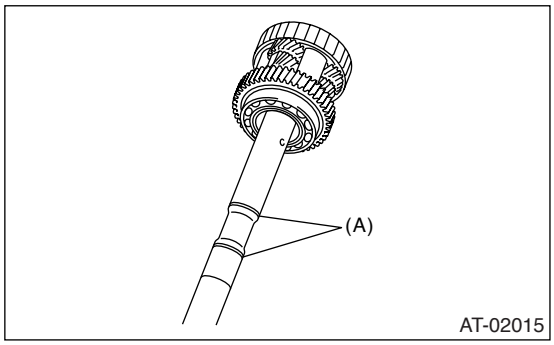
NOTE:
Press-fit it to the bottom of bearing shoulder completely.



2) Insert the rear drive shaft. <Ref. to 5AT-77, INSTALLATION, Rear Drive Shaft.>
3) Connect the transmission case, extension case and intermediate case, and install the rear wheel speed sensor. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
4) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

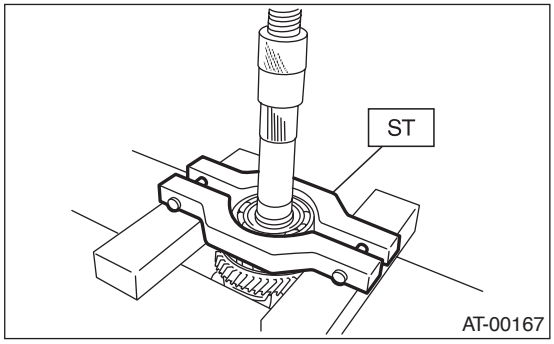
C: DISASSEMBLY

1) Remove the seal ring.

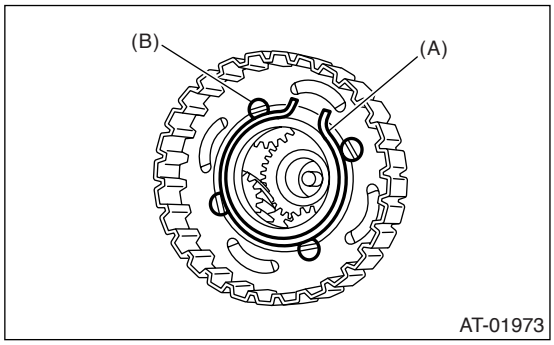


(A) Seal ring

2) Using a press and ST, remove the ball bearing.
ST 498077600 REMOVER

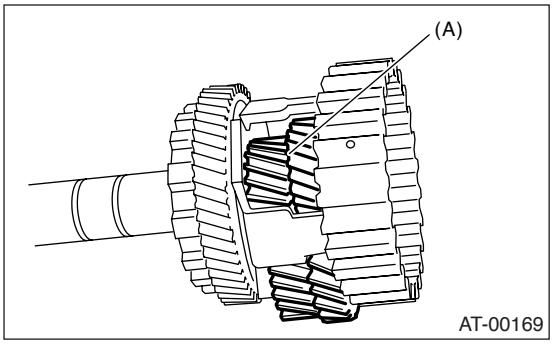


3) Remove the snap ring, and pull out the shaft from center differential assembly.



(A) Snap ring
(B) Shaft

4) Remove the thrust washers, pinion gears and washers from center differential assembly.

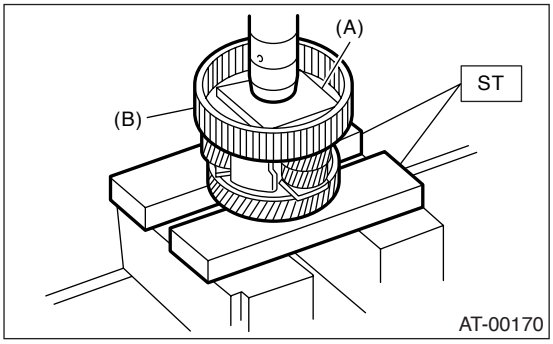


(A) Pinion gear

5) Pull out the intermediate shaft and thrust bearing.

D: ASSEMBLY

1) Install the thrust washer onto intermediate shaft.
2) Install the thrust bearing onto intermediate shaft.
3) Install the pinion gears and washers.
4) Insert the shaft into the center differential assembly.
5) Install the snap ring.
6) Using a press, install a new ball bearing into the center differential assembly.
ST 498077000 REMOVER



(A) Plate
(B) Center differential carrier

7) Apply vaseline onto the seal ring outer surface and shaft grooves.
8) Install a new seal rings.

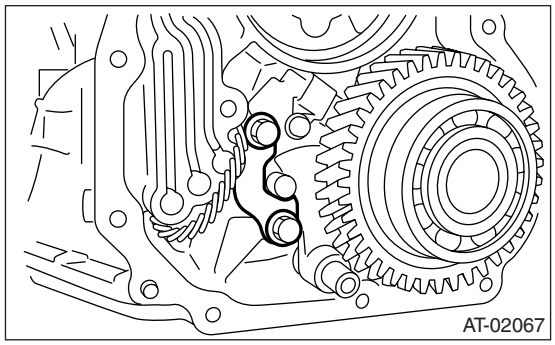
E: INSPECTION

• Check each parts for holes, damages or other foreign matters.
• Inspect the extension end play and adjust it to within specifications. <Ref. to 5AT-74, ADJUSTMENT, Transfer Clutch.>

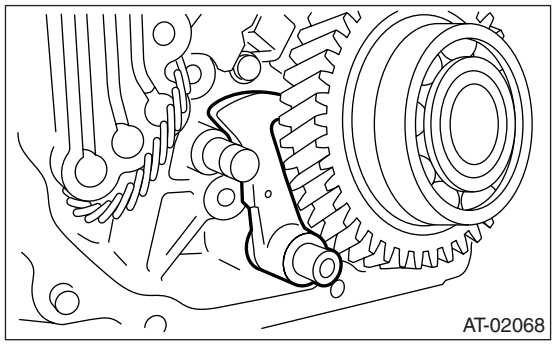
31.Parking Pawl

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the extension case and intermediate case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
3) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
4) Remove the parking support actuator.

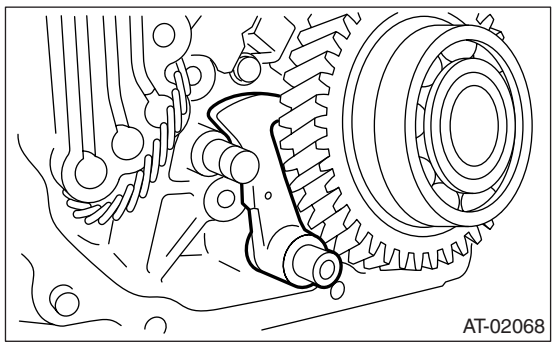


5) Remove the parking pawl, parking pawl shaft and return spring.

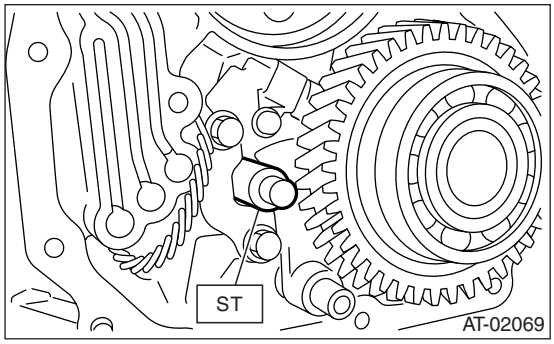


B: INSTALLATION

1) Set the transmission to “N” range.
2) Install the parking pawl, parking pawl shaft and return spring.



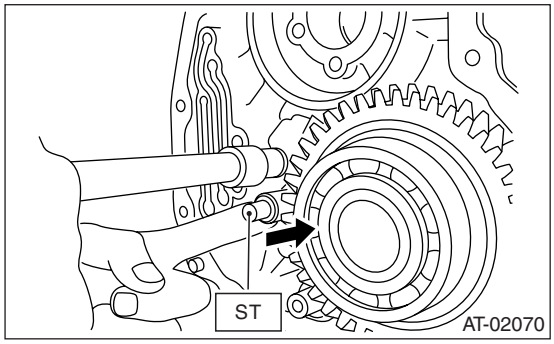
3) Temporarily secure the parking support actuator.
4) Set the ST between parking pawl and parking support actuator.
ST 18679AA000 ADJUSTER



5) Tighten the securing bolts while pressing parking support actuator with finger.

Tightening torque:
10±2 N·m (1.0±0.2 kgf-m, 7.4±1.5 ft-lb)

CAUTION:
Press the reduction driven gear and parking pawl in bottom condition.

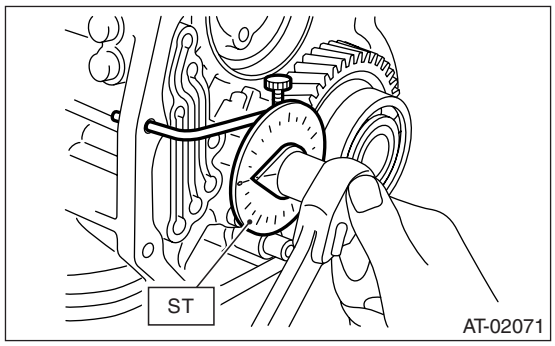


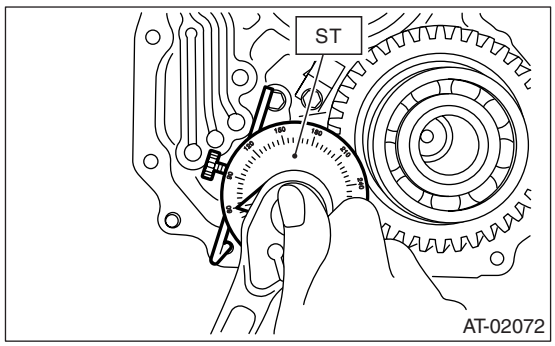
6) Using the ST, tighten the bolts which tightened in step 4) with specified angle.

Tightening angle:
18°±2°

ST 18554AA000 ANGLE GAUGE

NOTE:
Do not use extension as much as possible.





7) Install the center differential carrier. <Ref. to 5AT-80, INSTALLATION, Center Differential Carrier.>
8) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
9) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

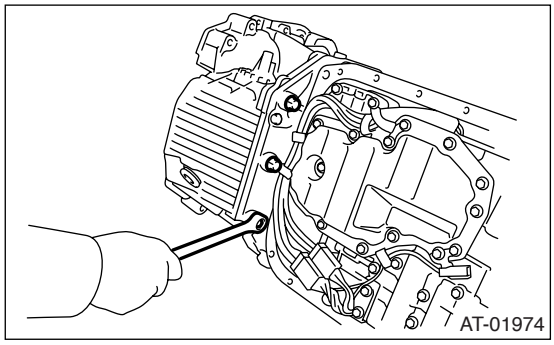
C: INSPECTION

Make sure that the tab of parking pawl on reduction driven gear is not worn or otherwise damaged.

32.Converter Case

A: REMOVAL

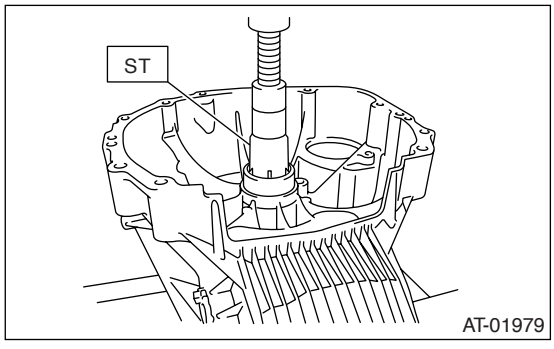
1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Remove the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the turbine speed sensor 1. <Ref. to 5AT-57, REMOVAL, Turbine speed sensor 1.>
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Remove the converter case aligning bolt.
8) Lay along the transmission body, and then remove the oil pan.
9) Remove the three converter case aligning bolts (TORX®).
ST 18676AA020 TORX® WRENCH



10) Separate the converter case by lightly tapping with plastic hammer.
11) Remove the differential assembly. <Ref. to 5AT-94, REMOVAL, Front Differential.>
12) Remove the oil seal from converter case.

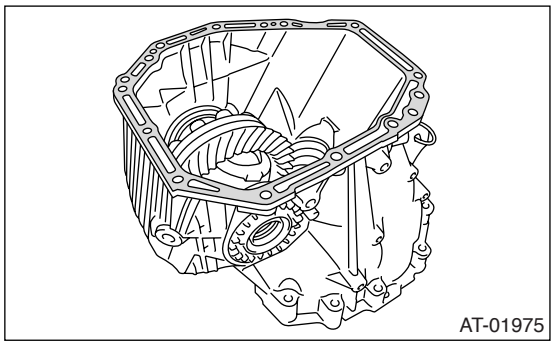
B: INSTALLATION

1) Check the appearance of each component and clean them.
2) Press-fit the oil seal to converter case using ST.
ST 499587100 OIL SEAL INSTALLER



3) Install the differential assembly to case. <Ref. to 5AT-94, INSTALLATION, Front Differential.>
4) Install the left and right side retainers. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Apply proper amount of liquid gasket to the entire matching surface of converter case.

Liquid gasket:
THREE BOND 1215 (Part No. 004403007)

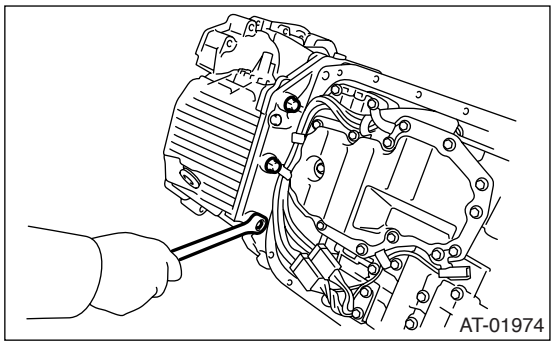


6) Install the converter case assembly without damaging bushing and oil seal.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Install the three converter case aligning bolts (TORX®).
ST 18676AA020 TORX® WRENCH

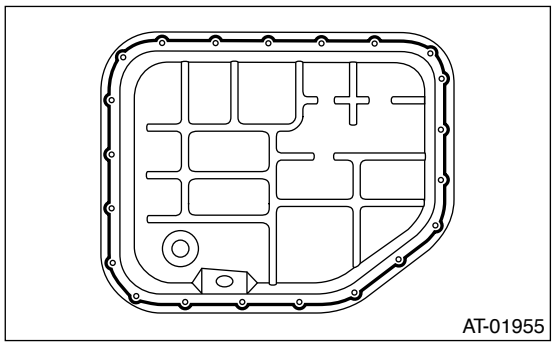
Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



8) Apply proper amount of liquid gasket to the entire oil pan mating surface, and then install it.

Liquid gasket:
THREE BOND 1217B (Part No. K0877YA020)

Tightening torque:
5 N·m (0.5 kgf-m, 3.7 ft-lb)



9) Install the transmission harness connector to the stay.
10) Install the air breather hose. <Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
11) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
12) Install the oil charge pipe with O-ring.<Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
13) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
14) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

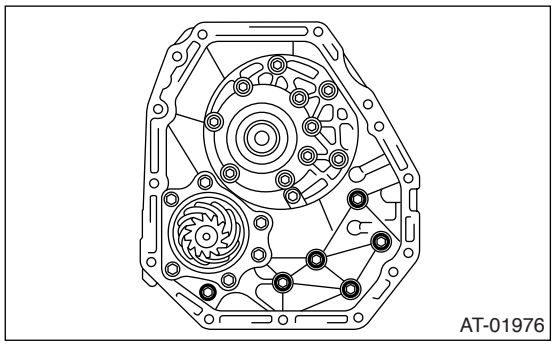
C: INSPECTION

Measure the backlash, and then adjust it within specification. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

33.Oil Pump Cover

A: REMOVAL

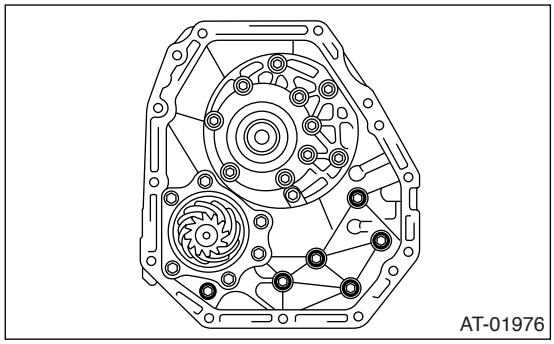
1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
6) Separate the converter case and transmission case part. <Ref. to 5AT-84, REMOVAL, Converter Case.>
7) Remove the oil pump cover aligning bolt, and then separate it from the AT main case by lightly tapping with plastic hammer.



B: INSTALLATION

1) Secure the oil pump cover.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

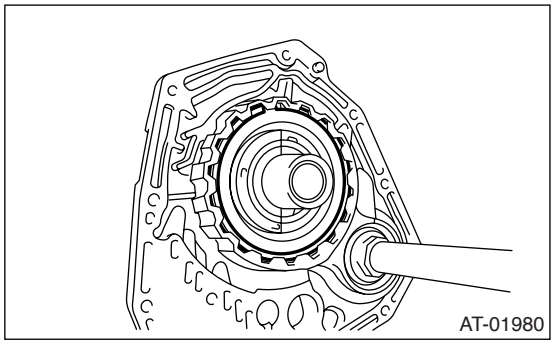


2) Install the converter case assembly into transmission case assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
3) Install the transmission harness connector to the stay.
4) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
5) Install the oil charge pipe with O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
6) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
7) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

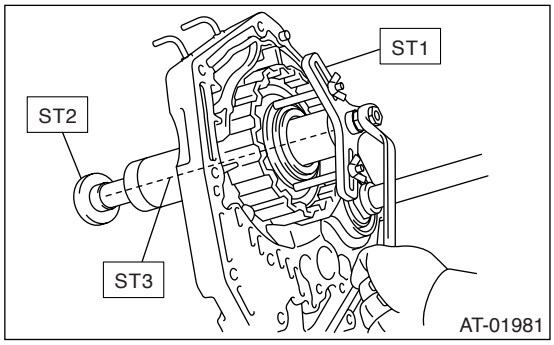
1. FRONT BRAKE

1) Remove the snap ring.

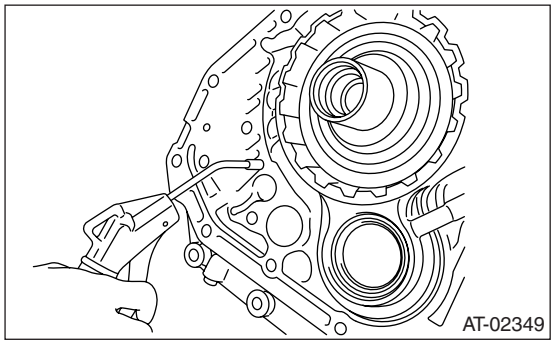


2) Remove the retainer plate, drive plate and driven plate.
3) Remove the snap ring using ST1, ST2 and ST3.

ST1	18762AA000	COMPRESSOR SPECIAL TOOL
ST2	18765AA000	COMPRESSOR SUPPORT
ST3	18763AA000	COMPRESSOR SHAFT



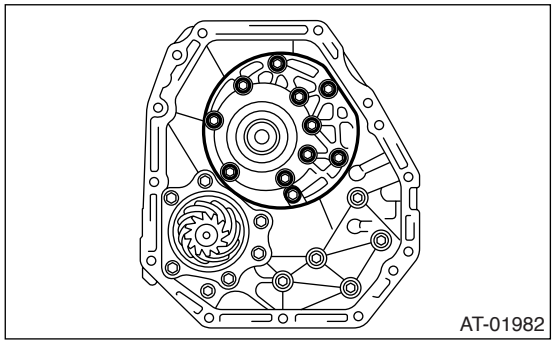
4) Remove the retainer and return spring.
5) Remove the front brake piston by blowing compressed air.



6) Remove the D-ring from front brake piston.

2. OIL PUMP

1) Take out the oil pump housing.



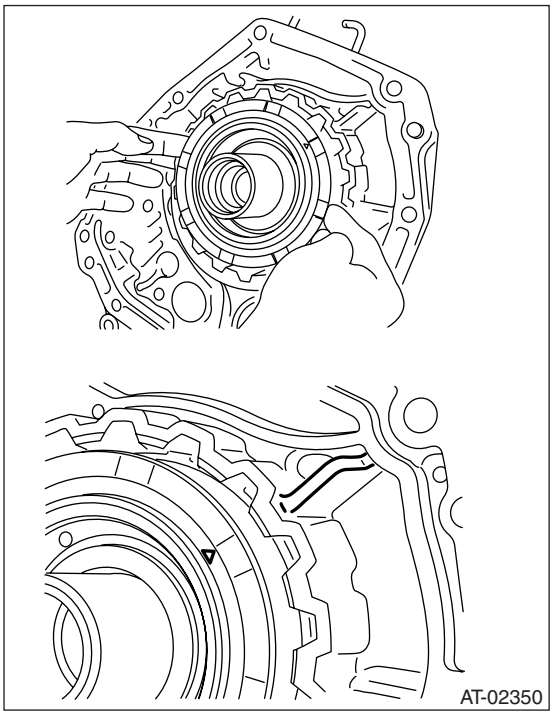
2) Take out the oil pump body.

D: ASSEMBLY

1. FRONT BRAKE

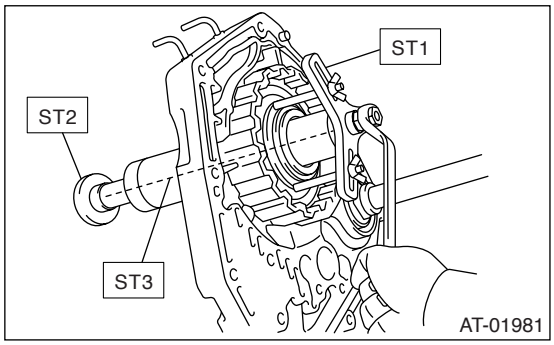
1) Apply ATF to D-ring, and then install it to the front brake piston.
2) Install the front brake piston to oil pump cover.

NOTE:
Install by aligning the "▲" mark on front brake piston surface with the oil pump cover rib.



3) Install the retainer and return spring.
4) Install the front brake piston assembly using ST1, ST2 and ST3.

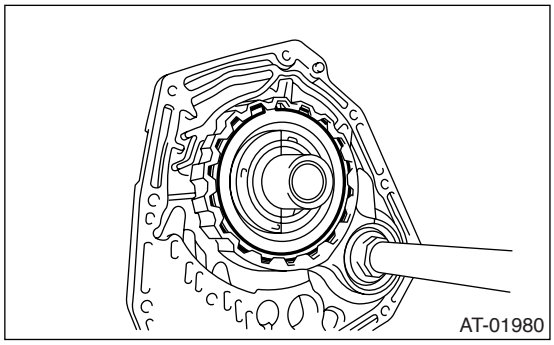
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



5) Install the genuine driven plate instead of retainer plate, temporarily assemble the drive plate and driven plate.

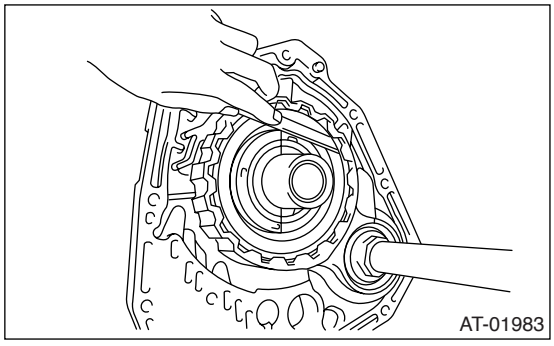
ST 31536AA290 DRIVEN PLATE

6) Install the snap ring.



7) Measure the clearance between retainer plate and snap ring, and then select a suitable retainer plate from table.

Front brake clearance standard value:
0.7 — 1.1 mm (0.028 — 0.043 in)



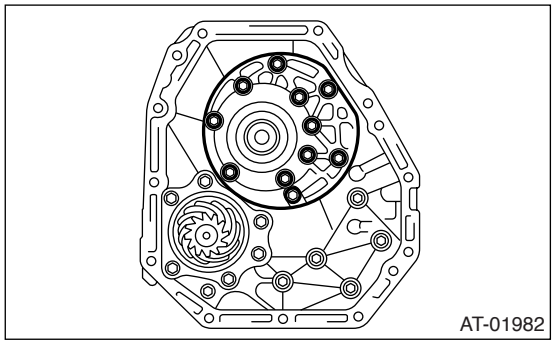
Front brake retainer plate	
Part Number	Thickness mm (in)
31567AB130	3.4 (0.134)
31567AB140	3.6 (0.142)
31567AB150	3.8 (0.150)
31567AB160	4.0 (0.157)

8) Remove the snap ring, replace the drive plate which used in measurement of clearance with retainer plate, and then reassemble.

2. OIL PUMP

1) Apply ATF to oil pump assembly, and then install it to oil pump housing.
2) Install the O-ring to oil pump cover.
3) Install the oil pump housing to oil pump housing cover.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)



E: INSPECTION

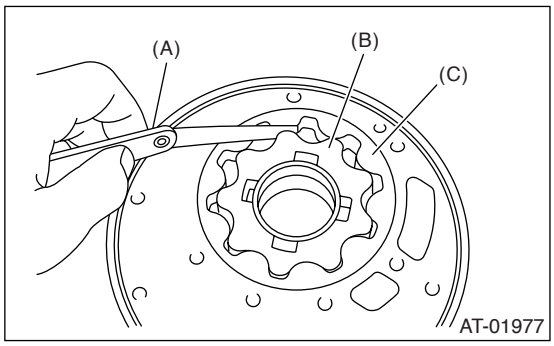
1. FRONT BRAKE

Check the following items:
• Drive plate facing for wear and damage
• Snap ring for wear, return spring for damage, and retainer for damage
• Piston for damage
• D-ring for damage

2. OIL PUMP

Check the following items:
• Oil pump cover and oil seal for breakage or damage
• Oil pump body for scratch or damage
1) Check seal ring and oil seal for breaks or damages.
2) Check other parts for dents or abnormalities.
3) Selection of oil pump rotor assembly
(1) Tip clearance
Install the inner rotor and outer rotor to oil pump housing. With rotor gears facing each other, measure the crest-to-crest clearance.

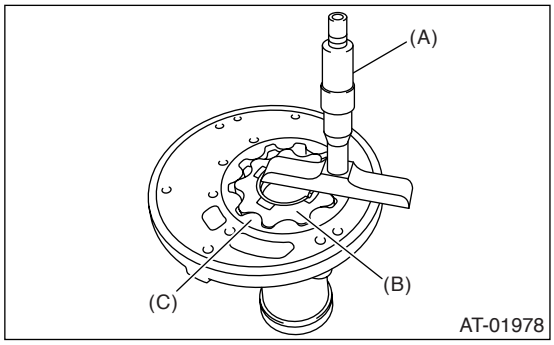
Tip clearance:
0.02 — 0.15 mm (0.0008 — 0.0059 in)



(A) Thickness gauge
(B) Inner rotor
(C) Outer rotor

(2) Side clearance
Set a depth gauge to oil pump housing, then measure the oil pump housing-to-rotor clearance.

Side clearance:
0.02 — 0.045 mm (0.0008 — 0.0018 in)



(A) Depth gauge
(B) Inner rotor
(C) Outer rotor

(3) If the depth and/or side clearance are not within the specifications, replace the rotor assembly.

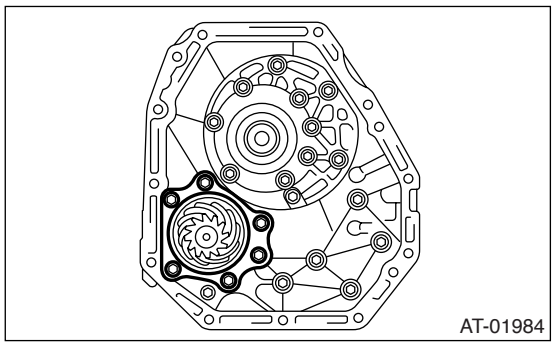
Oil pump rotor ASSY	
Part Number	Thickness mm (in)
15008AA130	11.37 — 11.38 (0.4476 — 0.4480)
15008AA140	11.38 — 11.39 (0.4480 — 0.4484)
15008AA150	11.39 — 11.40 (0.4484 — 0.4488)

Measure the total end play and adjust it within specifications. <Ref. to 5AT-106, ADJUSTMENT, AT Main Case.>

34.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-69, REMOVAL, Air Breather Hose.>
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Separate the converter case and transmission case part. <Ref. to 5AT-84, REMOVAL, Converter Case.>
8) Remove the drive pinion shaft mounting bolt, and then remove the drive shaft assembly from oil pump cover.



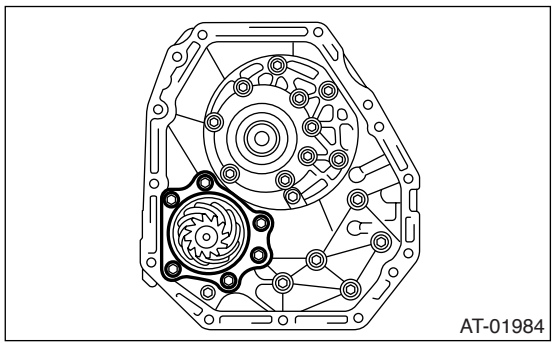
9) Remove the oil pump cover from AT main case. <Ref. to 5AT-86, Oil Pump Cover.>

B: INSTALLATION

1) Assemble the drive pinion assembly to oil pump cover.

NOTE:
Be careful not to bend the shim.

Tightening torque:
70 N·m (7.1 kgf-m, 51.6 ft-lb)

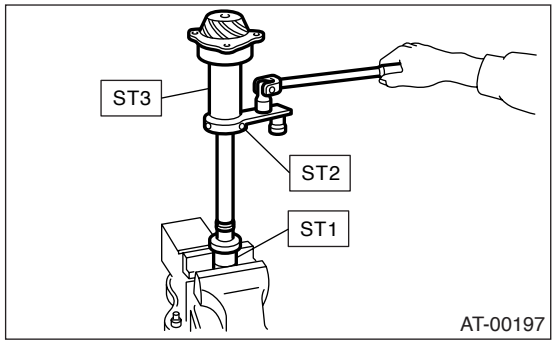


2) Adjust the tooth contact between drive pinion shaft assembly and front differential side gear. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>
3) Combine the converter case with transmission case. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
4) Install the transmission harness connector to the stay.
5) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
6) Install the oil charge pipe with O-ring.
7) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
8) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

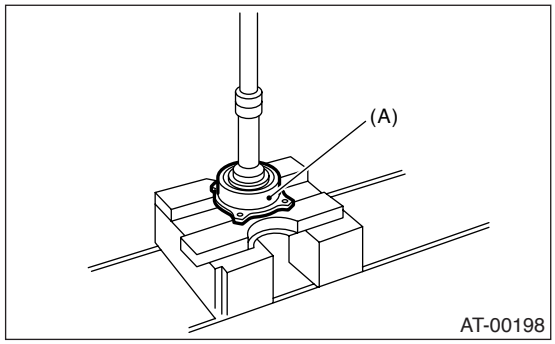
C: DISASSEMBLY

1) Remove the caulking part of lock nut, and then remove the lock nut with holding rear spline part of the shaft using ST1 and ST2. Pull out the drive pinion collar.

ST1	18667AA010	HOLDER
ST2	499787700	WRENCH
ST3	499787500	ADAPTER



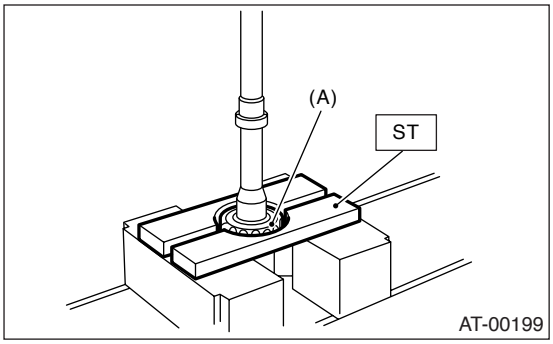
2) Remove the O-ring.
3) Separate the rear roller bearing and outer race from the shaft using press.



(A) Outer race

4) Separate the front roller bearing from the shaft using press and ST.

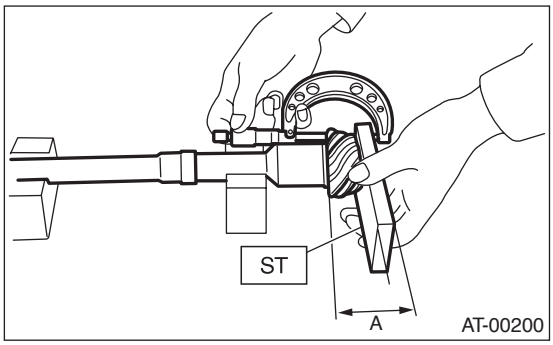
ST 498517000 REPLACER



(A) Front roller bearing

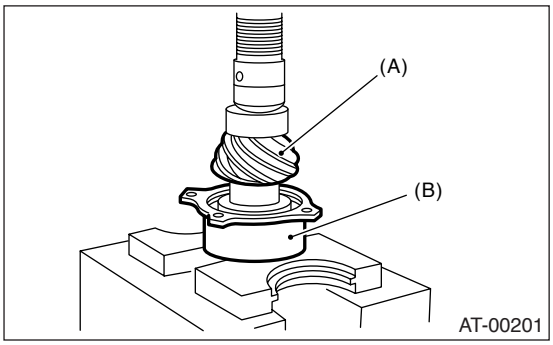
D: ASSEMBLY

1) Measure the dimension “A” of drive pinion shaft.
ST 398643600 GAUGE



2) Using a press, press-fit the new roller bearing into specified position.

NOTE:
If excessive force is applied to roller bearing, the roller bearing will not turn easily.



(A) Drive pinion shaft
(B) Roller bearing

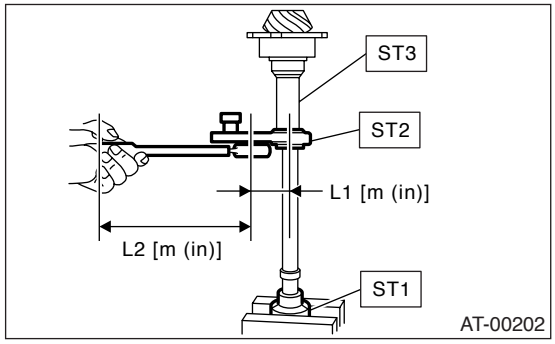
3) After fitting a new O-ring to the shaft, attach the drive pinion collar to shaft.
4) Install the lock washer to drive pinion shaft in proper direction.
5) Tighten new lock nuts using ST1, ST2 and ST3.
Calculate the lock washer and lock nut specifications using following formula.
$T2 = L2/(L1 + L2) \times T1$

T1: 116 N·m (11.8 kgf-m, 85.3 ft-lb)
[Required torque setting]
T2: Tightening torque
L1: ST2 length 0.072 m (2.83 in)
L2: Torque wrench length
Example:

Torque wrench length m (in)	Tightening torque N·m (kgf-m, ft-lb)
0.4 (15.75)	98 (10.0, 72)
0.45 (17.72)	100 (10.2, 73.8)
0.5 (19.69)	101 (10.3, 74.5)
0.55 (21.65)	102 (10.4, 75)

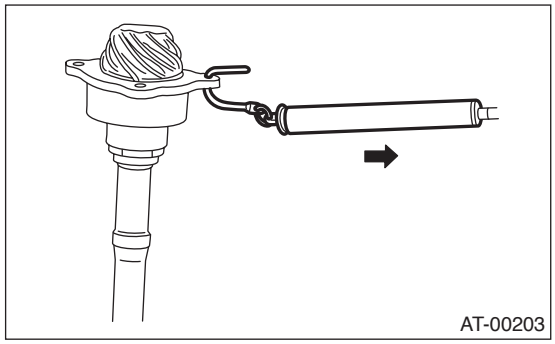
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH
ST3 499787500 ADAPTER

NOTE:
Install the ST2 to torque wrench as straight as possible.



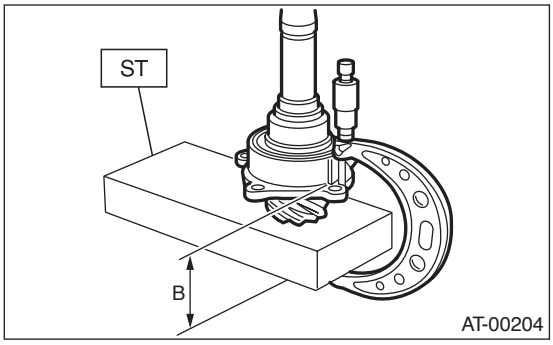
6) Measure the starting torque of bearing. Make sure the starting torque is within the specified range. If the torque is not within specified range, replace the roller bearing.

Starting torque:
7.6 — 38.1 N (0.776 — 3.88 kgf, 1.7 — 3.88 kg)



7) Stake the caulking of lock nut at two points.
8) Measure the dimension “B” of drive pinion shaft.

ST 398643600 GAUGE



9) Calculate the thickness “t” (mm) of drive pinion shim.
$t = 6.5 \pm 0.0625 - (B - A)$
10) Select three or less shims from following table.

Drive pinion shim	
Part Number	Thickness mm (in)
31451AA180	0.150 (0.0059)
31451AA190	0.175 (0.0069)
31451AA200	0.200 (0.0079)
31451AA210	0.225 (0.0089)
31451AA220	0.250 (0.0098)
31451AA230	0.275 (0.0108)

E: INSPECTION

• Make sure that all component parts are free of scratch, hole and other faults.
• Adjust the teeth alignment. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

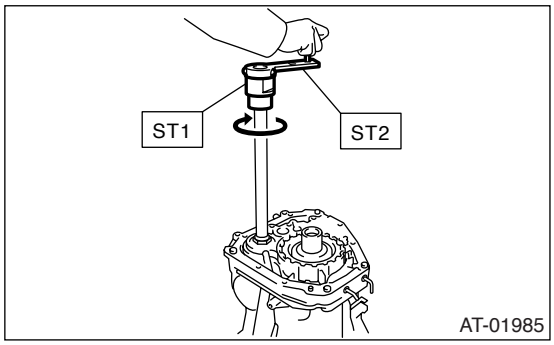
F: ADJUSTMENT

1) Remove the liquid gasket completely from mating surfaces.
2) Install the converter case to oil pump cover, and secure them with tightening four bolts evenly.

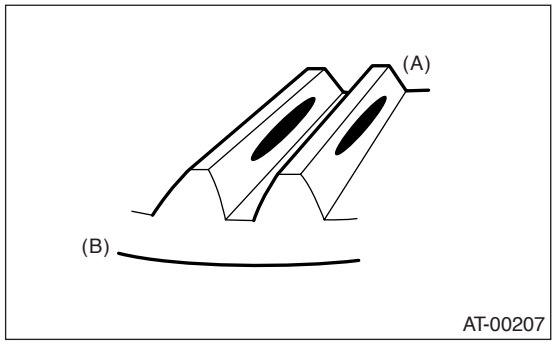
NOTE:
Use an old gasket or aluminum washer so as not to damage the mating surface of housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

3) Rotate the drive pinion several times using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

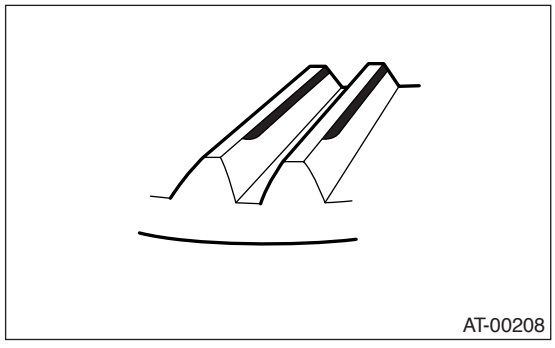


4) Adjust the backlash between drive pinion and hypoid driven gear. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Apply red lead evenly to the surfaces of three or four teeth on hypoid driven gear. Rotate the drive pinion in the leftward and rightward for several times. Remove the oil pump cover, and check the tooth contact pattern.
If the tooth contact is improper, readjust the backlash or shim thickness. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
• Correct tooth contact
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

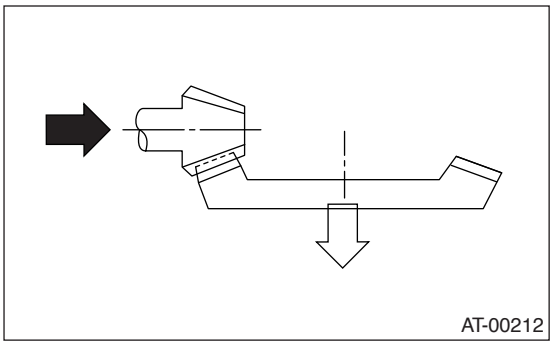


(A) Toe side
(B) Heel side

• Face contact
Checking item: Backlash is too large.
Contact pattern



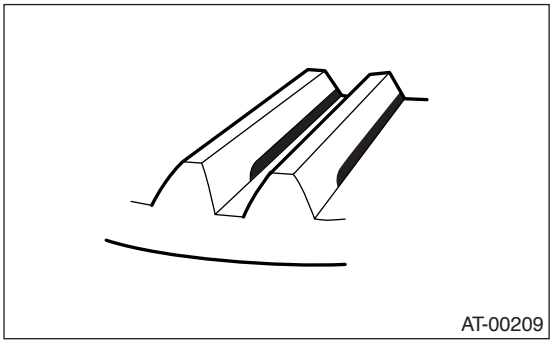
Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



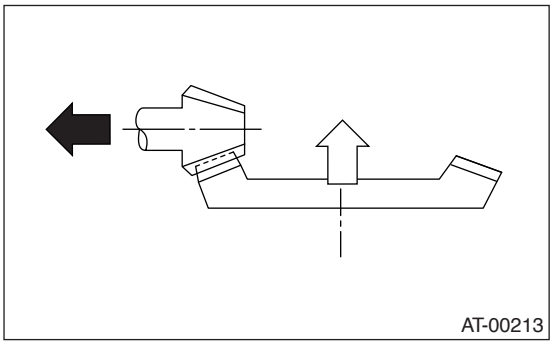
• Flank contact

Checking item: Backlash is too small.

Contact pattern



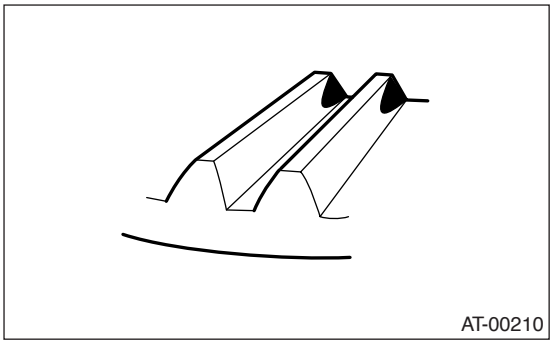
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to bring drive pinion away from hypoid driven gear.



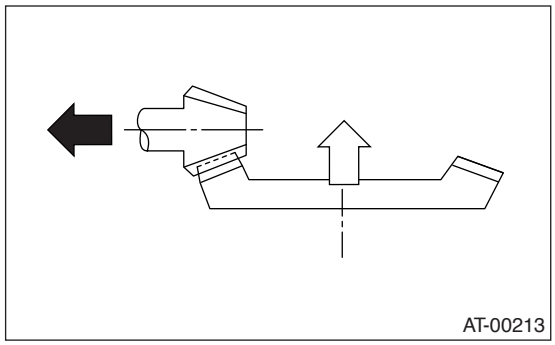
• Toe contact (inside end contact)

Checking item: Contact areas are too small

Contact pattern



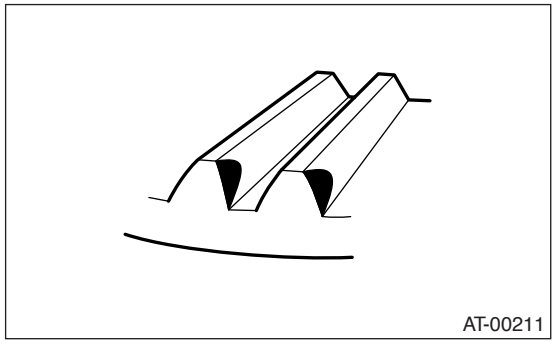
Corrective action: Reduce thickness of drive pinion height adjusting shim in order to bring drive pinion away from hypoid driven gear.



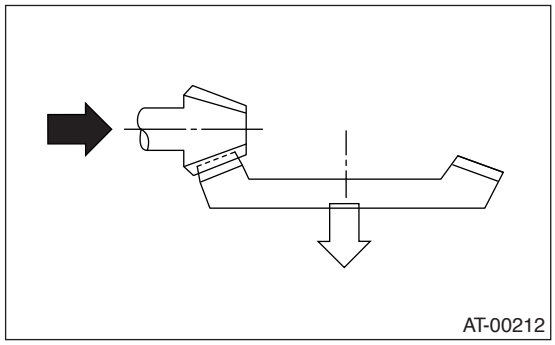
• Heel contact (outside end contact)

Checking item: Contact areas are too small

Contact pattern

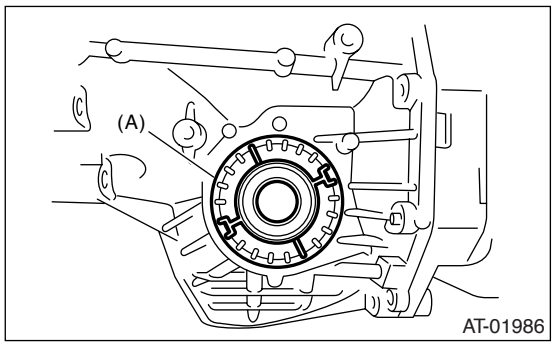


Corrective action: Increase thickness of drive pinion height adjusting shim in order to bring drive pinion close to hypoid driven gear.



6) If tooth contact is correct, mark the retainer position and loosen it. After fitting a new O-ring and oil seal, screw in the retainer to the marked position. Tighten the lock plate with specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Lock plate

35.Front Differential

A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
5) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
6) Separate the converter case and transmission case. <Ref. to 5AT-84, REMOVAL, Converter Case.>
7) Remove the differential side retainers using ST.

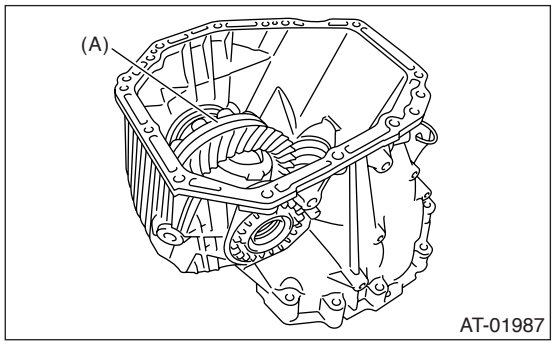
NOTE:
Hold the differential case assembly by hand to avoid damaging the retainer mounting hole of converter case.

ST 18630AA010 WRENCH COMPL RETAINER

8) Remove the differential assembly without damaging the installation part of retainer.

B: INSTALLATION

1) When installing the differential assembly to case, be careful not to damage the inside of case (particularly, the differential side retainer mating surface).



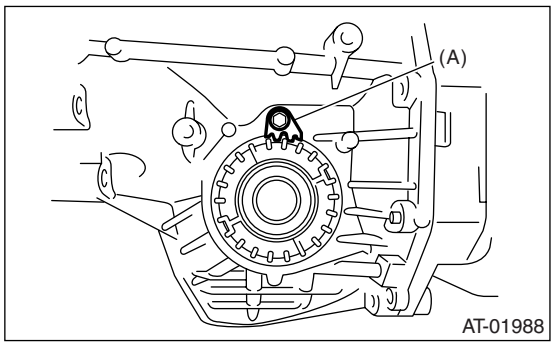
(A) Differential ASSY

2) Install the O-ring to left and right side retainer.
3) Install the side retainers using ST. <Ref. to 5AT-94, REMOVAL, Front Differential.>

ST 18630AA010 WRENCH COMPL RETAINER

4) Adjust the front differential backlash. <Ref. to 5AT-97, ADJUSTMENT, Front Differential.>
5) Install the lock plate.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Lock plate

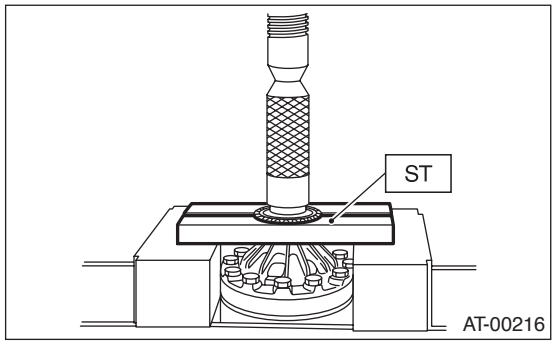
6) Install the converter case to transmission case. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
7) Install the transmission harness connector to the stay.
8) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
9) Install the oil charge pipe with a O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
10) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
11) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: DISASSEMBLY

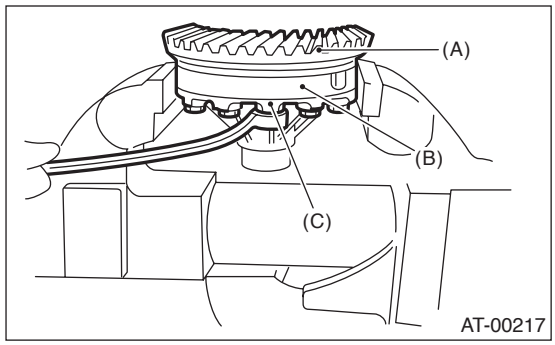
1. DIFFERENTIAL CASE ASSEMBLY

1) Remove the taper roller bearing using ST and press.

ST 498077000 REMOVER

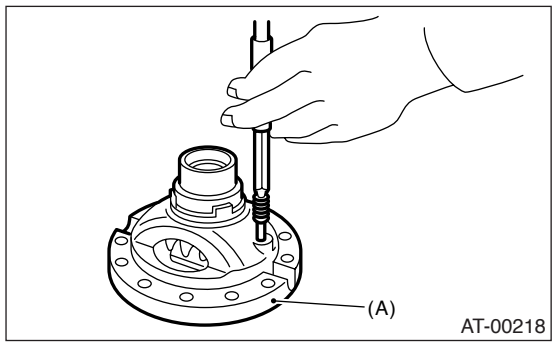


2) Secure the case in a vise and remove the hypoid driven gear tightening bolts, then separate the hypoid driven gear case (RH) and case (LH).



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

3) Pull out the straight pin and shaft, and then remove the differential bevel gear, washer and differential bevel pinion.

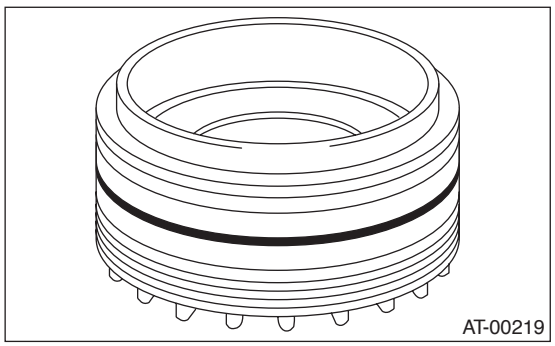


(A) Differential case (RH)

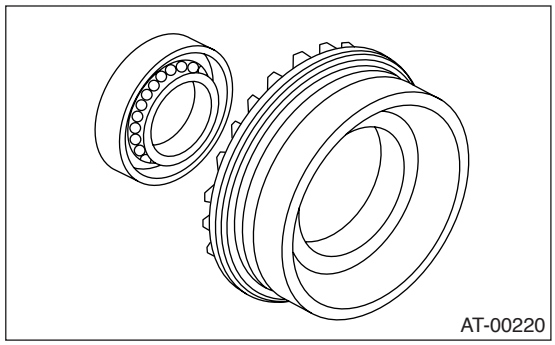
2. SIDE RETAINER

NOTE:
After adjusting the drive pinion backlash and tooth contact, remove and install the oil seal and O-ring.

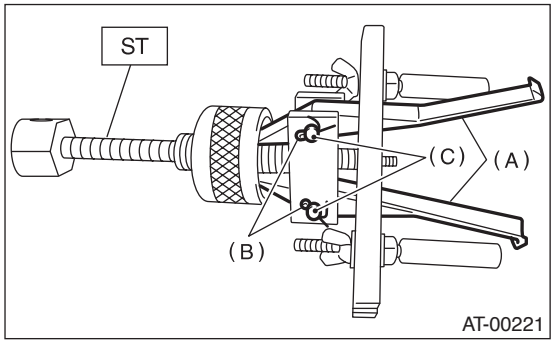
1) Remove the O-ring.



2) Remove the oil seal.

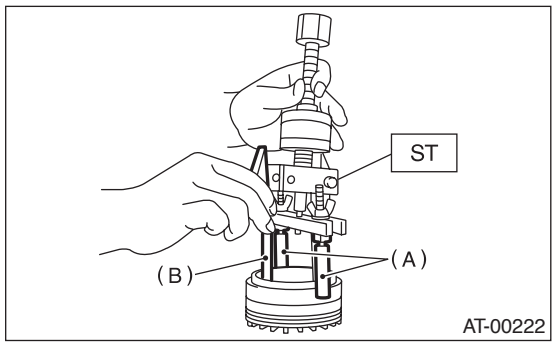


3) Remove the split pin, and then remove the claw.
ST 398527700 PULLER ASSY



(A) Claw
(B) Split pin
(C) Pin

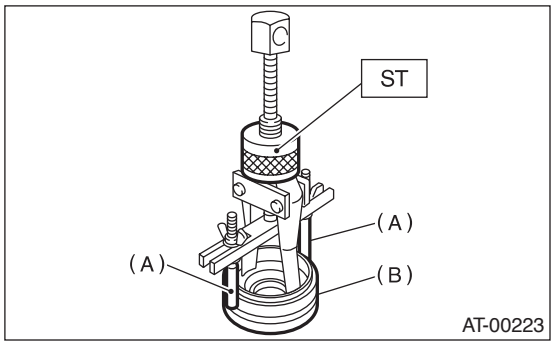
4) Attach two claws to the outer race, and set the ST to side retainer.
ST 398527700 PULLER ASSY



(A) Shaft
(B) Claw

5) Restore the removed claws to original position, and install the pin and split pin.
6) Hold the shaft of ST to avoid removing from side retainer, and then remove the bearing outer race.
ST 398527700 PULLER ASSY

NOTE:
Replace the bearing inner and outer races as a single unit.

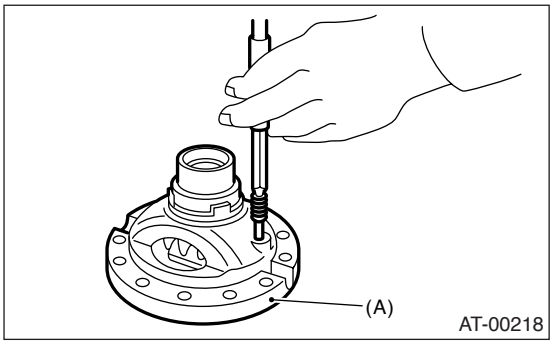


(A) Shaft
(B) Side retainer

D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the washer, differential bevel gear and differential bevel pinion in the differential case (RH). Insert the pinion shaft.
2) Install the straight pin in reverse direction.

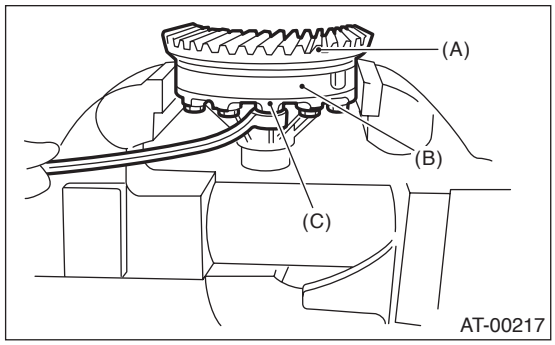


(A) Differential case (RH)

3) Install the washer and differential bevel gear to differential case (LH). Put the differential case (RH) on the case, and then combine the both cases.

4) Install the hypoid driven gear and secure by tightening the bolt.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case (RH)
(C) Differential case (LH)

5) Measurement of backlash (Selection of washer)
(1) Install the SUBARU genuine axle shaft to differential case.

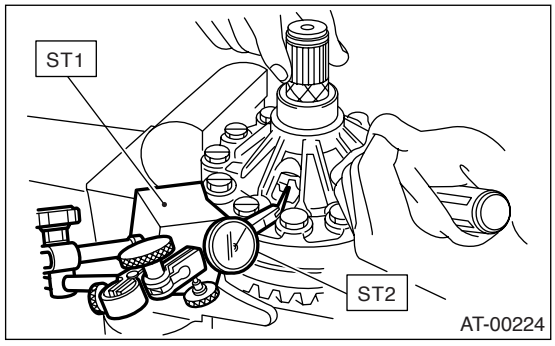
Parts No. 38415AA070 AXLE SHAFT

(2) Measure the gear backlash using ST1 and ST2, and then insert the ST2 from the access window of case.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

NOTE:
• Measure the backlash by applying a pinion tooth between two bevel gear teeth.
• Fix the bevel pinion gear in place with a screwdriver or similar tool when measuring.

Standard value:
0.13 — 0.18 mm (0.0051 — 0.0071 in)



(3) If the backlash is not within specifications, select a washer from the table below.

Washer	
Part Number	Thickness mm (in)
803038021	0.95 (0.037)
803038022	1.00 (0.039)
803038023	1.05 (0.041)

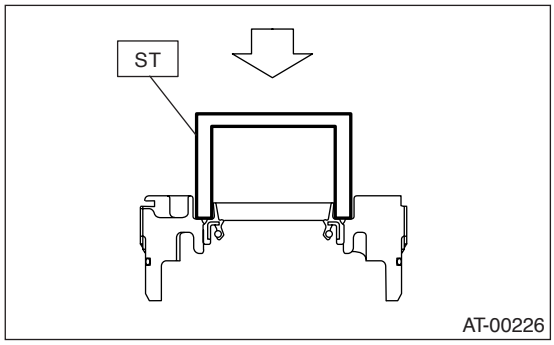
6) Using the ST, install the taper roller bearing.
ST 398487700 DRIFT

2. SIDE RETAINER

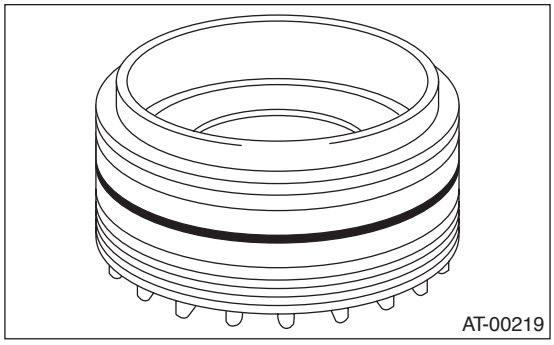
NOTE:
Install the oil seal and O-ring of side retainer after the adjustment of backlash and tooth contact.

1) Install the bearing outer race to side retainer.
2) Fit a new oil seal using ST.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



3) Install a new O-ring.



E: INSPECTION

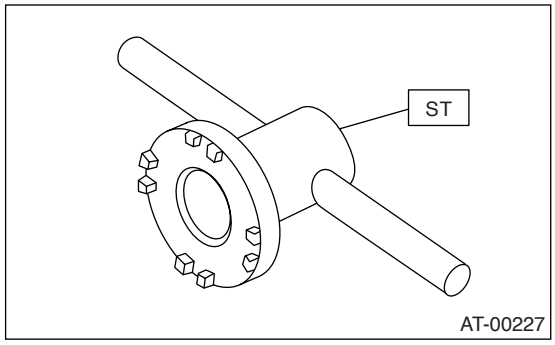
• Check each component for scratches, damage and other faults.
• Measure the backlash, and then adjust it within specification.
<Ref. to 5AT-97, ADJUSTMENT, Front Differential.>

F: ADJUSTMENT

1) Using the ST, screw-in the retainer until light contact is felt.

NOTE:
Screw-in the RH side slightly deeper than the LH side.

ST 18630AA010 WRENCH ASSY

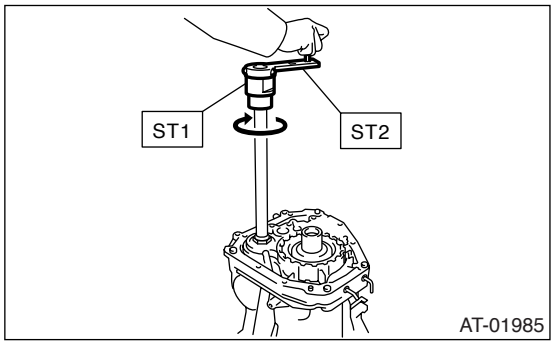


2) Remove the oil pump cover.
3) Remove the liquid gasket from the mating surface completely.
4) Install the oil pump cover to converter case, and secure them with tightening four bolts evenly.

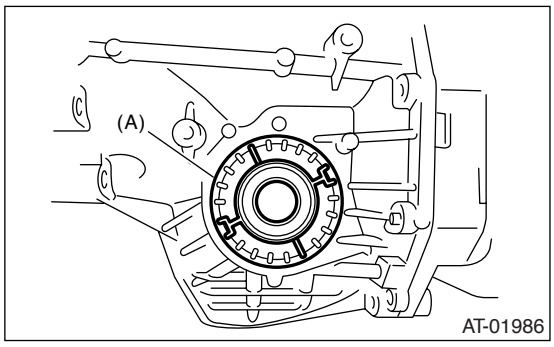
NOTE:
Use an old gasket or aluminum washer so as not to damage the mating surface of housing.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

5) Rotate the drive pinion ten times or more using ST1 and ST2.
ST1 18667AA010 HOLDER
ST2 499787700 WRENCH

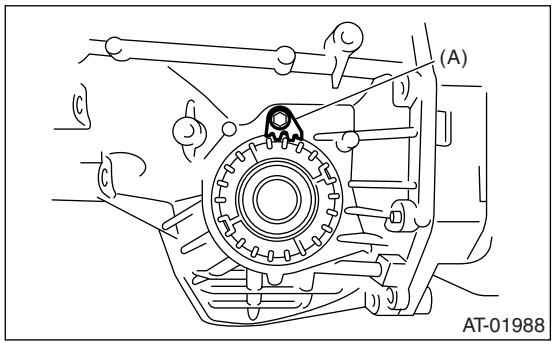


6) Tighten the retainer LH until contact is felt while rotating the shaft. Then loosen the retainer RH. Keep tightening the retainer LH, and loosening the retainer RH until the pinion shaft cannot be turned. This is the “zero” state.



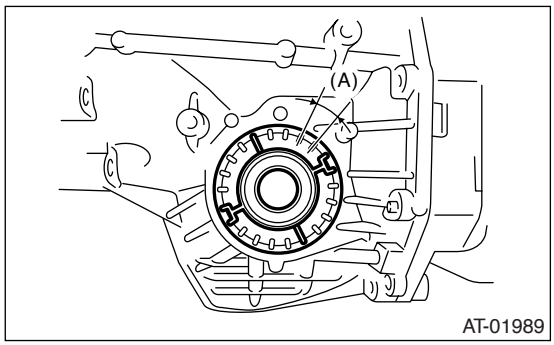
(A) Retainer

7) After the “zero” state is established, back off the retainer LH 3 notches and secure it with the lock plate. Then back off the retainer RH and retighten until it stops. Rotate the drive pinion few times. Tighten the retainer RH 1-3/4 notches further. This sets the preload. Finally, secure the retainer with its lock plate.



(A) Lock plate

NOTE:
Turning the retainer by one tooth changes the backlash about 0.05 mm (0.0020 in).



(A) 0.05 mm (0.0020 in)

8) Turn the drive pinion several times with ST1 and check to see if the backlash is within the specified value with ST2, ST3, ST4 and ST5.

ST1	499787700	WRENCH
ST2	498247001	MAGNET BASE
ST3	498247100	DIAL GAUGE
ST4	499787500	ADAPTER
ST5	498255400	PLATE

Backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

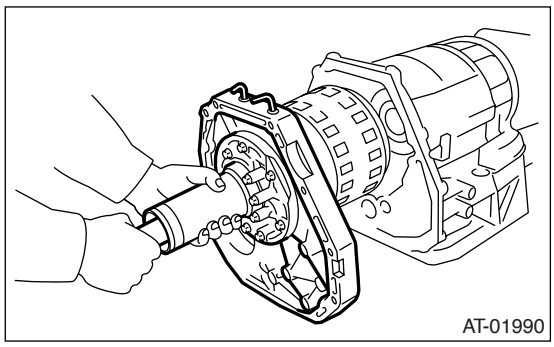
9) Adjust the tooth contact between front differential and drive shaft. <Ref. to 5AT-91, ADJUSTMENT, Drive Pinion Shaft Assembly.>

36.AT Main Case

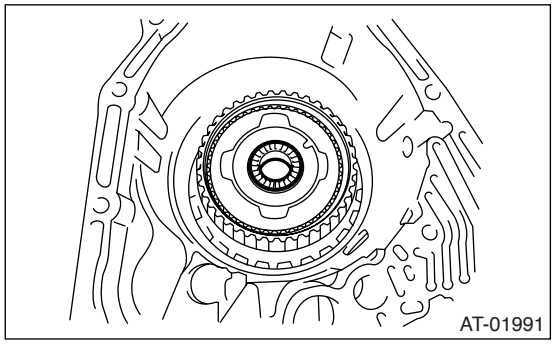
A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Remove the transmission harness connector from stay.
4) Disconnect the air breather hose.
5) Remove the oil charge pipe. <Ref. to 5AT-70, REMOVAL, Oil Charge Pipe.>
6) Remove the ATF filter inlet and outlet pipes. <Ref. to 5AT-60, REMOVAL, ATF Filter.>
7) Remove the extension case and intermediate case. <Ref. to 5AT-72, REMOVAL, Extension Case & Intermediate Case.>
8) Remove the center differential carrier. <Ref. to 5AT-80, REMOVAL, Center Differential Carrier.>
9) Remove the reduction driven gear. <Ref. to 5AT-78, REMOVAL, Reduction Driven Gear.>
10) Separate the converter case and transmission case. <Ref. to 5AT-84, REMOVAL, Converter Case.>
11) Remove the control valve body. <Ref. to 5AT-58, REMOVAL, Control Valve Body.>
12) Remove the oil pump cover.
<Ref. to 5AT-86, REMOVAL, Oil Pump Cover.>

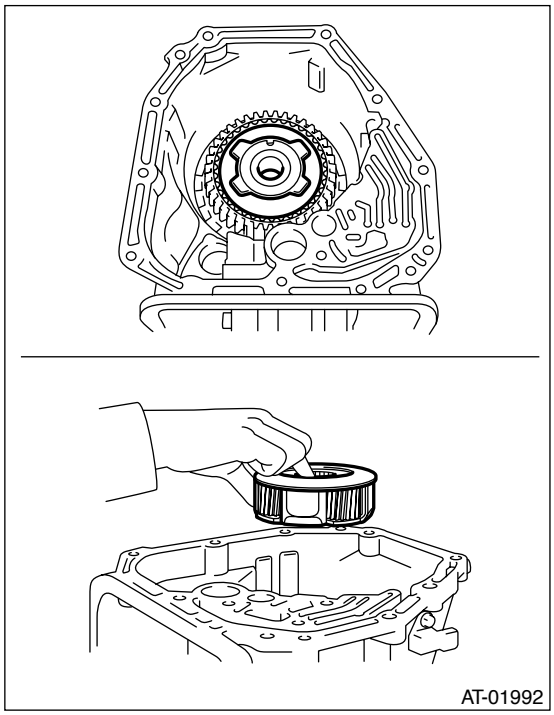
NOTE:
The input clutch pack assembly and front sun gear assembly are also removed together.


AT-01990

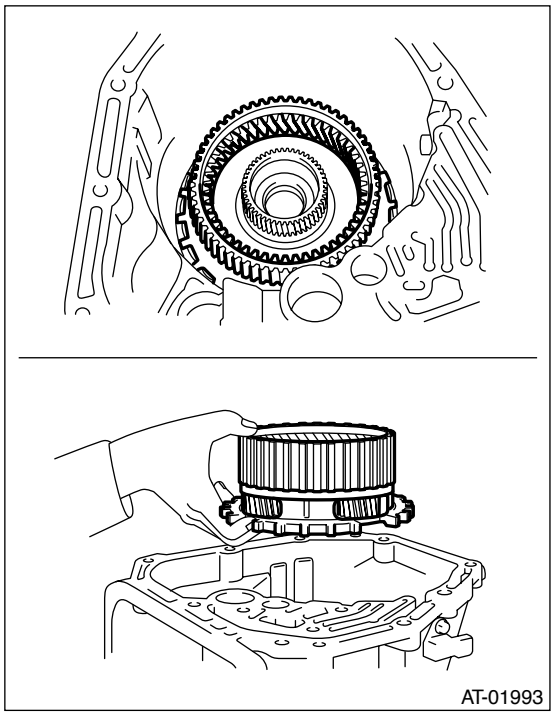
13) Remove the needle bearing of the mid carrier assembly.


AT-01991

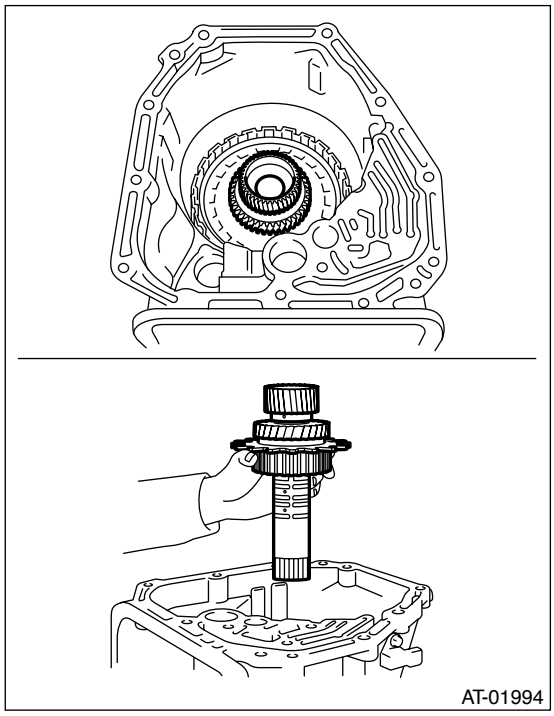
14) Remove the mid carrier assembly.


AT-01992

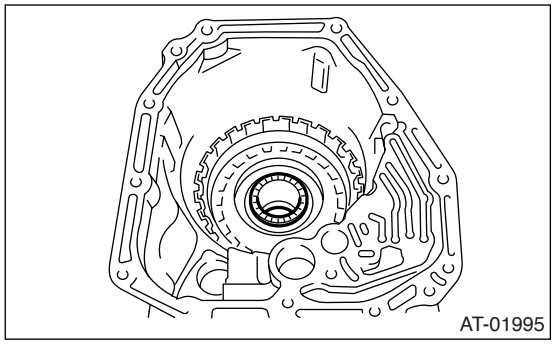
15) Remove the rear carrier assembly.


AT-01993

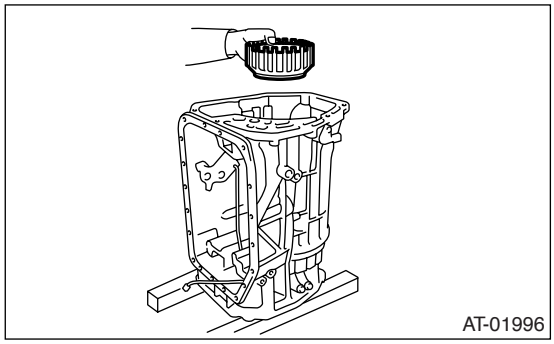
16) Remove the mid & rear sun gear assembly.



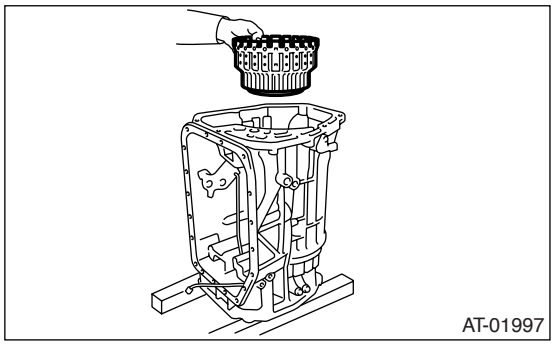
17) Remove the thrust needle bearing of high & low reverse clutch.



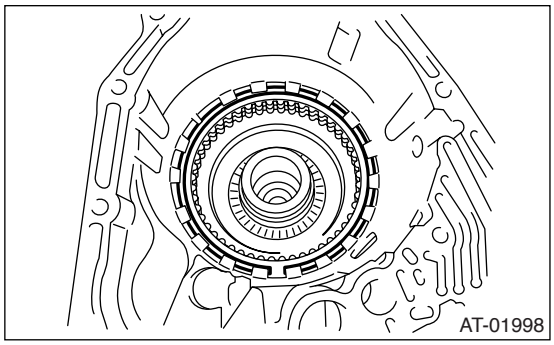
18) Remove the high & low reverse clutch assembly.



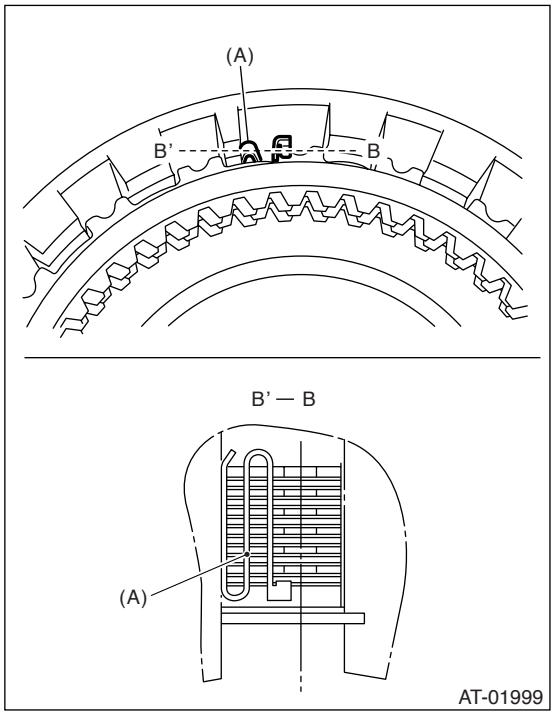
19) Remove the direct clutch assembly.



20) Remove the snap ring of reverse brake.



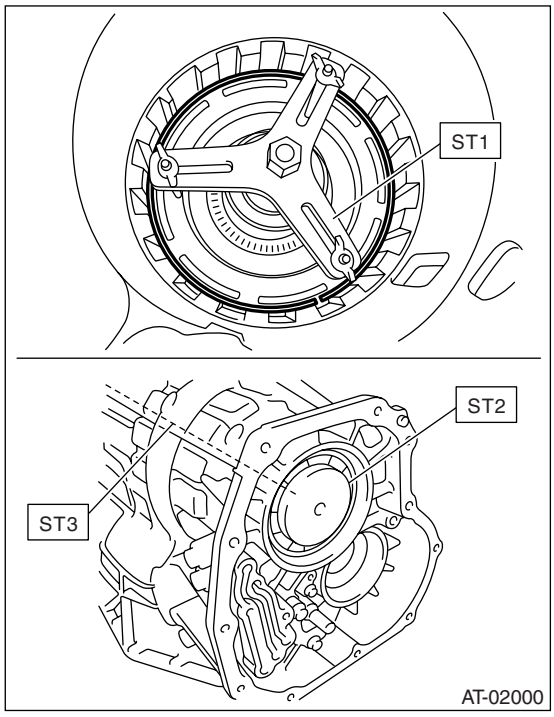
21) Remove the retaining plate.
22) Remove the leaf spring.



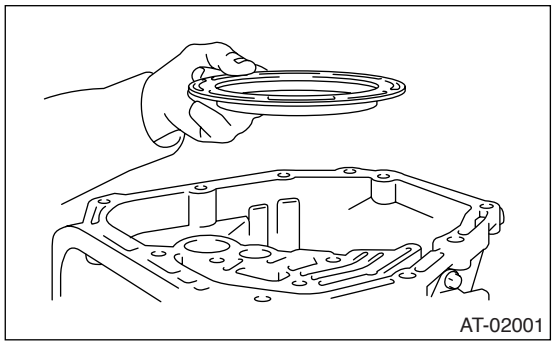
(A) Leaf spring

23) Take out the drive plate, driven plate and dish plate.
24) Remove the snap ring of the spring retainer of reverse brake.

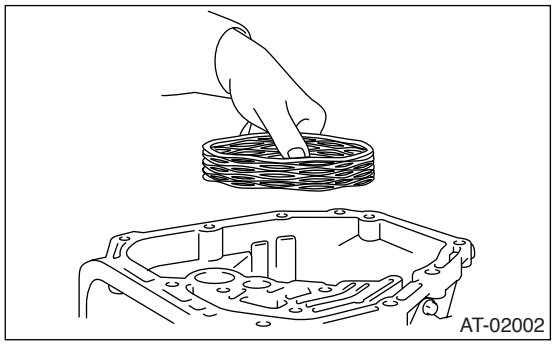
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT



25) Remove the spring retainer.

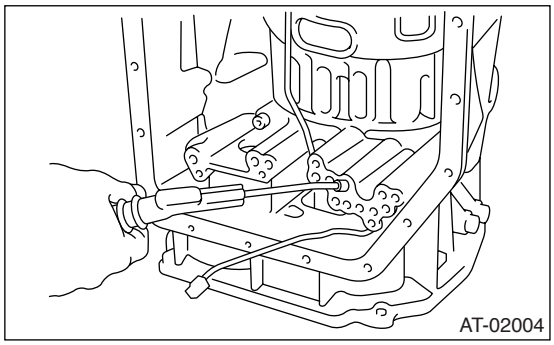


26) Remove the return spring.

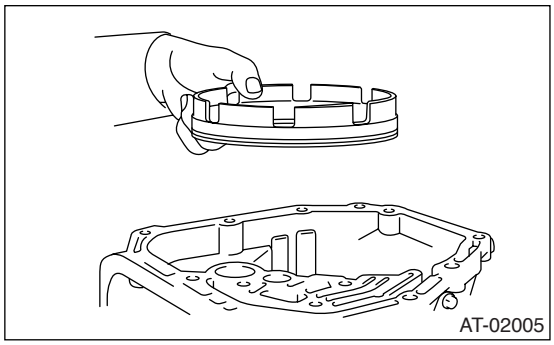


27) Remove the snap ring of reverse brake piston.
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT

28) Apply compressed air.



29) Remove the reverse brake piston.



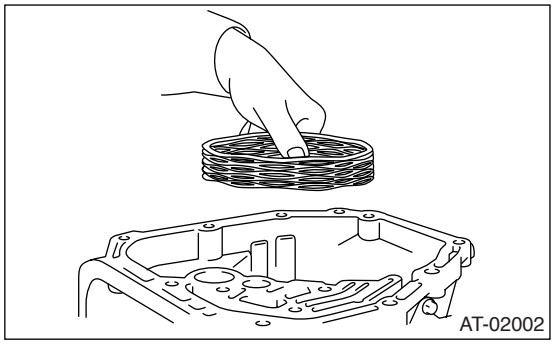
B: INSTALLATION

1) Install the reverse brake piston.

NOTE:
Apply ATF onto the piston sliding surface.

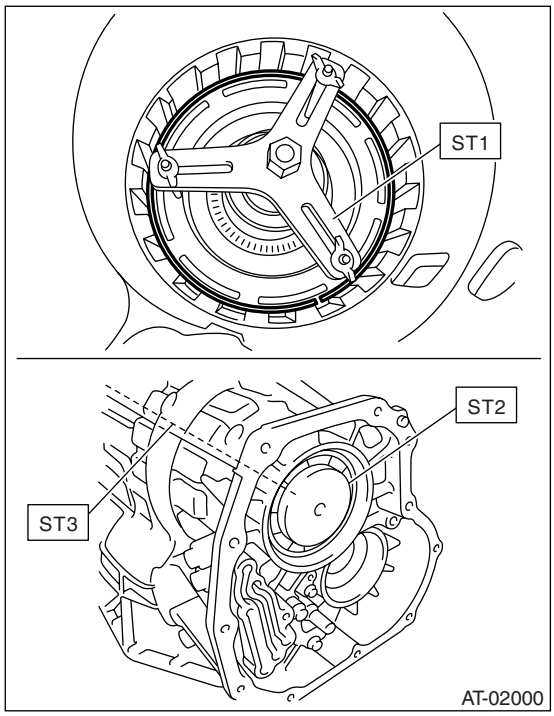
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT
ST3 18763AA000 COMPRESSOR SHAFT

2) Install the return spring.



3) Install the spring retainer and snap ring.
ST1 18762AA000 COMPRESSOR SPECIAL TOOL
ST2 18765AA000 COMPRESSOR SUPPORT

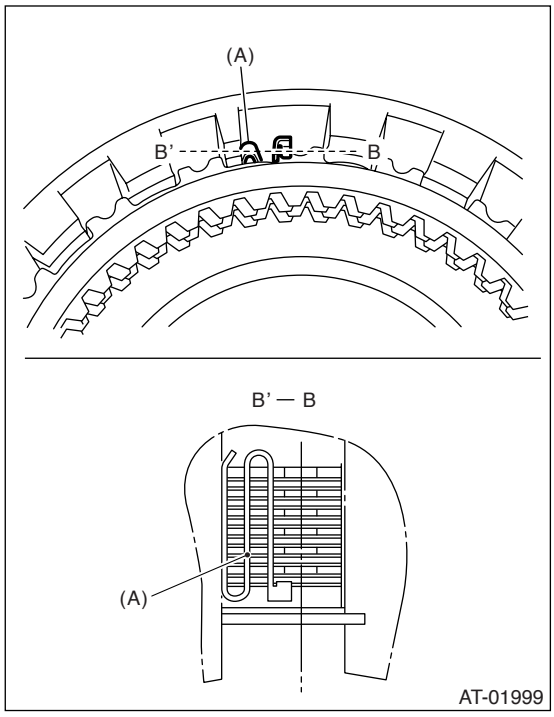
ST3 18763AA000 COMPRESSOR SHAFT



4) Install the dish plate.

NOTE:
When installing, make sure that the identification mark is facing the front side of transmission.

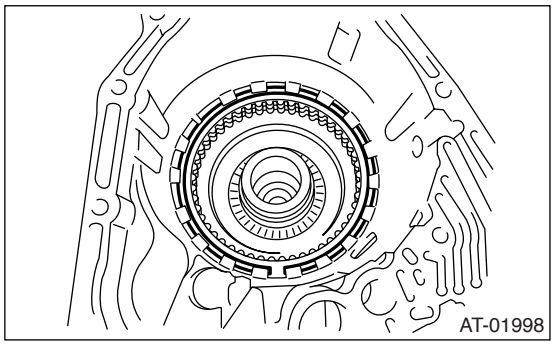
5) Install the drive plate and driven plate.
6) Install the leaf spring.



(A) Leaf spring

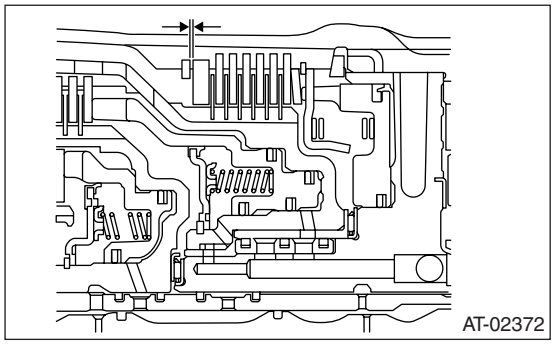
7) Install the retaining plate.

8) Install the snap ring of reverse brake.



9) Perform the clearance check of reverse brake.
(1) Measure the clearance between retainer plate and snap ring using thickness gauge.

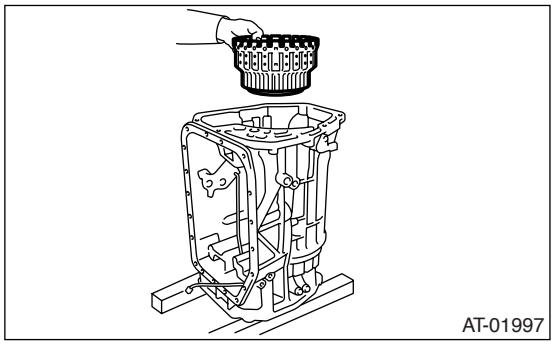
Standard value:
0.7 — 1.1 mm (0.028 — 0.043 in)



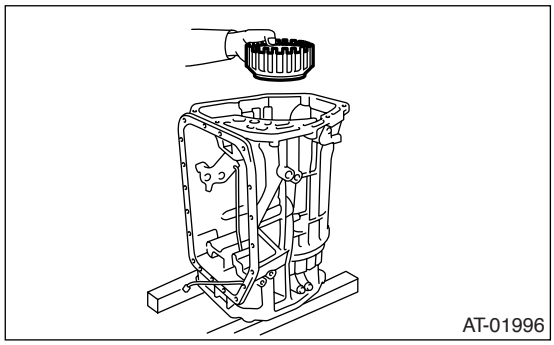
(2) If the clearance is out of specification, select a suitable retainer plate from following table and assemble it.

Retainer plate	
Part Number	Thickness mm (in)
31567AB100	4.2 (0.165)
31567AB170	4.4 (0.173)
31567AB180	4.6 (0.181)
31567AB190	4.8 (0.189)
31567AB200	5.0 (0.197)

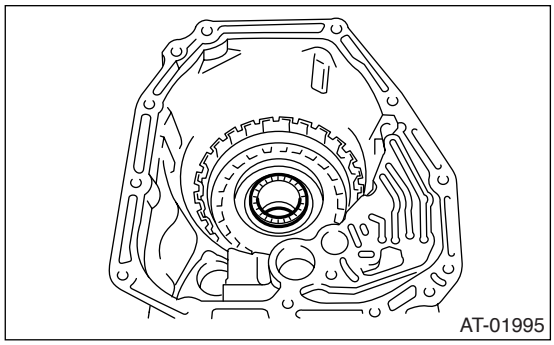
10) Install the direct clutch assembly.



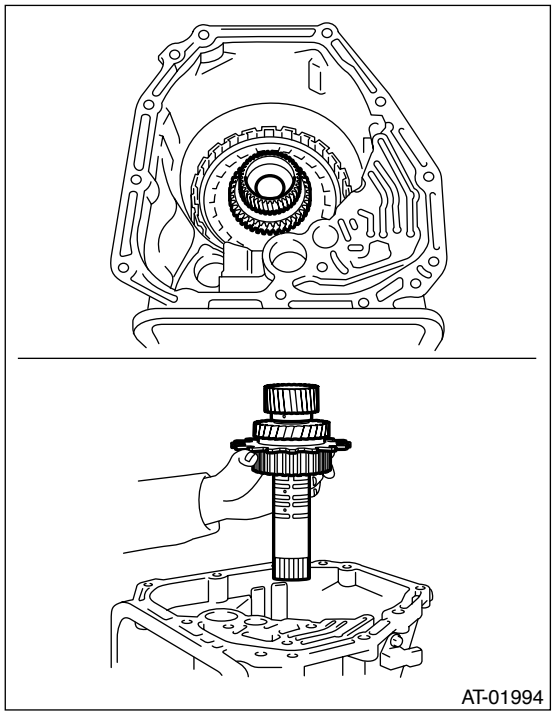
11) Install the high & low reverse clutch assembly.



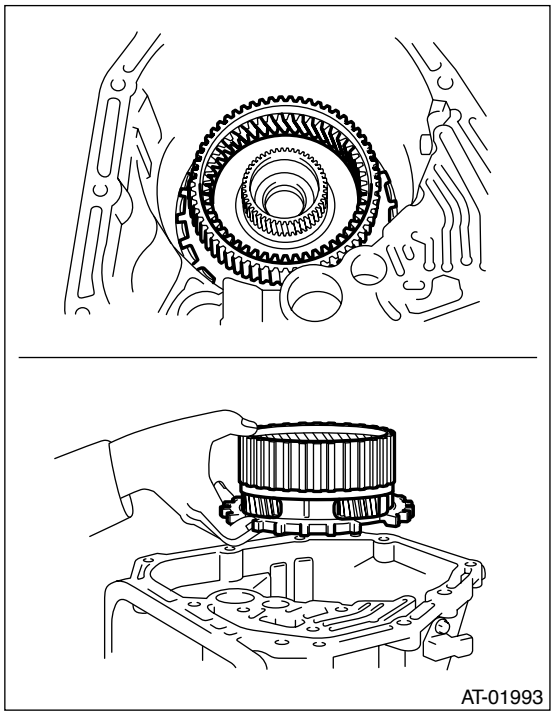
12) Install the thrust needle bearing of high & low reverse clutch.



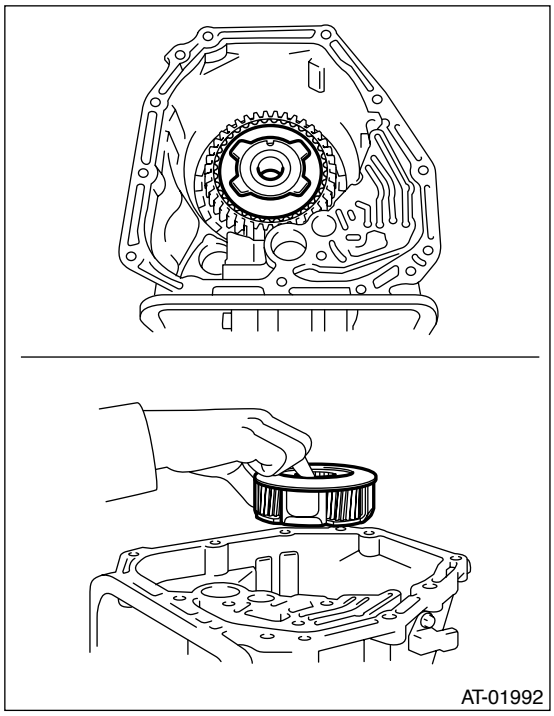
13) Install the middle & rear sun gear assembly.



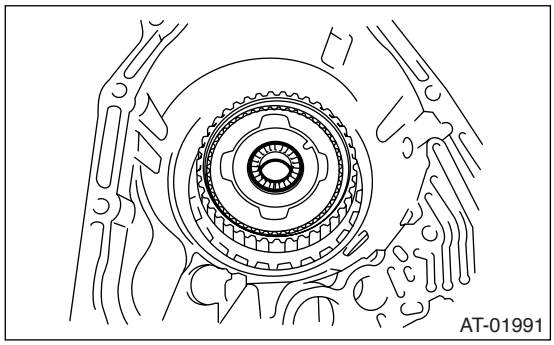
14) Install the rear carrier assembly.



15) Install the middle carrier assembly.

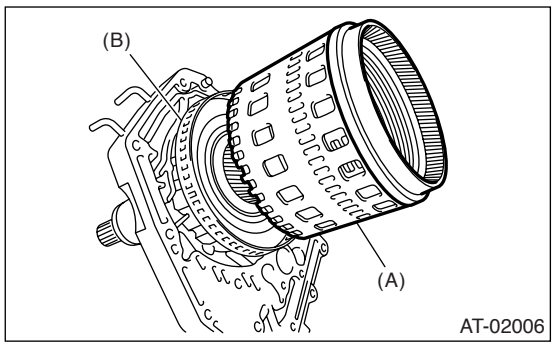


16) Install the thrust needle bearing of middle carrier assembly.



17) Measure the total end play, and select the bearing. <Ref. to 5AT-106, ADJUSTMENT, AT Main Case.>

18) Install the impact clutch pack assembly to oil pump cover.



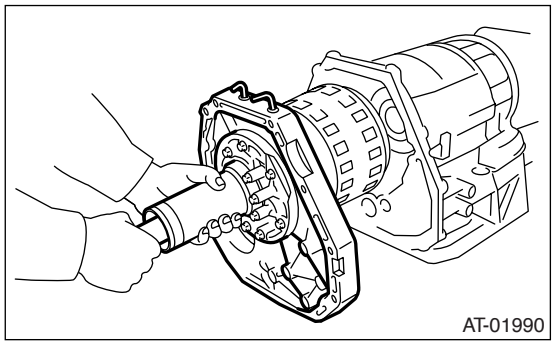
(A) Impact clutch pack ASSY
(B) Front sun gear ASSY

19) Turn the transmission sideways.

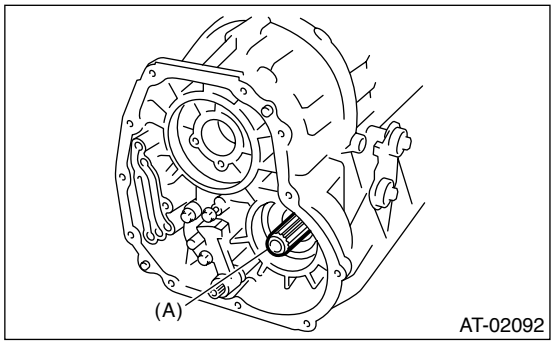
20) Install the oil pump cover.

(1) Apply ATF to the O-ring of input clutch shaft.

(2) Install the oil pump cover to AT main case while supporting the input clutch shaft and oil pump housing by hand.



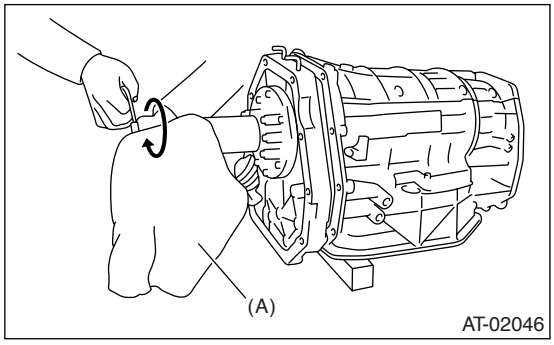
(3) Make sure the rear end of drive pinion shaft is engaged to the spline of reduction driven gear.



(A) Drive pinion shaft

(4) Using a cloth, protect the input clutch shaft and rotate to engage the spline of input clutch and rear carrier using pliers.

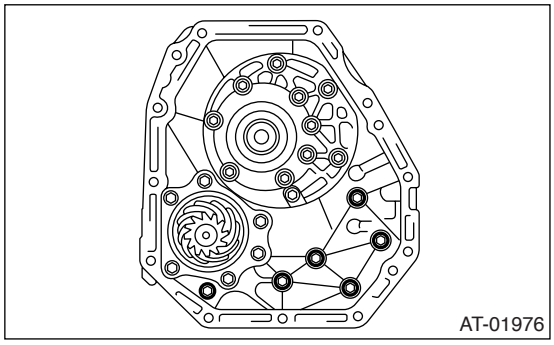
NOTE:
Work with pressing oil pump cover.



(A) Cloth

(5) Combine the oil pump cover with transmission main case.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)



21) Install the center differential carrier. <Ref. to 5AT-80, INSTALLATION, Center Differential Carrier.>

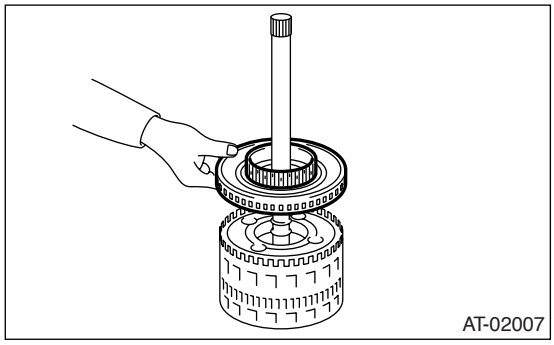
22) Install the reduction driven gear. <Ref. to 5AT-78, INSTALLATION, Reduction Driven Gear.>

23) Install the extension case and intermediate case. <Ref. to 5AT-72, INSTALLATION, Extension Case & Intermediate Case.>
24) Install the control valve body. <Ref. to 5AT-58, INSTALLATION, Control Valve Body.>
25) Install the converter case assembly into transmission case assembly. <Ref. to 5AT-84, INSTALLATION, Converter Case.>
26) Install the air breather hose. <Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
27) Install the ATF filter pipe. <Ref. to 5AT-60, INSTALLATION, ATF Filter.>
28) Install the oil charge pipe with O-ring. <Ref. to 5AT-70, INSTALLATION, Oil Charge Pipe.>
29) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
30) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

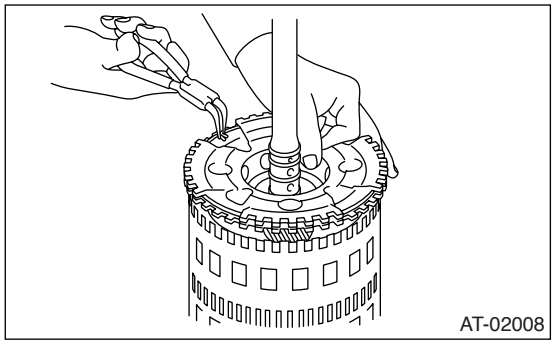
C: DISASSEMBLY

1. INPUT CLUTCH PACK ASSY

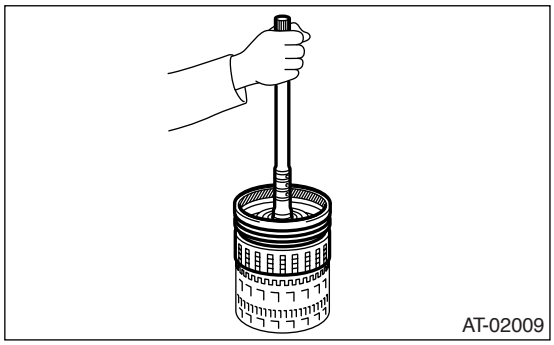
1) Remove the front sun gear.


AT-02007

2) Remove the snap ring, and then remove the front carrier.


AT-02008

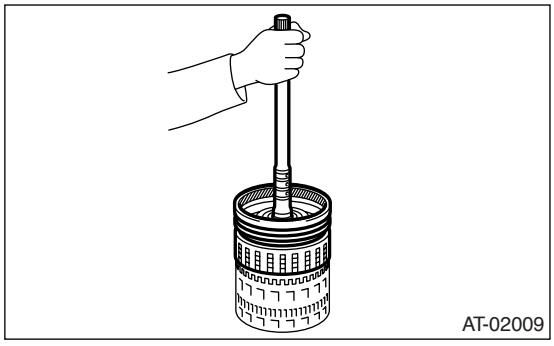
3) Remove the input clutch assembly from rear internal gear.


AT-02009

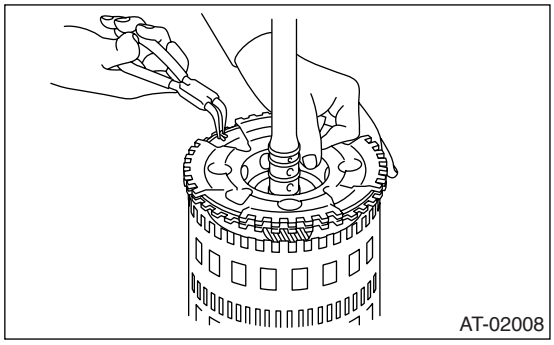
D: ASSEMBLY

1. INPUT CLUTCH PACK ASSY

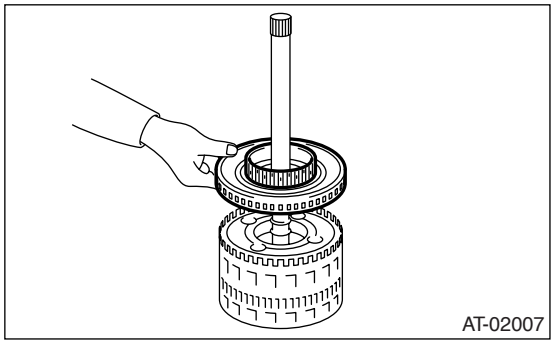
1) Assemble the input clutch assembly to rear internal gear.


AT-02009

2) Install the front carrier, and then install the snap ring.


AT-02008

3) Install the front sun gear.


AT-02007

E: INSPECTION

1. FRONT, MIDDLE & REAR PLANETARY CARRIER ASSY

Inspect the followings:
• Visually inspect the tooth surface of planetary gear, and replace with new one if damaged, broken or excessively worn.
• Inspect the planetary carrier body for damage or brakeage.

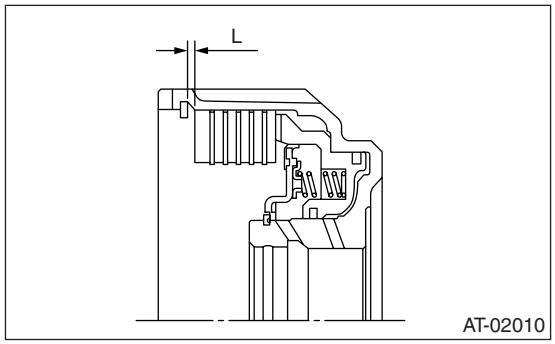
2. INPUT CLUTCH

Check for damage of drive plate, driven plate and snap ring, and replace them as input clutch assembly if damaged.

3. HIGH & LOW REVERSE CLUTCH ASSEMBLY

Check the clearance of high & low reverse clutch.
Measure the clearance “L” between snap ring and retaining plate using thickness gauge. If the measured value is out of specification, replace them as high & low reverse clutch assembly.

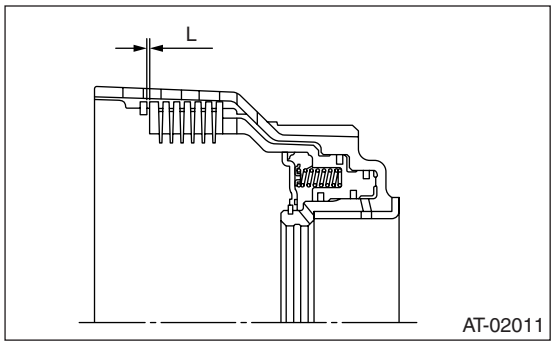
Standard value:
1.8 — 2.2 mm (0.070 — 0.087 in)



4. DIRECT CLUTCH ASSEMBLY

Check the clearance of direct clutch.
Measure the clearance “L” between snap ring and retaining plate using thickness gauge. If the measured value is out of specification, replace them as direct clutch assembly.

Standard value:
0.6 — 0.8 mm (0.024 — 0.031 in)

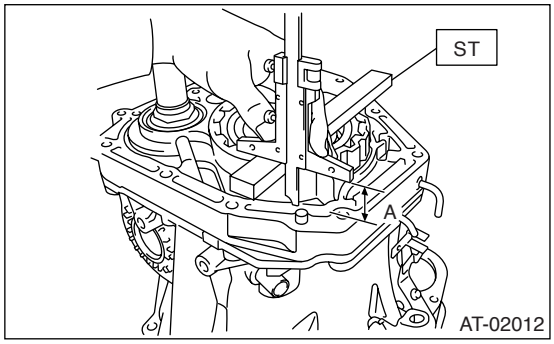


5. REVERSE BRAKE

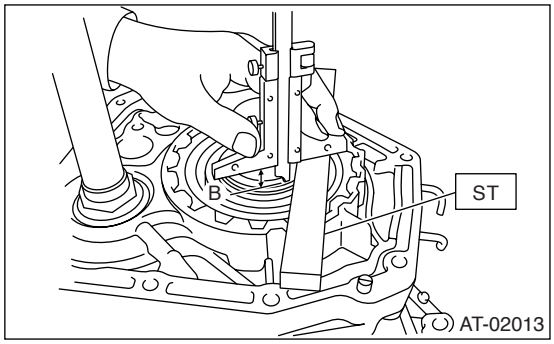
Check the following items:
• Drive plate facing for wear and damage
• Snap ring for wear, return spring for breakage, and spring retainer for deformation
• Lip seal and D-ring for damage
• Piston operation

F: ADJUSTMENT

1) Using the ST, measure the height “A” from AT main case mating surface to convex surface of oil pump cover.
ST 499575400 GAUGE

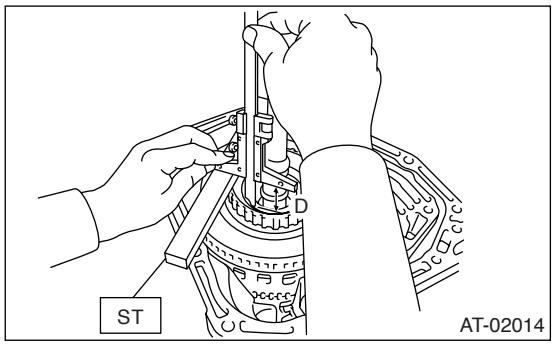


2) Using the ST, measure the depth “B” from the convex surface of oil pump cover to thrust bearing transferring surface.
ST 499575400 GAUGE



3) Calculate the measured value on step 1) and 2), and then set the calculated value as “C”
Calculation formula: C = A − B

4) Using the ST, measure the depth “D” from AT main case mating surface to thrust bearing transferring surface of front sun gear.
ST 499575400 GAUGE



5) Set the value as “E” which subtract the thickness of ST GAUGE from measured value on step 4).
Calculation formula: E (mm) = D − 15
[E (in) = D − 0.59]
6) Calculation formula:
Select a thrust bearing from the table to adjust clearance within 0.25 — 0.55 mm (0.0098 — 0.022 in).
When clearances are 0.25 mm (0.0098 in):
T (mm) = E − C + 0.03
[T (in) = E − C + 0.0012]
When clearances are 0.55 mm (0.022 in):
T (mm) = E − C − 0.27
[T (in) = E − C − 0.012]

T: Thrust bearing clearance
C: Distance from oil pump cover mating surface to rear end of oil pump cover
E: Depth from mating surface of AT main case to bearing surface of front sun gear

Example:
When the A is 39.50 mm (1.56 in), B is going to be 16.20 mm (0.64 in), so the C would be 23.30 mm (0.92 in) by calculation.
When the D is 41.90 mm (1.65 in), subtract the thickness of ST GAUGE from D, and then the value E would be 26.90 mm (1.06 in).
Calculation when clearance is 0.25 mm (0.0098 in)
T (mm) = 26.90 − 23.30 + 0.03 = 3.63
[T (in) = 1.059 − 0.917 + 0.0012 = 0.143]
Calculation formula when clearances are 0.55 mm (0.022 in)
T (mm) = 26.90 − 23.30 − 0.27 = 3.33
[T (in) = 1.059 − 0.917 − 0.012 = 0.131]

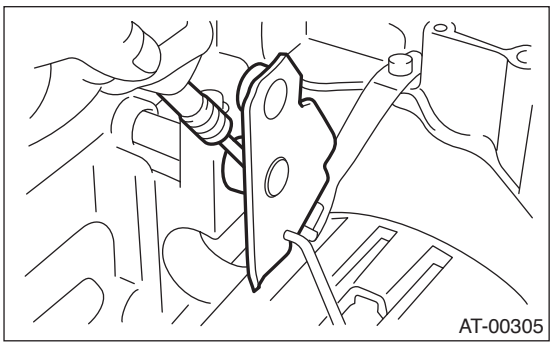
According to the calculation, the value “T” would be 3.33 — 3.63 mm (0.131 — 0.143 in), therefore select the thrust bearing with the thickness of 3.4 mm (0.134 in) or 3.6 mm (0.142 in) thrust bearing from the table.

NOTE:
Calculation formula for “T” is applied when measuring using ST (499575400 GAUGE). In the calculation without using ST, insert the thickness of collar to calculate value “E” on step 5).

37.Transmission Control Device

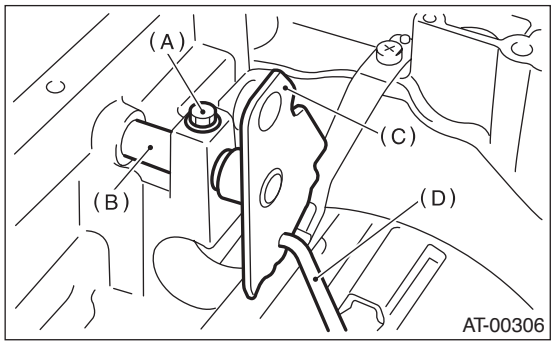
A: REMOVAL

1) Remove the transmission assembly from vehicle. <Ref. to 5AT-38, REMOVAL, Automatic Transmission Assembly.>
2) Pull out the torque converter assembly. <Ref. to 5AT-71, REMOVAL, Torque Converter Assembly.>
3) Lift-up the lever on rear side of transmission harness connector, and then disconnect it from stay.
4) Disconnect the air breather hose. <Ref. to 5AT-69, REMOVAL, Air Breather Hose.>
5) Wrap vinyl tape around the nipple attached to the air breather hose.
6) Remove the pitching stopper bracket.
7) Remove the control valve body assembly. <Ref. to 5AT-58, REMOVAL, Control Valve Body.>
8) Pull out the straight pin of manual plate.



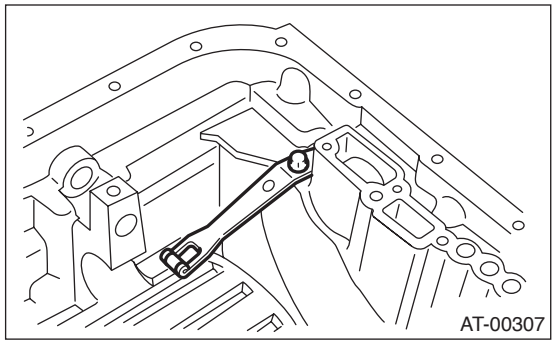
9) Remove the bolts securing select lever, and then remove the select lever, manual plate and parking rod.

NOTE:
Be careful not to damage the lips of press-fitted oil seal in the case.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

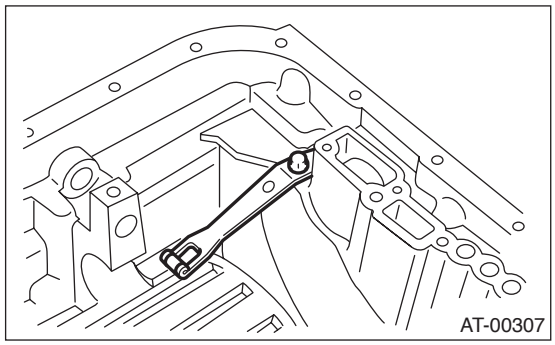
10) Remove the detention spring.



B: INSTALLATION

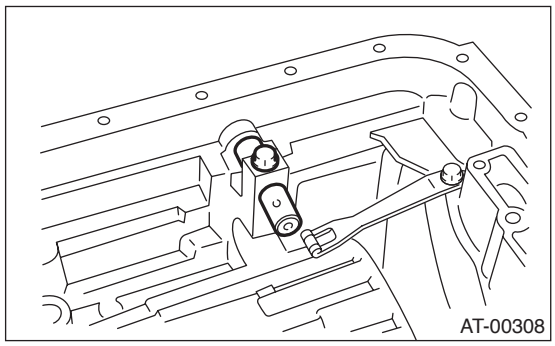
1) Install the detention spring to transmission case.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

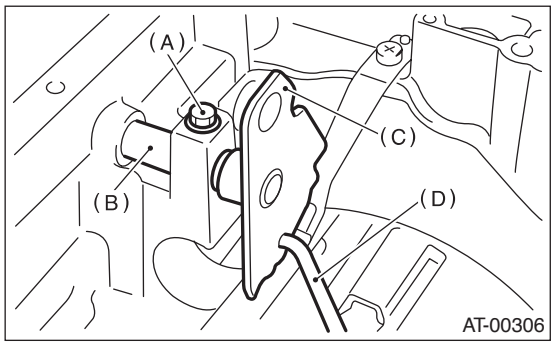


2) Insert the select lever, and then tighten the bolt.

Tightening torque:
6 N·m (0.6 kgf-m, 4.3 ft-lb)

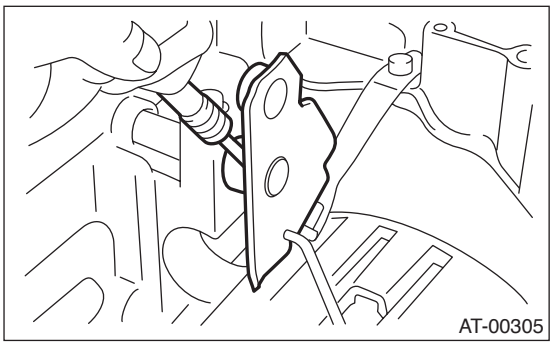


3) Insert the manual plate and parking rod.



(A) Bolt
(B) Range select lever
(C) Manual plate
(D) Parking rod

4) Insert the spring pin to manual plate.



5) Install the oil pan and control valve assembly. <Ref. to 5AT-58, INSTALLATION, Control Valve Body.>
6) Install the pitching stopper bracket.

Tightening torque:
41 N·m (4.2 kgf-m, 30.4 ft-lb)

7) Insert the transmission connector to the stay.
8) Install the air breather hose.<Ref. to 5AT-69, INSTALLATION, Air Breather Hose.>
9) Install the torque converter assembly. <Ref. to 5AT-71, INSTALLATION, Torque Converter Assembly.>
10) Install the transmission assembly into vehicle. <Ref. to 5AT-42, INSTALLATION, Automatic Transmission Assembly.>

C: INSPECTION

Make sure the manual lever and detention spring are not worn or otherwise damaged.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

AUTOMATIC TRANSMISSION (DIAGNOSTICS) 5AT(diag)

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4.	Electrical Component Location	7
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6.	Subaru Select Monitor	16
7.	Read Diagnostic Trouble Code (DTC)	19
8.	Inspection Mode	20
9.	Clear Memory Mode	21
10.	Learning Control	22
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14.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	34
15.	Diagnostic Procedure without Diagnostic Trouble Code (DTC)	138
16.	General Diagnostic Table	147

1. Basic Diagnostics Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview checklist. <Ref. to 5AT(diag)-4, Check List for Interview.> 2) Before performing diagnosis, inspect the following items which might influence the AT problems. • General inspection <Ref. to 5AT(diag)-5, INSPECTION, General Description.> • Oil Leakage • Stall speed test <Ref. to 5AT-31, Stall Test.> • Line Pressure Test <Ref. to 5AT-34, Line Pressure Test.> • Transfer Clutch Pressure Test <Ref. to 5AT-36, Transfer Clutch Pressure Test.> • Time Lag Test <Ref. to 5AT-33, Time Lag Test.> • Road Test <Ref. to 5AT-30, Road Test.> • Inhibitor Switch <Ref. to 5AT-51, Inhibitor Switch.>	Is the unit that might influence the AT problem normal?	Go to step **2.**	Repair or replace each item.
2	**CHECK SPORT INDICATOR LIGHT.** After the ignition switch is turned to “ON”, wait for at least 2 seconds.	Does the SPORT indicator light illuminate?	Go to step **4.**	Go to step **3.**
3	**CHECK SPORT INDICATOR LIGHT.** 1) Turn the ignition switch to OFF. 2) Check the SPORT indicator light. <Ref. to 5AT(diag)-24, INSPECTION, SPORT Indicator Light Display.> 3) After the ignition switch is turned to ON, wait for at least 2 seconds.	Does the SPORT indicator light blink?	Go to step **4.**	Go to step **5.**
4	**CHECK DTC.** Read the DTC. <Ref. to 5AT(diag)-19, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to 5AT(diag)-26, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure for Select Monitor Communication.>	Is DTC displayed?	Go to step **6.** NOTE: Record all DTC.	Go to step **5.**
5	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “Diagnostic Procedure without Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-138, Diagnostic Procedure without Diagnostic Trouble Code (DTC).> 2) Perform clear memory mode. 3) Perform the inspection mode. <Ref. to 5AT(diag)-20, Inspection Mode.> 4) Display DTC.	Is DTC displayed?	Go to step **6.**	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-147, General Diagnostic Table.>

	Step	Check	Yes	No
6	**PERFORM THE DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> NOTE: For DTC table, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-30, List of Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform clear memory mode. 4) Perform the inspection mode. <Ref. to 5AT(diag)-20, Inspection Mode.> 5) Display DTC.	Is DTC displayed?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to 5AT(diag)-34, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Inspect using “General Diagnostic Table”. <Ref. to 5AT(diag)-147, General Diagnostic Table.>

2. Check List for Interview

A: INSPECTION

Check the following items when problem has occurred.

NOTE:
Use copies of this page for interviewing customers.

Customer's name			
Date of sale			
Date of repair			
Trans. model	TRANSMISSION	V.I.N.	
Odometer reading	km (miles)		
Symptom	❑ No up-shift		
	❑ No down-shift		
	❑ No kick down		
	❑ Vehicle does not move (❑ Any position ❑ Particular position)		
	❑ Lock-up malfunction		
	❑ Noise or vibration		
	❑ Shift shock or slip		
	❑ Select lever does not move		
	❑ Others ( )		
Frequency	❑ Continuous ❑ Intermittent (times a day)		
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others ( )		
Place	❑ Highland ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Rough road ❑ Others ( )		
Ambient air temperature	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Vehicle speed	km/h (MPH)		
AT warning light (SPORT indicator light)	❑ Blinks continuously	❑ Not blink	
Select lever position	❑ P ❑ R ❑ N ❑ D ❑ Manual mode		
Driving condition	❑ Not affected ❑ At racing ❑ When decelerating	❑ At starting ❑ When accelerating ❑ While turning (❑ RH / ❑ LH)	❑ While idling ❑ While cruising
Manual mode	❑ ON ❑ OFF		

3. General Description

A: CAUTION

• **Supplemental Restraint System**

The airbag system wiring harness is routed near the TCM.

CAUTION:

• All airbag system wiring harnesses and connectors are colored yellow. Do not use an electric test equipment on these circuits.

• Be careful not to damage the airbag system wiring harness when performing diagnostics and servicing the TCM.

• **Measurement**

When measuring the voltage and resistance of the ECM, TCM or each sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert a pin more than 0.65 mm (0.026 in) diameter.

B: INSPECTION

1. BATTERY

Measure battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V or more

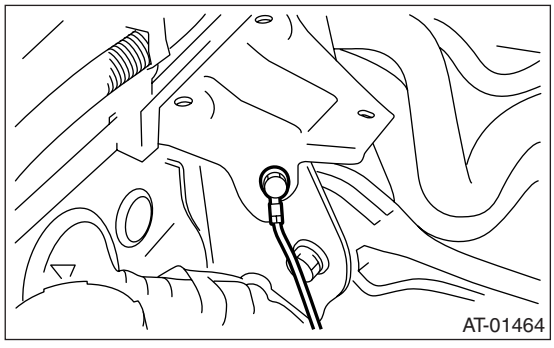
Specific gravity: More than 1.260

2. TRANSMISSION GROUND

Make sure that the ground terminal bolt is tightened securely.

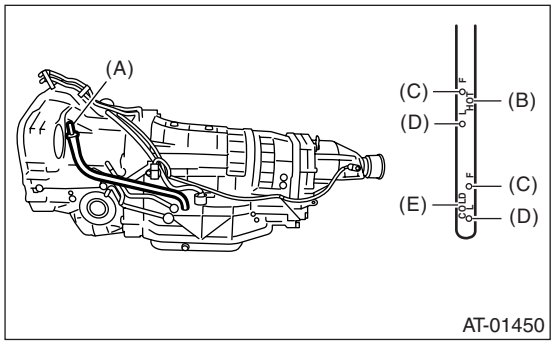
• Chassis side

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



3. ATF LEVEL

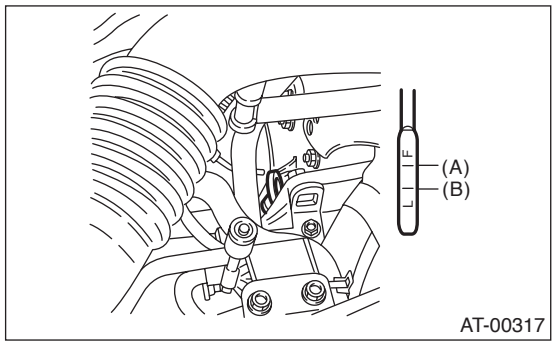
Make sure that ATF level is in the specification. <Ref. to 5AT-27, INSPECTION, Automatic Transmission Fluid.>



(A) Level gauge
(B) Check position when “HOT”
(C) Upper level
(D) Lower level
(E) Check position when “COLD”

4. FRONT DIFFERENTIAL OIL LEVEL

Make sure the front differential oil level is in the specification. <Ref. to 5AT-29, INSPECTION, Differential Gear Oil.>



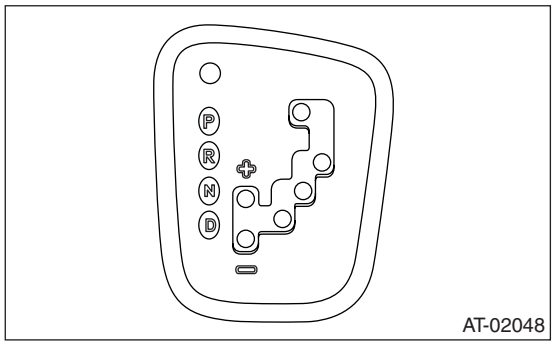
(A) Upper level
(B) Lower level

5. OPERATION OF SHIFT SELECT LEVER

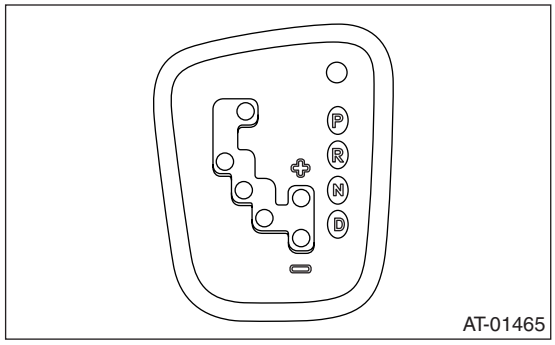
Make sure there is no abnormal noise, dragging or contact pattern in each select lever range.

WARNING:
Stop the engine while checking operation of the select lever.

• LHD model

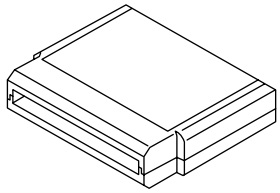


• RHD model



C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

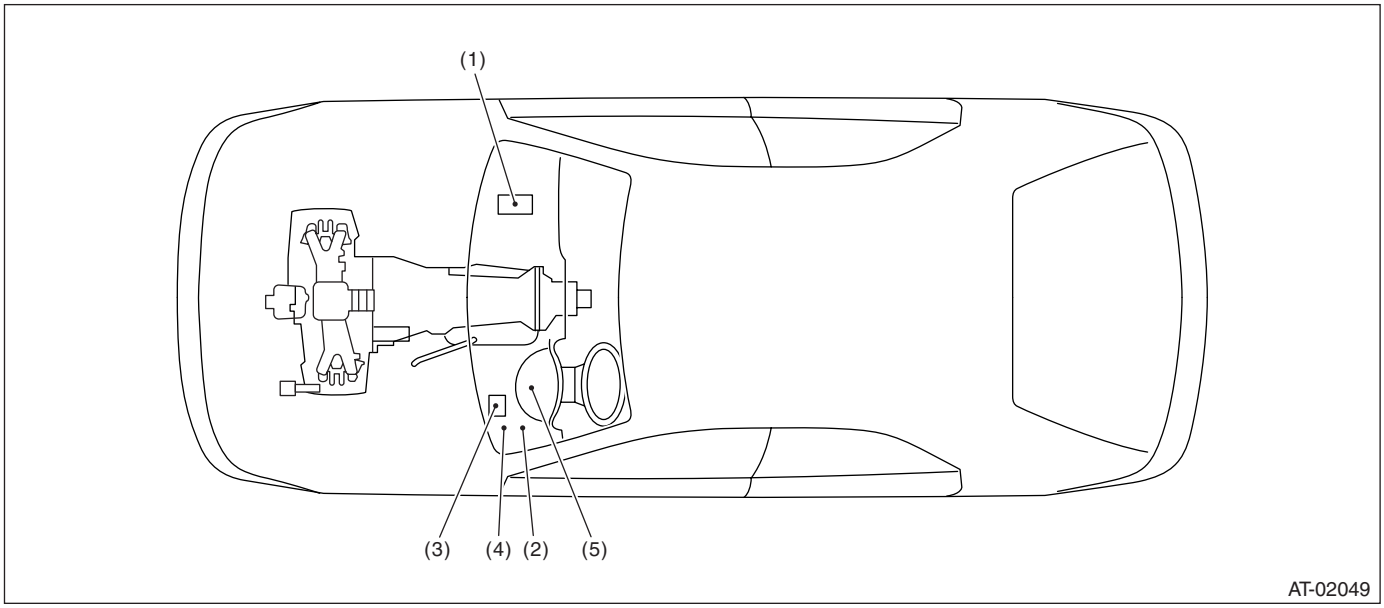
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring sensor.

4. Electrical Component Location

A: LOCATION

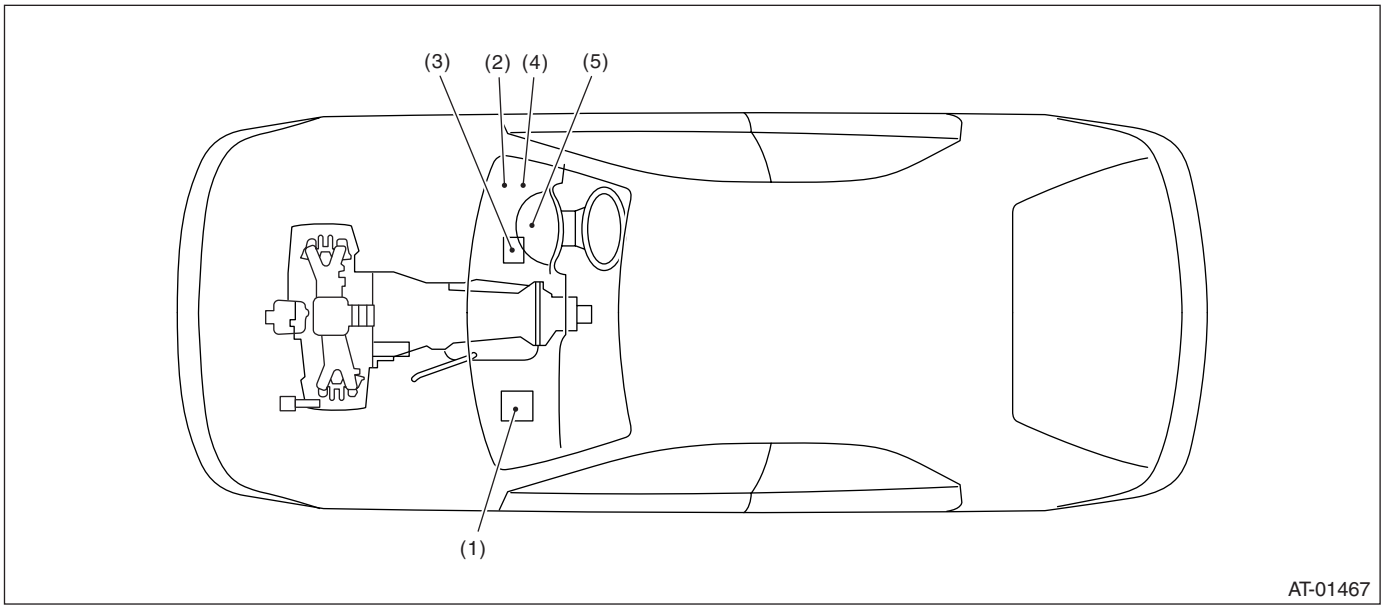
1. CONTROL MODULE

• LHD model



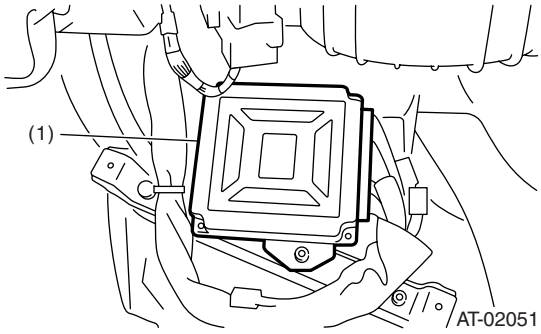
(1) Engine control module (ECM)
(2) SPORT indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit

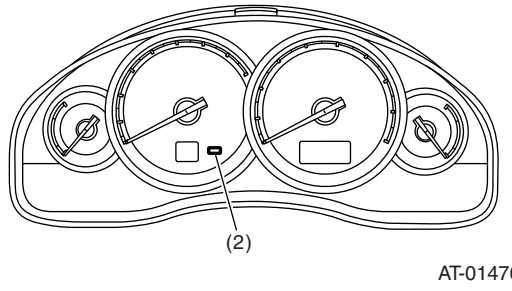
• RHD model

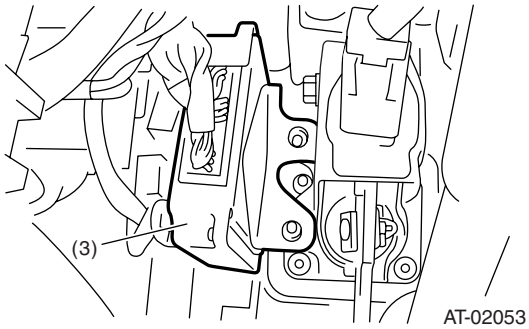


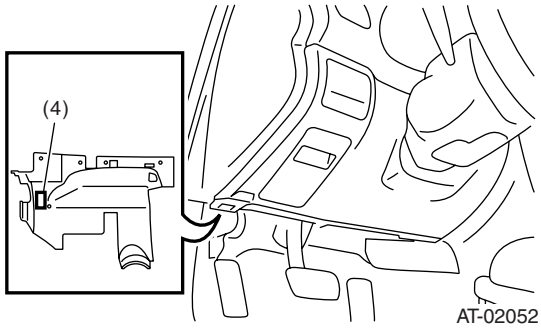
(1) Engine control module (ECM)
(2) SPORT indicator light (AT warning light)
(3) Transmission control module (TCM)
(4) Data link connector
(5) Body integrated unit

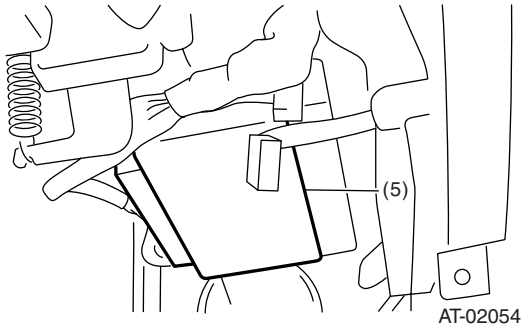
• LHD model





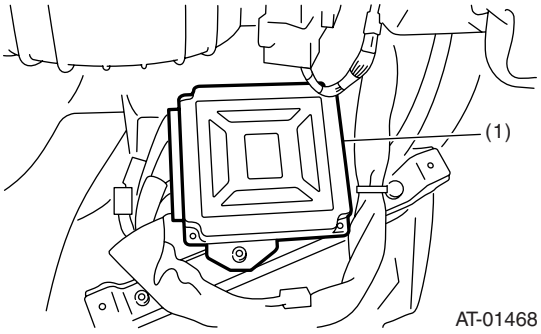


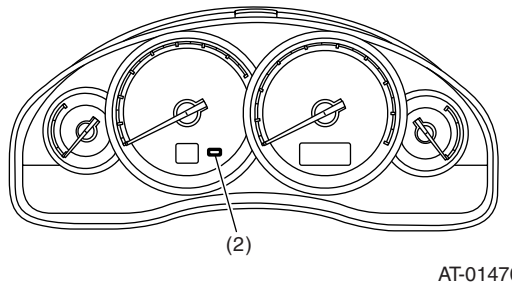


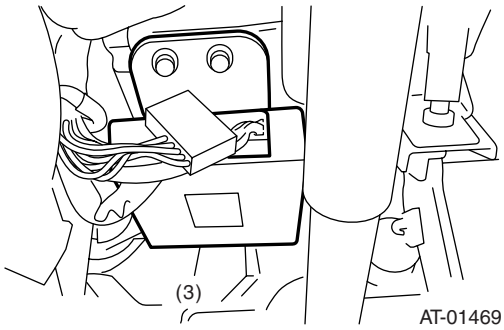


SUBARU.

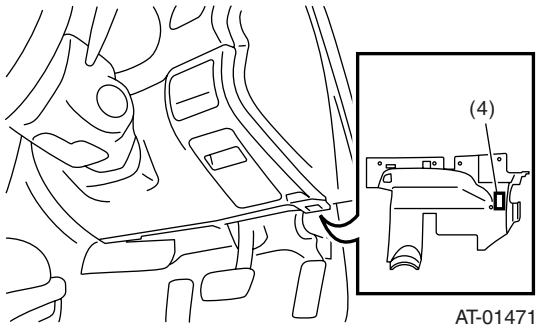
• RHD model



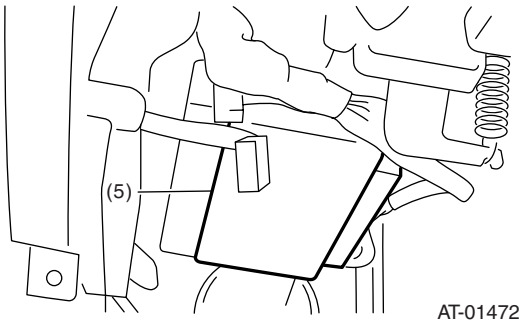




AT-01469



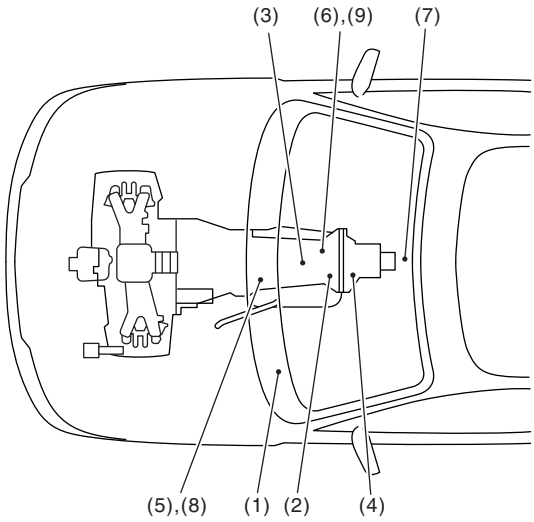
AT-01471



AT-01472

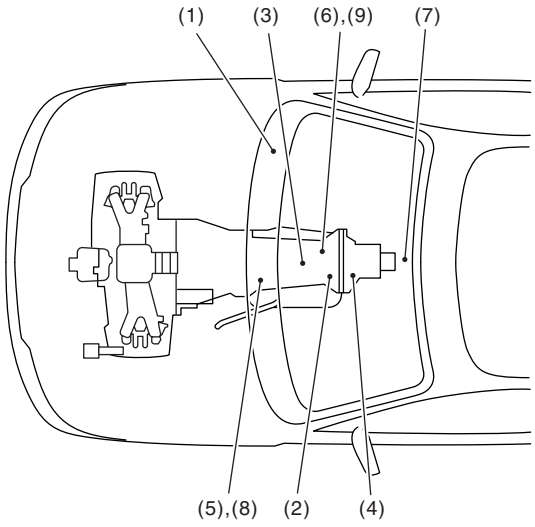
2. SENSOR

• LHD model



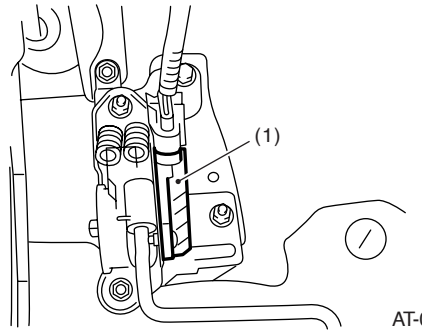
AT-02050

• RHD model

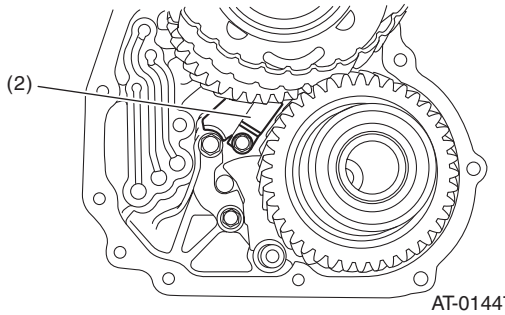


AT-01443

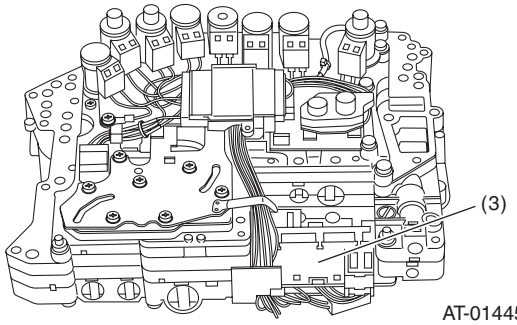
(1) Accelerator position sensor
(2) Front vehicle speed sensor
(3) Inhibitor switch
(4) Rear vehicle speed sensor
(5) Turbine speed sensor 1
(6) ATF temperature sensor 1
(7) Lateral G sensor
(8) Turbine speed sensor 2
(9) ATF temperature sensor 2



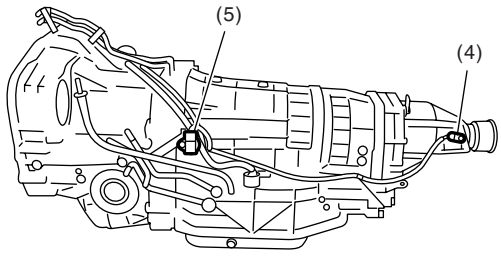
AT-00375



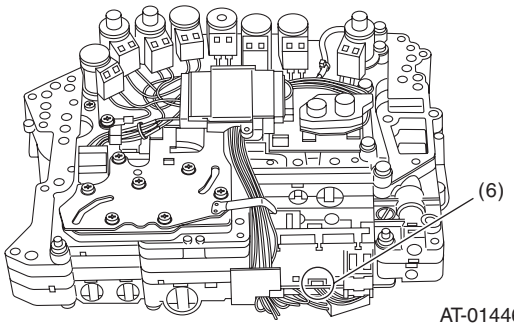
AT-01447



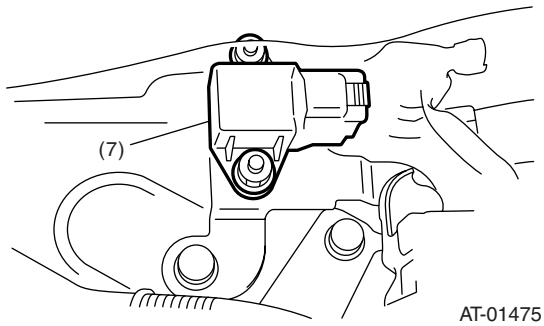
AT-01445



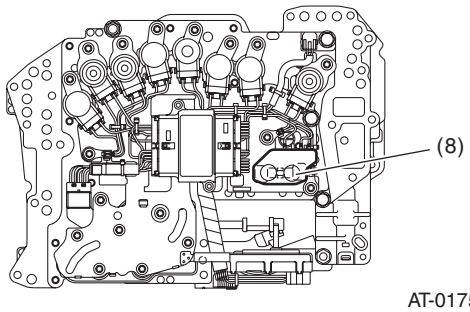
AT-01448



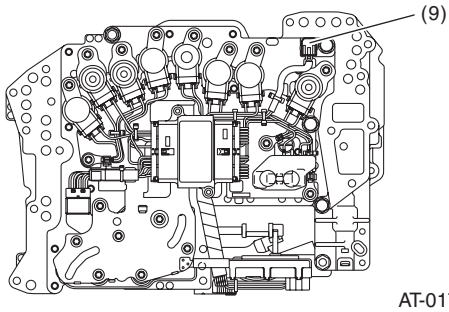
AT-01446



AT-01475

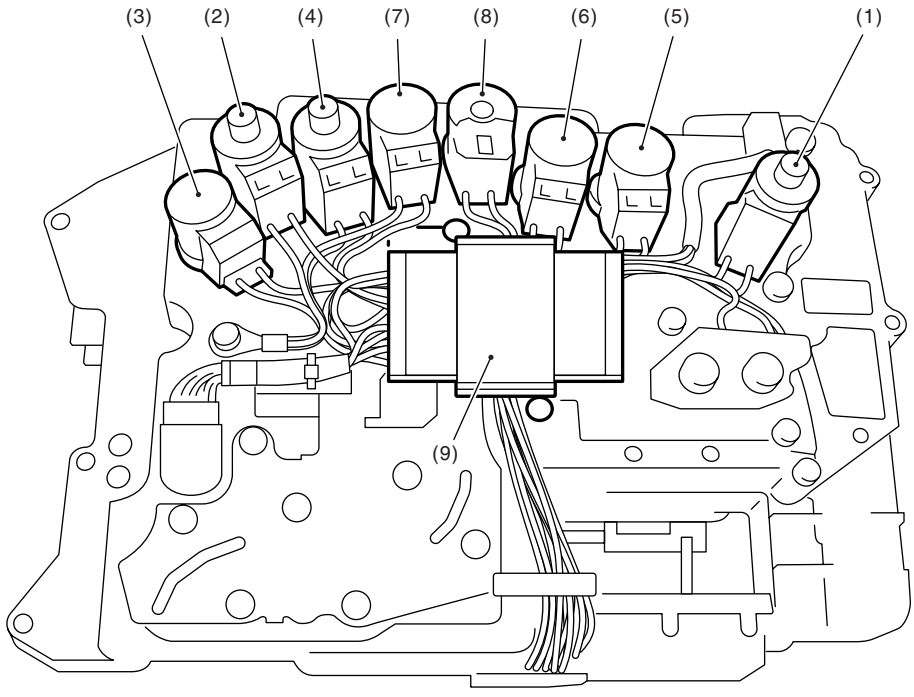


AT-01759



AT-01760

3. SOLENOID

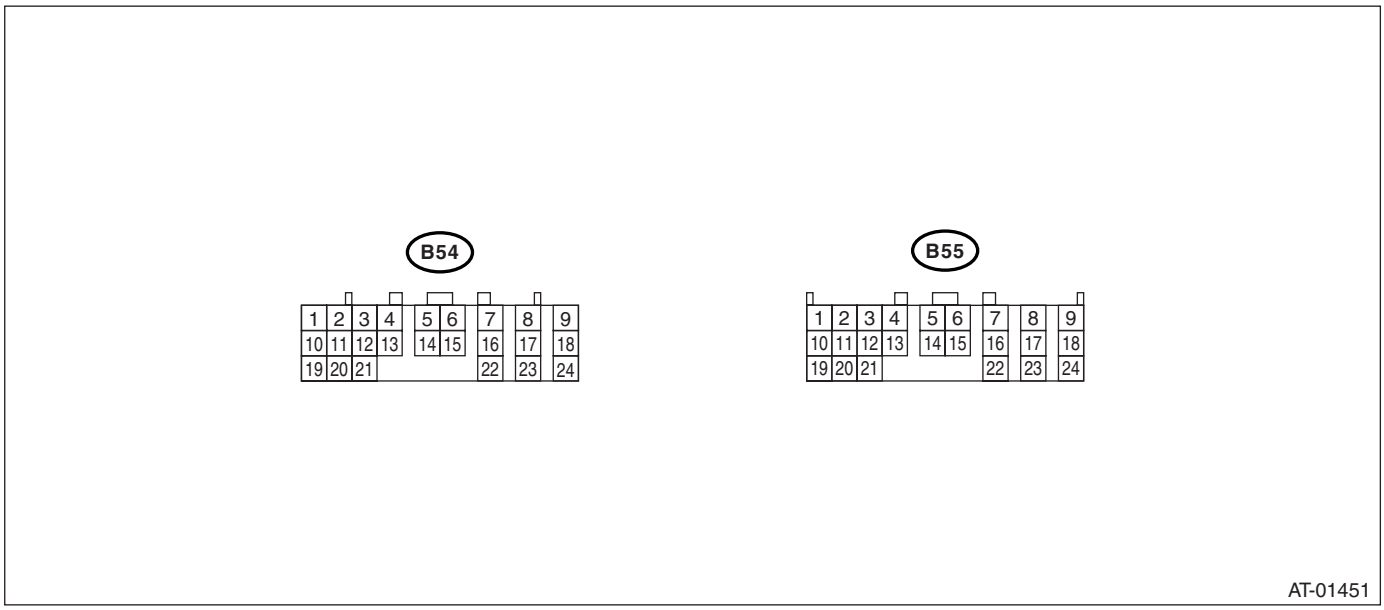


AT-01449

(1) High & low reverse clutch solenoid
(2) Direct clutch solenoid
(3) Front brake solenoid
(4) Input clutch solenoid
(5) Line pressure solenoid
(6) Lock up solenoid
(7) Transfer solenoid
(8) Low coast brake solenoid
(9) Memory box

5. Transmission Control Module (TCM) I/O Signal

A: ELECTRICAL SPECIFICATION



NOTE:
The measurement should perform after warming up.

Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Measure the resistance between terminal and chassis ground.	Remarks
P/L solenoid output	B54	9	Engine ON, "P" range, Accelerator OFF, Brake ON	Approx. 4.0 — 6.0 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Manual mode 1st, Accelerator OFF, Brake ON	Approx. 2.0 — 4.0 V		
PVIGN power supply	B54	8	Ignition switch ON	Power supply voltage	—	
		7	Ignition switch ON	Power supply voltage	—	
I/C oil pressure switch input	B54	6	—	—	—	The condition of I/C oil pressure switch cannot read by the tester.
Power GND	B54	5	Always	Approx. 0 V	—	
CAN communication line (+)	B54	4	—	—	—	
CAN communication line (–)	B54	3	—	—	—	
ATF temperature sensor 1 input	B54	2	Ignition switch ON	2.5 — 2.9 V (ATF temperature 20°C (68°F)) 0.8 — 1.0 V (ATF temperature 80°C (176°F))	4.0 — 5.0 kΩ (ATF temperature 20°C (68°F)) 0.7 — 0.9 kΩ (ATF temperature 80°C (176°F))	

Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Measure the resistance between terminal and chassis ground.	Remarks
Battery power supply	B54	1	Always	Power supply voltage	—	
I/C solenoid output	B54	18	While driving at 1st — 3rd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th or 5th of manual mode	Approx. 0 V		
H&LR/C solenoid output	B54	17	While driving at 2nd of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Control valve power supply output	B54	16	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
LC/B solenoid output	B54	15	While driving at 1st — 2nd of manual mode	Power supply voltage	5 — 17 Ω (ATF temperature 25°C (77°F))	
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Power GND	B54	14	Always	Approx. 0 V	—	
Analog GND (Sensor GND)	B54	13	Always	Approx. 0 V	—	
LC/B oil pressure switch input	B54	12	—	—	—	The condition of LC/B oil pressure switch cannot read by the tester.
ATF temperature sensor 2 input	B54	11	Ignition switch ON	2.3 — 2.7 V (ATF temperature 20°C (68°F)) 0.6 — 0.8 V (ATF temperature 80°C (176°F))	3.0 — 3.6 kΩ (ATF temperature 20°C (68°F)) 0.4 — 0.6 kΩ (ATF temperature 80°C (176°F))	
PVIGN power supply relay output	B54	10	Ignition switch ON	0 — 1.5 V	—	
Fr/B solenoid output	B54	24	While driving at other than 4th of manual mode	Approx. 4.5 — 6.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 4th of manual mode	Approx. 0 V		
L/U solenoid output	B54	23	When lock-up	Approx. 3.5 — 5.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			When not lock-up	Approx. 0 V		
D/C solenoid output	B54	22	While driving at 1st or 5th of manual mode	Approx. 5.5 — 7.5 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			While driving at 2nd — 4th of manual mode	Approx. 0 V		
D/C oil pressure switch input	B54	21	—	—	—	The condition of D/C oil pressure switch cannot read by the tester.
Subaru Select Monitor communication line	B54	20	—	—	—	

Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Measure the resistance between terminal and chassis ground.	Remarks
Control GND	B54	19	Always	Approx. 0 V	—	
H&LR/C oil pressure switch input	B55	8	While driving at 2nd of manual mode	Power supply voltage	—	
			While driving at 3rd — 5th of manual mode	Approx. 0 V		
Front vehicle speed sensor input	B55	7	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 140 — 170 Hz	—	
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 560 — 680 Hz		
Lateral G sensor power supply	B55	6	Ignition switch ON	4.75 — 5.25 V	—	
Lateral G sensor signal input	B55	5	Ignition switch ON, Engine ON, Flat value	2.0 — 3.0 V	—	
Inhibitor switch 1 input	B55	4	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “N” range	1.5 V or less		
Inhibitor switch 2 input	B55	3	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	1.5 V or less		
Accessory power supply	B55	2	Accessory switch ON	Power supply voltage	—	
			Accessory switch OFF	Approx. 0 V		
Ignition power supply	B55	1	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
Rear vehicle speed sensor input	B55	18	While driving at 2nd and 20 km/h (12 MPH) of manual mode	Approx. 190 — 230 Hz	—	
			While driving at 4th and 80 km/h (50 MPH) of manual mode	Approx. 760 — 920 Hz		
Fr/B oil pressure switch input	B55	17	Ignition switch ON, Engine ON, While driving at other than 4th	Approx. 0 V	—	
			Ignition switch ON, Engine ON, While driving at 4th	Power supply voltage		
Turbine speed sensor 1 input	B55	16	2nd of manual mode, Turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 0 Hz	—	Use an oscilloscope.
			4th of manual mode, Turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 Hz		Use an oscilloscope.

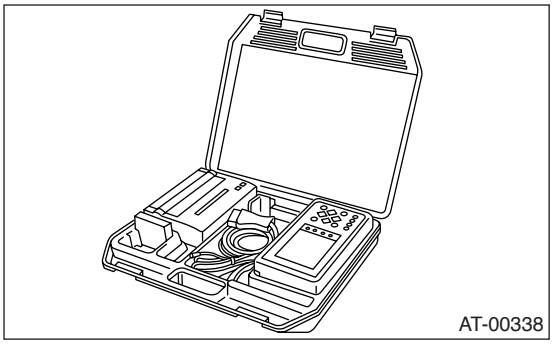
Item	Connector No.	Terminal No.	Measuring conditions	Voltage (V)	Measure the resistance between terminal and chassis ground.	Remarks
Range lock solenoid output	B55	15	Ignition switch ON, While stopping at “D” range	About Power Supply Voltage – 1.2 V	7 — 21 Ω	
			Ignition switch ON, Vehicle speed at least 20 km/h (12 MPH)	Approx. 0 V		
Inhibitor switch 3 input	B55	14	Ignition switch ON, “R” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	1.5 V or less		
Inhibitor switch 4 input	B55	13	Ignition switch ON, “P” range	4.0 — 5.0 V	—	
			Ignition switch ON, “D” range	1.5 V or less		
Control valve communication line	B55	12	—	—	—	
Back-up light relay output	B55	11	Ignition switch ON, “R” range	1.5 V	Approx. 90 — 110 Ω (ATF temperature 25°C (77°F))	
			Ignition switch ON, Other than “R” range	Power supply voltage		
Ignition power supply	B55	10	Ignition switch ON	Power supply voltage	—	
			Ignition switch OFF	Approx. 0 V		
AWD solenoid output	B55	23	Engine ON, “P” range or “N” range, Accelerator OFF	Approx. 0 V	3 — 9 Ω (ATF temperature 20°C (68°F))	Driving frequency 750 — 850 Hz
			Engine ON, “D” range, Accelerator OFF, Brake ON	Approx. 2.0 — 3.0 V		
Turbine speed sensor 2 input	B55	22	2nd of manual mode, Turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,300 — 1,500 Hz		Use an oscilloscope.
			4th of manual mode, Turbine speed sensor is 2,000 rpm (Read from Subaru Select Monitor)	Approx. 1,900 — 2,100 Hz	—	Use an oscilloscope.
Control GND	B55	21	Always	Approx. 0 V	—	
Inhibitor switch 3 open circuit monitor input	B55	20	Ignition switch ON, “D” range	4.0 — 5.0 V	—	
			Ignition switch ON, “R” range	Less than 1.5 V		
PN signal output	B55	19	Ignition switch ON, Other than “P” range or “N” range	Power supply voltage	—	ECM should connected correctly
			Ignition switch ON, “P” range or “N” range	0 — 1.0 V	—	

6. Subaru Select Monitor

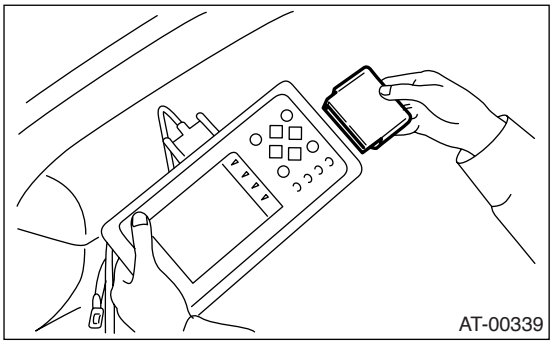
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit.

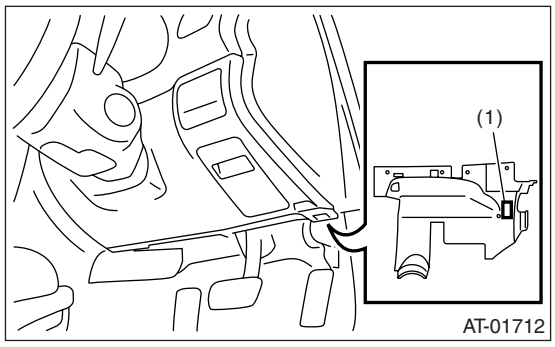


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to 5AT(diag)-6, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).

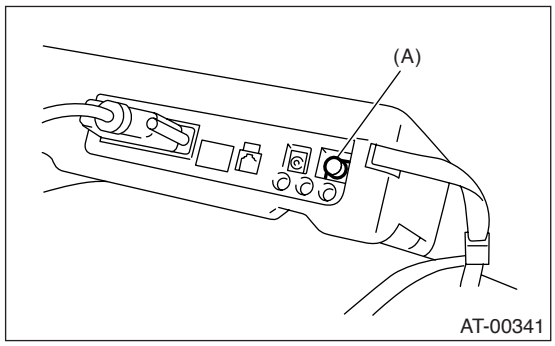


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

NOTE:
Do not connect scan tools except for Subaru Select Monitor.

5) Turn ignition switch to ON (engine OFF) and turn on the Subaru Select Monitor.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
8) Press the [YES] key after the information of transmission type is displayed.
9) On the «Transmission Diagnosis» display screen, select the {Diagnosis Code(s) Display} and press [YES] key.

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to 5AT(diag)-30, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
3) Press the [YES] key after the information of transmission type is displayed.
4) On the «Transmission Diagnosis» display screen, select the {Current Data Display & Save} and press the [YES] key.
5) On the «Transmission Diagnosis» display screen, select the {Data Display} and press the [YES] key.
6) Using the scroll key, scroll the display screen up or down until the desired data is shown.

• A list of the support data is shown in the following table.

Item	Display	Unit of measure
Engine speed signal	Engine speed	rpm
Battery voltage	Battery Voltage	V
Accelerator Position Sensor	Acceleration opening angle	%
Front vehicle speed sensor signal	Front Wheel Speed	km/h
Gear position	Gear Position	—
Turbine speed sensor signal	Turbine Revolution Speed	rpm
Rear vehicle speed sensor signal	Rear Wheel Speed	km/h
Lateral G sensor	Lateral G sensor	V
ATF Temperature Sensor 1 Signal	ATF Temp.	°C
ATF Temperature Sensor 2 Signal	ATF Temp. 2	°C
Turbine speed sensor 1 signal	Turbine Revolution Speed 1	rpm
Turbine speed sensor 2 signal	Turbine Revolution Speed 2	rpm
High & Low Reverse Clutch Solenoid Indicator Current	H&LR/C Solenoid Current	A
Direct Clutch Solenoid Indicator Current	D/C Solenoid Current	A
Front Brake Solenoid Indicator Current	F/B Solenoid Current	A
Input Clutch Solenoid Indicator Current	I/C Solenoid Current	A
Line Pressure Solenoid Indicator Current	P/L Solenoid Current	A
Lock-up Solenoid Indicator Current	L/U Solenoid Current	A
Transfer Solenoid Indicator Current	AWD Solenoid Current	A
High & Low Reverse Clutch Solenoid Target Oil Pressure	H&LR/C Solenoid Target Pressure	kPa
Direct Clutch Solenoid Target Oil Pressure	D/C Solenoid Target Pressure	kPa
Front Brake Solenoid Target Oil Pressure	F/B Solenoid Target Pressure	kPa
Input Clutch Solenoid Target Oil Pressure	I/C Solenoid Target Pressure	kPa
Line Pressure Solenoid Target Oil Pressure	P/L Solenoid Target Pressure	kPa
Lock-up Solenoid Target Oil Pressure	L/U Solenoid Target Pressure	kPa
Transfer Solenoid Target Oil Pressure	AWD Solenoid Target Pressure	kPa
Ignition switch	Ignition SW	ON Input or OFF Input
Tip signal	Tip Mode SW	ON or OFF
Cruise control On signal	Cruise Control Signal	ON or OFF
Tip Down Shift Signal	Down SW	ON or OFF
Stop light switch signal	Stop Light SW	ON or OFF
Tip Up Shift Signal	Up SW	ON or OFF
Drive range signal	D Range	ON or OFF
Reverse range signal	R Range	ON or OFF
Diagnosis Light Output Signal	Diagnosis Lamp	ON or OFF
Shift lock solenoid signal	Shift lock solenoid	ON or OFF
Parking range signal	P range	ON or OFF
P/N Range Output Signal	P/N Signal	ON or OFF
Neutral range signal	N range	ON or OFF
Inhibitor Switch 1 Input Signal	Inhibitor SW1	High or Low
Inhibitor Switch 2 Input Signal	Inhibitor SW2	High or Low
Inhibitor Switch 3 Input Signal	Inhibitor SW3	High or Low
Inhibitor Switch 4 Input Signal	Inhibitor SW4	High or Low
Inhibitor Switch 3 Monitor Input Signal	Inhibitor SW3 Monitor	High or Low
Backup light relay output signal	Back-up light relay	ON or OFF
High & Low Reverse Clutch Oil Pressure Switch Input Signal	H&LR/C Oil Pressure SW	ON or OFF
Direct Clutch Oil Pressure Switch Input Signal	D/C Oil Pressure SW	ON or OFF
Front Brake Oil Pressure Switch Input Signal	Fr/B Oil Pressure SW	ON or OFF
Input Clutch Oil Pressure Switch Input Signal	I/C Oil Pressure SW	ON or OFF

Item	Display	Unit of measure
Low Coast Brake Oil Pressure Switch Input Signal	LC/B Oil Pressure SW	ON or OFF
Low Coast Brake Solenoid Input Signal	LC B Solenoid	ON or OFF

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

NOTE:
To clear the previous DTC, use {Clear Memory}, and to clear the learned value, use {Clear Memory 2}.

1) Check that the select lever is in “P” range.
2) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
3) On the «System Selection Menu» display screen, select the {Transmission} and press the [YES] key.
4) Press the [YES] key after the information of transmission type is displayed.
5) On the «Transmission Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

NOTE:
If {Clear Memory 2} is selected and performed, DTC may not be cleared.

6) When the ‘Done’ are shown on the display screen, turn off the Subaru Select Monitor and turn the ignition switch to OFF. To turn the ignition switch ON again, wait for more than 10 seconds.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

Refer to “Subaru Select Monitor” for information about how to obtain and understand the DTC. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>

NOTE:
DTC can not be read by SPORT indicator light.

8. Inspection Mode

A: PROCEDURE

WARNING:
Observe the traffic law during actual driving.

1) Shift the select lever to “D” range, and then drive the vehicle with changing the gear from 1st to 5th.
2) When driving the vehicle at 5th speed of “D” range, set the gear to manual mode and drive the vehicle with shifting down using “–” of steering switch or “–” of select lever from 5th → 4th, 4th → 3rd, 3rd → 2nd, 2nd → 1st.

NOTE:
At shifting down, drive the vehicle at least 10 seconds in each speed.

3) Shift the select lever to “R” range and drive the vehicle for more than 2 seconds.

9. Clear Memory Mode

A: OPERATION

Use “Subaru Select Monitor” to clear DTC. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

NOTE:
DTC cannot be cleared without using Subaru Select Monitor.

10.Learning Control

A: GENERAL DESCRIPTION

Be sure to perform the {Clear Memory 2} only when the following services are performed. And when the shifting shock is occurred in total check with vehicle driving, perform the learning with following procedures. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

- Replacement of TCM
- Replacement of transmission assembly
- Replacement of TCM and transmission assembly

CAUTION:
When {Clear Memory 2} is executed, DTC may not be cleared.

B: PROCEDURE

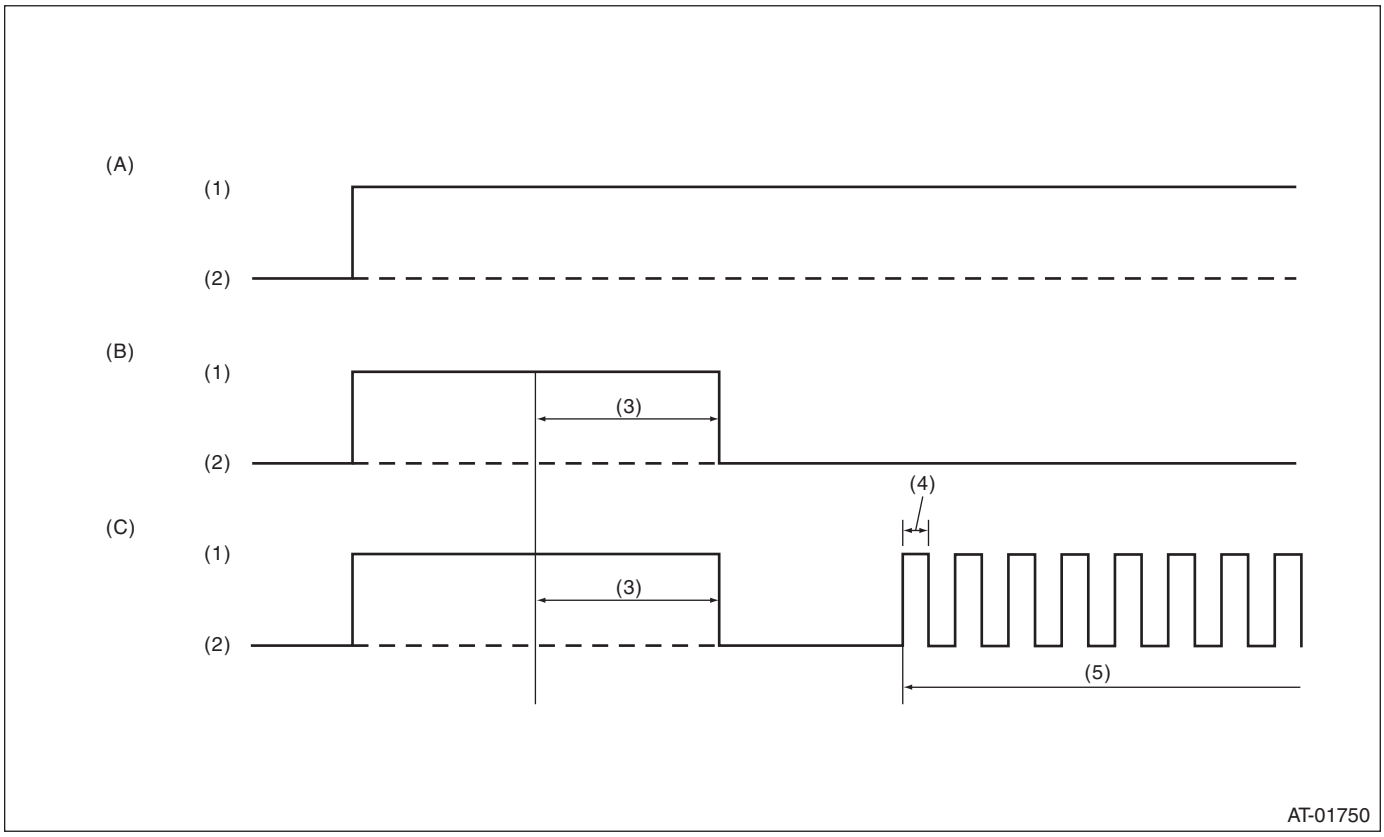
1) Turn the ignition switch to OFF.
2) Turn the air conditioner switch to OFF.
3) Turn the headlight switch to OFF.
4) Turn the rear defogger switch to OFF.
5) Start the engine.
6) Connect the Subaru Select Monitor to the vehicle.
7) Drive the vehicle for 5 — 10 km (3 — 6 miles) to warm up ATF temperature more than 70 °C (158 °F).
8) With the throttle opening angle on SUBARU select monitor indicates between 10%±2%, shift the gear from 1st → 2nd, 2nd → 3rd, 3rd → 4th, 4th → 5th while driving the vehicle at “D” range. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.>
9) Repeat the step 8) until reducing of shifting shock was felt.
10) Reducing of shifting shock was not felt though the procedure was repeated 5 cycle, recheck that the learning conditions (throttle opening angle, ATF temperature, etc.) are specified and recheck that other parts are normal.

11.SPORT Indicator Light Display

A: OPERATION

When any on-board diagnostics item is malfunctioning, the display on the SPORT indicator light blinks from the time the malfunction is detected after starting the engine until the ignition switch is turned OFF. The malfunctioning part or unit can be determined by a DTC during the on-board diagnostics operation. Problems which occurred previously can also be identified through the memory function. If the SPORT indicator light does not show a problem (although a problem is occurring), the problem can be determined by checking the performance characteristics of each sensor using the Subaru Select Monitor. Indicator light signal is as shown in the figure.

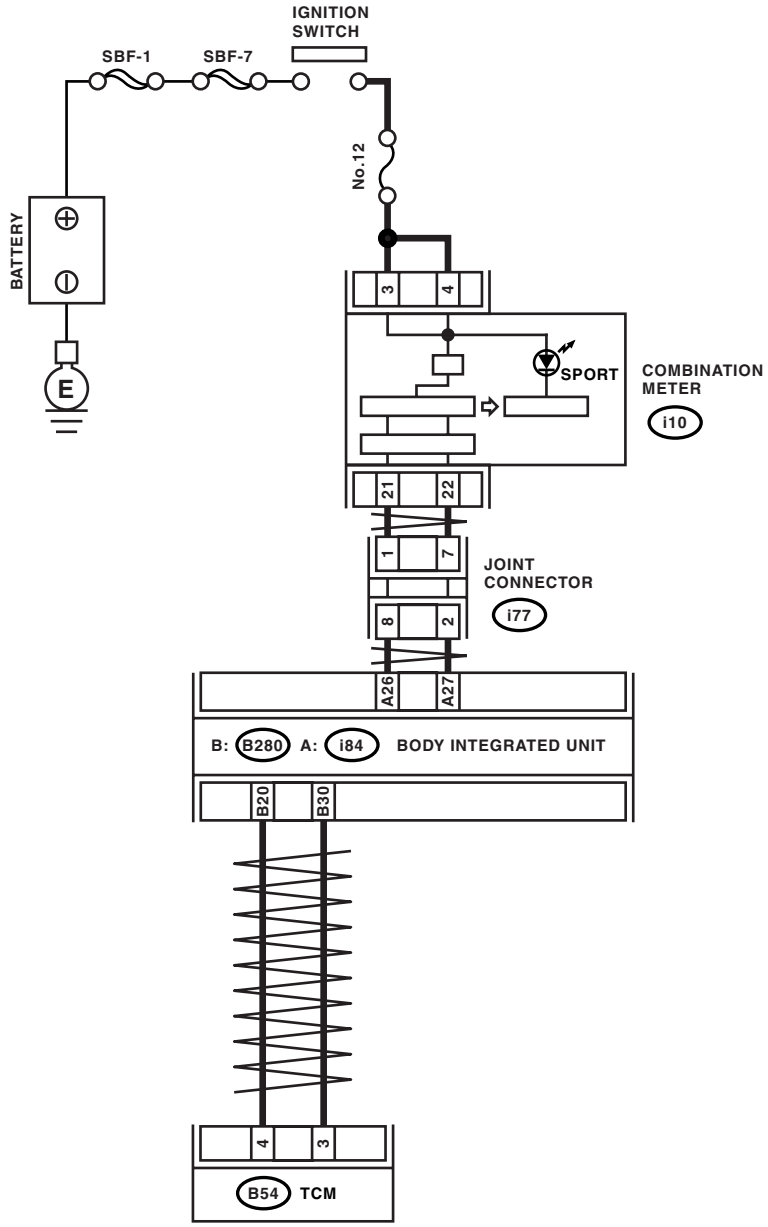
When the SPORT indicator light does not operates normally though the DTC is not stored, perform the SPORT indicator light inspection. <Ref. to 5AT(diag)-24, INSPECTION, SPORT Indicator Light Display.>

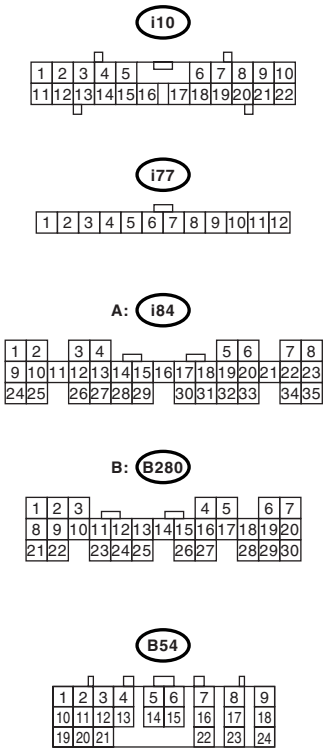


(A) Ignition switch (Engine OFF)
(B) Normal (Engine ON)
(C) Faulty (Engine ON)
(1) ON
(2) OFF
(3) 2 sec.
(4) 0.25 sec.
(5) Blink

B: INSPECTION

DIAGNOSIS:
SPORT indicator light circuit is open or shorted.
TROUBLE SYMPTOM:
When the ignition switch is turned to ON (engine OFF), SPORT indicator light does not illuminate.
WIRING DIAGRAM:





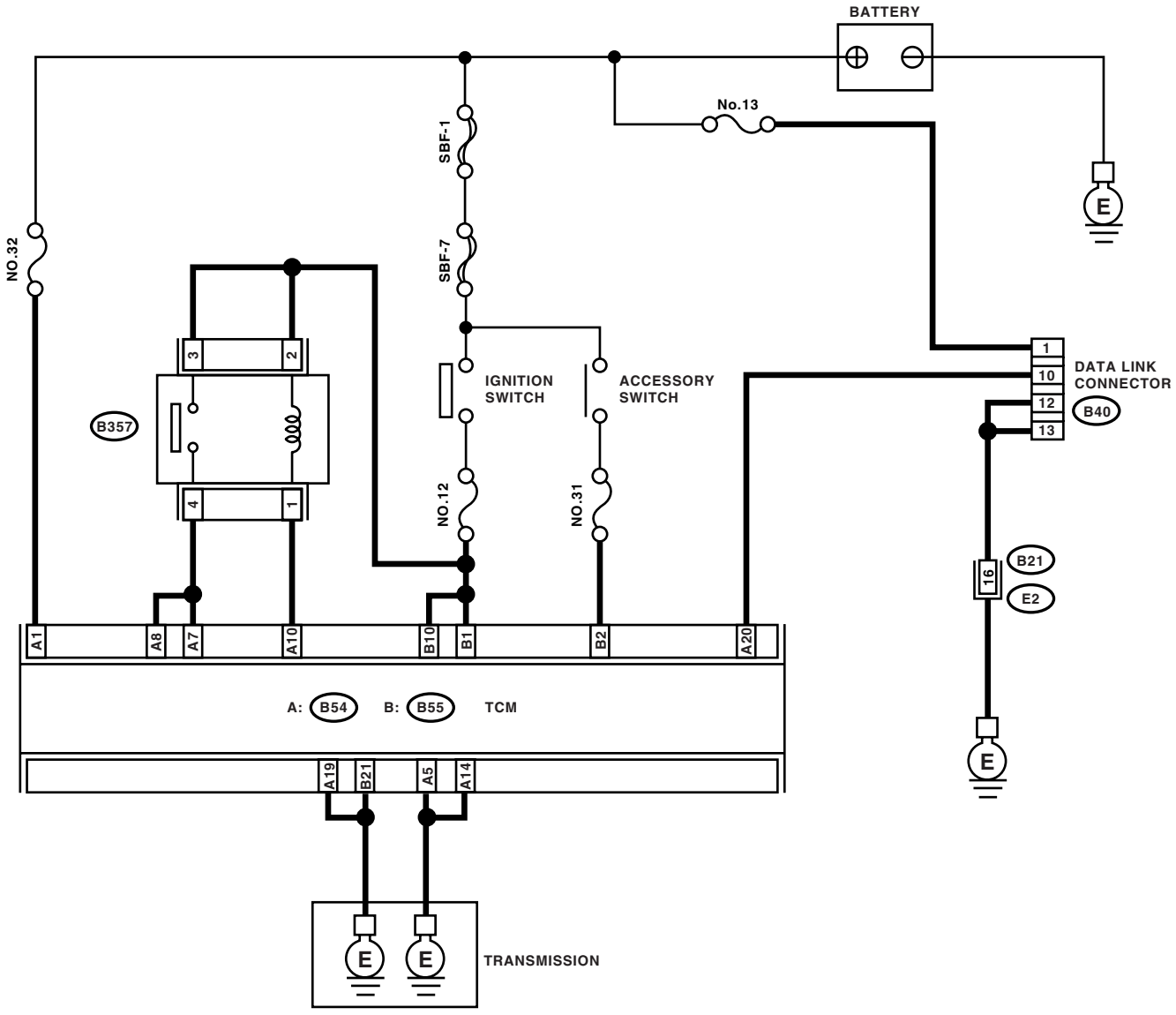
AT-01452

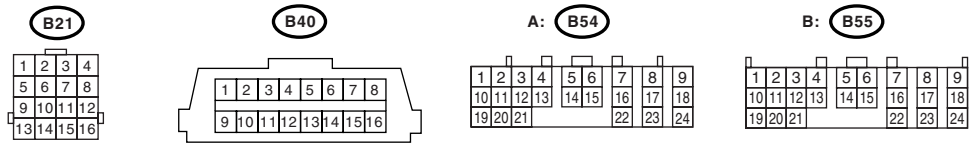
	Step	Check	Yes	No
1	**CHECK SPORT INDICATOR LIGHT.** Turn the ignition switch to ON.	Does the SPORT indicator light illuminate?	Go to step **2.**	Perform the self-diagnosis of combination meter.
2	**CHECK SPORT INDICATOR LIGHT.** After the ignition switch is “ON”, wait for at least 2 seconds.	Does the SPORT indicator light illuminate?	Go to step **3.**	Go to step **4.**
3	**CHECK SPORT INDICATOR LIGHT.** Start the engine.	Does the SPORT indicator light go off?	Normal. Go back to “Basic Diagnosis Procedure”. <Ref. to 5AT(diag)-2, Basic Diagnostics Procedure.>	Go to step **7.**
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** Connect the Subaru Select Monitor to data link connector.	Is the communication between Subaru Select Monitor and TCM normal?	Go to step **5.**	Check the TCM power supply ground circuit and Subaru Select Monitor communication. <Ref. to 5AT(diag)-26, Diagnostic Procedure for Select Monitor Communication.>
5	**CHECK TCM.** Display the current data of TCM using Subaru Select Monitor.	Is “Diagnosis light” output signal set to “ON”?	Go to step **6.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
6	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is “SPORT light” input signal set to “ON”?	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>	Check DTC of body integrated unit. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>
7	**CHECK TCM.** 1) Start the engine. 2) Display the current data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is “Diagnosis light” output signal set to “ON”?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **8.**
8	**CHECK BODY INTEGRATED UNIT.** Display the current data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is “SPORT light” input signal set to “ON”?	Check DTC of body integrated unit. Perform the diagnosis according to DTC. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Perform the self-diagnosis for combination meter. <Ref. to IDI-3, INSPECTION, Combination Meter System.>

12.Diagnostic Procedure for Select Monitor Communication

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DIAGNOSIS:
Faulty harness connector
TROUBLE SYMPTOM:
Subaru Select Monitor communication failure
WIRING DIAGRAM:





AT-01453

	Step	Check	Yes	No
1	**CHECK SUBARU SELECT MONITOR POWER SUPPLY CIRCUIT.** Measure the voltage between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair harness connector and connector between battery and data link connector, and poor contact in coupling connector.
2	**CHECK SUBARU SELECT MONITOR GROUND CIRCUIT.** Measure the resistance of harness between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 12 — Chassis ground:*** ***(B40) No. 13 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between data link connector and ground terminal, and poor contact in coupling connector.
3	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to transmission systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **4.**
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM connector. 3) Turn the ignition switch to ON. 4) Check whether communication to engine systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Connect the TCM connector. 3) Disconnect the ECM connector. 4) Turn the ignition switch to ON. 5) Check whether communication to transmission systems can be executed normally.	Are the name and year of system displayed on Subaru Select Monitor?	Inspect the ECM.	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL UNIT AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the TCM and ECM connector. 3) Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Check harness and connector between each control unit and data link connector.
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 1 V?	Check harness and connector between each control unit and data link connector.	Go to step **8.**
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND DATA LINK CONNECTOR.** Measure the resistance between TCM connector and data link connector. ***Connector & terminal*** ***(B54) No. 20 — (B40) No. 10:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the harness and connector between TCM and data link connector.

	Step	Check	Yes	No
9	**CHECK INSTALLATION OF TCM CONNECTOR.** Turn the ignition switch to OFF.	Is TCM connector connected to TCM?	Go to step **10.**	Connect the TCM connector to TCM.
10	**CHECK INSTALLATION OF TRANSMISSION HARNESS CONNECTOR.**	Is the transmission harness connector connected to bulkhead harness connector?	Go to step **11.**	Connect the bulkhead harness connector to transmission harness connector.
11	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in control unit power supply and data link connector?	Repair the poor contact.	Go to step **12.**
12	**CHECK POWER SUPPLY OF TCM.** 1) Disconnect the connector from TCM. 2) Turn the ignition switch to ON. 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **15.**	Go to step **13.**
13	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 32).	Is the fuse (No. 32) blown out?	Go to step **14.**	Repair the open circuit in harness between fuse (No. 32) and TCM, or fuse (No. 32) and battery, and poor contact in coupling connector.
14	**CHECK HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the fuse (No. 32). If the replaced fuse (No. 32) has blown out easily, repair the short circuit in harness between fuse (No. 32) and TCM.	Replace the fuse (No. 32).
15	**CHECK IGNITION POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition power supply voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 1 (+) — Chassis ground (–):*** ***(B55) No. 10 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **17.**	Go to step **16.**
16	**CHECK FUSE (No. 12).** Remove the fuse (No. 12).	Is the fuse (No. 12) blown out?	Replace the fuse (No. 12). If the replaced fuse (No. 12) has blown out easily, repair the short circuit in harness between fuse (No. 12) and TCM.	Repair the open circuit in harness between fuse (No. 12) and TCM, or fuse (No. 12) and battery, and poor contact in coupling connector.

	Step	Check	Yes	No
17	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 19 — Chassis ground:*** ***(B55) No. 21 — Chassis ground:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **18.**	Repair the short circuit in harness between TCM and transmission harness connector, and poor contact in coupling connector.
18	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in TCM power supply, ground and data link connector?	Repair the connector.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

13.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	Reference target
P0705	Transmission Range Sensor Circuit (PRNDL Input)	Inhibitor switch 1 malfunction, open or short circuit	<Ref. to 5AT(diag)-34, DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0712	Transmission Fluid Temperature Sensor Circuit Low Input	ATF temperature sensor 1 malfunction, open input signal circuit	<Ref. to 5AT(diag)-39, DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0713	Transmission Fluid Temperature Sensor Circuit High Input	ATF temperature sensor 1 malfunction, short input signal circuit	<Ref. to 5AT(diag)-42, DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0715	Input/Turbine Speed Sensor Circuit	Turbine speed sensor 1 malfunction, short input signal circuit	<Ref. to 5AT(diag)-45, DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0719	Torque Converter/Brake Switch “B” Circuit Low	Brake switch malfunction, open input signal circuit, body integrated unit malfunction, CAN communication malfunction	<Ref. to 5AT(diag)-49, DTC P0719 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0720	Output Speed Sensor Circuit	Front wheel speed sensor is faulty or input signal circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-51, DTC P0720 OUTPUT SPEED SENSOR CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0724	Torque Converter/Brake Switch “B” Circuit High	Brake switch malfunction, short circuit of input signal, body integrated unit malfunction, CAN communication malfunction	<Ref. to 5AT(diag)-56, DTC P0724 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0725	Engine Speed Input Circuit	Open or short engine speed output signal circuit, ECM malfunction, CAN communication malfunction	<Ref. to 5AT(diag)-58, DTC P0725 ENGINE SPEED INPUT CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0731	Gear 1 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-58, DTC P0731 GEAR 1 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0732	Gear 2 Incorrect Ratio	Vehicle sensor, turbine speed sensor, control valve malfunction or shift clutch malfunction	<Ref. to 5AT(diag)-58, DTC P0732 GEAR 2 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0733	Gear 3 Incorrect Ratio	Vehicle sensor, turbine speed sensor, or shift clutch malfunction	<Ref. to 5AT(diag)-58, DTC P0733 GEAR 3 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0734	Gear 4 Incorrect Ratio	Vehicle sensor, turbine speed sensor, or shift clutch malfunction	<Ref. to 5AT(diag)-58, DTC P0734 GEAR 4 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0735	Gear 5 Incorrect Ratio	Vehicle sensor, turbine speed sensor, or shift clutch malfunction	<Ref. to 5AT(diag)-58, DTC P0735 GEAR 5 INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0736	Reverse Incorrect Ratio	Vehicle sensor, turbine speed sensor, or shift clutch malfunction	<Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Lock-up clutch is faulty or valve is stuck.	<Ref. to 5AT(diag)-60, DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0743	Torque Converter Clutch Circuit Electrical	L/U solenoid circuit malfunction or L/U solenoid body malfunction	<Ref. to 5AT(diag)-61, DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0748	Pressure Control Solenoid “A” Electrical	Line pressure solenoid circuit malfunction or line pressure solenoid body malfunction	<Ref. to 5AT(diag)-63, DTC P0748 PRESSURE CONTROL SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0751	Shift Solenoid “A” Performance or Stuck Off	Shift Solenoid “A” performance malfunction	<Ref. to 5AT(diag)-65, DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0753	Shift Solenoid “A” Electrical	Fr/B solenoid circuit malfunction or Fr/B solenoid body malfunction	<Ref. to 5AT(diag)-69, DTC P0753 SHIFT SOLENOID “A” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0756	Shift Solenoid “B” Performance or Stuck Off	Shift Solenoid “B” Performance malfunction	<Ref. to 5AT(diag)-72, DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0758	Shift Solenoid “B” Electrical	I/C solenoid circuit malfunction or I/C solenoid body malfunction	<Ref. to 5AT(diag)-75, DTC P0758 SHIFT SOLENOID “B” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0761	Shift Solenoid “C” Performance or Stuck Off	H&LR/C solenoid malfunction	<Ref. to 5AT(diag)-78, DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0763	Shift Solenoid “C” Electrical	H&LR/C solenoid circuit malfunction or H&LR/C solenoid body malfunction	<Ref. to 5AT(diag)-82, DTC P0763 SHIFT SOLENOID “C” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0766	Shift Solenoid “D” Performance or Stuck Off	D/C solenoid malfunction	<Ref. to 5AT(diag)-85, DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0768	Shift Solenoid “D” Electrical	D/C solenoid circuit malfunction or D/C solenoid body malfunction	<Ref. to 5AT(diag)-88, DTC P0768 SHIFT SOLENOID “D” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0771	Shift Solenoid “E” Performance or Stuck Off	LC/B solenoid malfunction	<Ref. to 5AT(diag)-91, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0773	Shift Solenoid “E” Electrical	• LC/B solenoid circuit malfunction or LC/B solenoid body malfunction • OFF malfunction of PVIGN relay circuit or relay body	<Ref. to 5AT(diag)-94, DTC P0773 SHIFT SOLENOID “E” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0801	Reverse Inhibit Control Circuit	• Shift lock solenoid is faulty or output signal circuit is open or shorted. • Brown out of TCM+B fuse	<Ref. to 5AT(diag)-97, DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0817	Starter Disable Circuit	• PN signal output circuit is open or shorted. • ECM Source Voltage Is Abnormal • Brown out of TCM+B fuse	<Ref. to 5AT(diag)-100, DTC P0817 STARTER DISABLE CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0882	PVIGN Power Supply Circuit (Low)	PVIGN relay output circuit is open, shorted or relay malfunction	<Ref. to 5AT(diag)-102, DTC P0882 TCM POWER INPUT SIGNAL LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P0957	Backup Light Relay Circuit Low	Back-up relay output circuit is open, shorted or relay OFF malfunction	<Ref. to 5AT(diag)-104, DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P0958	Backup Light Relay Circuit High	Back-up relay output circuit is open, shorted or relay ON malfunction	<Ref. to 5AT(diag)-106, DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1601	TCM Communication Malfunction	Communication Failure between TCM and Memory Box	<Ref. to 5AT(diag)-108, DTC P1601 TCM COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1706	AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Rear wheel speed sensor is faulty or input circuit, ground, power supply is open or shorted.	<Ref. to 5AT(diag)-110, DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1707	AT AWD Solenoid Valve Circuit Malfunction	AWD solenoid circuit malfunction or AWD solenoid body malfunction	<Ref. to 5AT(diag)-114, DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1710	Torque Converter Turbine 2 Speed Signal Circuit 2 Malfunction	Torque converter sensor 2 malfunction, input circuit, ground, power open, short circuit	<Ref. to 5AT(diag)-116, DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT 2 MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1716	ATF Temp. Sensor 2 Circuit Low	ATF temperature sensor 2 malfunction, open input signal circuit	<Ref. to 5AT(diag)-120, DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1717	ATF Temp. Sensor 2 Circuit High	ATF temperature sensor 2 malfunction, short input signal circuit	<Ref. to 5AT(diag)-123, DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1718	AT CAN Communication Circuit	CAN communication line bus off is open, EUM short circuit, ABS/VDCCM, integrated CU malfunction	<Ref. to 5AT(diag)-125, DTC P1718 AT CAN COMMUNICATION CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1760	Lateral Acceleration Sensor Performance Problem	Lateral G sensor malfunction	<Ref. to 5AT(diag)-126, DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1761	Lateral Acceleration Sensor Circuit Low	Lateral G sensor is faulty or input signal circuit is open.	<Ref. to 5AT(diag)-129, DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1762	Lateral Acceleration Sensor Circuit High	Lateral G sensor is faulty or input signal circuit is shorted.	<Ref. to 5AT(diag)-131, DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1798	Gear 1 Engine Brake	Malfunction of clutch oil pressure related to 1st engine brake, solenoid current malfunction	<Ref. to 5AT(diag)-133, DTC P1798 GEAR 1 ENGINE BRAKE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1799	Interlock	Malfunction of clutch oil pressure which emit interlock, solenoid current malfunction	<Ref. to 5AT(diag)-134, DTC P1799 INTERLOCK, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1817	SPORTS Mode Switch Circuit (Manual Switch)	Manual mode switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-135, DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Content of diagnosis	Reference target
P1840	Transmission Fluid Pressure Sensor/Switch A Circuit	H&LR/C oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-137, DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH A CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1841	Transmission Fluid Pressure Sensor/Switch B Circuit	D/C oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-137, DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH B CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1842	Transmission Fluid Pressure Sensor/Switch C Circuit	Fr/B oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-137, DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH C CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1843	Transmission Fluid Pressure Sensor/Switch D Circuit	I/C oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-137, DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH D CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1844	Transmission Fluid Pressure Sensor/Switch E Circuit	LC/B oil pressure switch is open or shorted, or switch malfunction	<Ref. to 5AT(diag)-137, DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

14.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0705 TRANSMISSION RANGE SENSOR CIRCUIT (PRNDL INPUT)

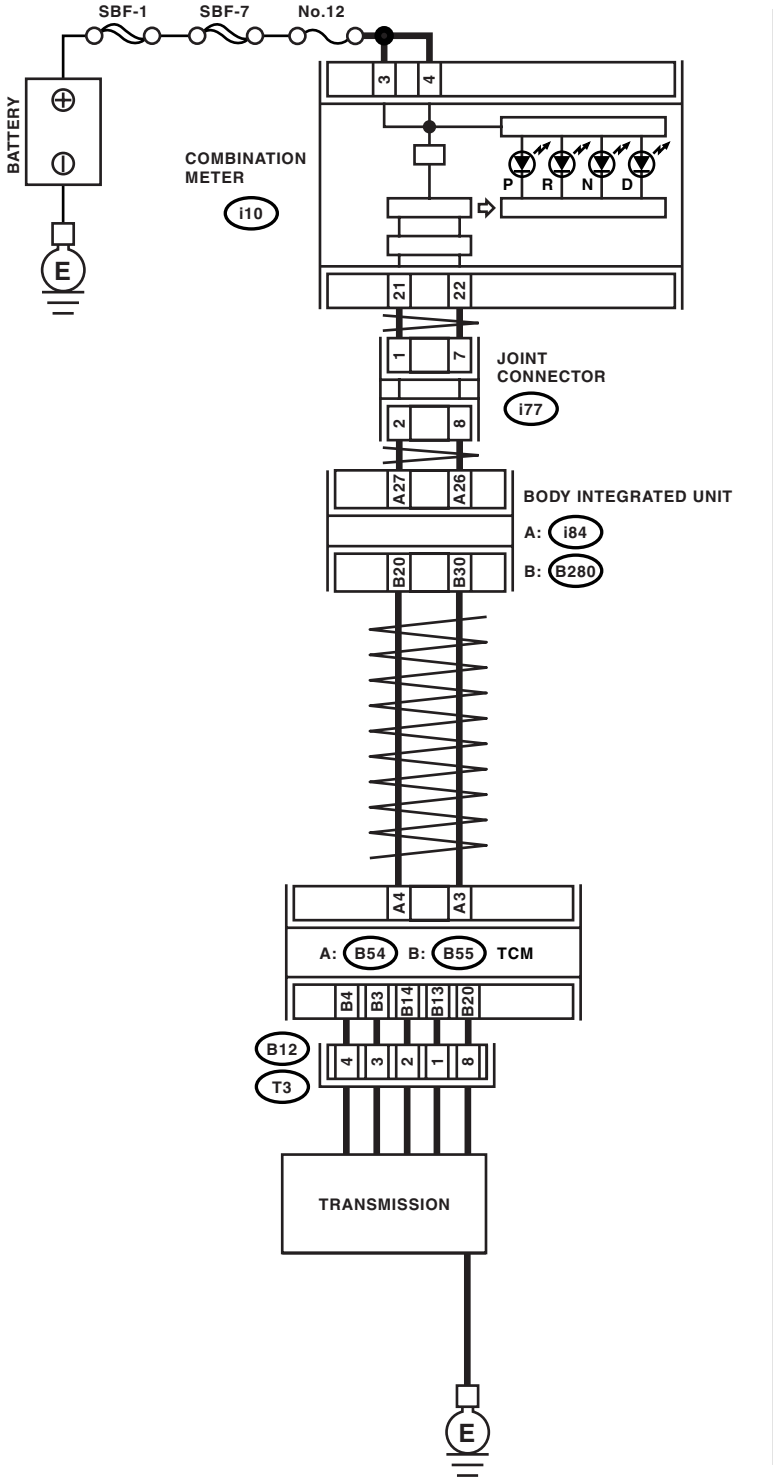
DTC DETECTING CONDITION:

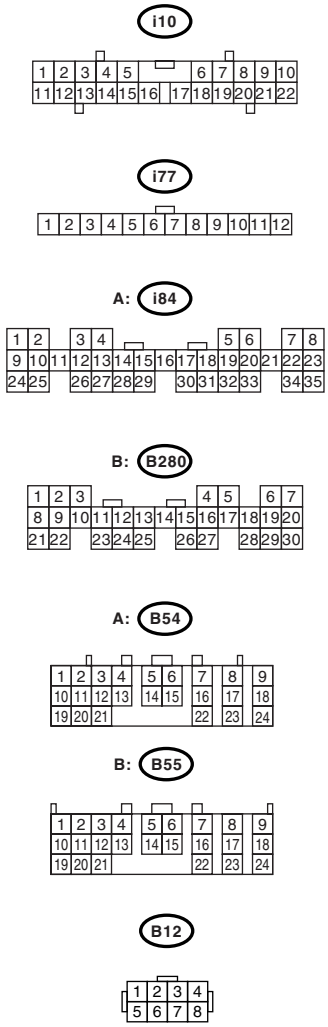
The inhibitor switch is open or short.

TROUBLE SYMPTOM:

- Shift characteristics are erroneous.
- Shift indicator light does not match with select lever.
- Shift indicator light does not illuminate.
- N-D, N-R shock occur.

WIRING DIAGRAM:





AT-02073

	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **3.**	Go to step **7.**
3	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to "P" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Are all indications High?	Go to step **5.**	Go to step **4.**
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance between TCM connector and chassis ground about the item which indicated Low on step 3. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:*** ***(B55) No. 3 — Chassis ground:*** ***(B55) No. 14 — Chassis ground:*** ***(B55) No. 13 — Chassis ground:*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM connector and chassis ground.
5	**CHECK INHIBITOR SWITCH.** 1) Shift the select lever to "D" range. 2) Check input signal of inhibitor SW 1 — 4 and inhibitor SW 3 monitor using Subaru Select Monitor.	Are all indications High?	Go to step **9.**	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector about the item which indicated High on step 5. ***Connector & terminal*** ***(B55) No. 4 — (B12) No. 4:*** ***(B55) No. 3 — (B12) No. 3:*** ***(B55) No. 14 — (B12) No. 2:*** ***(B55) No. 13 — (B12) No. 1:*** ***(B55) No. 20 — (B12) No. 8:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the open circuit in harness between TCM connector and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 4 — (B12) No. 4:*** ***(B55) No. 3 — (B12) No. 3:*** ***(B55) No. 14 — (B12) No. 2:*** ***(B55) No. 13 — (B12) No. 1:*** ***(B55) No. 20 — (B12) No. 8:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM connector and transmission connector.

	Step	Check	Yes	No
8	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 4 — Chassis ground:*** ***(B55) No. 3 — Chassis ground:*** ***(B55) No. 14 — Chassis ground:*** ***(B55) No. 13 — Chassis ground:*** ***(B55) No. 20 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM connector and chassis ground.
9	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Disconnect the transmission connector (B12). 3) Connect the TCM connector. 4) Turn the ignition switch to ON. 5) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 4 — (B54) No. 19:*** ***(B55) No. 3 — (B54) No. 19:*** ***(B55) No. 14 — (B54) No. 19:*** ***(B55) No. 13 — (B54) No. 19:*** ***(B55) No. 20 — (B54) No. 19:***	Is the voltage 4 — 6 V for the inhibitor SW 1 — 4? Is the voltage 3.5 — 5.5 V for the inhibitor SW 3 monitor?	Go to step **11.**	Go to step **10.**
10	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 4 — (T5) No. 6:*** ***(T3) No. 3 — (T5) No. 5:*** ***(T3) No. 2 — (T5) No. 4:*** ***(T3) No. 1 — (T5) No. 3:*** ***(T3) No. 8 — (T5) No. 2:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between control valve body connector and transmission connector.

	Step	Check	Yes	No
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 6 — Transmission ground:*** ***(T5) No. 5 — Transmission ground:*** ***(T5) No. 4 — Transmission ground:*** ***(T5) No. 3 — Transmission ground:*** ***(T5) No. 2 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Repair the short circuit in harness between control valve body connector and transmission connector.
13	**CHECK POOR CONTACT.**	Is there any poor contact in inhibitor SW 1 — 4 or inhibitor SW 3 monitor circuit?	Repair the poor contact.	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>

B: DTC P0712 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT

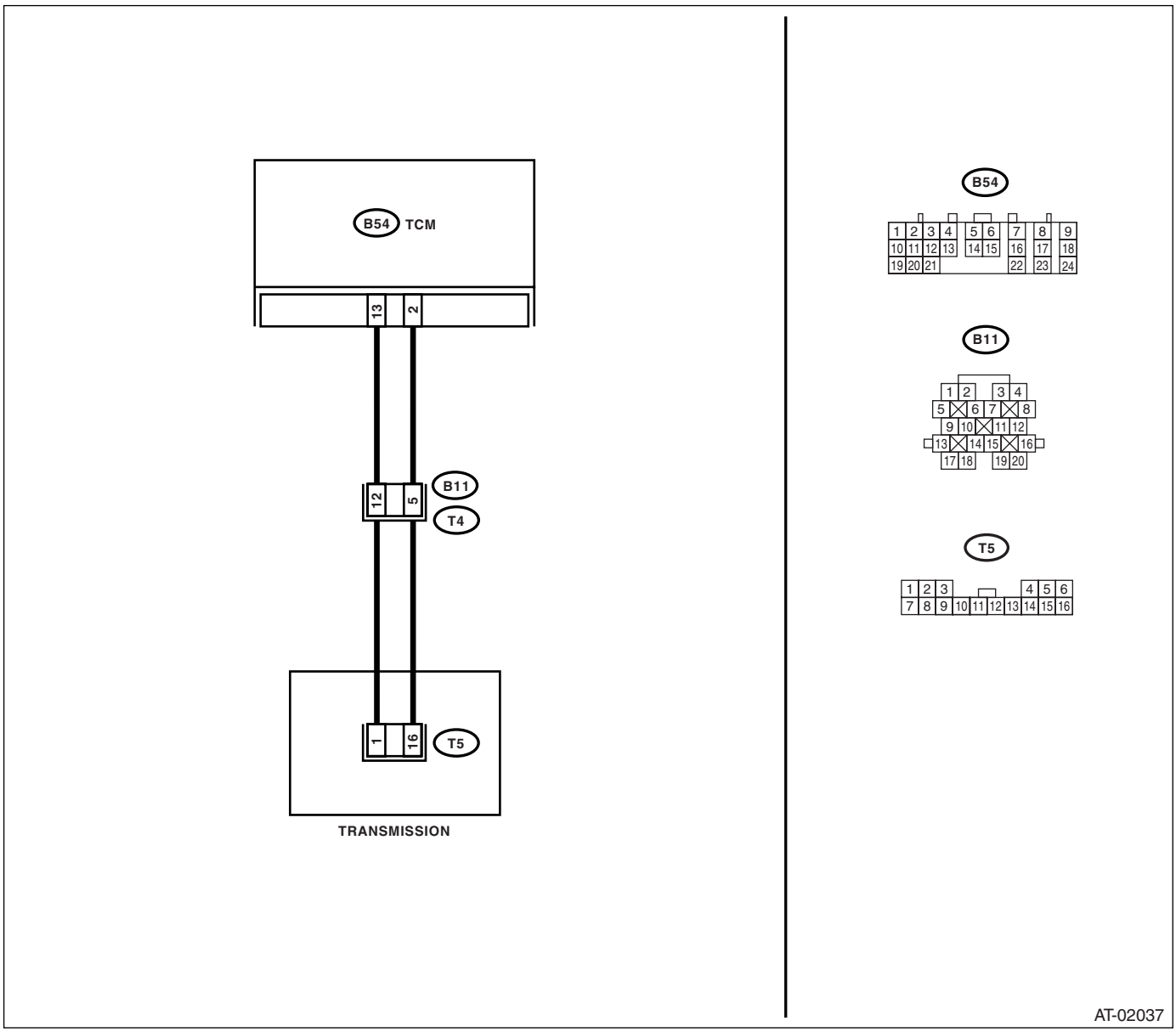
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor 1 is opened.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 2 — (B11) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Is the resistance 500 — 1,200 Ω?	Go to step **3.**	Go to step **7.**
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4.**	Go to step **7.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FROM TCM.** 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 (+) — (B54) No. 13 (–):***	Is the voltage 0.5 — 1.2 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **8.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON (engine OFF). 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **8.**
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T5) No. 1:*** ***(T4) No. 5 — (T5) No. 16:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the open circuit in harness between control valve body connector and transmission connector.
8	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit 1?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

C: DTC P0713 TRANSMISSION FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT

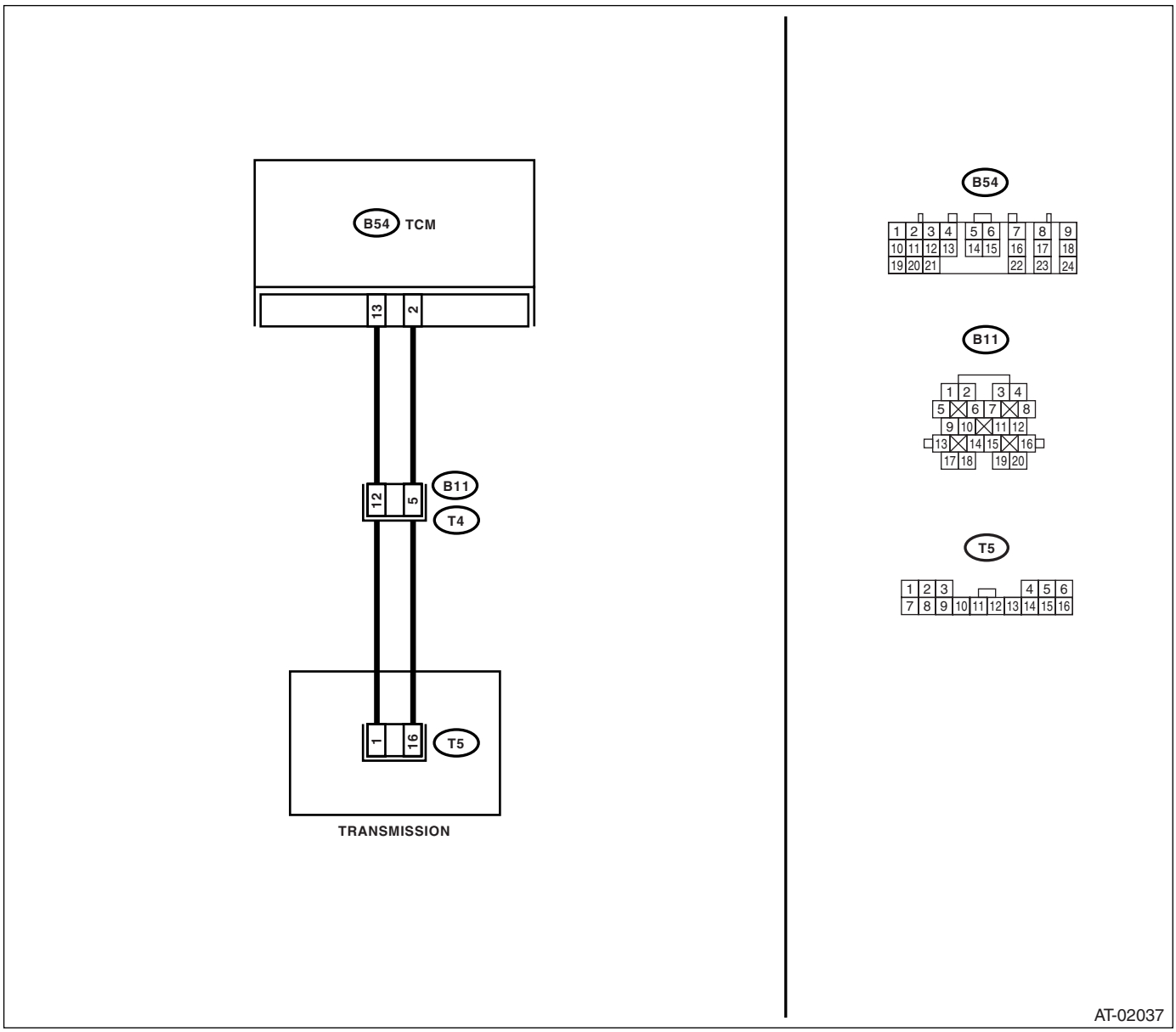
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor 1 is shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:*** ***(B54) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit in harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Is the resistance 500 — 1,200 Ω?	Go to step **3.**	Go to step **7.**
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 5 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4.**	Go to step **7.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FROM TCM.** 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 2 (+) — (B54) No. 13 (–):***	Is the voltage 0.5 — 1.2 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **8.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON (engine OFF). 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between ATF temperature sensor and transmission connector.	Go to step **8.**
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 1 — Chassis ground:*** ***(T5) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.
8	**CHECK POOR CONTACT.**	Is there poor contact in ATF temperature sensor circuit 1?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

D: DTC P0715 INPUT/TURBINE SPEED SENSOR CIRCUIT

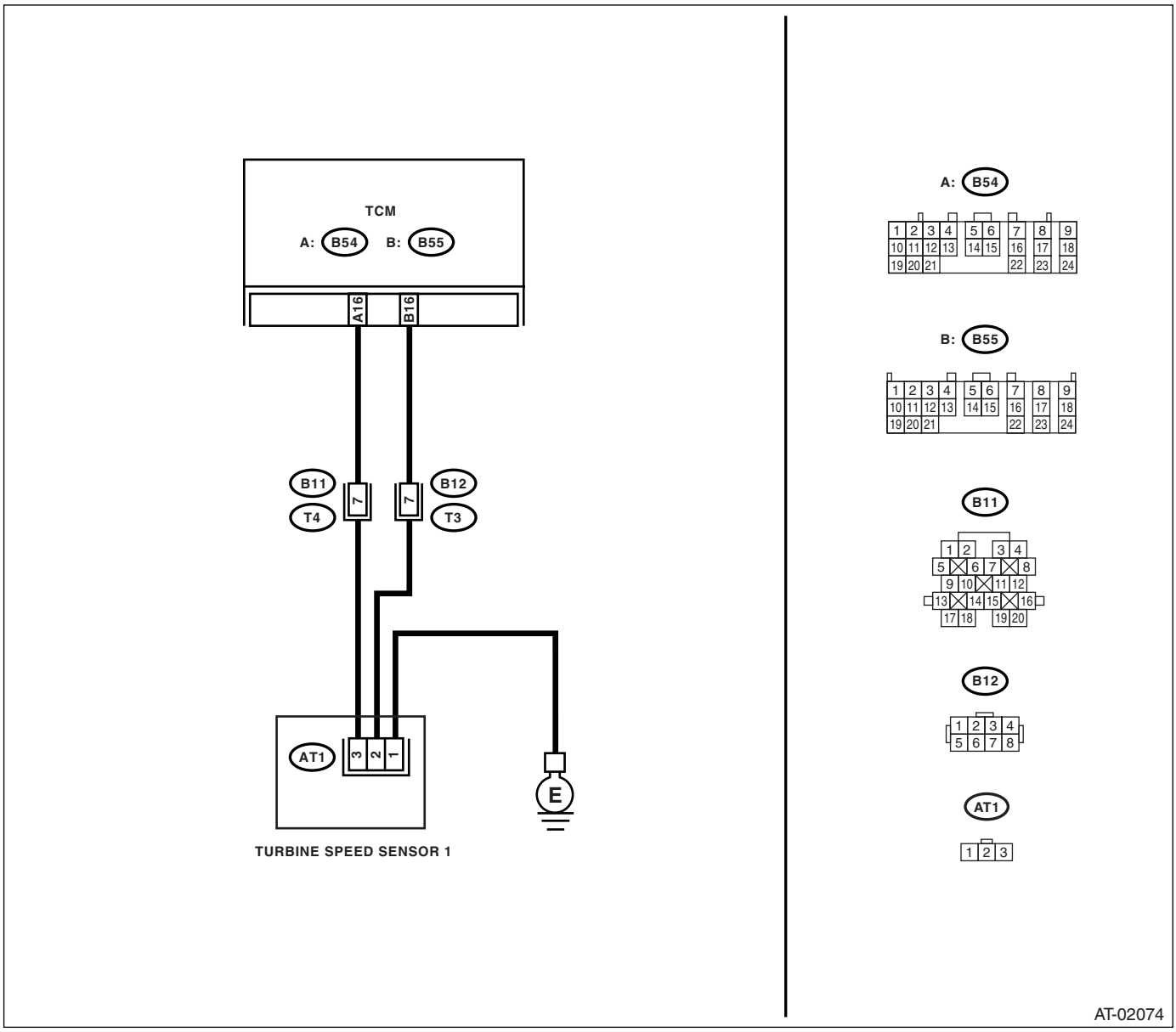
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock.
- Does not shift to 5th

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 16 — (B12) No. 7:*** ***(B54) No. 16 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 16 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the TCM connector. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **5.**
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 16 (+) — (B54) No. 19 (−):***	Is the voltage 4 — 6 V?	Go to step **6.**	Go to step **5.**
5	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** Check the installing condition of ground connecting harness of harness assembly (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness connected to transmission body securely? And there are no excessive damages on harness and terminal?	Go to step **7.**	If the poor installation of ground occurs, install it securely. Replace the transmission assembly when the harness or terminal is damaged. <Ref. to 5AT-38, Automatic Transmission Assembly.>

	Step	Check	Yes	No
7	**CHECK HARNESS ASSEMBLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Disconnect the connector from turbine speed sensor 1. 4) Measure the resistance between transmission connector and turbine speed sensor 1 connector. ***Connector & terminal*** ***(T4) No. 7 — (AT1) No. 3:*** ***(T3) No. 7 — (AT1) No. 2:*** ***(AT1) No. 1 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
8	**CHECK HARNESS ASSEMBLY.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(T4) No. 7 — Chassis ground:*** ***(T3) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the short circuit in harness between TCM and transmission connector.
9	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **11.**	Go to step **10.**
10	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **12.**	Go to step **13.**
11	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 4th speed driving condition of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 4) Read the current data of turbine speed sensor 1 using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the value of the turbine speed sensor 1 change depending on the acceleration, deceleration and shifting range of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Replace the turbine speed sensor 1. <Ref. to 5AT-57, Turbine speed sensor 1.>

	Step	Check	Yes	No
12	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Set the oscilloscope to TCM connector terminals. ***Positive probe; (B55) No. 16:*** ***Ground lead; (B54) No. 19:*** 4) Start the engine, and set the vehicle in 4th speed driving condition of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 5) Display the pulse signal of turbine speed sensor 1 to oscilloscope, and measure the frequency. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the frequency of measured waveform (pulse wave) changed depending on the acceleration, deceleration and shifting range of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Replace the turbine speed sensor 1. <Ref. to 5AT-57, Turbine speed sensor 1.>
13	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 4th speed driving condition of manual mode. NOTE: Turbine speed sensor 1 signal can be measured only on 4th speed. 4) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 16 (+) — (B54) No. 19 (–):*** 5) Stop the vehicle, and shift the select lever to “P” range. 6) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 16 (+) — (B54) No. 19 (–):*** NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the voltage change within the range of 2 — 3 V when driving the vehicle with 4th of manual mode? Is the voltage less than 0.5 V or more than 4.5 V constantly when the vehicle is parked with “P” range?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Replace the turbine speed sensor 1. <Ref. to 5AT-57, Turbine speed sensor 1.>

E: DTC P0719 TORQUE CONVERTER/BRAKE SWITCH “B” CIRCUIT LOW

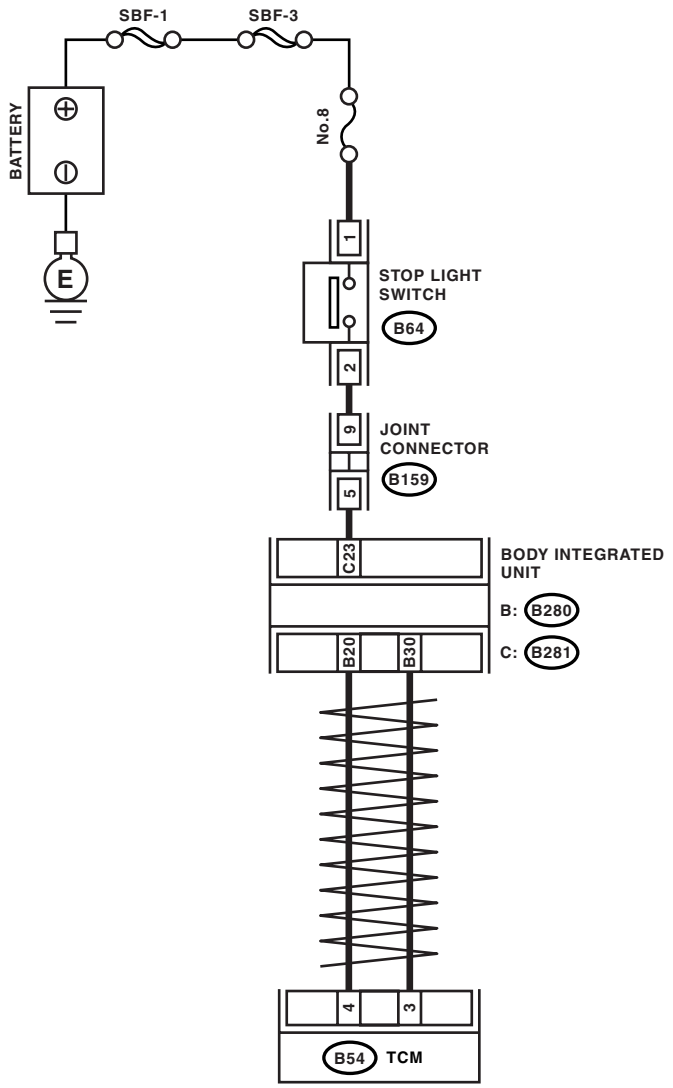
DTC DETECTING CONDITION:

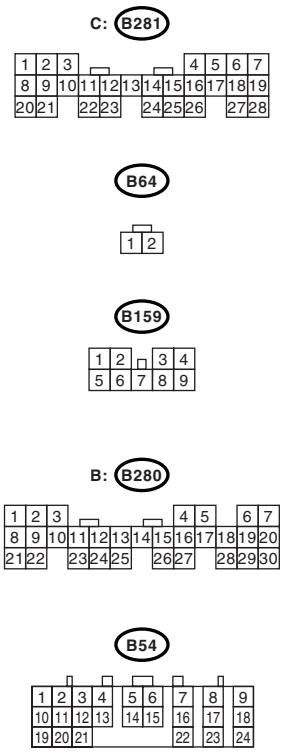
Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

- Brake down control is not operated at SPORT mode.
- No lock-up occurs at braking.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC displayed? • AT CAN Communication Circuit • Output Speed Sensor Circuit • AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Depress the brake pedal. 6) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the ON displayed?	Go to step **3.**	Go to step **4.**
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is the ON displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM <Ref. to 5AT-61, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the connector from body integrated unit. 2) Depress the brake pedal. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Go to step **5.**
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between body integrated unit and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — (B64) No. 2:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit of harness between the body integrated unit and stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** Measure the resistance of harness between body integrated unit connector and stop light switch. ***Connector & terminal*** ***(B281) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the short circuit of harness between the body integrated unit and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

F: DTC P0720 OUTPUT SPEED SENSOR CIRCUIT

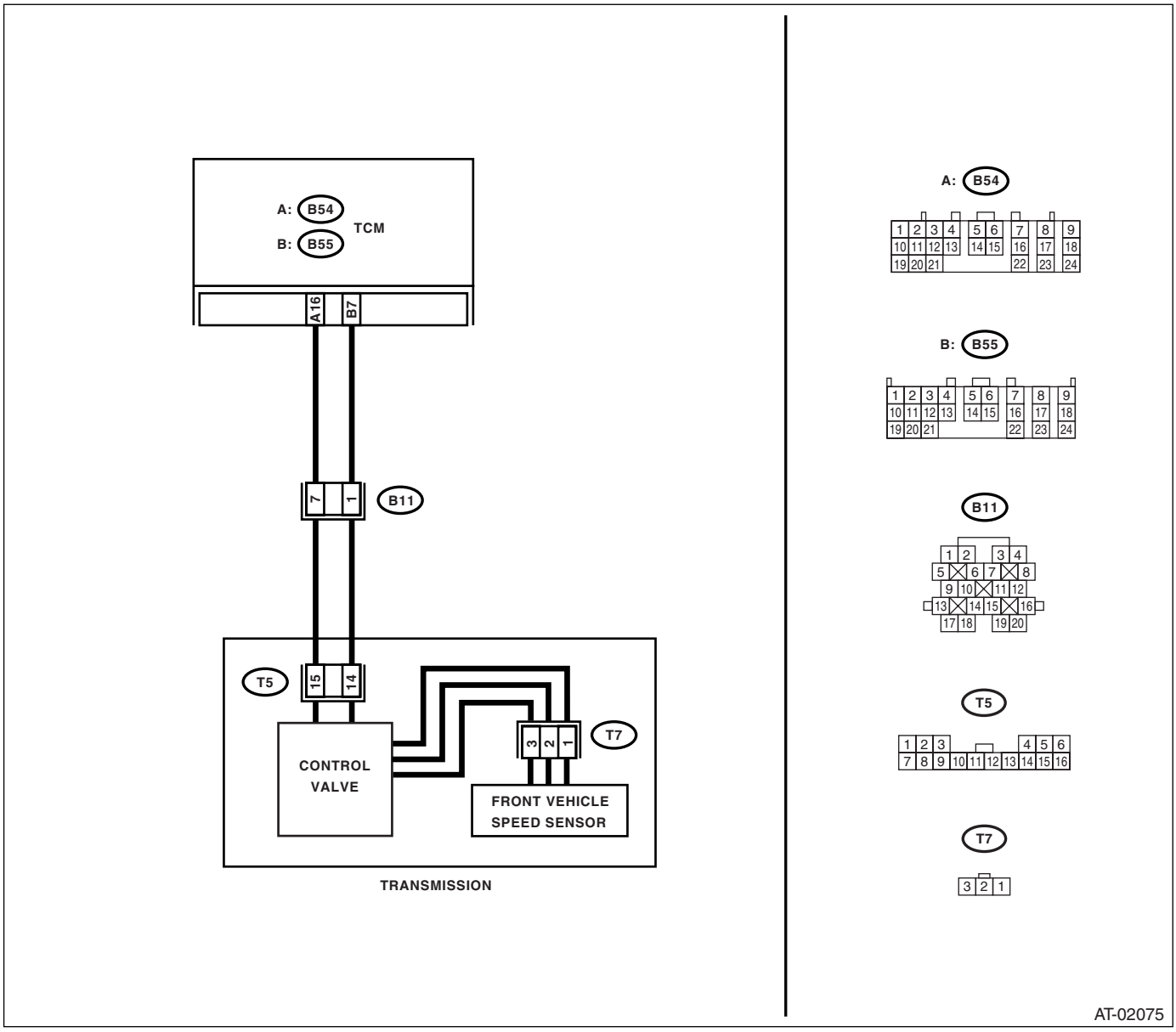
DTC DETECTING CONDITION:

- AT vehicle speed signal is abnormal.
- The harness connector between TCM and vehicle speed sensor is in short or open.

TROUBLE SYMPTOM:

- Deterioration of shifting quality.
- Poor driving performance.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 7 — (B11) No. 1:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **5.**
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6.**	Go to step **5.**
5	**CHECK TCM I/O SIGNAL.** Check I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **8.**	Go to step **7.**
7	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **9.**	Go to step **10.**

	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive it. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-16, READ CURRENT DATA, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the value of the front wheel speed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Go to step **11.**
9	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Set the oscilloscope to TCM connector terminals. ***Positive probe; (B55) No. 16:*** ***Ground lead; (B54) No. 19:*** 4) Start the engine, and drive it. 5) Display the pulse signal of turbine speed sensor 1 to oscilloscope, and measure the frequency. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the frequency of measured waveform (pulse wave) changed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Go to step **11.**

	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive it. 4) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (–):*** 5) Stop the vehicle, and shift the select lever to "P" range. 6) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (–):*** NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the voltage change within the range of 2 — 3 V when vehicle is driving? Is the voltage less than 0.5 V or more than 4.5 V constantly when the vehicle is parked with "P" range?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness between the ATF temperature sensor and transmission connector.	Go to step **11.**
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 7 — (T5) No. 15:*** ***(B11) No. 1 — (T5) No. 14:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between control valve body connector and transmission connector.
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 15 — Transmission ground:*** ***(T5) No. 14 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **13.**	Repair the short circuit in harness between transmission connector and transmission ground.

	Step	Check	Yes	No
13	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** 1) Disconnect the connector from vehicle speed sensor. 2) Measure the resistance of harness between control valve body connector and vehicle speed sensor connector. ***Connector & terminal*** ***(T5) No. 15 — (T7) No. 3:*** ***(T5) No. 14 — (T7) No. 2:*** ***(T7) No. 1 — Transmission ground:***	Is the resistance less than 1 Ω?	Go to step **14.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
14	**CHECK HARNESS CONNECTOR BETWEEN CONTROL VALVE BODY AND VEHICLE SPEED SENSOR.** Measure the resistance of harness between control valve body connector and transmission ground. ***Connector & terminal*** ***(T5) No. 15 — Transmission ground:*** ***(T5) No. 14 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the vehicle speed sensor.	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>

G: DTC P0724 TORQUE CONVERTER/BRAKE SWITCH "B" CIRCUIT HIGH

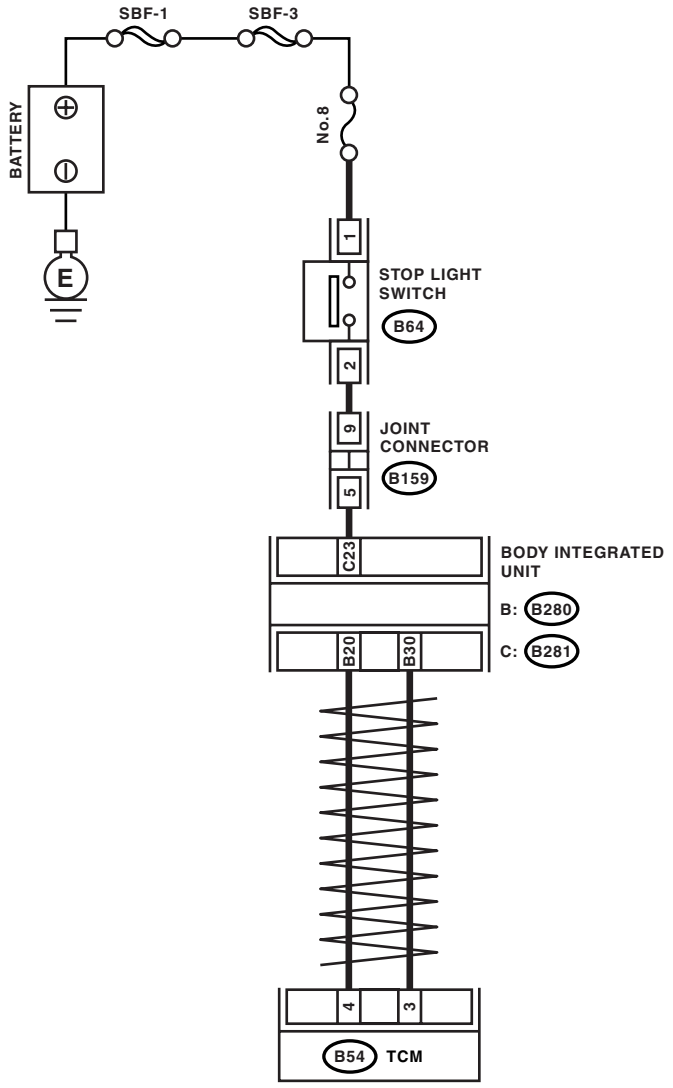
DTC DETECTING CONDITION:

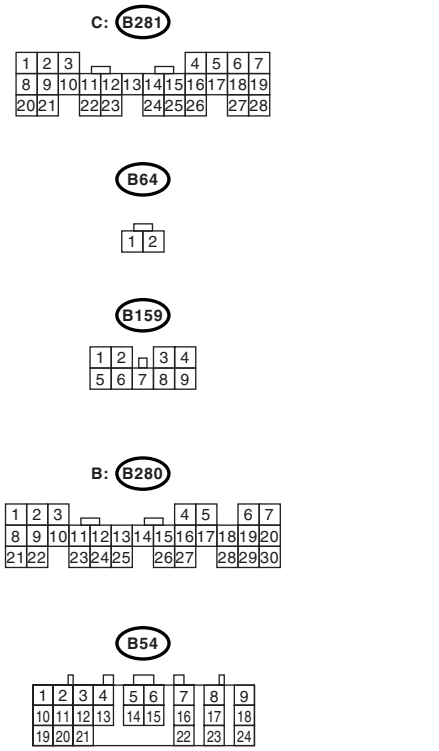
Brake switch malfunction, open input signal circuit

TROUBLE SYMPTOM:

Gear is not shifted down when climbing a hill.

WIRING DIAGRAM:





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	Step	Check	Yes	No
1	**CHECK DTC.**	Is any of following DTC detected? • AT CAN Communication Circuit • Output Speed Sensor Circuit • AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3.**	Go to step **4.**
3	**CHECK TCM.** Read the data of brake pedal switch using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	A temporary poor contact of connector or harness may be the cause. Check the poor contact.	Replace the TCM <Ref. to 5AT-61, Transmission Control Module (TCM).>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Disconnect the connector from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **7.**
5	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from stop light switch. 3) Measure the resistance of harness between stop light switch connectors. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace stop light switch.
6	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STOP LIGHT SWITCH.** 1) Turn the ignition switch to ON. 2) Measure the voltage of harness between the body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 23 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **7.**	Repair the short circuit in harness between TCM and stop light switch.
7	**CHECK POOR CONTACT.**	Is there poor contact in input signal of brake switch?	Repair the poor contact.	Check the body integrated unit.

H: DTC P0725 ENGINE SPEED INPUT CIRCUIT

DTC DETECTING CONDITION:
Information of engine speed is not correctly received from ECM.
TROUBLE SYMPTOM:
No lock-up (after engine warm-up).

	Step	Check	Yes	No
1	**CHECK DTC OF ECM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK DTC OF TCM.**	Is DTC of AT CAN communication circuit detected?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK DTC OF TCM.**	Is any of following DTC detected? • Output Speed Sensor Circuit • AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel)	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

I: DTC P0731 GEAR 1 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC P0732 GEAR 2 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC P0733 GEAR 3 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC P0734 GEAR 4 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC P0735 GEAR 5 INCORRECT RATIO

NOTE:
Refer to DTC P0736 for diagnostic procedure. <Ref. to 5AT(diag)-59, DTC P0736 REVERSE INCORRECT RATIO, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

N: DTC P0736 REVERSE INCORRECT RATIO

DTC DETECTING CONDITION:

Vehicle speed sensor, turbine speed sensor or control valve malfunction

TROUBLE SYMPTOM:

- Shift point is too high or too low.
- Excessive shift shock.
- Tight corner braking phenomenon is occurred.
- Gear is not shifted to reverse.
- Gear position is held by fail safe function.
- Vehicle does not run.

	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is any of following DTC detected? • AT CAN Communication Circuit • Engine Speed Input Circuit Range/Performance • Input/Turbine Speed Sensor Circuit • Torque Converter Turbine 2 Speed Signal Circuit 2 Malfunction • Output Speed Sensor Circuit • AT Vehicle Speed Sensor Circuit Malfunction (Rear Wheel) • Transmission Range Sensor Circuit (PRNDL Input) • PVIGN Power Supply Circuit (Low)	Perform the diagnosis according to DTC.	Go to step **2.**
2	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **3.**	Go to step **7.**
3	**CHECK ENGINE SPEED.** Compare the meter with Subaru Select Monitor indications.	Is the indication of Subaru Select Monitor and meter matches?	Go to step **4.**	Perform the diagnosis according to DTC P0725.
4	**CHECK TURBINE SPEED SENSOR.** Check the indication of Subaru Select Monitor.	Is the indication changes according to acceleration, braking and shifting?	Go to step **5.**	Perform the diagnosis according to DTC P0715, P1710.
5	**CHECK FRONT AND REAR VEHICLE SPEED SENSOR.**	Is the indication of Subaru Select Monitor and meter matches?	Go to step **6.**	Perform the diagnosis according to DTC P0720, P1706.
6	**CHECK INHIBITOR SWITCH.**	Is the indication of Subaru Select Monitor and meter matches?	Go to step **7.**	Perform the diagnosis according to DTC P0705.
7	**CHECK AFTER REPAIR.**	Is DTC displayed?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Temporary poor contact occurs.

O: DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION:

- Lock up clutch malfunction
- Locking of bulb

TROUBLE SYMPTOM:

No lock-up occurs. (After engine is warmed-up)

	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is any of following DTC detected? • AT CAN Communication Circuit • Engine Speed Input Circuit • Input/Turbine Speed Sensor Circuit • Torque Converter Turbine 2 Speed Signal Circuit 2 Malfunction	Perform the diagnosis according to each DTC.	Go to step **2.**
2	**CHECK DTC OF TCM.** 1) Perform the clear memory mode. <Ref. to 5AT(diag)-18, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 2) Read DTC.	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK INHIBITOR SWITCH CIRCUIT.** Diagnose according to DTC P0705 procedure.	Is there any trouble?	Repair or replace the inhibitor switch circuit.	Go to step **4.**
4	**CHECK STOP LIGHT SWITCH CIRCUIT.** Diagnose according to DTC P0719 and P0724 procedure.	Is there any trouble?	Repair or replace the stop light switch circuit.	Go to step **5.**
5	**CHECK ATF TEMPERATURE SENSOR CIRCUIT.** Diagnose according to DTC P0712, P0713, P1716 and P1717 procedure.	Is there any trouble?	Repair or replace the ATF temperature sensor circuit.	There are malfunctions in TCM, TCM connector poor contact or transmission assembly mechanical malfunction.

P: DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT ELECTRICAL

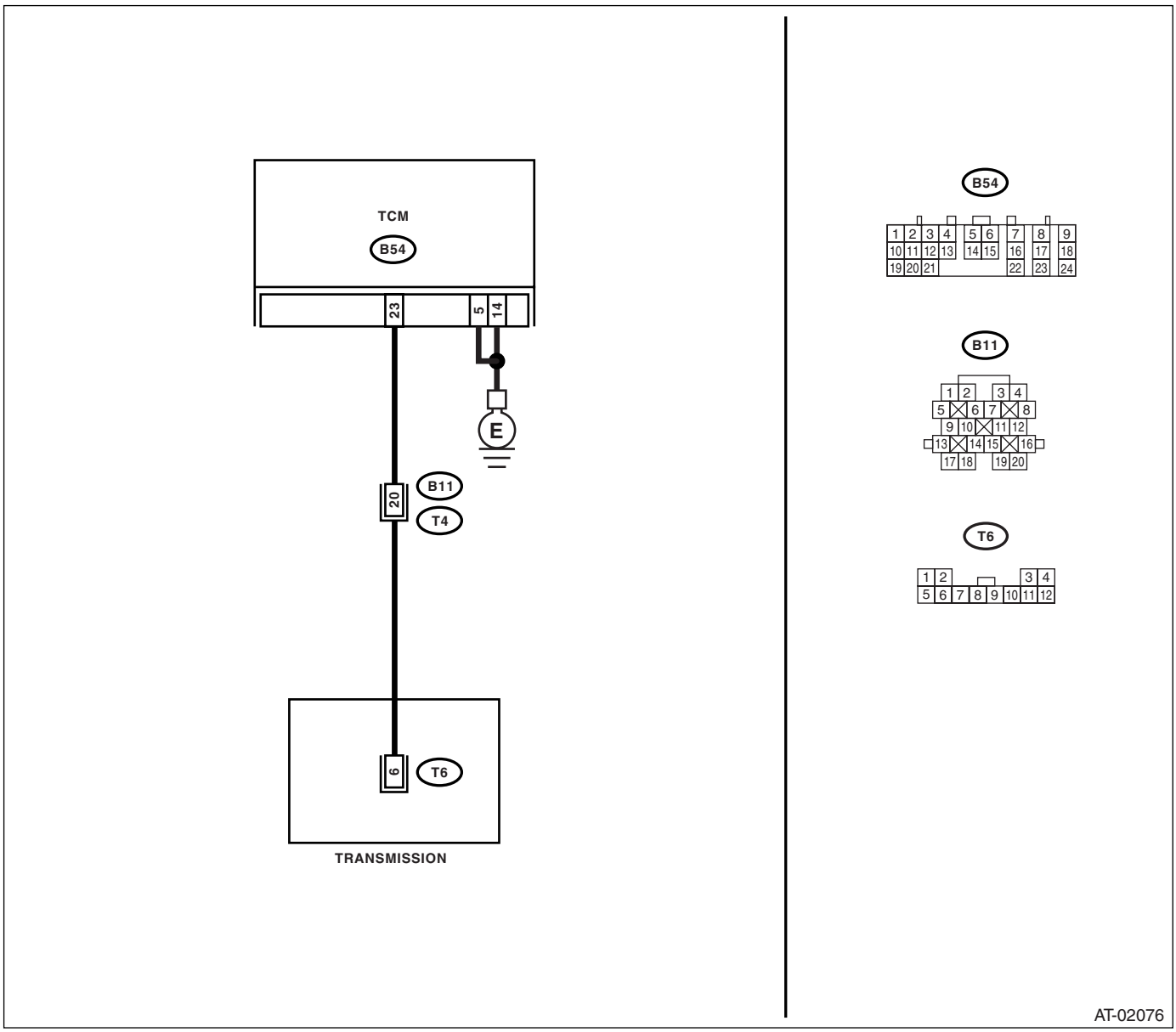
DTC DETECTING CONDITION:

The output signal circuit of lock up solenoid is open or shorted.

TROUBLE SYMPTOM:

No lock-up (after engine warm-up).

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 23 — (B11) No. 20:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 20 — (T6) No. 6:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission ground.
5	**CHECK LOCK-UP SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 6 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Q: DTC P0748 PRESSURE CONTROL SOLENOID "A" ELECTRICAL

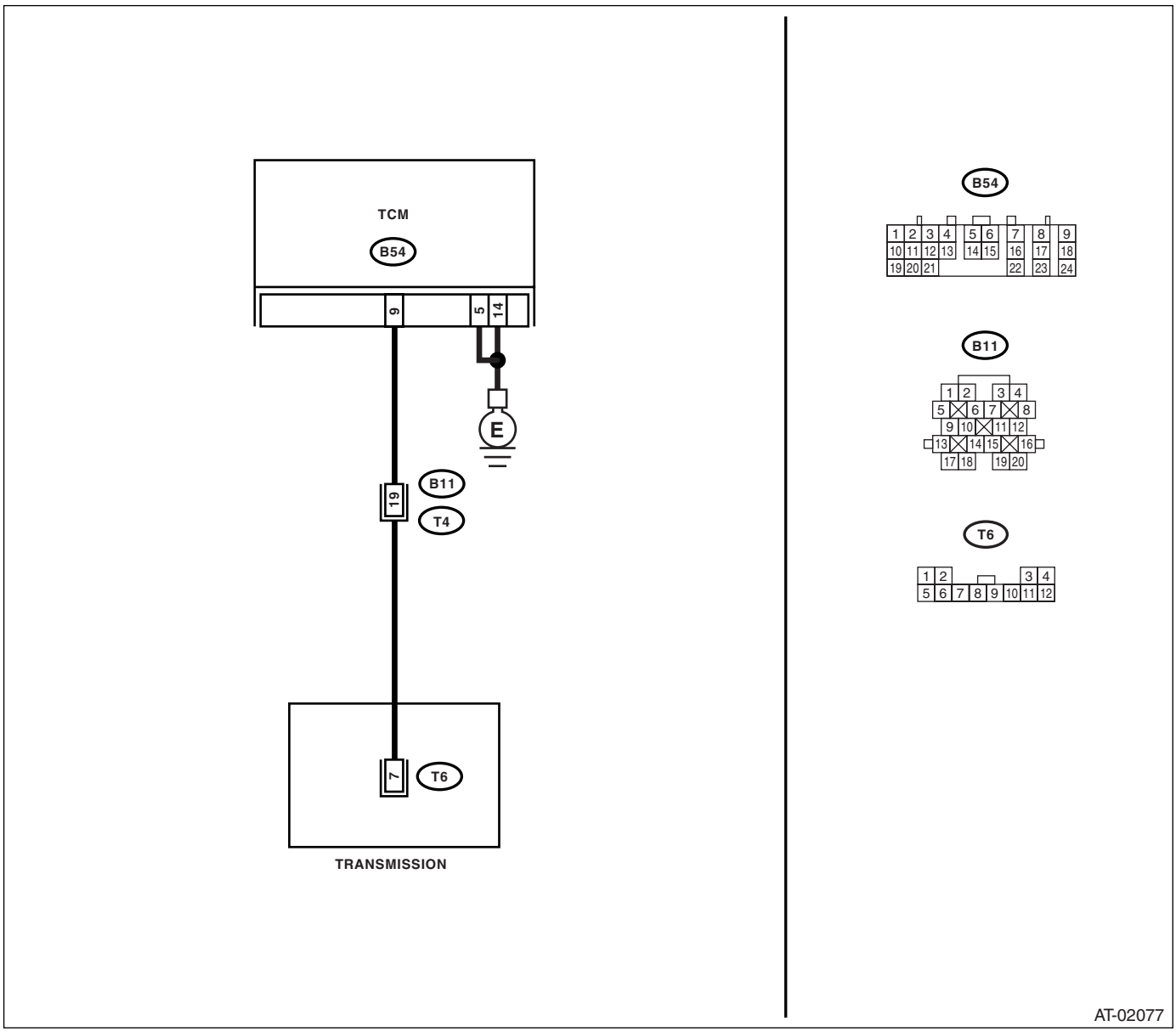
DTC DETECTING CONDITION:

Output signal circuit of line pressure solenoid is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 9 — (B11) No. 19:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 19 — (T6) No. 7:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission ground.
5	**CHECK LINE PRESSURE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 7 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

R: DTC P0751 SHIFT SOLENOID "A" PERFORMANCE OR STUCK OFF

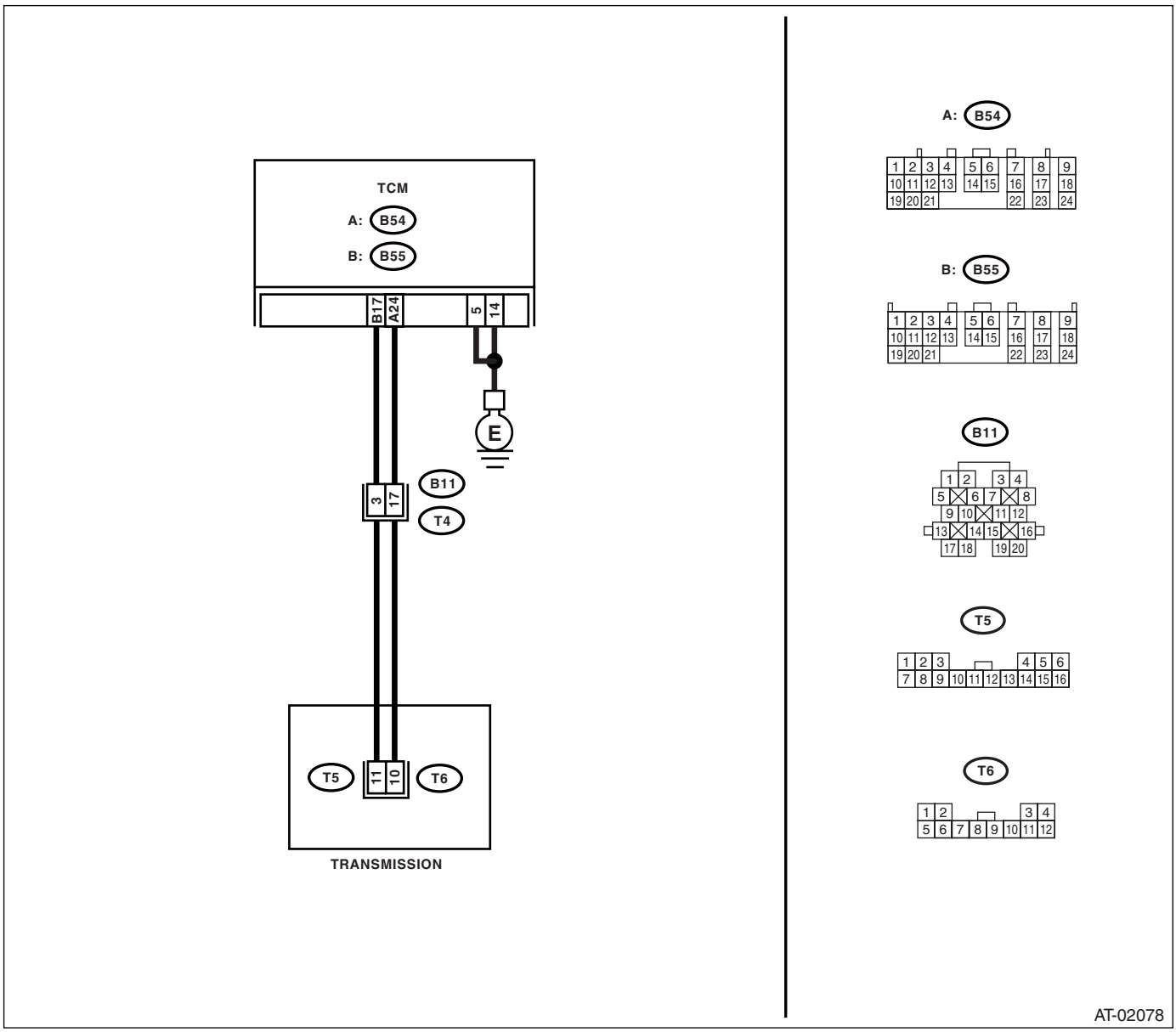
DTC DETECTING CONDITION:

Output signal of front brake solenoid does not match with oil pressure.

TROUBLE SYMPTOM:

Locked to 4th or 5th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 17:*** ***(B55) No. 17 — (B11) No. 3:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **4.**	Go to step **7.**
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of Fr/B oil pressure SW.	Is OFF displayed?	Go to step **5.**	Go to step **11.**
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 4th speed with checking current gear position using Subaru Select Monitor. 4) Check input signal of Fr/B oil pressure SW.	Is OFF displayed?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 1st speed with checking current gear position using Subaru Select Monitor. 4) Check input signal of Fr/B oil pressure SW.	Is the ON displayed?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **10.**
7	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **8.**	Go to step **11.**

	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 4th speed of manual mode with checking indication of gear position in combination meter. NOTE: Read the value of gear position indication after the shifting is completed (approx. 2 seconds later from shifting). 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **9.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
9	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 1st speed of manual mode with checking indication of gear position in combination meter. NOTE: Read the value of gear position indication after the shifting is completed (approx. 2 seconds later from shifting). 4) Measure the voltage of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 17 (+) — Chassis ground (−):***	Is the voltage less than 1.5 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **10.**
10	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B11) No. 17 — (T6) No. 10:*** ***(B11) No. 3 — (T6) No. 11:***	Is the resistance less than 1 Ω?	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>	Repair the open circuit in harness between control valve body connector and transmission connector.

	Step	Check	Yes	No
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 10 — Transmission ground:*** ***(T5) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.

S: DTC P0753 SHIFT SOLENOID “A” ELECTRICAL

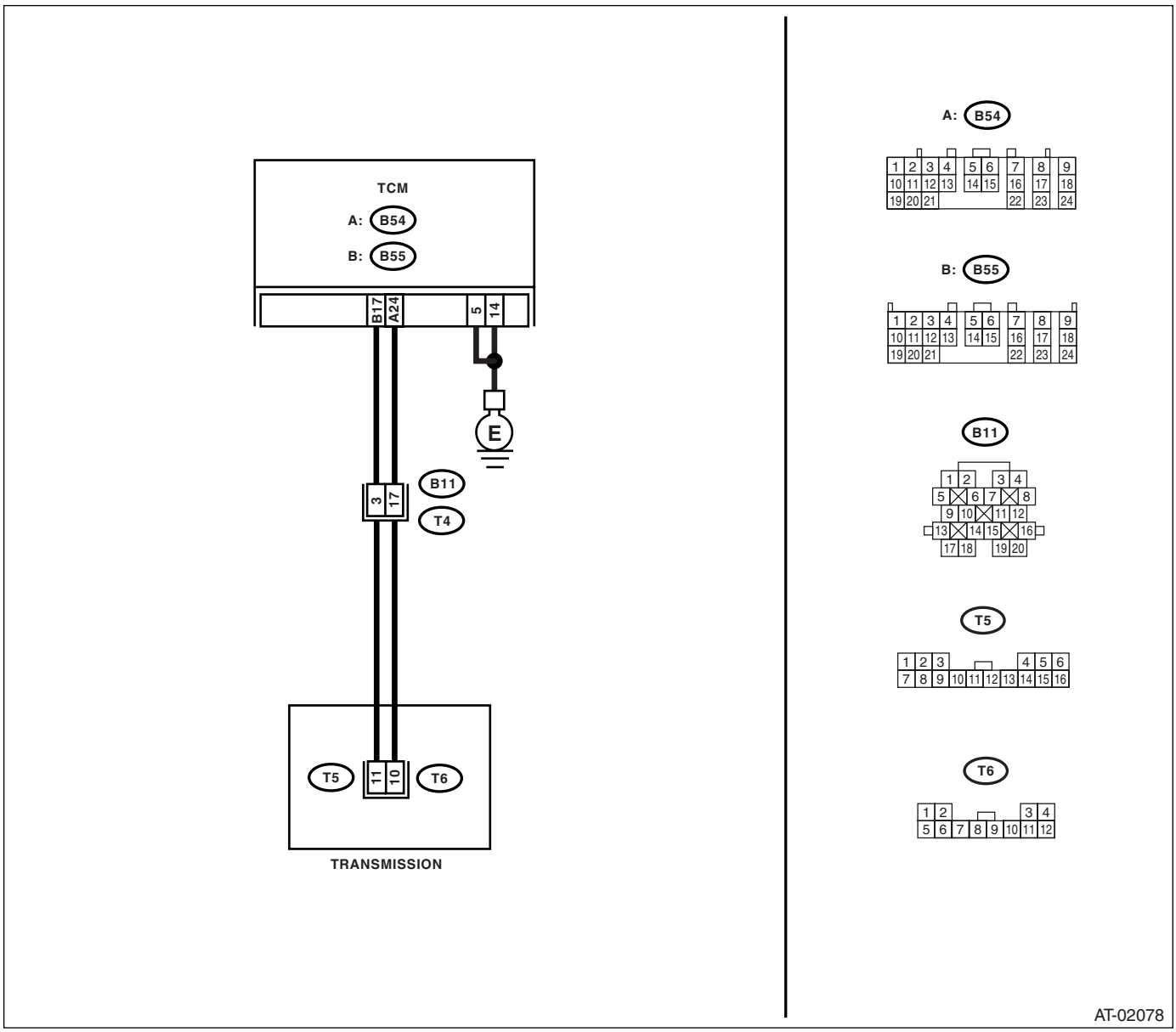
DTC DETECTING CONDITION:

Output signal circuit of front brake solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th or 5th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 24 — (B11) No. 17:*** ***(B55) No. 17 — (B11) No. 3:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 24 — Chassis ground:*** ***(B55) No. 17 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 17 — (T6) No. 9:*** ***(T4) No. 3 — (T5) No. 11:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 9 — Transmission ground:*** ***(T5) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body and transmission connector.
5	**CHECK FRONT BRAKE SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 9 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

T: DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF

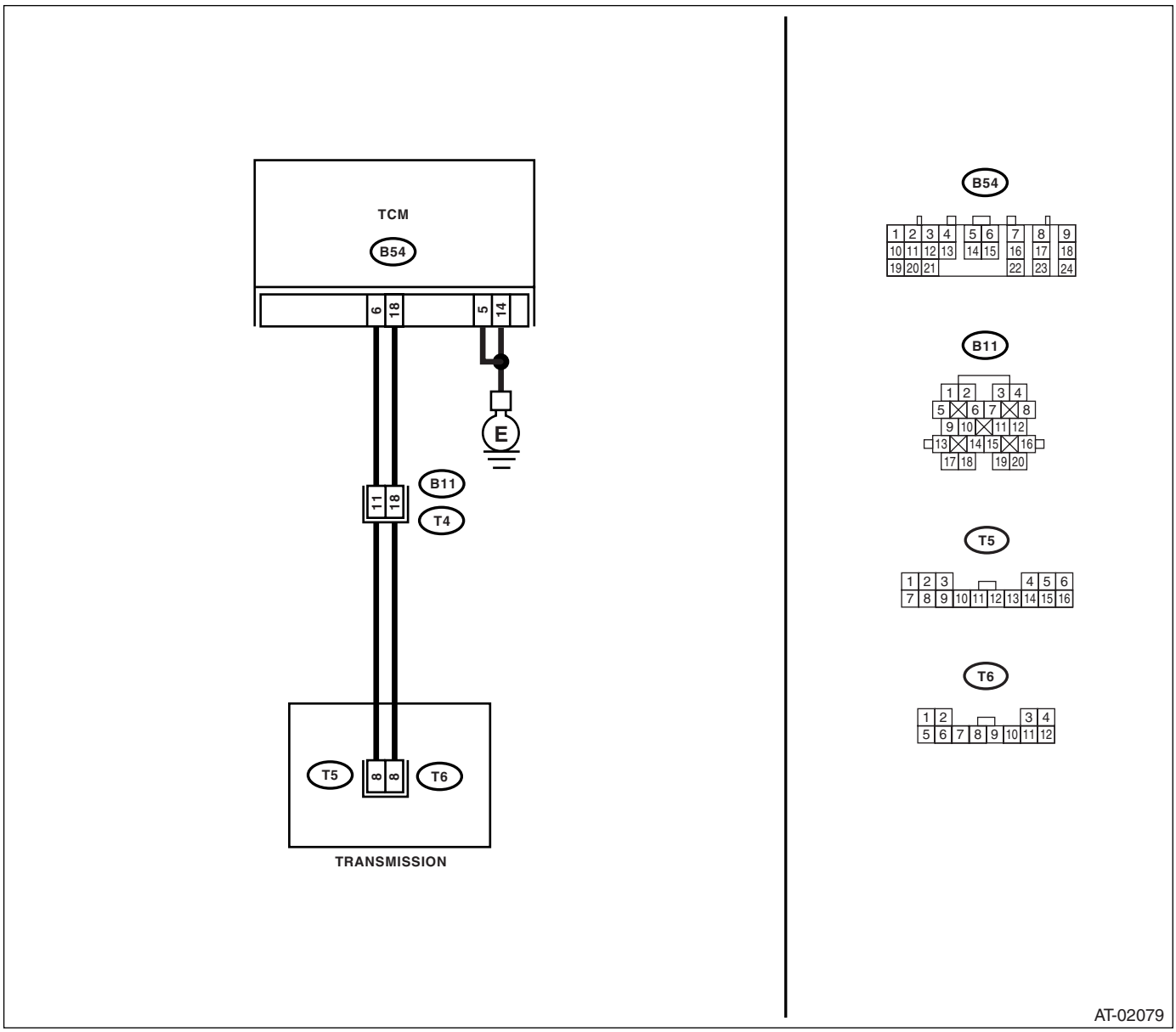
DTC DETECTING CONDITION:

Output signal value of input clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 6 — (B11) No. 11:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 18 — Chassis ground:*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of I/C oil pressure SW.	Is OFF displayed?	Go to step **4.**	Go to step **7.**
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to “D” range and brake ON (1st) with checking current gear position using Subaru Select Monitor. 4) Check input signal of I/C oil pressure SW.	Is OFF displayed?	Go to step **5.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Drive the vehicle on 4th speed of “D” range with checking current gear position using Subaru Select Monitor. 4) Check input signal of I/C oil pressure SW.	Is the ON displayed?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T6) No. 8:*** ***(T4) No. 11 — (T5) No. 8:***	Is the resistance less than 1 Ω?	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>	Repair the open circuit in harness between control valve body connector and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — Transmission ground:*** ***(T4) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.

U: DTC P0758 SHIFT SOLENOID “B” ELECTRICAL

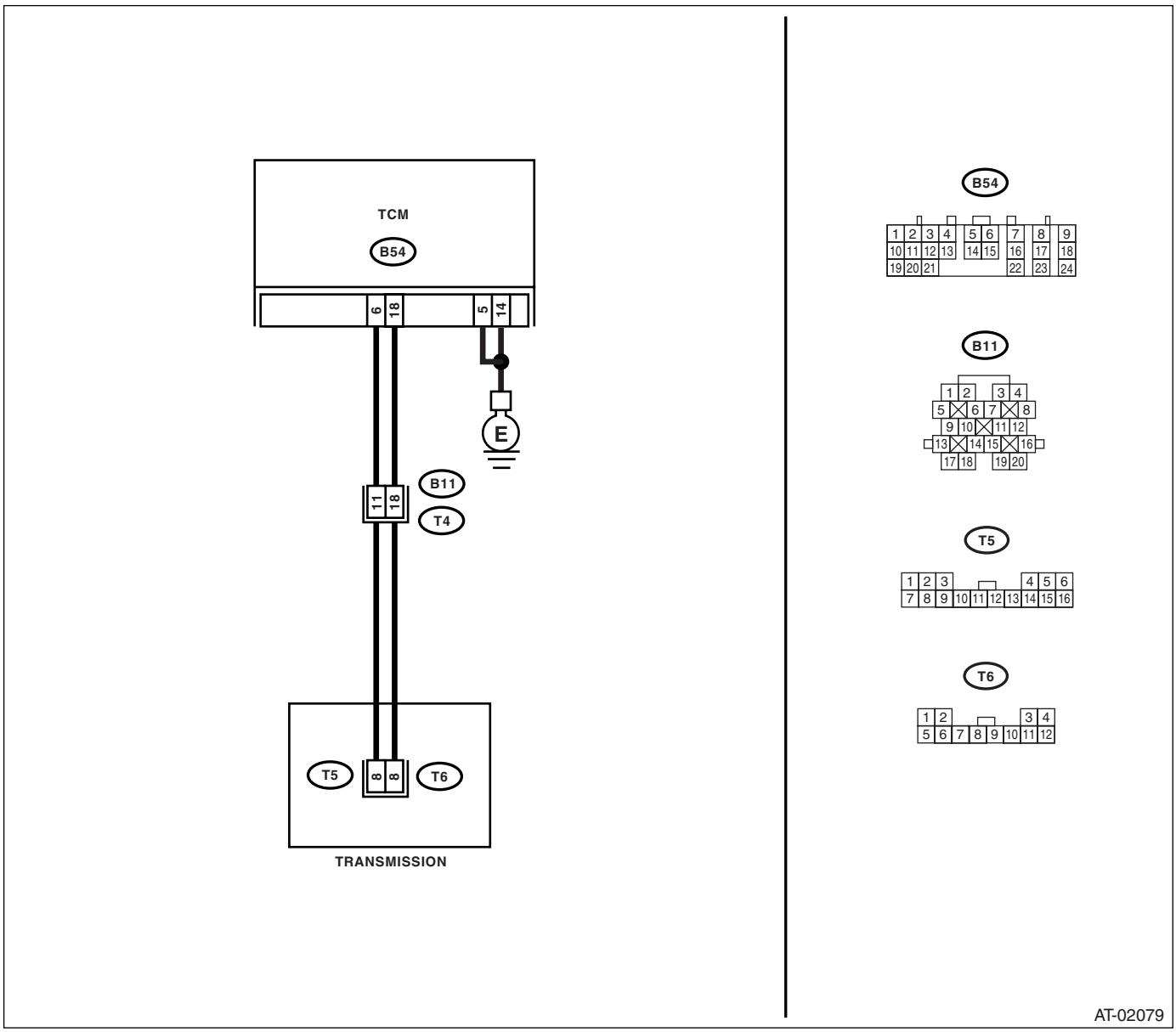
DTC DETECTING CONDITION:

Output signal circuit of input clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 18 — (B11) No. 18:*** ***(B54) No. 6 — (B11) No. 11:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 18 — Chassis ground:*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 18 — (T6) No. 8:*** ***(T4) No. 11 — (T5) No. 8:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 8 — Chassis ground:*** ***(T5) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission connector.
5	**CHECK INPUT CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 8 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

V: DTC P0761 SHIFT SOLENOID "C" PERFORMANCE OR STUCK OFF

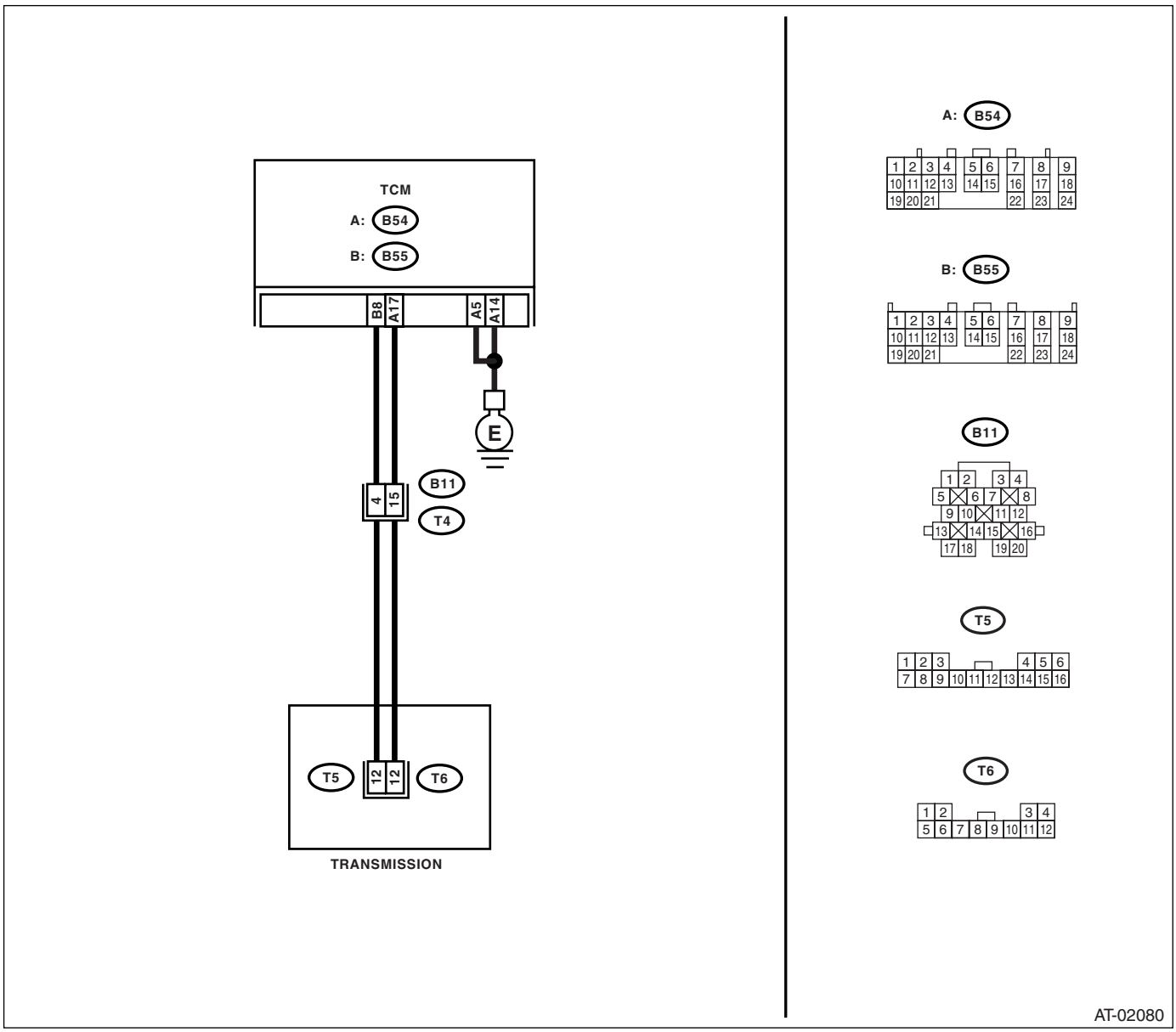
DTC DETECTING CONDITION:

Output signal value of high & low reverse clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B55) No. 8 — (B11) No. 4:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 17 — Chassis ground:*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **4.**	Go to step **7.**
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of H&LR/C oil pressure SW.	Is OFF displayed?	Go to step **5.**	Go to step **11.**
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Drive the vehicle on 2nd speed of “D” range with checking current gear position using Subaru Select Monitor. 4) Check input signal of H&LR/C oil pressure SW.	Is OFF displayed?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to “D” range and brake ON (1st) with checking current gear position using Subaru Select Monitor. 4) Check input signal of H&LR/C oil pressure SW.	Is the ON displayed?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **10.**

	Step	Check	Yes	No
7	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 8 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **8.**	Go to step **11.**
8	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 2nd speed of manual mode with checking indication of gear position in combination meter. NOTE: Read the value of gear position indication after the shifting is completed (approx. 2 seconds later from shifting). 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 8 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **9.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
9	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 1st speed of manual mode with checking indication of gear position in combination meter. NOTE: Read the value of gear position indication after the shifting is completed (approx. 2 seconds later from shifting). 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 8 (+) — Chassis ground (–):***	Is the voltage less than 1.5 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **10.**
10	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T6) No. 12:*** ***(T4) No. 4 — (T5) No. 12:***	Is the resistance less than 1 Ω?	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>	Repair the open circuit in harness between control valve body connector and transmission connector.

	Step	Check	Yes	No
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — Transmission ground:*** ***(T4) No. 4 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.

W: DTC P0763 SHIFT SOLENOID “C” ELECTRICAL

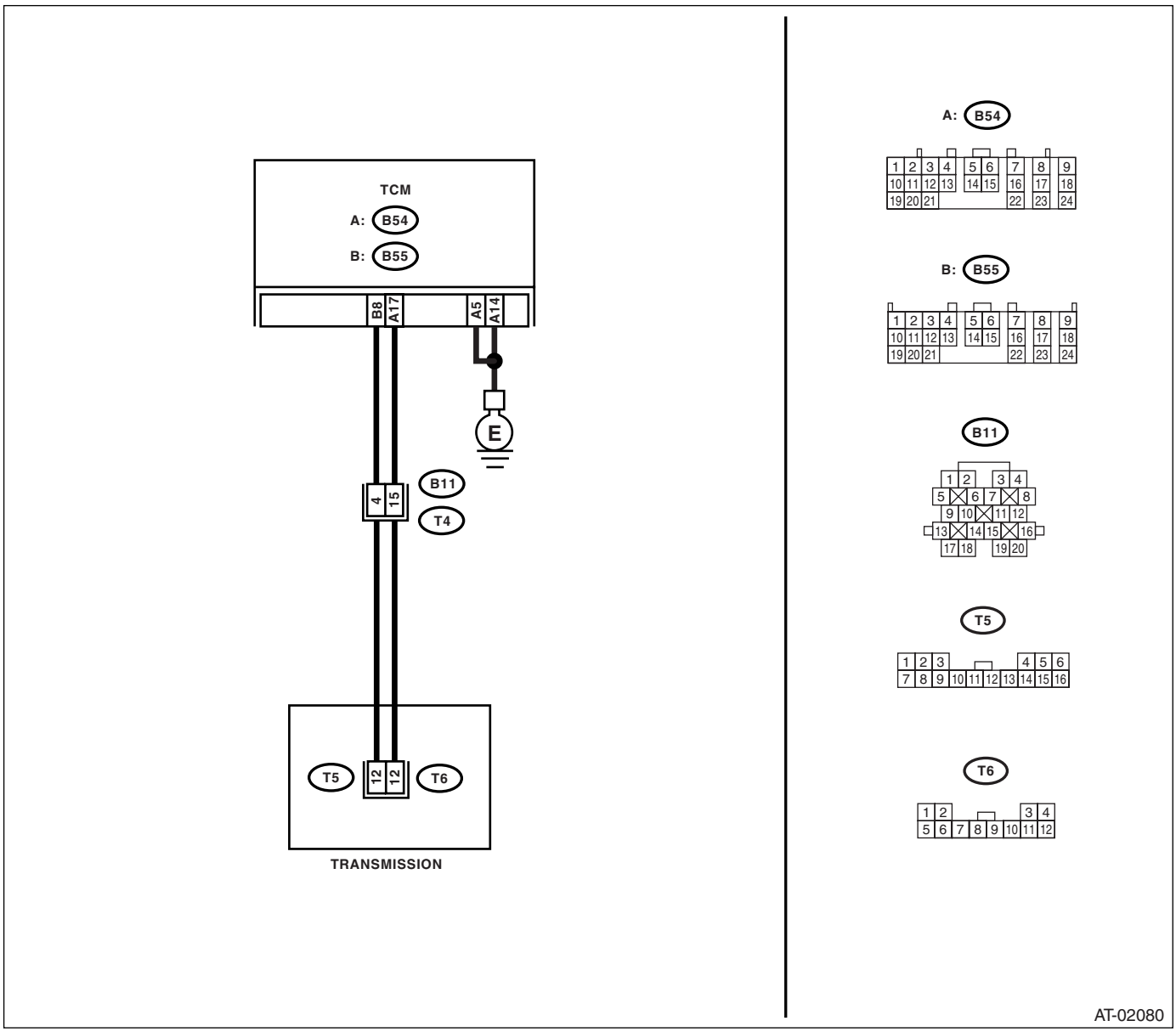
DTC DETECTING CONDITION:

Output signal circuit of high & low reverse clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 17 — (B11) No. 15:*** ***(B55) No. 8 — (B11) No. 4:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 17 — Chassis ground:*** ***(B55) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 15 — (T6) No. 12:*** ***(T4) No. 4 — (T5) No. 12:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance of harness connector between control valve body connector and chassis ground. ***Connector & terminal*** ***(T6) No. 12 — Chassis ground:*** ***(T5) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the open circuit in harness between control valve body connector and transmission ground.
5	**CHECK HIGH & LOW REVERSE CLUTCH SOLENOID.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 12 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

X: DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF

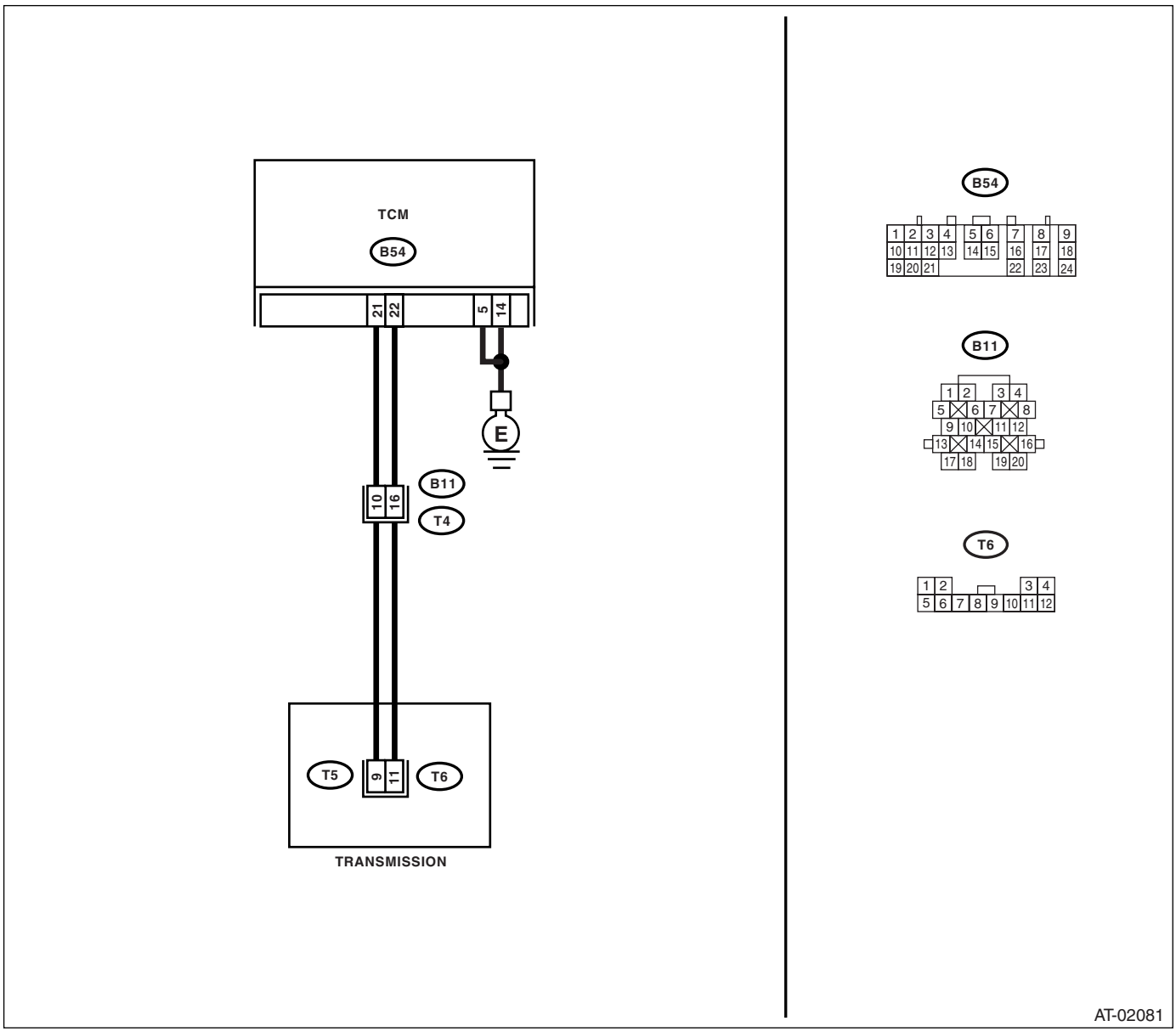
DTC DETECTING CONDITION:

Output signal value of direct clutch solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of D/C oil pressure SW.	Is OFF displayed?	Go to step **4.**	Go to step **7.**
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to “D” range and brake ON (1st) with checking current gear position using Subaru Select Monitor. 4) Check input signal of D/C oil pressure SW.	Is OFF displayed?	Go to step **5.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 2nd speed of manual mode and brake ON with checking current gear position using Subaru Select Monitor. 4) Check input signal of D/C oil pressure SW.	Is the ON displayed?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T6) No. 10:*** ***(T4) No. 10 — (T5) No. 9:***	Is the resistance less than 1 Ω?	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>	Repair the open circuit in harness between control valve body connector and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 10 — Chassis ground:*** ***(T5) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.

Y: DTC P0768 SHIFT SOLENOID “D” ELECTRICAL

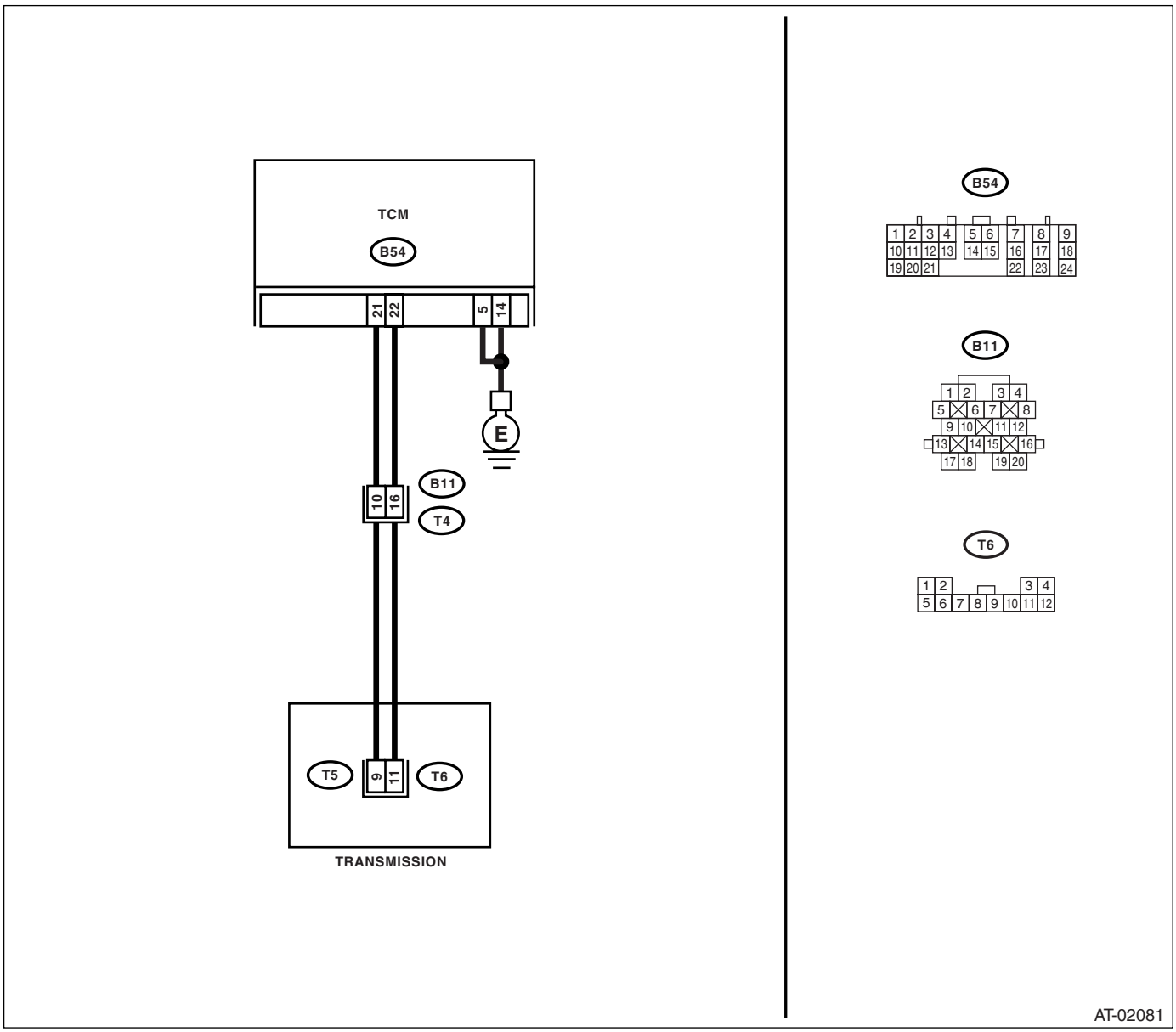
DTC DETECTING CONDITION:

The output signal circuit of direct clutch solenoid is open or shorted.

TROUBLE SYMPTOM:

Locked to 4th gear.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 22 — (B11) No. 16:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 22 — Chassis ground:*** ***(B54) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 16 — (T6) No. 10:*** ***(T4) No. 10 — (T5) No. 9:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 10 — Chassis ground:*** ***(T5) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission ground.
5	**CHECK DIRECT CLUTCH SOLENOID.** Measure the resistance of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T6) No. 10 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

Z: DTC P0771 SHIFT SOLENOID "E" PERFORMANCE OR STUCK OFF

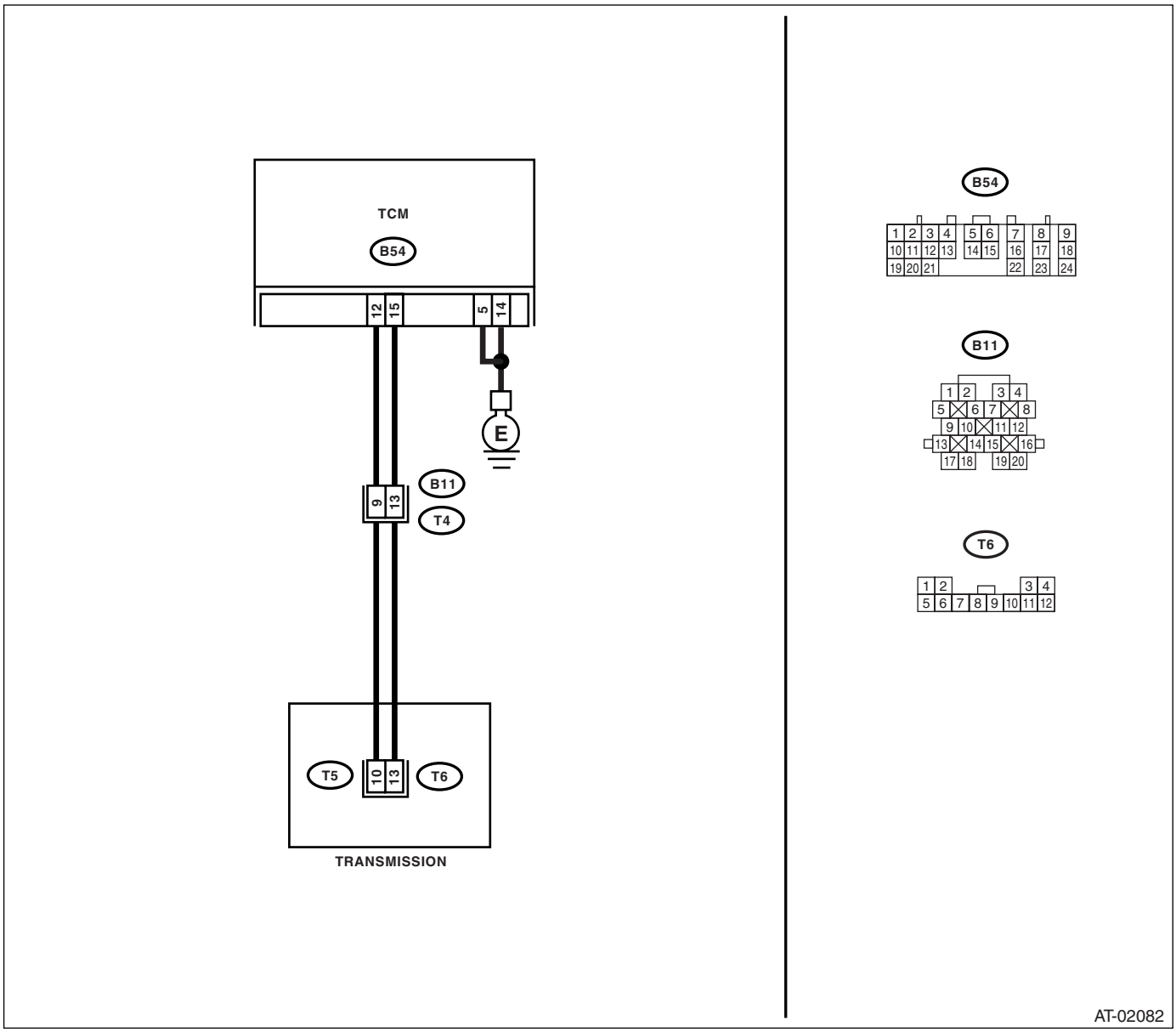
DTC DETECTING CONDITION:

Output signal value of low coast brake solenoid and oil pressure does not match.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:*** ***(B54) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. (engine OFF) 3) Check input signal of LC/B oil pressure SW.	Is OFF displayed?	Go to step **4.**	Go to step **7.**
4	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Shift to 3rd speed with checking current gear position using Subaru Select Monitor. 4) Check input signal of LC/B oil pressure SW.	Is OFF displayed?	Go to step **5.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
5	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON. (engine ON) 3) Drive the vehicle on 2nd speed of manual mode 15 km/h (9 MPH) with checking current gear position using Subaru Select Monitor. 4) Check input signal of LC/B oil pressure SW.	Is the ON displayed?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact of harness in the solenoid output and oil pressure SW input.	Go to step **6.**

	Step	Check	Yes	No
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T6) No. 13:*** ***(T4) No. 9 — (T5) No. 10:***	Is the resistance less than 1 Ω?	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>	Repair the open circuit in harness between control valve body connector and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 13 — Chassis ground:*** ***(T5) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.

AA:DTC P0773 SHIFT SOLENOID “E” ELECTRICAL

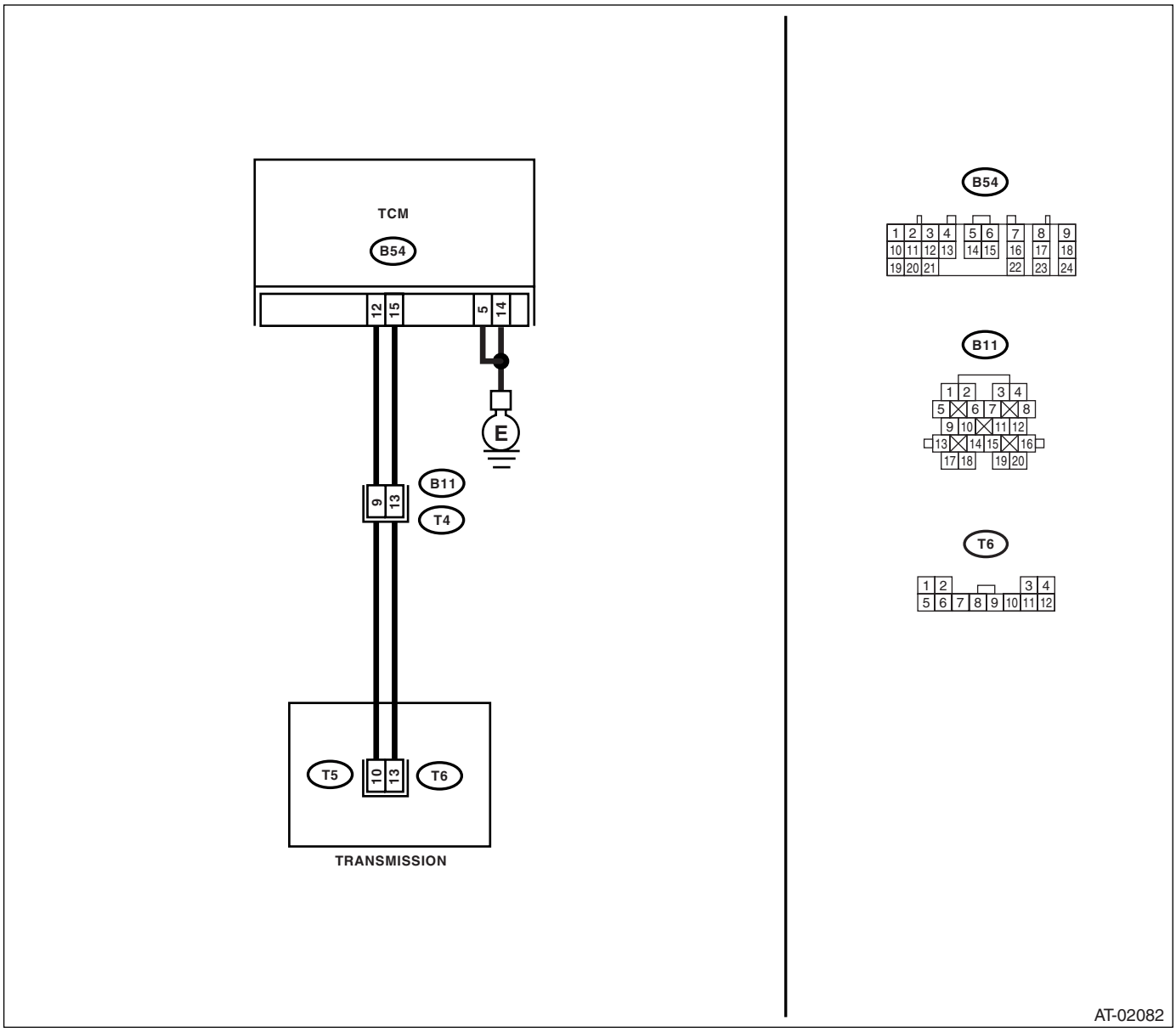
DTC DETECTING CONDITION:

Output signal circuit of low coast brake solenoid is open or shorted.

TROUBLE SYMPTOM:

- Locked to 2nd gear.
- Engine brake does not function at 1st or 2nd of manual mode.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 15 — (B11) No. 13:*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BODY HARNESS.** Measure resistance of harness between TCM connector and body harness. ***Connector & terminal*** ***(B54) No. 15 — Chassis ground:*** ***(B54) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 13 — (T6) No. 13:*** ***(T4) No. 9 — (T5) No. 10:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between chassis ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 13 — Chassis ground:*** ***(T5) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission ground.
5	**CHECK LOW COAST BRAKE SOLENOID.** Measure the resistance of harness connector between control valve body connector and transmission ground. ***Connector & terminal*** ***(T6) No. 13 — Transmission ground:***	Is the resistance between 5 — 17 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**

	Step	Check	Yes	No
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

AB:DTC P0801 REVERSE INHIBIT CONTROL CIRCUIT

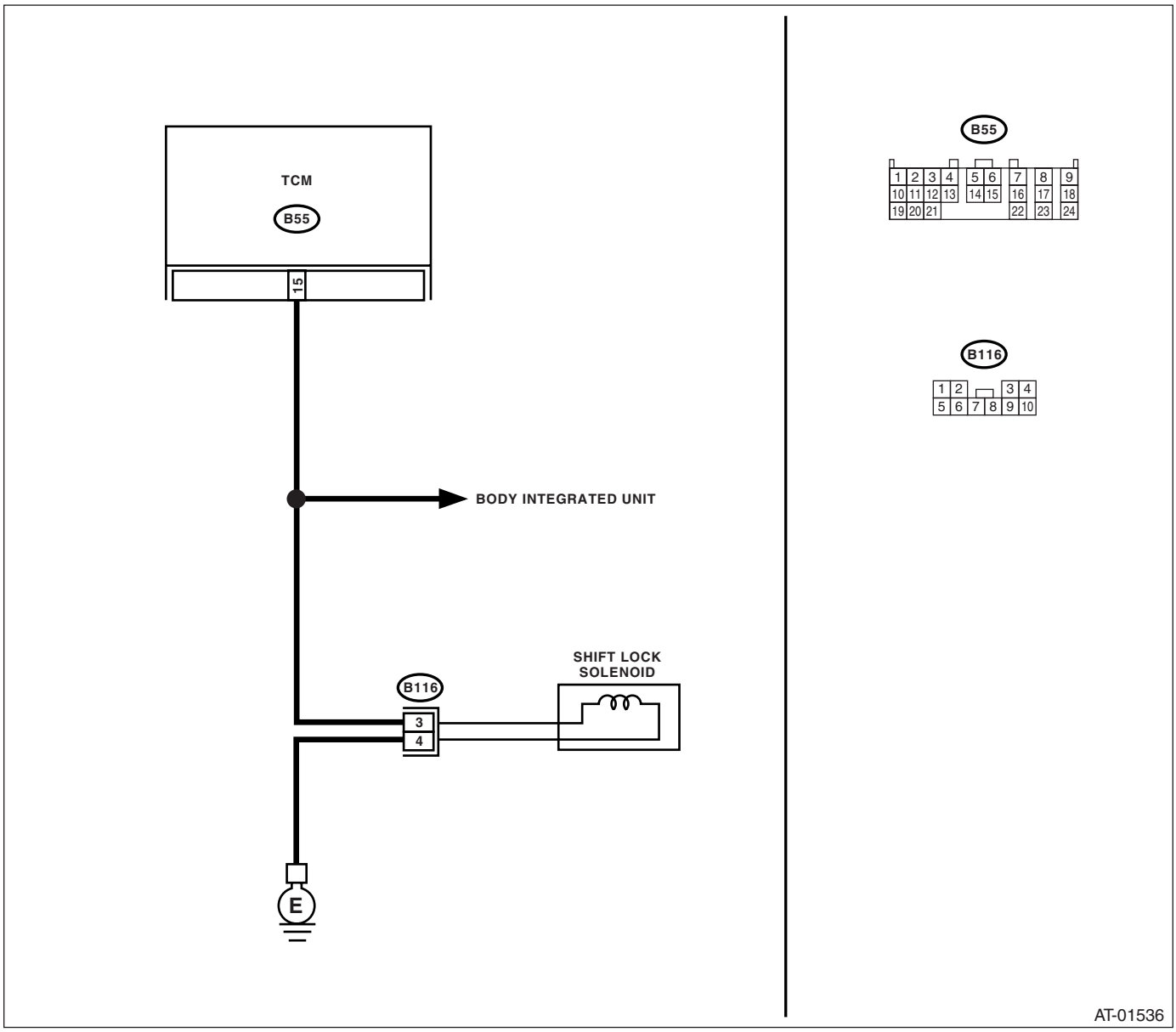
DTC DETECTING CONDITION:

Shift lock solenoid malfunction, open or short reverse inhibitor control circuit

TROUBLE SYMPTOM:

- Gear is shifted from “N” range to “R” range during driving at 20 km/h 12 MPH) or more.
- Gear can not be shifted from “N” range to “R” range though the vehicle is parked.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 32).	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32). If the replaced fuse has blown out easily, repair the short circuit in harness between fuse (No. 32) and TCM.	Go to step **2.**
2	**CHECK OUTPUT SIGNAL OF TCM.** 1) Turn the ignition switch to ON. 2) With the brake pedal depressed, shift the select lever to "D" range. 3) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (−):***	Is the voltage more than 10.5 V?	Go to step **3.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and shift lock solenoid. 3) Measure the resistance of harness between TCM and shift lock solenoid connector. ***Connector & terminal*** ***(B55) No. 15 — (B116) No. 3:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between TCM and shift lock solenoid connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND SHIFT LOCK SOLENOID.** Measure the voltage of harness between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between TCM and shift lock solenoid connector.
5	**CHECK HARNESS BETWEEN SHIFT LOCK SOLENOID AND CHASSIS GROUND TERMINAL.** Measure the resistance of harness between shift lock solenoid and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between chassis ground and shift lock solenoid connector.
6	**CHECK SHIFT LOCK SOLENOID.** Measure the resistance of shift lock solenoid terminals. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance 7 — 21 Ω?	Go to step **7.**	Replace the shift lock solenoid.

	Step	Check	Yes	No
7	**CHECK OUTPUT SIGNAL OF TCM.** 1) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 2) Start the engine. 3) Shift the select lever to "D" range and slowly increase vehicle speed to 20 km/h (12 MPH). NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.> 4) Measure the voltage between TCM and chassis ground. ***Connector & terminal*** ***(B55) No. 15 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Even if the SPORT indicator lights up, the circuit has returned to normal condition at this time. A temporary poor contact of connector or harness may be the cause. Repair harness or connector in reverse inhibitor control circuit.	Go to step **8.**
8	**CHECK POOR CONTACT.**	Is there poor contact in the reverse inhibitor control circuit?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

AC:DTC P0817 STARTER DISABLE CIRCUIT

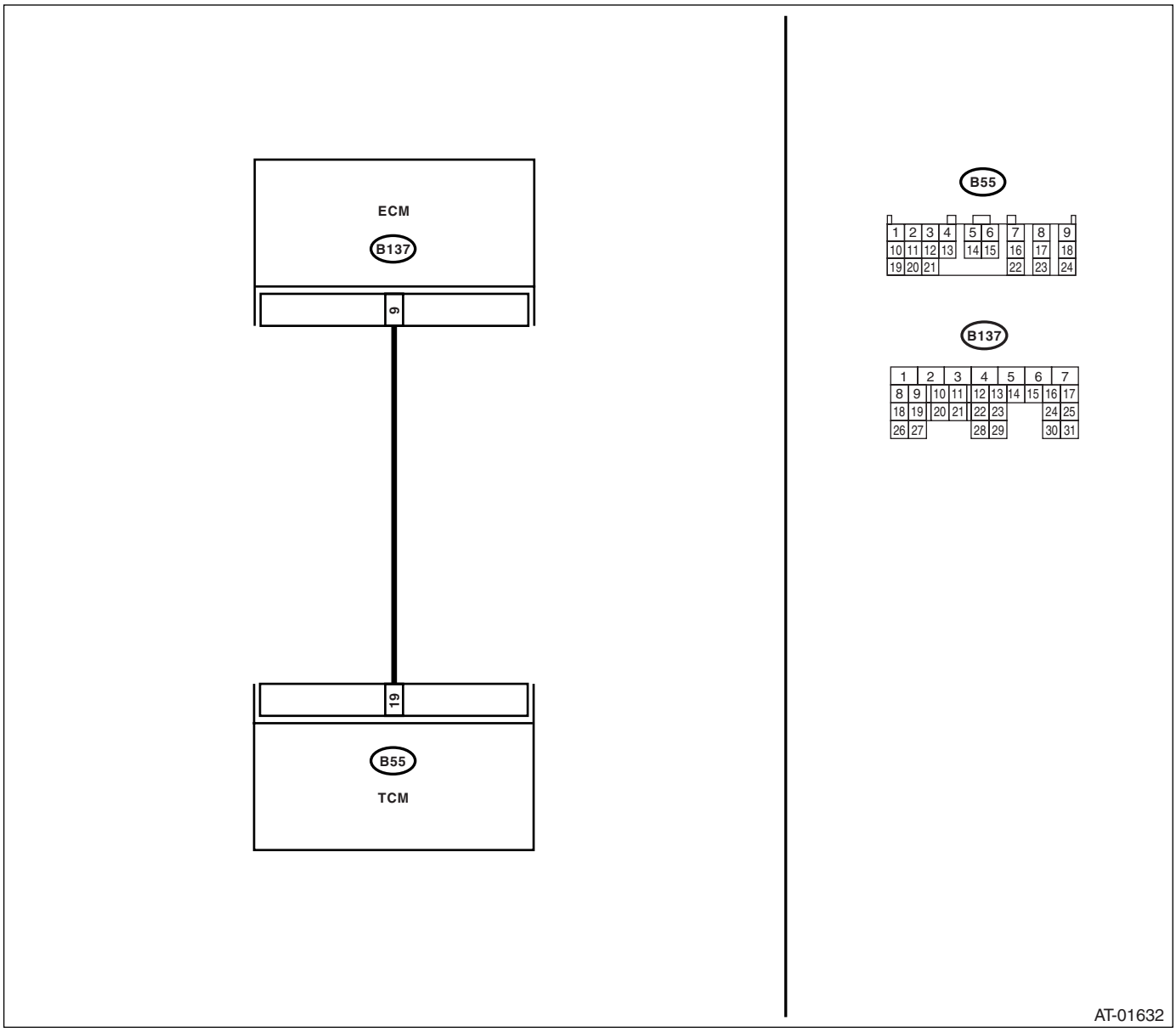
DTC DETECTING CONDITION:

Open or short in P/N signal output circuit

TROUBLE SYMPTOM:

- Engine can be started on other than “P” or “N” range
- Engine can not be started on “P” or “N” range

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) circuit detected?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK ECM.**	Is the communication between Subaru Select Monitor and ECM normal?	Go to step **3.**	Perform the diagnosis according to DTC concerning ECM.
3	**CHECK FUSE (No. 32).** 1) Turn the ignition switch to OFF. 2) Remove the fuse.	Is the fuse (No. 32) blown out?	Replace the fuse (No. 32). If the replaced fuse (No. 32) has blown out easily, repair the short circuit in harness between fuse (No. 32) and TCM.	Go to step **4.**
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 19 — (B137) No. 9:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND ECM.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between transmission connector and chassis ground.
6	**CHECK TCM OUTPUT SIGNAL.** 1) Connect the TCM and ECM connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Shift the select lever to “P” range. 4) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **7.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
7	**CHECK TCM OUTPUT SIGNAL.** 1) Shift the select lever to “D” range. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
8	**CHECK POOR CONTACT.**	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Check neutral circuit inside the ECM.

AD:DTC P0882 TCM POWER INPUT SIGNAL LOW

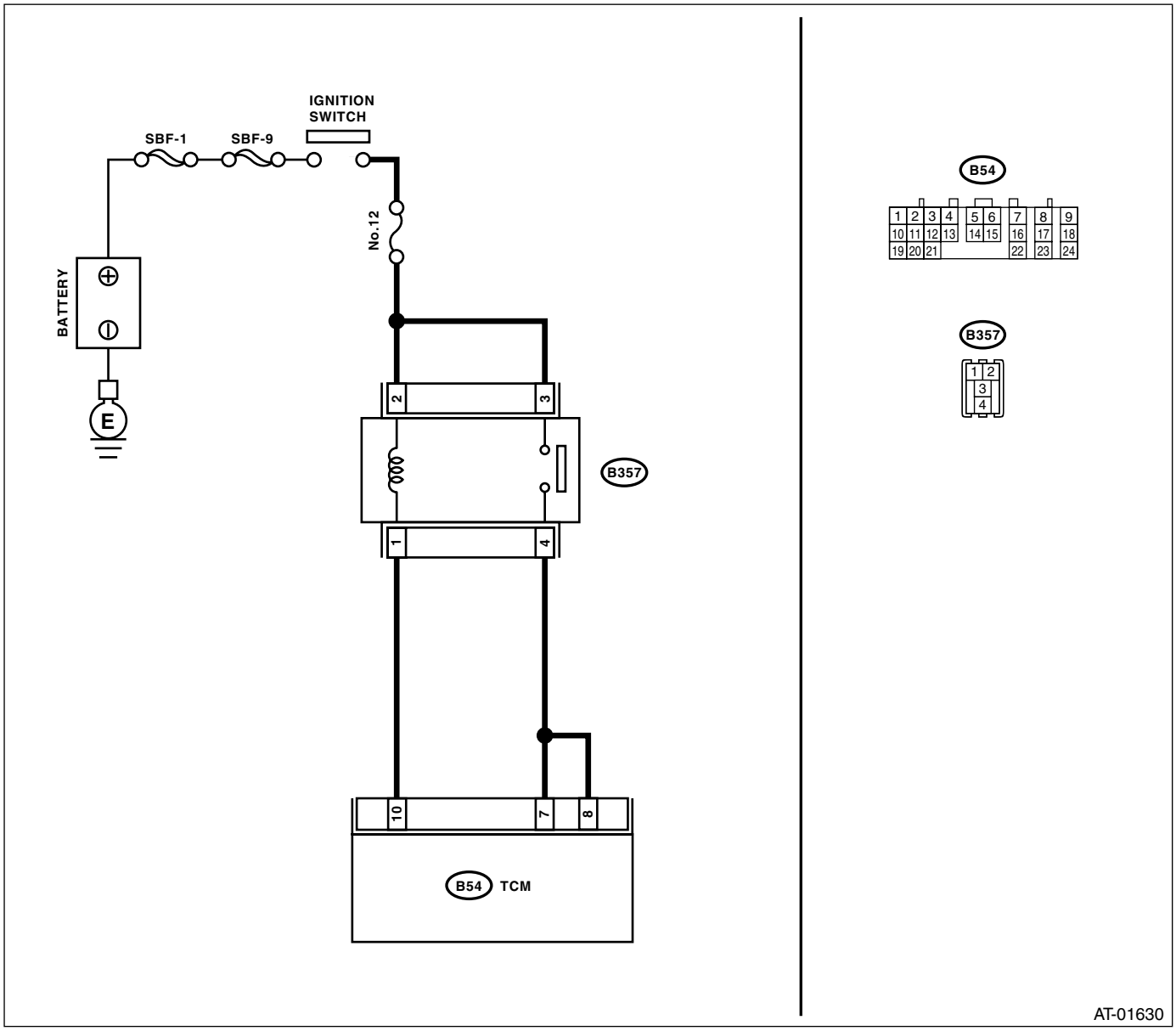
DTC DETECTING CONDITION:

Malfunction of PVIGN power supply relay or open, short circuit of PVIGN power supply circuit.

TROUBLE SYMPTOM:

Gear is not changed.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the SBF 1, SBF 2 and fuse (No. 12), and then check those are not blown out.	Is the fuse blown out?	Replace the fuse. If the replaced fuse has blown out easily, repair the short circuit in harness of each fuse.	Go to step **2.**
2	**CHECK INPUT VOLTAGE FOR PVIGN RELAY.** Measure the voltage between PVIGN relay and chassis ground. ***Connector & terminal*** ***(B357) No. 2 (+) — Chassis ground (−):*** ***(B357) No. 3 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **3.**	Check open circuit in harness between fuse (No. 12) and PVIGN relay.
3	**CHECK HARNESS BETWEEN PVIGN RELAY OF TCM.** Measure the resistance between TCM connector and PVIGN relay connector. ***Connector & terminal*** ***(B54) No. 10 — (B357) No. 1:*** ***(B54) No. 7 — (B357) No. 4:*** ***(B54) No. 8 — (B357) No. 4:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit of harness.
4	**CHECK PVIGN POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 7 (+) — Chassis ground (−):*** ***(B54) No. 8 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Temporary poor contact. Recheck the harness between TCM and relay. (Lightly move the harness and check that the open or short circuit is not occurred.)	Go to step **5.**
5	**CHECK PVIGN RELAY OUTPUT OF TCM.** Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1.5 V?	Replace the PVIGN relay.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

AE:DTC P0957 BACKUP LIGHT RELAY CIRCUIT LOW

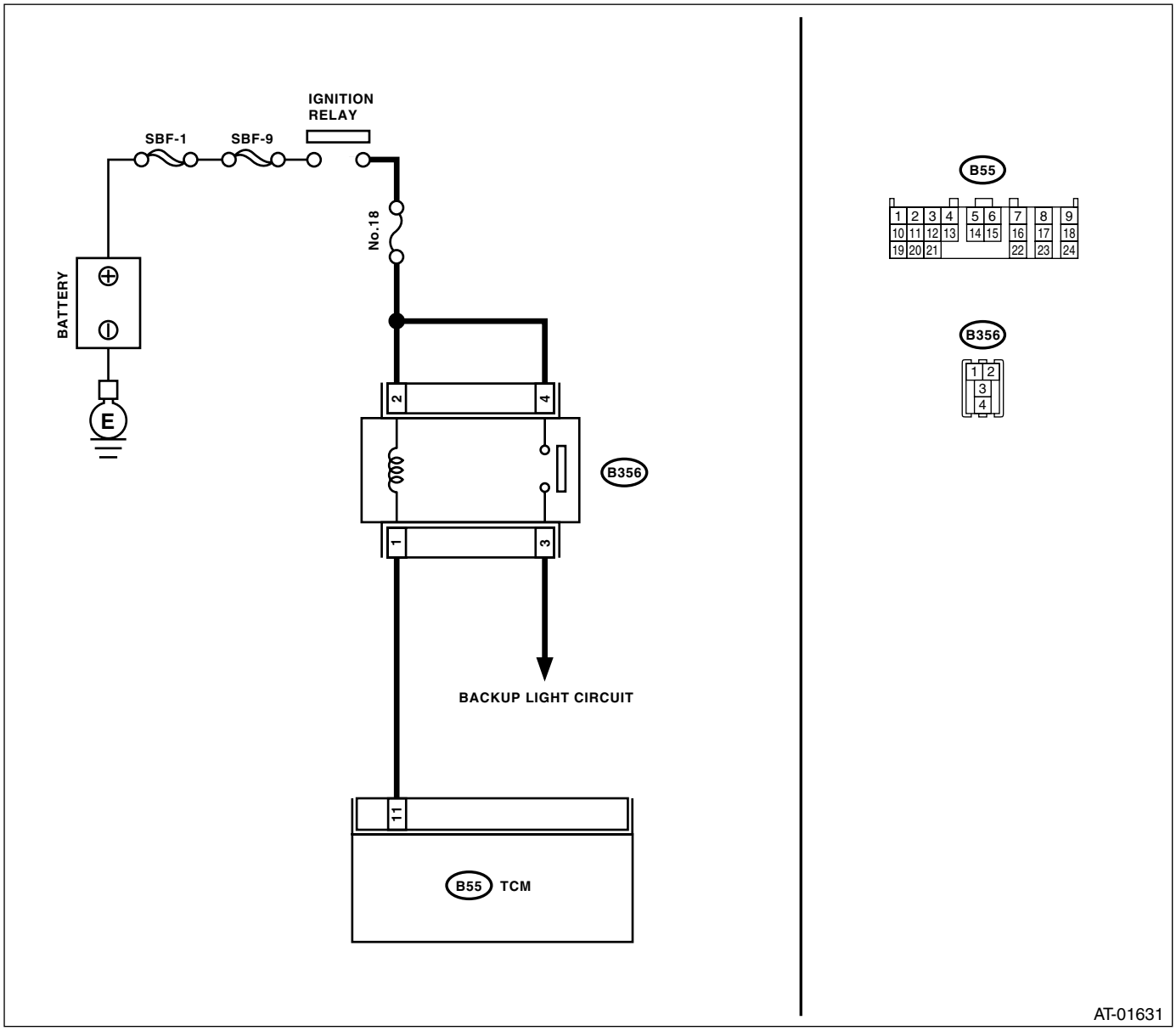
DTC DETECTING CONDITION:

Short circuit of back-up light relay output circuit

TROUBLE SYMPTOM:

Back-up light does not illuminate in “R” range.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) circuit detected?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and backup light relay. 3) Measure the resistance of harness between TCM and backup light relay connector. ***Connector & terminal*** ***(B55) No. 11 — (B356) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Shift the select lever to “P” range.	Is the voltage more than 10 V?	Go to step **5.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** Shift the select lever to “R” range.	Is the voltage less than 1 V?	Go to step **6.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACKUP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit in harness between fuse (No. 18) and backup light relay.

AF:DTC P0958 BACKUP LIGHT RELAY CIRCUIT HIGH

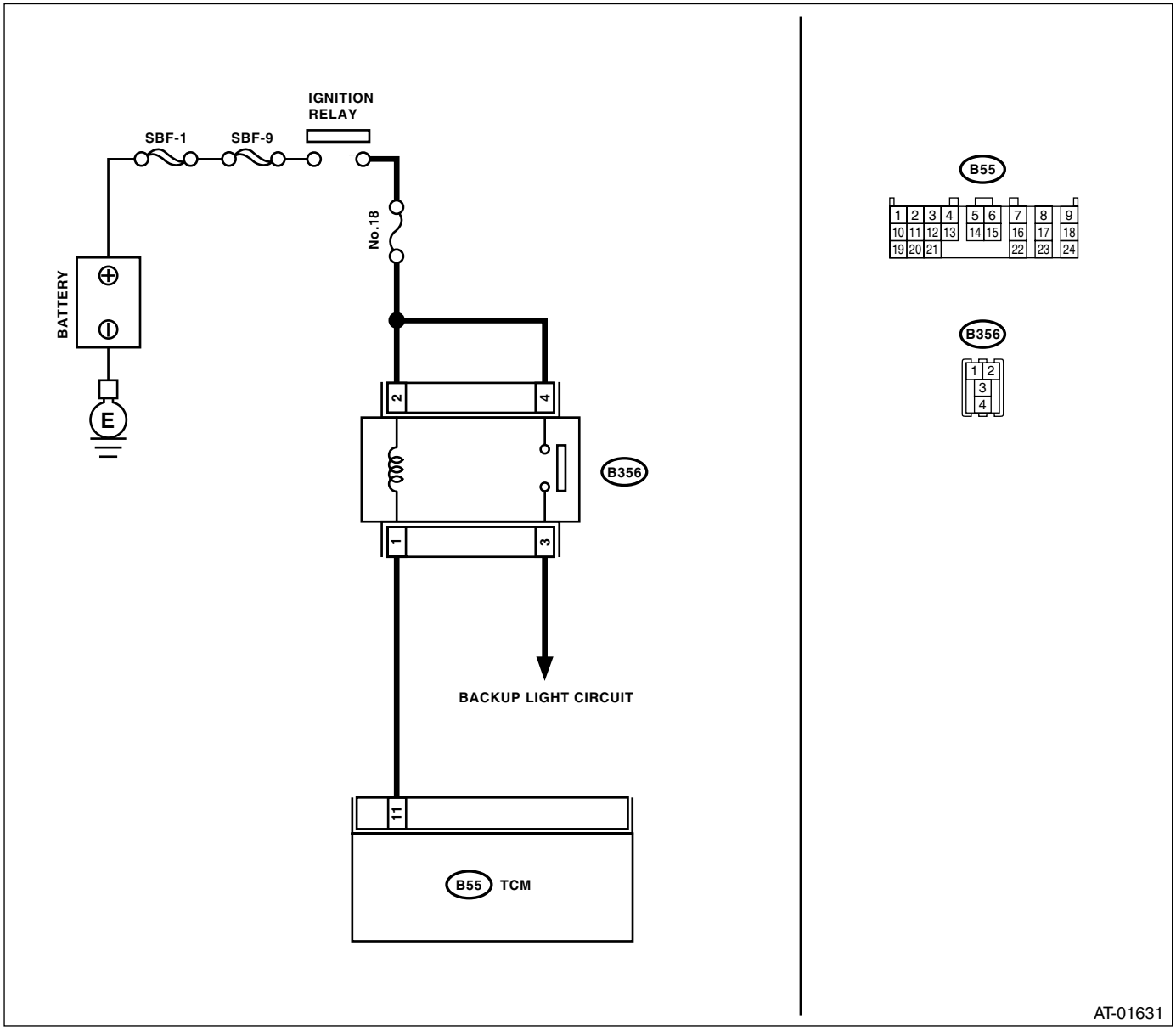
DTC DETECTING CONDITION:

Back-up light relay malfunction, or open/short circuit in back-up light relay output circuit

TROUBLE SYMPTOM:

- Back-up light does not illuminate in “R” range.
- Back-up light always illuminate in other than “R” range.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) circuit detected?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND BACK-UP LIGHT RELAY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM and back-up light relay. 3) Measure the resistance of harness between TCM and back-up light relay connector. ***Connector & terminal*** ***(B55) No. 11 — (B356) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the short circuit in harness between TCM and transmission connector.
4	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Shift the select lever to “P” range.	Is the voltage more than 10 V?	Go to step **5.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
5	**CHECK TCM OUTPUT SIGNAL.** Shift the select lever to “R” range.	Is the voltage less than 1 V?	Go to step **6.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
6	**CHECK INPUT VOLTAGE FOR BACK-UP LIGHT RELAY.** Measure the voltage between back-up light relay and chassis ground.	Is the voltage 10 — 13 V?	Replace the back-up light relay.	Check open or short circuit in harness between fuse (No. 18) and backup light relay.

AG:DTC P1601 TCM COMMUNICATION MALFUNCTION

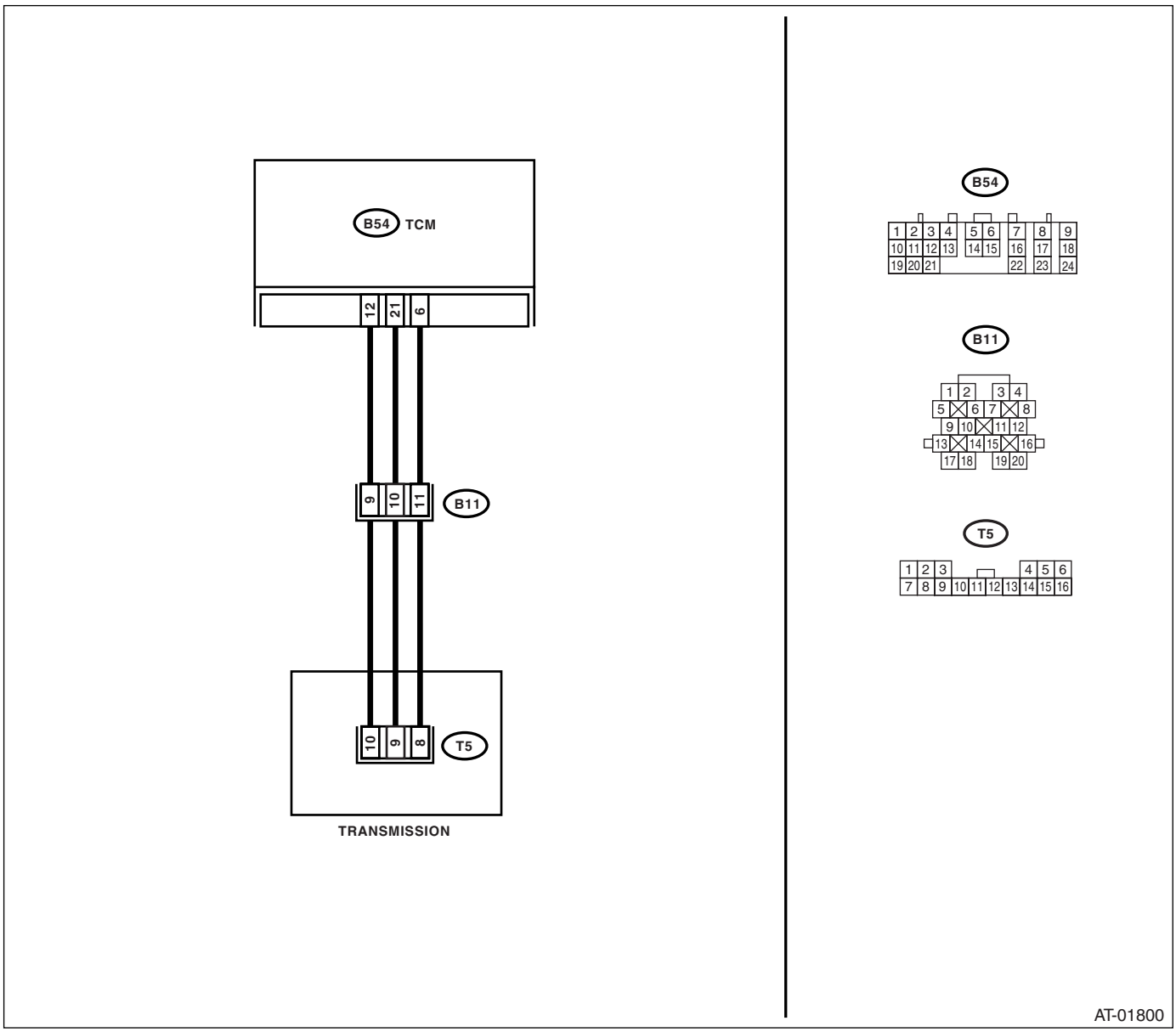
DTC DETECTING CONDITION:

Communication does not complete between control valve memory box.

TROUBLE SYMPTOM:

Shifting quality malfunction

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK POOR CONTACT OF TRANSMISSION CONNECTOR.** Check loose connection on TCM connector (B54).	Is there poor contact on connector?	Go to step **2.**	Connect it securely.
2	**CHECK DTC OF TCM.**	Is DTC of oil pressure switch detected?	Perform the diagnosis according to DTC.	Go to step **3.**

	Step	Check	Yes	No
3	**CHECK TCM OUTPUT SIGNAL.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **5.**
4	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 12 — (B11) No. 9:*** ***(B54) No. 21 — (B11) No. 10:*** ***(B54) No. 6 — (B11) No. 11:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between TCM and transmission connector, and poor contact in coupling connector.
5	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 12 — Chassis ground:*** ***(B54) No. 21 — Chassis ground:*** ***(B54) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Repair the short circuit in harness between TCM and transmission connector.
6	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(B54) No. 9 — (T5) No. 10:*** ***(B54) No. 10 — (T5) No. 9:*** ***(B54) No. 11 — (T5) No. 8:***	Is the resistance less than 1 Ω?	Go to step **7.**	Repair the open circuit in harness between control valve body connector and transmission connector.
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION CONNECTOR AND CONTROL VALVE BODY CONNECTOR.** Measure the resistance between transmission connector and chassis ground. ***Connector & terminal*** ***(B54) No. 9 — Chassis ground:*** ***(B54) No. 10 — Chassis ground:*** ***(B54) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit in harness between control valve body connector and transmission connector.
8	**CHECK POOR CONTACT.** NOTE: Data communication malfunction is detected when the malfunction occurred on inspection area above while transmission assembly is replacing or “Clear Memory 2” is performing. When the repair is performed with following diagnosis above, perform the “Clear Memory 2”, and then recheck that the DTC of TCM data communication malfunction is not detected.	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Replace the transmission assembly. <Ref. to 5AT-38, Automatic Transmission Assembly.>

AH:DTC P1706 AT VEHICLE SPEED SENSOR CIRCUIT MALFUNCTION (REAR WHEEL)

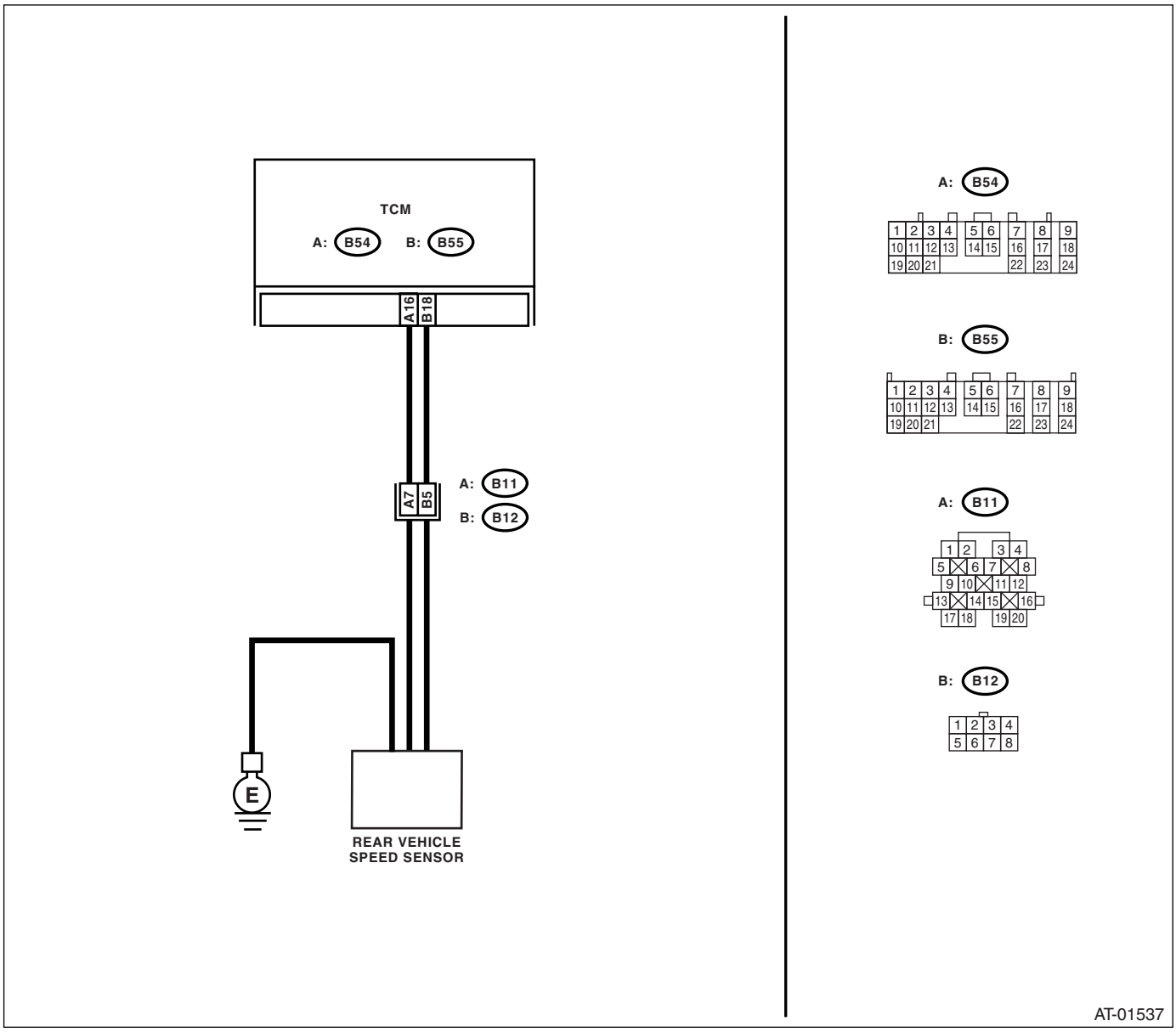
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Shifting quality malfunction
- Tight corner braking phenomenon is occurred.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 16 — (B11) No. 7:*** ***(B55) No. 18 — (B12) No. 5:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 — Chassis ground:*** ***(B55) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and chassis ground.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — Chassis ground (–):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **5.**
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 18 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6.**	Go to step **5.**
5	**CHECK TCM I/O SIGNAL.** Check TCM I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is TCM I/O signal OK?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**CHECK HARNESS ASSEMBLY (TURBINE SPEED SENSOR GROUND).** Check the installing condition of ground connecting harness (used for both of turbine speed sensor 1, rear vehicle speed sensor).	Is the ground connecting harness installed to transmission body correctly, or the harness and connector terminals not damaged?	Go to step **7.**	When the poor installation of ground connecting harness, install it securely. Replace the transmission assembly when the harness is damaged. <Ref. to 5AT-38, Automatic Transmission Assembly.>
7	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **9.**	Go to step **8.**
8	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **10.**	Go to step **11.**

	Step	Check	Yes	No
9	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive the vehicle. 4) Read the current data of front wheel speed using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the value of the front wheel speed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Replace the transmission harness.
10	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B55) No. 18:*** ***Ground lead; (B54) No. 19:*** 4) Start the engine, and drive the vehicle. 5) Display the pulse signal of turbine speed sensor 1 to oscilloscope, and measure the frequency. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the frequency of measured waveform (pulse wave) changed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Replace the transmission harness.

	Step	Check	Yes	No
11	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and drive the vehicle. 4) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (−):*** 5) Stop the vehicle, and shift the select lever to "P" range. 6) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 7 (+) — (B54) No. 19 (−):*** NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the voltage change within the range of 2 — 3 V when vehicle is driving? Is the voltage less than 0.5 V or more than 4.5 V constantly when the vehicle is parked with "P" range?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Replace the transmission harness.

AI: DTC P1707 AT AWD SOLENOID VALVE CIRCUIT MALFUNCTION

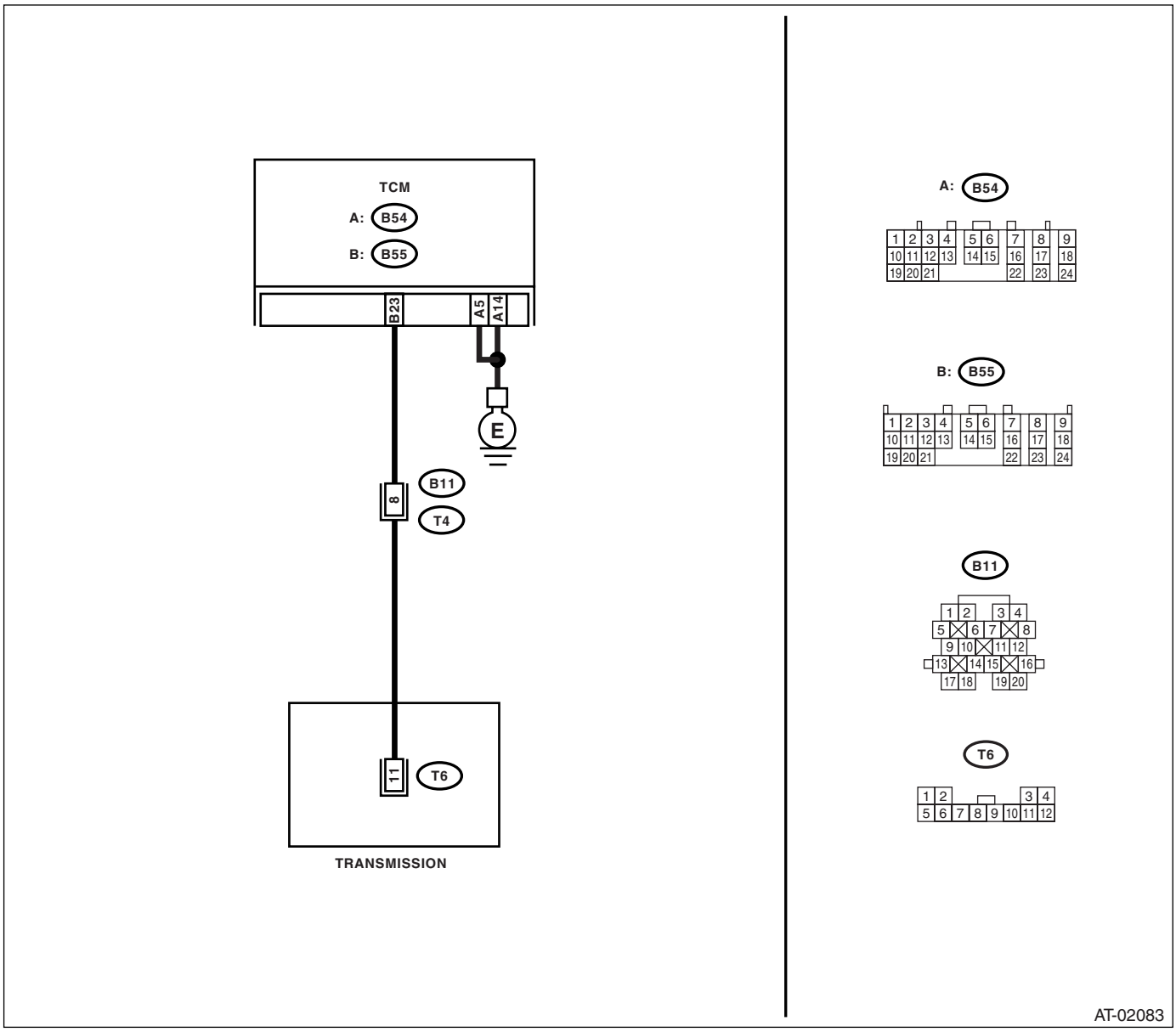
DTC DETECTING CONDITION:

Output signal circuit of transfer solenoid is open or shorted.

TROUBLE SYMPTOM:

- Tight corner braking phenomenon is occurred.
- Drivability getting worse.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 23 — (B11) No. 8:*** ***(B54) No. 5 — Chassis ground:*** ***(B54) No. 14 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM connector and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND CHASSIS GROUND.** Measure resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 23 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM connector and transmission connector.
3	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. 5) Drain the ATF. 6) Remove the oil pan, and disconnect the control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 8 — (T6) No. 11:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the open circuit in harness between control valve body connector and transmission connector.
4	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 11 — Transmission ground:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Repair the short circuit in harness between control valve body connector and transmission ground.
5	**AWD SOLENOID CURRENT.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 11 — Transmission ground:***	Is the resistance 3 — 9 Ω?	Go to step **6.**	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>
6	**CHECK POOR CONTACT.** Check that there are no poor contact in TCM connector, transmission connector and control valve body connector.	Is there any loosing terminal, entering foreign matter, damaging connector body?	Repair the poor contact.	Go to step **7.**
7	**CHECK AFTER REPAIR.** 1) Perform the clear memory mode. 2) Drive for a while, read the DTC, and verify that there is no faulty.	Is DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Temporary poor contact or open circuit occurs. Recheck that the harness connector has no faulty.

AJ:DTC P1710 TORQUE CONVERTER TURBINE 2 SPEED SIGNAL CIRCUIT 2 MALFUNCTION

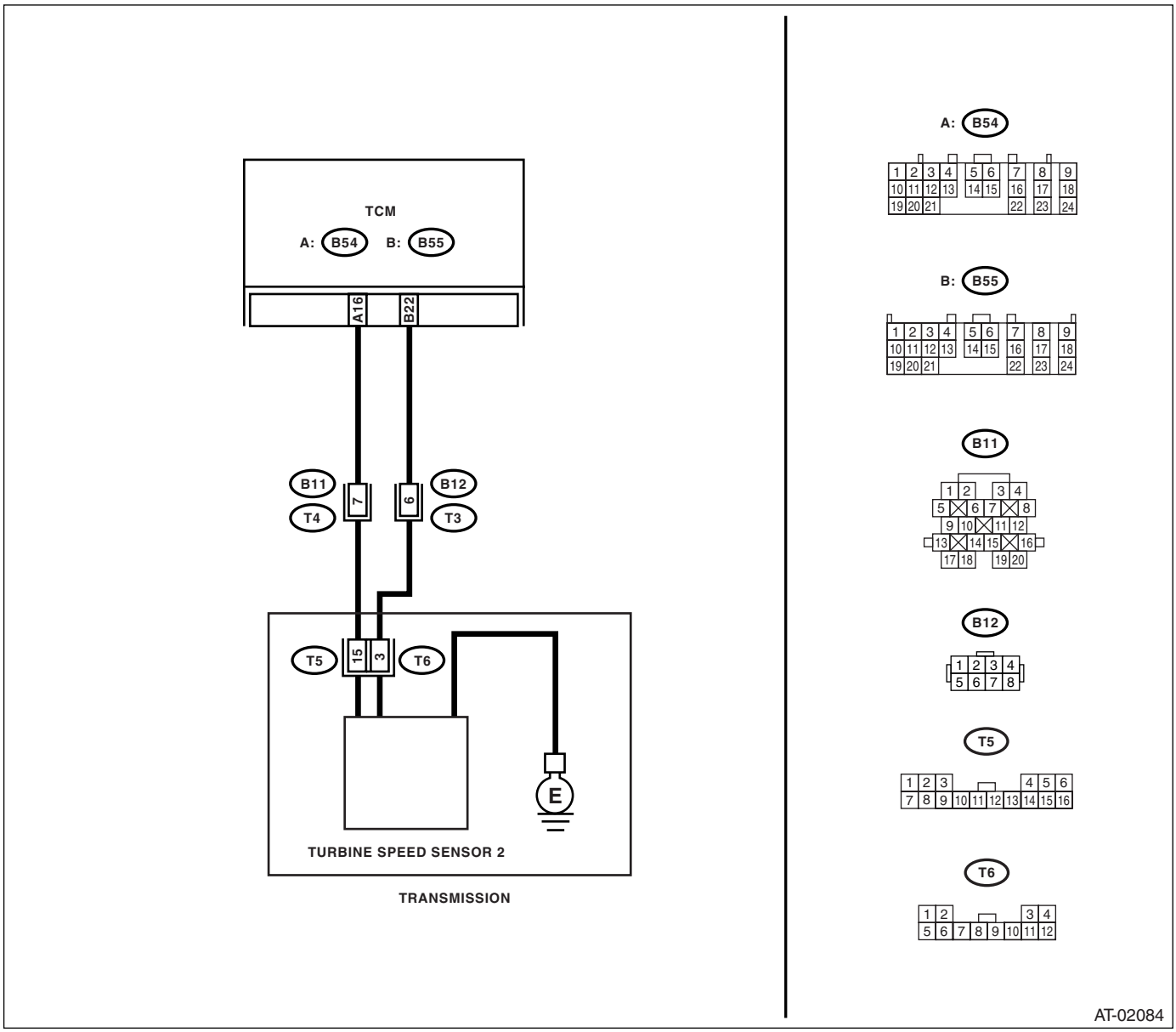
DTC DETECTING CONDITION:

Input signal circuit of TCM is open or shorted.

TROUBLE SYMPTOM:

- Excessive shift shock.
- Does not shift to 5th

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B55) No. 22 — (B12) No. 6:*** ***(B54) No. 16 — (B11) No. 7:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 22 — Chassis ground:*** ***(B54) No. 16 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **3.**	Repair the short circuit in harness between TCM and transmission connector.
3	**CHECK TCM POWER SUPPLY OUTPUT.** 1) Connect the connector to TCM. (Transmission connector is disconnected) 2) Turn the ignition switch to ON. (engine OFF) 3) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 16 (+) — (B54) No. 19 (–):***	Is the voltage 10 — 13 V?	Go to step **4.**	Go to step **5.**
4	**CHECK TURBINE SPEED SENSOR INPUT CIRCUIT OF TCM.** Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 22 (+) — (B54) No. 19 (–):***	Is the voltage 4 — 6 V?	Go to step **6.**	Go to step **5.**
5	**CHECK TCM I/O SIGNAL.** Check TCM I/O signal of power supply, ground and PVIGN power supply relay. <Ref. to 5AT(diag)-12, ELECTRICAL SPECIFICATION, Transmission Control Module (TCM) I/O Signal.>	Is I/O signal OK?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Repair the open or short circuit for power supply and ground. Perform the diagnosis according to DTC for PVIGN power supply relay.
6	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **8.**	Go to step **7.**
7	**PREPARE OSCILLOSCOPE.**	Do you have an oscilloscope?	Go to step **9.**	Go to step **10.**

	Step	Check	Yes	No
8	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 1st speed driving condition of manual mode. 4) Read the current data of torque converter turbine speed 2 using the Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.> NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the value of the turbine speed sensor 2 change depending on the acceleration, deceleration and shifting gear of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact in harness of turbine speed sensor 2 and transmission connector.	Go to step **11.**
9	**CHECK INPUT SIGNAL FOR TCM USING OSCILLOSCOPE.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Set the oscilloscope to TCM connector terminals. ***Connector & terminal*** ***Positive probe; (B55) No. 22:*** ***Ground lead; (B54) No. 19:*** 4) Start the engine, and set the vehicle in 1st speed driving condition of manual mode. 5) Display the pulse signal of turbine speed sensor 1 to oscilloscope, and measure the frequency. NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Is the frequency of measured waveform (pulse wave) changed depending on the acceleration and deceleration of the vehicle?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact in harness of turbine speed sensor 2 and transmission connector.	Go to step **11.**

	Step	Check	Yes	No
10	**CHECK INPUT SIGNAL FOR TCM USING CIRCUIT TESTER.** 1) Connect all the connectors. 2) Lift-up the vehicle and support with rigid racks. NOTE: Raise all wheels off floor. 3) Start the engine, and set the vehicle in 1st speed driving condition of manual mode. 4) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 22 (+) — (B54) No. 19 (–):*** 5) Stop the vehicle, and shift the select lever to "P" range. 6) Measure the voltage between TCM terminals. ***Connector & terminal*** ***(B55) No. 22 (+) — (B54) No. 19 (–):*** NOTE: The speed difference between front and rear wheels may light the ABS warning light, but this indicates no malfunction. When AT control diagnosis is finished, perform the ABS memory clearance procedure of on-board diagnostics system. <Ref. to ABS(diag)-27, Clear Memory Mode.>	Does the voltage change within the range of 2 — 3 V when vehicle is driving? Is the voltage less than 0.5 V or more than 4.5 V constantly when the vehicle is parked with "P" range?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair the poor contact in harness of turbine speed sensor 2 and transmission connector.	Go to step **11.**
11	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T3) No. 6 — (T6) No. 3:*** ***(T4) No. 7 — (T5) No. 15:***	Is the resistance less than 1 Ω?	Go to step **12.**	Repair the open circuit in harness between control valve body connector and transmission connector.
12	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T6) No. 3 — Transmission ground:*** ***(T5) No. 15 — Transmission ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between transmission connector and transmission ground.

AK:DTC P1716 ATF TEMP. SENSOR 2 CIRCUIT LOW

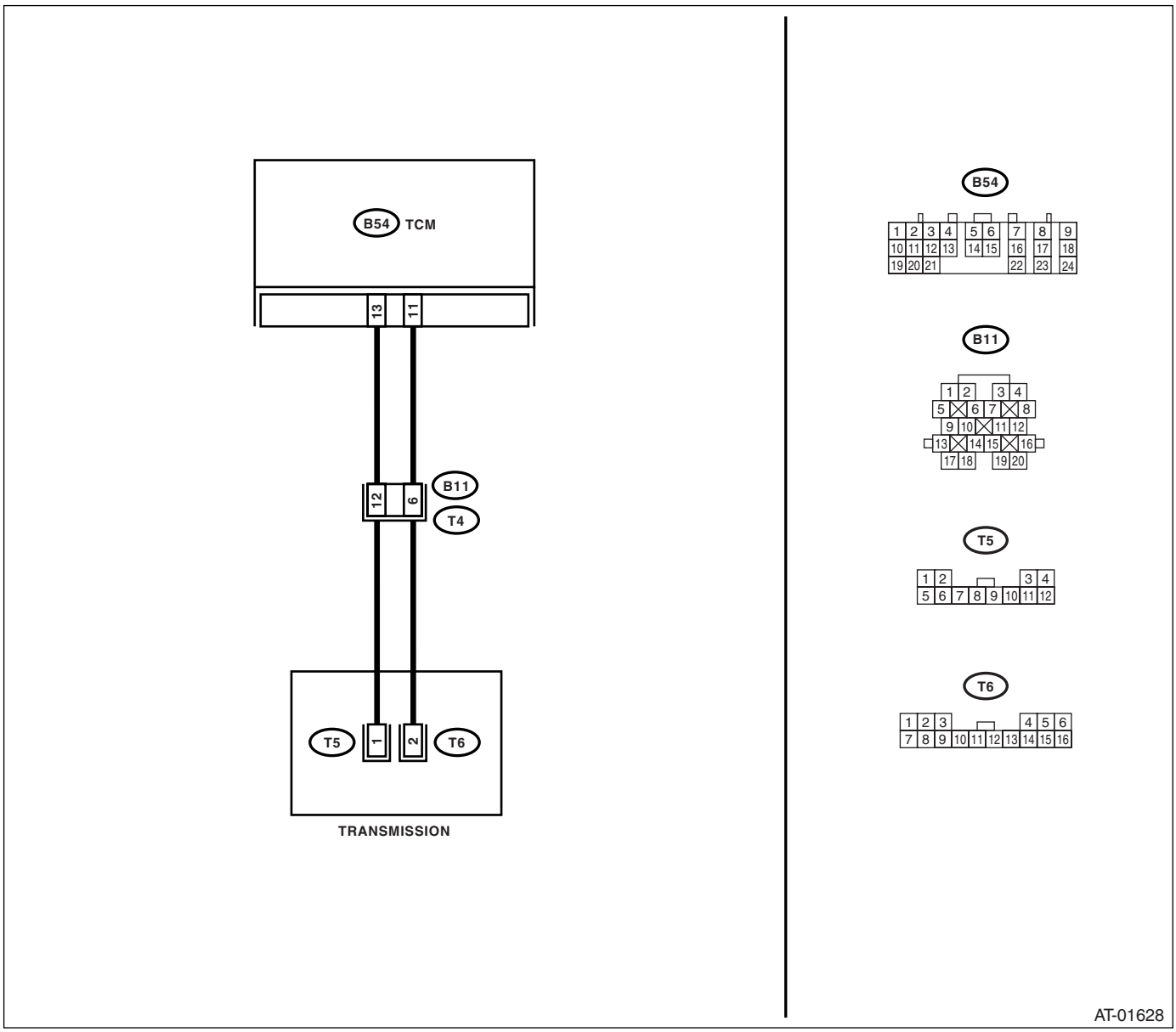
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM and transmission connector. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	Is the resistance less than 1 Ω?	Go to step **2.**	Repair the open circuit in harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Is the resistance 300 — 700 Ω?	Go to step **3.**	Go to step **7.**
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4.**	Go to step **7.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 11 (+) — (B54) No. 13 (−):***	Is the voltage 0.4 — 0.9 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **8.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **8.**
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission connector and control valve body connector. ***Connector & terminal*** ***(T4) No. 12 — (T5) No. 1:*** ***(T4) No. 6 — (T6) No. 2:***	Is the resistance less than 1 Ω?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the open circuit in harness between control valve body connector and transmission connector.
8	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

AL:DTC P1717 ATF TEMP. SENSOR 2 CIRCUIT HIGH

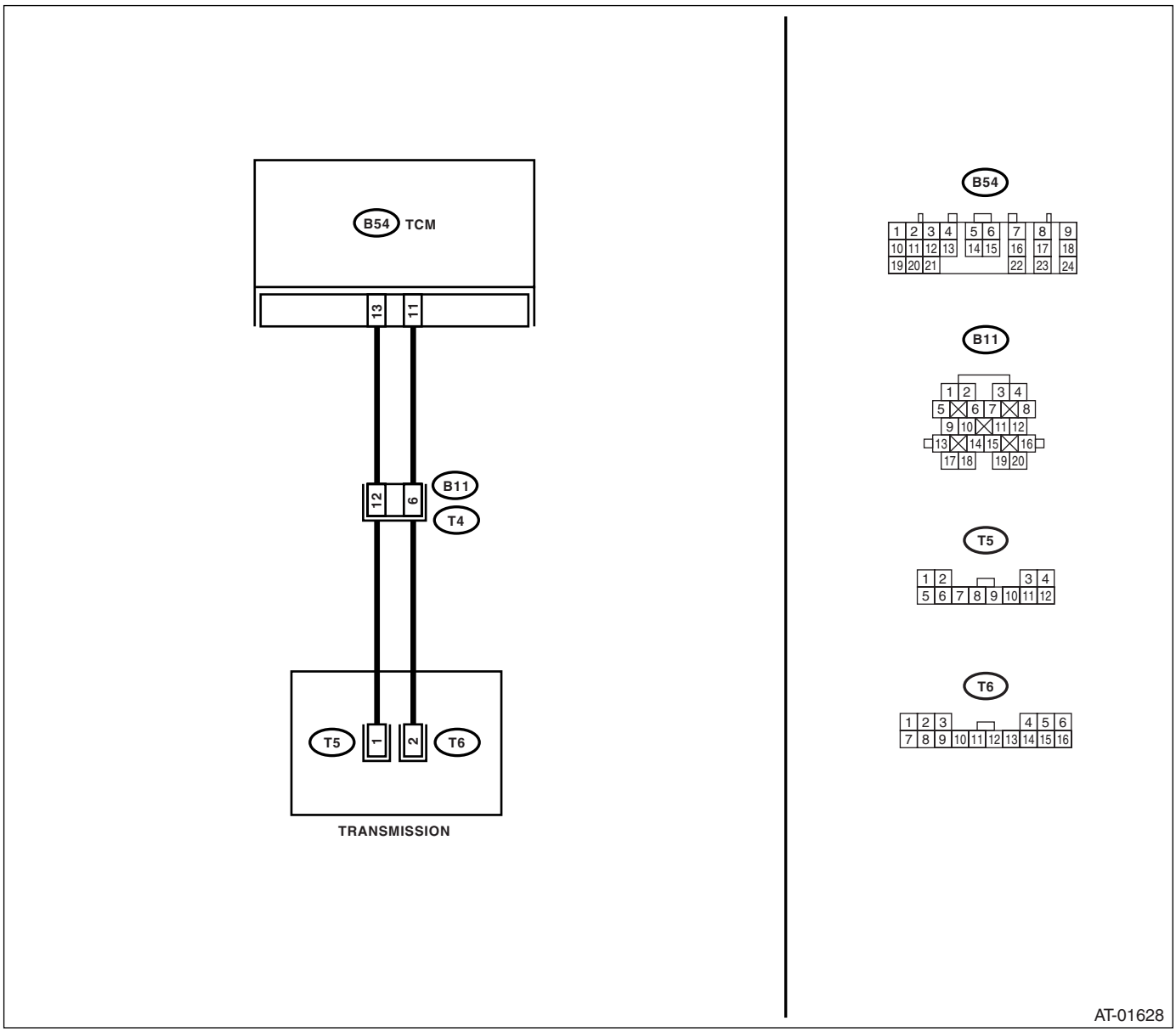
DTC DETECTING CONDITION:

Input signal circuit of TCM to ATF temperature sensor 2 is open or shorted.

TROUBLE SYMPTOM:

Excessive shift shock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS CONNECTOR BETWEEN TCM AND TRANSMISSION.** 1) Turn the ignition switch to OFF. 2) Disconnect the connectors from TCM and transmission. 3) Measure the resistance of harness between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — (B11) No. 12:*** ***(B54) No. 11 — (B11) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Repair the short circuit in harness between TCM and transmission connector.
2	**CHECK ATF TEMPERATURE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the connectors to transmission and TCM. 3) Turn the ignition switch to ON and start engine. 4) Warm-up the transmission until the ATF temperature reaches to 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 5) Disconnect the connector from transmission. 6) Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Is the resistance 300 — 700 Ω?	Go to step **3.**	Go to step **7.**
3	**CHECK ATF TEMPERATURE SENSOR.** Measure the resistance between transmission connector terminals. ***Connector & terminal*** ***(T4) No. 6 — (T4) No. 12:***	Does the resistance value increase while the ATF temperature decreases?	Go to step **4.**	Go to step **7.**
4	**PREPARE SUBARU SELECT MONITOR.**	Do you have a Subaru Select Monitor?	Go to step **6.**	Go to step **5.**
5	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect the connector to transmission. 2) Warm-up the transmission until the ATF temperature is approx. 80°C (176°F). NOTE: If the ambient temperature is below 0°C (32°F), drive the vehicle until the ATF reaches its operating temperature. 3) Measure the voltage between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 11 (+) — (B54) No. 13 (−):***	Is the voltage 0.4 — 0.9 V?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **8.**

	Step	Check	Yes	No
6	**CHECK INPUT SIGNAL FOR TCM USING SUBARU SELECT MONITOR.** 1) Connect the connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the ATF temperature using Subaru Select Monitor.	Does the ATF temperature gradually decrease?	Even if the SPORT indicator lights blinks, the system is in normal condition. A temporary poor contact of connector or harness may be the cause. Repair harness or contact in the ATF temperature sensor and transmission connector.	Go to step **8.**
7	**CHECK HARNESS CONNECTOR BETWEEN TRANSMISSION AND CONTROL VALVE BODY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from transmission. 3) Remove the transmission connector from bracket. 4) Lift-up the vehicle and place it on rigid racks. NOTE: Raise all wheels off floor. 5) Drain the ATF. **CAUTION:** **Do not drain the ATF until it cools down.** 6) Remove the oil pan, and disconnect the connector from control valve body connector. 7) Measure the resistance between transmission ground and control valve body connector. ***Connector & terminal*** ***(T5) No. 1 — Chassis ground:*** ***(T6) No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the control valve body. <Ref. to 5AT-58, Control Valve Body.>	Repair the short circuit in harness between control valve body connector and transmission connector.
8	**CHECK POOR CONTACT.** Check poor contact of ATF temperature sensor 1 circuit.	Is there poor contact?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

AM:DTC P1718 AT CAN COMMUNICATION CIRCUIT

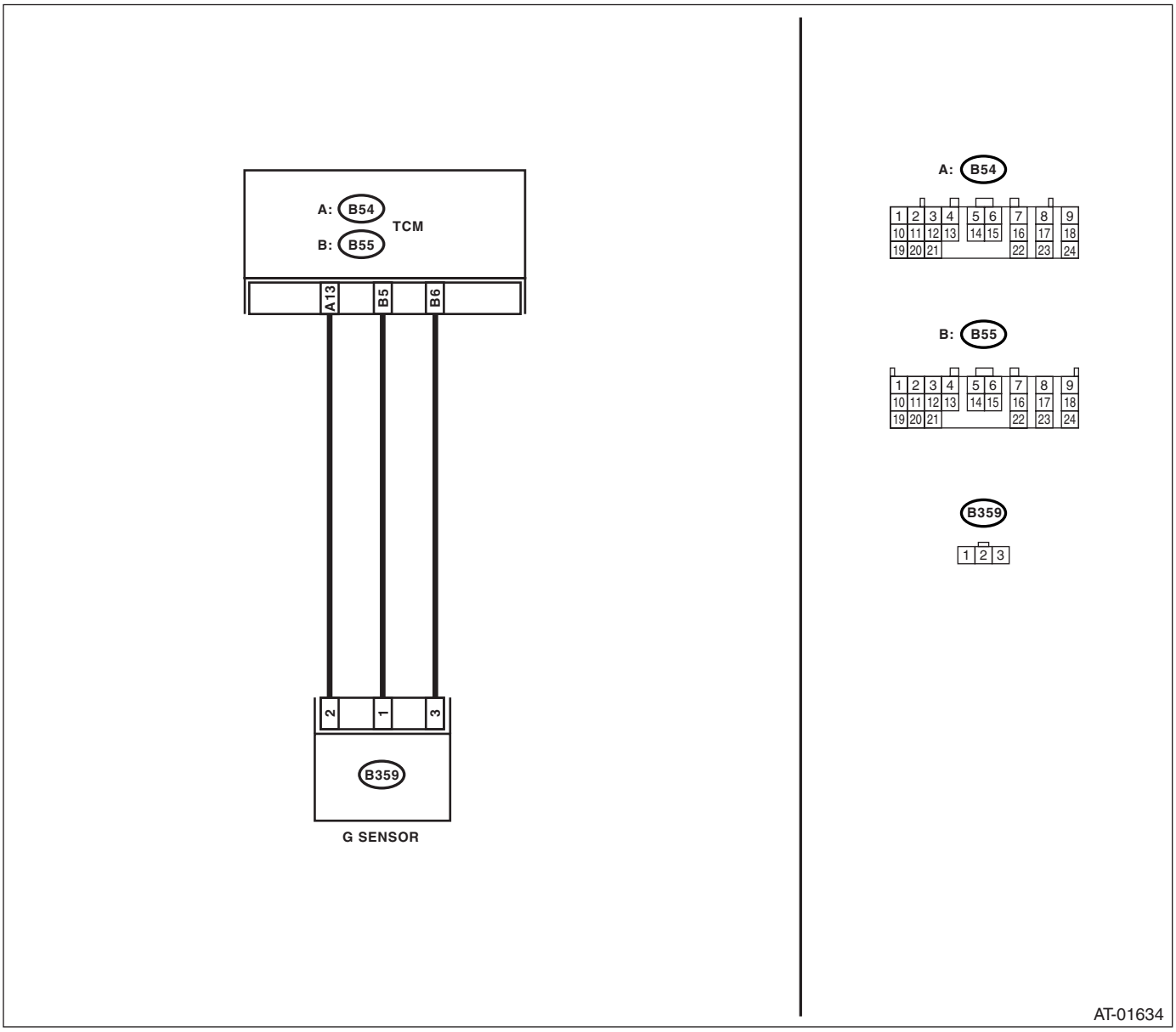
NOTE:
For DTC P1718 AT CAN Communication circuit, Refer to “LAN System”. <Ref. to LAN(diag)-14, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

AN:DTC P1760 LATERAL ACCELERATION SENSOR PERFORMANCE PROBLEM

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the value on the monitor display 2.3 — 2.7 V when the vehicle is on a level?	Go to step **2.**	Go to step **7.**
2	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Select {Current Data Display & Save} in Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the value on the monitor display 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **3.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
3	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the value on the monitor display 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **4.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
4	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
7	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 13 — (B55) No. 6:***	Is the resistance 5.0 — 6.0 kΩ?	Go to step **8.**	Repair the harness connector between lateral G sensor and TCM.
8	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 2.3 — 2.7 V when the lateral G sensor is horizontal?	Go to step **9.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
10	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **11.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>

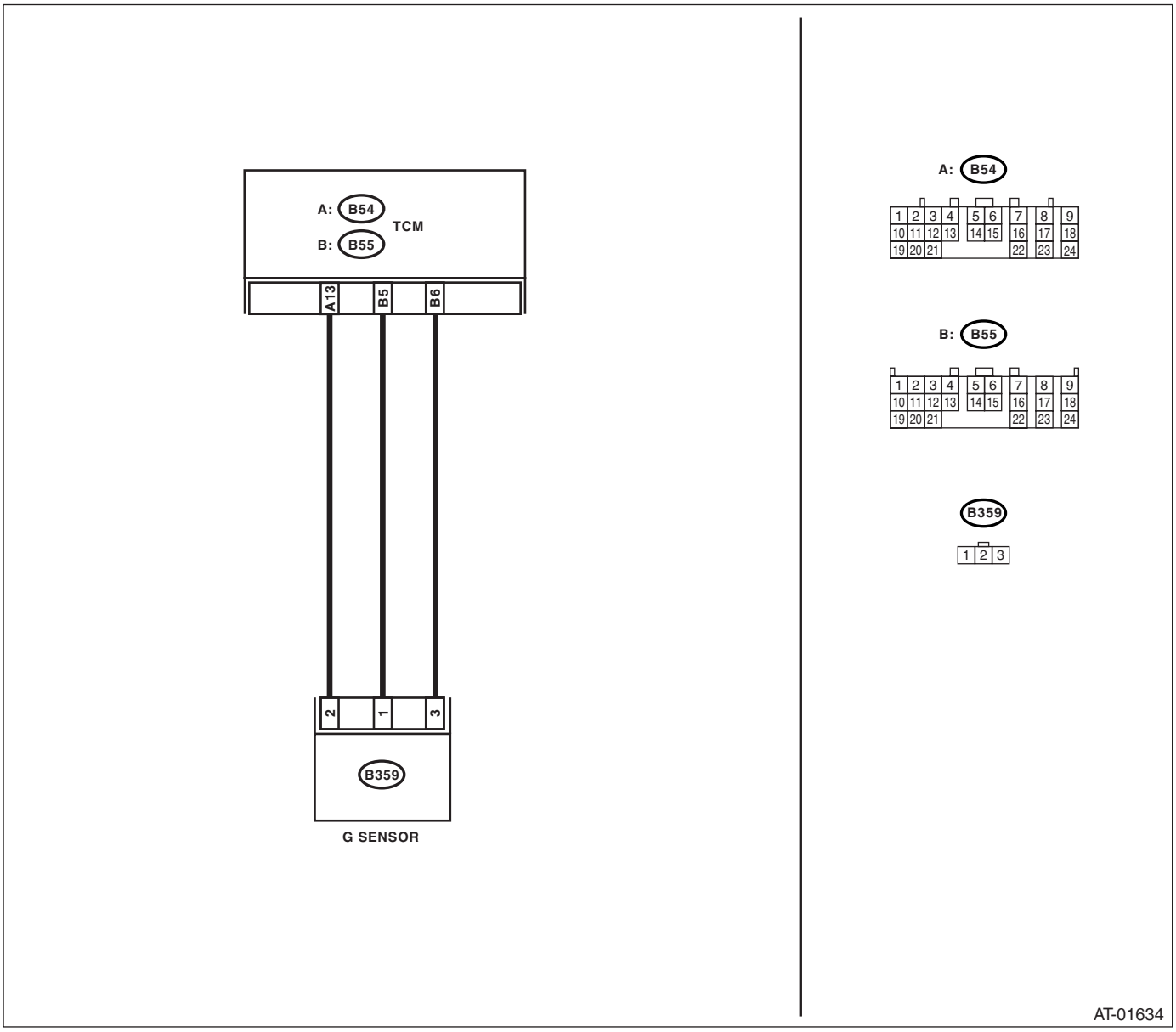
	Step	Check	Yes	No
11	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **12.**
12	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AO:DTC P1761 LATERAL ACCELERATION SENSOR CIRCUIT LOW

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the lateral G sensor output on the Subaru Select Monitor display.	Is the value on the monitor display 2.3 — 2.7 V when the lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **6.**
2	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **3.**

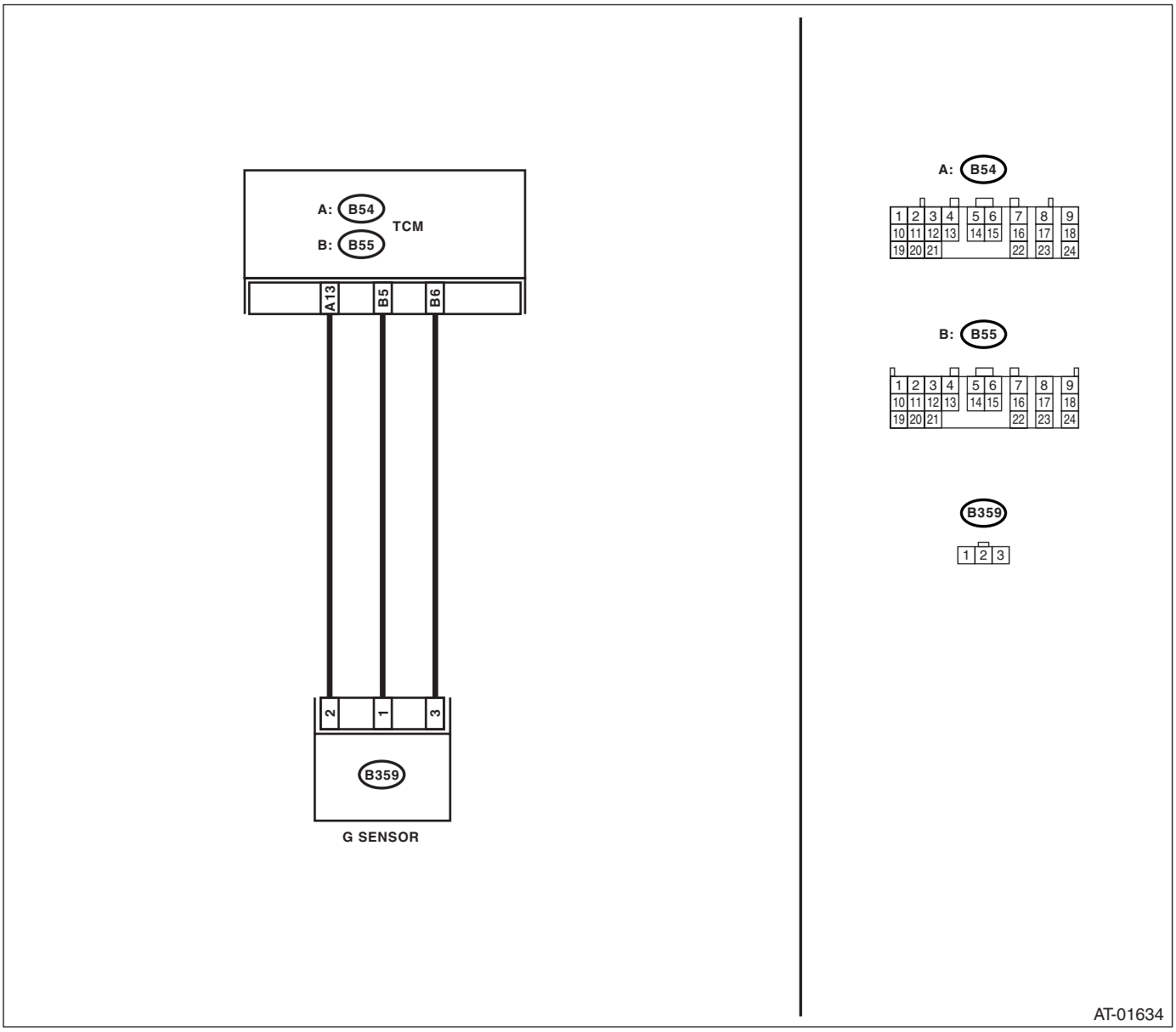
	Step	Check	Yes	No
3	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
5	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B54) No. 13 — (B55) No. 6:***	Is the resistance 5.0 — 6.0 kΩ?	Go to step **6.**	Repair the harness connector between lateral G sensor and TCM.
6	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between TCM connector and chassis ground. ***Connector & terminal*** ***(B54) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness between lateral G sensor and TCM. Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
7	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the lateral G sensor from vehicle. 3) Connect the connector to lateral G sensor. 4) Connect the connector to the TCM. 5) Turn the ignition switch to ON. 6) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 2.3 — 2.7 V when the lateral G sensor is horizontal?	Go to step **8.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
8	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 3.3 — 4.3 V when lateral G sensor is inclined to the right to 90°?	Go to step **9.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
9	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (−):***	Is the voltage 0.7 — 1.7 V when lateral G sensor is inclined to the left to 90°?	Go to step **10.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
10	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AP:DTC P1762 LATERAL ACCELERATION SENSOR CIRCUIT HIGH

DTC DETECTING CONDITION:

Faulty lateral G sensor output voltage

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK OUTPUT OF LATERAL G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the lateral G sensor output on the Subaru Select Monitor display.	Is the value on the monitor display 2.3 — 2.7 V when the lateral G sensor is in horizontal position?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
5	**CHECK CONDITIONAL INFORMATION WHEN FAULTY.** Read the lateral G sensor output on the Subaru Select Monitor display.	Is the reading indicated on monitor display 4.65 V or more?	Go to step **6.**	Go to step **12.**
6	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 5 — No. 1:***	Is the resistance 4.3 — 4.9 kΩ?	Go to step **7.**	Repair the harness connector between lateral G sensor and ABSCM&H/U.
7	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Disconnect the connector from lateral G sensor. 4) Disconnect the connector from TCM. 5) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness between lateral G sensor and TCM.
8	**CHECK BATTERY SHORT OF HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM connector and chassis ground. ***Connector & terminal*** ***(B55) No. 6 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **9.**	Repair the harness between lateral G sensor and TCM.
9	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **10.**
10	**CHECK TCM.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

	Step	Check	Yes	No
12	**CHECK INPUT VOLTAGE OF LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the lateral G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 1 (+) — No. 2 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **13.**	Repair the harness connector between lateral G sensor and TCM.
13	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from TCM. 3) Measure the resistance between TCM connector terminals. ***Connector & terminal*** ***(B55) No. 5 — No. 6:***	Is the resistance 5.0 — 5.6 kΩ?	Go to step **14.**	Repair the harness connector between lateral G sensor and TCM.
14	**CHECK LATERAL G SENSOR.** 1) Connect the connector to lateral G sensor. 2) Connect the connector to the TCM. 3) Turn the ignition switch to ON. 4) Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 2.1 — 2.5 V when the lateral G sensor is horizontal?	Go to step **15.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
15	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 3.3 — 3.7 V when lateral G sensor is inclined to the right to 90°?	Go to step **16.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
16	**CHECK LATERAL G SENSOR.** Measure the voltage between lateral G sensor connector terminals. ***Connector & terminal*** ***(B359) No. 3 (+) — No. 2 (–):***	Is the voltage 0.5 — 0.9 V when lateral G sensor is inclined to the left to 90°?	Go to step **17.**	Replace the lateral G sensor. <Ref. to 5AT-63, Lateral G Sensor.>
17	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between TCM and the lateral G sensor?	Repair the connector.	Go to step **18.**
18	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **19.**
19	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AQ:DTC P1798 GEAR 1 ENGINE BRAKE

NOTE:
Refer to DTC P0773 for diagnostic procedure. <Ref. to 5AT(diag)-94, DTC P0773 SHIFT SOLENOID “E” ELECTRICAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AR:DTC P1799 INTERLOCK

DTC DETECTING CONDITION:

Perform the interlock judgment when the oil pressure switch pattern detect the specified interlock patterns for more than 2 seconds other than shifting.

TROUBLE SYMPTOM:

Locked to 2nd, 4th or 5th gear.

	Step	Check	Yes	No
1	**CHECK DTC OF TCM.**	Is DTC of oil pressure switch detected?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK DTC OF TCM.**	Is the DTC related to solenoid function or solenoid circuit detected?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK POOR CONTACT.**	Is there any open or poor contact of connector (loosing terminal, entering foreign matter, damaging connector body)?	Repair the poor contact.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>

AS:DTC P1817 SPORTS MODE SWITCH CIRCUIT (MANUAL SWITCH)

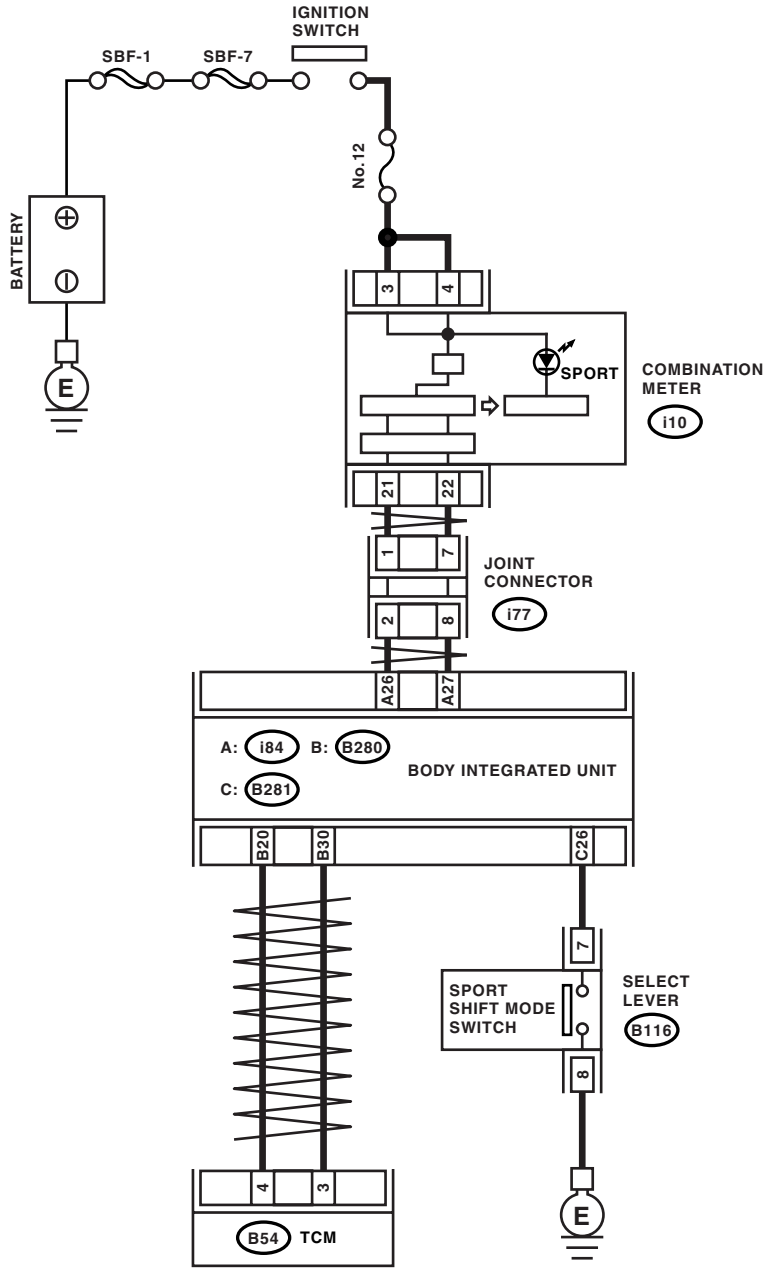
DTC DETECTING CONDITION:

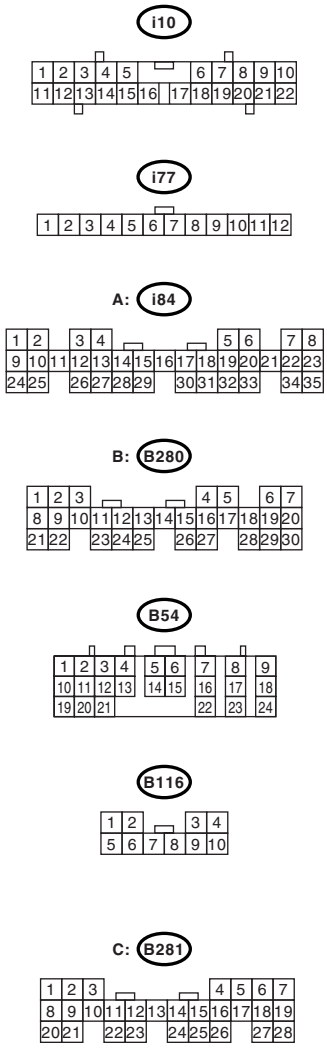
Input signal circuit of SPORT shift switch is open or shorted.

TROUBLE SYMPTOM:

- Can not set to manual mode.
- "SPORT" light illuminates when shifting to "N" → "D" range.

WIRING DIAGRAM:





AT-01539

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. (engine OFF) 3) Read the DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to "P" range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **3.**	Go to step **7.**
3	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever from "P" to "D" range. 2) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Go to step **4.**	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>
4	**CHECK BODY INTEGRATED UNIT INPUT SIGNAL.** 1) Shift the select lever to manual mode. 2) Shift the select lever to other than "D" range. 3) Read the TIP mode SW data of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is OFF displayed?	Go to step **5.**	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>
5	**CHECK DTC OF TCM.**	Is DTC of Transmission Range Sensor Circuit (PRNDL Input) and AT CAN communication circuit displayed?	Perform the diagnosis according to each DTC.	Go to step **6.**
6	**CHECK TCM INPUT SIGNAL.** 1) Shift the select lever from "P" to "D" range. 2) Read the TIP mode SW data of TCM using Subaru Select Monitor. <Ref. to 5AT(diag)-16, OPERATION, Subaru Select Monitor.>	Is the indication on each range OFF?	Even if the SPORT indicator lights blinks, the circuit is in normal condition. A temporary poor contact of connector or harness may be the cause.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
7	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect harness connector from body integrated unit and select lever. 3) Measure the harness resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B281) No. 26 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the short circuit of harness between the body integrated unit and SPORT shift switch.
8	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to "P" range. 2) Measure the resistance between harness connector terminals of SPORT shift switch. ***Terminals*** ***(B116) No. 7 — No. 8:***	Is the resistance more than 1 MΩ?	Check the body integrated unit.	Replace the select lever assembly. <Ref. to CS-7, Select Lever.>

AT:DTC P1840 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH A CIRCUIT

DTC DETECTING CONDITION:
Front brake oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0751 for diagnostic procedure. <Ref. to 5AT(diag)-65, DTC P0751 SHIFT SOLENOID “A” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AU:DTC P1841 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH B CIRCUIT

DTC DETECTING CONDITION:
Low coast brake oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock

NOTE:
Refer to DTC P0771 for diagnostic procedure. <Ref. to 5AT(diag)-91, DTC P0771 SHIFT SOLENOID “E” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AV:DTC P1842 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH C CIRCUIT

DTC DETECTING CONDITION:
Input clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock.

NOTE:
Refer to DTC P0756 for diagnostic procedure. <Ref. to 5AT(diag)-72, DTC P0756 SHIFT SOLENOID “B” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AW:DTC P1843 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH D CIRCUIT

DTC DETECTING CONDITION:
Direct clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock.

NOTE:
Refer to DTC P0766 for diagnostic procedure. <Ref. to 5AT(diag)-85, DTC P0766 SHIFT SOLENOID “D” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AX:DTC P1844 TRANSMISSION FLUID PRESSURE SENSOR/SWITCH E CIRCUIT

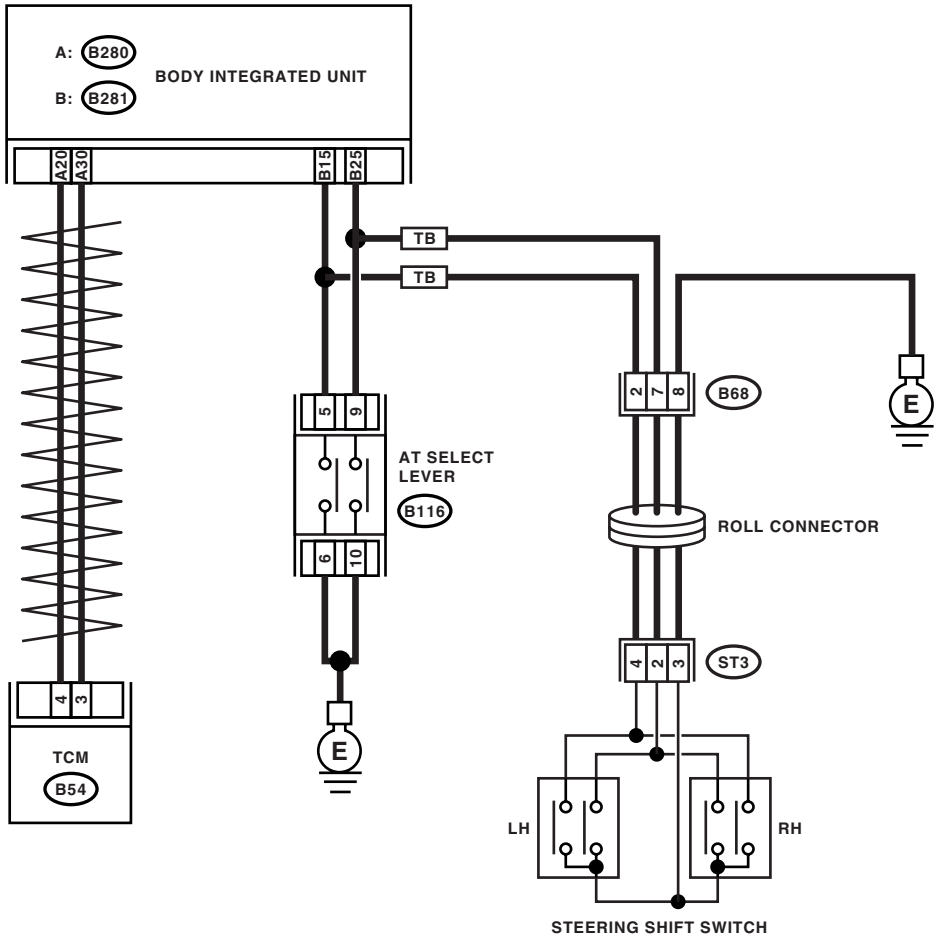
DTC DETECTING CONDITION:
High & low reverse clutch oil pressure switch malfunction.
TROUBLE SYMPTOM:
Excessive shift shock.

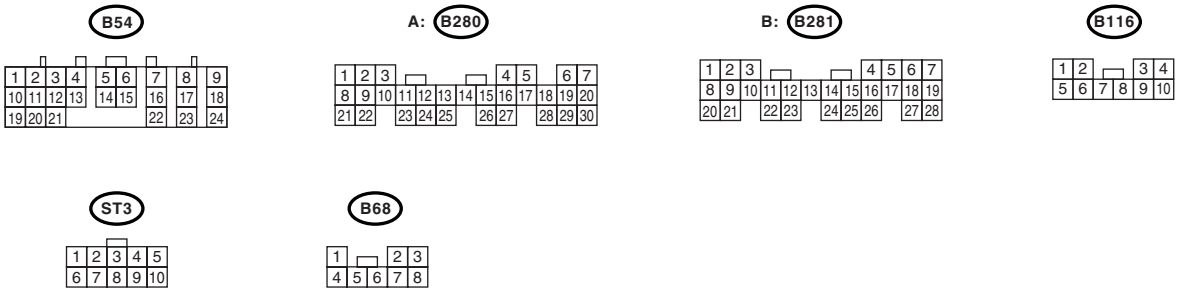
NOTE:
Refer to DTC P0761 for diagnostic procedure. <Ref. to 5AT(diag)-78, DTC P0761 SHIFT SOLENOID “C” PERFORMANCE OR STUCK OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

15.Diagnostic Procedure without Diagnostic Trouble Code (DTC)

A: CHECK SPORT SHIFT SWITCH

DIAGNOSIS:
Input signal circuit of SPORT shift switch is open or shorted.
TROUBLE SYMPTOM:
Does not shift on manual mode.
WIRING DIAGRAM:





AT-01545

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** 1) Perform the ON/OFF operation on SPORT shift switch. 2) Read the data of SPORT shift switch signal using Subaru Select Monitor.	Both ON/OFF can be detected normally?	Go to step **2.**	Go to step **7.**
2	**CHECK DTC OF BODY INTEGRATED UNIT.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK TCM.** 1) Perform the ON/OFF operation on SPORT shift switch. 2) Read the data of SPORT shift switch signal using Subaru Select Monitor.	Both ON/OFF can be detected normally?	Go to step **4.**	Go to step **5.**
4	**CHECK TIP INDICATOR ON COMBINATION METER.**	Is the TIP indicator OK?	Go to step **6.**	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
5	**CHECK DTC OF TCM.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
6	**CHECK DTC OF METER.**	Is DTC of CAN detected?	Perform the diagnosis according to DTC.	Replace the meter.
7	**CHECK SPORT SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 6 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **8.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
8	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between the SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 5:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Replace the guide plate assembly.
9	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between the SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 6 — No. 5:***	Is the resistance less than 1 Ω?	Go to step **10.**	Replace the guide plate assembly.
10	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between the body integrated unit and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 5 — (B281) No. 15:***	Is the resistance less than 1 Ω?	Go to step **11.**	Repair the open circuit in harness between SPORT shift switch connector and TCM connector, or poor contact in coupling connector.

	Step	Check	Yes	No
11	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Repair the short circuit in harness between SPORT shift switch connector and TCM connector.
12	**CHECK INPUT SIGNAL FOR TCM.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage more than 9 V?	Go to step **13.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
13	**CHECK INPUT SIGNAL FOR TCM.** 1) Shift and hold the select lever to up side. 2) Measure the signal voltage for TCM. ***Connector & terminal*** ***(B281) No. 15 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Go to step **26.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
14	**CHECK SPORT SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from SPORT shift switch. 3) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 10 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **15.**	Repair the open circuit in harness between SPORT shift switch and chassis ground.
15	**CHECK SPORT SHIFT SWITCH.** Measure the resistance between the SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 9:***	Is the resistance more than 1 MΩ?	Go to step **16.**	Replace the guide plate assembly.
16	**CHECK SPORT SHIFT SWITCH.** 1) Shift the select lever to manual mode. 2) Measure the resistance between the SPORT shift switch terminals. ***Connector & terminal*** ***(B116) No. 10 — No. 9:***	Is the resistance less than 1 Ω?	Go to step **17.**	Replace the guide plate assembly.
17	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between the body integrated unit and SPORT shift switch connector. ***Connector & terminal*** ***(B116) No. 9 — (B281) No. 25:***	Is the resistance less than 1 Ω?	Go to step **18.**	Repair the open circuit in harness between SPORT shift switch connector and body integrated unit connector, or poor contact in coupling connector.

	Step	Check	Yes	No
18	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND SPORT SHIFT SWITCH.** 1) Disconnect the steering roll connector. 2) Measure the resistance of harness between SPORT shift switch connector and chassis ground. ***Connector & terminal*** ***(B116) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **19.**	Repair the short circuit of harness between the SPORT shift switch connector and body integrated unit connector.
19	**CHECK THE INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Connect all the connectors. 2) Turn the ignition switch to ON (engine OFF). 3) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (−):***	Is the voltage more than 9 V?	Go to step **20.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
20	**CHECK THE INPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Shift and hold the select lever to up side. 2) Check the signal voltage for body integrated unit. ***Connector & terminal*** ***(B281) No. 25 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **26.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
21	**CHECK STEERING SHIFT SWITCH GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering roll connector. 3) Measure the resistance of harness between steering roll connector and chassis ground. ***Connector & terminal*** ***(ST3) No. 3 — Chassis ground:***	Is the resistance less than 1 Ω?	Go to step **22.**	Repair the open circuit in harness between steering roll connector and chassis ground.
22	**CHECK STEERING SHIFT SWITCH.** Measure the resistance between steering roll connector terminals. ***Connector & terminal*** ***(ST3) No. 1 — No. 3:***	Is the resistance more than 1 MΩ?	Go to step **23.**	Replace the steering roll connector or steering shift switch. Or repair the poor contact in connector.
23	**CHECK STEERING SHIFT SWITCH.** 1) Press and hold the steering shift switch to + side. 2) Measure the resistance between the steering shift switch terminals. ***Connector & terminal*** ***(ST3) No. 1 — No. 3:***	Is the resistance less than 1 Ω?	Go to step **24.**	Replace the steering roll connector or steering shift switch. Or repair the poor contact in connector.
24	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STEERING ROLL CONNECTOR.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between the body integrated unit connector and steering roll connector. ***Connector & terminal*** ***(B281) No. 15 — (B68) No. 2:***	Is the resistance less than 1 Ω?	Go to step **25.**	Repair the open circuit in harness between body integrated unit connector and steering roll connector, or poor contact in connector.

	Step	Check	Yes	No
25	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND STEERING ROLL CONNECTOR.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance of harness between the body integrated unit connector and steering roll connector. ***Connector & terminal*** ***(B281) No. 25 — (B68) No. 6:***	Is the resistance less than 1 Ω?	Go to step **26.**	Repair the open circuit in harness between body integrated unit connector and steering roll connector, or poor contact in connector.
26	**CHECK POOR CONTACT.**	Is there poor contact in SPORT shift switch circuit?	Repair the poor contact.	A temporary poor contact of SPORT shift switch connector or harness

B: CHECK SPORT SHIFT INDICATOR LIGHT

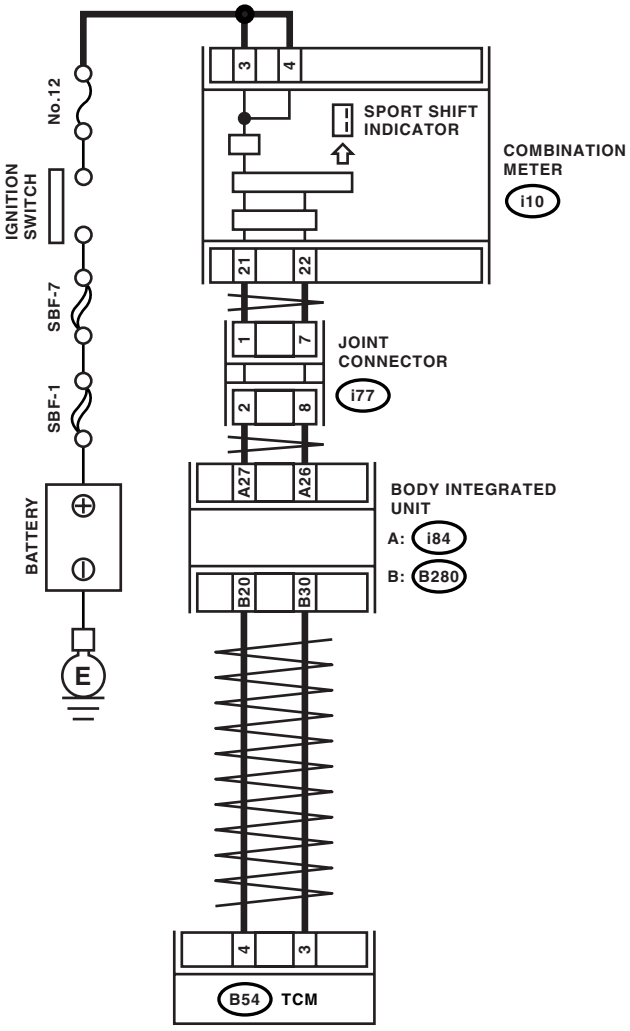
DIAGNOSIS:

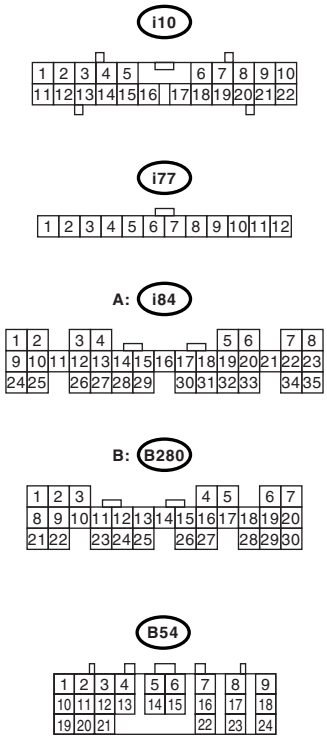
Output signal circuit of SPORT shift indicator light is open or shorted.

TROUBLE SYMPTOM:

- SPORT shift indicator light does not illuminate or remains illuminated.
- SPORT shift indicator light display does not change.

WIRING DIAGRAM:



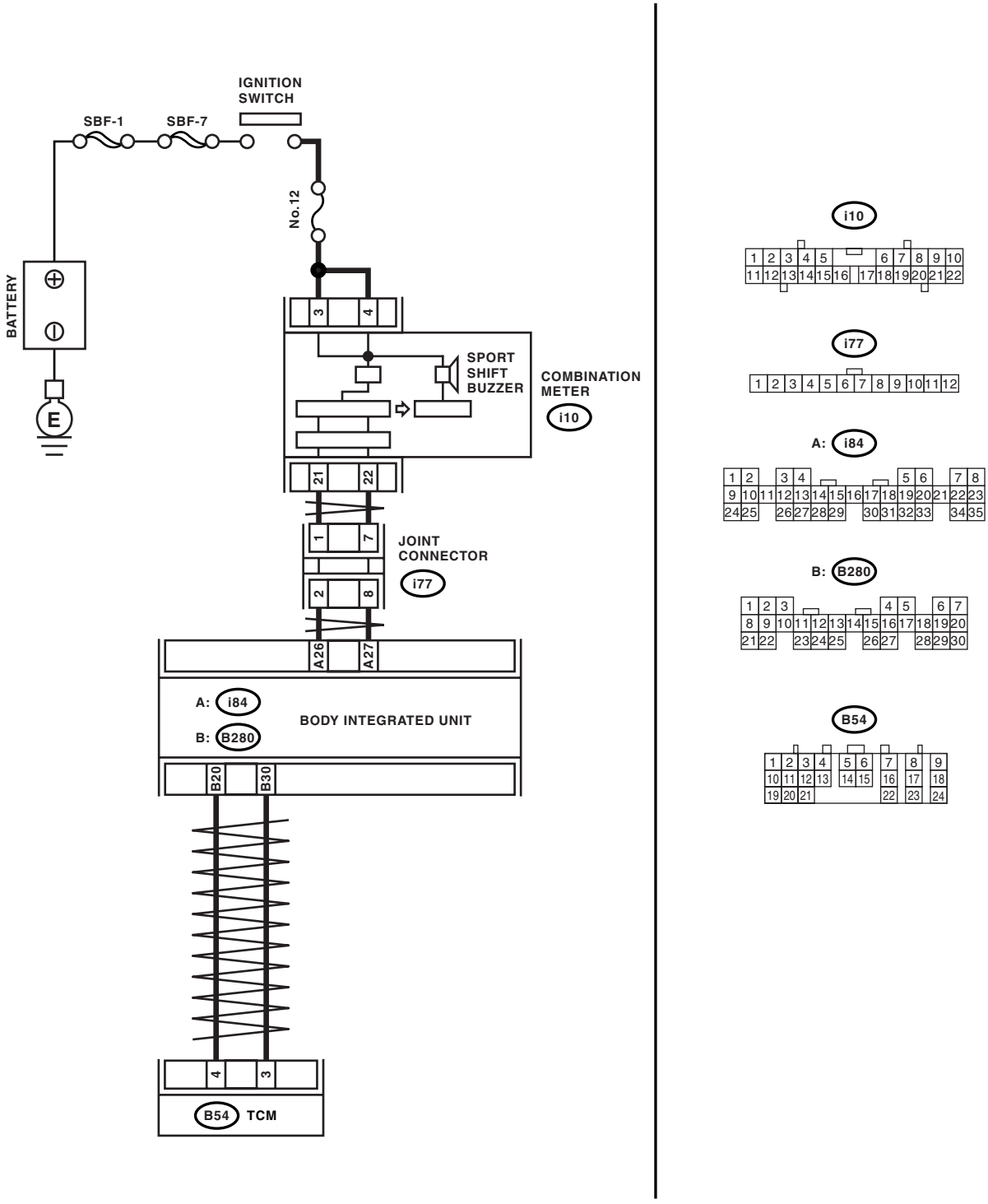


AT-01626

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK TCM.** Check DTC of TCM.	Is DTC of AT CAN communication circuit displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK TCM.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Shift the select lever to manual mode side, and then shift down the select lever. 6) Read the indicator.	Is gear position 1 and "▲" displayed?	Go to step **4.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
4	**CHECK TCM.** 1) Shift up the select lever. 2) Read the indicator.	Is gear position 2 and "▼" displayed?	Go to step **5.**	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>
5	**CHECK BODY INTEGRATED UNIT.** Read the data of gear position using Subaru Select Monitor.	Is SPORT shift gear position 2?	Refer to "General Diagnostic Table". <Ref. to 5AT(diag)-147, General Diagnostic Table.>	Check the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
6	**CHECK COMBINATION METER.**	Is the SPORT shift indicator OK?	Refer to "General Diagnostic Table". <Ref. to 5AT(diag)-147, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>

C: CHECK BUZZER

DIAGNOSIS:
Output signal circuit of buzzer is open or shorted.
TROUBLE SYMPTOM:
Buzzer remains beeping.
WIRING DIAGRAM:



AT-01627

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT.** Check DTC of body integrated unit.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK TCM.** Check DTC of TCM.	Is DTC of CAN communication displayed?	Perform the diagnosis according to DTC.	Go to step **5.**
3	**CHECK BUZZER STOP.** Disconnect the connector (B54).	Does the buzzer stop?	Replace the TCM. <Ref. to 5AT-61, Transmission Control Module (TCM).>	Go to step **4.**
4	**CHECK BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON. (engine OFF) 4) Turn the Subaru Select Monitor switch to ON. 5) Read the data of SPORT shift buzzer using Subaru Select Monitor.	Is the SPORT shift buzzer display “ON”?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>
5	**CHECK COMBINATION METER.**	Is the buzzer OK?	Refer to “General Diagnostic Table”. <Ref. to 5AT(diag)-147, General Diagnostic Table.>	Replace the combination meter assembly. <Ref. to IDI-16, Combination Meter Assembly.>

16.General Diagnostic Table

A: INSPECTION

Symptom	Problem parts
Shifting vehicle speed is low on “D” range.	• Vehicle speed sensor 1 and Vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • ATF temperature sensor • CAN communication signal
Shifting vehicle speed is high on “D” range.	• Vehicle speed sensor 1 and Vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Brake switch signal • Lateral G sensor • ATF temperature sensor
Excessive shock. (“N” → “D” range)	• Engine idle speed • Engine speed signal • Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • ATF temperature sensor • Oil pressure switch 1 and Front brake solenoid valve • CAN communication signal • Fluid level and condition • TCM power supply • PVIGN relay
Excessive shift shock on 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 4 and Direct clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shift shock on 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 5 and High & low reverse clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shift shock on 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 3 and Input clutch solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition

General Diagnostic Table

Symptom	Problem parts
Excessive shift shock on 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Oil pressure switch 1 and Front brake solenoid valve • CAN communication signal • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shock at kick down.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shock at shift up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shock at lock up.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • Engine speed signal • CAN communication signal • Turbine speed sensor • Lock up solenoid valve • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Fluid level and condition
Excessive shock at engine brake.	• Accelerator pedal position sensor • Throttle position sensor • Control cable adjustment • CAN communication signal • Fluid level and condition • Line pressure • Low coast brake solenoid valve
Judder is occurred at lock up.	• Fluid level and condition • Engine speed signal • Turbine speed sensor • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Accelerator pedal position sensor • Throttle position sensor • Lock up solenoid valve • ATF temperature sensor 1 and 2
Noise at “R”, “N” and “D” range.	• Fluid level and condition • Engine speed signal • ATF temperature sensor 1 and 2
Hold at “D” range or 1st on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Direct clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptom	Problem parts
Hold at “D” range or 2nd on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Low coast brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 3rd on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Hold at “D” range or 4th on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 3 and Input clutch solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Oil pressure switch 5 and High & low reverse clutch solenoid valve • Low coast brake solenoid valve • Front brake solenoid valve • Line pressure • Up switch signal • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply • PVIGN relay
Hold at “D” range or 5th on manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 1 and Front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Up switch • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 5 and High & low reverse clutch solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 3 and Input clutch solenoid valve • Oil pressure switch 1 and Front brake solenoid valve • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor

Symptom	Problem parts
Gear does not shift 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 1 and Front brake solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Turbine speed sensor • ATF temperature sensor • Line pressure • Up switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 4th on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 1 and Front brake solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 3rd on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 3 and Input clutch solenoid valve • Oil pressure switch 1 and Front brake solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor • TCM power supply • PVIGN relay
Gear does not shift down to 2nd on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 5 and High & low reverse clutch solenoid • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
Gear does not shift down to 1st on “D” range or manual mode.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Down switch signal • CAN communication signal • Accelerator pedal position sensor
No lock-up occurs.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor • Lock up solenoid valve • CAN communication signal • ATF temperature sensor 1 and 2 • Accelerator pedal position sensor • Brake switch signal • Range signal
No shift shock occurred when shifting 1st of “D” range → 2nd of “D” range or “1st of manual mode” → “2nd of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • CAN communication signal

Symptom	Problem parts
No shift shock occurred when shifting 2nd of “D” range → 3rd of “D” range or “2nd of manual mode” → “3rd of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 5 and High & low reverse clutch solenoid valve • Line pressure • CAN communication signal
No shift shock occurred when shifting 3rd of “D” range → 4th of “D” range or “3rd of manual mode” → “4th of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 3 and Input clutch solenoid valve • Oil pressure switch 1 and Front brake solenoid valve • Line pressure • CAN communication signal
No shift shock occurred when shifting 4th of “D” range → 5th of “D” range or “4th of manual mode” → “5th of manual mode”. Or clutch slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 1 and Front brake solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 5th of “D” range → 4th of “D” range or “5th of manual mode” → “4th of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 1 and Front brake solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 4th of “D” range → 3rd of “D” range or “4th of manual mode” → “3rd of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 3 and Input clutch solenoid valve • Oil pressure switch 1 and Front brake solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 3rd of “D” range → 2nd of “D” range or “3rd of manual mode” → “2nd of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 5 and High & low reverse clutch solenoid valve • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine skids when shifting 2nd of “D” range → 1st of “D” range or “2nd of manual mode” → “1st of manual mode”. Or slipping occurred.	• Fluid level and condition • Vehicle speed sensor 1 and Vehicle speed sensor 2 • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure • Accelerator pedal position sensor • Throttle position sensor
Engine brake does not function at 5th → 4th of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 • Down switch signal
Engine brake does not function at 4th → 3rd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 1 and Oil pressure switch 3 • Down switch signal

Symptom	Problem parts
Engine brake does not function at 3rd → 2nd of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 5 • Low coast brake solenoid valve
Engine brake does not function at 2nd → 1st of manual mode.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Manual mode switch • Oil pressure switch 4 • Low coast brake solenoid valve
Excessive acceleration failure on “D” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Inhibitor switch • Control cable adjustment • Vehicle speed sensor 1, 2
Excessive acceleration failure on “R” range.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • Oil pressure switch 5 and High & low reverse clutch solenoid valve • CAN communication signal • Inhibitor switch • Control cable adjustment • Vehicle speed sensor 1, 2
Engine skids when start driving (1st) the vehicle. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal
Engine skids when driving at 2nd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 4 and Direct clutch solenoid valve
Engine skids when driving at 3rd. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 5 and High & low reverse clutch solenoid valve
Engine skids when driving at 4th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 3 and Input clutch solenoid valve

Symptom	Problem parts
5Engine skids when driving 5th. Or slipping occurred.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Oil pressure switch 1 and Front brake solenoid valve
Slip at lock up.	• Fluid level and condition • Line pressure • Engine speed signal • Turbine speed sensor • Lock up solenoid valve • CAN communication signal
Maximum vehicle speed is low.	• Fluid level and condition • Line pressure • Accelerator pedal position sensor • Throttle position sensor • CAN communication signal • Direct clutch solenoid valve • Vehicle speed sensor 1 and 2
There is completely no creep.	• Fluid level and condition • Engine speed signal • CAN communication signal • Oil pressure switch 4 and Direct clutch solenoid valve • Line pressure
Excessive large creep.	• Engine speed signal • CAN communication signal • Oil pressure switch 4
Vehicle cannot be parking condition on “P” range. Parking condition is not released though shifting to other ranges.	• Inhibitor switch • Control cable adjustment
Vehicle can drive on “P” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle can drive on “N” range.	• Inhibitor switch • Fluid level and condition • Control cable adjustment • Line pressure
Vehicle cannot drive at any range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “D” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.
Vehicle cannot drive on “R” range.	• Fluid level and condition • Line pressure • Inhibitor switch • Control cable adjustment • Loosing or damaging of propeller shaft. • Loosing or damaging of drive shaft.

General Diagnostic Table

Symptom	Problem parts
Engine cannot start on “P” or “N” range	• Key switch and Starter • Control cable adjustment • Inhibitor switch • CAN communication line • TCM
Engine start other than “P” or “N” range	• Key switch and Starter • Control cable adjustment • Inhibitor switch • TCM
Engine stalls.	• Fluid level and condition • Engine speed signal • Turbine speed sensor • Lock up solenoid valve • Line pressure
Engine stalls when shifting to “N” → “D” and “R” range.	• Fluid level and condition • Engine speed signal • Turbine speed sensor • Lock up solenoid valve • Line pressure

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

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1. General Description

A: SPECIFICATION

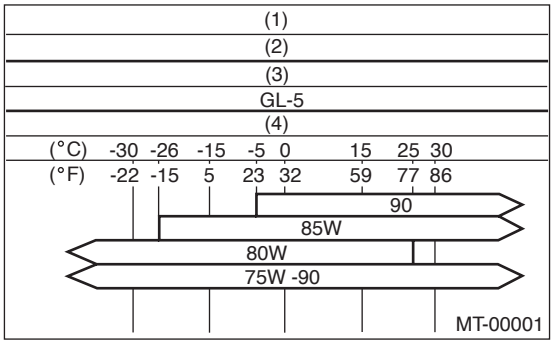
1. MANUAL TRANSMISSION AND DIFFERENTIAL

Option code★1			EC, K4, EK		KS	EC, K4, EK		KA	
Model			2.0 L			2.5 L			
			Except for OUTBACK	OUTBACK		Except for OUTBACK	OUTBACK	Except for OUTBACK	OUTBACK
Type			5-forward speeds and 1-reverse (5 × 2-forward speeds and 1 × 2-reverse)★2						
Transmission gear ratio		1st	3.454			3.454			
		2nd	1.947		2.062	2.062			
		3rd	1.366		1.448	1.448			
		4th	0.972		1.088	1.088			
		5th	0.738	0.78	0.825	0.825		0.78	0.825
		Reverse	3.333						
Auxiliary transmission gear ratio★2		High	1.000						
		Low	1.447			1.196			
Front reduction gear	Final	Type of gear	Hypoid						
		Gear ratio	4.111			3.700	3.900	4.111	
Rear reduction gear	Transfer	Type of gear	Helical						
		Gear ratio	1.000						
	Final	Type of gear	Hypoid						
		Gear ratio	4.111			3.700	3.900	4.111	
Front differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2)						
Center differential	Type and number of gear		Straight bevel gear (Bevel pinion: 2, Bevel gear: 2 and viscous coupling)						
Transmission gear oil			GL-5						
Transmission gear oil capacity		Single-range model	3.5 ℓ (3.7 US qt, 3.1 Imp qt)						
		Dual-range model	4.0 ℓ (4.2 US qt, 3.5 Imp qt)						

★1: For option code, refer to ID section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>
★2: Dual-range model only

2. TRANSMISSION GEAR OIL

Recommended oil:



(1) Item
(2) Transmission gear oil
(3) API classification
(4) SAE viscosity No. and applicable temperature

3. TRANSMISSION CASE ASSEMBLY

Drive pinion shim adjustment

Hypoid gear backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Drive pinion shim			
Part Number	Thickness mm (in)	Part Number	Thickness mm (in)
32295AA031	0.150 (0.0059)	32295AA071	0.250 (0.0098)
32295AA041	0.175 (0.0069)	32295AA081	0.275 (0.0108)
32295AA051	0.200 (0.0079)	32295AA091	0.300 (0.0118)
32295AA061	0.225 (0.0089)	32295AA101	0.500 (0.0197)

Selection of main shaft rear plate

Main shaft rear plate		
Dimension “A” mm (in)	Part Number	Marking
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2

Input shaft holder adjustment

Dimension “D” mm (in)	Shim Number
52.50 — 53.11 (2.0669 — 2.0909)	—
52.00 — 52.49 (2.0472 — 2.0665)	1
51.26 — 51.99 (2.0181 — 2.0468)	2

4. DRIVE PINION ASSEMBLY

Preload adjustment of thrust bearing

Starting torque:
0.3 — 0.8 N·m(0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)

Adjusting washer No. 1	
Part Number	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

Adjusting washer No. 2	
Part Number	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

5. INPUT SHAFT ASSEMBLY

Snap ring (Outer-28) to ball bearing clearance:
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Outer-28)	
Part Number	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

Snap ring (Inner-68) to ball bearing clearance:
0 — 0.12 mm (0 — 0.0047 in)

Snap ring (Inner-68)	
Part Number	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

6. MAIN SHAFT

Snap ring (Outer-25) to synchronizer hub clearance:
0.060 — 0.100 mm (0.0024 — 0.0039 in)

Snap ring (Outer-25)			
Part Number	Thickness mm (in)	Part Number	Thickness mm (in)
805025051	2.42 (0.0953)	805025055	2.62 (0.1031)
805025052	2.47 (0.0972)	805025056	2.67 (0.1051)
805025053	2.52 (0.0992)	805025057	2.72 (0.1071)
805025054	2.57 (0.1012)	805025058	2.37 (0.0933)

7. REVERSE IDLER GEAR

Adjustment of reverse idler gear position

Reverse idler gear to transmission case (LH) wall clearance:
6.0 — 7.5 mm (0.236 — 0.295 in)

Reverse shifter lever		
Part Number	Marking	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to the case wall

After installing a suitable reverse shifter lever, adjust the clearance using washer.

Reverse idler gear to transmission case wall clearance:
0 — 0.5 mm (0 — 0.020 in)

Washer (20.5 × 26 × t)			
Part Number	Thickness mm (in)	Part Number	Thickness mm (in)
803020151	0.4 (0.016)	803020154	1.9 (0.075)
803020152	1.1 (0.043)	803020155	2.3 (0.091)
803020153	1.5 (0.059)	—	—

8. SHIFTER FORK AND ROD

Select suitable shifter forks so that both the coupling sleeve and reverse driven gear are positioned in the center of their synchromesh mechanisms.

Rod end clearance:
A: 3rd-4th — 5th
0.5 — 1.3 mm (0.020 — 0.051 in)
B: 1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)

1st-2nd shifter fork		
Part Number	Marking	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	No mark	Standard
32804AA080	3	Approach to 2nd gear by 0.2 mm (0.008 in)

3rd-4th shifter fork		
Part Number	Marking	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	No mark	Standard
32810AA101	3	Approach to 3rd gear by 0.2 mm (0.008 in)

5th shifter fork		
Part Number	Marking	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

9. TRANSFER CASE OR REAR CASE

Neutral position adjustment

Adjusting shim	
Part Number	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

Reverse check plate adjustment

Reverse check plate			
Part Number	Marking	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
33189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

10.EXTENSION ASSEMBLY

Thrust washer (50 × 61 × t) to taper roller bearing table outer race side preload:
0.2 — 0.3 mm (0.0008 — 0.012 in)

NOTE:
Be sure that it is within the standard preload.

Thrust washer (50 × 61 × t)	
Part Number	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

Thrust washer to center differential side clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part Number	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

11.FRONT DIFFERENTIAL

Bevel gear to pinion backlash:
0.13 — 0.18 mm (0.0051 — 0.0071 in)

Washer (38.1 × 50 × t)			
Part Number	Thickness mm (in)	Part Number	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)	803038023	1.025 — 1.050 (0.0404 — 0.0413)
803038022	0.975 — 1.000 (0.0384 — 0.0394)	—	—

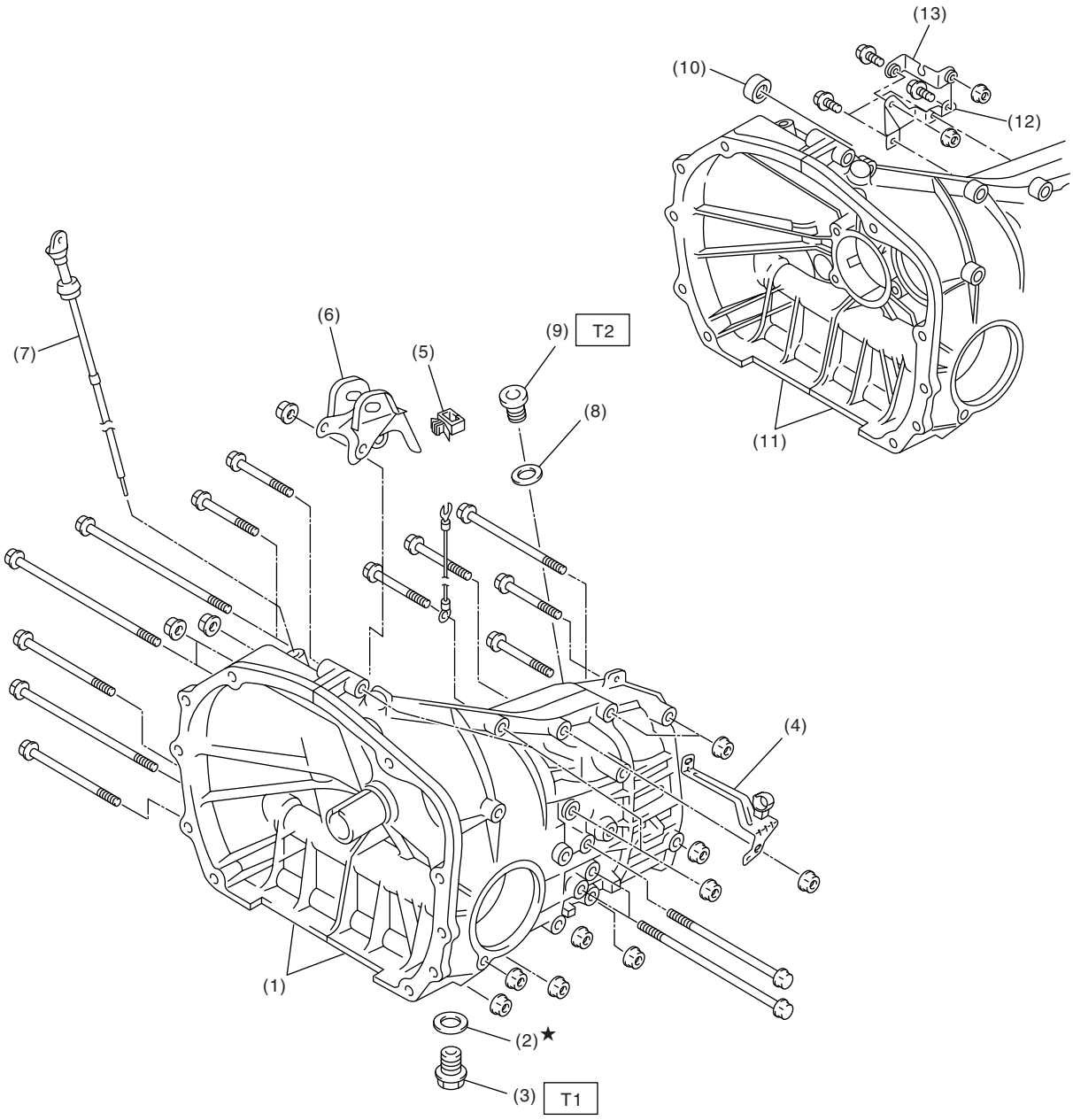
12.TRANSFER DRIVE GEAR

Snap ring (Outer-30) to ball bearing clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)

Snap ring (Outer-30)	
Part Number	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

B: COMPONENT

1. TRANSMISSION CASE

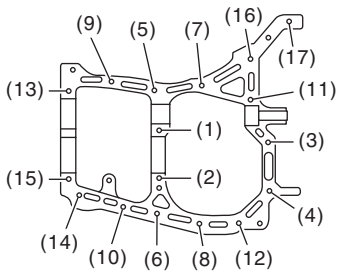


MT-01008

(1) Transmission case ASSY (Single-range)
(2) Gasket
(3) Drain plug
(4) Harness bracket
(5) Clamp
(6) Pitching stopper bracket
(7) Oil level gauge
(8) Gasket
(9) Plug
(10) Oil seal (Dual-range)
(11) Transmission case ASSY (Dual-range)
(12) High-low cable bracket A (Dual-range)
(13) High-low cable bracket B (Dual-range)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 70 (7.1, 51)
T2: 60 (6.1, 43.7)

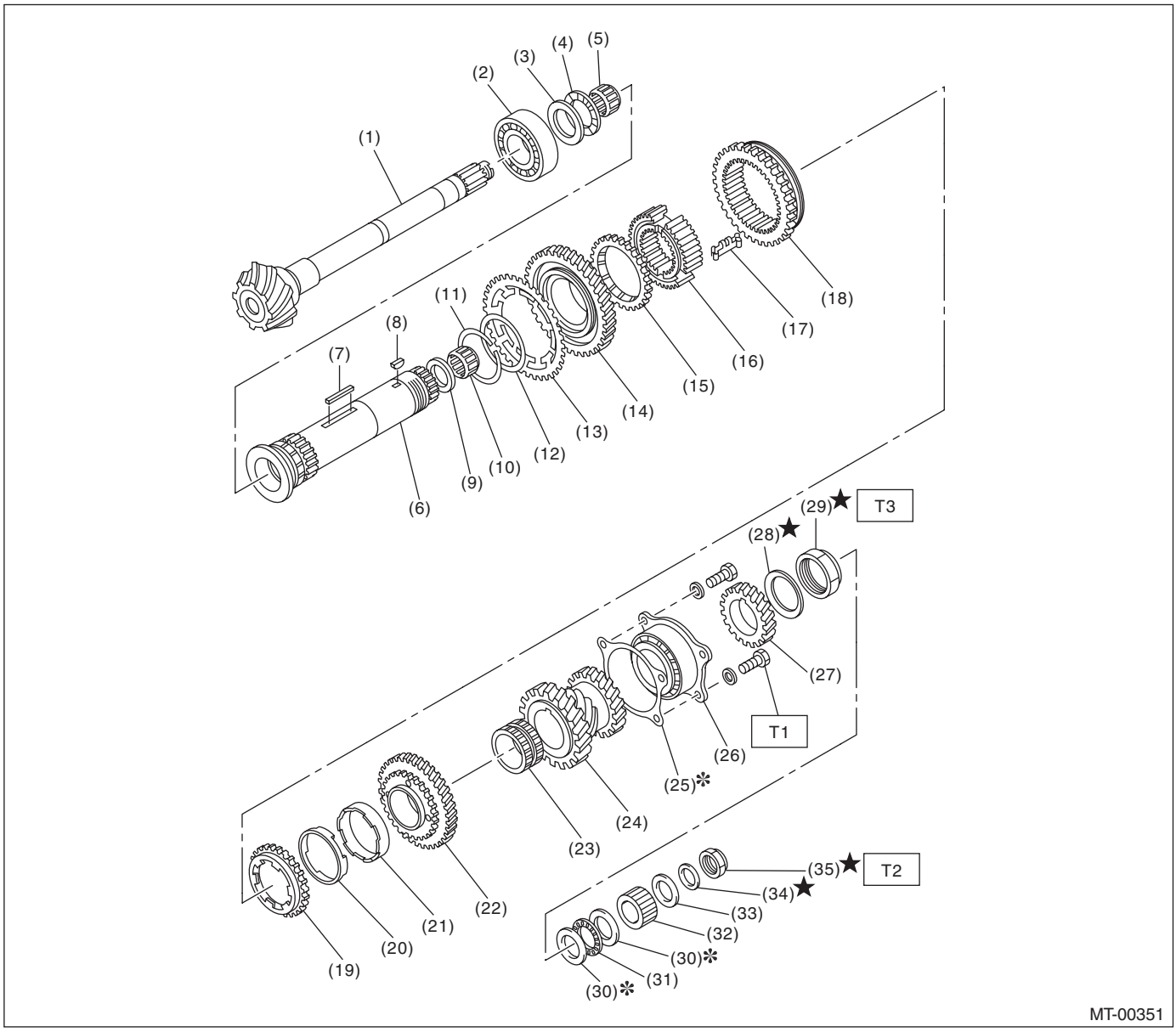
- Transmission case tightening torque



MT-00003

Bolt No.	Bolt size mm	Tightening torque: N·m (kgf-m, ft-lb)
(5) — (15)	8	25 (2.5, 18.4)
(1) — (4) (16) — (17)	10	39 (4.0, 28.9)

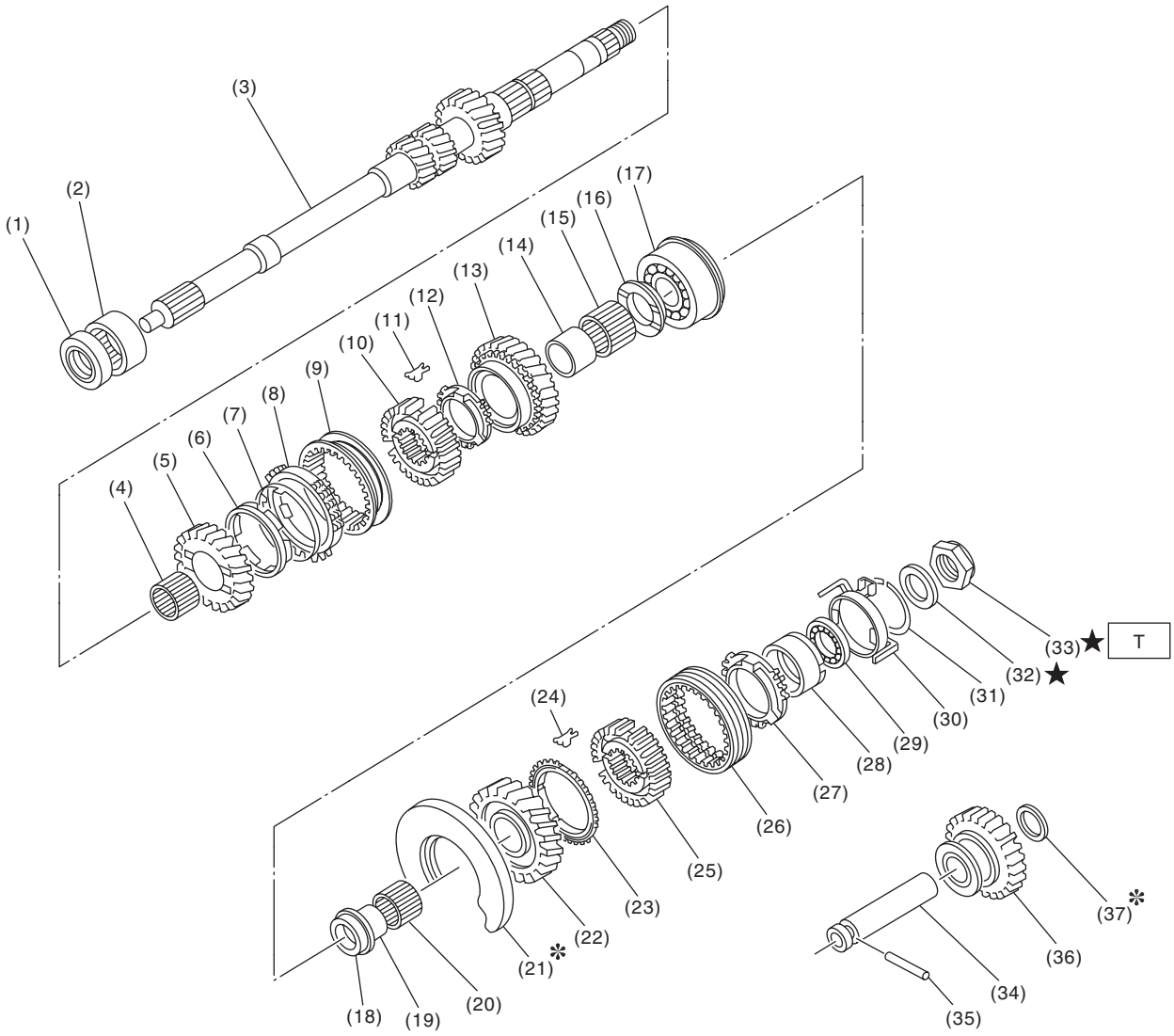
2. DRIVE PINION ASSEMBLY



(1) Drive pinion shaft
(2) Roller bearing
(3) Washer
(4) Thrust bearing
(5) Needle bearing
(6) Driven shaft
(7) Key
(8) Woodruff key
(9) Drive pinion collar
(10) Needle bearing
(11) Snap ring (KS and K4 model)
(12) Washer (KS and K4 model)
(13) Sub gear (KS and K4 model)
(14) 1st driven gear
(15) Baulk ring
(16) 1st-2nd synchronizer hub
(17) Insert key
(18) Reverse driven gear
(19) Outer baulk ring
(20) Synchro cone
(21) Inner baulk ring
(22) 2nd driven gear
(23) 2nd driven gear bushing
(24) 3rd-4th driven gear
(25) Driven pinion shim
(26) Roller bearing
(27) 5th driven gear
(28) Lock washer
(29) Lock nut
(30) Washer
(31) Thrust bearing
(32) Differential bevel gear sleeve
(33) Washer
(34) Lock washer
(35) Lock nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.4)
T2: 120 (12.2, 88.2)
T3: 260 (26.5, 191.7)

3. MAIN SHAFT ASSEMBLY FOR SINGLE-RANGE

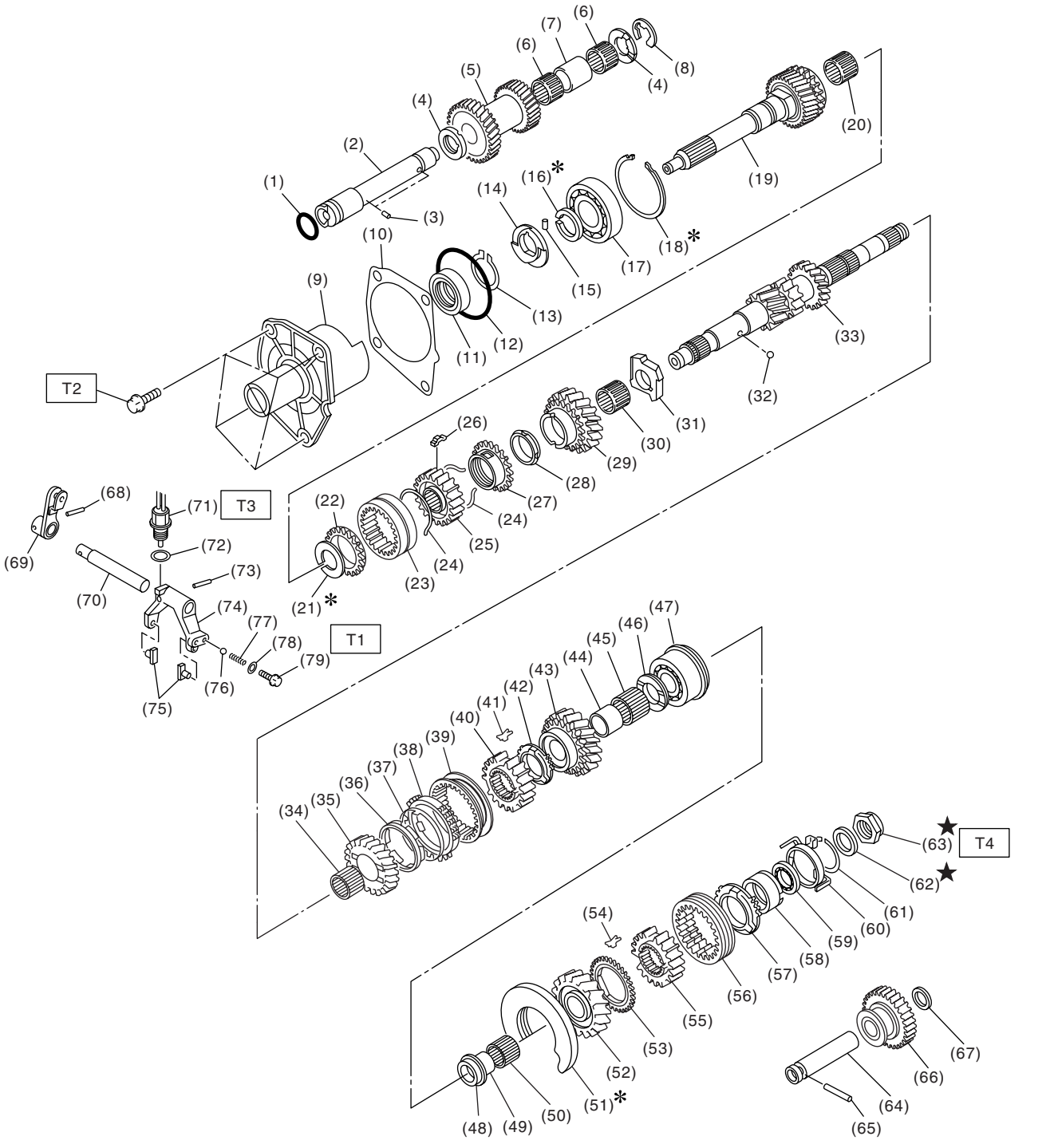


MT-01018

(1) Oil seal
(2) Needle bearing
(3) Transmission main shaft
(4) Needle bearing
(5) 3rd drive gear
(6) Inner baulk ring
(7) 3rd synchro cone
(8) Outer baulk ring
(9) 3rd-4th coupling sleeve
(10) 3rd-4th synchronizer hub
(11) 3rd-4th shifting insert key
(12) 4th baulk ring
(13) 4th drive gear
(14) 4th needle bearing race
(15) Needle bearing
(16) 4th gear thrust washer
(17) Ball bearing
(18) 5th gear thrust washer
(19) 5th needle bearing race
(20) Needle bearing
(21) Main shaft rear plate
(22) 5th drive gear
(23) 5th baulk ring
(24) 5th-Rev shifting insert key
(25) 5th-Rev synchronizer hub
(26) 5th-Rev coupling sleeve
(27) Reverse baulk ring
(28) Reverse synchro cone
(29) Ball bearing
(30) Synchro cone stopper
(31) Snap ring
(32) Lock washer
(33) Lock nut
(34) Reverse idler gear shaft
(35) Straight pin
(36) Reverse idler gear
(37) Washer

Tightening torque: N·m (kgf-m, ft-lb)
T: 120 (12.2, 88.5)

4. MAIN SHAFT ASSEMBLY FOR DUAL-RANGE

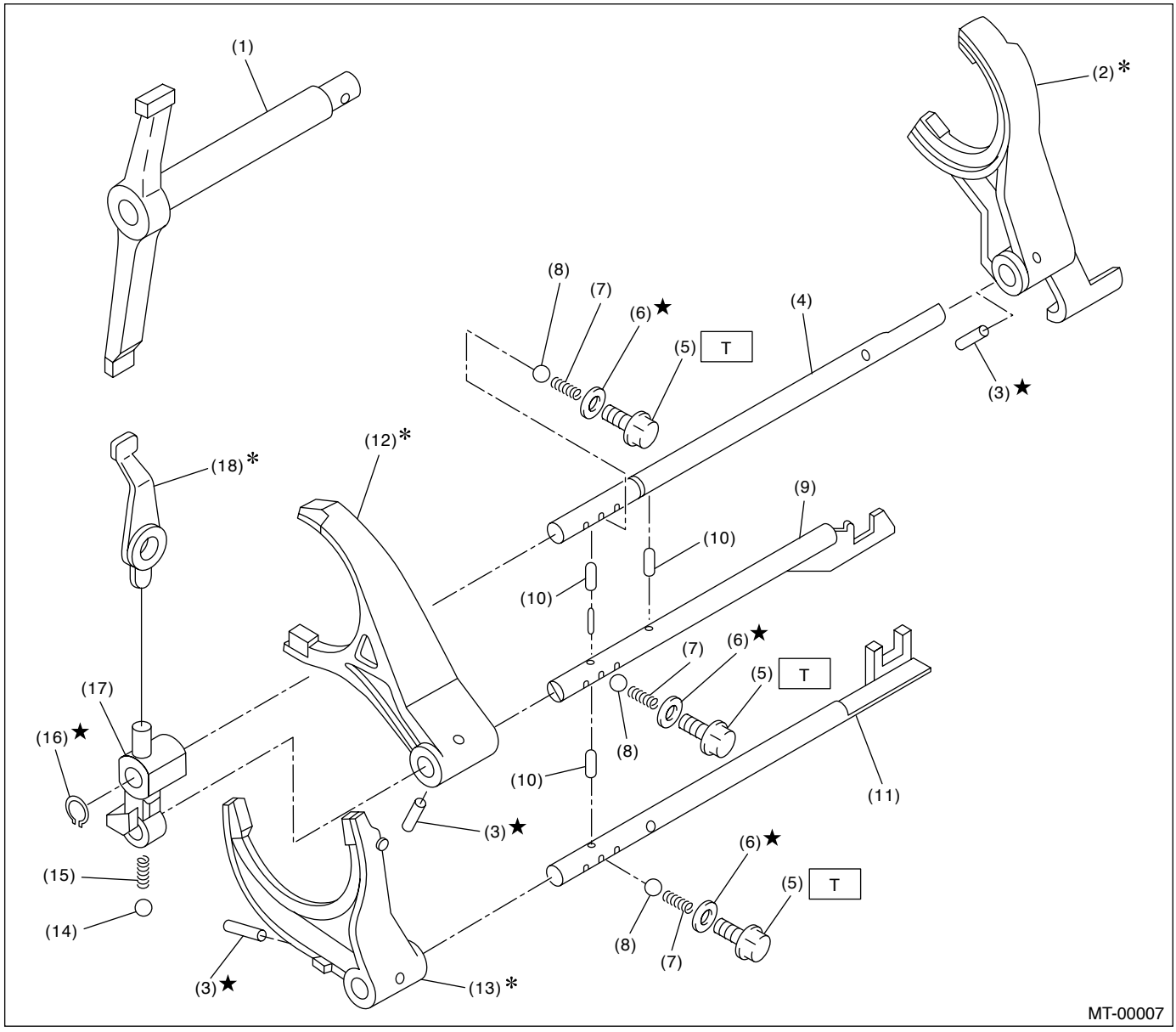


MT-01019

(1) O-ring
(2) High-low counter shaft
(3) Knock pin
(4) High-low counter washer
(5) Counter gear
(6) Needle bearing
(7) Counter gear collar
(8) Snap ring (Outer-19)
(9) Input shaft holder
(10) Input shaft shim
(11) Oil seal
(12) O-ring
(13) Snap ring (Outer-28)
(14) Oil squeeze
(15) Straight pin
(16) Snap ring (Outer-28)
(17) Ball bearing
(18) Snap ring (Inner-68)
(19) Input shaft
(20) Needle bearing
(21) Snap ring (Outer-25)
(22) High-low baulk ring
(23) High-low coupling sleeve
(24) High-low synchronizer spring
(25) High-low synchronizer hub
(26) Shifting insert key
(27) High-low baulk ring
(28) Friction damper
(29) Input low gear
(30) Needle bearing
(31) Input low gear spacer
(32) Ball
(33) Main shaft
(34) Needle bearing
(35) 3rd drive gear
(36) Inner baulk ring
(37) Synchro cone
(38) Outer baulk ring
(39) 3rd-4th coupling sleeve
(40) 3rd-4th synchronizer hub
(41) 3rd-4th shifting insert key
(42) 4th baulk ring
(43) 4th drive gear
(44) 4th needle bearing race
(45) Needle bearing
(46) 4th gear thrust washer
(47) Ball bearing
(48) 5th gear thrust washer
(49) 5th needle bearing race
(50) Needle bearing
(51) Main shaft rear plate
(52) 5th drive gear
(53) 5th baulk ring
(54) 5th-Rev shifting insert key
(55) 5th-Rev synchronizer hub
(56) 5th-Rev coupling sleeve
(57) Rev baulk ring
(58) Rev synchro cone
(59) Ball bearing
(60) Synchro cone stopper
(61) Snap ring
(62) Lock washer
(63) Lock nut
(64) Reverse idler gear shaft
(65) Straight pin
(66) Reverse idler gear
(67) Washer
(68) Straight pin
(69) High-low shifter lever
(70) High-low shifter shaft
(71) Low switch
(72) Gasket
(73) Straight pin
(74) High-low shifter fork
(75) High-low shifter piece
(76) Ball
(77) Spring
(78) Gasket
(79) Plug

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.0, 7.4)
T2: 20 (2.0, 14.5)
T3: 25 (2.5, 18.1)
T4: 120 (12.2, 88.5)

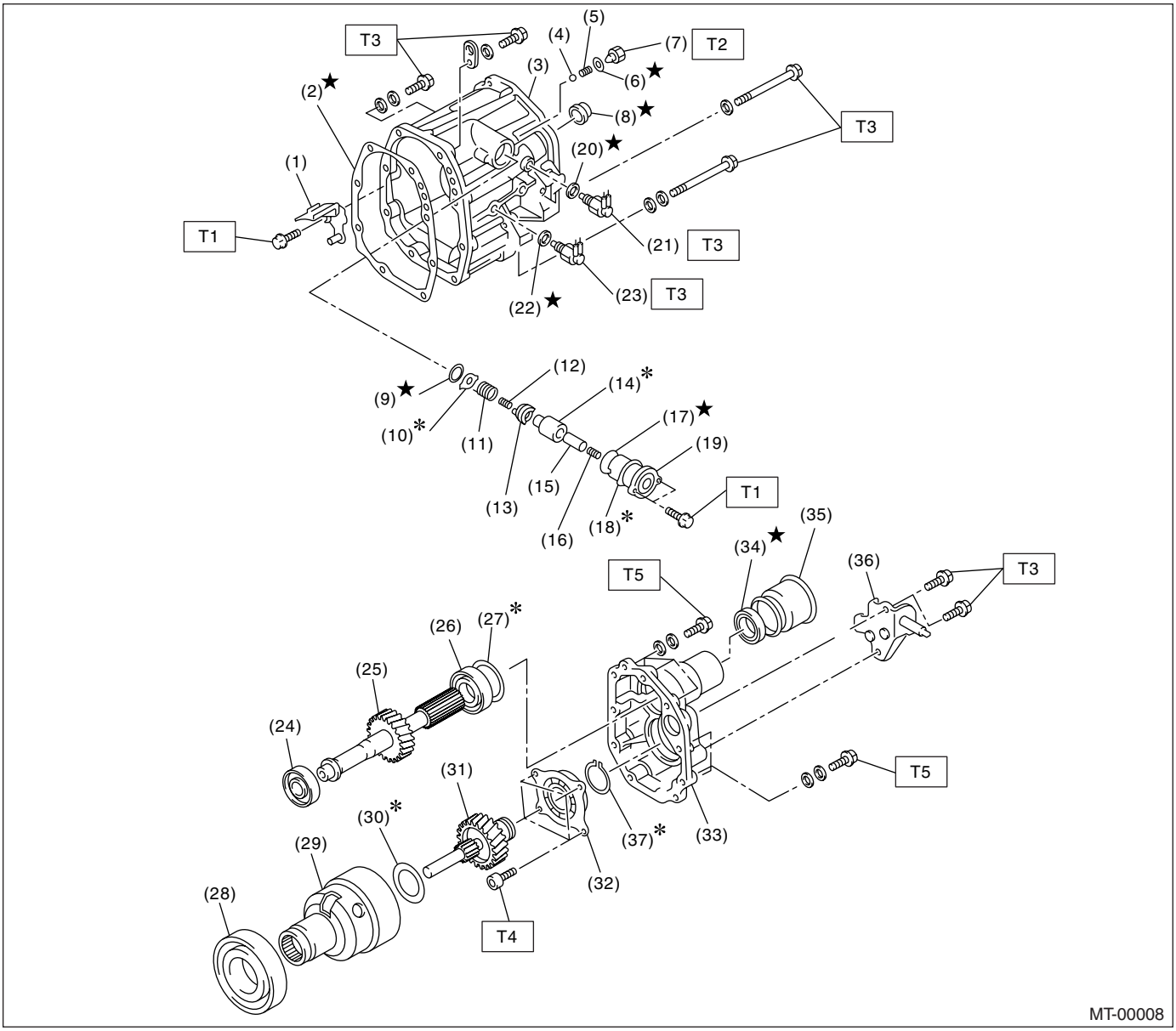
5. SHIFTER FORK AND SHIFTER ROD



(1) Shifter arm
(2) 5th shifter fork
(3) Straight pin
(4) Reverse fork rod
(5) Checking ball plug
(6) Gasket
(7) Checking ball spring
(8) Ball
(9) 3rd-4th fork rod
(10) Interlock plunger
(11) 1st-2nd fork rod
(12) 3rd-4th shifter fork
(13) 1st-2nd shifter fork
(14) Ball
(15) Spring
(16) Snap ring (Outer)
(17) Reverse fork rod arm
(18) Reverse shifter lever

Tightening torque: N·m (kgf-m, ft-lb)
T: 19.5 (2.0, 14.4)

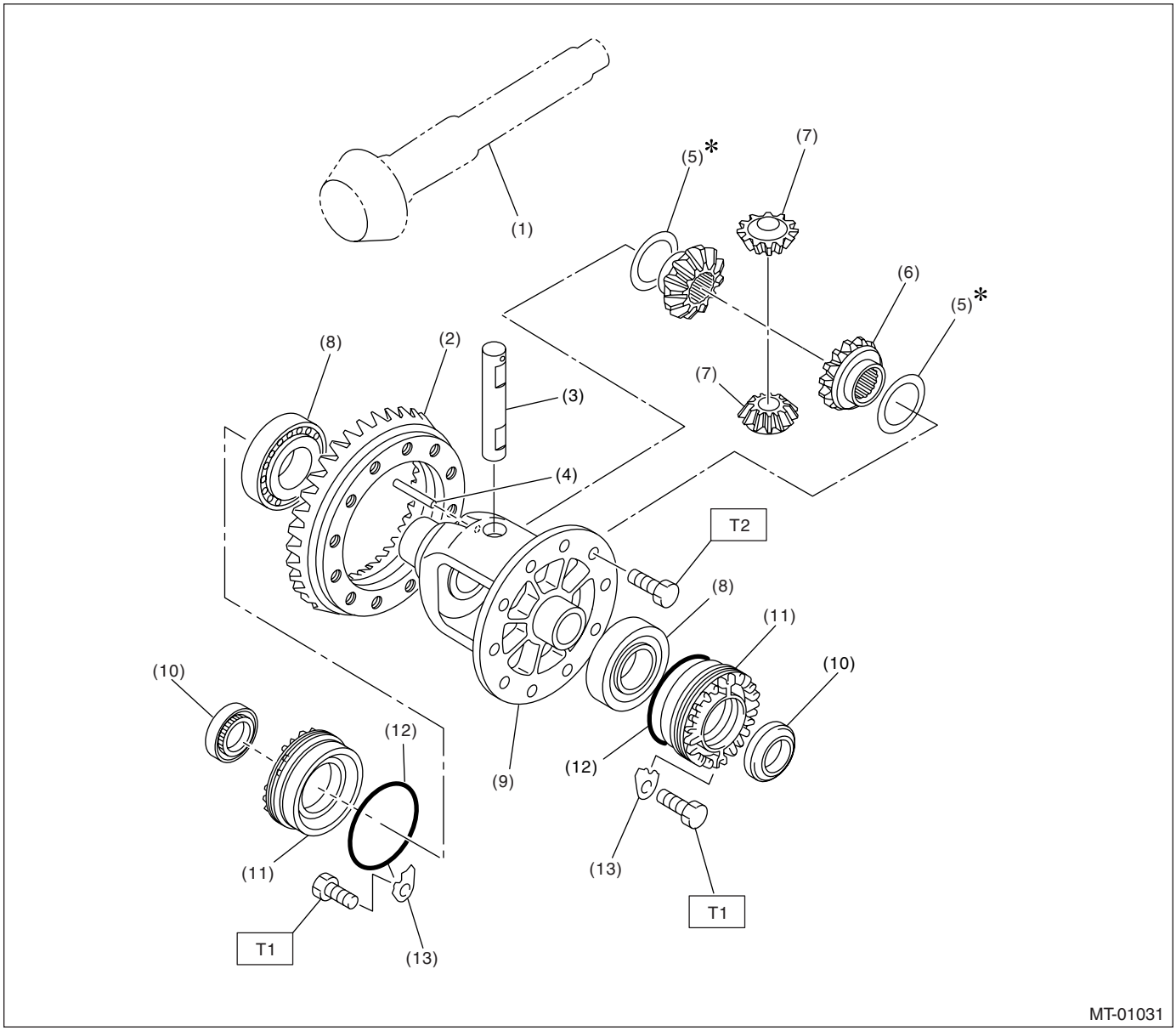
6. TRANSFER CASE AND EXTENSION



(1) Oil guide
(2) Gasket
(3) Transfer case
(4) Ball
(5) Reverse accent spring
(6) Gasket
(7) Plug
(8) Oil seal
(9) Snap ring (Inner)
(10) Reverse check plate
(11) Reverse check spring
(12) Reverse return spring
(13) Reverse check cam
(14) Reverse accent shaft
(15) Return spring cap
(16) Return spring
(17) O-ring
(18) Adjusting select shim
(19) Reverse check sleeve
(20) Gasket
(21) Neutral position switch
(22) Gasket
(23) Back-up light switch
(24) Roller bearing
(25) Transfer driven gear
(26) Roller bearing
(27) Adjusting washer
(28) Ball bearing
(29) Center differential
(30) Adjusting washer
(31) Transfer drive gear
(32) Ball bearing
(33) Extension case
(34) Oil seal
(35) Dust cover
(36) Shift bracket
(37) Snap ring

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.4 (0.65, 4.7)
T2: 10 (1.0, 7.4)
T3: 25 (2.5, 18.4)
T4: 26 (2.7, 20)
T5: 40 (4.1, 29.7)

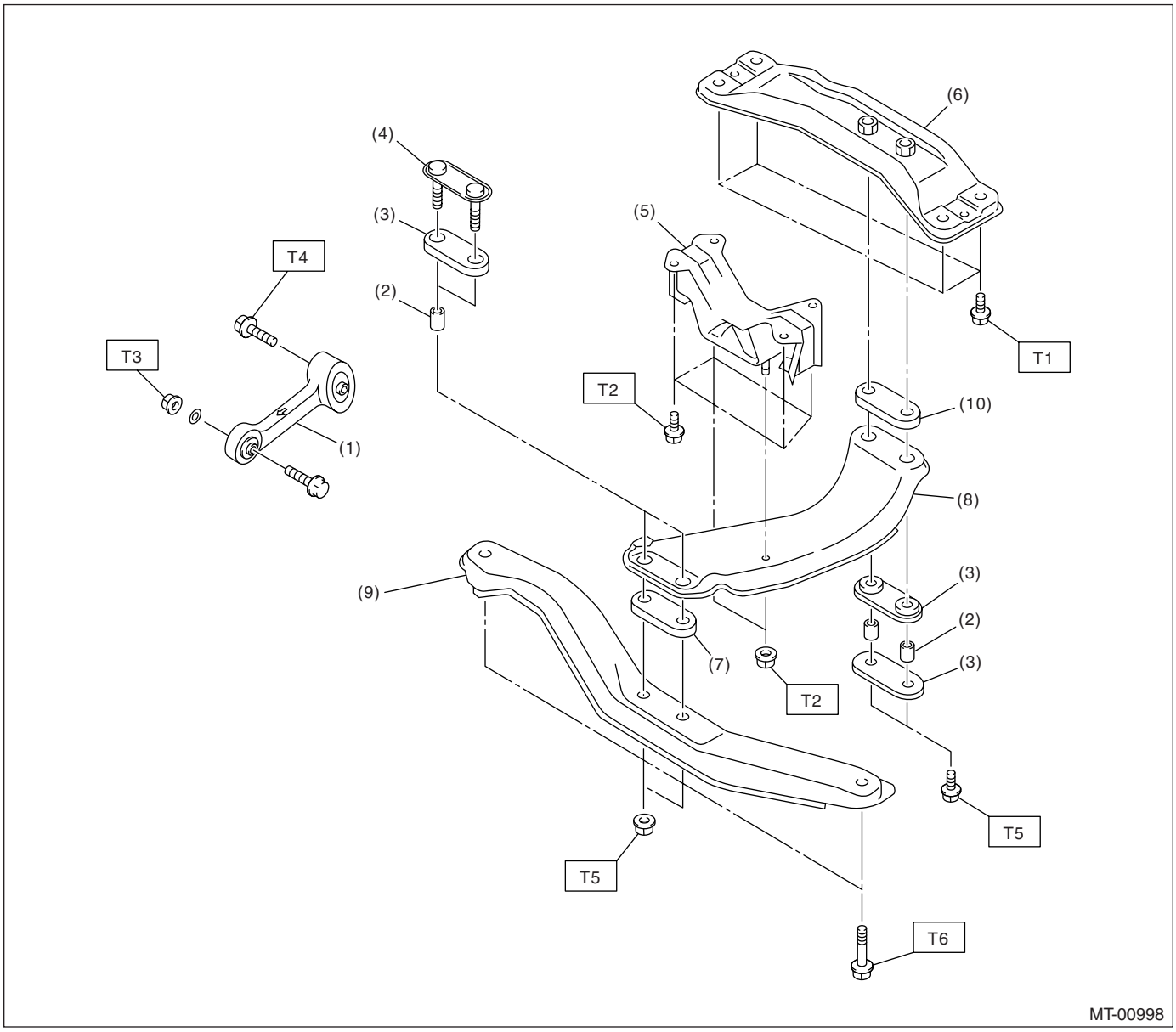
7. FRONT DIFFERENTIAL



(1) Drive pinion shaft
(2) Hypoid driven gear
(3) Pinion shaft
(4) Straight pin
(5) Washer
(6) Differential bevel gear
(7) Differential bevel pinion
(8) Roller bearing
(9) Differential case
(10) Oil seal
(11) Differential side retainer
(12) O-ring
(13) Retainer lock plate

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 62 (6.3, 45.6)

8. TRANSMISSION MOUNTING



(1) Pitching stopper
(2) Spacer
(3) Cushion rubber
(4) Front plate
(5) Rear cushion rubber
(6) Rear crossmember
(7) Cushion D
(8) Center crossmember
(9) Front crossmember
(10) Cushion (crossmember)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 70 (7.1, 51)
T2: 35 (3.6, 26)
T3: 50 (5.1, 37)
T4: 58 (5.9, 43)
T5: 70 (7.1, 51)
T6: 140 (14.3, 103)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes, during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• When disassembling the case and other light alloy parts, use a plastic hammer to force it apart. Do not pry it apart with a screwdriver or other tool.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine gear oil, grease etc. or equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil onto sliding or revolution surfaces before installation.
• Replace deformed or damaged snap rings with new ones.
• Before installing O-rings or oil seals, apply sufficient amount of gear oil to avoid damage and deformation.
• Be careful not to incorrectly install or fail to install O-rings, snap rings and other such parts.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vice.
• Avoid damaging the mating surface of the case.
• Before applying sealant, completely remove the old seal.

D: PREPARATION TOOL

1. SPECIAL TOOL

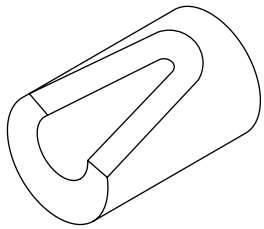
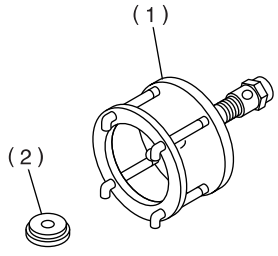
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399411700	399411700	ACCENT BALL INSTALLER	Used for installing reverse shifter rail arm.
 ST-899524100	899524100	PULLER SET	Used for removing and installing roller bearing (Differential). (1) Puller (2) Cap

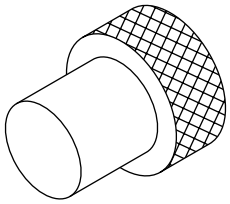
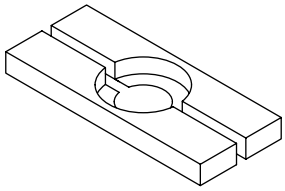
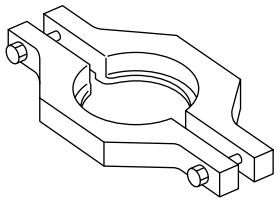
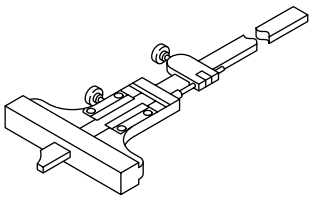
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399780104	399780104	WEIGHT	Used for measuring preload on roller bearing.
 ST-498077000	498077000	REMOVER	Used for removing roller bearing of drive pinion shaft.
 ST-498077300	498077300	CENTER DIFFERENTIAL BEARING REMOVER	Used for removing the center differential cover ball bearing.
 ST-498147000	498147000	DEPTH GAUGE	Used for adjusting main shaft axial end play.

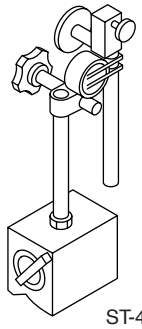
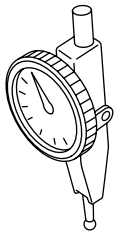
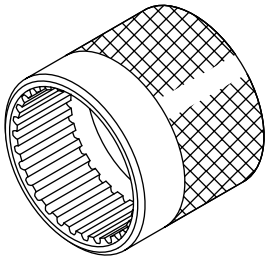
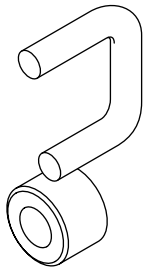
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).
 ST-498427100	498427100	STOPPER	Used for securing drive pinion shaft assembly and driven gear assembly when removing lock nut of drive pinion shaft assembly.
 ST-498787100	498787100	MAIN SHAFT STOPPER	Used for removing and installing lock nut of transmission main shaft.

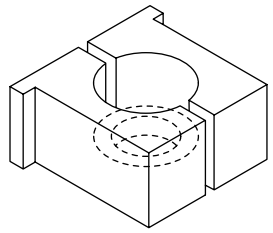
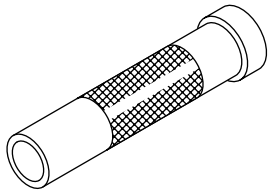
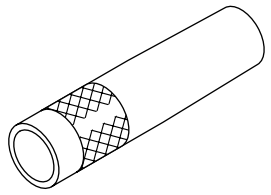
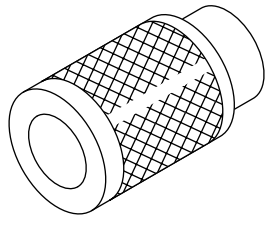
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498937000	498937000	TRANSMISSION HOLDER	Used for removing and installing transmission main shaft lock nut.
 ST-499277100	499277100	BUSHING 1-2 INSTALLER	• Used for installing 1st driven gear thrust plate and 1st-2nd driven gear bushing. • Used for installing roller bearing outer races to differential case.
 ST-499277200	499277200	INSTALLER	Used for press-fitting 2nd driven gear, roller bearings, and 5th driven gear onto driven shaft.
 ST-499757002	499757002	INSTALLER	• Used for installing snap ring (OUT 25), and ball bearing (25 × 26 × 17). • Used for installing bearing cone of transfer driven gear (extension core side).

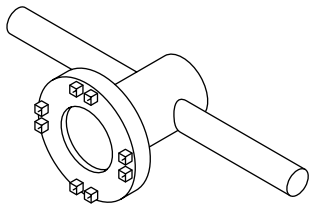
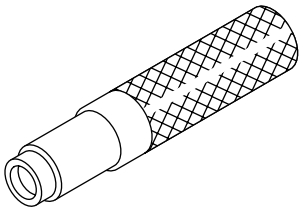
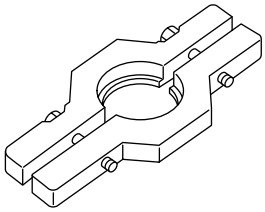
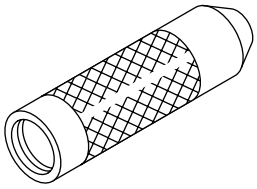
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499787000	499787000	WRENCH ASSY	Used for removing and installing differential side retainer.
 ST-499827000	499827000	PRESS	Used for installing speedometer oil seal when installing speedometer cable to transmission.
 ST-499857000	499857000	5TH DRIVEN GEAR REMOVER	Used for removing 5th driven gear.
 ST-499877000	499877000	RACE 4-5 INSTALLER	• Used for installing 4th needle bearing race and ball bearing onto transmission main shaft. • Used with REMOVER (899714110).

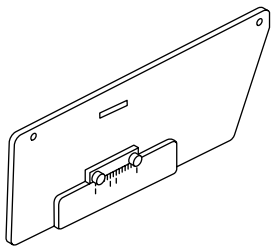
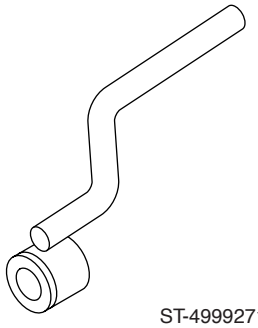
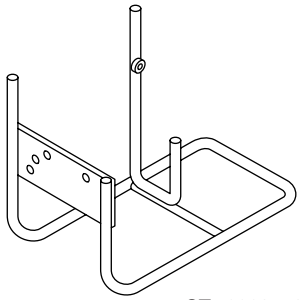
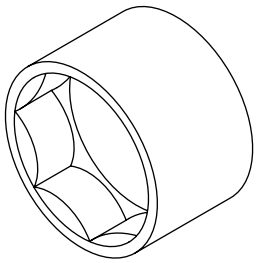
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499917500	499917500	DRIVE PINION GAUGE ASSY	Used for adjusting drive pinion shim.
 ST-499927100	499927100	HANDLE	Used for fitting transmission main shaft.
 ST-499937100	499937100	TRANSMISSION STAND SET	Stand used for transmission disassembly and assembly.
 ST-499987003	499987003	SOCKET WRENCH (35)	Used for removing and installing driven pinion lock nut and main shaft lock nut.

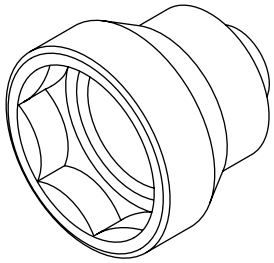
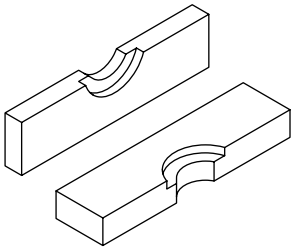
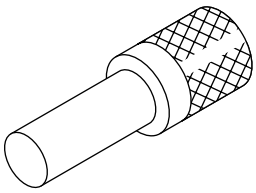
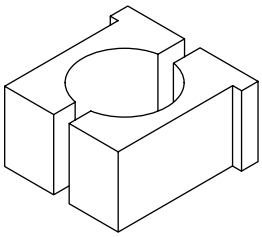
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987300	499987300	SOCKET WRENCH (50)	Used for removing and installing driven gear assembly lock nut.
 ST-899714110	899714110	REMOVER	Used for installing transmission main shaft drive pinion and rear drive shaft.
 ST-899864100	899864100	REMOVER	Used for removing parts on transmission main shaft and drive pinion.
 ST-899884100	899884100	HOLDER	Used for tightening lock nut on sleeve.

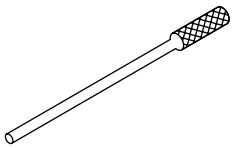
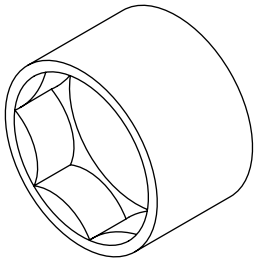
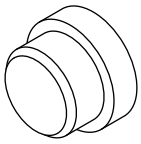
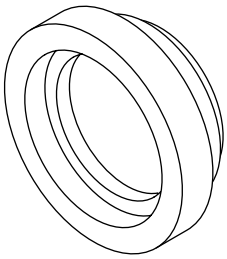
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899904100	899904100	REMOVER	Used for removing and installing straight pin.
 ST-899988608	899988608	SOCKET WRENCH (27)	Used for removing and installing drive pinion lock nut.
 ST-398497701	398497701	ADAPTER	• Used for installing roller bearing onto differential case. • Used with INSTALLER (499277100).
 ST-499587000	499587000	INSTALLER	Used for installing driven gears to driven shaft.

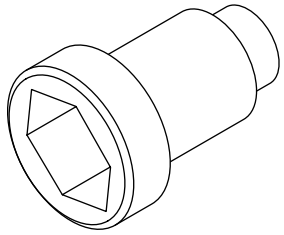
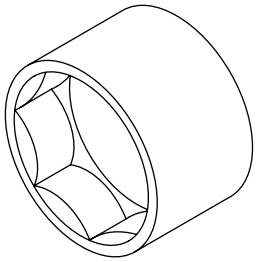
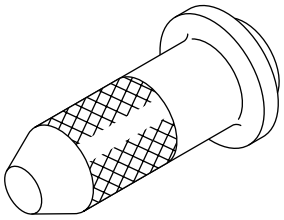
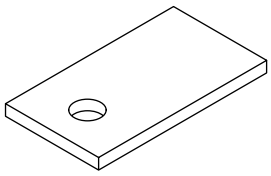
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499987100	499987100	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 ST-899984103	899984103	SOCKET WRENCH (35)	Used for removing and installing drive pinion lock nut.
 ST-498057300	498057300	INSTALLER	Used for installing extension oil seal.
 ST-498255400	498255400	PLATE	Used for measuring backlash.

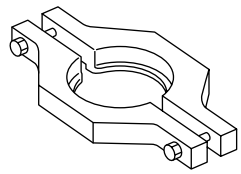
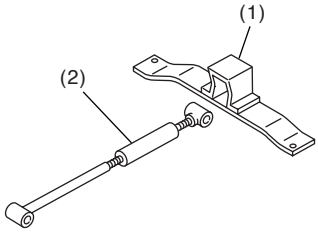
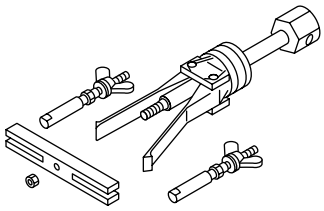
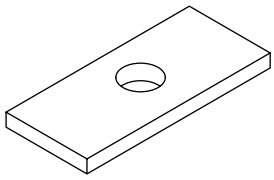
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498077400	498077400	SYNCHRONIZER CONE REMOVER	• Used for removing synchronizer cone of main shaft. • Used for removing 5th driven gear of drive pinion shaft.
 ST41099AA000	41099AA000	ENGINE SUPPORT BRACKET	Used for supporting engine. (1) ENGINE SUPPORT BRACKET (41099AA010) (2) ENGINE SUPPORT (41099AA020)
 ST-398527700	398527700	PULLER ASSY	Used for removing extension case roller bearing.
 ST-398643600	398643600	GAUGE	Used for measuring total end play, extension end play and drive pinion height.

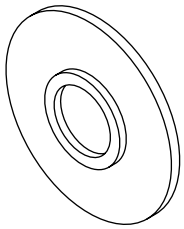
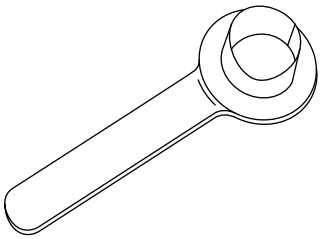
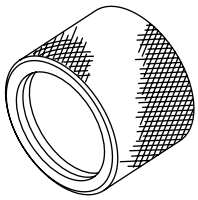
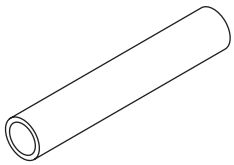
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398177700	398177700	INSTALLER	• Used for installing bearing cone of transfer driven gear (transfer case side). • Used for installing ball bearing of transfer drive gear.
 ST28399SA010	28399SA010	FRONT DRIVE SHAFT OIL SEAL PROTECTOR	Used for protecting oil seal from damage when inserting front drive shaft.
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-398507703	398507703	DUMMY COLLAR	• Used for installing input shaft holder oil seal. • For dual-range model.

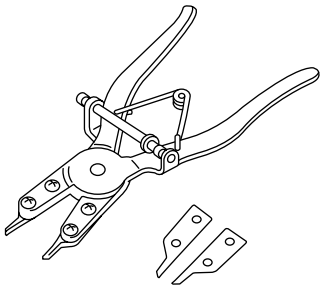
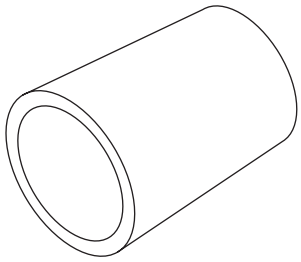
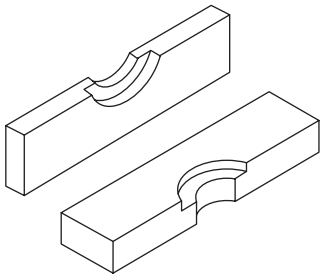
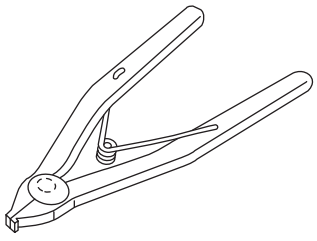
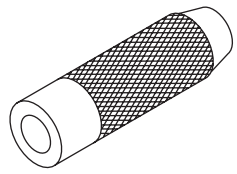
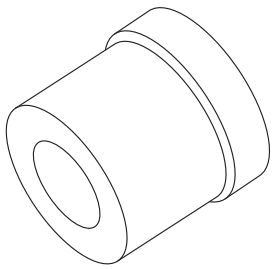
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398663600	398663600	PLIERS	• Used for removing and installing input shaft snap ring. • For dual-range model.
 ST-499757001	499757001	SNAP RING GUIDE	• Used for installing snap ring (OUT 25). • For dual-range model.
 ST-899858600	899858600	RETAINER	• Used for removing ball bearing. • For dual-range model.
 ST-899474100	899474100	EXPANDER	• Used for removing and installing snap ring. • For dual-range model.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899580100	899580100	INSTALLER	• Used for pressing ball bearings into input shaft. • For dual-range model.
 ST-399513600	399513600	INSTALLER	• Used for pressing ball bearings into input shaft. • For dual-range model.

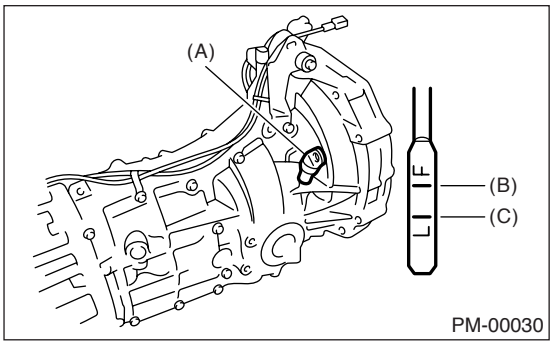
2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

2. Transmission Gear Oil

A: INSPECTION

1) Park the vehicle on a level surface.
2) Turn the ignition switch to OFF, and wait until the engine cools.
3) Remove the oil level gauge and wipe it clean.
4) Reinsert the level gauge all the way. Be sure that the level gauge is correctly inserted and in the proper direction.
5) Pull out the oil level gauge again, and check the oil level. If it is below the lower level, add oil through the oil level gauge hole to bring the level up to the upper level.



(A) Oil level gauge
(B) Upper level
(C) Lower level

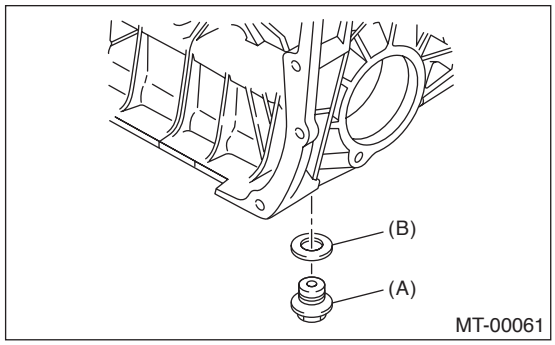
B: REPLACEMENT

1) Pull out the oil level gauge.
2) Lift-up the vehicle.
3) Drain transmission gear oil completely.

CAUTION:
Immediately after the engine running, the transmission gear oil is very hot. Be careful not to burn yourself.

NOTE:
• Tighten the transmission gear oil drain plug after draining transmission gear oil.
• Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



(A) Drain plug
(B) Gasket

4) Lower the vehicle.
5) Pour gear oil through the gauge hole.

Recommended gear oil:
GL-5 (75W-90) or equivalent

Gear oil capacity:
Single-range model
3.5 ℓ (3.7 US qt, 3.1 Imp qt)
Dual-range model
4.0 ℓ (4.2 US qt, 3.5 Imp qt)

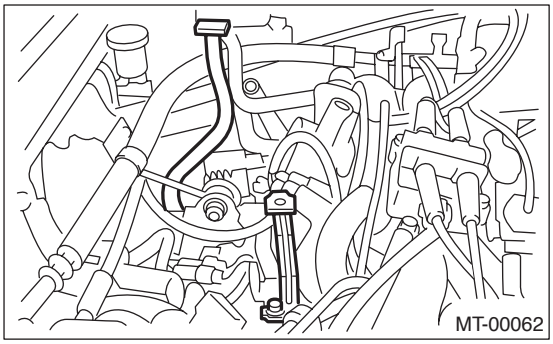
6) Check the level of transmission gear oil.

CAUTION:
The level should be within the specified range marked on the gauge.

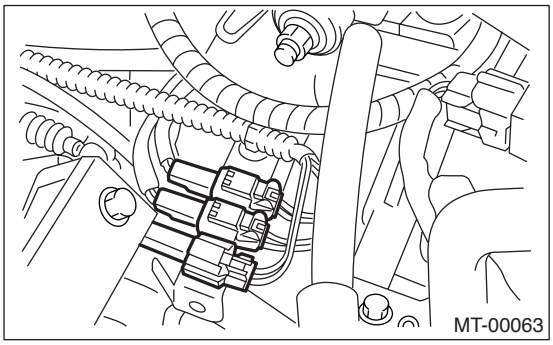
3. Manual Transmission Assembly

A: REMOVAL

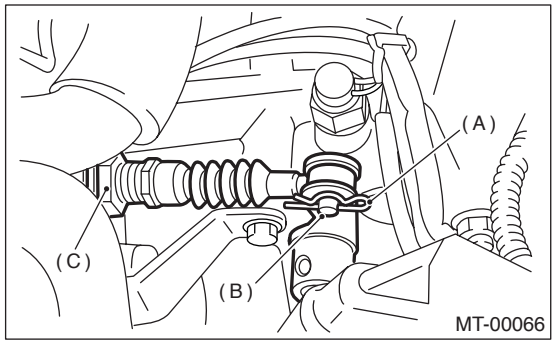
1) Open the front hood fully, and support with stay.
2) Disconnect the ground cable from battery.
3) Drain transmission gear oil completely.
4) Remove the air intake chamber and air cleaner case. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.> <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
5) Remove the air intake chamber stay.


MT-00062

6) Disconnect the following connectors:
   (1) Neutral position switch connector
   (2) Back-up light switch connector
   (3) High-low switch connector (Dual-range model)


MT-00063

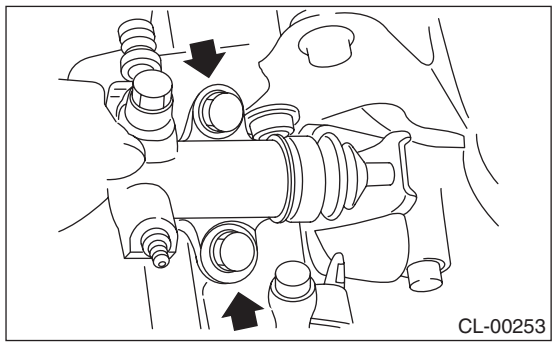
7) Remove the snap pin and clevis pin from drive select cable. (Dual-range model)
8) Remove the drive select cable on transmission side. (Dual-range model)



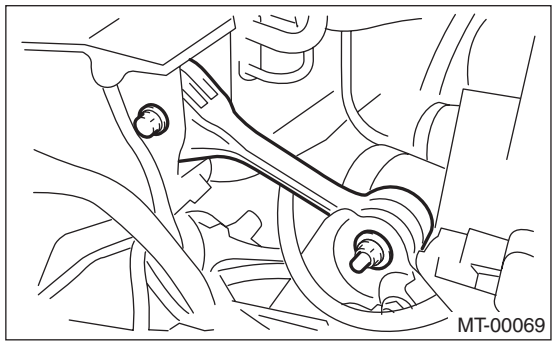
MT-00066

(A) Snap pin
(B) Clevis pin
(C) Drive select cable

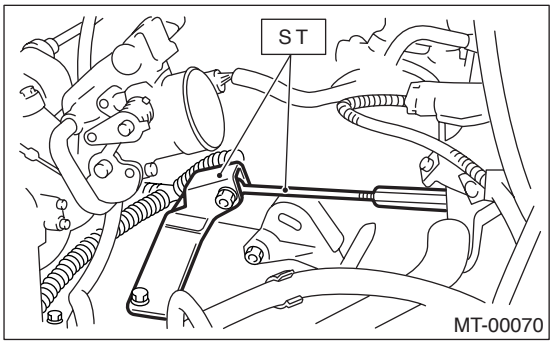
9) Remove the starter. <Ref. to SC(H4SO 2.0)-6, REMOVAL, Starter.>
10) Remove the operating cylinder from transmission.


CL-00253

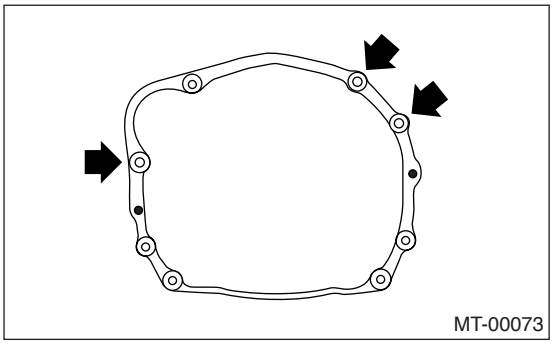
11) Remove the pitching stopper.


MT-00069

12) Set the ST.
ST 41099AA000 ENGINE SUPPORT ASSY



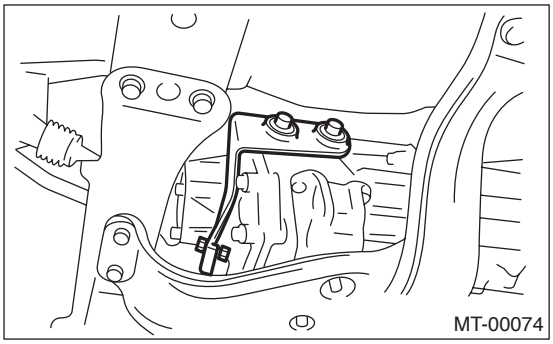
13) Remove the bolts which hold upper side of transmission to engine.



14) Lift-up the vehicle.
15) Remove the front and center exhaust pipes. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>
16) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>

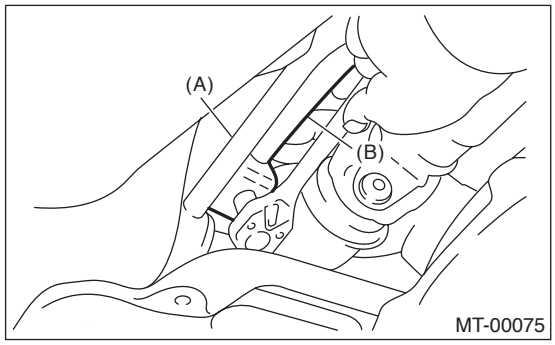
CAUTION:
When removing the exhaust pipes, be careful each exhaust pipe does not drop out.

17) Remove the heat shield cover. (if equipped)
18) Remove the hanger bracket from the right side of transmission.



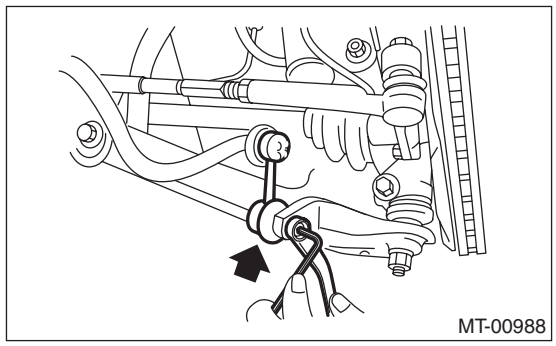
19) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
20) Remove the gear shift rod and the stay from transmission.

(1) Disconnect the stay from transmission.
(2) Remove the rod from transmission.

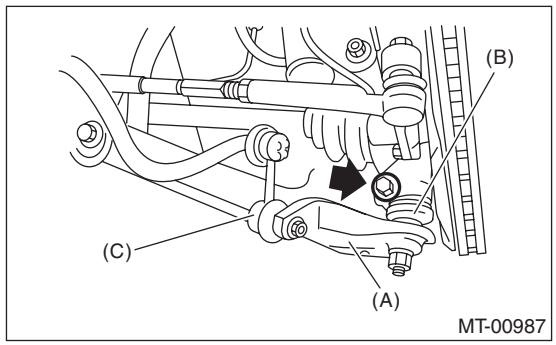


(A) Stay
(B) Rod

21) Remove the stabilizer link from front arm.

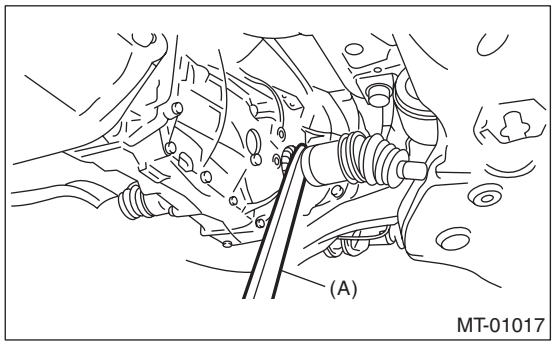


22) Remove the bolt securing ball joint of front arm to housing.



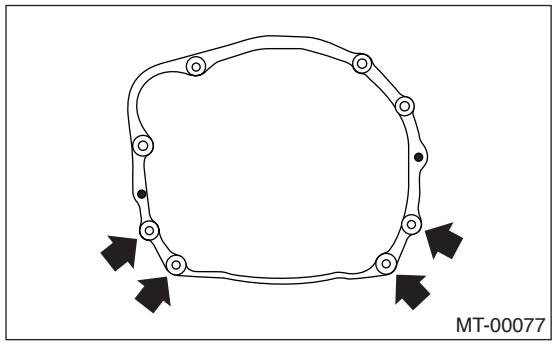
(A) Front arm
(B) Ball joint
(C) Stabilizer link

23) Using the lever, remove the left and right front drive shaft from transmission.



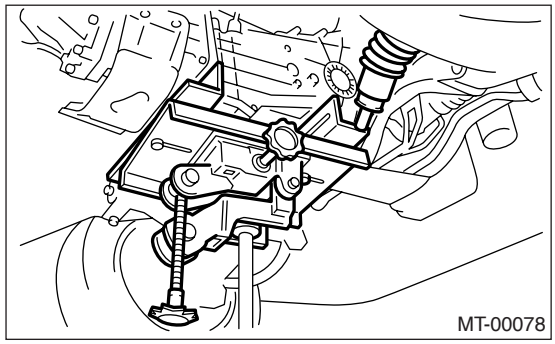
(A) Lever

24) Remove the nuts which hold lower side of transmission to engine.

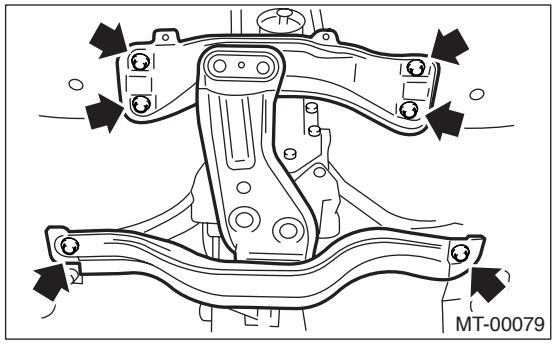


25) Place the transmission jack under transmission.

CAUTION:
Always support transmission case with a transmission jack.



26) Remove the transmission rear crossmember from vehicle.



27) Remove the transmission.

NOTE:
Move the transmission jack toward rear until main shaft is withdrawn from clutch disc.

28) Separate the transmission assembly from rear cushion rubber.

B: INSTALLATION

1) Install the rear cushion rubber to transmission assembly.

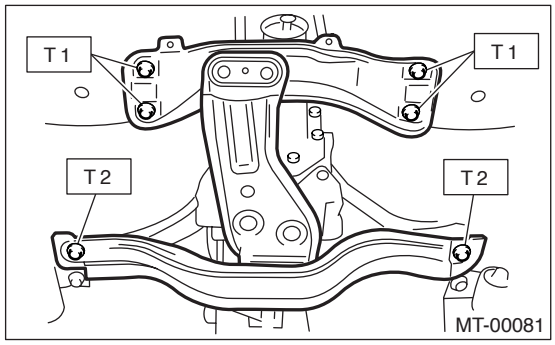
Tightening torque:
35 N·m (3.57 kgf-m, 25.8 ft-lb)

2) Install the transmission onto engine.
(1) Gradually raise the transmission with transmission jack.
(2) Engage them at splines.

NOTE:
Be careful not to strike the main shaft against clutch housing cover.

3) Install the transmission rear crossmember.

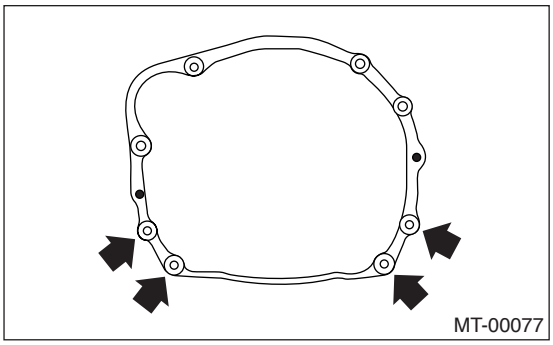
Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



4) Take out the transmission jack.

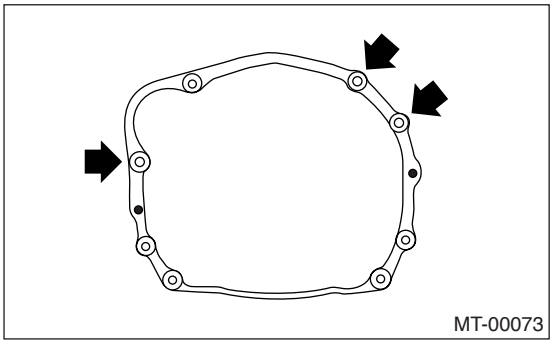
5) Tighten the nuts which hold lower side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

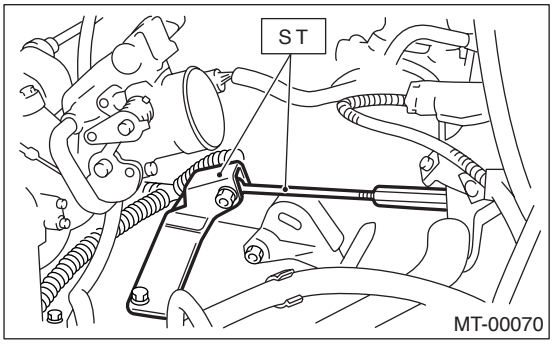


6) Connect the transmission to engine.
(1) Install the starter.
<Ref. to SC(H4SO 2.0)-6, INSTALLATION, Starter.>
(2) Tighten the bolts that hold upper side of transmission to engine.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

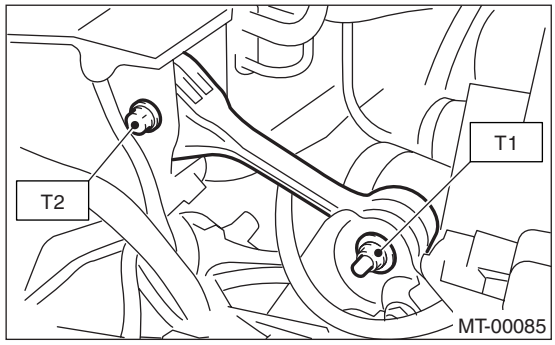


7) Remove the ST.



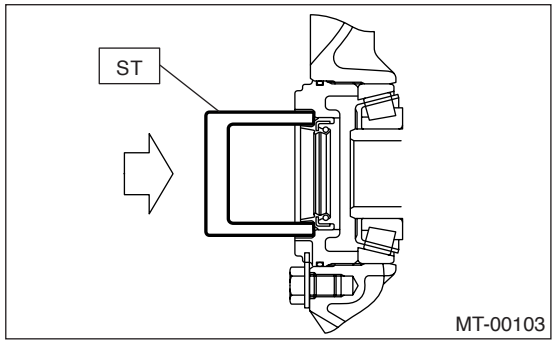
8) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)

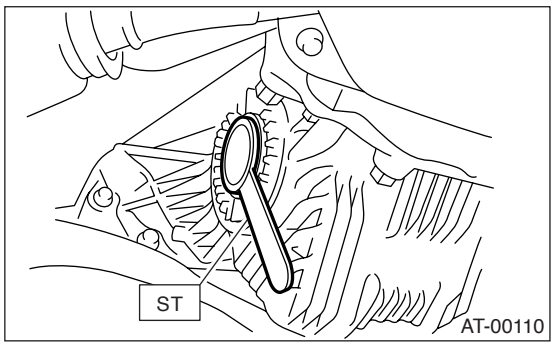


9) Lift-up the vehicle.
10) Install the front drive shaft into transmission.
11) Replace the differential side retainer oil seal. <Ref. to 5MT-40, REPLACEMENT, Differential Side Retainer Oil Seal.>
ST 186755AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Be sure to replace the differential side retainer oil seal after the procedure of removing the front drive shaft.

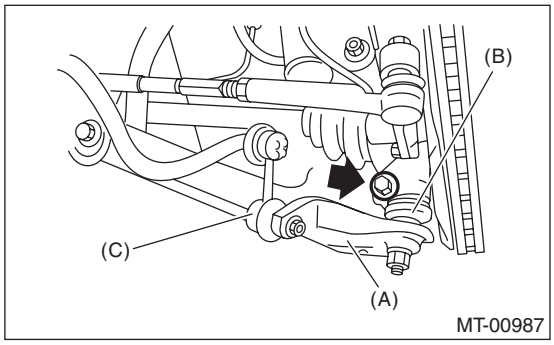


12) Install the front drive shaft into transmission.
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR



13) Install the ball joint of lower arm.

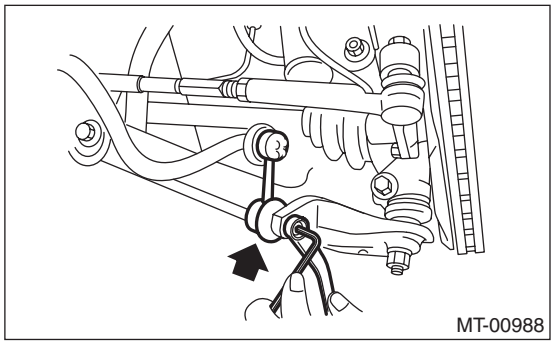
Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)



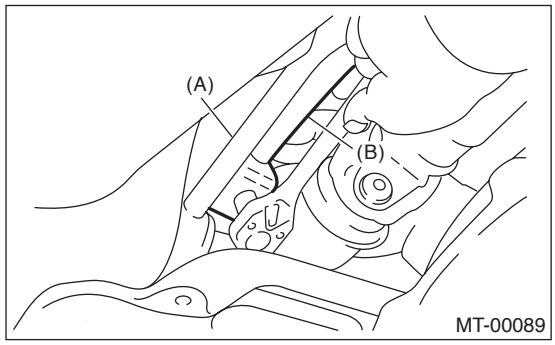
(A) Front arm
(B) Ball joint
(C) Stabilizer link

14) Install the stabilizer link into front arm.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)



15) Install the gear shift rod and the stay.
(1) Install the gear shift rod into transmission.



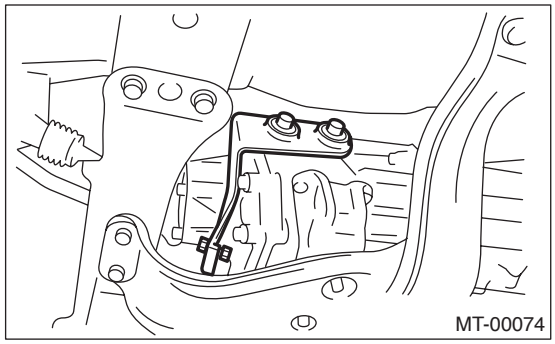
(A) Stay
(B) Rod

(2) Install the stay onto transmission.

16) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>

17) Install the heat shield cover. (if equipped)

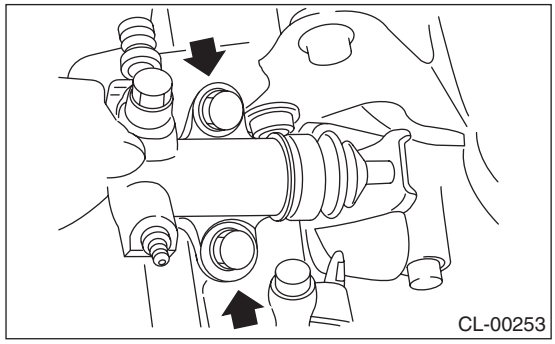
18) Install the hanger bracket on the right side of transmission.



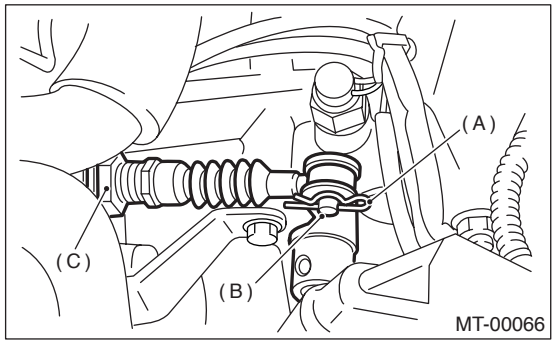
19) Install the front, center and rear exhaust pipe, and muffler. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>

20) Install the operating cylinder.

Tightening torque:
37 N·m (3.8 kgf-m, 27.5 ft-lb)



21) Install the drive select cable on transmission side. (Dual-range model)



(A) Snap pin
(B) Clevis pin
(C) Drive select cable

22) Connect the following connectors:
(1) Transmission ground cable

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Neutral position switch connector
(3) Back-up light switch connector
(4) High-low switch connector (Dual-range model)

23) Fill transmission gear oil through the transmission level gauge hole.
24) Install the air intake chamber stay.

Tightening torque:
16 N·m (1.6 kgf-m, 11.6 ft-lb)

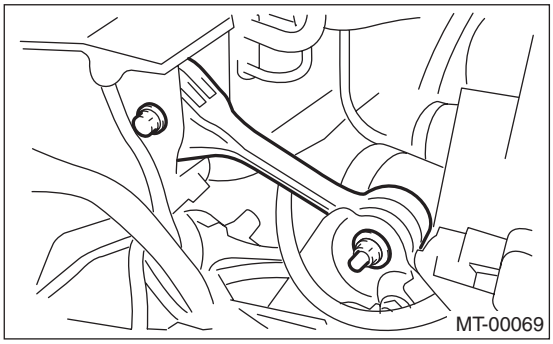
25) Install the air intake chamber and air cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
26) Connect the battery ground cable to battery.
27) Take off the vehicle from lift arms.

4. Transmission Mounting System

A: REMOVAL

1. PITCHING STOPPER

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Remove the air cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.>
4) Remove the pitching stopper.

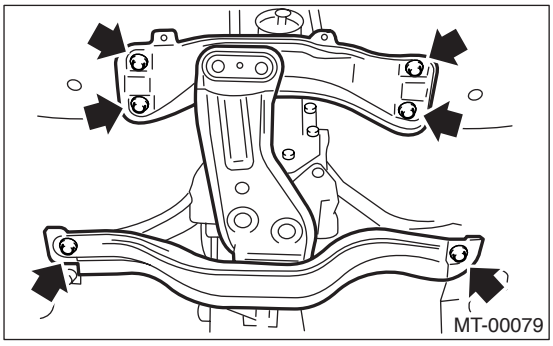


2. CROSSMEMBER AND CUSHION RUBBER

1) Disconnect the ground cable from battery.
2) Jack-up the vehicle and support it with rigid racks.
3) Remove the front, center and rear exhaust pipe, and muffler. <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
4) Remove the heat shield cover. (If equipped)
5) Set the transmission jack under transmission body.

CAUTION:
Always support the transmission case with a transmission jack.

6) Remove the rear crossmember.



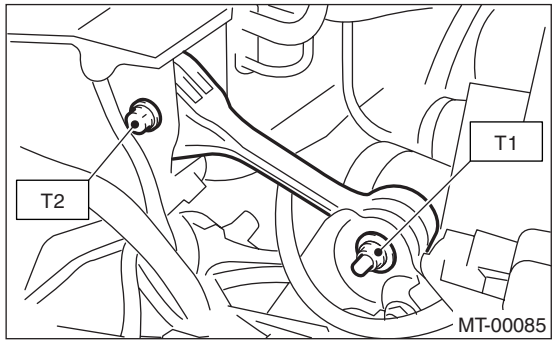
7) Remove the rear cushion rubber.

B: INSTALLATION

1. PITCHING STOPPER

1) Install the pitching stopper.

Tightening torque:
T1: 50 N·m (5.1 kgf-m, 37 ft-lb)
T2: 58 N·m (5.9 kgf-m, 43 ft-lb)



2) Install the air intake chamber and cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
3) Connect the battery ground cable to battery.

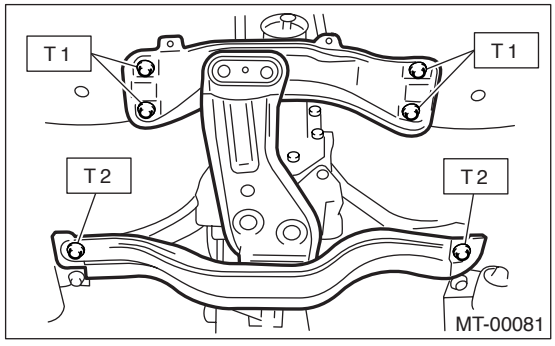
2. CROSSMEMBER AND CUSHION RUBBER

1) Install the rear cushion rubber.

Tightening torque:
35 N·m (3.6 kgf-m, 26 ft-lb)

2) Install the rear crossmember.

Tightening torque:
T1: 70 N·m (7.1 kgf-m, 51 ft-lb)
T2: 140 N·m (14.3 kgf-m, 103 ft-lb)



3) Remove the transmission jack.
4) Install the heat shield cover. (If equipped)
5) Install the front, center and rear exhaust pipe, and muffler. <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
6) Lower the vehicle.
7) Connect the battery ground cable to battery.

C: INSPECTION

Perform the following inspection procedures and repair or replace defective parts.

1. PITCHING STOPPER

Check pitching stopper for bends or damage. Check that the rubber is not stiff, cracked, or otherwise damaged.

2. CROSSMEMBER AND CUSHION RUBBER

Check crossmember for bends or damage. Check that the cushion rubber is not stiff, cracked, or otherwise damaged.

5. Oil Seal

A: INSPECTION

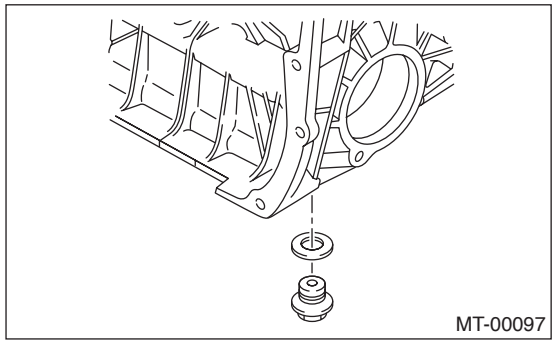
Check leakage of gear oil from the oil seal part. If there is oil leakage, replace with a new oil seal.

B: REPLACEMENT

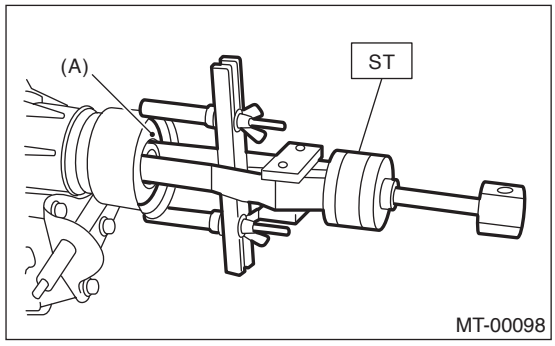
1) Clean the transmission exterior.
2) Drain gear oil completely.

NOTE:
Tighten the drain plug after draining gear oil.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

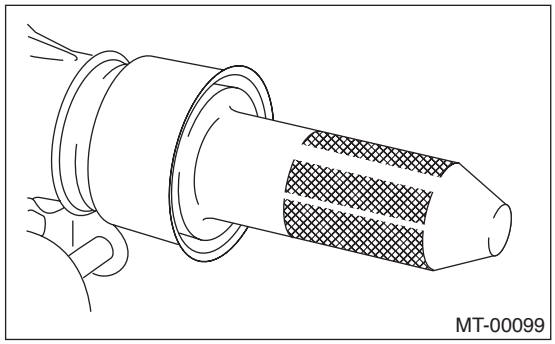


3) Remove the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, REMOVAL, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.>
4) Remove the heat shield cover. (If equipped)
5) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
6) Using the ST, remove the oil seal.
ST 398527700 PULLER ASSY



(A) Oil seal

7) Using the ST, install the oil seal.
ST 498057300 INSTALLER



8) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
9) Install the heat shield cover. (If equipped)
10) Install the rear exhaust pipe and muffler. <Ref. to EX(H4SO 2.0)-11, INSTALLATION, Rear Exhaust Pipe.> <Ref. to EX(H4SO 2.0)-13, INSTALLATION, Muffler.>
11) Pour gear oil and check the oil level. <Ref. to 5MT-30, REPLACEMENT, Transmission Gear Oil.>

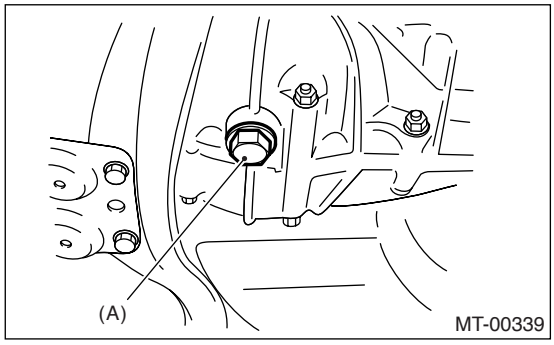
6. Differential Side Retainer Oil Seal

A: INSPECTION

Check leakage of gear oil from the differential side retainer oil seal part. If there is oil leakage, replace with a new oil seal.

B: REPLACEMENT

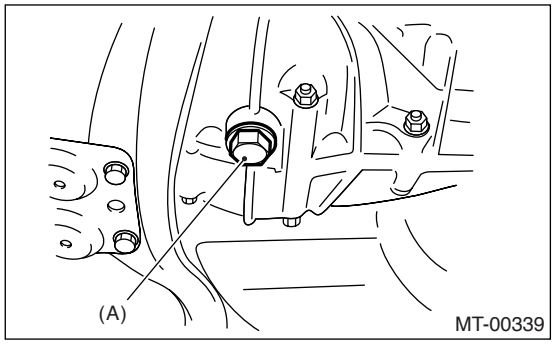
1) Lift-up the vehicle.
2) Drain gear oil from differential oil drain plug.



(A) Differential oil drain plug

3) Replace with a new gasket and tighten the differential oil drain plug.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



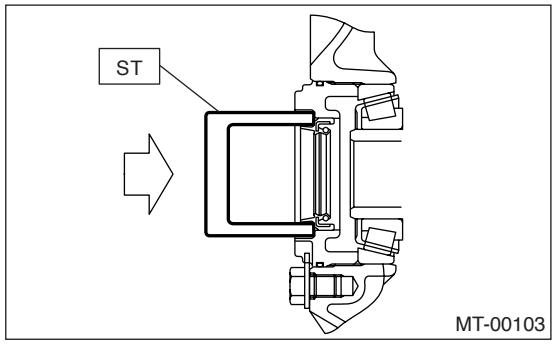
(A) Differential oil drain plug

4) Remove the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>
5) Separate the front drive shaft from transmission.
<Ref. to DS-22, REMOVAL, Front Drive Shaft.>
6) Remove the differential side retainer oil seal.

NOTE:
• Be sure to replace the differential side retainer oil seal after the procedure of removing the front drive shaft from transmission.
• When prying to remove the part using flat tip screwdriver, be careful not to scratch the differential side retainer. ST 398527700 puller assembly may be used for this operation procedure.

7) Using the ST, install the differential side retainer by slightly tapping with a plastic hammer.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

NOTE:
Apply oil to the oil seal lips.



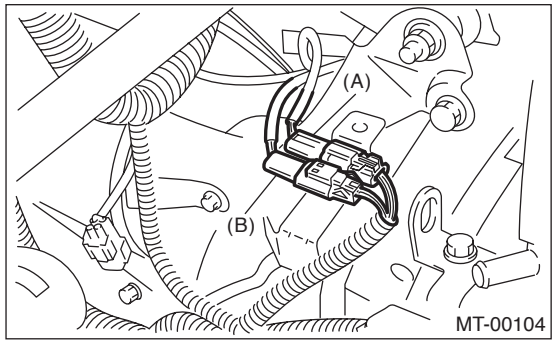
8) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
ST 28399SA010 FRONT DRIVE SHAFT OIL SEAL PROTECTOR
9) Install the front and center exhaust pipe.
<Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
10) Lower the vehicle.
11) Pour gear oil through the gauge hole. <Ref. to 5MT-30, REPLACEMENT, Transmission Gear Oil.>

7. Switches and Harness

A: REMOVAL

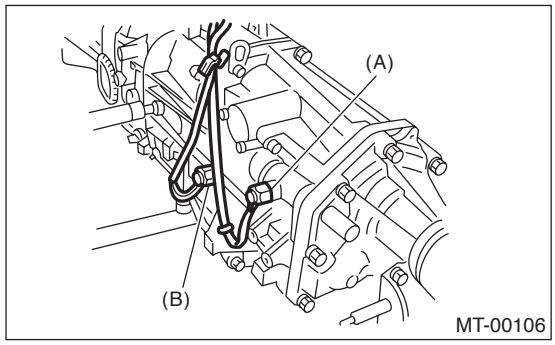
1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber and cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the connectors of back-up light switch and neutral position switch.



(A) Neutral position switch connector (Brown)
(B) Back-up light switch connector (Gray)

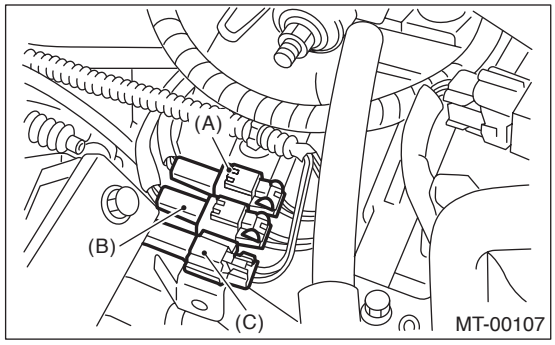
4) Lift-up the vehicle.
5) Remove the back-up light switch and neutral position switch with harness.



(A) Neutral position switch (Brown)
(B) Back-up light switch (Gray)

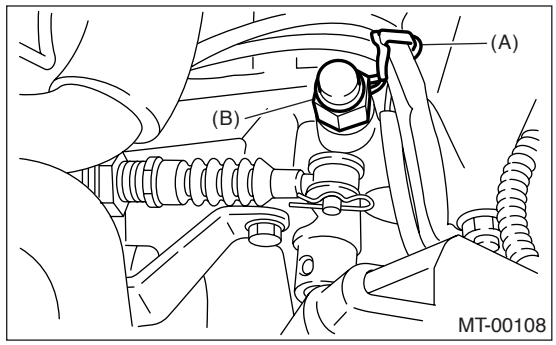
2. HIGH-LOW SWITCH (DUAL-RANGE MODEL)

1) Disconnect the ground cable from battery.
2) Remove the air intake chamber and cleaner case. <Ref. to IN(H4SO 2.0)-6, REMOVAL, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
3) Disconnect the connector of high-low switch.



(A) Neutral switch (Brown)
(B) Back-up light switch (Gray)
(C) High-low switch (Black)

4) Remove the high-low switch cable from clamp.
5) Remove the high-low switch.



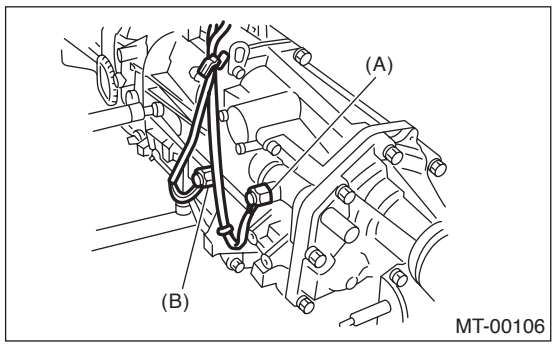
(A) Clamp
(B) High-low switch

B: INSTALLATION

1. BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH

1) Install the back-up light switch and neutral position switch with harness.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Neutral position switch
(B) Back-up light switch

2) Connect the connectors of back-up light switch and neutral position switch.
3) Install the air intake chamber and cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
4) Connect the battery ground cable to battery.

2. HIGH-LOW SWITCH (DUAL-RANGE MODEL)

1) Install the high-low switch.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

2) Install the high-low switch cable to clamp.
3) Connect the connector of high-low switch.
4) Install the air intake chamber and cleaner case. <Ref. to IN(H4SO 2.0)-7, INSTALLATION, Air Cleaner Case.> <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>
5) Connect the battery ground cable to battery.

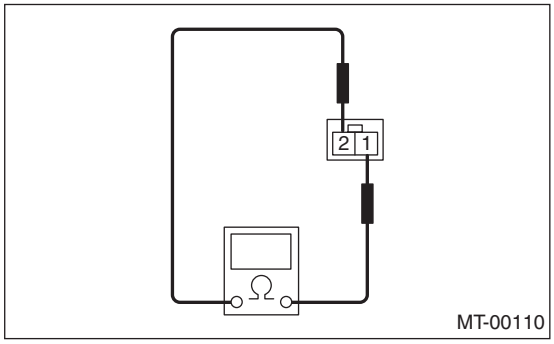
C: INSPECTION

1. BACK-UP LIGHT SWITCH

Inspect the back-up light switch. <Ref. to LI-7, INSPECTION, Back-up Light System.>

2. NEUTRAL POSITION SWITCH

1) Turn the ignition switch to OFF.
2) Disconnect the connector of neutral position switch.
3) Measure the resistance between neutral position switch terminals.



Gear shift position	Terminal No.	Specified resistance
Neutral position	1 and 2	More than 1 MΩ
Other positions		Less than 1 Ω

4) Replace the faulty parts.

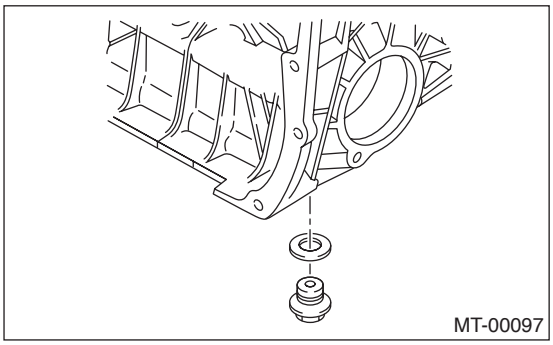
8. Preparation for Overhaul

A: PROCEDURE

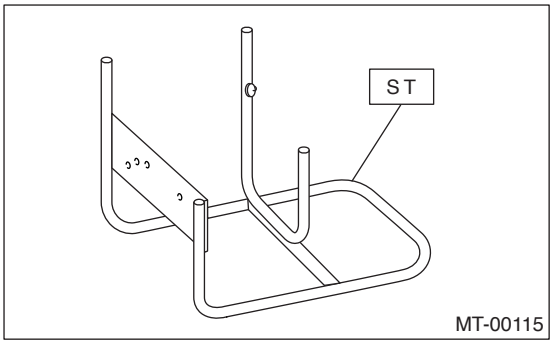
1) Clean oil, grease, dirt and dust from transmission.
2) Remove the drain plug to drain oil. Tighten the engine oil drain plug after draining.

NOTE:
Use a new gasket.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



3) Attach the transmission to ST.
ST 499937100 TRANSMISSION STAND

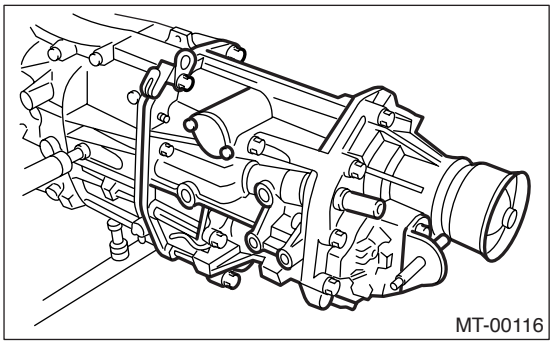


4) Rotating parts should be coated with oil prior to assembly.
5) All disassembled parts, if to be reused, should be reinstalled in the original positions and directions.
6) Always use new ones for gaskets, lock washers and lock nut.
7) Liquid gasket should be used where specified to prevent leakage.

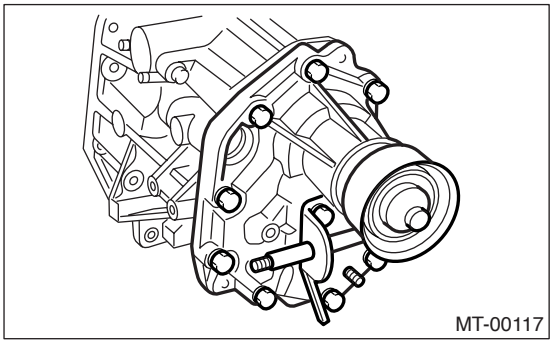
9. Transfer Case and Extension Case Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly.

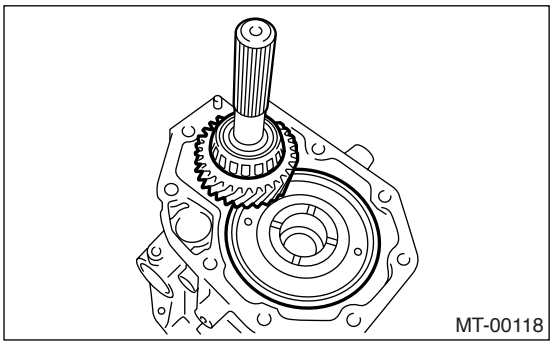

MT-00116

4) Remove the shifter arm.
5) Remove the extension case assembly.

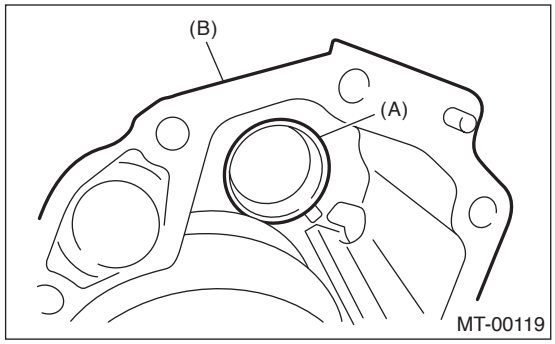

MT-00117

B: INSTALLATION

1) Install the center differential and transfer driven gear into transfer case.


MT-00118

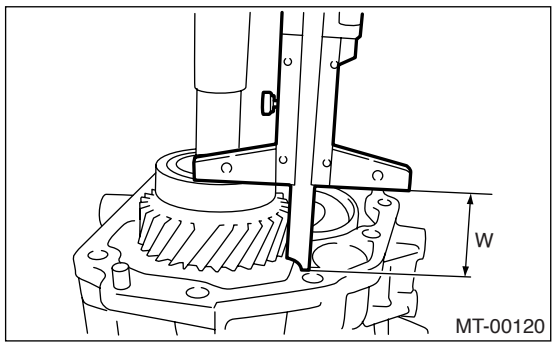
2) Remove the bearing outer race from extension case.



MT-00119

(A) Bearing outer race
(B) Extension case

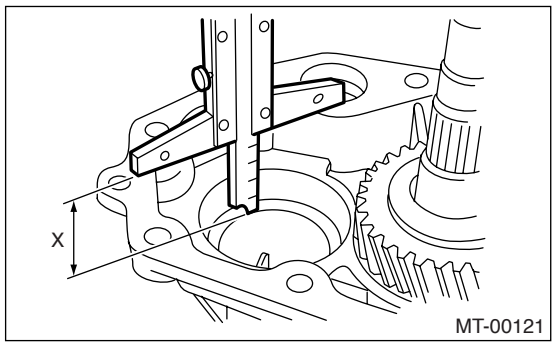
3) While pressing the bearing outer race horizontally, turn the driven shaft ten rotations.
4) Measure the height “W” between transfer case and taper roller bearing on the transfer driven gear.



MT-00120

5) Measure the depth “X” on bearing insertion part of extension case.

NOTE:
Measure with bearing outer race and thrust washer removed.



MT-00121

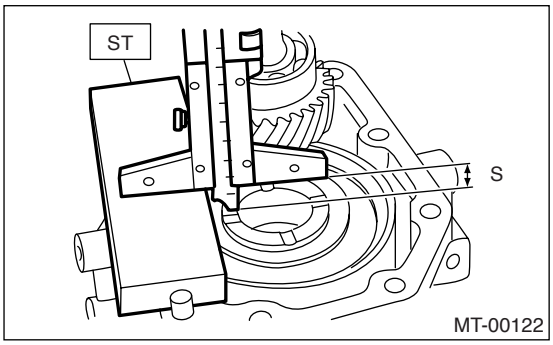
6) Calculate the tight “t” using following equation.
t = X − W + 0.2 to 0.3 mm (0.008 to 0.012 in)
7) Select the washer of nearest value in the following table:

Standard preload between thrust washer and taper roller bearing:
0.2 — 0.3 mm (0.008 — 0.012 in)

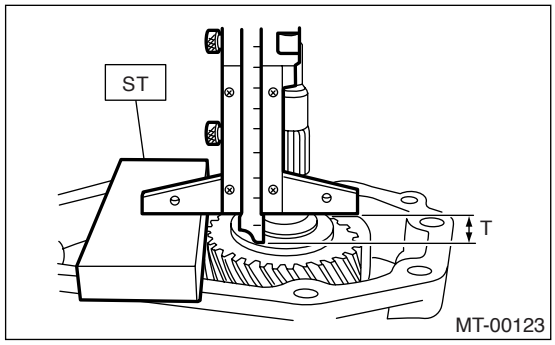
NOTE:
Be sure that the preload is within standard value.

Thrust washer (50 × 61 × t)	
Part Number	Thickness mm (in)
803050060	0.50 (0.0197)
803050061	0.55 (0.0217)
803050062	0.60 (0.0236)
803050063	0.65 (0.0256)
803050064	0.70 (0.0276)
803050065	0.75 (0.0295)
803050066	0.80 (0.0315)
803050067	0.85 (0.0335)
803050068	0.90 (0.0354)
803050069	0.95 (0.0374)
803050070	1.00 (0.0394)
803050071	1.05 (0.0413)
803050072	1.10 (0.0433)
803050073	1.15 (0.0453)
803050074	1.20 (0.0472)
803050075	1.25 (0.0492)
803050076	1.30 (0.0512)
803050077	1.35 (0.0531)
803050078	1.40 (0.0551)
803050079	1.45 (0.0571)

8) Fit the thrust washers on transfer drive shaft.
9) Install the bearing outer race into extension case.
10) Measure the depth “S” between transfer case and center differential.
ST 398643600 GAUGE



11) Measure the height “T” between extension case and transfer drive gear.
ST 398643600 GAUGE



12) Calculate the thrust washer “U” using following equation.
U = {15 mm (1.18 in) – T} – {S – 15 mm (1.18 in)} – 0.15 to 0.35 mm (0.0059 to 0.0138 in)

U mm (in)	Thickness of transfer drive gear thrust washer
T mm (in)	Height from end of ST to transfer drive gear
S mm (in)	Depth from end of transmission case to the end of ST
0.15 — 0.35 mm (0.0059 — 0.0138 in)	Standard clearance between thrust washer and transfer drive gear.
15 mm (1.18 in)	Thickness of ST

13) Select a suitable washer in the following table:

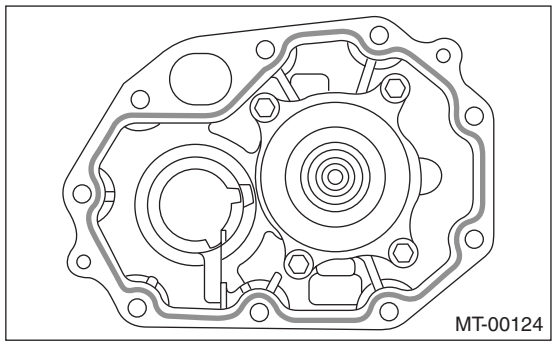
Standard clearance:
0.15 — 0.35 mm (0.0059 — 0.0138 in)

Thrust washer	
Part Number	Thickness mm (in)
803036050	0.9 (0.035)
803036054	1.0 (0.039)
803036051	1.1 (0.043)
803036055	1.2 (0.047)
803036052	1.3 (0.051)
803036056	1.4 (0.055)
803036053	1.5 (0.059)
803036057	1.6 (0.063)
803036058	1.7 (0.067)

14) Fit the thrust washer on center differential.

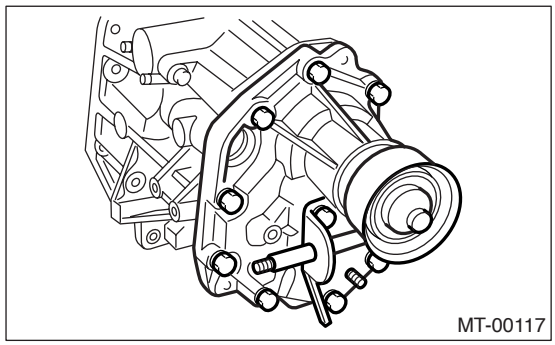
15) Apply proper amount of liquid gasket to the transfer case mating surface.

Liquid gasket
THREE BOND 1215 (Part No. 004403007) or equivalent

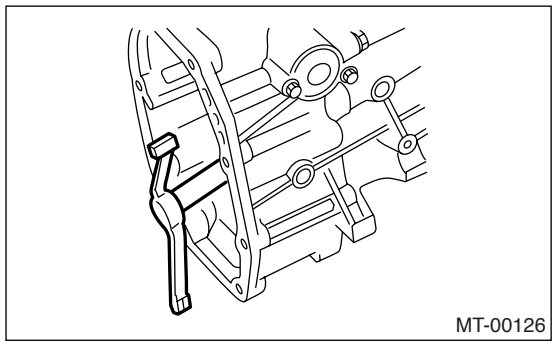

MT-00124

16) Install the extension assembly into transfer case.

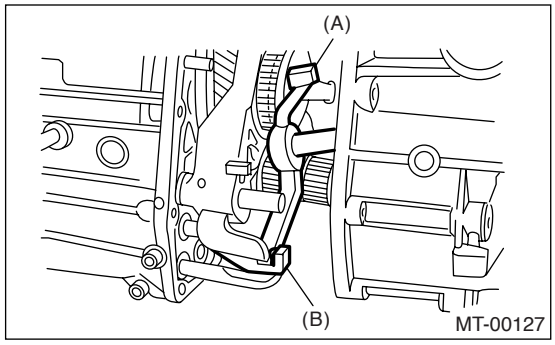
Tightening torque:
40 N·m (4.1 kgf-m, 29.7 ft-lb)


MT-00117

17) Install the shifter arm to transfer case.


MT-00126

18) Hang the shifter arm on 3rd-4th fork rod.

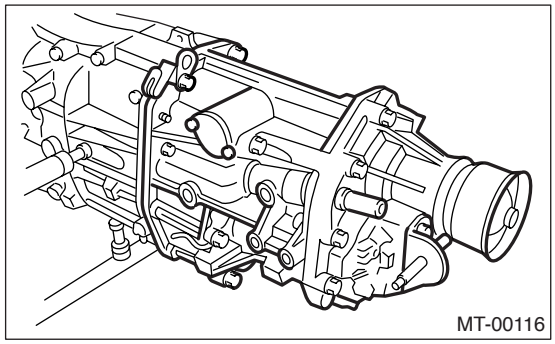


MT-00127

(A) Shifter arm
(B) 3rd-4th fork rod

19) Install the transfer case with extension case assembly to transmission case.

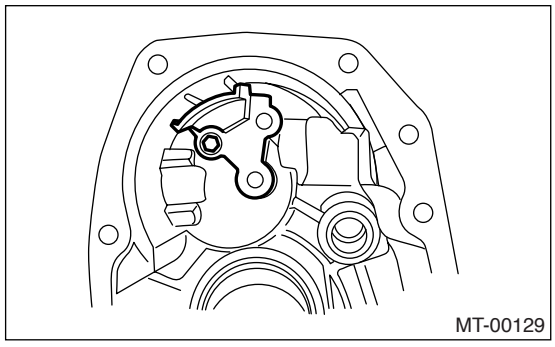
Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)


MT-00116

C: DISASSEMBLY

1. TRANSFER CASE

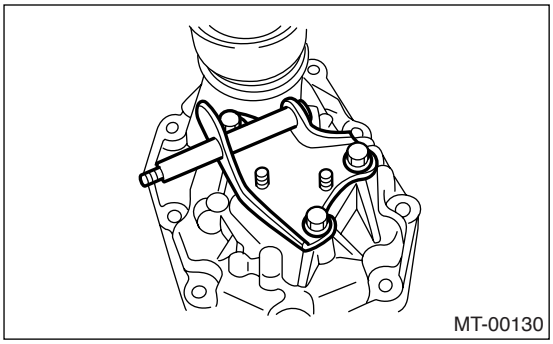
1) Remove the reverse check assembly. <Ref. to 5MT-53, REMOVAL, Reverse Check Sleeve.>
2) Remove the oil guide.


MT-00129

2. EXTENSION CASE

1) Remove the transfer drive gear assembly. <Ref. to 5MT-48, REMOVAL, Transfer Drive Gear.>

2) Remove the shift bracket.


MT-00130

3) Remove the oil seal from extension case. <Ref. to 5MT-39, Oil Seal.>

D: ASSEMBLY

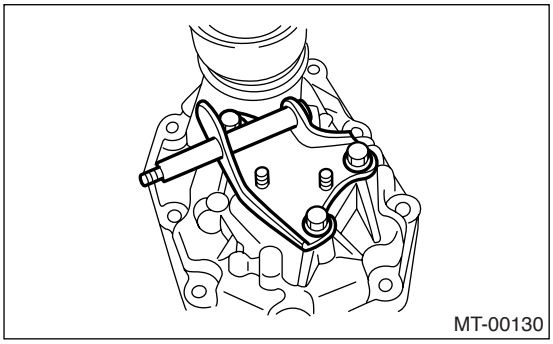
1. EXTENSION CASE

1) Using the ST, install the oil seal to extension case. <Ref. to 5MT-39, Oil Seal.>

NOTE:
Use a new oil seal.

2) Install the shift bracket to extension case.

Tightening torque:
25 N·m (2.5 kgf-m, 18.4 ft-lb)

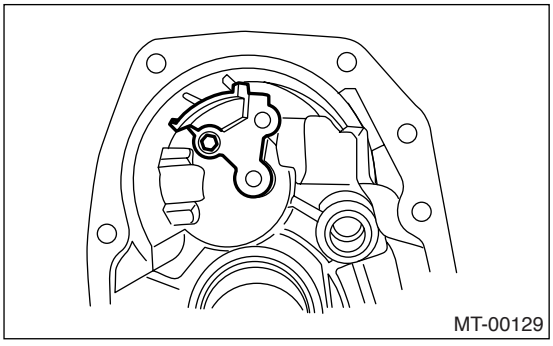

MT-00130

3) Install the transfer drive gear to extension case. <Ref. to 5MT-48, INSTALLATION, Transfer Drive Gear.>

2. TRANSFER CASE

1) Install the oil guide to transfer case.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)

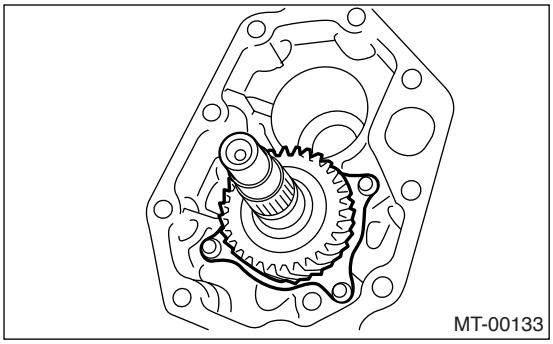

MT-00129

2) Install the reverse check sleeve assembly to transfer case. <Ref. to 5MT-53, INSTALLATION, Reverse Check Sleeve.>

10.Transfer Drive Gear

A: REMOVAL

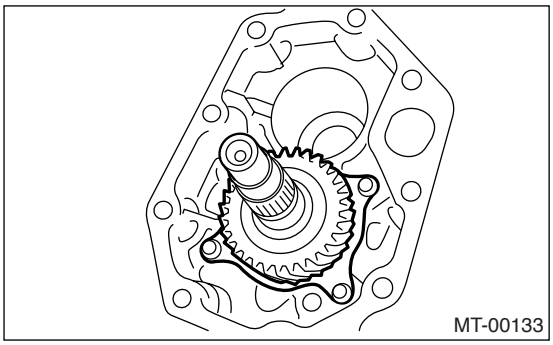
1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.
6) Remove the transfer drive gear.


MT-00133

B: INSTALLATION

1) Install the transfer drive gear.

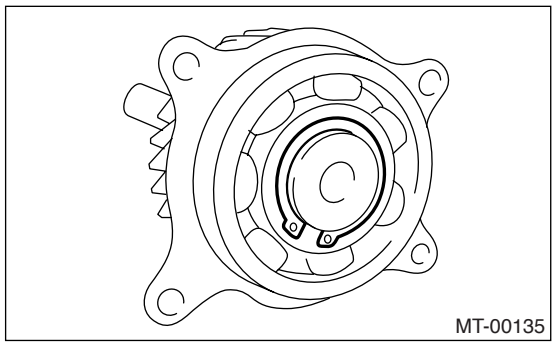
Tightening torque:
26 N·m (2.7 kgf-m, 20 ft-lb)


MT-00133

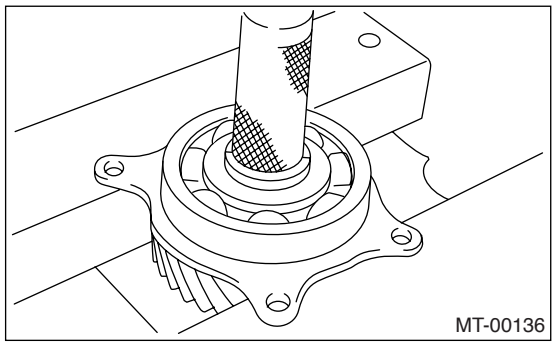
2) Install the transfer driven gear.
3) Install the extension case assembly.
4) Install the transfer case and extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Remove the snap ring.


MT-00135

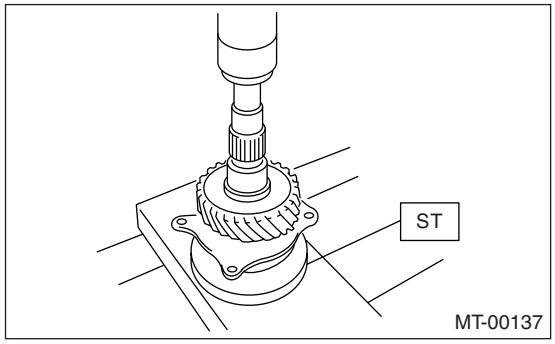
2) Remove the ball bearing.


MT-00136

D: ASSEMBLY

1) Set the ST applying to the inner race of bearing to install the drive shaft.
ST 398177700 INSTALLER

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



MT-00137

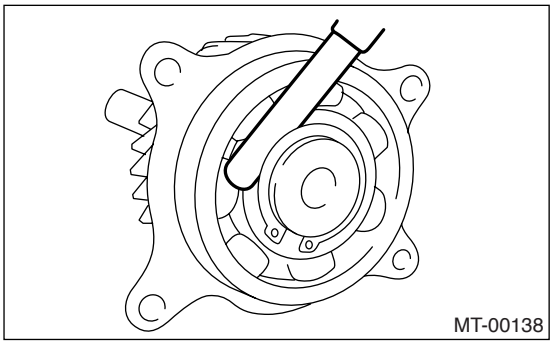
2) Install the snap ring on transfer drive shaft.
3) Inspect the clearance between snap ring and ball bearing. <Ref. to 5MT-48, INSPECTION, Transfer Drive Gear.>

E: INSPECTION

1) Bearings
Replace the bearing in following cases:
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

2) Drive gear
Replace the drive gear when their tooth surface and shaft are excessively broken or damaged.
3) Measure the clearance between snap ring and inner race of ball bearing with a thickness gauge.

Clearance:
0.01 — 0.15 mm (0.0004 — 0.0059 in)



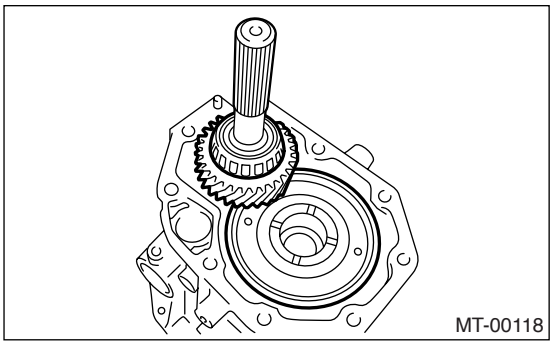
If the measurement is not within specification, select a suitable snap ring and replace it.

Snap ring (Outer-30)	
Part Number	Thickness mm (in)
805030041	1.53 (0.0602)
805030042	1.65 (0.0650)
805030043	1.77 (0.0697)

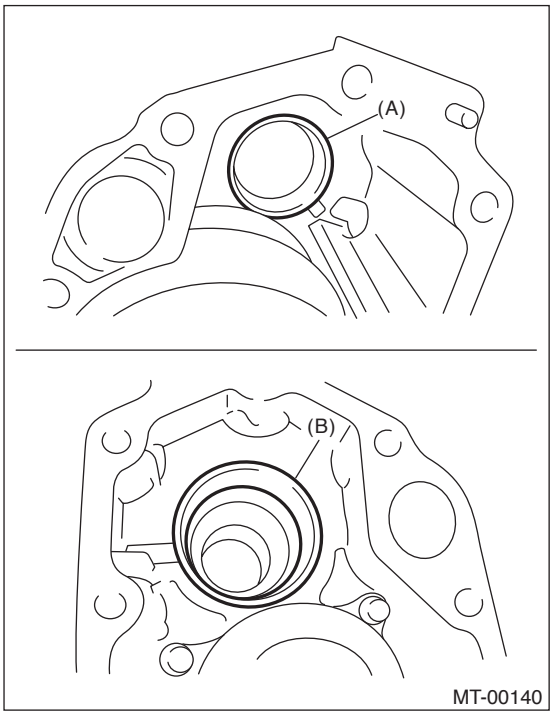
11.Transfer Driven Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the extension case assembly.
5) Remove the transfer driven gear.



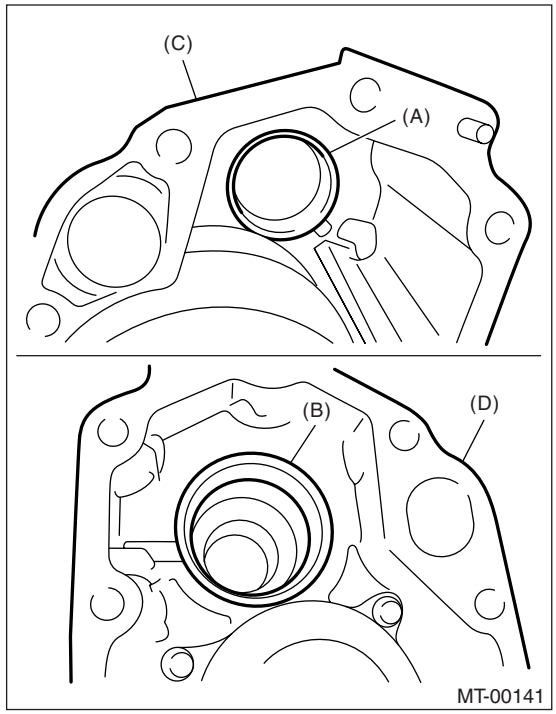
6) Remove the bearing outer races from the extension case and transfer case.



(A) Bearing outer race (Transfer case side)
(B) Bearing outer race (Extension case side)

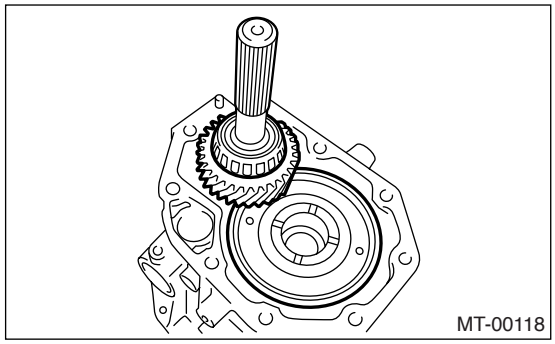
B: INSTALLATION

1) Install the bearing outer races to the extension case and transfer case.



(A) Bearing outer race
(B) Bearing outer race
(C) Transfer case
(D) Extension case

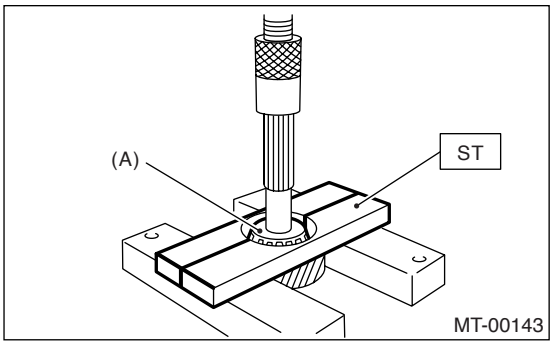
2) Install the transfer driven gear.



3) Install the transfer case and extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
5) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

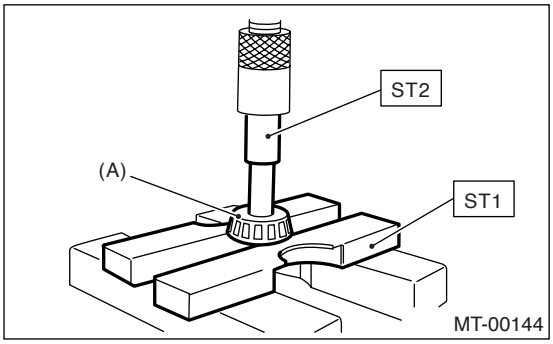
C: DISASSEMBLY

1) Using the ST, remove the roller bearing (extension case side).
ST 498077000 REMOVER



(A) Roller bearing

2) Using the ST1 and ST2, remove the roller bearing (transfer case side).
ST1 498077000 REMOVER
ST2 899864100 REMOVER

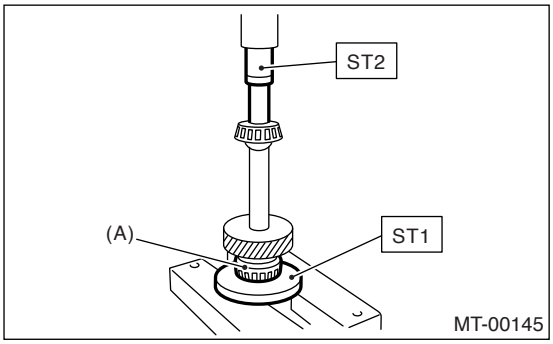


(A) Roller bearing

D: ASSEMBLY

1) Using the ST, install the roller bearing (extension case side).
ST1 398177700 INSTALLER
ST2 899864100 REMOVER

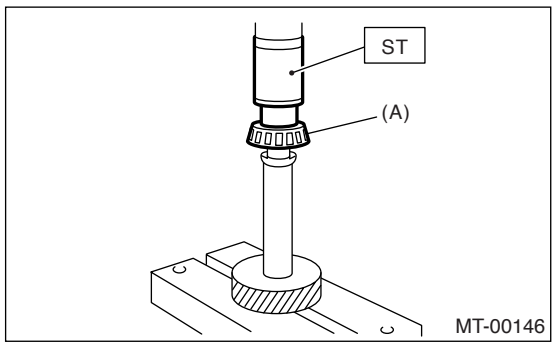
NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

2) Using the ST, install the roller bearing (transfer case side).
ST 499757002 INSTALLER

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Roller bearing

E: INSPECTION

1) Bearings
Replace the bearing in following cases:
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.

2) Driven gear
Replace the drive gear when their tooth surface and shaft are excessively broken or damaged.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

MANUAL TRANSMISSION AND DIFFERENTIAL

5MT

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12.Center Differential

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transfer driven gear. <Ref. to 5MT-50, REMOVAL, Transfer Driven Gear.>
5) Remove the center differential.

B: INSTALLATION

1) Install the center differential into transfer case.
2) Install the transfer driven gear. <Ref. to 5MT-50, INSTALLATION, Transfer Driven Gear.>
3) Install the extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
4) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
6) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

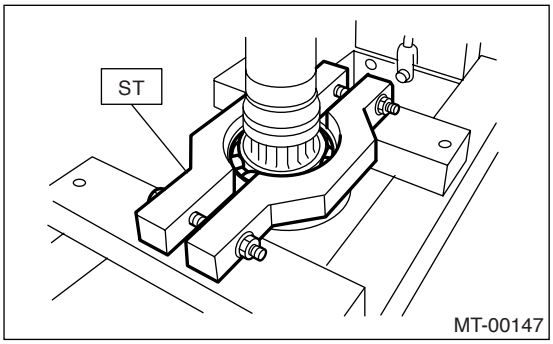
C: DISASSEMBLY

NOTE:
Center differential is a non-disassembled part which should not be disassembled.

Remove the ball bearing using ST.

NOTE:
Do not reuse the ball bearing.

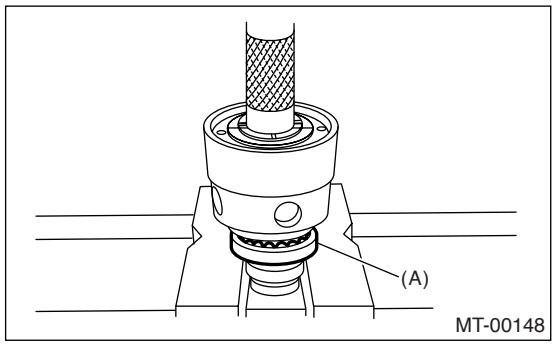
ST 498077300 CENTER DIFFERENTIAL BEARING REMOVER



D: ASSEMBLY

Install the ball bearing into center differential assembly.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).



(A) Ball bearing

E: INSPECTION

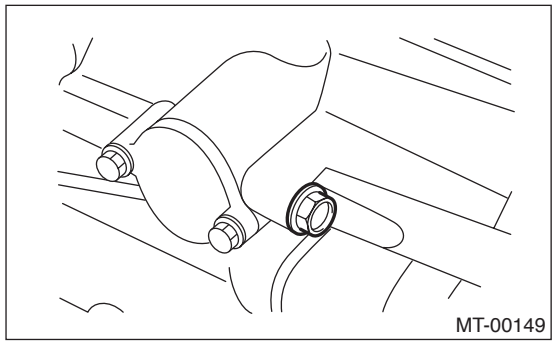
1) Bearings
Replace the bearing in following cases:
- In case of broken or rusty bearings
- In case of worn or damaged bearings
- When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
- When bearings have other defects.

2) Center differential
Replace the center differential case assembly if worn or damaged.

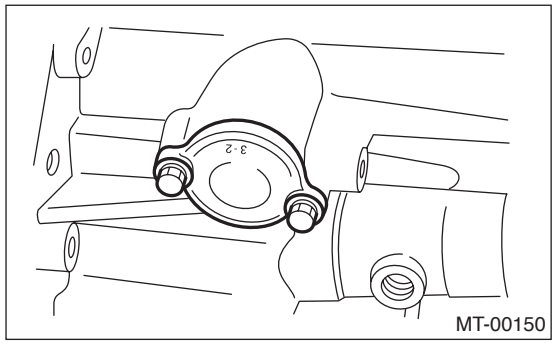
13.Reverse Check Sleeve

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the shifter arm.
4) Remove the plug, spring, washer and reverse check ball.


MT-00149

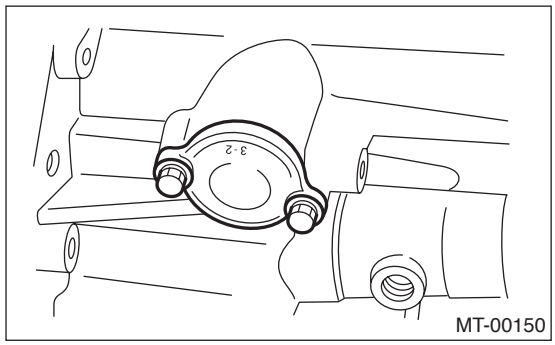
5) Remove the reverse check sleeve.


MT-00150

B: INSTALLATION

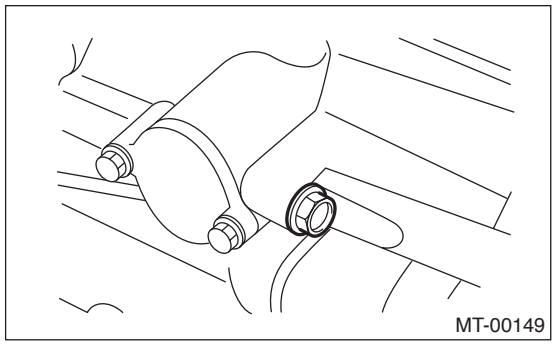
1) Install the reverse check sleeve.

Tightening torque:
6.4 N·m (0.65 kgf-m, 4.7 ft-lb)


MT-00150

2) Install the ball, spring, washer and plug to transfer case.

Tightening torque:
10 N·m (1.0 kgf-m, 7.4 ft-lb)

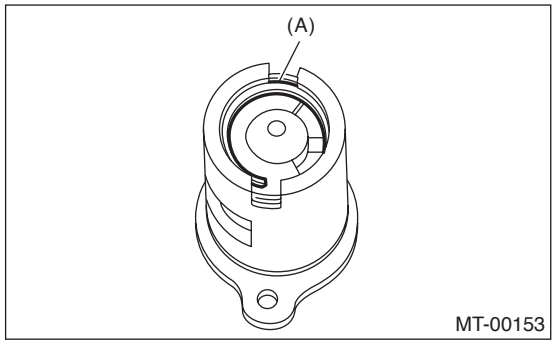

MT-00149

3) Install the shifter arm to transfer case assembly.
4) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

1) Cover the reverse check sleeve with a rag, and remove the snap ring using a screwdriver.

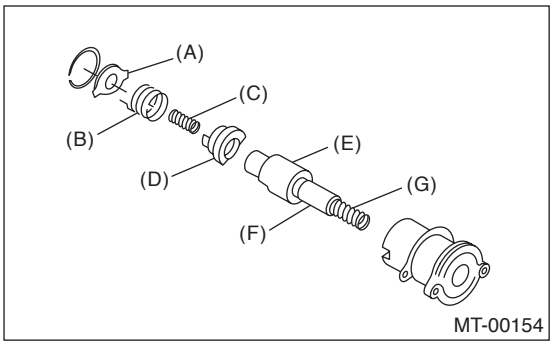
NOTE:
Replace the snap ring with a new one if it is deformed or reactive force is weakened.



MT-00153

(A) Snap ring

2) Remove the reverse check plate, reverse check spring, reverse check cam, return spring (5th-Rev), reverse accent shaft, return spring cap and return spring (1st-2nd).



(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

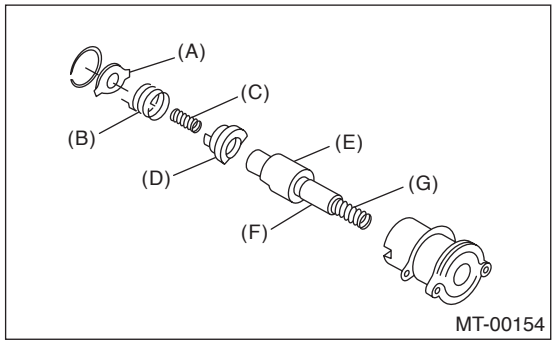
3) Remove the O-ring.

NOTE:
• Visually check the O-ring. Replace if defective.
• Be careful not to break adjustment shim placed between reverse check sleeve assembly and case.

D: ASSEMBLY

1) Install the return spring (1st-2nd), return spring cap, reverse accent shaft, check cam, return spring (5th-Rev.) and reverse check spring onto reverse check sleeve.

NOTE:
Be sure to position the bent section of reverse check spring in the groove in check cam.

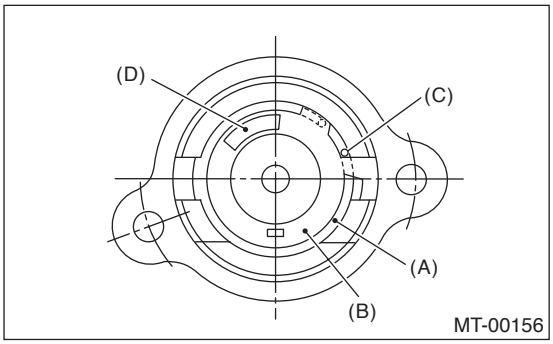


(A) Reverse check plate
(B) Reverse check spring
(C) Return spring (5th-Rev)
(D) Reverse check cam
(E) Reverse accent shaft
(F) Return spring cap
(G) Return spring (1st-2nd)

2) Hook the bent section of reverse check spring over reverse check plate.
3) Rotate the cam so that the protrusion of reverse check cam is at the opening in plate.
4) With cam held in that position, install the reverse check plate onto reverse check sleeve and hold with snap ring.
5) Position the O-ring in the groove in sleeve.

E: INSPECTION

• Make sure the cutout of reverse accent shaft is aligned with the opening in reverse check sleeve.
• Check the cam for smooth rotation by turning with hand.
• Make sure the cam and shaft move all the way toward plate and release.
If the cam does not return properly, replace the reverse check spring. If the shaft does not return, check for scratches on the inner surface of sleeve. If the sleeve is in good order, replace the spring.



(A) Snap ring
(B) Reverse check plate
(C) Checking spring
(D) Check cam

• Select a suitable reverse accent shaft and reverse check plate. <Ref. to 5MT-55, ADJUSTMENT, Reverse Check Sleeve.>

F: ADJUSTMENT

1. NEUTRAL POSITION ADJUSTMENT

1) Shift the gear into 3rd gear position.
2) Shifter arm turns lightly toward the 1st/2nd gear side but heavily toward the reverse gear side because of the function of return spring, until arm contacts the stopper.
3) Make adjustment so that the heavy stroke (reverse side) is a little more than the light stroke (1st/2nd side).
4) To adjust, remove the bolts holding reverse check sleeve assembly to the case, move the sleeve assembly outward, and place the adjustment shim between sleeve assembly and case to adjust the clearance.

CAUTION:
Be careful not to break O-ring when placing shim(s).

NOTE:
• When the shim is removed, the neutral position will move closer to reverse; when the shim is added, the neutral position will move closer to 1st gear.
• If the shims alone cannot adjust the clearance, replace the reverse accent shaft and re-adjust.

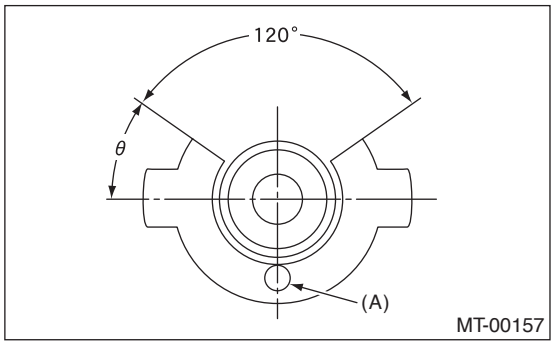
Adjusting shim	
Part Number	Thickness mm (in)
32190AA000	0.15 (0.0059)
32190AA010	0.30 (0.0118)

Reverse accent shaft		
Part No.	Mark	Remarks
32188AA090	3	Neutral position is closer to 1st.
32188AA100	0	Standard
32188AA110	1	Neutral position is closer to reverse gear.

2. REVERSE CHECK PLATE ADJUSTMENT

1) Shift the shifter arm to “5th” and then to reverse to see if reverse check mechanism operates properly.
2) Also check to see if the arm returns to neutral when released from the reverse position. If the arm does not return properly, replace the reverse check plate.

Reverse check plate			
Part Number	(A): No.	Angle θ	Remarks
32189AA000	0	28°	Arm stops closer to 5th gear.
32189AA010	1	31°	Arm stops closer to 5th gear.
32189AA020	2	34°	Arm stops in the center.
32189AA030	3	37°	Arm stops closer to reverse gear.
32189AA040	4	40°	Arm stops closer to reverse gear.

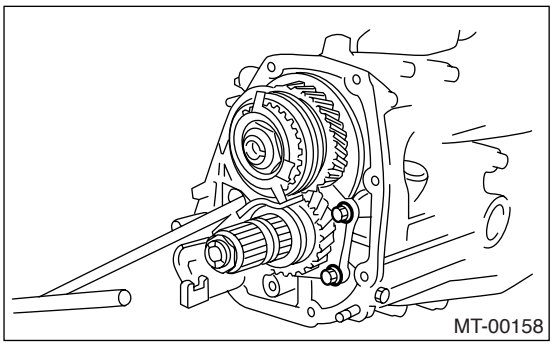


14.Transmission Case

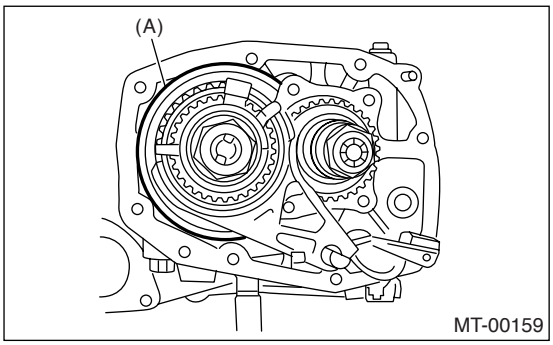
A: REMOVAL

1. SINGLE-RANGE MODEL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-18, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the bearing mounting bolts.


MT-00158

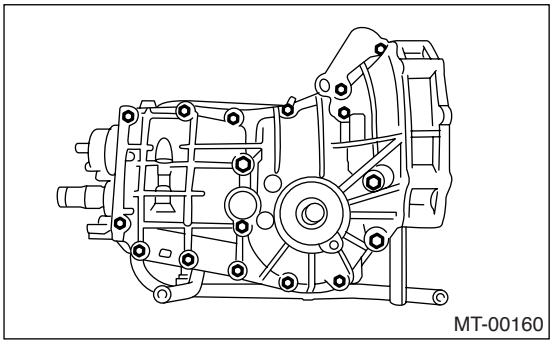
5) Remove the main shaft rear plate.



MT-00159

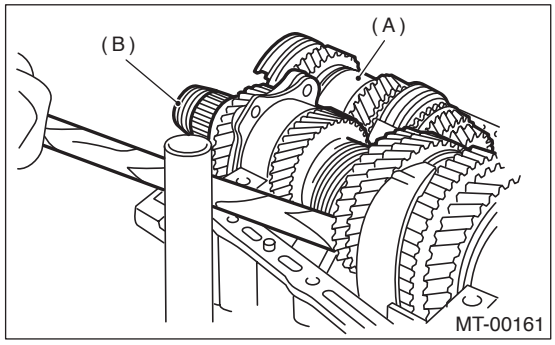
(A) Main shaft rear plate

6) Separate the transmission case into the right and left cases by loosening coupling bolts and nuts.


MT-00160

7) Remove the drive pinion shaft assembly from the left side of transmission case.

NOTE:
Use a hammer handle, etc. to remove if too tight.

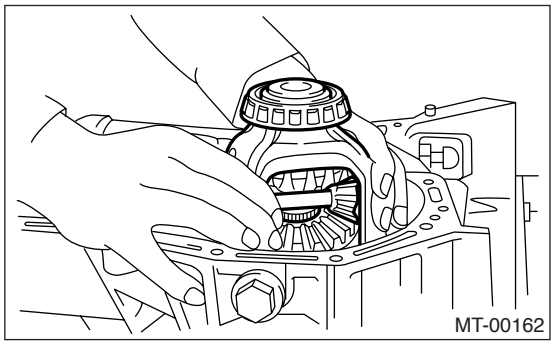


MT-00161

(A) Main shaft ASSY for single-range
(B) Drive pinion shaft ASSY

8) Remove the main shaft assembly for single-range.
9) Remove the differential assembly.

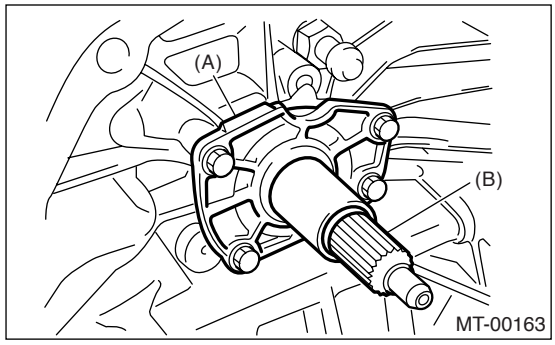
NOTE:
• Be careful not to confuse right and left roller bearing outer races.
• Be careful not to damage the oil seal of retainer.


MT-00162

2. DUAL-RANGE MODEL

1) Remove the manual transmission assembly from vehicle. **<Ref. to 5MT-31,** REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch release lever. <Ref. to CL-18, REMOVAL, Release Bearing and Lever.>
3) Remove the transfer case with extension case assembly. **<Ref. to 5MT-44,** REMOVAL, Transfer Case and Extension Case Assembly.>

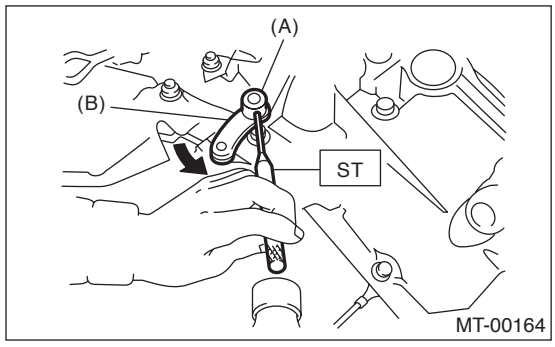
4) Remove the input shaft holder.



(A) Input shaft holder
(B) Input shaft

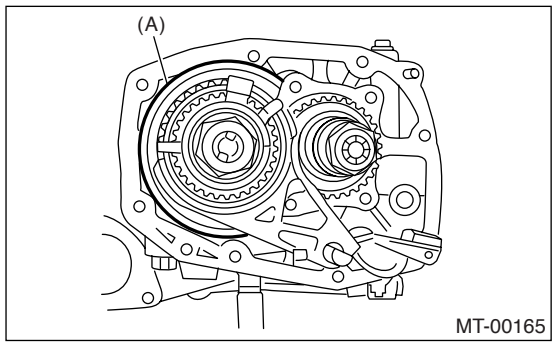
5) Remove the high-low switch. **<Ref. to 5MT-41,** REMOVAL, Switches and Harness.>
6) Using the ST, drive out the straight pin, and remove the high-low shifter lever.
ST 398791700 STRAIGHT PIN REMOVER 2

NOTE:
When driving out the straight pin, remove it in the direction that it does not hit against transmission case.



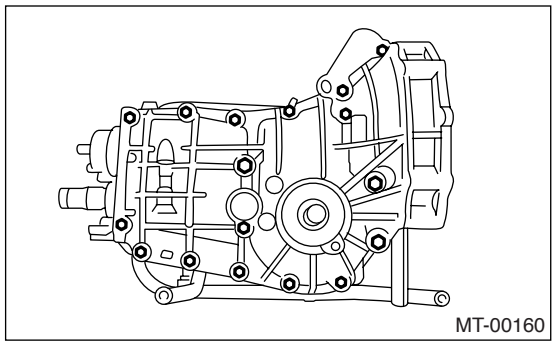
(A) Straight pin
(B) High-low shifter lever

7) Remove the main shaft rear plate.



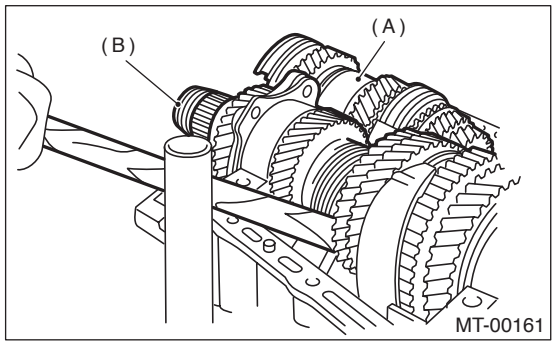
(A) Main shaft rear plate

8) Separate the transmission case into right and left cases by loosening the seventeen coupling bolts and nuts.



9) Remove the drive pinion shaft assembly from transmission case LH.

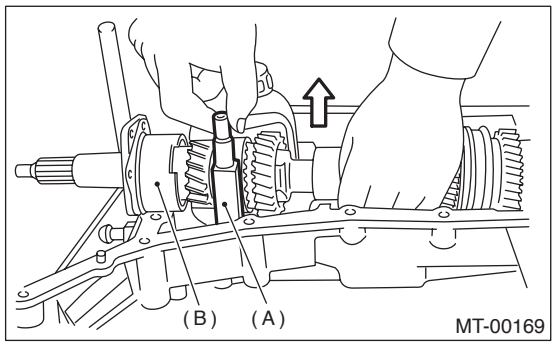
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft ASSY for dual-range
(B) Drive pinion shaft ASSY

10) Removing high-low shifter fork:
Raise the main shaft assembly slightly, and remove the high-low shifter fork together with high-low shifter shaft and washer.

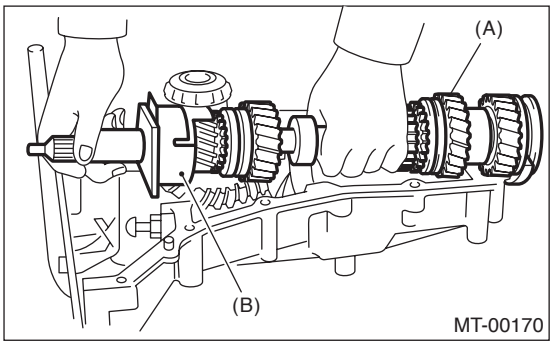
NOTE:
Be careful not to drop the two high-low shifter pieces.



(A) High-low shifter fork
(B) Input shaft ASSY

11) Remove the main shaft assembly and input shaft assembly.

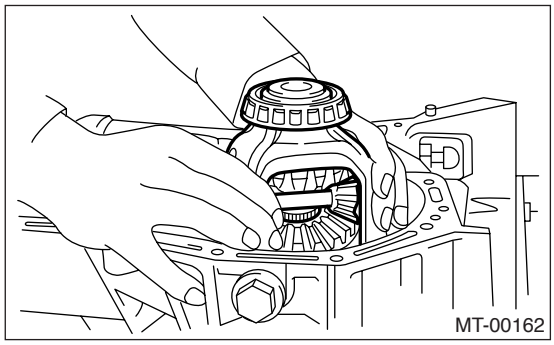
NOTE:
Be careful not to drop the input shaft and main shaft as they are separable.



(A) Main shaft ASSY
(B) Input shaft ASSY

12) Remove the differential assembly.

NOTE:
• Be careful not to confuse the right and left roller bearing outer races.
• Be careful not to damage the retainer oil seal.



B: INSTALLATION

1. SINGLE-RANGE MODEL

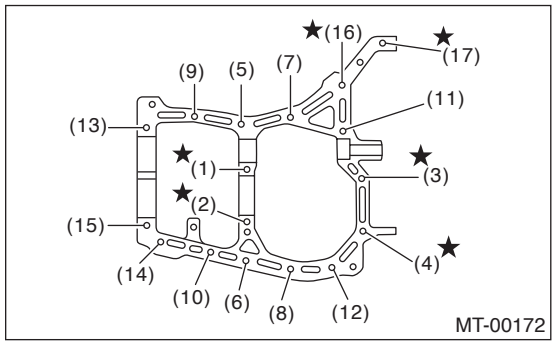
1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.
2) Install the front differential assembly.
3) Install the main shaft assembly for single-range.
Install the transmission case knock pin into needle bearing knock pin hole.
4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into roller bearing knock pin hole.
5) Apply liquid gasket, and then put the case RH and LH together.

Liquid gasket
THREE BOND 1215 (Part No. 004403007) or equivalent

6) Tighten seventeen bolts with bracket, clip, etc. as shown in the figure.

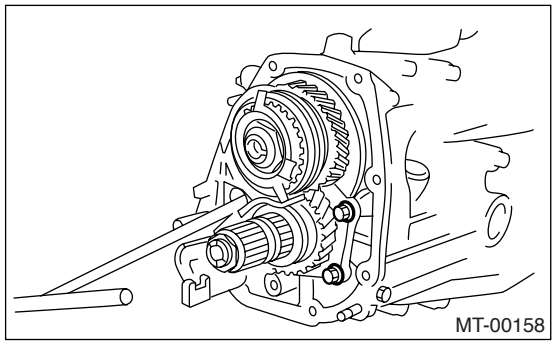
NOTE:
• Insert the bolts from the bottom and tighten nuts on the top.
• Put the cases together being careful that the drive pinion shim and input shaft holder shim are not caught up in between.

Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.1 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



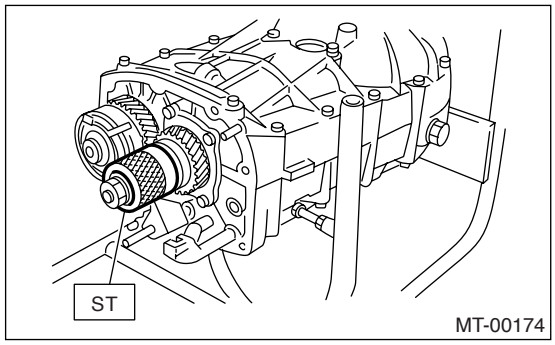
7) Tighten the ball bearing mounting bolts.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Backlash adjustment of hypoid gear and preload adjustment of roller bearing:

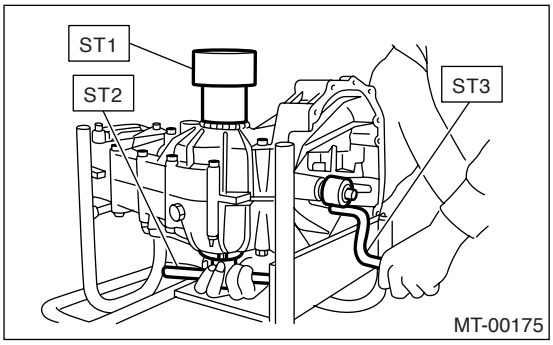
NOTE:
Set the ST on drive pinion assembly.
ST 498427100 STOPPER



9) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.

10) Screw the retainer assembly into left case from the bottom with ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

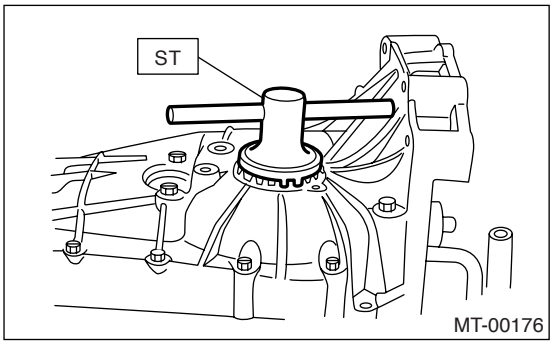
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



11) Remove the weight, and screw in the retainer without O-ring on the upper side and stop at the point where slight resistance is felt.

NOTE:
At this condition, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



12) Install the lock plate. Loosen the retainer on the lower side by 1-1/2 notches from lock plate, and turn the retainer on the upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

13) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

14) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

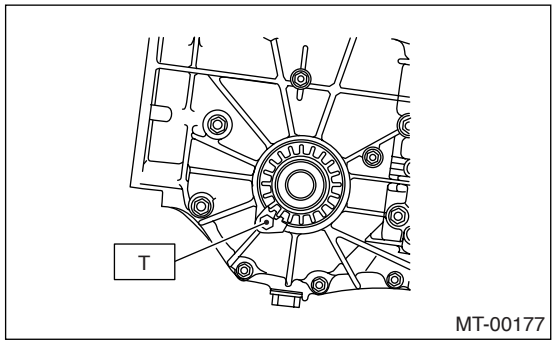
15) Turn the transmission main shaft several times while tapping around retainer lightly with plastic hammer.

16) Inspect and adjust the backlash and tooth contact of hypoid gear. <Ref. to 5MT-88, INSPECTION, Front Differential Assembly.>

17) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit O-ring into the groove and tighten the retainer into the position where retainer has been tightened in.
Tighten the lock plate.

NOTE:
Carry out this job on both upper and lower retainers.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



18) Selecting of main shaft rear plate: <Ref. to 5MT-66, ADJUSTMENT, Main Shaft Assembly for Single-Range.>

19) Install the clutch release lever and bearing. <Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>

20) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

2. DUAL-RANGE MODEL

1) Wipe off grease, oil and dust on the mating surfaces of transmission cases with white gasoline.

2) Install the front differential assembly.

3) Install the main shaft assembly for dual-range and the input shaft assembly.
Connect the main shaft assembly for dual-range with the input shaft assembly, and install the transmission case knock pin into needle bearing knock pin hole.

4) Install the drive pinion shaft assembly.
Install the transmission case knock pin into roller bearing knock pin hole.

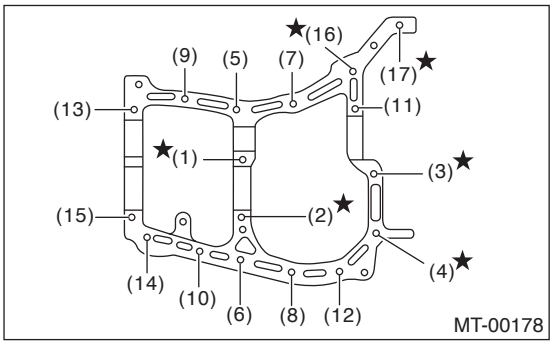
5) Apply liquid gasket, and then put the case right side and left side together.

Liquid gasket:
THREE BOND (Part No. 004403007) 1215 or equivalent

6) Tighten the seventeen bolts with bracket, clip, etc. as shown in the figure.

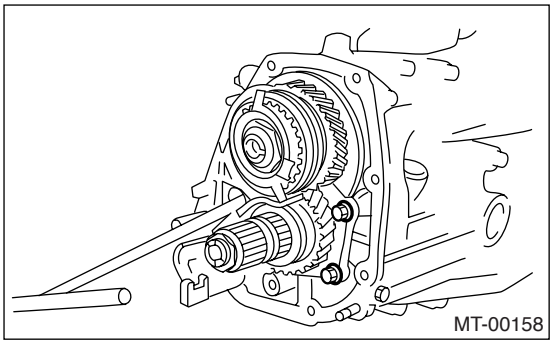
NOTE:
• Insert the bolts from the bottom and tighten the nuts at the top.
• Put the cases together being careful that the drive pinion shim and input shaft holder shim are not caught up in between.

Tightening torque:
8 mm bolt
25 N·m (2.5 kgf-m, 18.1 ft-lb)
★ 10 mm bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)



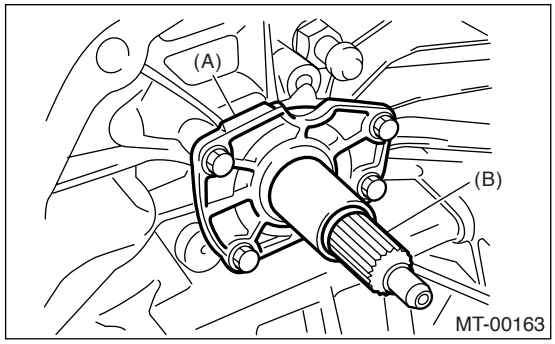
7) Tighten the ball bearing mounting bolts.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



8) Tighten the input shaft holder attaching bolts.

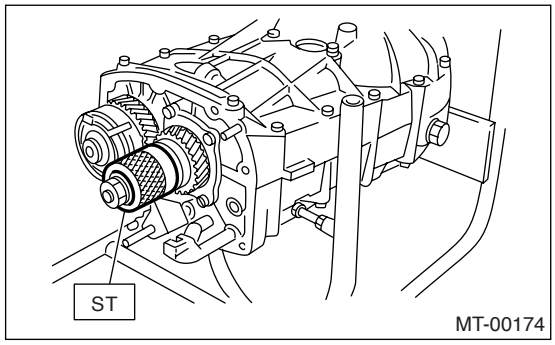
Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)



(A) Input shaft holder
(B) Input shaft

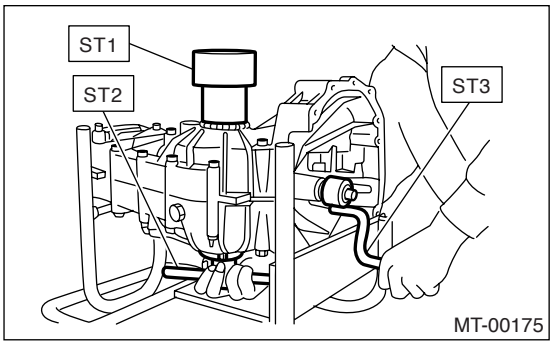
9) Backlash adjustment of hypoid gear and preload adjustment of roller bearing

NOTE:
Set the ST to drive pinion assembly.
ST 498427100 STOPPER



10) Place the transmission with the left side of case facing downward, and put ST1 on bearing cup.
11) Screw the retainer assembly into left case from the bottom using ST2. Fit the ST3 on transmission main shaft. Shift the gear into 4th or 5th and turn the shaft several times. Screw in the retainer while turning ST3 until a slight resistance is felt on ST2. This is the contact point of hypoid gear and drive pinion shaft. Repeat the above sequence several times to ensure the contact point.

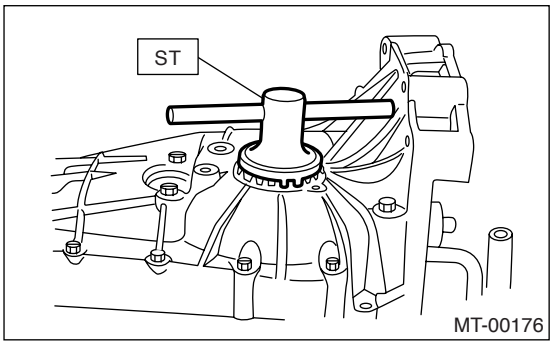
ST1 399780104 WEIGHT
ST2 499787000 WRENCH ASSY
ST3 499927100 HANDLE



12) Remove the weight, and screw in the retainer without O-ring on upper side and stop at the point where slight resistance is felt.

NOTE:
In this condition, the backlash between hypoid gear and drive pinion shaft is zero.

ST 499787000 WRENCH ASSY



13) Fit the lock plate. Loosen the retainer on the lower side by 1-1/2 notches of lock plate and turn in the retainer on upper side by the same amount in order to obtain the backlash.

NOTE:
The notch on the lock plate moves by 1/2 notch if the plate is turned upside down.

14) Turn in the retainer on the upper side additionally by 1 notch in order to apply preload on taper roller bearing.

15) Tighten temporarily both the upper and lower lock plates and mark both holder and lock plate for later readjustment.

16) Turn the transmission main shaft several times while tapping around the retainer lightly with plastic hammer.

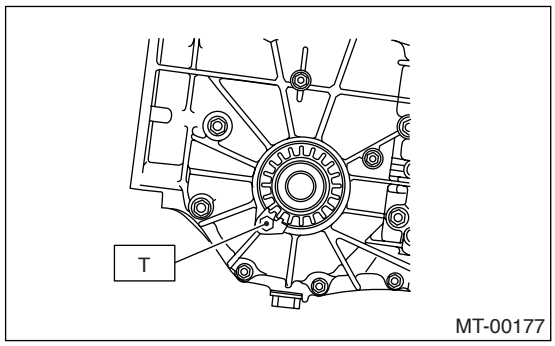
17) Inspect and adjust the backlash and tooth contact of hypoid gear. **<Ref. to 5MT-88,** INSPECTION, Front Differential Assembly.>

18) After checking the tooth contact of hypoid gears, remove the lock plate. Then loosen the retainer until the O-ring groove appears. Fit the O-ring into groove and tighten the retainer into the position where retainer has been tightened in.

Tighten the lock plate.

NOTE:
Carry out this job on both upper and lower retainers.

Tightening torque:
T: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



19) Selection of main shaft rear plate: **<Ref. to 5MT-66,** ADJUSTMENT**, Main Shaft Assembly for Single-Range.>**

20) Install the transfer case with extension case assembly. **<Ref. to 5MT-44,** INSTALLATION, Transfer Case and Extension Case Assembly.>

21) Install the clutch release lever and bearing.
<Ref. to CL-18, INSTALLATION, Release Bearing and Lever.>

22) Install the manual transmission assembly into vehicle. **<Ref. to 5MT-33,** INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

Check the transmission case for cracks, damage, or oil leaks.

15.Main Shaft Assembly for Single-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly for single range.

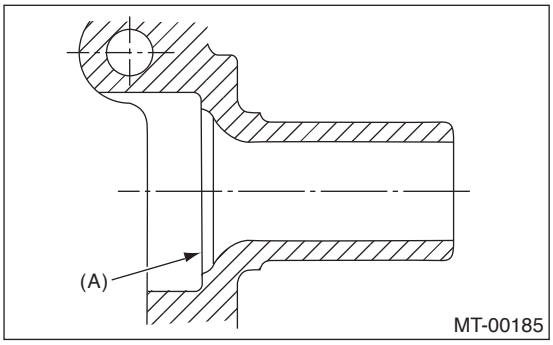
B: INSTALLATION

1) Install the needle bearing and oil seal onto the front of transmission main shaft assembly for single range.

NOTE:
• Wrap the clutch splined section with vinyl tape to prevent damage to oil seal.
• Apply grease (UNILUBE #2 or equivalent) to the sealing lip of oil seal.
• Use a new oil seal.

2) Install the transmission case knock pin into needle bearing outer race knock pin hole.

NOTE:
Align the end face of seal with surface (A) when installing oil seal.



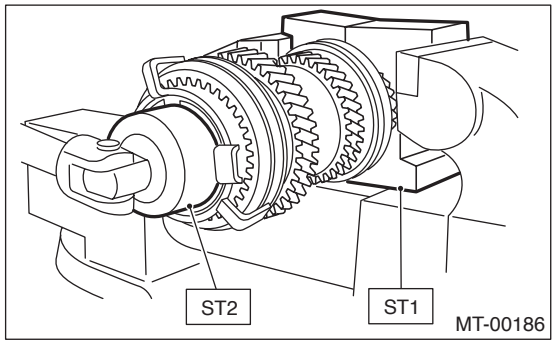
3) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
4) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
5) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
6) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

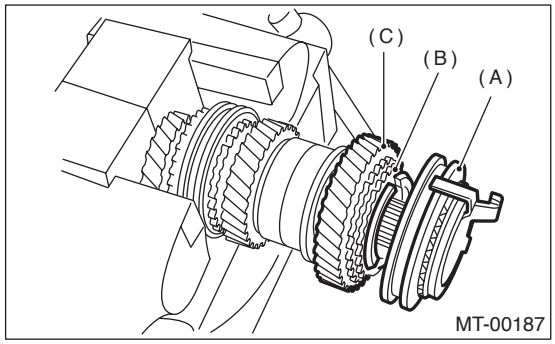
1) Put the vinyl tape around main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly for single range.

NOTE:
Unlock the caulking before removing lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

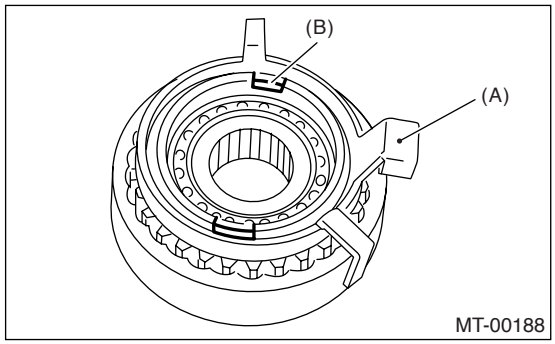


3) Remove the 5th-Rev sleeve & hub assembly, baulk ring, 5th drive gear & needle bearing.



(A) 5th-Rev sleeve & hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve & hub assembly.

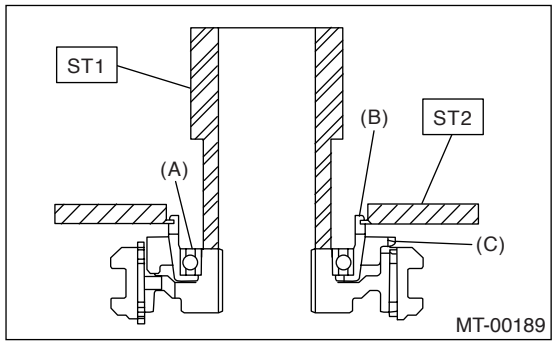


(A) Synchro cone stopper
(B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• When replacing the sleeve & hub with new ones, replace them as a set.
• Do not disassemble the sleeve & hub, because the aligning position is specified.
• If it is necessary to disassemble, mark the engaging points on the splines beforehand.
• Do not reuse the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

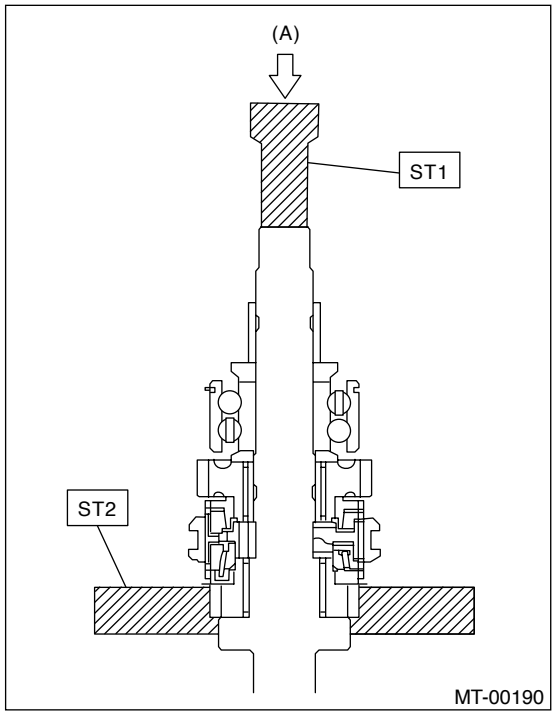


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove the rest of parts.

NOTE:
• When replacing the sleeve & hub with new ones, replace them as a set.
• Do not disassemble the sleeve & hub, because the aligning position is specified.
• If it is necessary to disassemble, mark the engaging points on the splines beforehand.

ST1 899864100 REMOVER
ST2 899714110 REMOVER

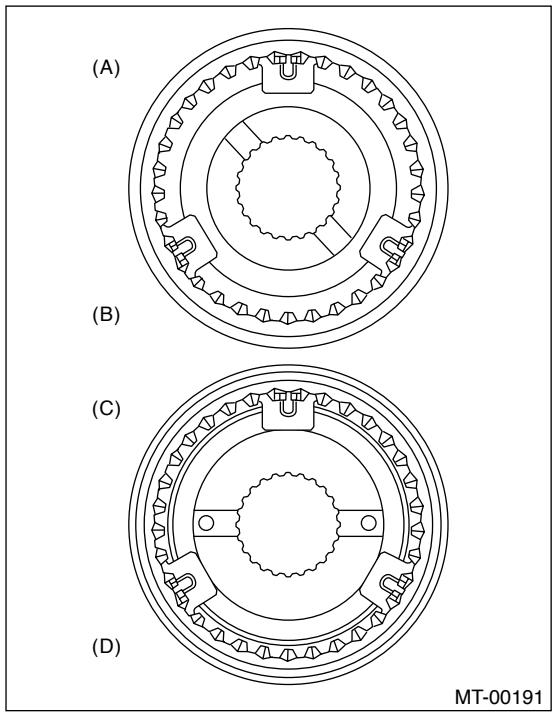


(A) Push

D: ASSEMBLY

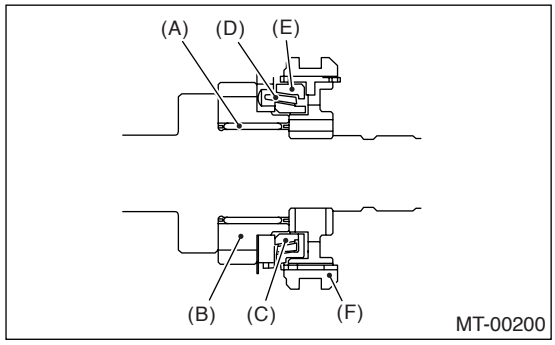
1) When the sleeve & hub assemblies have been disassembled, reassemble with aligning each engaging point.

NOTE:
Position open ends of spring 120° apart.



(A) 3rd-4th hub ASSY
(B) 3rd gear side
(C) 5th-Rev hub ASSY
(D) 5th gear side

2) Install the 3rd drive gear, baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.0 L model)
3) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.5 L model)



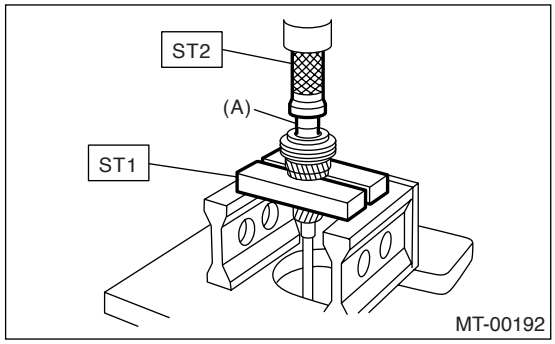
(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve & hub ASSY

NOTE:
Align the groove in baulk ring with shifting insert.

4) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

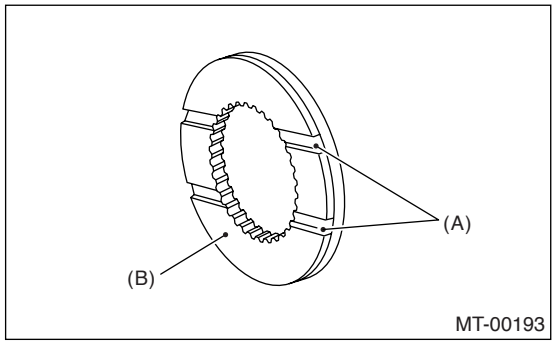
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

5) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Align the baulk ring and gear & hub assembly with key groove.

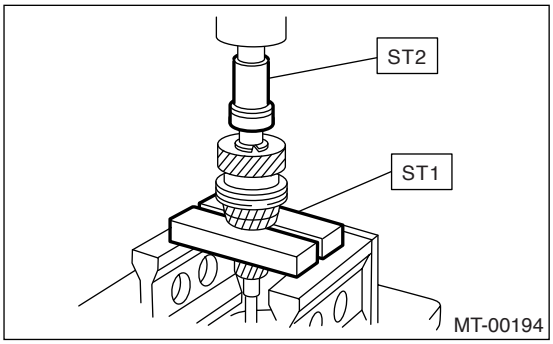


(A) Groove
(B) 4th gear side

6) Press the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

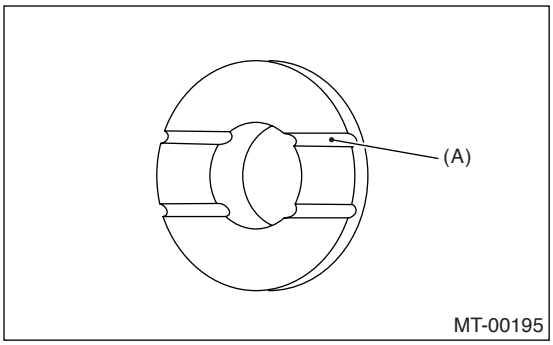
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



7) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Face the thrust washer in the correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

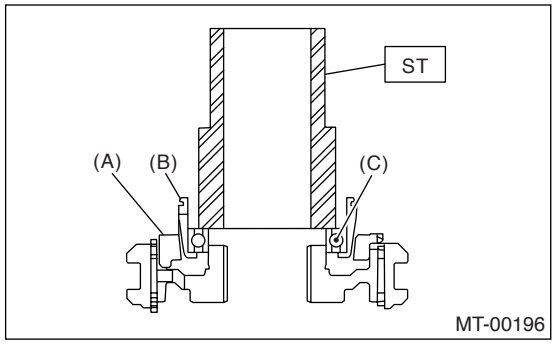


(A) Face this surface to 5th gear side.

8) Install the bearing onto synchro cone.
9) Install the baulk ring and synchro cone onto 5th-Rev sleeve & hub assembly using ST and a press.

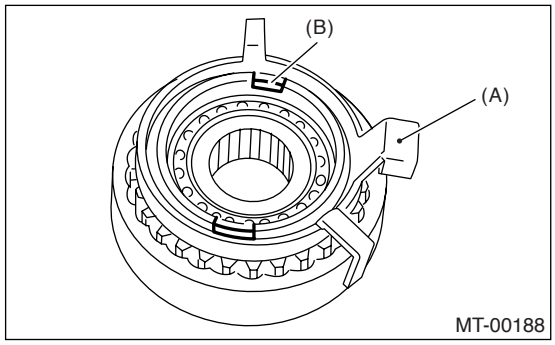
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Use new ball bearing.
• Make sure the synchro cone rotates smoothly after press-fitting.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

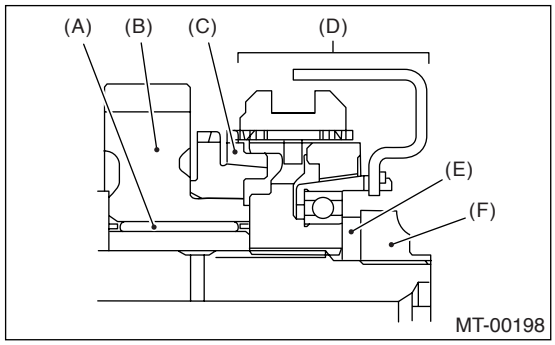
10) Install the synchro cone stopper and snap ring to 5th-Rev sleeve & hub assembly.



(A) Synchro cone stopper
(B) Snap ring

11) Install the rest of parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve & hub ASSY
(E) Lock washer
(F) Lock nuts

12) Tighten the lock nuts to the specified torque using ST1 and ST2.

NOTE:
Caulk the lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

E: INSPECTION

Disassembled parts should be washed with unleaded gasoline first and then inspected carefully.

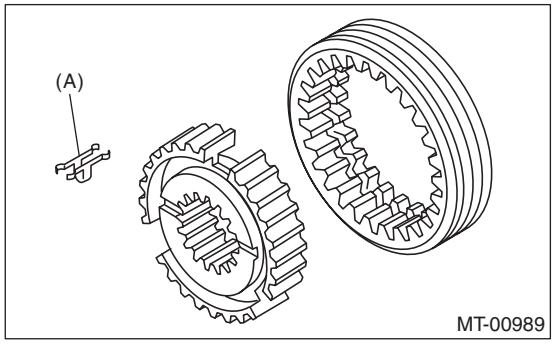
1) Bearings
Replace the bearing in following cases:
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• When bearings have other defects.

2) Bushing (each gear)
Replace the bushings in following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.

3) Gears
• Replace gears with new ones if their tooth surfaces are broken, damaged or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.

4) Baulk ring
Replace the ring in following cases:
• When the inner surface and end face is damaged.
• When the ring inner surface is abnormally or partially worn.
• When contact surfaces of the synchronizer ring insert have cracks or abnormally worn.

5) Shifting insert key
Replace the insert key if deformed, excessively worn or defective in any way.



(A) Insert key

6) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.

7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn or defective in any way.

8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

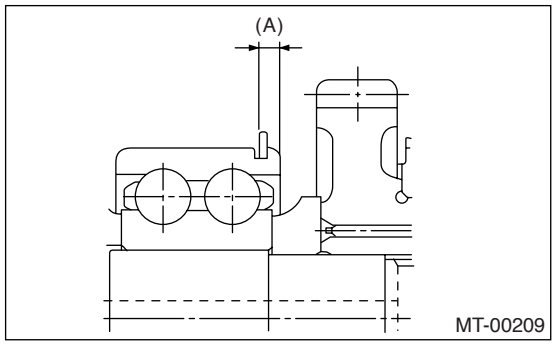
F: ADJUSTMENT

Selection of main shaft rear plate:
Using the ST, measure the amount (A) of ball bearing protrusion from transmission main case surface, and select a suitable plate in the following table.

NOTE:
Before measuring, tap the end of main shaft with a plastic hammer lightly in order to make the clearance zero between the main case surface and moving flange of bearing.

ST 498147000 DEPTH GAUGE

Dimension (A) mm (in)	Part Number	Marking
4.00 — 4.13 (0.1575 — 0.1626)	32294AA041	1
3.87 — 3.99 (0.1524 — 0.1571)	32294AA051	2



16. Main Shaft Assembly for Dual-Range

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. **<Ref. to 5MT-31,** REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. **<Ref. to 5MT-44,** REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. **<Ref. to 5MT-56,** REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. **<Ref. to 5MT-77,** REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

B: INSTALLATION

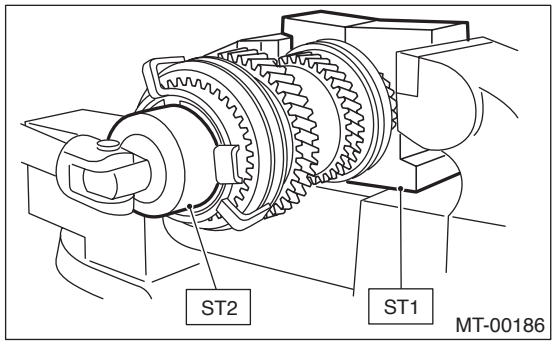
1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the transmission case knock pin into needle bearing outer race knock pin hole.
4) Install the drive pinion assembly. **<Ref. to 5MT-77,** INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. **<Ref. to 5MT-58,** INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. **<Ref. to 5MT-44,** INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly to vehicle. **<Ref. to 5MT-33,** INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

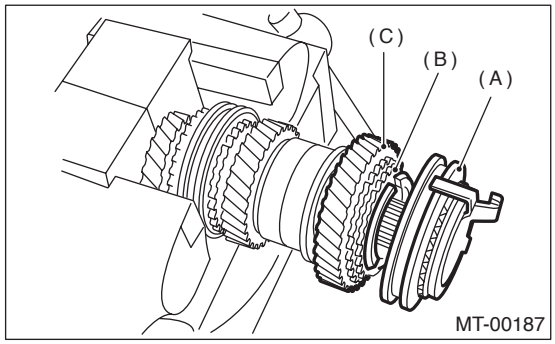
1) Put a vinyl tape around the main shaft splines to protect oil seal from damage. Then pull out the oil seal and needle bearing by hand.
2) Remove the lock nut from transmission main shaft assembly.

NOTE:
Straighten the caulking before taking off lock nut.

ST1 498937000 TRANSMISSION HOLDER
ST2 499987003 SOCKET WRENCH (35)

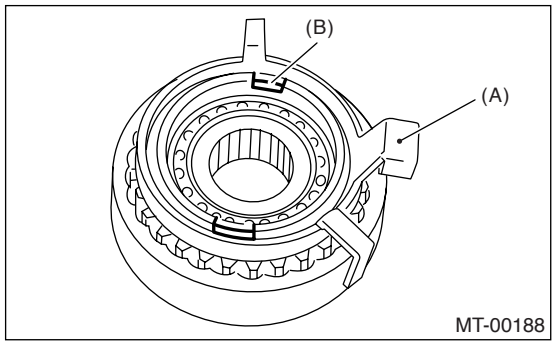


3) Remove the 5th-Rev sleeve & hub assembly, baulk ring, 5th drive gear and needle bearing.



(A) 5th-Rev sleeve & hub ASSY
(B) Baulk ring
(C) 5th drive gear

4) Remove the snap ring and synchro cone stopper from 5th-Rev sleeve & hub assembly.



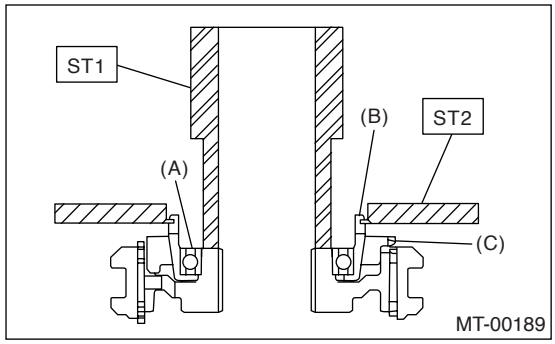
(A) Synchro cone stopper
(B) Snap ring

5) Using the ST1, ST2 and a press, remove the ball bearing, synchro cone and baulk ring (Rev).

NOTE:
• When replacing the sleeve and hub with new ones, replace them as a set.
• Do not disassemble the sleeve and hub, because the aligning position is specified.
• If it is necessary to disassemble, mark the engaging points on the splines beforehand.

• Do not reuse the ball bearing.

ST1 499757002 INSTALLER
ST2 498077400 SYNCHRO CONE REMOVER

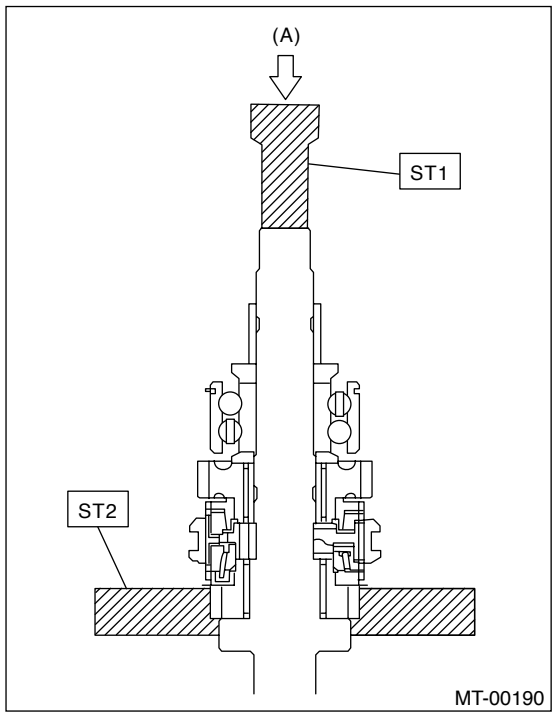


(A) Ball bearing
(B) Synchro cone
(C) Baulk ring

6) Using the ST1 and ST2, remove rest of the parts.

NOTE:
• When replacing the sleeve and hub with new ones, replace them as a set.
• Do not disassemble the sleeve and hub, because the aligning position is specified.
• If it is necessary to disassemble, mark the engaging points on the splines beforehand.

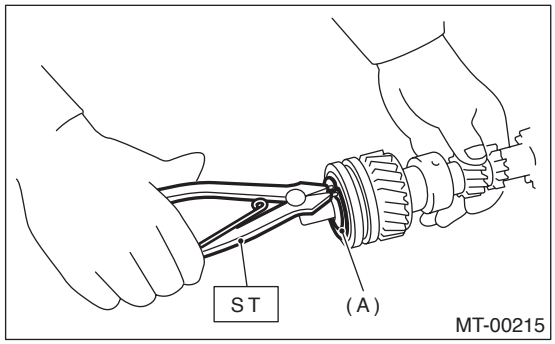
ST1 899864100 REMOVER
ST2 899714110 REMOVER



(A) Press

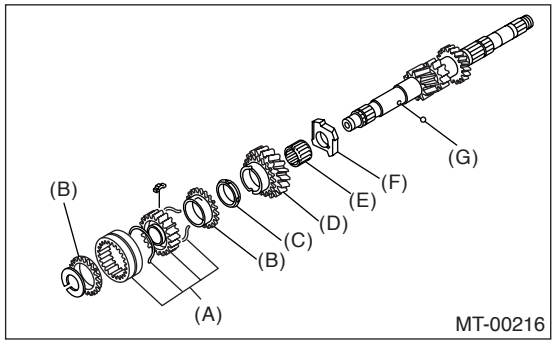
7) Remove the snap ring from main shaft.

ST 899474100 EXPANDER



(A) Snap ring

8) Remove rest of the parts.

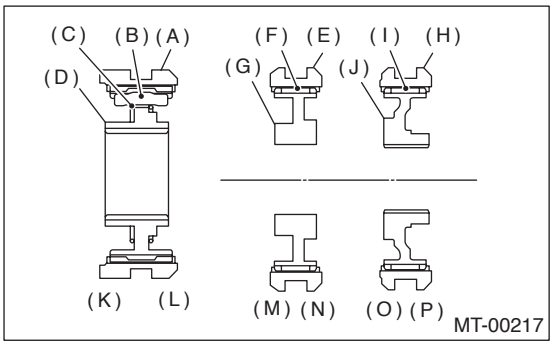


(A) Sleeve & hub ASSY
(B) High-low baulk ring
(C) Friction damper
(D) Low input gear
(E) Needle bearing
(F) Input low gear spacer
(G) Ball

D: ASSEMBLY

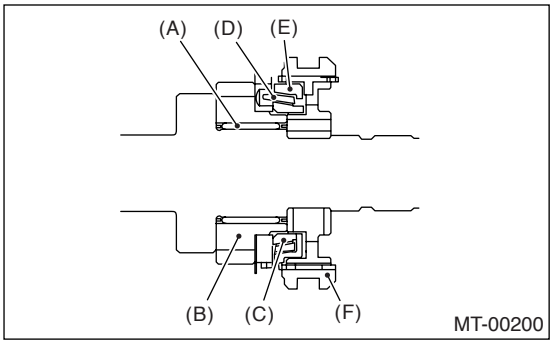
1) Assemble with aligning the matching mark if the sleeve & hub assembly have been disassembled.

NOTE:
Position the open ends of spring 120° apart.



(A) High-low coupling sleeve
(B) Shifting insert
(C) High-low synchronizer spring
(D) High-low synchronizer hub
(E) Sleeve
(F) Insert key
(G) 3rd-4th synchronizer hub
(H) Sleeve
(I) Insert key
(J) 5th-Rev synchronizer hub
(K) High side
(L) Low side
(M) 3rd side
(N) 4th side
(O) 5th side
(P) Rev side

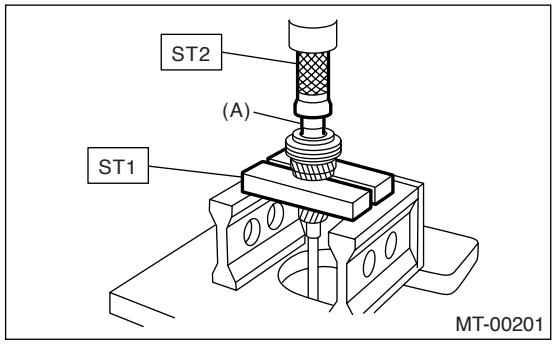
2) Install the 3rd drive gear, baulk ring, sleeve & hub assembly for 3rd-4th needle bearing on transmission main shaft. (2.0 L model)
3) Install the 3rd drive gear, outer baulk ring, synchro cone, inner baulk ring, sleeve & hub assembly for 3rd needle bearing, on the transmission main shaft. (2.5 L model)



(A) 3rd needle bearing
(B) 3rd drive gear
(C) Inner baulk ring
(D) Synchro cone
(E) Outer baulk ring
(F) Sleeve & hub ASSY

NOTE:
Align the groove in baulk ring with shifting insert.

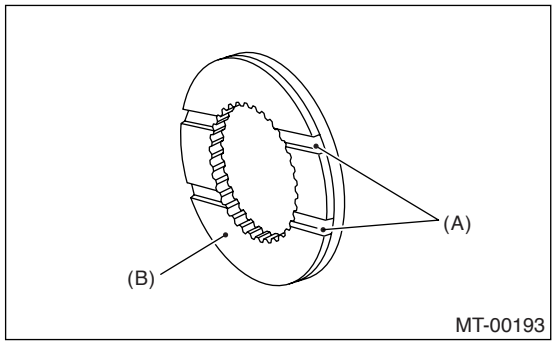
4) Install the 4th needle bearing race onto transmission main shaft using ST1, ST2 and a press.
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



(A) 4th needle bearing race

5) Install the baulk ring, needle bearing, 4th drive gear and 4th gear thrust washer to transmission main shaft.

NOTE:
Face the thrust washer in correct direction.

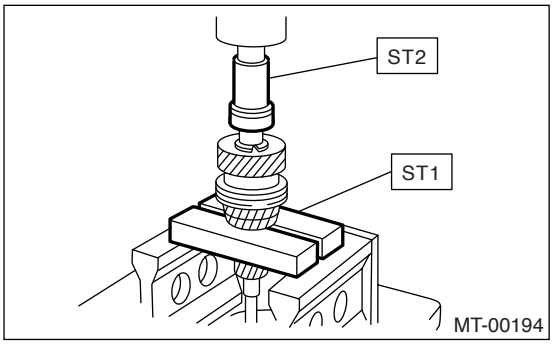


(A) Groove
(B) 4th gear side

6) Press-fit the ball bearing into the rear section of transmission main shaft using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).

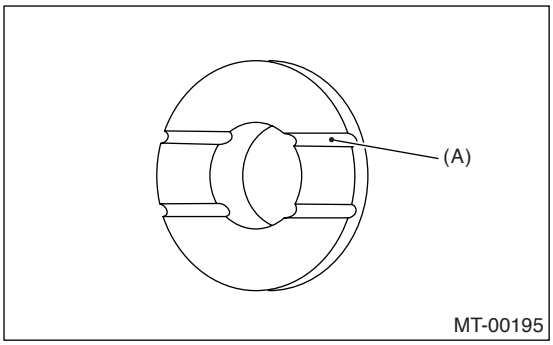
ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER



7) Using the ST1 and ST2, install the 5th gear thrust washer and 5th needle bearing race onto the rear section of transmission main shaft.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Face the thrust washer in correct direction.

ST1 899714110 REMOVER
ST2 499877000 RACE 4-5 INSTALLER

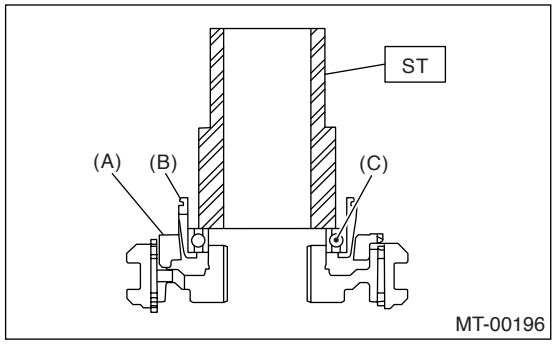


(A) Face this surface to 5th gear side.

8) Install the bearing onto synchro cone.
9) Install the baulk ring and synchro cone onto 5th-Rev sleeve & hub assembly using ST and a press.

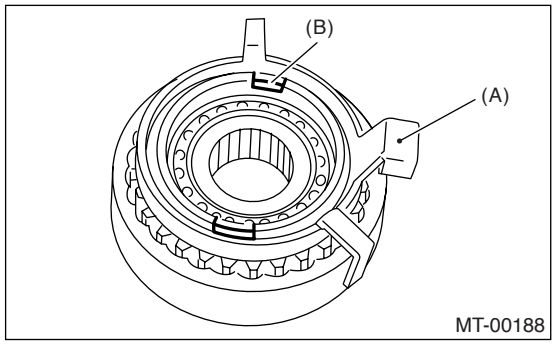
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Use a new ball bearing.
• After press-fitting, make sure the synchro cone rotates freely.

ST 499757002 INSTALLER



(A) Baulk ring
(B) Synchro cone
(C) Ball bearing

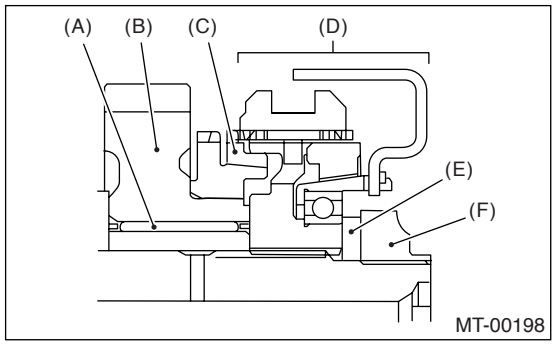
10) Install the synchro cone stopper and snap ring to 5th-Rev sleeve & hub assembly.



(A) Synchro cone stopper
(B) Snap ring

11) Install rest of the parts to the rear section of transmission main shaft.

NOTE:
Align the groove in baulk ring with shifting insert.



(A) Needle bearing
(B) 5th drive gear
(C) Baulk ring
(D) 5th-Rev sleeve & hub ASSY
(E) Lock washer
(F) Lock nuts

12) Tighten the lock nuts to the specified torque using ST1 and ST2.

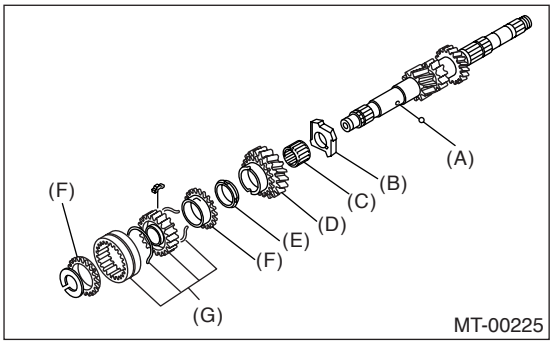
NOTE:
Stake the caulking of lock nuts in two places after tightening.

ST1 499987003 SOCKET WRENCH
ST2 498937000 TRANSMISSION HOLDER

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

13) Install the needle bearing on main shaft.
14) Install rest of the parts to the front section of transmission main shaft.

NOTE:
• Be careful not to damage the graded section of transmission main shaft when installing the needle bearing.
• Face the grooved side toward input gear.
• Align the high-low baulk ring's groove with shifting insert.



(A) Ball
(B) Input low gear spacer
(C) Needle bearing
(D) Input low gear
(E) Friction damper
(F) High-low baulk ring
(G) Sleeve & hub ASSY

15) Install a new snap ring to the rod section of transmission main shaft using ST1 and ST2.

NOTE:
Select a suitable outer snap ring so that axial clearance between snap ring and hub is held within 0.060 to 0.100 mm (0.0024 to 0.0039 in).

ST1 499757002 INSTALLER
ST2 499757001 SNAP RING GUIDE

Snap ring	
Part No.	Thickness mm (in)
805025051	2.42 (0.0953)
805025052	2.47 (0.0972)
805025053	2.52 (0.0992)
805025054	2.57 (0.1012)
805025055	2.62 (0.1031)
805025056	2.67 (0.1051)
805025057	2.72 (0.1071)
805025058	2.37 (0.0933)

E: INSPECTION

Disassembled parts should be washed with unleaded gasoline first and then inspected carefully.
1) Bearings
Replace the bearings in following cases:
• Bearings balls, outer races and inner races are broken or rusty.
• Worn bearings
• Bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• Bearings having other defects
2) Bushing (each gear)
Replace the bushing in following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.
3) Gears
• Replace the gears with new ones if their tooth surfaces are broken, damaged or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.
5) Shifting insert key
Replace the insert key if deformed, excessively worn or defective in any way.
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.
7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn or defective in any way.
8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

F: ADJUSTMENT

Select a suitable main shaft rear plate. **<Ref. to 5MT-66,** ADJUSTMENT**, Main Shaft Assembly for Single-Range.>**

17.Input Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. **<Ref. to 5MT-31,** REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. **<Ref. to 5MT-44,** REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. **<Ref. to 5MT-56,** REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly. **<Ref. to 5MT-77,** REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly and input shaft assembly.

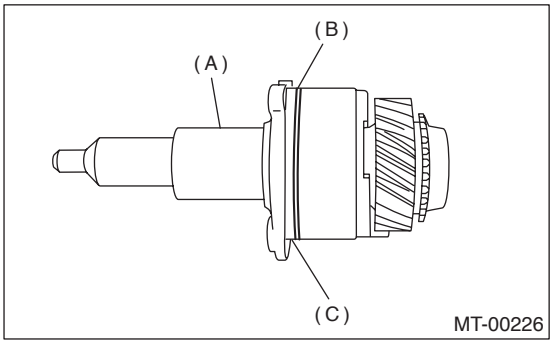
B: INSTALLATION

1) Install the needle bearing onto the front of transmission main shaft assembly.
2) Connect the main shaft assembly and input shaft assembly.
3) Install the transmission case knock pin into needle bearing outer race knock pin hole.
4) Install the drive pinion assembly. **<Ref. to 5MT-77,** INSTALLATION, Drive Pinion Shaft Assembly.>
5) Install the transmission case. **<Ref. to 5MT-58,** INSTALLATION, Transmission Case.>
6) Install the transfer case with extension case assembly. **<Ref. to 5MT-44,** INSTALLATION, Transfer Case and Extension Case Assembly.>
7) Install the manual transmission assembly on the vehicle. **<Ref. to 5MT-33,** INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

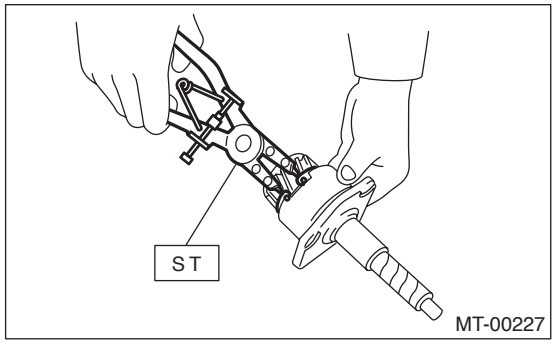
1) Remove the O-ring from input shaft holder. Also, remove the input shaft holder shim.

NOTE:
- Use a new O-ring.
- Number of shims used varies from zero to two.

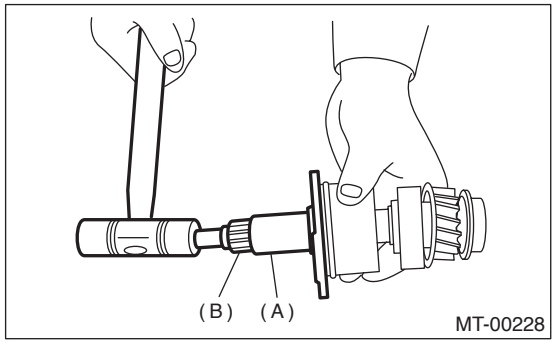


(A) Input shaft holder
(B) O-ring
(C) Input shaft holder shim

2) Put a vinyl tape around the input shaft splines to protect oil seal from damage.
3) Remove the inner snap ring.
ST 398663600 PLIERS

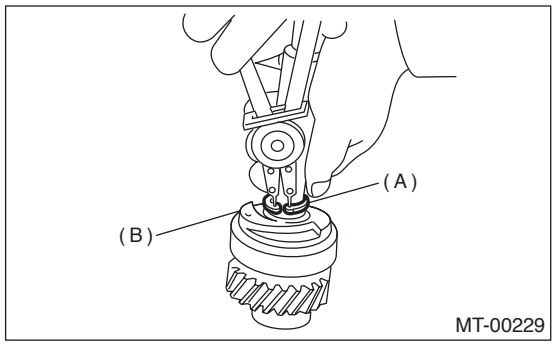


4) Hold the input shaft holder stationary and remove the input shaft by tapping its end with a plastic hammer.



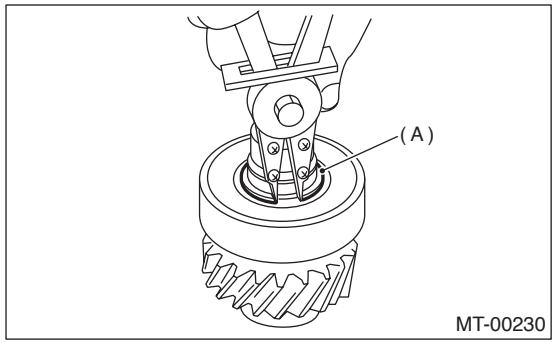
(A) Input shaft holder
(B) Input shaft

5) Remove the outer snap ring. Then remove the oil squeeze plate and straight pin.



(A) Snap ring
(B) Oil squeeze plate

6) Remove the snap ring.

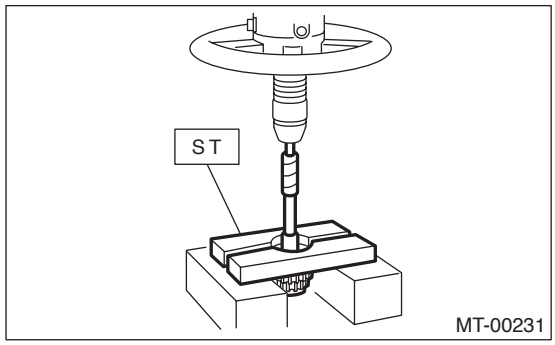


(A) Snap ring

7) Using a press and ST, remove the ball bearing.

NOTE:
Remove the inner snap ring before pressing.

ST 498077000 REMOVER



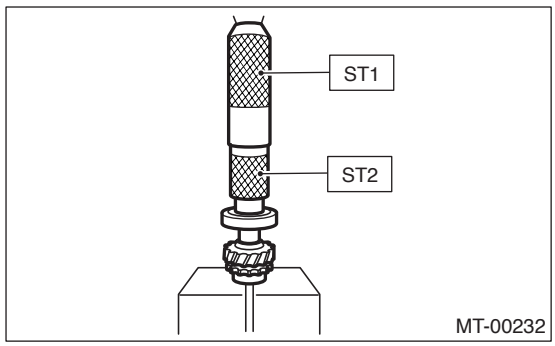
8) Remove the oil seal from input shaft holder.

D: ASSEMBLY

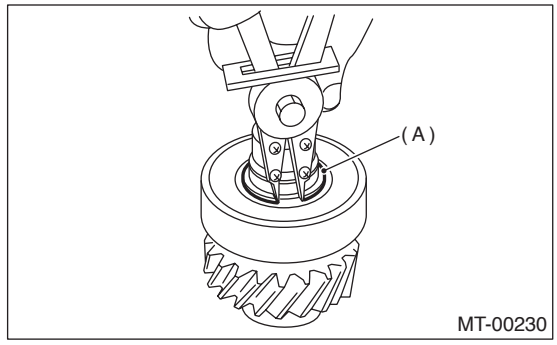
1) Install the ball bearing onto input shaft.

NOTE:
Place the snap ring between input shaft gear and ball bearing beforehand. Use the table at 8) as a guide in selecting a suitable snap ring.

ST1 899580100 INSTALLER
ST2 399513600 INSTALLER



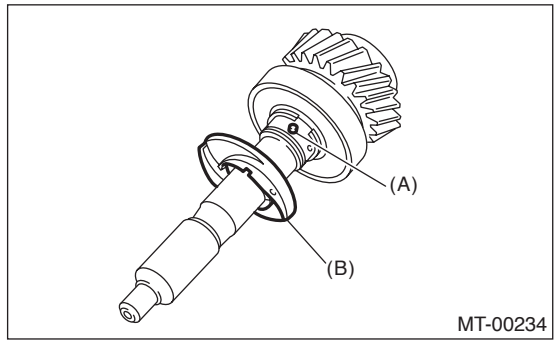
2) Install the snap ring on input shaft.



(A) Snap ring

3) Inspect the clearance between ball bearing and snap ring. **<Ref. to 5MT-75,** INSPECTION**, Input Shaft Assembly.>**

4) Install the straight pin and oil squeeze plate to input shaft.



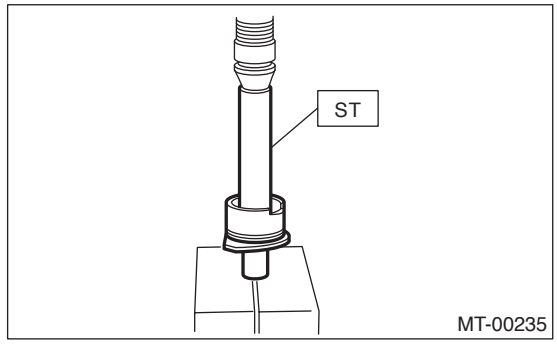
(A) Straight pin
(B) Oil squeeze plate

5) Install the snap ring.

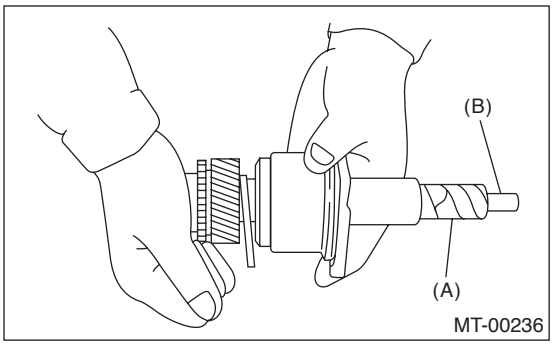
6) Install the oil seal into input shaft holder.

NOTE:
Apply a coat of grease to sealing lips before installing oil seal.

ST 398507703 DUMMY COLLAR



7) Wind a vinyl tape around the shaft splines and insert the input shaft into holder by lightly tapping it by hand.

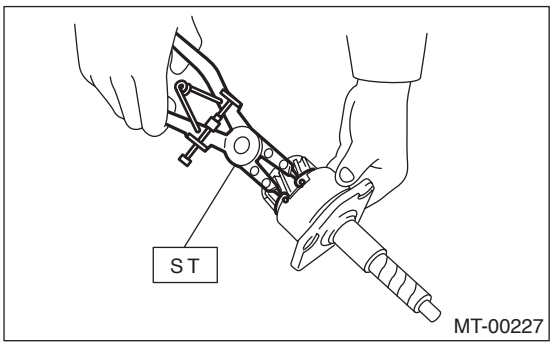


(A) Vinyl tape
(B) Input shaft

8) Install the snap ring to input shaft holder.

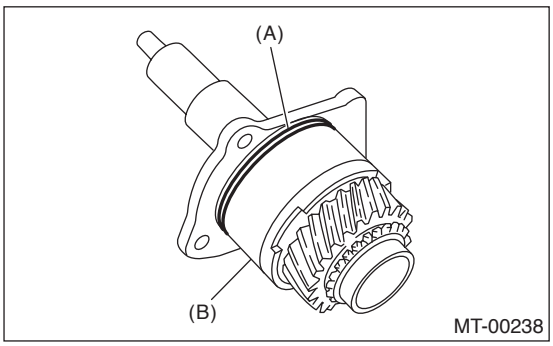
NOTE:
Select a suitable snap ring so that clearance between snap ring and bearing is held within 0 to 0.12 mm (0 to 0.0047 in).

ST 398663600 PLIERS



Snap ring	
Part No.	Thickness mm (in)
805168020	1.84 (0.0724)
805168030	1.92 (0.0756)
805168040	2.00 (0.0787)

9) Install the O-ring to input shaft holder.



(A) O-ring
(B) Input shaft holder

E: INSPECTION

Disassembled parts should be washed clean first with unleaded gasoline and then inspected carefully.

1) Bearings
Replace the bearings in following cases:
• Bearing balls, outer races and inner races are broken or rusty.
• Worn bearings
• Bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• Bearings having other defects

2) Bushing (each gear)
Replace the bushing in following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.

3) Gears
• Replace the gears with new ones if their tooth surfaces are broken, damaged or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.

4) Baulk ring
Replace the ring in following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn down.
• When the contact surface of the synchronizer ring insert is scored or abnormally worn down.

5) Shifting insert key
Replace the insert key if deformed, excessively worn or defective in any way.

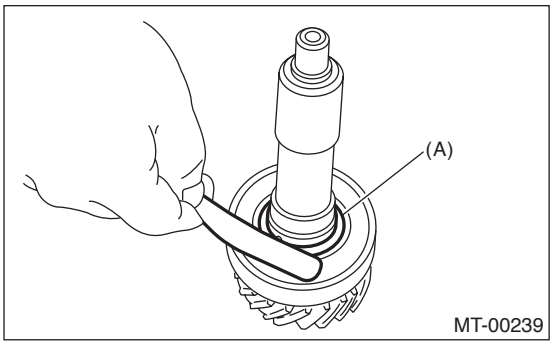
6) Oil seal
Replace the oil seal if the lip is deformed, hardened, worn or defective in any way.

7) O-ring
Replace the O-ring if the sealing face is deformed, hardened, damaged, worn or defective in any way.

8) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent or defective in any way.

9) Measure the clearance between snap ring and ball bearing using thickness gauge.

Clearance:
0 — 0.12 mm (0 — 0.0047 in)



(A) Snap ring

If the measurement is not within specification, select a suitable snap ring.

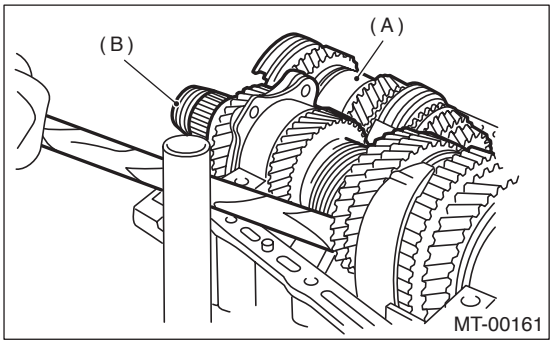
Snap ring	
Part No.	Thickness mm (in)
805028050	2.48 (0.0976)
805028060	2.56 (0.1008)
805028070	2.64 (0.1039)

18.Drive Pinion Shaft Assembly

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
4) Remove the drive pinion shaft assembly.

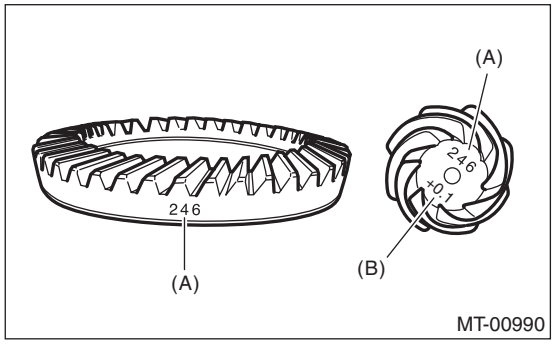
NOTE:
Use a hammer handle, etc. to remove if too tight.



(A) Main shaft ASSY
(B) Drive pinion shaft ASSY

B: INSTALLATION

1) Remove the differential assembly.
2) Alignment marks/numbers on hypoid gear set:
Use hypoid driven gear of its match number corresponding with upper one on the drive pinion (A).
The figure (B) shows a number for shim adjustment. If no number is shown, the value is zero.

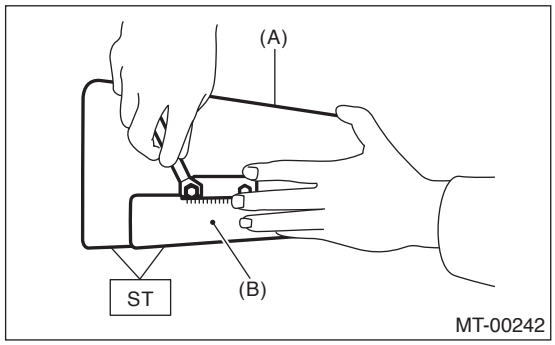


(A) Match number
(B) Number for shim adjustment

3) Place the drive pinion shaft assembly on the transmission main case RH without shim and tighten the bearing mounting bolts.
4) Inspection and adjustment of ST:

NOTE:
• Loosen the two bolts and adjust so that the scale indicates 0.5 correctly when the plate end and the scale end are on the same level.
• Tighten the two bolts.

ST 499917500 DRIVE PINION GAUGE ASSY



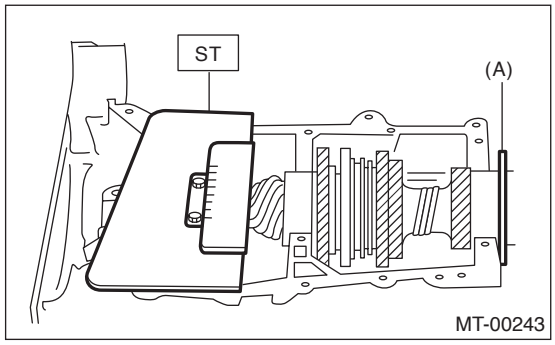
(A) Plate
(B) Scale

5) Position the ST by inserting the knock pin of ST into the knock hole in the transmission case.

ST 499917500 DRIVE PINION GAUGE ASSY

6) Slide the drive pinion gauge scale with finger tip and read the value at the point where it matches with the end face of drive pinion.

ST 499917500 DRIVE PINION GAUGE ASSY



(A) Adjust clearance to zero without shim.

7) The thickness of shim shall be determined by adding the value indicated on drive pinion to the value indicated on the ST. (Add if the number on drive pinion is prefixed by +, and subtract if the number is prefixed by −.)

ST 499917500 DRIVE PINION GAUGE ASSY

8) Select one to three shims in the next table for the value determined as described above, and take the shim(s) which thickness is closest to the said value.

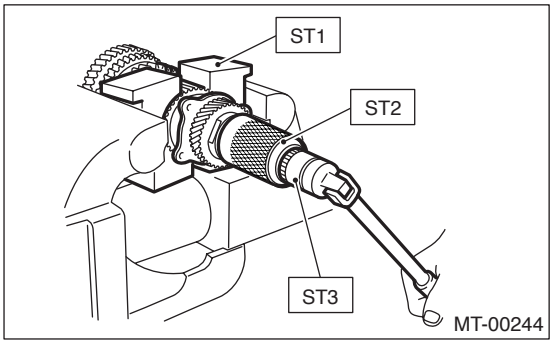
Drive pinion shim	
Part Number	Thickness mm (in)
32295AA031	0.150 (0.0059)
32295AA041	0.175 (0.0069)
32295AA051	0.200 (0.0079)
32295AA061	0.225 (0.0089)
32295AA071	0.250 (0.0098)
32295AA081	0.275 (0.0108)
32295AA091	0.300 (0.0118)
32295AA101	0.500 (0.0197)

9) Install the differential assembly. <Ref. to 5MT-85, INSTALLATION, Front Differential Assembly.>
10) Set the transmission main shaft assembly and drive pinion assembly in position. (So there is no clearance between these two when moved all the way to the front). Inspect the suitable 1st — 2nd, 3rd — 4th and 5th shifter fork so that the coupling sleeve and reverse driven gear are positioned in the center of their synchronizing mechanisms. <Ref. to 5MT-82, INSPECTION, Drive Pinion Shaft Assembly.>
11) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
12) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
13) Install the manual transmission assembly to vehicle. <Ref. to 5MT-31, Manual Transmission Assembly.>

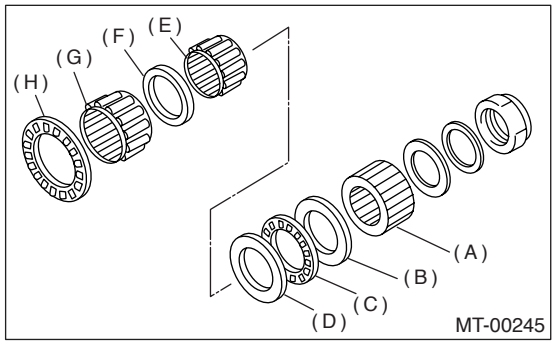
C: DISASSEMBLY

NOTE:
Attach a cloth to the end of driven shaft (on the frictional side of thrust needle bearing) to prevent damage during disassembly or reassembly.

1) Unlock the caulking of lock nut. Remove the lock nut using ST1, ST2 and ST3.
ST1 899884100 HOLDER
ST2 498427100 STOPPER
ST3 899988608 SOCKET WRENCH (27)



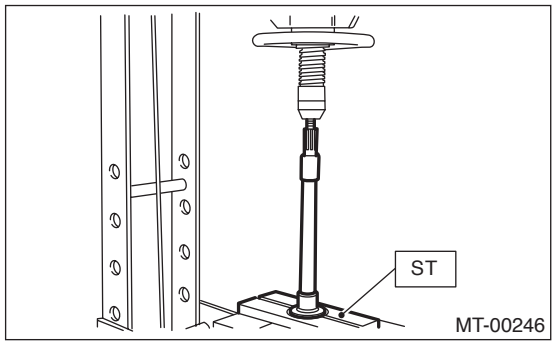
2) Draw out the drive pinion from driven shaft. Remove the differential bevel gear sleeve, adjusting washer No. 1, adjusting washer No. 2, thrust bearing, needle bearing and drive pinion collar.



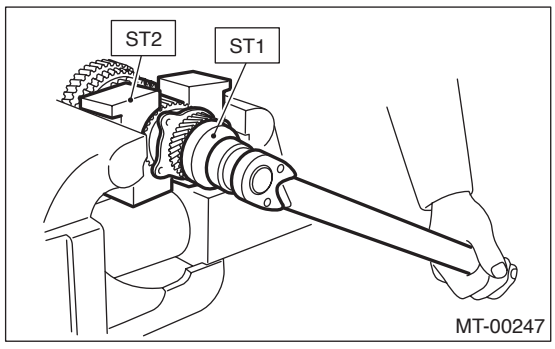
(A) Differential bevel gear sleeve
(B) Washer No. 1 (25 × 37.5 × t)
(C) Thrust bearing (25 × 37.5 × 3)
(D) Washer No. 2 (25 × 37.5 × 4)
(E) Needle bearing (25 × 30 × 20)
(F) Drive pinion collar
(G) Needle bearing (30 × 37 × 23)
(H) Thrust bearing (33 × 50 × 3)

3) Remove the roller bearing and washer using ST and press.

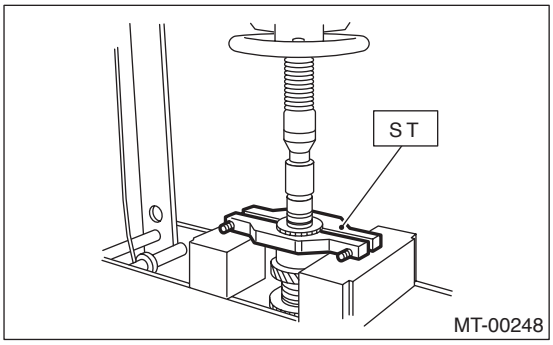
NOTE:
Do not reuse the roller bearing.
ST 498077000 REMOVER



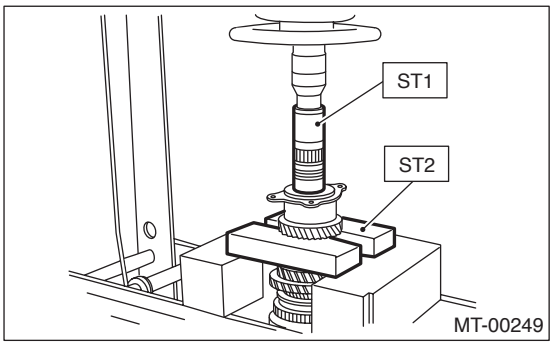
4) Unlock the caulking of lock nut. Remove the lock nut using ST1 and ST2.
ST1 499987300 SOCKET WRENCH (50)
ST2 899884100 HOLDER



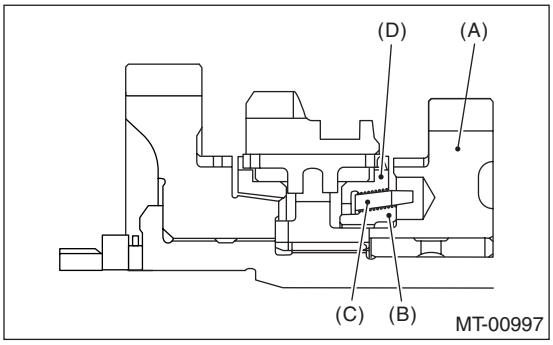
5) Remove the 5th driven gear using ST.
ST 499857000 5TH DRIVEN GEAR REMOVER



6) Remove the woodruff key.
7) Remove the roller bearing and 3rd-4th driven gear using ST1 and ST2.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER

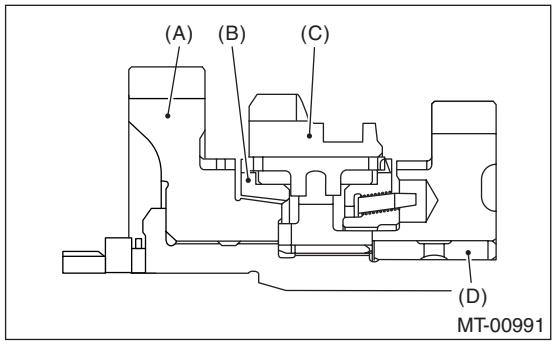


8) Remove the key.
9) Remove the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring.



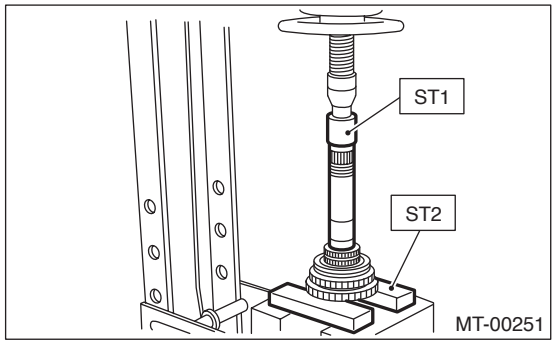
(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

10) Remove the 1st driven gear, 2nd gear bushing, gear and hub using ST1 and ST2.



(A) 1st driven gear
(B) Inner baulk ring
(C) Hub
(D) 2nd gear bushing

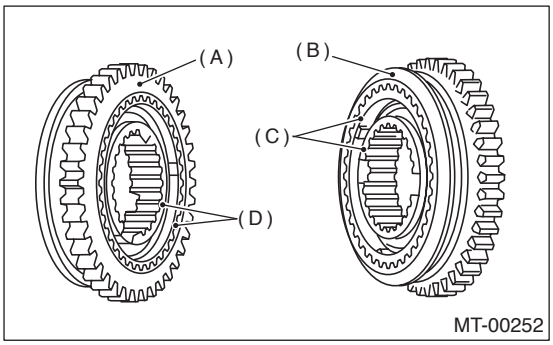
NOTE:
Replace the gear and hub if necessary. Do not disassemble because they must engage at a specified point. If they have to be disassembled, mark the engaging point on the spline beforehand.
ST1 499757002 INSTALLER
ST2 899714110 REMOVER



D: ASSEMBLY

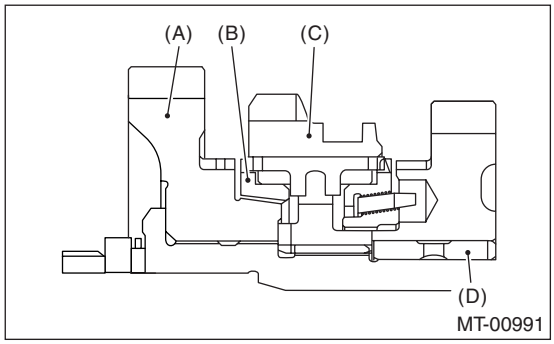
1) Install the sleeve and hub assembly by matching alignment marks.

NOTE:
Use the new gear and hub assembly, when replacing the gear or hub.



(A) 1st gear side
(B) 2nd gear side
(C) Flush surface
(D) Stepped surface

2) Install the washer to 1st driven gear. (EC, EK and KA model)
3) Install the washer, snap ring and sub gear onto 1st driven gear. (Except for EC, EK and KA model)
4) Install the 1st driven gear, 1st baulk ring, gear and hub assembly onto driven shaft.



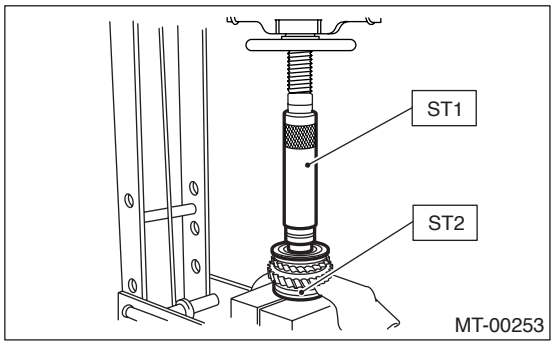
(A) 1st driven gear
(B) 1st baulk ring
(C) Gear and hub ASSY
(D) 2nd gear bushing

NOTE:
• Take care to install the gear and hub assembly in proper direction.
• Align the baulk ring and gear and hub assembly with key groove.

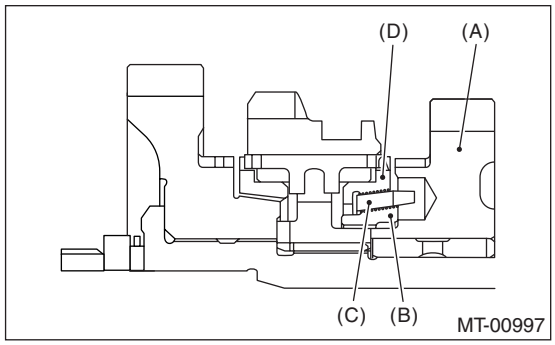
5) Install the 2nd driven gear bushing onto driven shaft using ST1, ST2 and a press.

NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Attach a cloth to the end of driven shaft to prevent damage.
• When press-fitting, align the oil holes of shaft and bushing.

ST1 499277200 INSTALLER
ST2 499587000 INSTALLER



6) Install the 2nd driven gear, inner baulk ring, synchro cone and outer baulk ring, and insert onto driven shaft.

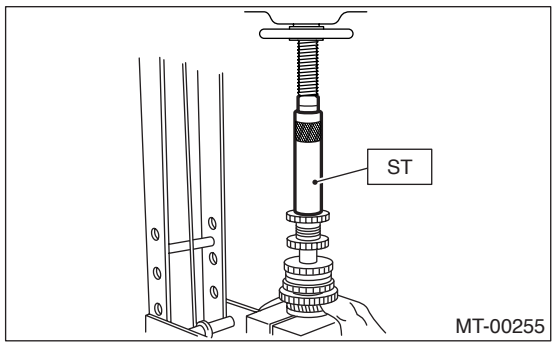


(A) 2nd driven gear
(B) Inner baulk ring
(C) Synchro cone
(D) Outer baulk ring

7) After installing the key on driven shaft, install the 3rd-4th driven gear using ST and press.

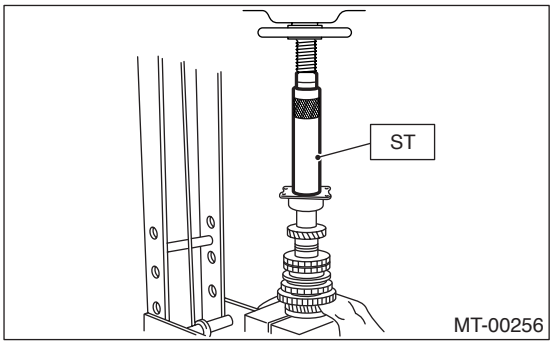
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Align the groove in baulk ring with insert.

ST 499277200 INSTALLER



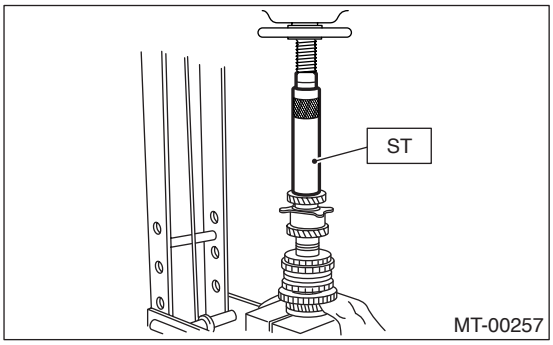
8) Install a set of roller bearings onto the driven shaft using ST and press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST 499277200 INSTALLER



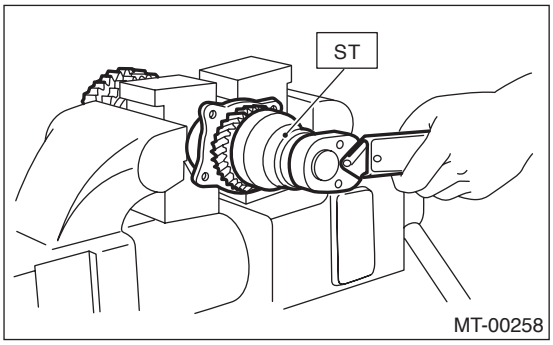
9) Position the woodruff key in groove on the rear of driven shaft. Install the 5th driven gear onto driven shaft using ST and press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST 499277200 INSTALLER



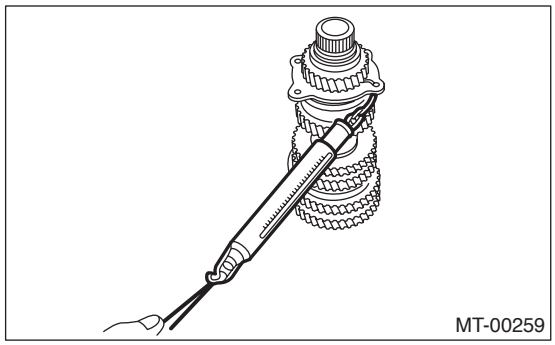
10) Install the lock washer. Install the lock nut and tighten to the specified torque using ST.
ST 499987300 SOCKET WRENCH (50)

Tightening torque:
260 N·m (26.5 kgf-m, 191.7 ft-lb)



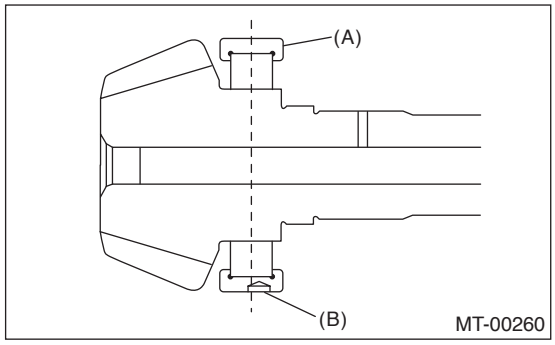
NOTE:
• Stake the caulking of lock nut at two points.

• Using a spring balancer, check that starting torque of roller bearing is 0.1 to 1.5 N (0.01 to 0.15 kgf, 0.02 to 0.33 ft).



11) Install the roller bearing onto drive pinion.

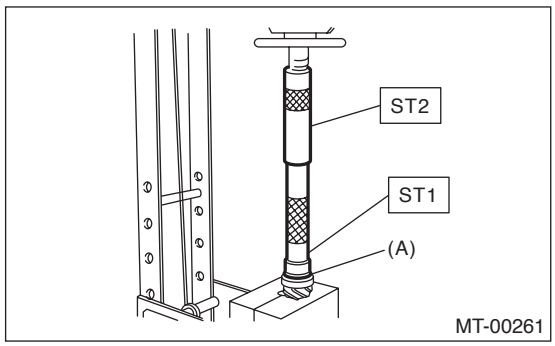
NOTE:
When installing roller bearing, note its directions (front and rear) because the knock pin hole in outer race is offset.



(A) Roller bearing
(B) Knock pin hole

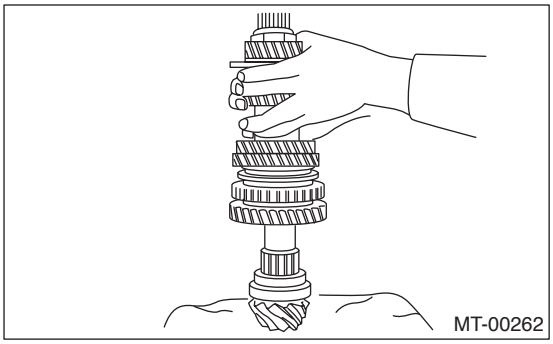
12) Install the washer using ST1, ST2 and a press.

NOTE:
Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
ST1 499277100 BUSHING 1-2 INSTALLER
ST2 499277200 INSTALLER



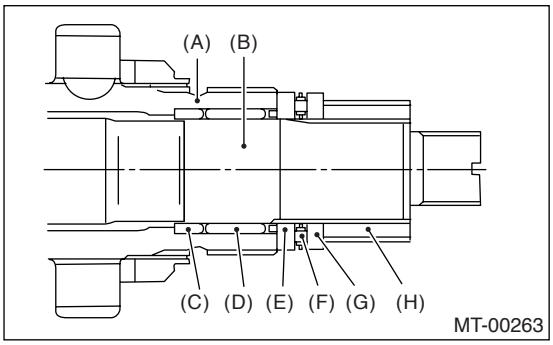
(A) Washer

13) Install the thrust bearing and needle bearing. Install the driven shaft assembly.



14) Install the drive pinion collar, needle bearing, adjusting washer No. 2, thrust bearing, adjusting washer No. 1 and differential bevel gear sleeve in this order.

NOTE:
Be careful because the spacer must be installed in proper direction.

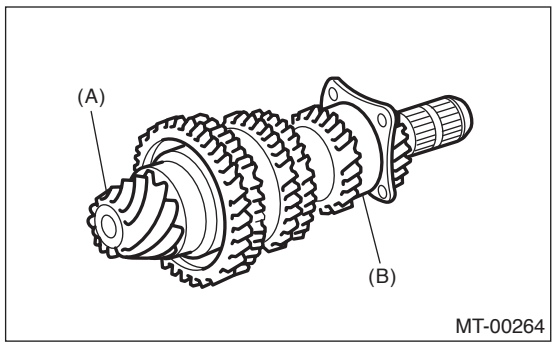


(A) Driven shaft
(B) Drive shaft
(C) Drive pinion collar
(D) Needle bearing (25 × 30 × 20)
(E) Washer No. 2 (25 × 36 × 4)
(F) Thrust bearing (25 × 37.5 × 3)
(G) Washer No. 1 (25 × 36 × t)
(H) Differential bevel gear sleeve

15) Adjust the thrust bearing preload. <Ref. to 5MT-83, THRUST BEARING PRELOAD, ADJUSTMENT, Drive Pinion Shaft Assembly.>

E: INSPECTION

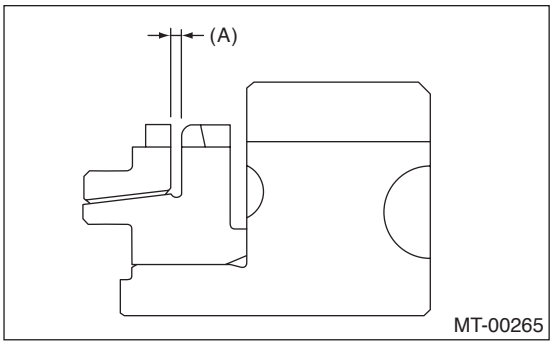
Disassembled parts should be washed with unleaded gasoline first and then inspected carefully.
1) Bearings
Replace the bearing in following cases:
• When the bearing balls, outer races and inner races are broken or rusty.
• When the bearing is worn.
• When the bearings fail to turn smoothly or emit noise in rotation after gear oil lubrication.
• The ball bearing on the rear side of the drive pinion shaft should be checked for smooth rotation before the drive pinion assembly is disassembled. In this case, because a preload is working on the bearing, its rotation feels like it is slightly dragging unlike other bearings.



(A) Drive pinion shaft
(B) Ball bearing

• When bearings have other defects:
2) Bushing (each gear)
Replace the bushings in following cases:
• When the sliding surface is damaged or abnormally worn.
• When the inner wall is abnormally worn.
3) Gears
• Replace gears with new ones if their tooth surfaces are broken, damaged, or excessively worn.
• Correct or replace if the cone that contacts the baulk ring is rough or damaged.
• Correct or replace if the inner surface or end face is damaged.
4) Baulk ring
Replace the ring in following cases:
• When the inner surface and end face are damaged.
• When the ring inner surface is abnormally or partially worn.
• If the gap between the end faces of ring and the gear splined part is excessively small, check the clearance (A) while pressing the ring against the cone.

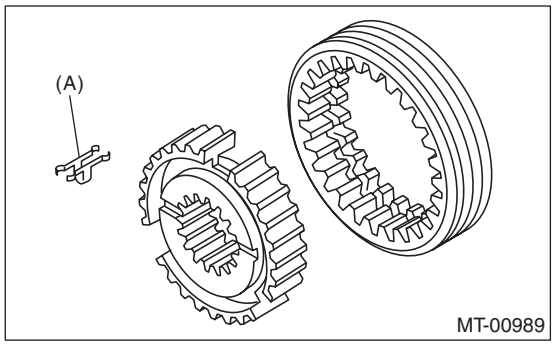
Clearance (A):
0.5 — 1.0 mm (0.020 — 0.040 in)



• When the contact surface of synchronizer ring insert is scratched or abnormally worn.

5) Shifting insert key

Replace the insert key if deformed, excessively worn, or defective in any way.



(A) Insert key

6) Oil seal

Replace the oil seal if the lip is deformed, hardened, worn, or defective in any way.

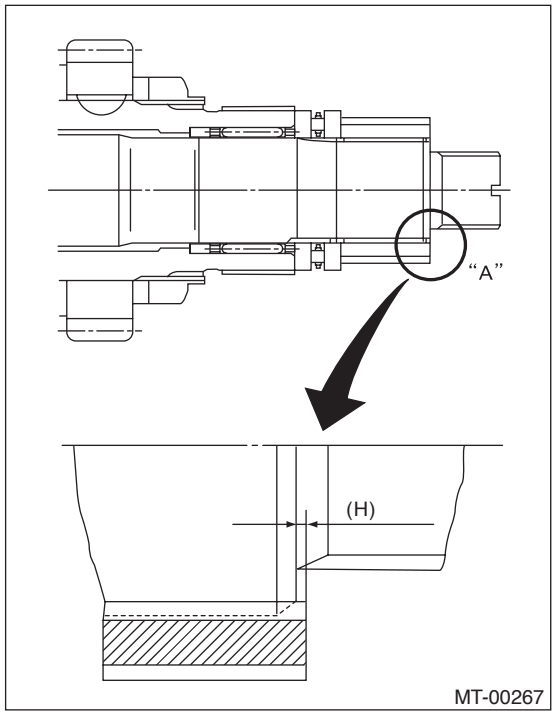
7) O-ring

Replace the O-ring if the sealing face is deformed, hardened, damaged, worn, or defective in any way.

F: ADJUSTMENT

1. THRUST BEARING PRELOAD

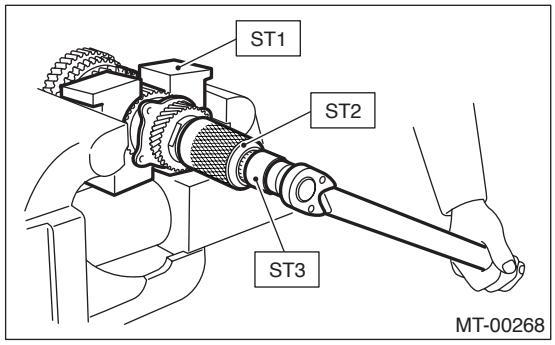
1) Select a suitable adjusting washer No. 1 to adjust dimension (H) to zero through visual check. Position the washer (18.3 × 30 × 4) and lock washer (18 × 30 × 2) and install the lock nut (18 × 13.5).



2) Using the ST1, ST2 and ST3, tighten new lock nut to the specified torque.

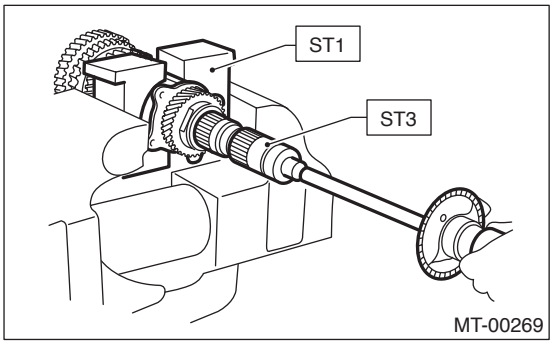
ST1	899884100	HOLDER
ST2	498427100	STOPPER
ST3	899988608	SOCKET WRENCH (27)

Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

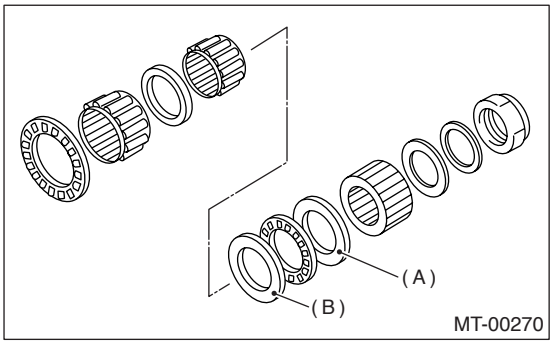


3) After removing the ST2, measure the starting torque using torque driver.
ST1 899884100 HOLDER
ST3 899988608 SOCKET WRENCH (27)

Starting torque:
0.3 — 0.8 N·m (0.03 — 0.08 kgf-m, 0.2 — 0.6 ft-lb)



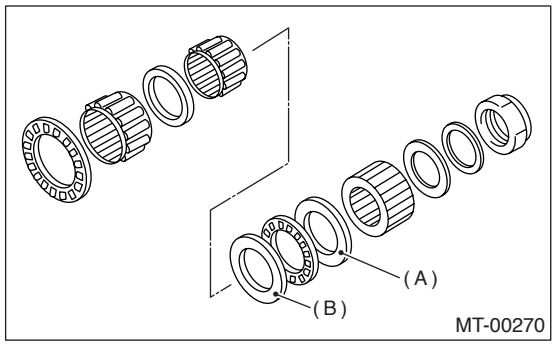
4) If the starting torque is not within specified limit, select new adjusting washer No. 1 and recheck starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Adjusting washer No. 1	
Part Number	Thickness mm (in)
803025051	3.925 (0.1545)
803025052	3.950 (0.1555)
803025053	3.975 (0.1565)
803025054	4.000 (0.1575)
803025055	4.025 (0.1585)
803025056	4.050 (0.1594)
803025057	4.075 (0.1604)

5) When the specified starting torque cannot be obtained by the adjusting washer No. 1, select the adjusting washer No. 2 from following table. Repeat steps 1) through 4) to adjust starting torque.



(A) Adjusting washer No. 1
(B) Adjusting washer No. 2

Starting torque	Dimension H	Washer No. 2
Low	Small	Select thicker one.
High	Large	Select thinner one.

Adjusting washer No. 2	
Part Number	Thickness mm (in)
803025059	3.850 (0.1516)
803025054	4.000 (0.1575)
803025058	4.150 (0.1634)

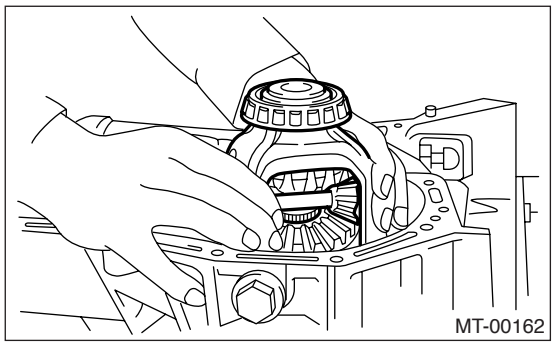
6) Recheck that the starting torque is within specified range, then clinch the lock nut at four positions.

19.Front Differential Assembly

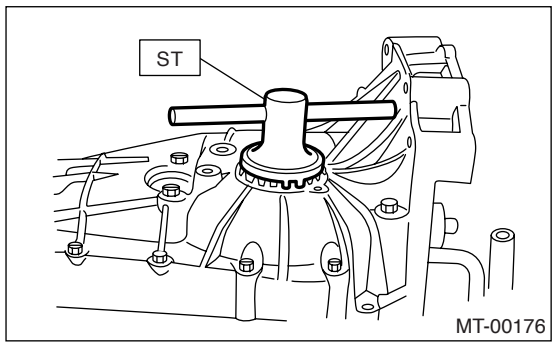
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
4) Removes the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
6) Remove the differential assembly.

NOTE:
• Be careful not to confuse right and left roller bearing outer races.
• Be careful not to damage the oil seal of retainer.



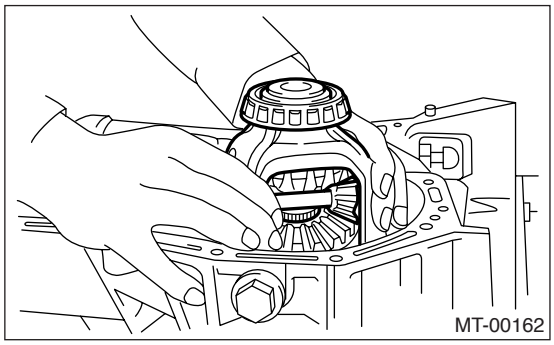
7) Remove the differential side retainers using ST.
ST 499787000 WRENCH ASSY



B: INSTALLATION

1) Install the differential side retainers using ST.
ST 499787000 WRENCH ASSY
2) Install the bearing outer race on transmission case.
3) Install the differential assembly.

NOTE:
Be careful not to fold the sealing lip of oil seal.

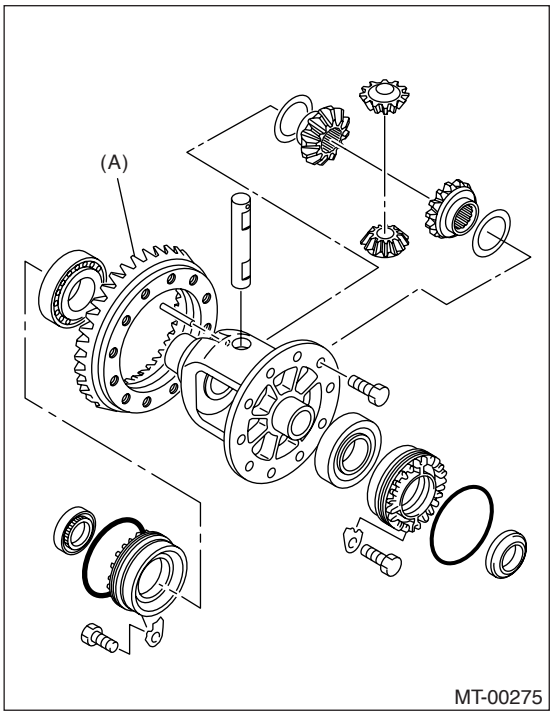


4) Install the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, INSTALLATION, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>
5) Install the drive pinion assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
6) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
7) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
8) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: DISASSEMBLY

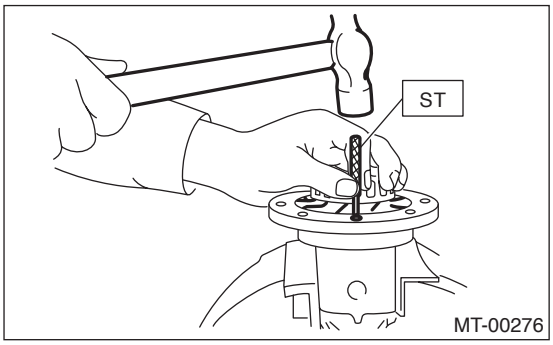
1. DIFFERENTIAL CASE ASSEMBLY

1) Loosen the twelve bolts and remove hypoid driven gear.

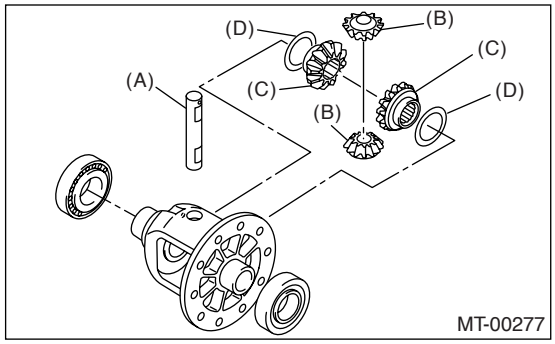


(A) Hypoid driven gear

2) Drive out the straight pin from differential assembly toward hypoid driven gear side.
ST 899904100 REMOVER

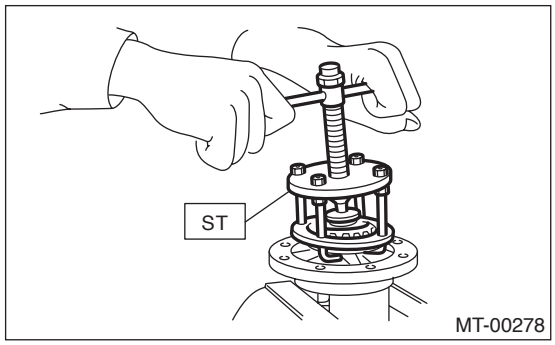


3) Pull out the pinion shaft, and remove the differential bevel pinion, bevel gear and washer.



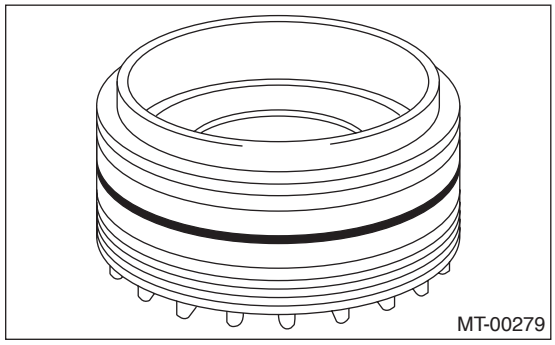
(A) Pinion shaft
(B) Bevel pinion
(C) Bevel gear
(D) Washer

4) Using the ST, remove the roller bearing.
ST 899524100 PULLER SET



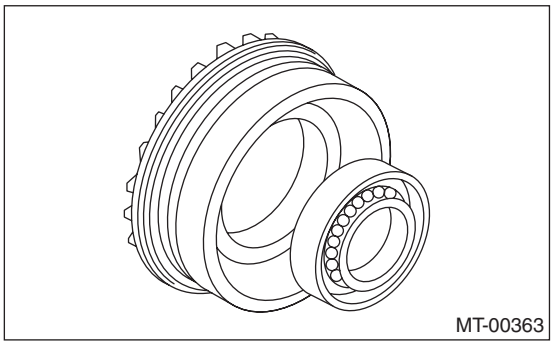
2. SIDE RETAINER

1) Remove the O-ring.



2) Remove the oil seal.

NOTE:
Do not reuse the oil seal. Replace with a new oil seal.

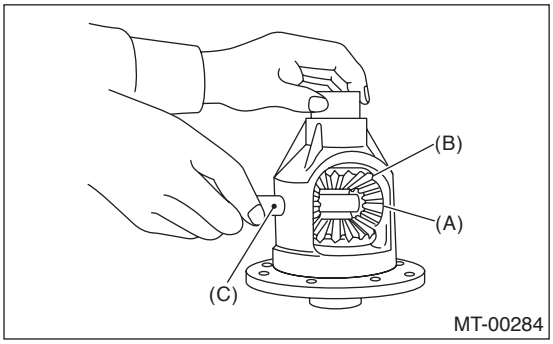


D: ASSEMBLY

1. DIFFERENTIAL CASE ASSEMBLY

1) Install the bevel gear and bevel pinion together with washers, and insert the pinion shaft.

NOTE:
Face the chamfered side of washer toward gear.



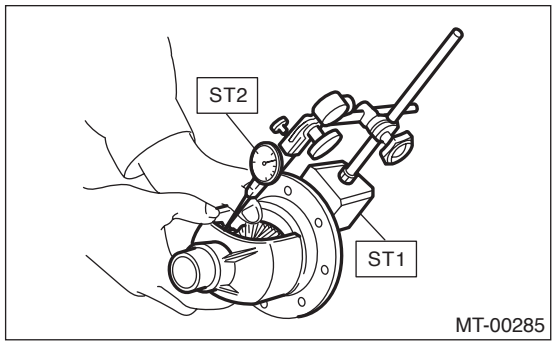
(A) Bevel pinion
(B) Bevel gear
(C) Pinion shaft

2) Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust. <Ref. to 5MT-89, ADJUSTMENT, Front Differential Assembly.>

NOTE:
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.

ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

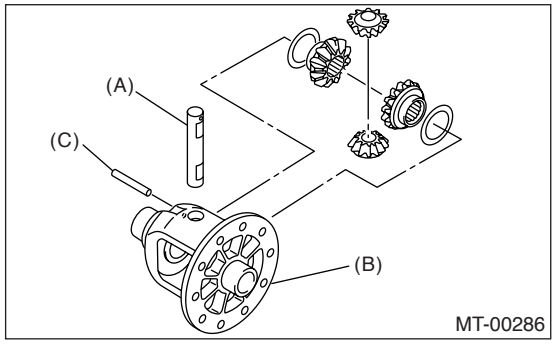
Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)



3) Align the pinion shaft and differential case at their holes, and drive the straight pin into holes from the hypoid driven gear side, using ST.

NOTE:
Lock the straight pin after installing.

ST 899904100 REMOVER

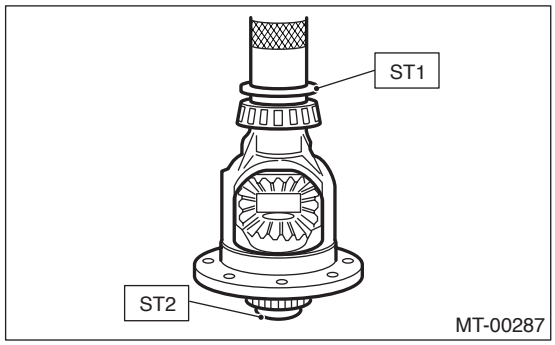


(A) Pinion shaft
(B) Differential case
(C) Straight pin

4) Install the roller bearing to differential case.

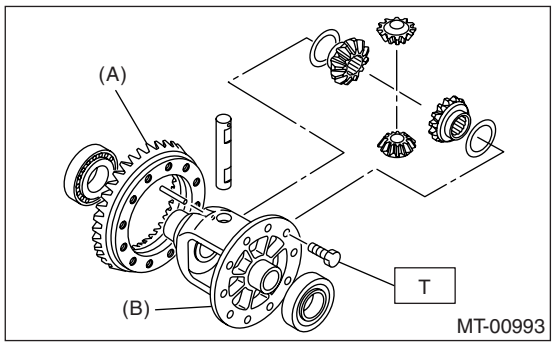
NOTE:
• Do not apply pressure in excess of 10 kN (1 ton, 1.1 US ton, 1.0 Imp ton).
• Be careful because the roller bearing outer races are used as a set.

ST1 499277100 BUSHING 1-2 INSTALLER
ST2 398497701 ADAPTER



5) Install the hypoid driven gear to differential case using twelve bolts.

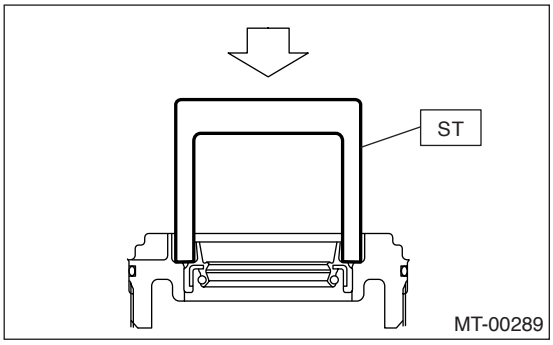
Tightening torque:
T: 62 N·m (6.3 kgf-m, 45.6 ft-lb)



(A) Hypoid driven gear
(B) Differential case

2. SIDE RETAINER

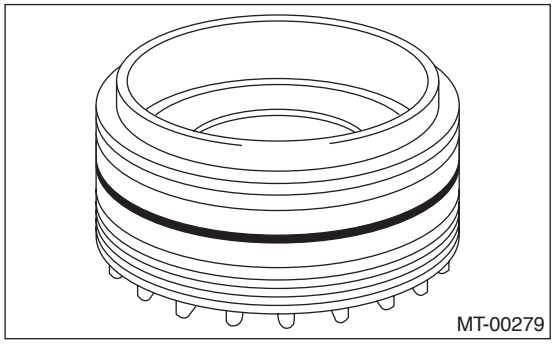
1) Install a new oil seal.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER



NOTE:
• For press-fitting of oil seal to retainer, make tapping with plastic hammer etc.
• Do not use press.

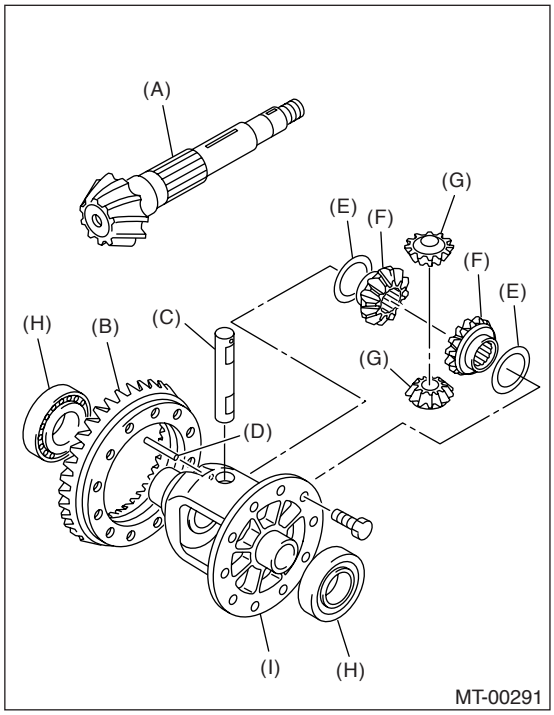
2) Install a new O-ring.

NOTE:
Do not stretch or damage the O-ring.



E: INSPECTION

Repair or replace the differential gear in following cases:
• When the hypoid drive gear and drive pinion shaft tooth surface are damaged, excessively worn or seized.
• When the roller bearing on the drive pinion shaft is worn or damaged.
• When there is damage, wear or seizure of the differential bevel pinion, differential bevel gear, washer, pinion shaft and straight pin.
• When the differential case sliding surfaces is worn or damaged.



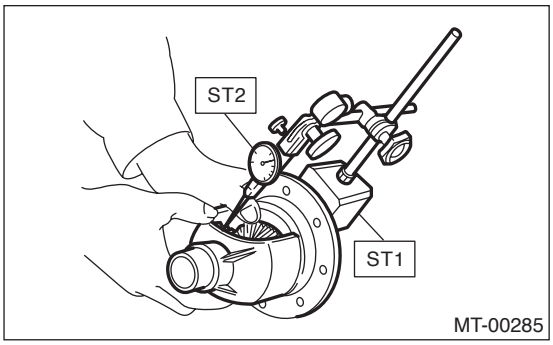
(A) Drive pinion shaft
(B) Hypoid driven gear
(C) Pinion shaft
(D) Straight pin
(E) Washer
(F) Differential bevel gear
(G) Differential bevel pinion
(H) Roller bearing
(I) Differential case

1. BEVEL PINION GEAR BACKLASH

Measure the backlash between bevel gear and pinion. If it is not within specifications, install a suitable washer to adjust.

NOTE:
Be sure the pinion gear teeth contacts adjacent gear teeth during measurement.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE

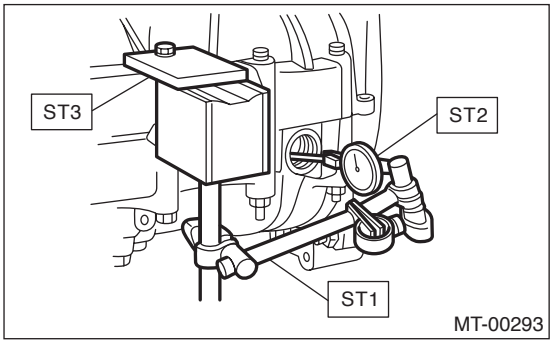
Standard backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)



2. HYPOID GEAR BACKLASH

1) Set the ST1, ST2 and ST3. Insert the needle through transmission oil drain plug hole so that the needle comes in contact with the tooth surface on the right corner and check the backlash.
ST1 498247001 MAGNET BASE
ST2 498247100 DIAL GAUGE
ST3 498255400 PLATE
2) Install the SUBARU genuine axle shafts to both side, rotate in the inversion direction so that the gauge contact with the tooth surface and read the dial gauge.
Part No. 38415AA100 AXLE SHAFT

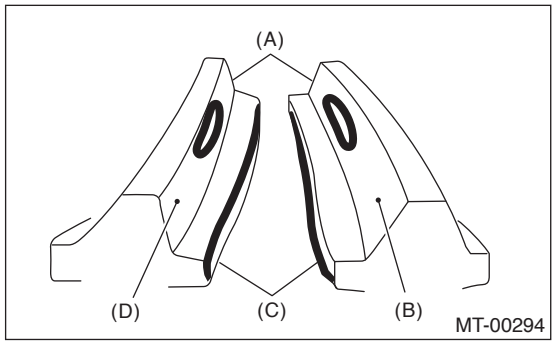
Backlash
0.13 — 0.18 mm (0.0051 — 0.0071 in)



NOTE:
If the backlash is outside the specified range, adjust it by turning the side retainer in right side case.

3. TOOTH CONTACT OF HYPOID GEAR

Check tooth contact of hypoid gear as follows: Apply a uniform thin coat of red lead on both tooth surfaces of 3 or 4 teeth of the hypoid gear. Move the hypoid gear back and forth by turning the transmission main shaft until a definite contact pattern is developed on hypoid gear, and judge whether face contact is correct. If it is inaccurate, make adjustment. <Ref. to 5MT-89, ADJUSTMENT, Front Differential Assembly.>
• Tooth contact is correct.



(A) Toe
(B) Coast side
(C) Heel
(D) Drive side

F: ADJUSTMENT

1. BEVEL PINION GEAR BACKLASH

1) Disassemble the front differential. <Ref. to 5MT-85, REMOVAL, Front Differential Assembly.>
2) Select a different washer from the table and install.

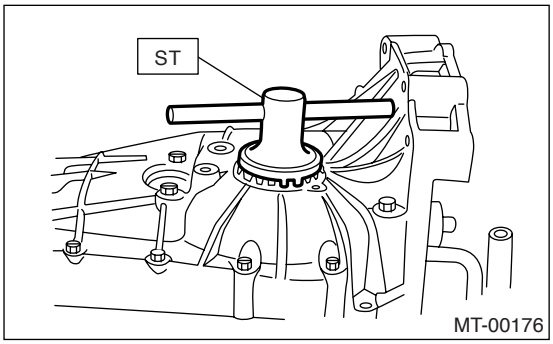
Washer	
Part Number	Thickness mm (in)
803038021	0.925 — 0.950 (0.0364 — 0.0374)
803038022	0.975 — 1.000 (0.0384 — 0.0394)
803038023	1.025 — 1.050 (0.0404 — 0.0413)

3) Adjust until the standard value is obtained.

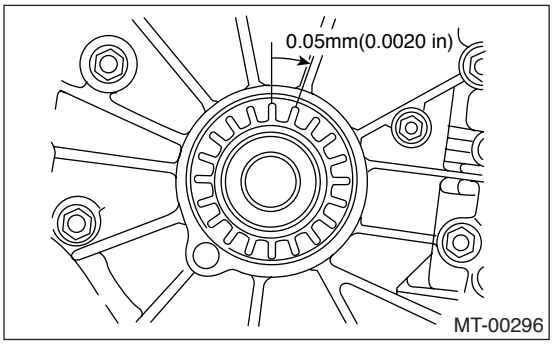
Backlash:
Standard
0.13 — 0.18 mm (0.0051 — 0.0071 in)

2. HYPOID GEAR BACKLASH

Adjust the backlash by turning holder in the right side case.
ST 499787000 WRENCH ASSY

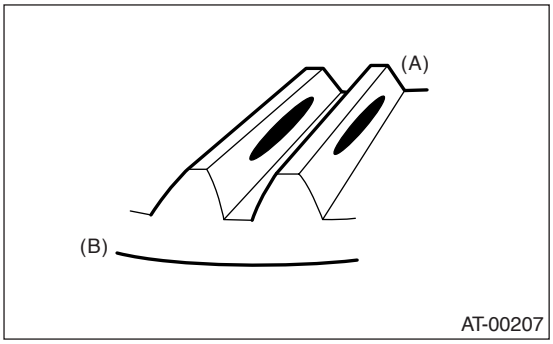


NOTE:
Each time the side retainer rotates one notch, backlash changes by 0.05 mm (0.020 in).



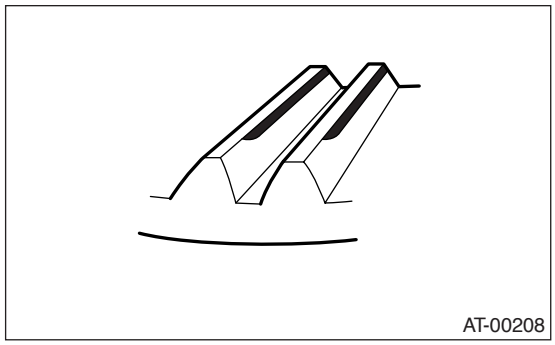
3. TOOTH CONTACT OF HYPOID GEAR

1) Adjust until correct teeth contact is obtained.
2) Check tooth contact as follows.
• Tooth contact
Checking item: Tooth contact pattern is slightly shifted to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

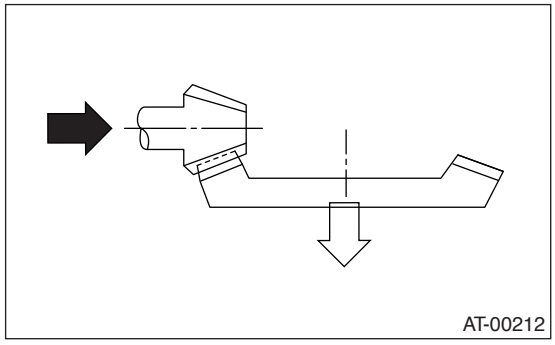


(A) Toe side
(B) Heel side

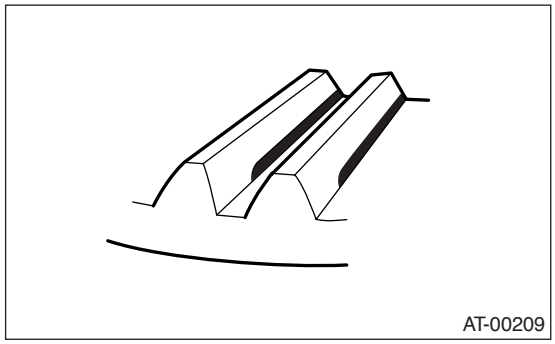
• Face contact
Checking item: Backlash is too large.
Contact pattern



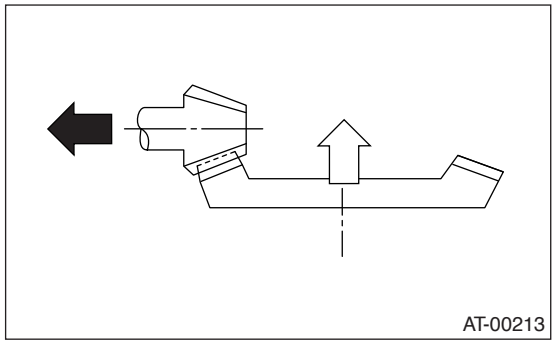
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.



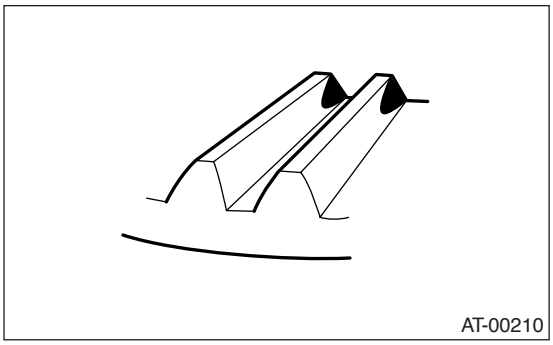
• Flank contact
Checking item: Backlash is too small.
Contact pattern



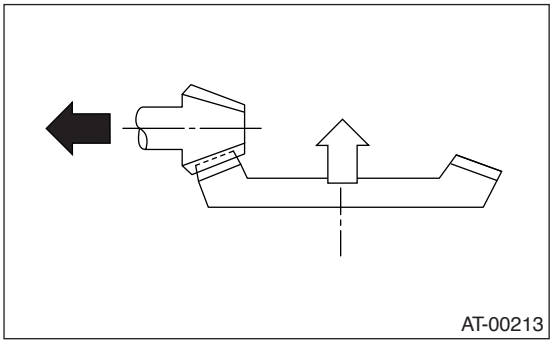
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



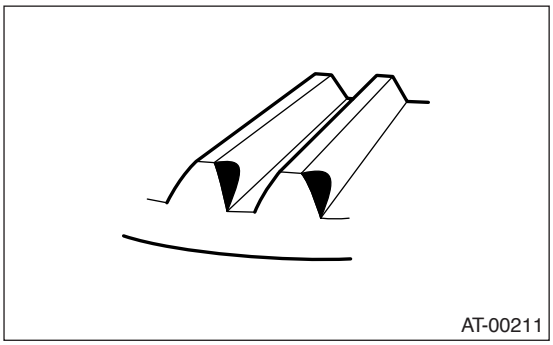
• Toe contact (inside end contact)
Checking item: Contact area is small.
Contact pattern



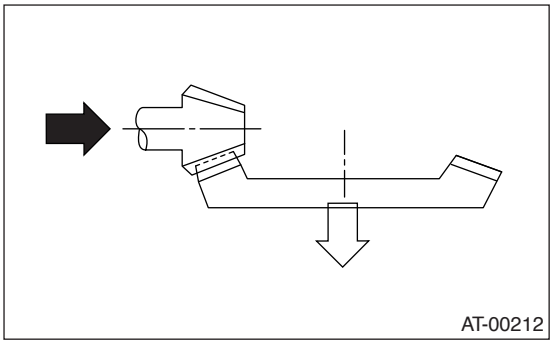
Corrective action: Increase thickness of pinion height adjusting washer in order to bring drive pinion closer to driven gear.



• Heel contact (outside end contact)
Checking item: Contact area is small.
Contact pattern



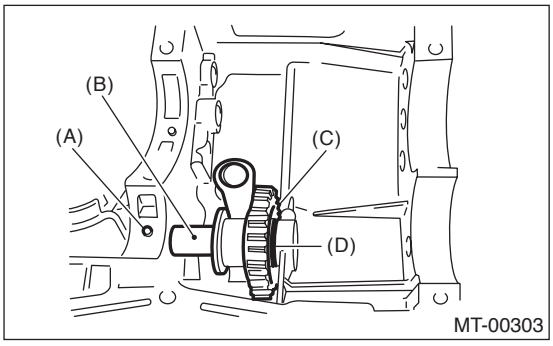
Corrective action: Reduce thickness of pinion height adjusting washer in order to bring drive pinion away from driven gear.



20.Reverse Idler Gear

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove the transmission case. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
5) Remove the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-85, REMOVAL, Front Differential Assembly.>
8) Remove the shifter forks and rods. <Ref. to 5MT-94, REMOVAL, Shifter Fork and Rod.>
9) Pull out the straight pin, and remove the idler gear shaft, reverse idler gear and washer.



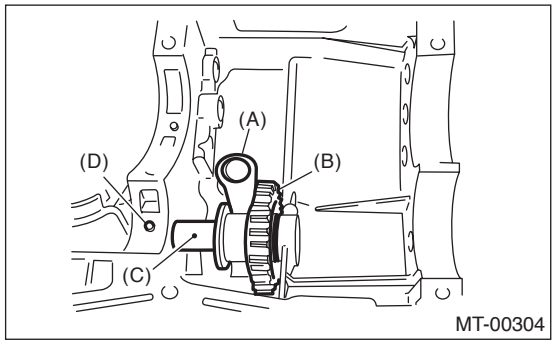
(A) Straight pin
(B) Reverse idler gear shaft
(C) Reverse idler gear
(D) Washer

10) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse shifter lever, reverse idler gear and reverse idler gear shaft, and secure them with straight pin.

NOTE:
Be sure to install the reverse idler shaft from rear side.



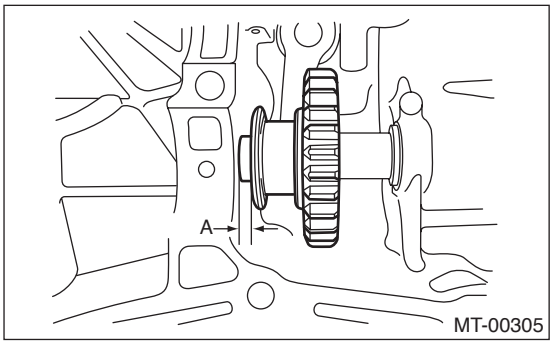
(A) Reverse shifter lever
(B) Reverse idler gear
(C) Reverse idler gear shaft
(D) Straight pin

2) Inspect and adjust the clearance between reverse idler gear and transmission case wall. <Ref. to 5MT-92, INSTALLATION, Reverse Idler Gear.> <Ref. to 5MT-93, ADJUSTMENT, Reverse Idler Gear.>
3) Install the shifter forks and rods. <Ref. to 5MT-94, INSTALLATION, Shifter Fork and Rod.>
4) Install the differential assembly. <Ref. to 5MT-85, INSTALLATION, Front Differential Assembly.>
5) Install the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, INSTALLATION, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>
6) Install the drive pinion shaft assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
7) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
8) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
9) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
10) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

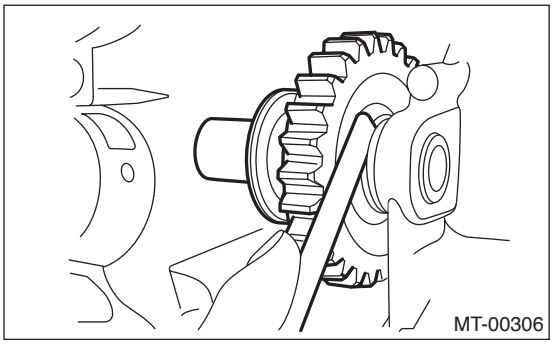
1) Move the reverse shifter rod toward reverse side. Inspect the clearance between reverse idler gear and transmission case wall.
If out of specification, select an appropriate reverse shifter lever and adjust.

Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



2) After installing a suitable reverse shifter lever, shift into neutral. Inspect the clearance between reverse idler gear and transmission case wall.
If out of specification, select an appropriate washer and adjust.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

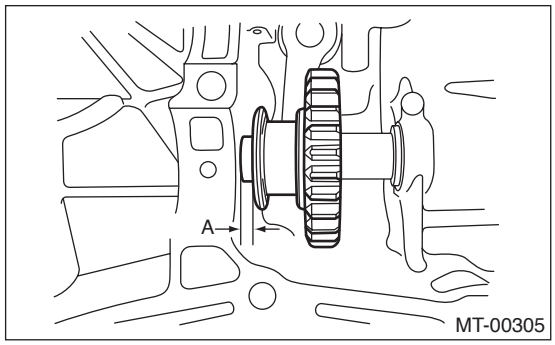


3) Check the reverse idler gear and shaft for damage. Replace if it is damaged.

D: ADJUSTMENT

1) Select an appropriate reverse shifter lever from the table below, and adjust until the gap between reverse idler gear and transmission case wall is within specification.

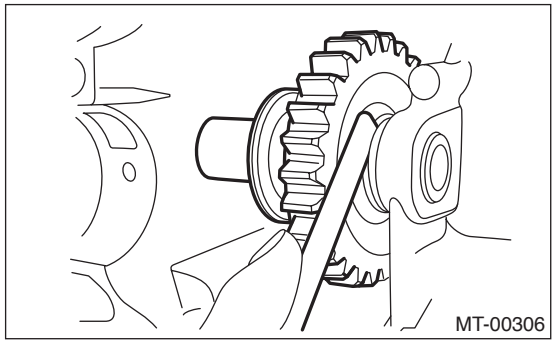
Clearance A:
6.0 — 7.5 mm (0.236 — 0.295 in)



Reverse shifter lever		
Part Number	Marking	Remarks
32820AA070	7	Further from case wall
32820AA080	8	Standard
32820AA090	9	Closer to case wall

2) Select an appropriate washer from the table below, and adjust until the gap between the reverse idler gear and transmission case wall is within specification.

Clearance:
0 — 0.5 mm (0 — 0.020 in)

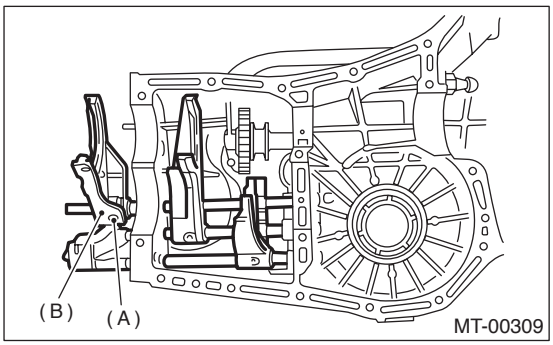


Washer	
Part Number	Thickness mm (in)
803020151	0.4 (0.016)
803020152	1.1 (0.043)
803020153	1.5 (0.059)
803020154	1.9 (0.075)
803020155	2.3 (0.091)

21.Shifter Fork and Rod

A: REMOVAL

1) Remove the manual transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the back-up light switch and neutral position switch. <Ref. to 5MT-41, REMOVAL, Switches and Harness.>
3) Remove the transfer case with extension case assembly. <Ref. to 5MT-44, REMOVAL, Transfer Case and Extension Case Assembly.>
4) Remove transmission case. <Ref. to 5MT-56, REMOVAL, Transmission Case.>
5) Removes the drive pinion shaft assembly. <Ref. to 5MT-77, REMOVAL, Drive Pinion Shaft Assembly.>
6) Remove the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, REMOVAL, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, REMOVAL, Main Shaft Assembly for Dual-Range.>
7) Remove the differential assembly. <Ref. to 5MT-85, REMOVAL, Front Differential Assembly.>
8) Drive out the straight pin tapping by ST, and pull out the 5th shifter fork.
ST 398791700 STRAIGHT PIN REMOVER

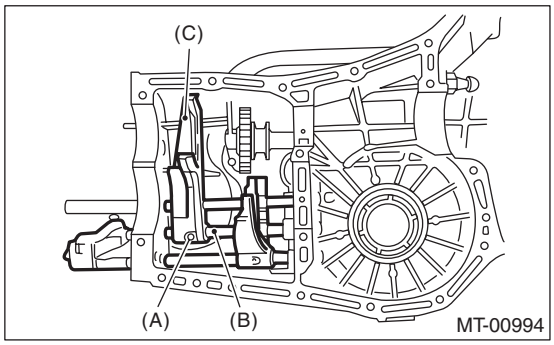


(A) Straight pin
(B) 5th shifter fork

9) Remove the plugs, springs and checking balls.
10) Drive out the straight pin tapping by ST, and pull out the 3-4 fork rod and shifter fork.

NOTE:
When removing a rod, keep other rods in neutral. Also, when pulling out the straight pin, remove it toward the inside of case so that it does not hit against the case.

ST 398791700 STRAIGHT PIN REMOVER



(A) Straight pin
(B) 3-4 fork rod
(C) Shifter fork

11) Drive out the straight pin tapping by ST, and pull out the 1-2 fork rod and shifter fork.
ST 398791700 STRAIGHT PIN REMOVER
12) Remove the outer snap ring, and pull out reverse fork rod from reverse shifter rod arm. Then take out the ball, spring and interlock plunger from rod.
And then remove the rod.

NOTE:
When pulling out reverse shifter rod arm, be careful not to let ball pop out of arm.

13) Remove the reverse shifter lever.

B: INSTALLATION

1) Install the reverse arm fork spring, ball and interlock plunger to reverse fork rod arm. Insert the reverse fork rod into the hole in reverse fork rod arm, and hold it with outer snap ring using ST.

NOTE:
Apply a coat of grease to plunger to prevent it from falling.

ST 399411700 ACCENT BALL INSTALLER
2) Position the ball, spring and new gasket in the reverse shifter rod hole on the left side of transmission case, and tighten the checking ball plug.
3) Install the 1-2 fork rod into 1-2 shifter fork through the hole on the rear of transmission case.
4) Align the holes in rod and fork, and drive new straight pin into these holes using ST.

NOTE:
• Set other rods to neutral.
• Make sure the interlock plunger is on the 3-4 fork rod side.

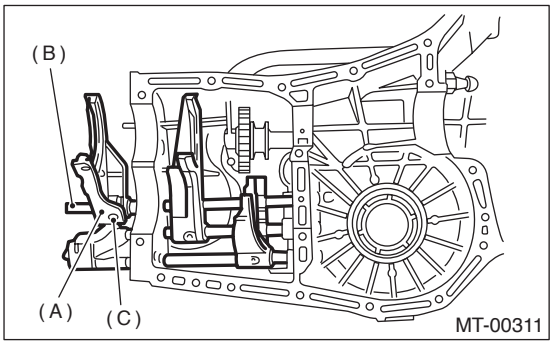
ST 398791700 STRAIGHT PIN REMOVER
5) Install the interlock plunger onto 3-4 fork rod.

NOTE:
Apply a coat of grease to plunger to prevent it from falling.

6) Install the 3-4 fork rod into 3-4 shifter fork through the hole on the rear of transmission case.
7) Align the holes in rod and fork, and drive new straight pin into these holes.

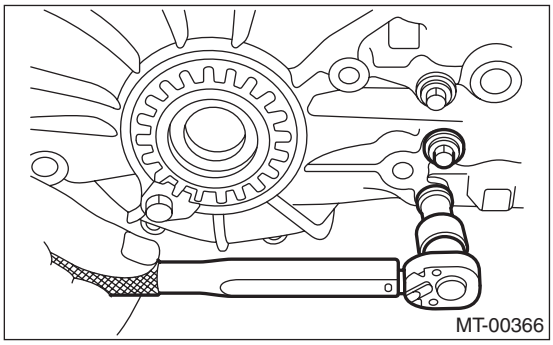
NOTE:
• Set the reverse fork rod to neutral.
• Make sure the interlock plunger (before installation) is on the reverse fork rod side.

ST 398791700 STRAIGHT PIN REMOVER
8) Install the 5th shifter fork onto the rear of reverse fork rod. Align the holes in the two parts and drive new straight pin into the specified place.
ST 398791700 STRAIGHT PIN REMOVER



(A) 5th shifter fork
(B) Reverse fork rod
(C) Straight pin

9) Position the balls, checking ball springs and new gaskets into 3-4 and 1-2 rod holes, and install plugs.

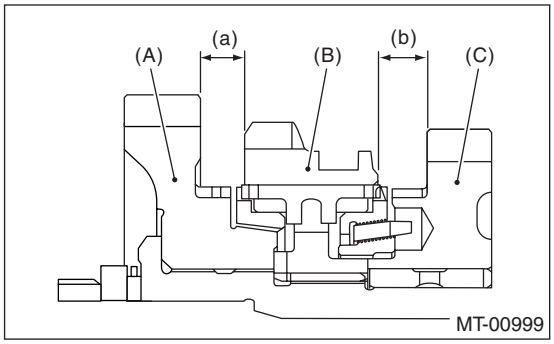


10) Install the differential assembly. <Ref. to 5MT-85, INSTALLATION, Front Differential Assembly.>
11) Install the main shaft assembly.
• Single-range model
<Ref. to 5MT-62, INSTALLATION, Main Shaft Assembly for Single-Range.>
• Dual-range model
<Ref. to 5MT-67, INSTALLATION, Main Shaft Assembly for Dual-Range.>
12) Install the drive pinion shaft assembly. <Ref. to 5MT-77, INSTALLATION, Drive Pinion Shaft Assembly.>
13) Install the transmission case. <Ref. to 5MT-58, INSTALLATION, Transmission Case.>
14) Install the transfer case with extension case assembly. <Ref. to 5MT-44, INSTALLATION, Transfer Case and Extension Case Assembly.>
15) Install the back-up light switch and neutral position switch. <Ref. to 5MT-41, INSTALLATION, Switches and Harness.>
16) Install the manual transmission assembly into vehicle. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

1) Inspect the fork and rod for damage. Replace if it is damaged.
2) Gearshift mechanism
Repair or replace the gearshift mechanism if excessively worn, bent, or defective in any way.
3) Inspect the clearance between 1st, 2nd driven gear and reverse driven gear. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
9.5 mm (0.374 in)

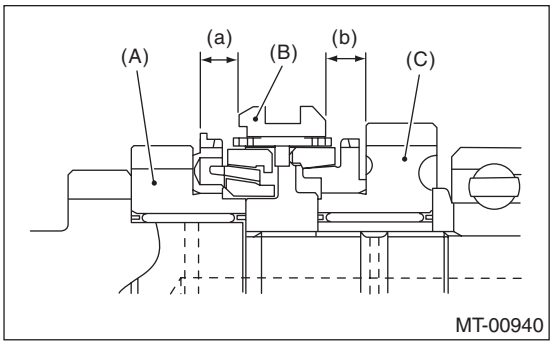


(A) 1st driven gear
(B) Reverse driven gear
(C) 2nd driven gear

1st-2nd shifter fork		
Part Number	Marking	Remarks
32804AA060	1	Approach to 1st gear by 0.2 mm (0.008 in).
32804AA070	—	Standard
32804AA080	3	Become distant from 2nd gear by 0.2 mm (0.008 in).

4) Inspect the clearance between 3rd, 4th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a) and (b):
7.3 mm (0.287 in)

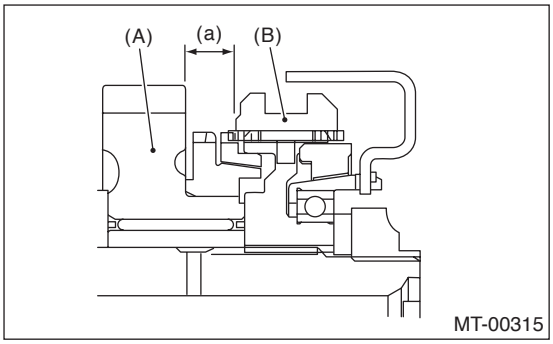


(A) 3rd drive gear
(B) Coupling sleeve
(C) 4th drive gear

3rd-4th shifter fork		
Part Number	Marking	Remarks
32810AA061	1	Approach to 4th gear by 0.2 mm (0.008 in).
32810AA071	—	Standard
32810AA101	3	Become distant from 3rd gear by 0.2 mm (0.008 in).

5) Inspect the clearance between 5th drive gear and coupling sleeve. If any clearance is not within specifications, replace the shifter fork as required.

Clearance (a):
9.3 mm (0.366 in)



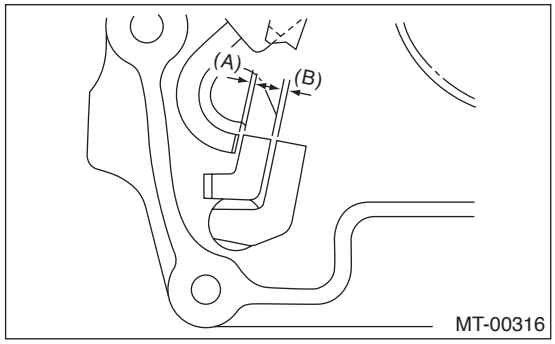
(A) 5th drive gear
(B) Coupling sleeve

5th shifter fork		
Part Number	Marking	Remarks
32812AA201	4	Approach to 5th gear by 0.2 mm (0.008 in).
32812AA211	5	Standard
32812AA221	6	Become distant from 5th gear by 0.2 mm (0.008 in).

6) Inspect the rod end clearances (A) and (B). If any clearance is not within specifications, replace the rod or fork as required.

Clearance (A):
3rd-4th — 5th:
0.5 — 1.3 mm (0.020 — 0.051 in)

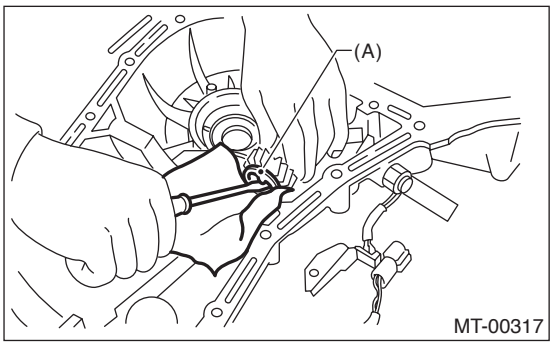
Clearance (B):
1st-2nd — 3rd-4th
0.4 — 1.4 mm (0.016 — 0.055 in)



22.Counter Gear

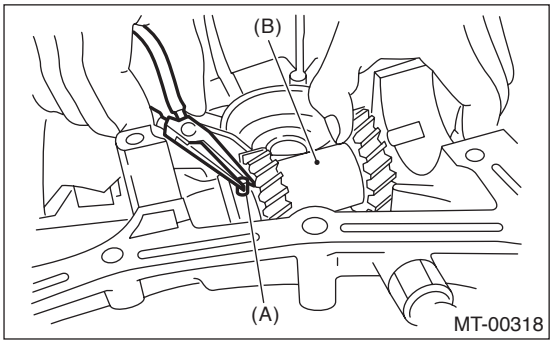
A: REMOVAL

1) Remove the manual transmission assembly from vehicle. **<Ref. to 5MT-31,** REMOVAL, Manual Transmission Assembly.>
2) Remove the transfer case with extension case assembly. **<Ref. to 5MT-44,** REMOVAL, Transfer Case and Extension Case Assembly.>
3) Remove the transmission case. **<Ref. to 5MT-56,** REMOVAL, Transmission Case.>
4) Move the counter gear shaft until it touches transmission case, and remove the snap ring with a suitable tool.



(A) Snap ring

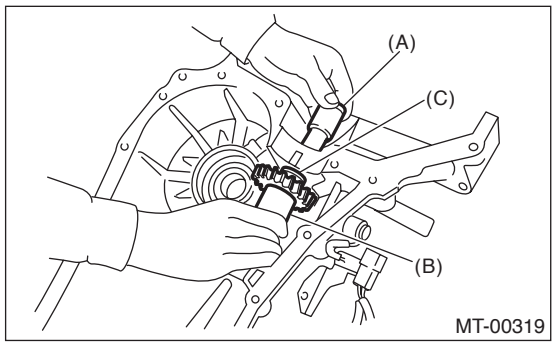
5) Slide the washer to the rear of high-low counter shaft, and remove the straight pin from counter shaft.



(A) Straight pin
(B) Counter gear

6) Remove the counter shaft from transmission case, taking care not to drop the counter gear and two washers.

NOTE:
• Be careful not to damage the O-ring.
• Be careful not to drop the straight pin on front side.
• Be careful not to drop the two needle bearings and collar contained in counter gear.



(A) Counter shaft
(B) Counter gear
(C) Washers

B: INSTALLATION

1) Install the O-ring and straight pin onto counter gear shaft.
2) Install the following parts in main case (Right-side), and push the shaft perfectly into case.
• Counter gear shaft
• Two counter gear washers
• Two needle bearings
• Counter gear collar
• Counter gear
• Straight pin
• Snap ring
3) Install the transmission case. **<Ref. to 5MT-58,** INSTALLATION, Transmission Case.>
4) Install the transfer case with extension case assembly. **<Ref. to 5MT-44,** INSTALLATION, Transfer Case and Extension Case Assembly.>
5) Install the manual transmission assembly on vehicle. **<Ref. to 5MT-33,** INSTALLATION, Manual Transmission Assembly.>

NOTE:
• Make sure that the cut-out end surface of counter gear shaft does not protrude above the end surface of the case.
• Position the cut-out portion of counter gear shaft.

C: INSPECTION

1) After installing the snap ring, measure the clearance between snap ring and counter washer.

Clearance:
0.05 — 0.35 mm (0.0020 — 0.0138 in)

2) If the clearance is out of specified value, select a snap ring and install to put clearance within specified value. **<Ref. to 5MT-98,** ADJUSTMENT**, Counter Gear.>**

D: ADJUSTMENT

Selection of snap ring:
If the measurement is not within specification, select a suitable snap ring.

Snap ring	
Part No.	Thickness mm (in)
031319000	1.50 (0.0591)
805019010	1.72 (0.0677)

23.General Diagnostic Table

A: INSPECTION

1. MANUAL TRANSMISSION

Symptom	Possible cause	Corrective action
1. Gears are difficult to intermesh. NOTE: The cause for difficulty in shifting gears can be classified into two kinds: one is defective gear shift system and the other is defective transmission. However, if the operation is heavy and engagement of the gears is difficult, defective clutch disengagement may also be responsible. Check whether the clutch is correctly functioning, before checking the gear shift system and transmission.	(a) Worn, damaged or burred chamfer of internal spline of sleeve and reverse driven gear	Replace.
	(b) Worn, damaged or burred chamfer of spline of gears	Replace.
	(c) Worn or scratched bushings	Replace.
	(d) Incorrect contact between synchronizer ring and gear cone, or wear	Rectify or replace.
2. Gear slip-out • Gear slips out when coasting on rough road. • Gear slips out during acceleration.	(a) Defective pitching stopper adjustment	Adjust.
	(b) Loose engine mounting bolts	Tighten or replace.
	(c) Worn fork shifter, broken shifter fork rail spring	Replace.
	(d) Worn or damaged ball bearing	Replace.
	(e) Excessive clearance between splines of synchronizer hub and synchronizer sleeve	Replace.
	(f) Worn tooth step of synchronizer hub (caused by slip-out of 3rd gear)	Replace.
	(g) Worn 1st driven gear and driven shaft	Replace.
	(h) Worn 2nd driven gear and bushing	Replace.
	(i) Worn 3rd drive gear and needle bearing	Replace.
	(j) Worn 3rd drive gear and needle bearing	Replace.
	(k) Worn reverse idler gear and bushing	Replace.
3. Noise emit from transmission. NOTE: If a noise is heard when the vehicle is parked with its engine idling and if a noise ceases when the clutch is disengaged, it may be considered that the noise comes from the transmission.	(a) Insufficient or improper lubrication	Lubricate with specified oil or replace.
	(b) Worn or damaged gears and bearings NOTE: If the trouble is only wear of the tooth surfaces, merely a high roaring noise will occur at high speeds, but if any part is broken, rhythmical knocking sound will be heard even at low speeds.	Replace.

2. DIFFERENTIAL

Symptom	Possible cause	Corrective action
1. Broken differential (case, gear, bearing, etc.) NOTE: Noise will be developed and finally it will become impossible to continue to run due to broken pieces obstructing the gear revolution.	(a) Insufficient or improper oil	Disassemble differential and replace broken components. At the same time check other components for any trouble, and replace if necessary.
	(b) Use of vehicle under severe conditions such as excessive load and improper use of clutch	Readjust bearing preload and backlash and face contact of gears.
	(c) Improper adjustment of taper roller bearing	Adjustment.
	(d) Improper adjustment of drive pinion and hypoid driven gear	Adjustment.
	(e) Excessive backlash due to worn differential side gear, washer or differential pinion under severe operating conditions of the vehicle.	Add recommended oil to the specified level. Do not use vehicle under severe operating conditions.
	(f) Loose hypoid driven gear tightening bolts	Tighten.
2. Differential and hypoid gear noises Troubles of the differential and hypoid gear always appear as noise problems. Therefore noise is the first indication of trouble. However noises from the engine, muffler, tire, exhaust gas, bearing, body, etc. are easily mistaken for the differential noise. Pay special attention to the hypoid gear noise because it is easily confused with other gear noises. There are the following four kinds of noises. • Gear noise when driving: If noise increases as the vehicle speed increases it may be due to insufficient gear oil, incorrect gear engagement, damaged gears, etc. • Gear noise when coasting: Damaged gears due to maladjusted bearings and incorrect shim adjustment. • Bearing noise when driving or coasting: Cracked, broken or rusty bearings • Noise mainly when turning: Noise occurs form differential side gear, differential pinion or differential pinion shaft, etc.	(a) Insufficient oil	Lubricate.
	(b) Improper adjustment of hypoid driven gear and drive pinion	Check tooth contact.
	(c) Worn teeth of hypoid driven gear and drive pinion	Replace as a set. Readjust bearing preload.
	(d) Loose roller bearing	Readjust hypoid driven gear to drive pinion backlash and check tooth contact.
	(e) Distorted hypoid driven gear or differential case	Replace.
	(f) Worn washer and differential pinion shaft	Replace.

TRANSMISSION SECTION

CONTROL SYSTEMS	CS
AUTOMATIC TRANSMISSION	4AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	4AT(diag)
AUTOMATIC TRANSMISSION	5AT
AUTOMATIC TRANSMISSION (DIAGNOSTICS)	5AT(diag)
MANUAL TRANSMISSION AND DIFFERENTIAL	5MT
CLUTCH SYSTEM	CL

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD.

G2320GE5

CLUTCH SYSTEM

CL

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1.	General Description	2
2.	Clutch Disc and Cover	12
3.	Flywheel	16
4.	Release Bearing and Lever	18
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6.	Master Cylinder	21
7.	Clutch Pipe and Hose	23
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9.	Clutch Fluid Air Bleeding	25
10.	Clutch Pedal	26
11.	Clutch Switch	32
12.	General Diagnostic Table	33

1. General Description

A: SPECIFICATION

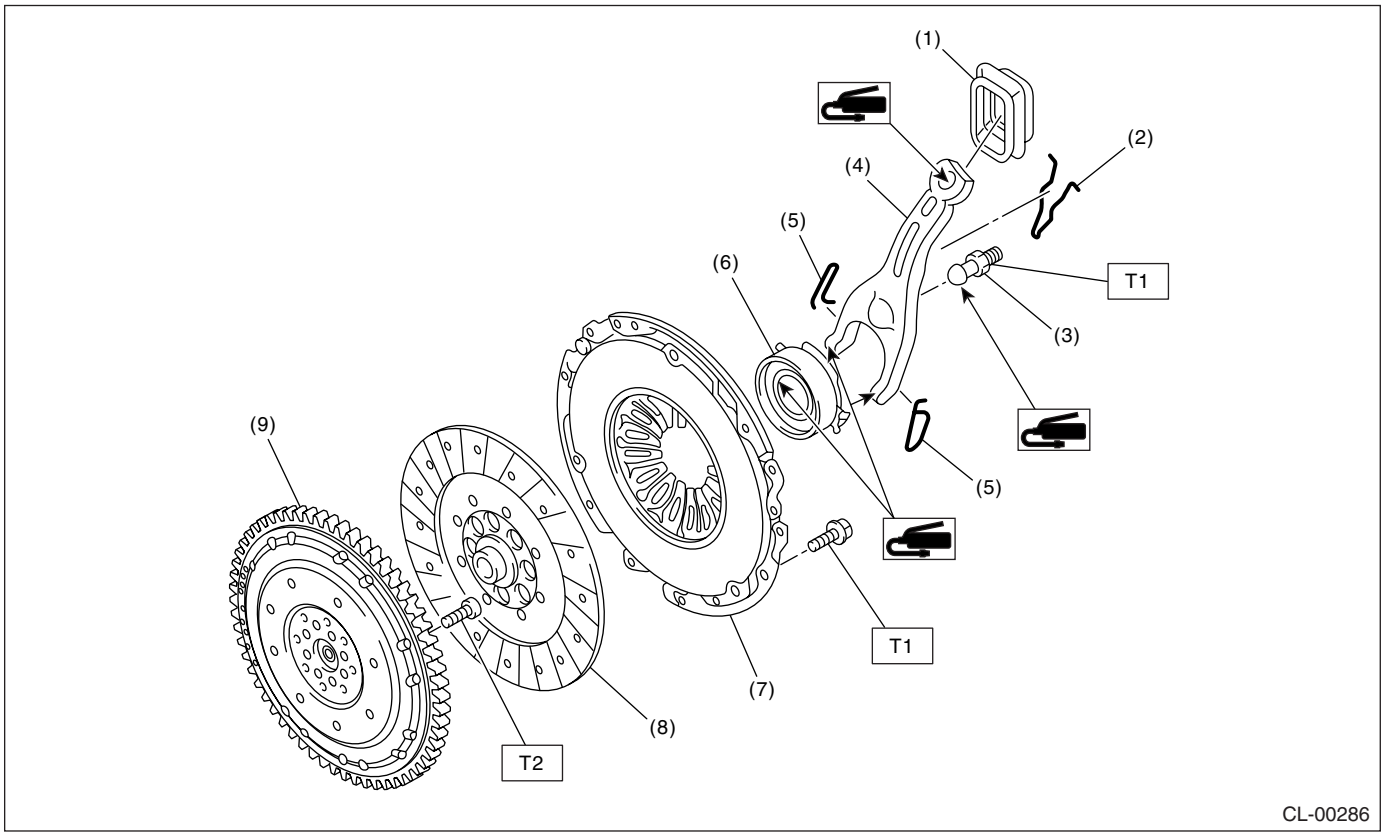
Option code★1			EC, EK, KA		KS, K4	
Model			2.0 L	2.5 L	2.0 L	2.5 L
Clutch cover	Diaphragm set load	kgf (lb)	550 (1,213)		450 (992)	580 (1,279)
Clutch disc	Facing material		Woven			
	Outer diameter × Inner diameter × Thickness	mm (in)	228.6 × 155 × 2.95 (9.00 × 6.10 × 0.1161)		225 × 150 × 3.5 (8.86 × 5.91 × 0.138)	
	Spline outer diameter	mm (in)	25.2 (0.992)			
	Depth of rivet head mm (in)	Standard	1.3 — 1.9 (0.051 — 0.075)			
		Limit of sinking	0.3 (0.012)			
	Limit for deflection	mm (in)	1.0 (0.039) at R = 110 (4.33)			
Clutch release lever ratio			1.6			
Release bearing			Grease-packed self-aligning			
Clutch pedal	Full stroke	mm (in)	130 — 135 (5.12 — 5.31)			
	Free play	mm (in)	4 — 13 (0.16 — 0.51)			
Flywheel	Type		Dual mass		Flexible	

★1: For option code, refer to “ID” section. <Ref. to ID-5, MODEL NUMBER PLATE, IDENTIFICATION, Identification.>

B: COMPONENT

1. CLUTCH ASSEMBLY

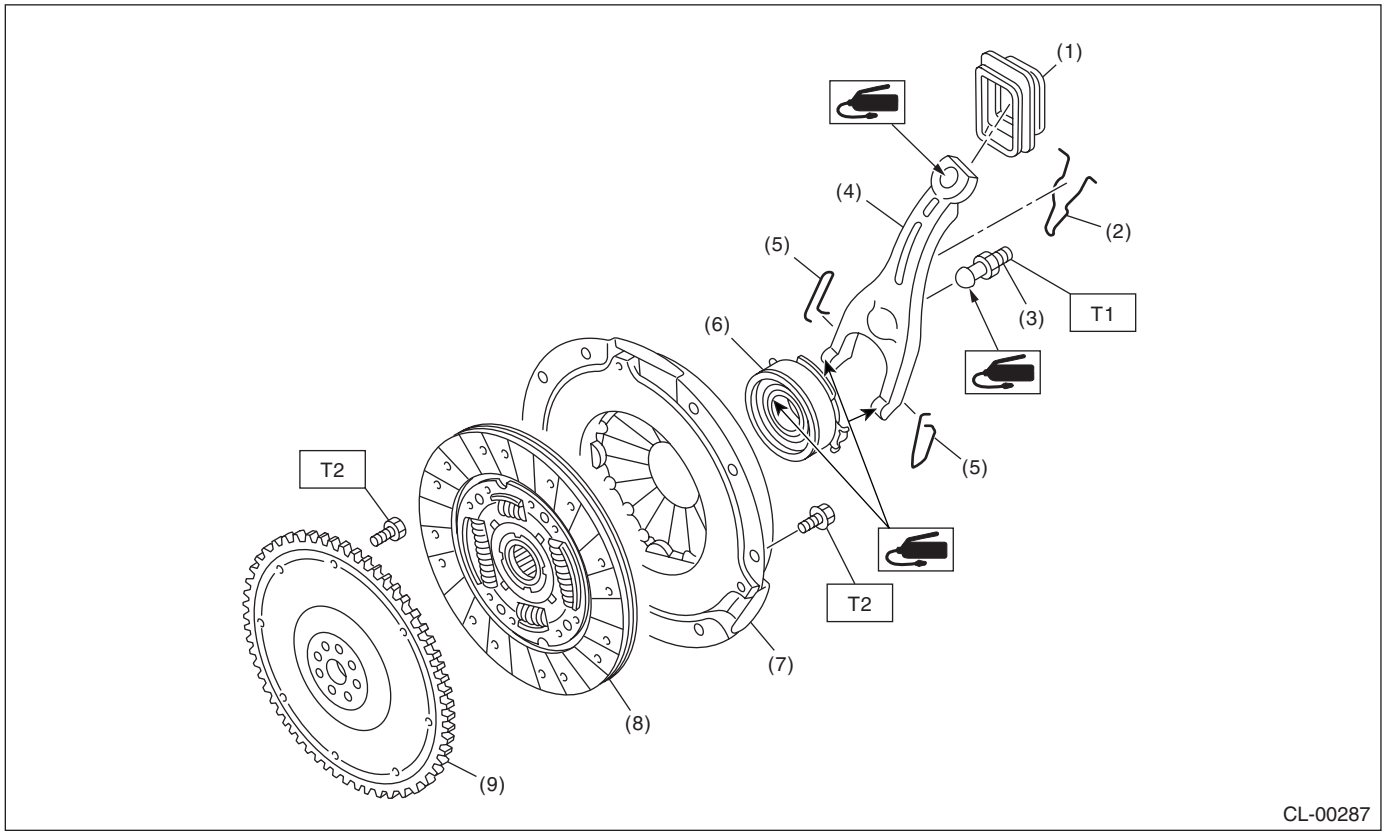
• EC, EK and KA model



(1) Dust cover
(2) Lever spring
(3) Pivot
(4) Release lever
(5) Clip
(6) Release bearing
(7) Clutch cover
(8) Clutch disc
(9) Dual mass flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

• KS and K4 model

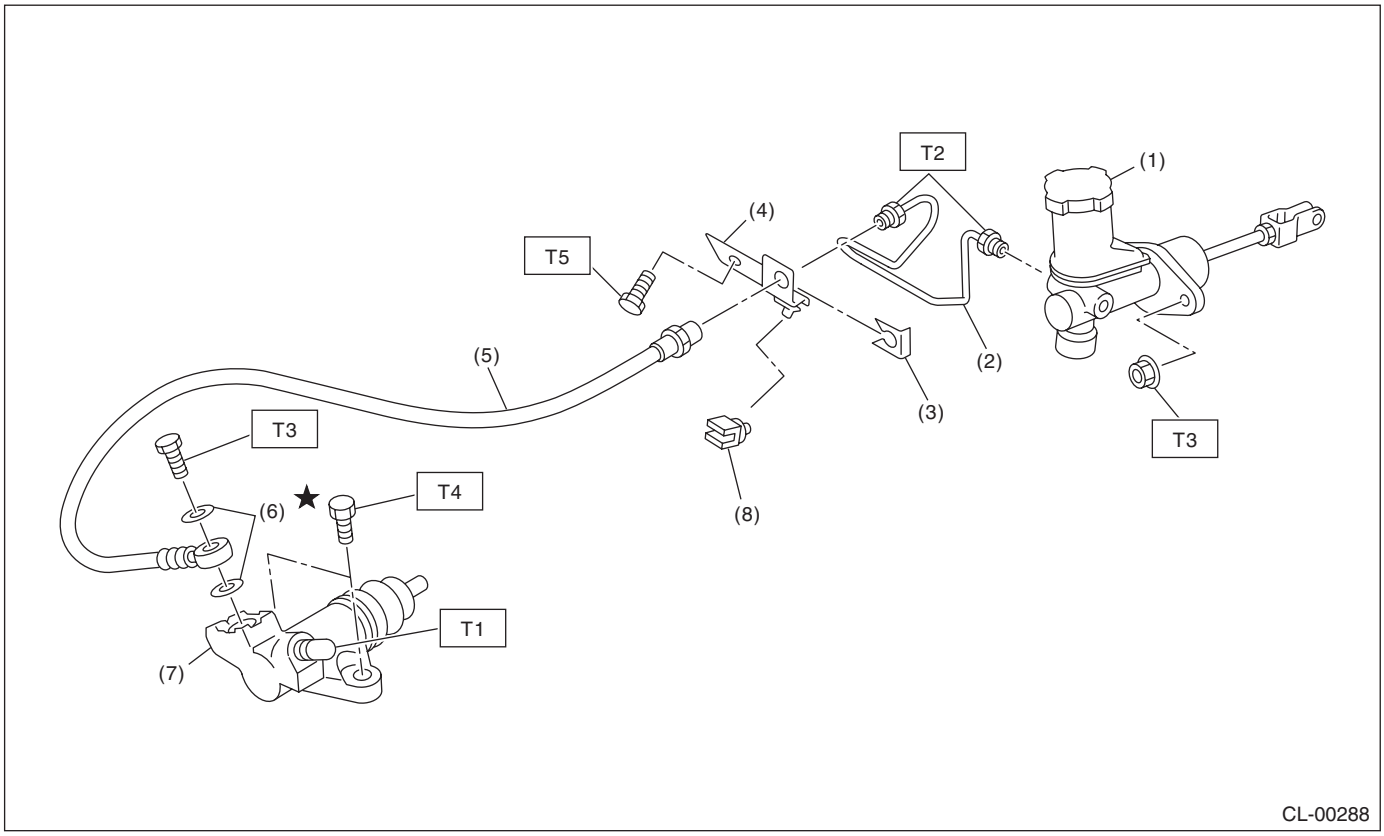


(1) Dust cover
(2) Lever spring
(3) Pivot
(4) Release lever
(5) Clip
(6) Release bearing
(7) Clutch cover
(8) Clutch disc
(9) Flexible flywheel

Tightening torque: N·m (kgf-m, ft-lb)
T1: 16 (1.6, 11.8)
T2: 72 (7.3, 52.8)

2. CLUTCH PIPE AND HOSE

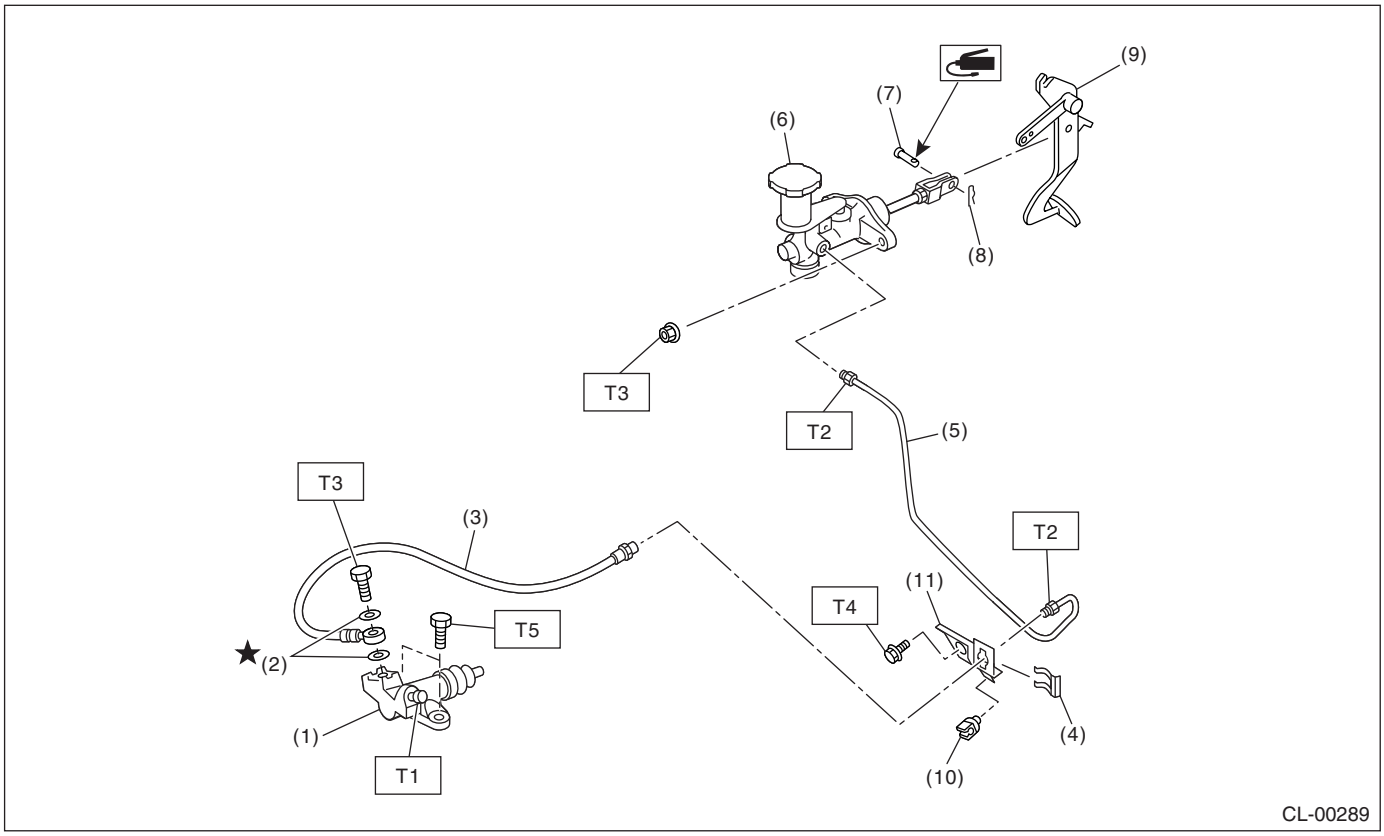
• LHD model



(1) Master cylinder ASSY
(2) Clutch pipe
(3) Clamp
(4) Bracket
(5) Clutch hose
(6) Washer
(7) Operating cylinder
(8) Clip

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15 (1.5, 10.8)
T3: 18 (1.8, 13.0)
T4: 37 (3.8, 27.5)
T5: 25 (2.5, 18.4)

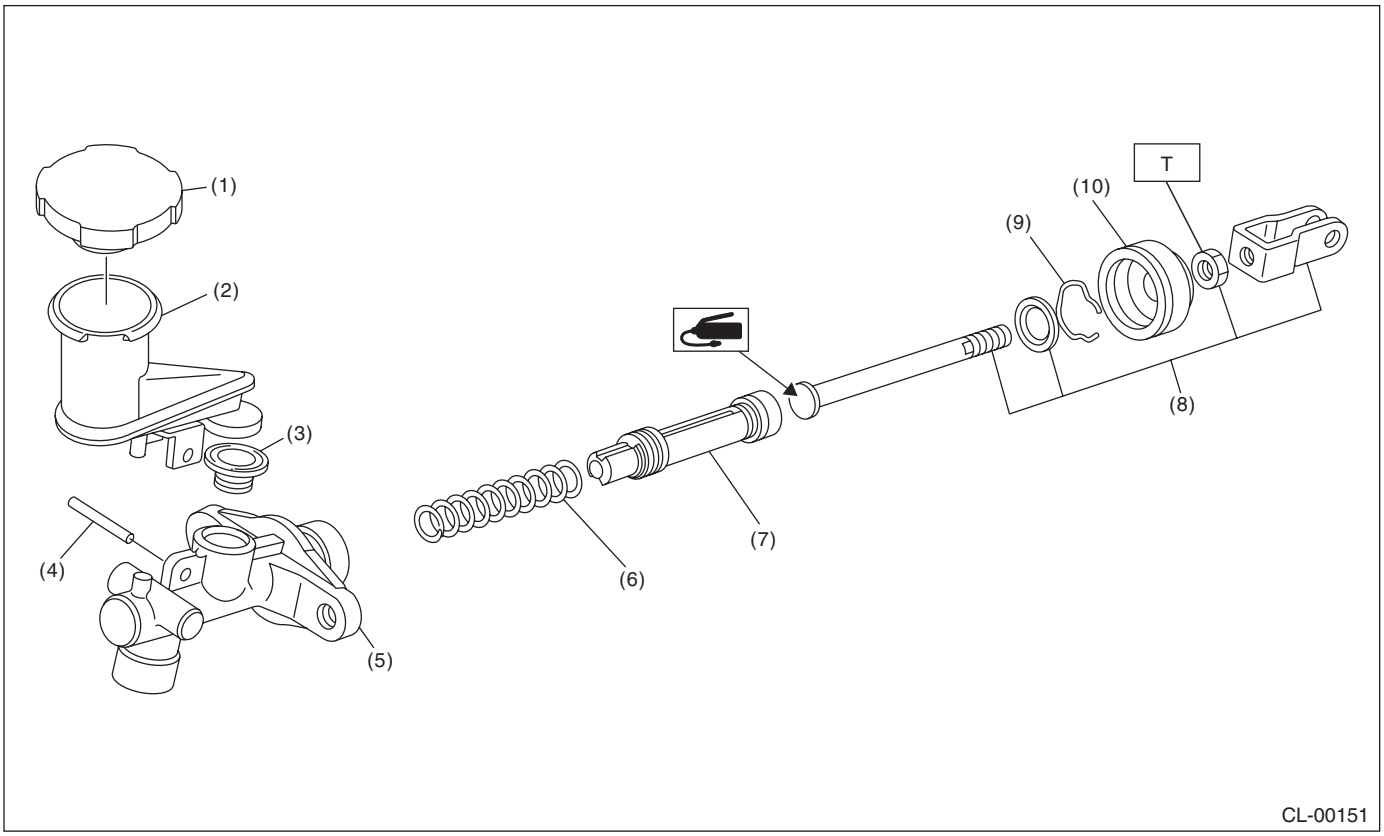
• RHD model



(1)	Operating cylinder	(7)	Clevis pin
(2)	Washer	(8)	Snap pin
(3)	Clutch hose	(9)	Pedal
(4)	Clamp	(10)	Clip
(5)	Clutch pipe	(11)	Bracket
(6)	Master cylinder ASSY		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15 (1.5, 10.8)
T3: 18 (1.8, 13.0)
T4: 25 (2.5, 18.4)
T5: 37 (3.8, 27.5)

3. MASTER CYLINDER

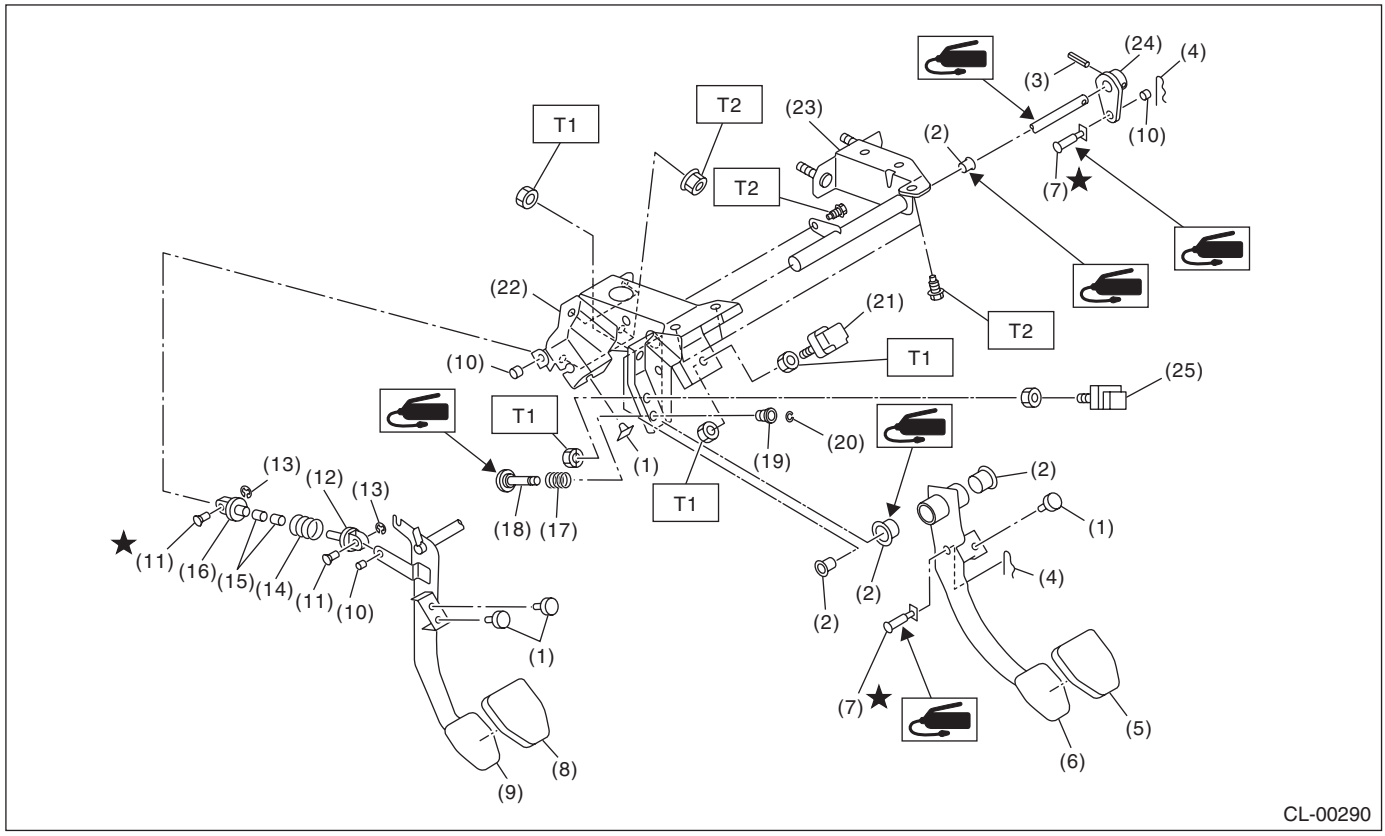


(1) Reservoir cap
(2) Reservoir tank
(3) Oil seal
(4) Straight pin
(5) Master cylinder
(6) Return spring
(7) Piston
(8) Push rod ASSY
(9) Piston stop ring
(10) Cylinder boot

Tightening torque: N·m (kgf-m, ft-lb)
T: 10 (1.0, 7)

4. CLUTCH PEDAL

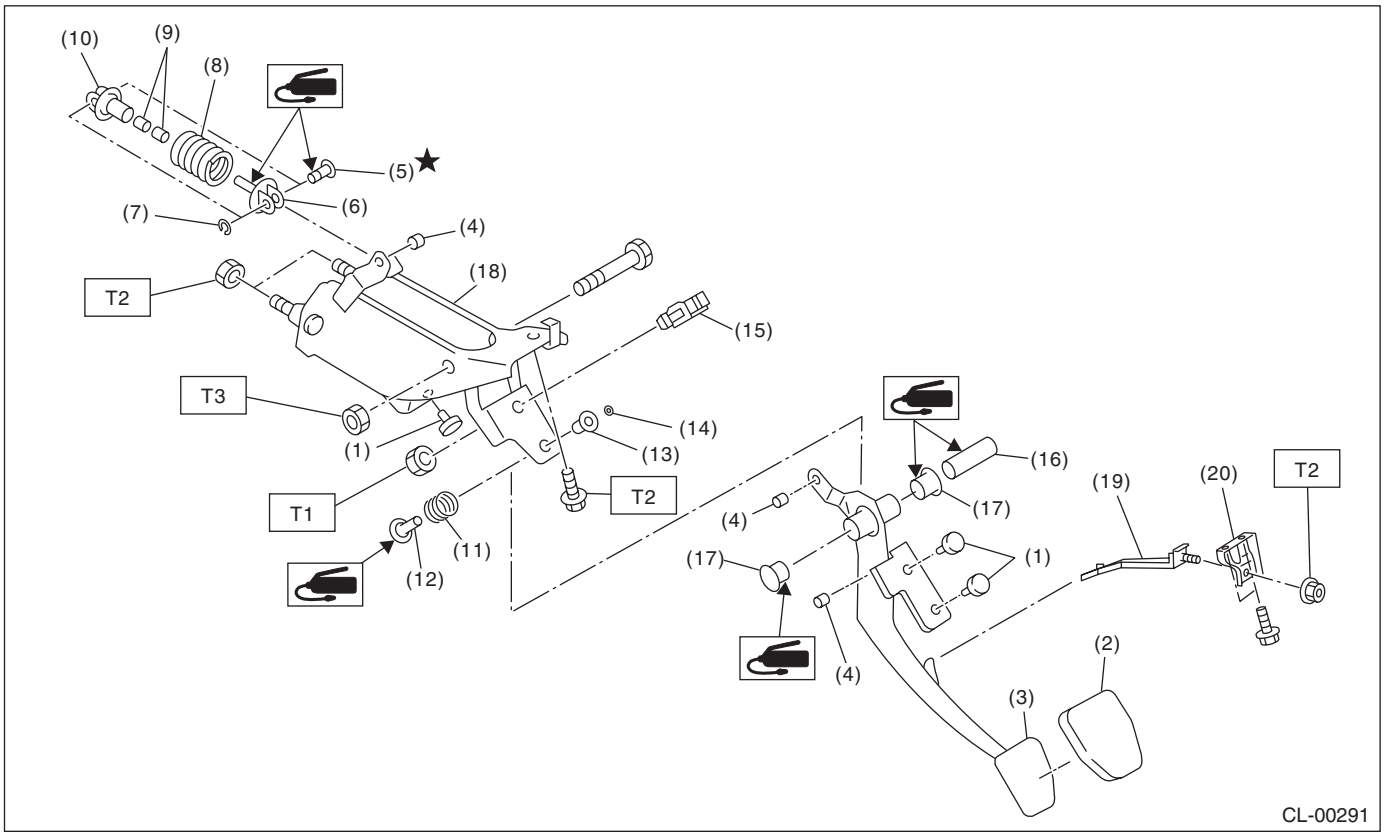
• LHD model



(1) Stopper
(2) Bushing
(3) Spring pin
(4) Snap pin
(5) Brake pedal pad
(6) Brake pedal
(7) Clevis pin
(8) Clutch pedal pad
(9) Clutch pedal
(10) Bushing C
(11) Clutch clevis pin
(12) Assist rod A
(13) Clip
(14) Assist spring
(15) Assist bushing
(16) Assist rod B
(17) Spring A (EC and 2.5 L model)
(18) Rod (EC and 2.5 L model)
(19) Bushing B (EC and 2.5 L model)
(20) Clip (EC and 2.5 L model)
(21) Stop light switch
(22) Pedal bracket
(23) Clutch master cylinder bracket
(24) Lever
(25) Clutch switch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

• RHD model



(1) Stopper
(2) Clutch pedal pad
(3) Clutch pedal
(4) Bushing C
(5) Clutch clevis pin
(6) Assist rod A
(7) Clip
(8) Assist spring
(9) Assist bushing
(10) Assist rod B
(11) Spring A
(12) Rod S
(13) Bushing B
(14) Clip
(15) Clutch switch
(16) Spacer
(17) Bushing
(18) Clutch pedal bracket
(19) Clutch pedal catcher
(20) Bracket (Clutch pedal catcher)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)
T3: 30 (3.1, 22.4)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine fluid, grease etc. or equivalent. Do not mix fluid, grease, etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of fluid to avoid damage and deformation.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and the vice.
• Keep fluid away from the vehicle body. If any fluid contacts the vehicle body, immediately flush the area with water.

D: PREPARATION TOOL

1. SPECIAL TOOL

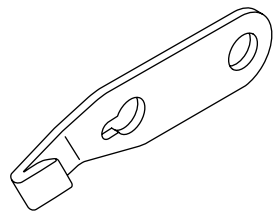
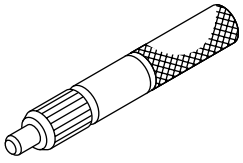
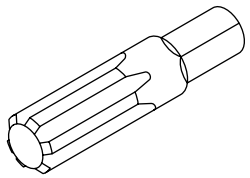
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498497100	498497100	CRANKSHAFT STOPPER	Used for stopping rotation of flywheel when loosening/tightening bolt, etc.
 ST-499747100	499747100	CLUTCH DISC GUIDE	Used for installing clutch disc to flywheel.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499057000	499057000	TORX® PLUS	Used for removing flywheel (dual mass flywheel type).

2. GENERAL TOOL

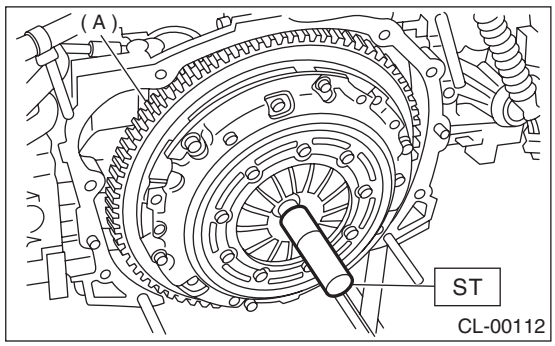
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Dial gauge	Used for measuring clutch disk run-out.

2. Clutch Disc and Cover

A: REMOVAL

1. EC, EK AND KA MODEL

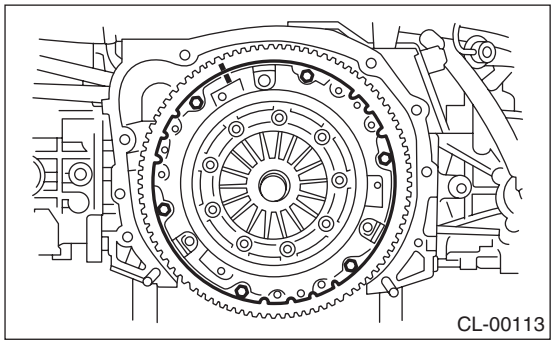
1) Remove the transmission assembly from vehicle. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Insert the ST on flywheel.
ST 499747100 CLUTCH DISC GUIDE



(A) Dual mass flywheel

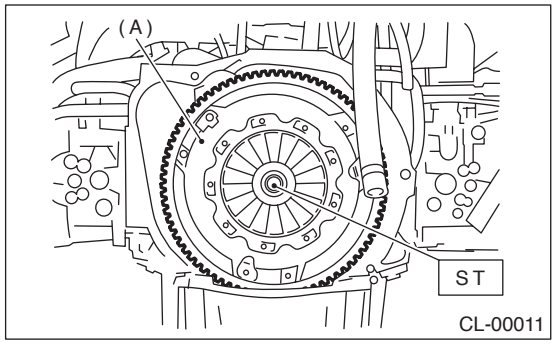
3) Remove the clutch cover and clutch disc.

NOTE:
• Take care not to allow oil on the clutch disc surface.
• Do not disassemble the clutch cover or clutch disc.
• Be sure to mark alignment marks on the flywheel and clutch cover before removing the clutch cover.



2. KS AND K4 MODEL

1) Remove the transmission assembly from vehicle body. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>
2) Install the ST on flywheel.
ST 499747100 CRANKSHAFT STOPPER



(A) Clutch cover

3) Remove the clutch cover and clutch disc.

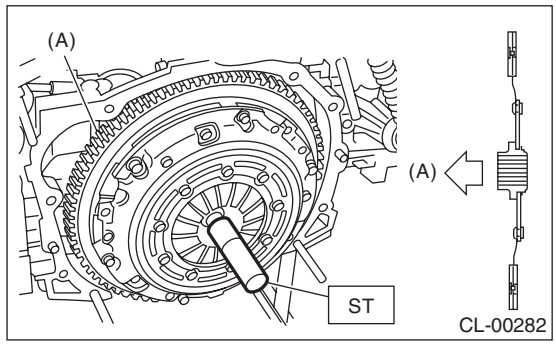
NOTE:
• Take care not to allow oil on the clutch disc facing.
• Do not disassemble the clutch cover or clutch disc.

B: INSTALLATION

1. EC, EK AND KA MODEL

1) Insert the ST into clutch disc and install on the flywheel by inserting the ST end into pilot bearing.

NOTE:
When installing the clutch disc, be careful of its direction.
ST 499747100 CLUTCH DISC GUIDE



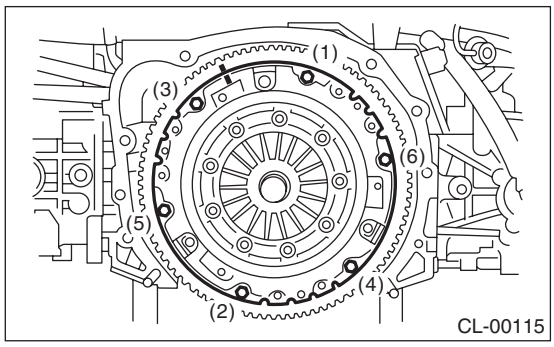
(A) Flywheel side

2) Place the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• When reinstalling, align the alignment marks.
• When installing a new clutch cover and flywheel, position the clutch cover in order to make the gap between “0” marks of flywheel and clutch cover 120° or more.
• Note the front and rear of the clutch disc when installing.

• Tighten the clutch cover installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



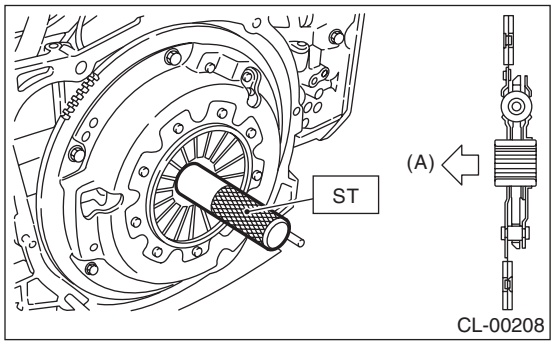
3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

2. KS AND K4 MODEL

1) Insert the ST into clutch disc and install them on the flywheel by inserting the ST end into pilot bearing.

NOTE:
When installing the clutch disc, be careful to its direction.

ST 499747100 CLUTCH DISC GUIDE



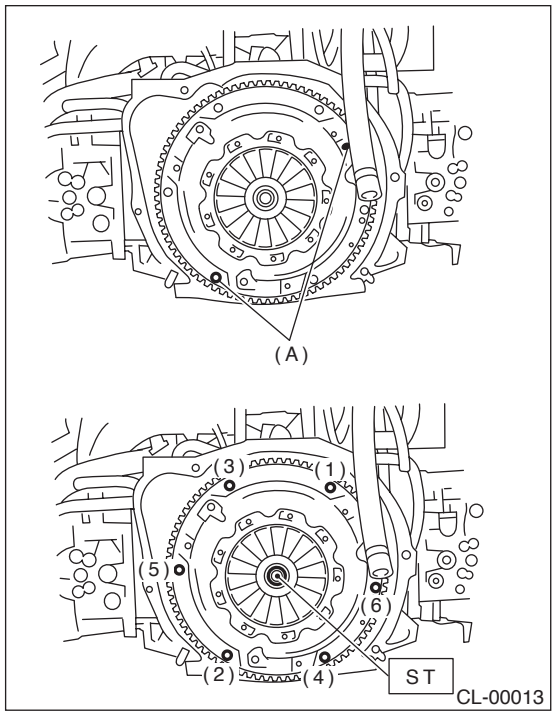
(A) Flywheel side

2) Install the clutch cover on flywheel and tighten the bolts to specified torque.

NOTE:
• When installing the clutch cover on flywheel, position the clutch cover so that there is a gap of 120° or more between “0” marks on the flywheel and clutch cover. (“0” marks indicate the directions of residual unbalance.)
• Note the front and rear of the clutch disc when installing.

• Temporarily tighten the bolts by hand. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:
16 N·m (1.6 kgf-m, 11.8 ft-lb)



(A) “0” marks

3) Remove the ST.
ST 499747100 CLUTCH DISC GUIDE
4) Install the transmission assembly. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

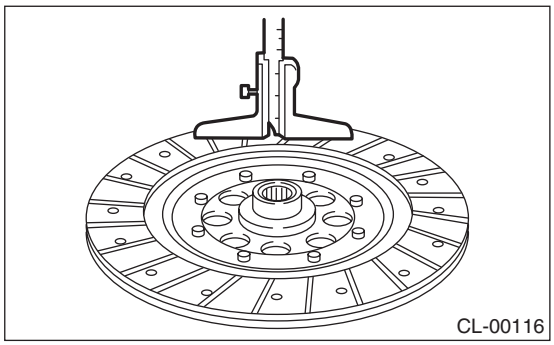
1. CLUTCH DISC

1) Facing wear:
Measure the depth from the surface of facing to rivet head. Replace if the facings are worn locally or worn down to less than the specified value.

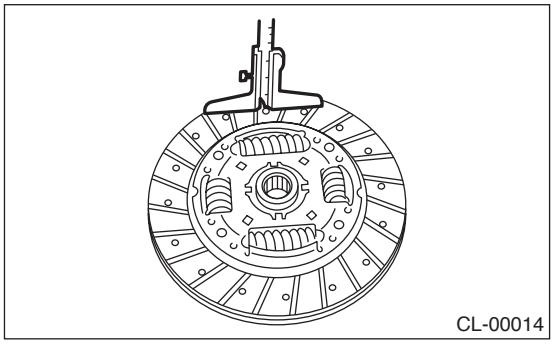
Depth of rivet head:
Limit of sinking
0.3 mm (0.012 in)

NOTE:
Do not wash the clutch disc with any cleaning fluid.

• EC, EK and KA model

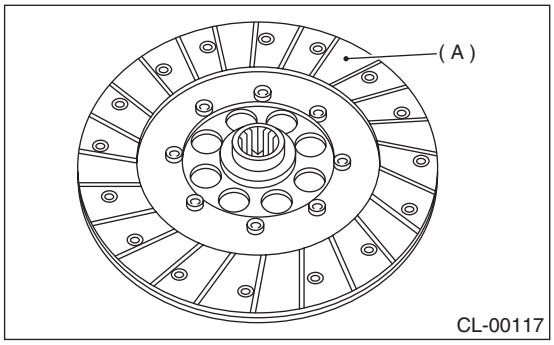


• KS and K4 model



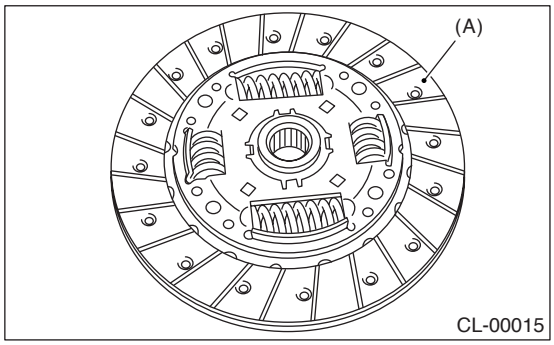
2) Hardened facing:
Replace the clutch disc.
3) Oil leakage on facing:
Replace the clutch disc and inspect the transmission front oil seal, transmission case mating surface, engine rear oil seal and other points for oil leakage.

• EC, EK and KA model



(A) Clutch facing

• KS and K4 model

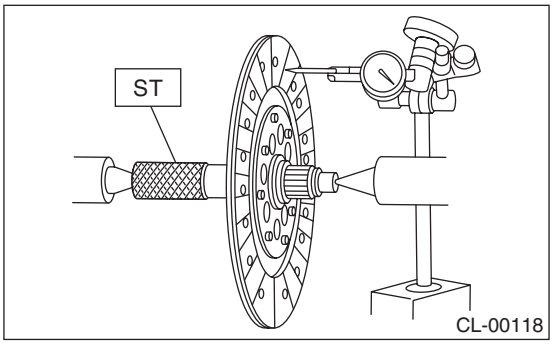


(A) Clutch facing

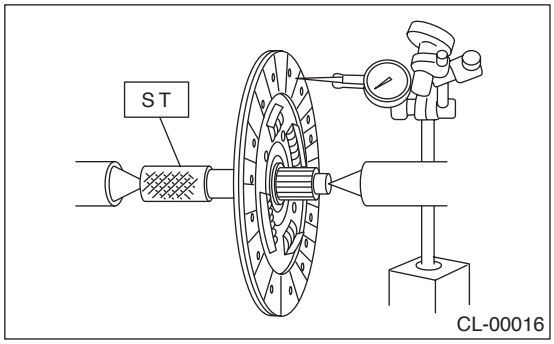
4) Deflection on facing:
If deflection exceeds the specified value at the outer circumference of facing, replace the clutch disc.
ST 499747100 CLUTCH DISC GUIDE

Limit for deflection:
1.0 mm (0.039 in) at R = 110 mm (4.33 in)

• EC, EK and KA model

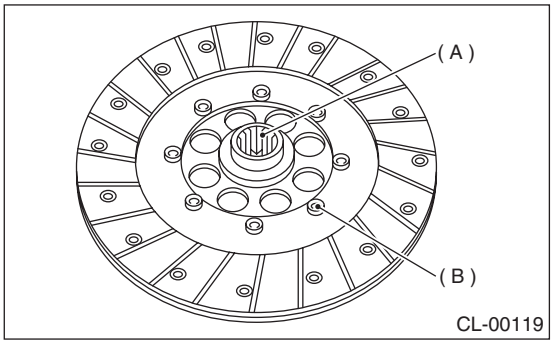


• KS and K4 model



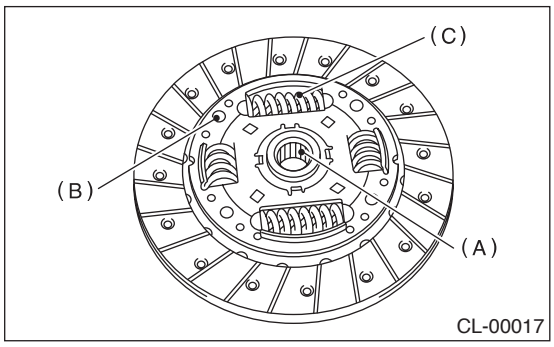
5) If the spline wears, rivets loosen and damper spring is failure, replace the clutch disc.

• EC, EK and KA model



(A) Spline
(B) Rivet

• KS and K4 model



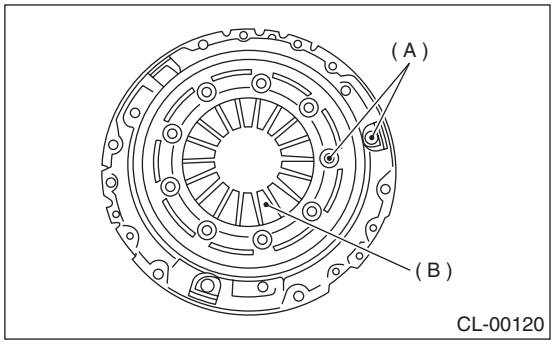
(A) Spline
(B) Rivet
(C) Damper spring

2. CLUTCH COVER

NOTE:
Visually check the following items without disassembling, and replace or repair if defective.

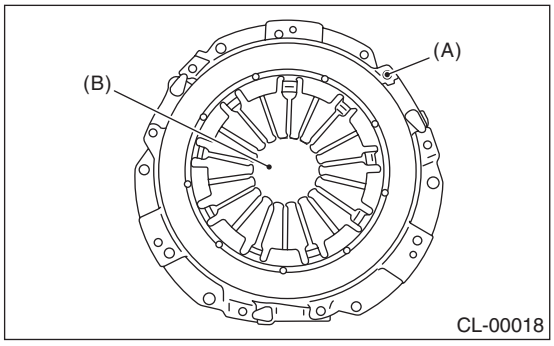
1) Loose thrust rivet
2) Damaged or worn bearing contact area at the center of diaphragm spring

• EC, EK and KA model



(A) Thrust rivet
(B) Diaphragm spring

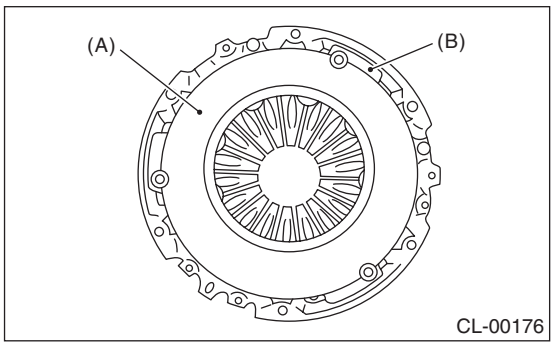
• KS and K4 model



(A) Thrust rivet
(B) Diaphragm spring

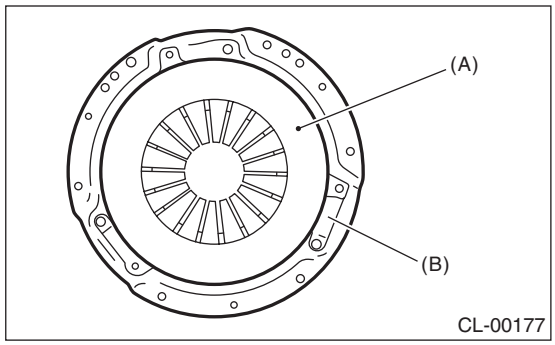
3) Damaged or worn disc contact surface of pressure plate
4) Loose strap plate installation area
5) Worn diaphragm sliding area

• EC, EK and KA model



(A) Pressure plate
(B) Strap plate

• KS and K4 model



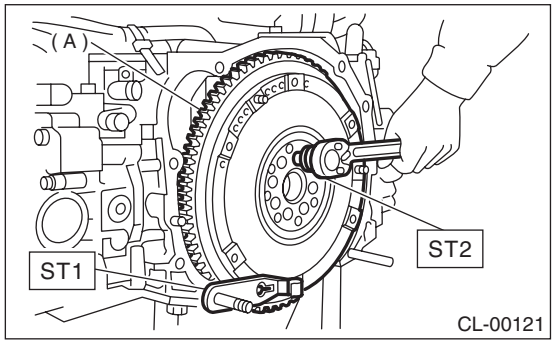
(A) Pressure plate
(B) Strap plate

3. Flywheel

A: REMOVAL

1. EC, EK AND KA MODEL

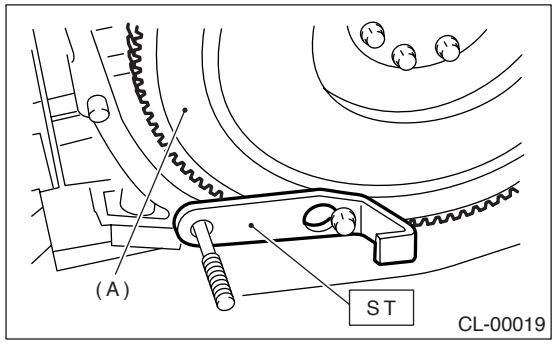
1) Remove the transmission assembly. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. <Ref. to CL-12, REMOVAL, Clutch Disc and Cover.>
3) Using ST1 and ST2, remove the flywheel.
ST1 498497100 CRANKSHAFT STOPPER
ST2 499057000 TORX® PLUS



(A) Flywheel

2. KS AND K4 MODEL

1) Remove the transmission assembly. <Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the clutch cover and clutch disc. **<Ref. to CL-12,** REMOVAL, Clutch Disc and Cover.>
3) Using the ST, remove the flywheel.
ST 498497100 CRANKSHAFT STOPPER

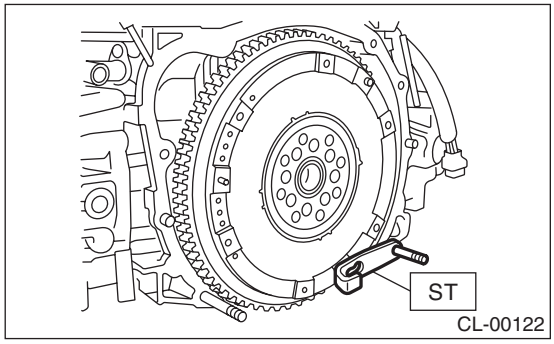


(A) Flywheel

B: INSTALLATION

1. EC, EK AND KA MODEL

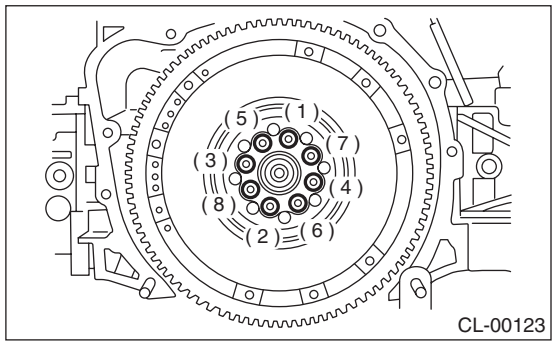
1) Set the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel mounting bolts to specified torque.
ST 499057000 TORX® PLUS

NOTE:
Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

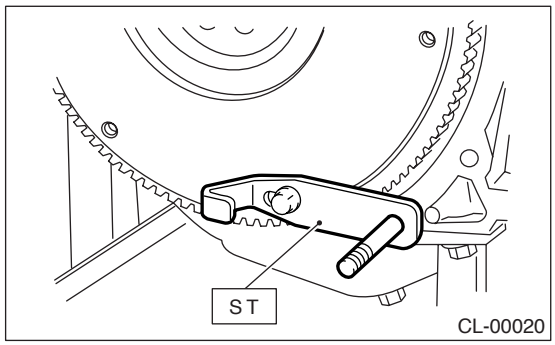
Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)



3) Install the clutch disc and cover. <Ref. to CL-12, INSTALLATION, Clutch Disc and Cover.>
4) Install the transmission assembly. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

2. KS AND K4 MODEL

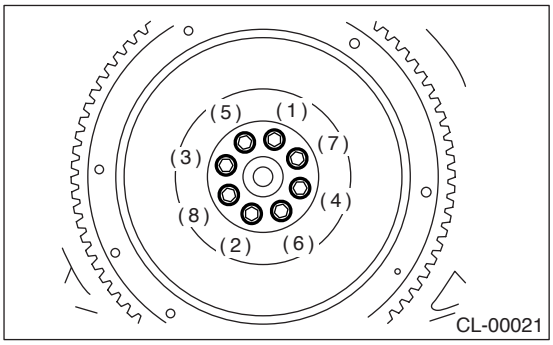
1) Install the flywheel and ST.
ST 498497100 CRANKSHAFT STOPPER



2) Tighten the flywheel attaching bolts to specified torque.

NOTE:
Tighten the flywheel installing bolts gradually. Each bolt should be tightened to the specified torque in a crisscross order.

Tightening torque:
72 N·m (7.3 kgf-m, 52.8 ft-lb)

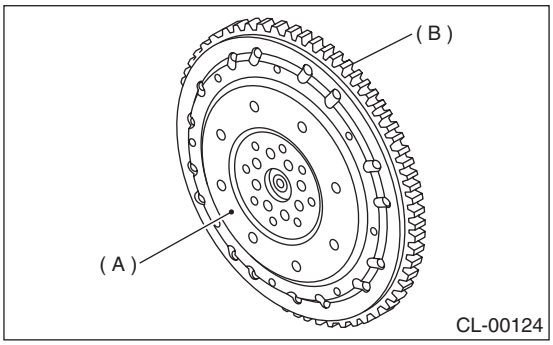


3) Install the clutch disc and cover. **<Ref. to CL-13,** KS AND K4 MODEL, INSTALLATION**, Clutch Disc and Cover.>**
4) Install the transmission assembly. <Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

C: INSPECTION

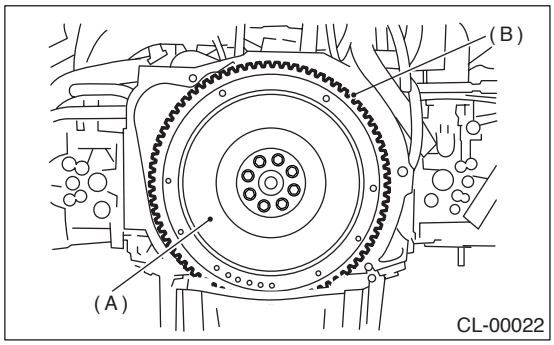
CAUTION:
Since this bearing is grease-sealed and non-lubrication type, do not wash it with gasoline or any solvent.

1) Damage on sliding surface of facing and ring gear:
If defective, replace the flywheel.
• EC, EK and KA model



(A) Flywheel
(B) Ring gear

• KS and K4 model



(A) Flywheel
(B) Ring gear

2) Smoothness of rotation
Rotate the ball bearing while applying pressure in thrust direction.
3) If noise or excessive play is noted, replace the flywheel.

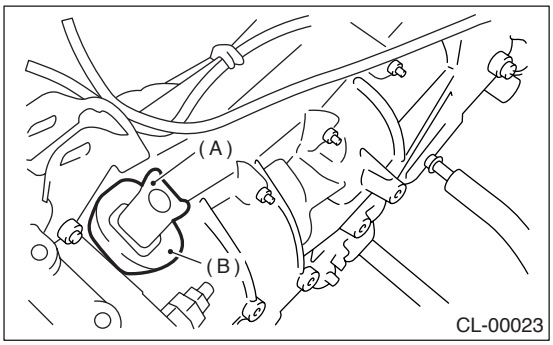
4. Release Bearing and Lever

A: REMOVAL

1) Remove the transmission assembly from vehicle body.
<Ref. to 5MT-31, REMOVAL, Manual Transmission Assembly.>
2) Remove the two clips from clutch release lever and remove the release bearing.

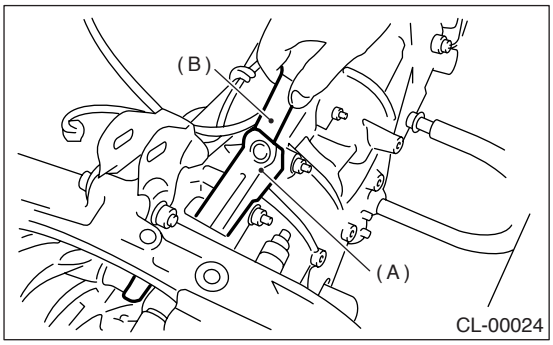
CAUTION:
Be careful not to deform the clips.

3) Remove the dust cover.



(A) Clutch release lever
(B) Dust cover

4) Remove the lever spring from pivot with a screwdriver by accessing it through the clutch housing release lever hole. Then remove the release lever.



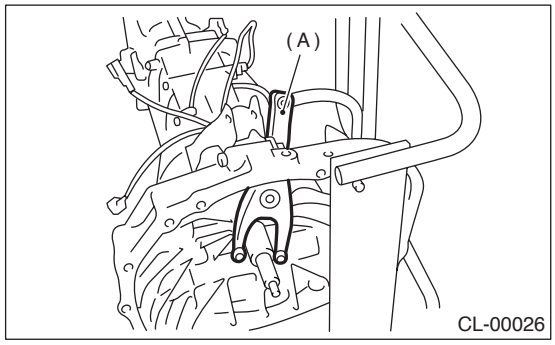
(A) Clutch release lever
(B) Screwdriver

B: INSTALLATION

NOTE:
Before or during installation, lubricate the following points with a light coat of grease.
• Contact surface of lever and pivot
• Contact surface of lever and bearing
• Transmission main shaft spline (Use grease containing molybdenum disulphide.)

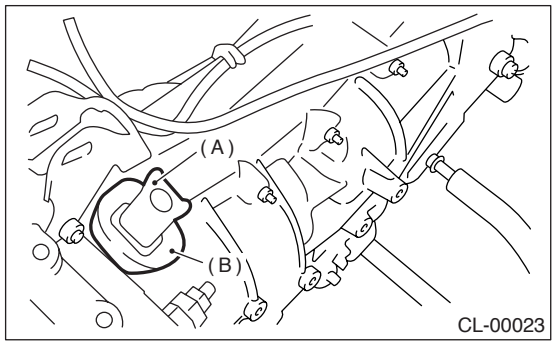
1) While pushing the release lever to pivot and twisting it to both sides, fit the lever spring onto the constricted portion of pivot.

NOTE:
• Apply grease (SUNLIGHT 2: Part No. 003602010) to the contact point of release lever and operating cylinder.
• Observing from main case hole, check that the lever spring is installed securely.



(A) Release lever

2) Place the release bearing and fasten it with two clips.
3) Install the dust cover.



(A) Release lever
(B) Dust cover

4) Check smooth movement of bearing with operating release lever.
5) Install the transmission assembly.
<Ref. to 5MT-33, INSTALLATION, Manual Transmission Assembly.>

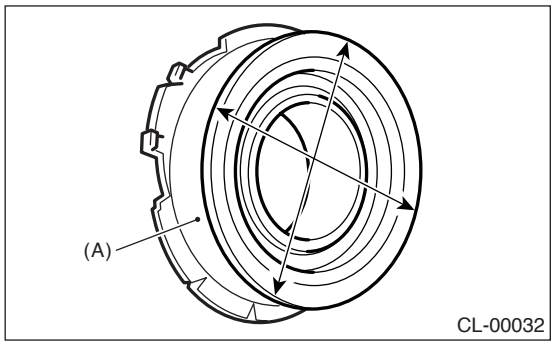
C: INSPECTION

1. RELEASE BEARING

NOTE:
Since this bearing is grease-sealed and non-lubrication type, do not wash with gasoline or any solvent when servicing the clutch.

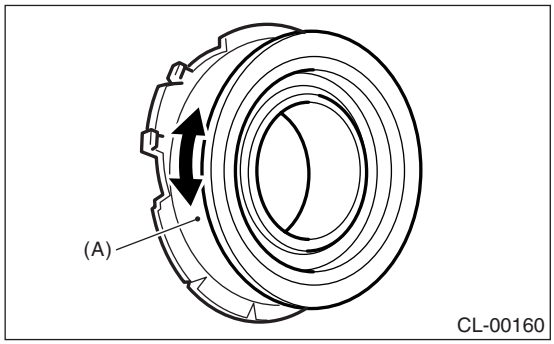
1) Check the bearing for smooth movement by applying force to the bearing in radial direction.

Radial direction stroke:
1.6 mm (0.063 in)



(A) Bearing case

2) Check the bearing for smooth rotation by applying force to the bearing in thrust direction.

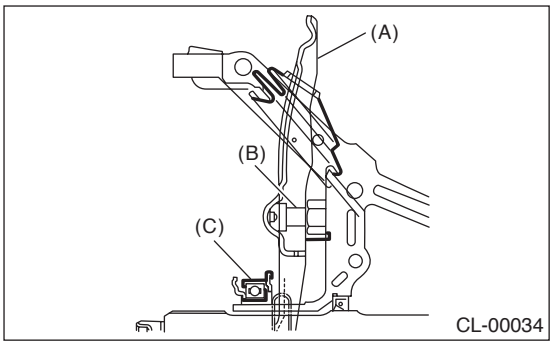


(A) Bearing case

3) Check wear and damage of bearing case surface contacting with lever.

2. RELEASE LEVER

Check the lever pivot portion and contact point with release bearing case for wear.



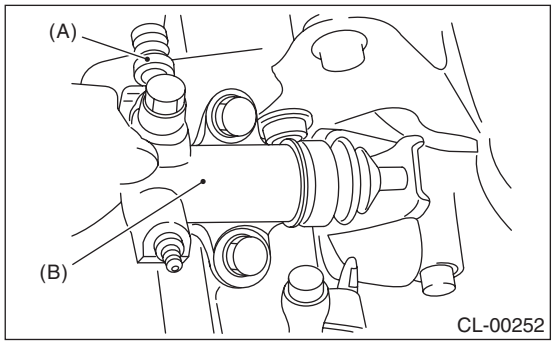
(A) Clutch release lever
(B) Pivot
(C) Clutch release bearing

5. Operating Cylinder

A: REMOVAL

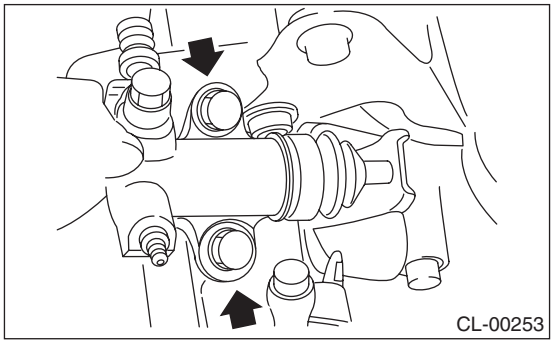
1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Disconnect the clutch hose from operating cylinder.

CAUTION:
Cover the hose joint to prevent clutch fluid from flowing out.



(A) Clutch hose
(B) Operating cylinder

3) Remove the operating cylinder from transmission.

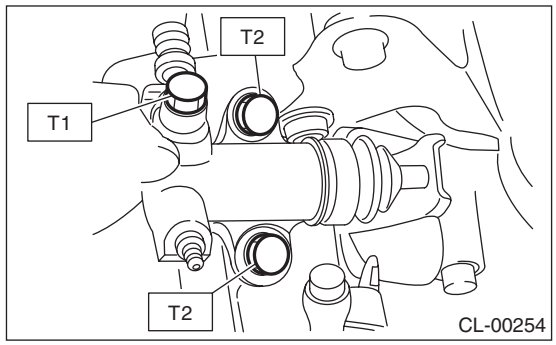


B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Before installing the operating cylinder, apply grease (SUNLIGHT 2: Part No. 003602010) to the contact point of the release lever and operating cylinder.

Tightening torque:
T1: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T2: 37 N·m (3.8 kgf-m, 27.5 ft-lb)



2) After bleeding air from the operating cylinder, ensure that clutch operates properly.
<Ref. to CL-25, Clutch Fluid Air Bleeding.>

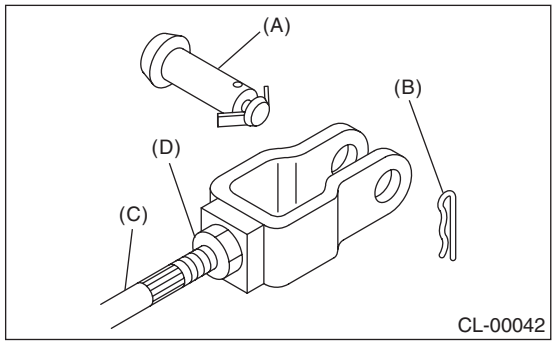
C: INSPECTION

1) Check the operating cylinder for damage. If operating cylinder is damaged, replace it.
2) Check the operating cylinder for fluid leakage or damage on boot. If any leakage or damage is found, replace the operating cylinder.

6. Master Cylinder

A: REMOVAL

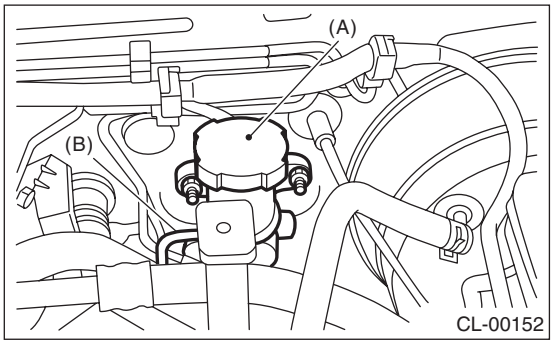
1) Thoroughly drain the brake fluid from reservoir tank.
2) Remove the snap pin and clevis pin, and then separate the push rod of master cylinder from clutch pedal.



(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Lock nut

3) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
4) Disconnect the clutch pipes from master cylinder.
5) Remove the master cylinder and reservoir tank as a unit.

CAUTION:
Be careful not to spill the brake fluid. Brake fluid spilt on the vehicle body will harm the paint surface; wipe it off quickly if spilt.



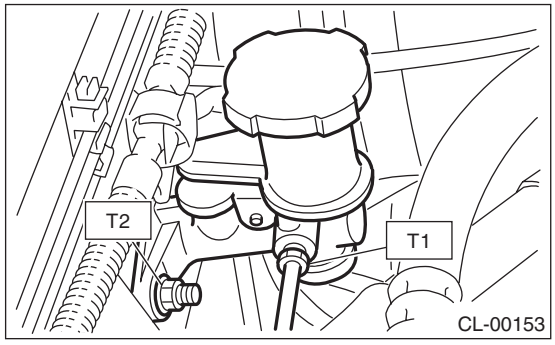
(A) Master cylinder ASSY
(B) Clutch pipe

B: INSTALLATION

1) Install the master cylinder to the vehicle, and connect the clutch pipe to master cylinder.

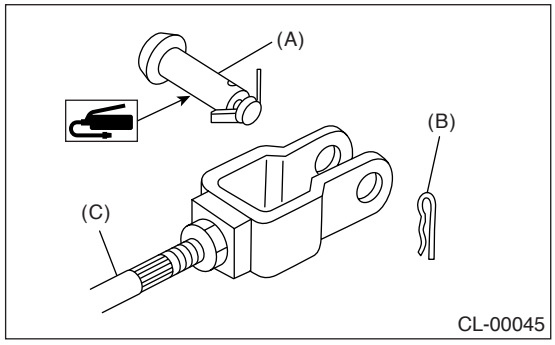
NOTE:
Check that the pipe is routed properly.

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)



2) Connect the push rod of master cylinder to clutch pedal, and install the clevis pin and snap pin.

NOTE:
Apply grease to the clevis pin.

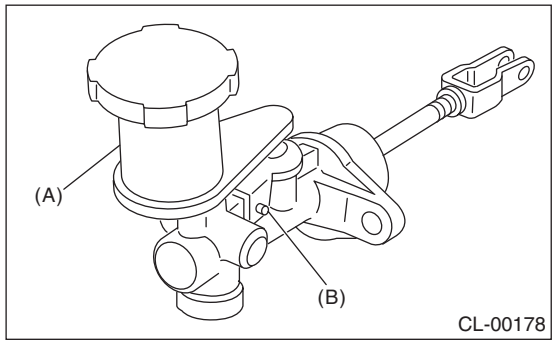


(A) Clevis pin
(B) Snap pin
(C) Push rod

3) After bleeding air from the clutch system, ensure that clutch operates properly. <Ref. to CL-25, Clutch Fluid Air Bleeding.>
4) Install the air intake chamber. <Ref. to IN(H4SO 2.0)-8, INSTALLATION, Air Intake Chamber.>

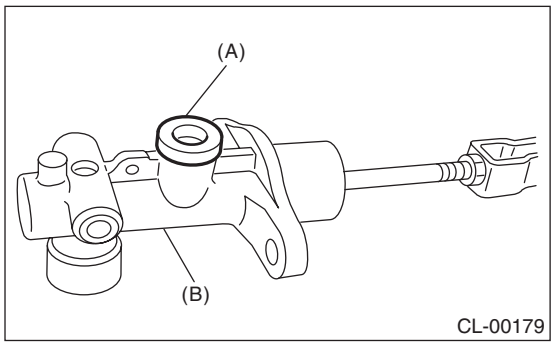
C: DISASSEMBLY

1) Remove the straight pin and reservoir tank.



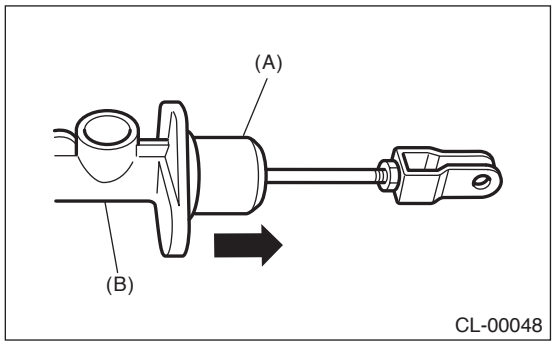
(A) Reservoir tank
(B) Straight pin

2) Remove the oil seal.



(A) Oil seal
(B) Master cylinder

3) Pull the cylinder boot backward.



(A) Cylinder boot
(B) Master cylinder

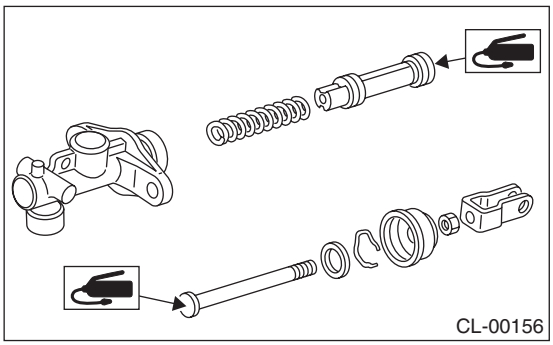
4) Remove the snap ring.

CAUTION:
Be careful to prevent the rod, washer, piston and return spring from flying out when removing the snap ring.

D: ASSEMBLY

1) Apply a coat of grease to the contacting surfaces of the push rod and piston before installation.

Grease:
SILICONE GREASE G40M (Part No. 004404003)

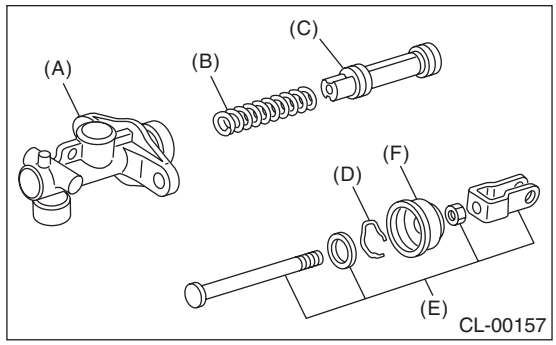


2) Assemble in the reverse order of disassembly.

Tightening torque:
10 N·m (1.0 kgf-m, 7 ft-lb)

E: INSPECTION

If any damage, deformation, wear, swelling, rust or other faults are found on the cylinder, piston, push rod, fluid reservoir, return spring, gasket, clutch damper cylinder boot or hose, replace the faulty part.

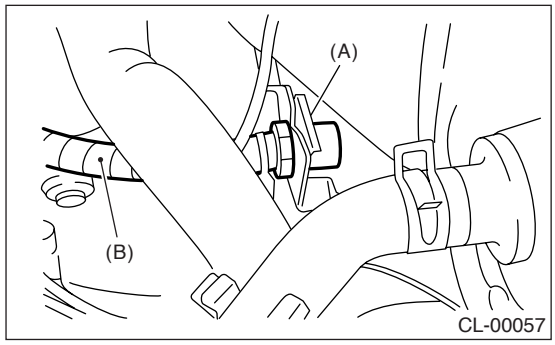


(A) Master cylinder body
(B) Return spring
(C) Piston
(D) Stop ring
(E) Push rod ASSY
(F) Cylinder boot

7. Clutch Pipe and Hose

A: REMOVAL

1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Drain the clutch fluid. <Ref. to CL-24, Clutch Fluid.>
3) Disconnect the clutch pipe from the clutch hose and master cylinder.
4) Pull out the clamp, then remove the clutch hose from bracket.



(A) Clamp
(B) Clutch hose

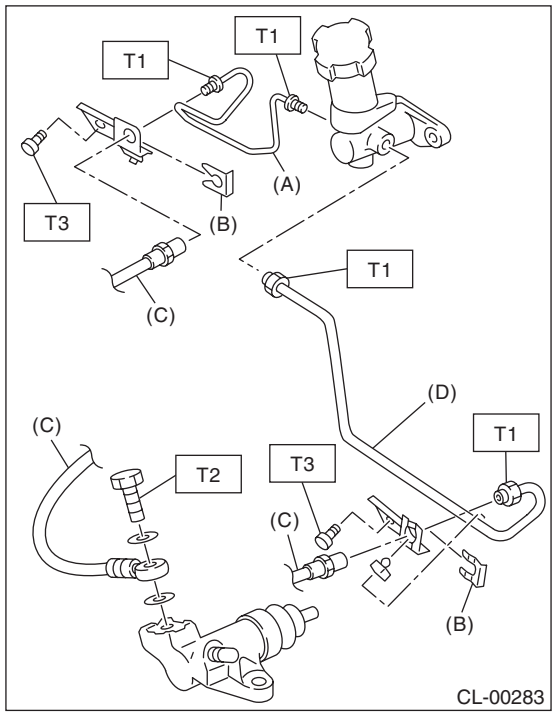
5) Disconnect the hose from operating cylinder.
6) Remove the bracket.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Bleed the air of clutch fluid. <Ref. to CL-25, Clutch Fluid Air Bleeding.>

Tightening torque:
T1: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
T2: 18 N·m (1.8 kgf-m, 13.0 ft-lb)
T3: 25 N·m (2.5 kgf-m, 18.4 ft-lb)



(A) Clutch pipe (LHD model)
(B) Clip
(C) Clutch hose
(D) Clutch pipe (RHD model)

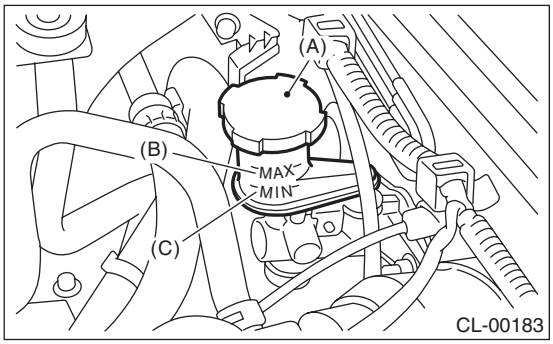
C: INSPECTION

Check pipes and hoses for cracks, breakage or damage. Check joints for fluid leakage. If any crack, breakage, damage or leakage is found, repair or replace the defective pipe or hose.

8. Clutch Fluid

A: INSPECTION

1) Park the vehicle on a level surface.
2) Inspect the fluid level using the scale on the outside of reservoir tank. If the level is below “MIN”, add fluid to bring it up to “MAX”, and also inspect for leakage.



(A) Reservoir tank
(B) MAX. level
(C) MIN. level

B: REPLACEMENT

CAUTION:
• The FMVSS No. 116, fresh DOT3 or 4 brake fluid must be used.
• When loosening bleeder screw, cover the bleeder with cloth to prevent brake fluid from being splashed over surrounding parts.
• Avoid mixing different brands of brake fluid to prevent the quality of fluid from degrading.
• Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
• During bleeding operation, keep the clutch reservoir tank filled with brake fluid to eliminate the entry of air.
• Clutch pedal operating must be very slow.
• For convenience and safety, it is advisable to have two people working.
• The amount of brake fluid required is approx. 70 mℓ (2.4 US fl oz, 2.5 Imp fl oz) for total clutch system.

1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Drain the brake fluid from reservoir tank.
3) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
FMVSS No. 116, fresh DOT3 or 4 brake fluid

4) Drain all contaminated fluid in the same method as air bleeding.

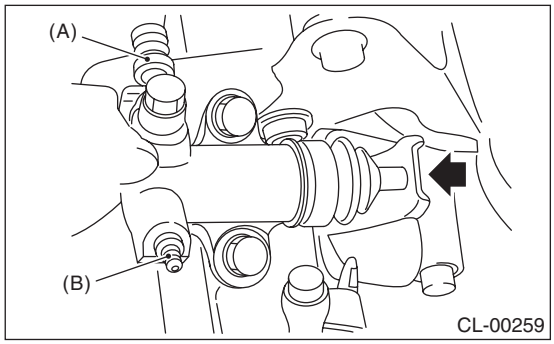
NOTE:
Refill the brake fluid before reservoir tank becomes empty.

9. Clutch Fluid Air Bleeding

A: PROCEDURE

NOTE:
Bleed air from the oil line with help of a co-worker.

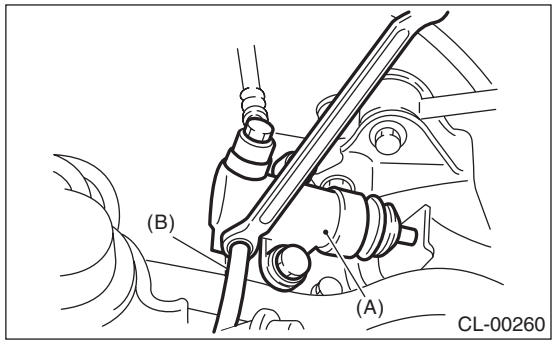
1) Remove the air intake chamber. <Ref. to IN(H4SO 2.0)-8, REMOVAL, Air Intake Chamber.>
2) Fit one end of a vinyl tube into the air bleeder of operating cylinder and put the other end into a brake fluid container.



(A) Clutch hose
(B) Air bleeder

3) Slowly depress the clutch pedal and keep it depressed. Then open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 or 2 seconds. Next, with the bleeder closed, slowly release the clutch pedal.

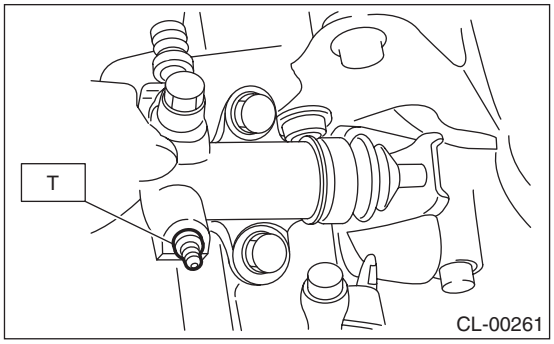
CAUTION:
When loosening bleeder screw, cover the bleeder with cloth to prevent brake fluid from being splashed over surrounding parts.



(A) Operating cylinder
(B) Vinyl tube

4) Repeat the procedure 3), until there are no more air bubbles in the vinyl tube.
5) Tighten the air bleeder.

Tightening torque:
T: 8 N·m (0.8 kgf-m, 5.8 ft-lb)



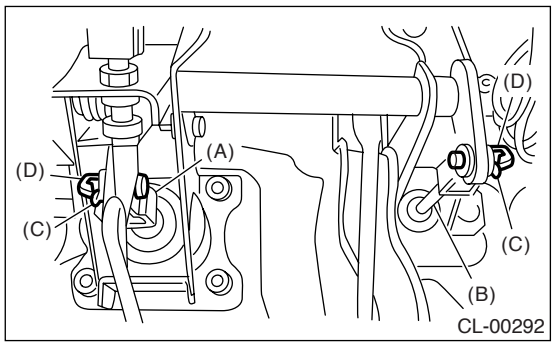
6) After depressing the clutch pedal, make sure that there are no leaks evident in the entire clutch system.
7) After bleeding air from the clutch system, ensure that clutch operates properly.

10.Clutch Pedal

A: REMOVAL

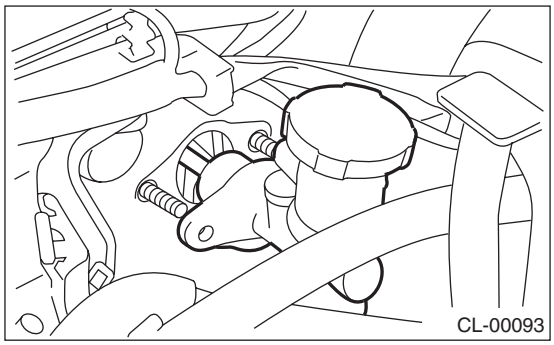
1. LHD MODEL

1) Disconnect the ground cable from battery.
2) Remove the steering column. <Ref. to PS-23, REMOVAL, Tilt Steering Column.>
3) Disconnect the connectors from the stop light and clutch switches.
4) Remove the snap pins which secure lever to push rod and operating rod.
5) Remove the clevis pins which secure lever to push rod and operating rod.



(A) Operating rod
(B) Push rod
(C) Snap pin
(D) Clevis pin

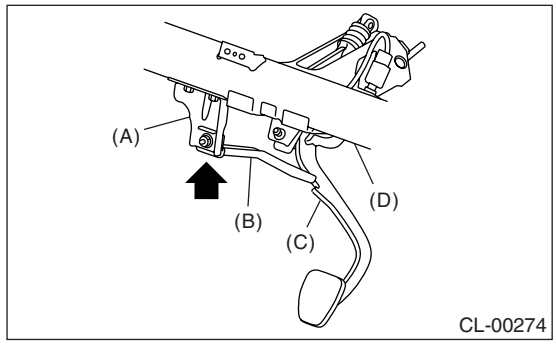
6) Remove the nut which secures clutch master cylinder.



7) Remove the bolts and nuts which secure brake pedal and clutch pedal, and remove the pedal assembly.

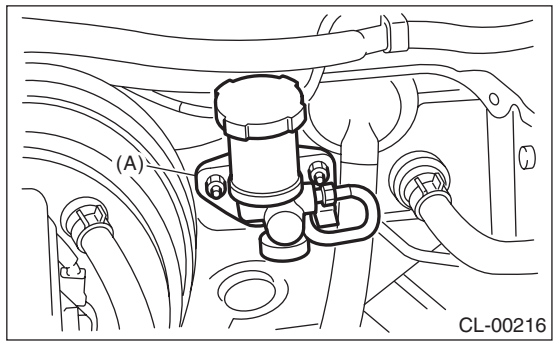
2. RHD MODEL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover.
3) Remove the clutch pedal catcher from bracket (clutch pedal catcher).



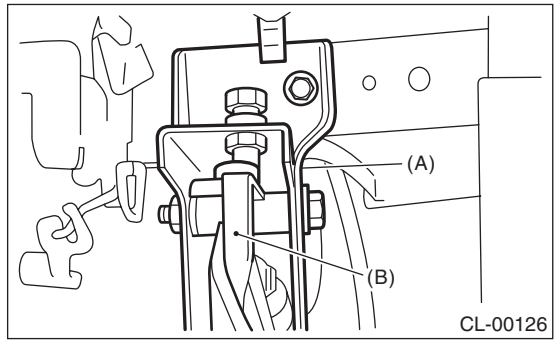
(A) Bracket (Clutch pedal catcher)
(B) Clutch pedal catcher
(C) Clutch pedal
(D) Steering support beam

4) Remove the clutch switch connector from clutch pedal.
5) Remove the snap pin and clevis pin which join the push rod and clutch pedal.
6) Remove the master cylinder mounting nuts.



(A) Master cylinder

7) Remove the clutch pedal and bracket as a unit.



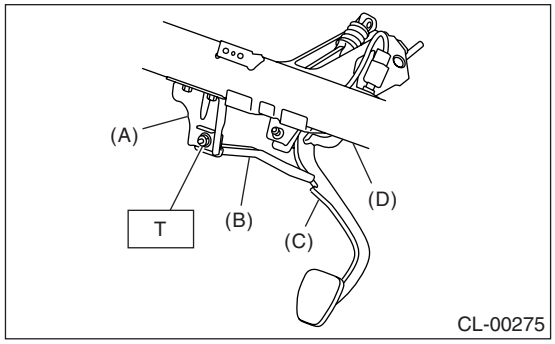
(A) Clutch pedal bracket
(B) Clutch pedal

B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
T: 18 N·m (1.8 kgf-m, 13.0 ft-lb)

- Clutch pedal catcher



(A) Bracket (Clutch pedal catcher)
(B) Clutch pedal catcher
(C) Clutch pedal
(D) Steering support beam

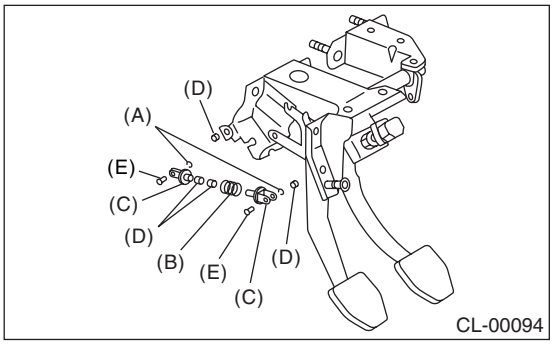
CAUTION:
Always use a new clevis pin.

2) Adjust the clutch pedal after installation. <Ref. to CL-29, ADJUSTMENT, Clutch Pedal.>

C: DISASSEMBLY

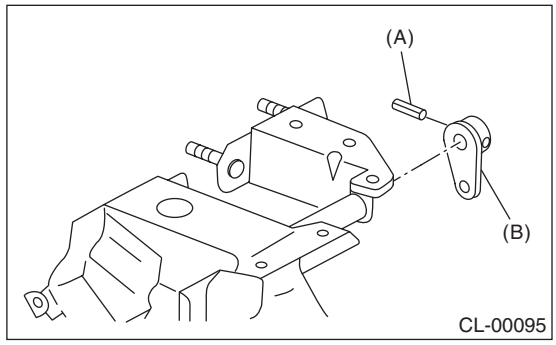
1. LHD MODEL

1) Remove the clutch switches.
2) Remove the clips, assist spring, rod and bushing.



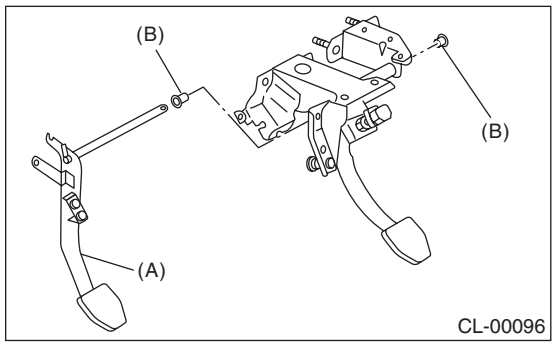
(A) Clip
(B) Assist spring
(C) Assist rod
(D) Bushing
(E) Clevis pin

3) Remove the spring pin and lever.



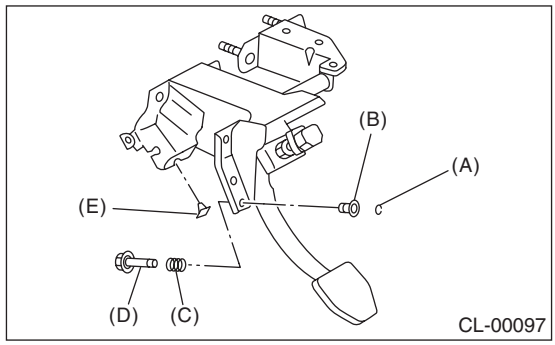
(A) Pin
(B) Lever

4) Remove the clutch pedal and bushings.



(A) Clutch pedal
(B) Bushing

5) Remove the stopper, clip and rod S, and then remove the spring and bushing S.

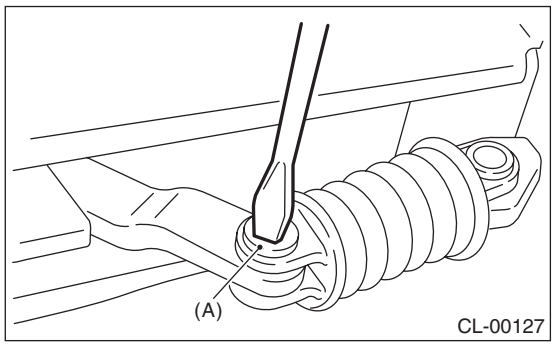


(A) Clip
(B) Bushing S
(C) Spring S
(D) Rod S
(E) Stopper

6) Remove the stoppers from clutch pedal.
7) Remove the clutch pedal pad.

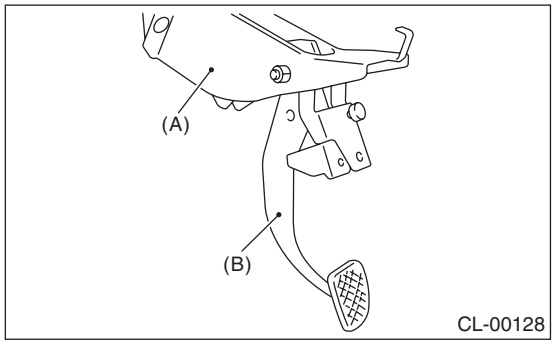
2. RHD MODEL

1) Remove the clutch switch.
2) Remove the clip, and then pull out the clevis pin.



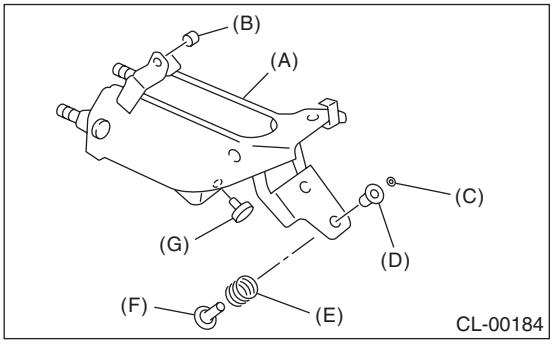
(A) Clevis pin

3) Remove the assist rod, spring and bushing.
4) Remove the clutch pedal from clutch pedal bracket.



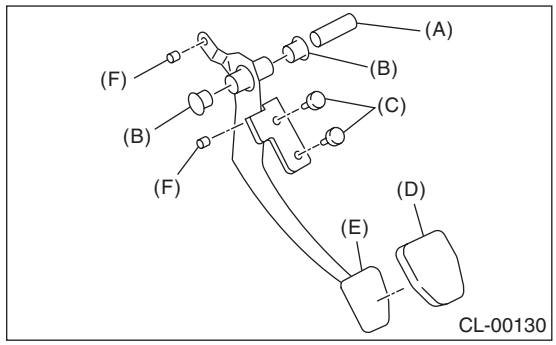
(A) Clutch pedal bracket
(B) Clutch pedal

5) Remove the following parts (B to G) from clutch pedal bracket (A) as shown in the figure.



(A) Clutch pedal bracket
(B) Bushing C
(C) Clip
(D) Bushing S
(E) Spring S
(F) Rod S
(G) Bushing

6) Remove the spacer, bushing and pedal pad from clutch pedal.



(A) Spacer
(B) Bushing
(C) Bushing
(D) Pedal pad
(E) Clutch pedal
(F) Bushing C

D: ASSEMBLY

1. LHD MODEL

1) Attach the clutch switch, etc. to pedal bracket temporarily.
2) Clean the inside of bores of clutch pedal and brake pedal, and apply grease, and set bushings into bores.
3) Align the bores of pedal bracket, clutch pedal and brake pedal, and then attach the brake pedal return spring, assist rods, spring and bushing.

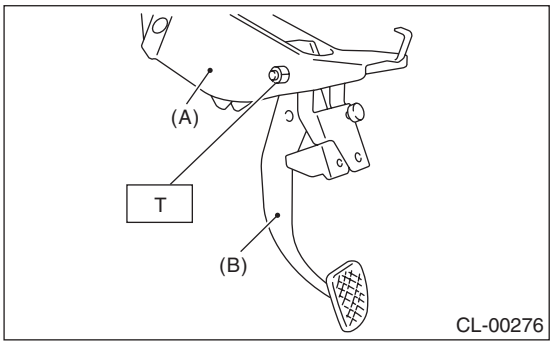
NOTE:
Clean up the inside of bushings and apply grease before installing spacer.

2. RHD MODEL

1) Clean and apply grease to the hole of sliding portion between clutch pedal and bushing.
2) Install the pad, stopper, bushing C, spacer and bushing to clutch pedal.
3) Install the rod S, spring S, bushing S, clip, bushing, clutch switch and bushing C to clutch pedal bracket.

4) Install the clutch pedal assembly, stopper, adjusting rod, bushing and spring to clutch pedal bracket.

Tightening torque:
T: 30 N·m (3.1 kgf-m, 22.4 ft-lb)



(A) Clutch pedal bracket
(B) Clutch pedal

5) Install the assist rod, bushing and assist spring to clutch pedal and pedal bracket.

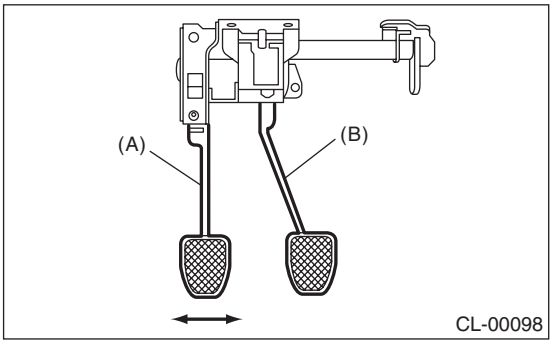
E: INSPECTION

1. CLUTCH PEDAL

Move the clutch pedal pads in the lateral direction with a force of approximately 10 N (1 kgf, 2 lb) to ensure the pedal deflection is in specified range.
If excessive deflection is noted, replace the bushings with new ones.

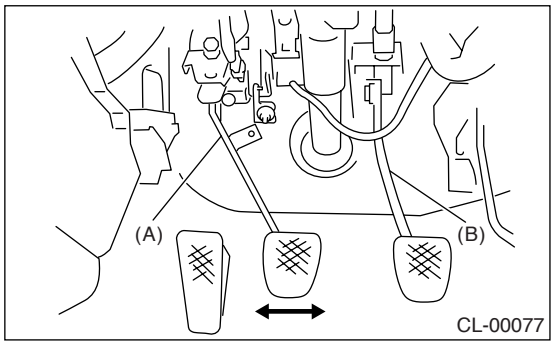
Deflection of clutch pedal:
Service limit
5.0 mm (0.197 in) or less

• LHD model



(A) Clutch pedal
(B) Brake pedal

• RHD model



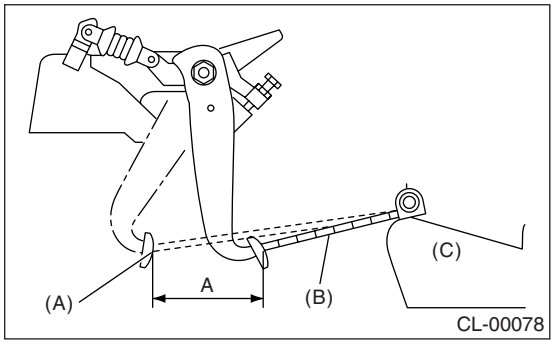
(A) Clutch pedal
(B) Brake pedal

F: ADJUSTMENT

1) Measure the full stroke amount of clutch pedal.

NOTE:
• Measure the length between the seat cushion front end and center portion of clutch pedal.
• Slide the seat at seventh notch from first notch.

Specified clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)

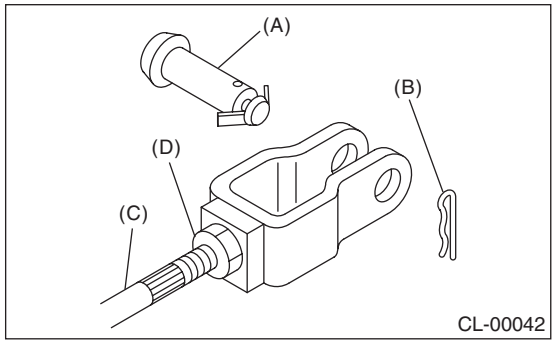


(A) Clutch pedal (Full stroke condition)
(B) Scale
(C) Seat

2) If the clutch pedal stroke is out of specification, loosen the clutch stopper nut and adjust it.

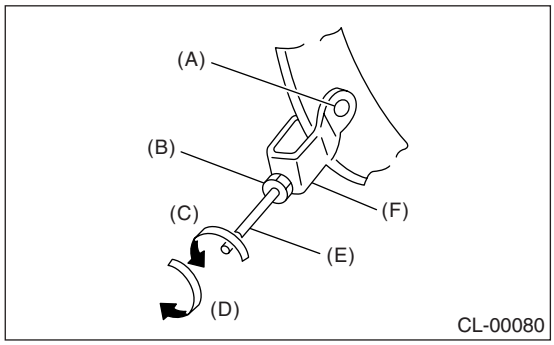
Tightening torque (Clutch stopper nut):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

3) Loosen the push rod lock nut.



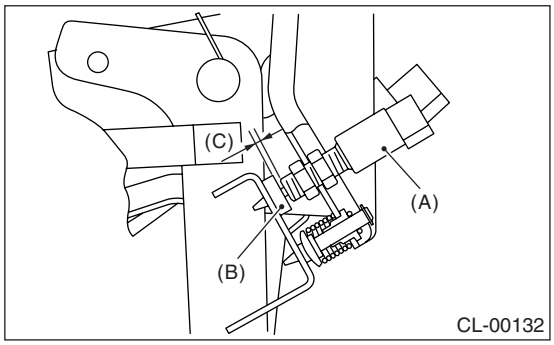
(A) Clevis pin
(B) Snap pin
(C) Push rod
(D) Push rod lock nut

4) Turn the push rod to adjust.
(1) Ensure that the clutch pedal contacts clutch switch, when releasing the clutch pedal.
(2) Ensure that the clutch pedal contacts clutch pedal bracket stopper, when fully depressing the clutch pedal.



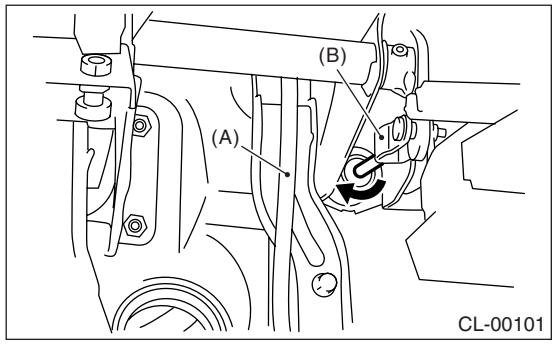
(A) Clevis hole
(B) Push rod lock nut
(C) Shortening direction
(D) Lengthening direction
(E) Push rod
(F) U shaped bracket

5) Turn the push rod counterclockwise to shorten until clearance is made at clutch switch.



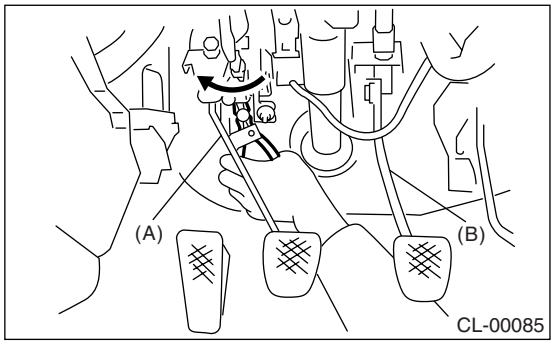
(A) Clutch switch
(B) Stopper
(C) Clearance

6) Turn the push rod clockwise to lengthen until clutch pedal contacts to clutch switch.
7) Turn the push rod further 270° counterclockwise to shorten (arrow direction as shown in the figure).
• LHD model



(A) Accelerator pedal
(B) Clevis

• RHD model



(A) Clutch pedal
(B) Brake pedal

8) Move the clevis pin in lateral direction to ensure it moves smoothly.

9) Tighten the push rod lock nut.

Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

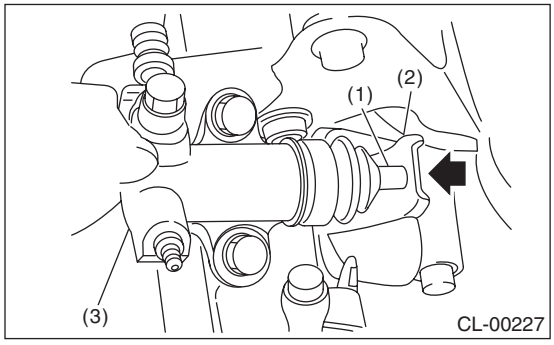
10) Depress and release the clutch pedal two or three times to ensure that clutch pedal and release fork operates smoothly. If the clutch pedal and release fork do not operate smoothly, bleed air from the clutch hydraulic system. **<Ref. to CL-25, Clutch Fluid Air Bleeding.>**

11) Measure the clutch pedal full stroke length again to ensure that it is within specifications. If it is not, repeat adjustment procedures again from the beginning.

Specified clutch pedal full stroke:
130 — 135 mm (5.12 — 5.31 in)

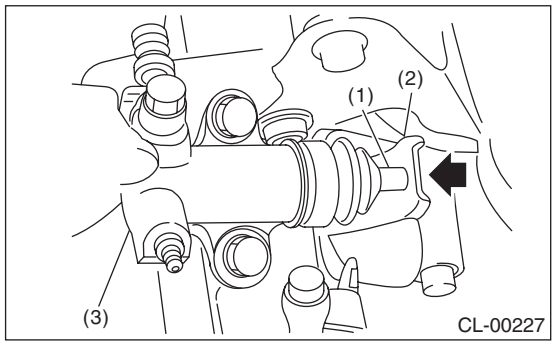
12) Move the clevis pin to the left and then to the right. It should move without resistance while it is rattling. If resistance is felt, repeat adjustment procedures again from the beginning.

13) Push the release lever until operating cylinder push rod retracts. Ensure that clutch fluid level in reservoir tank increases. If the clutch fluid level increases, hydraulic clutch is properly adjusted; if fluid level does not increase or push rod does not retract, replace the master cylinder with a new one. **<Ref. to CL-21, Master Cylinder.>**



(1) Push rod
(2) Release lever
(3) Operating cylinder

14) Push the release lever until operating cylinder push rod retracts. Check that the clutch fluid level in reservoir tank increases.



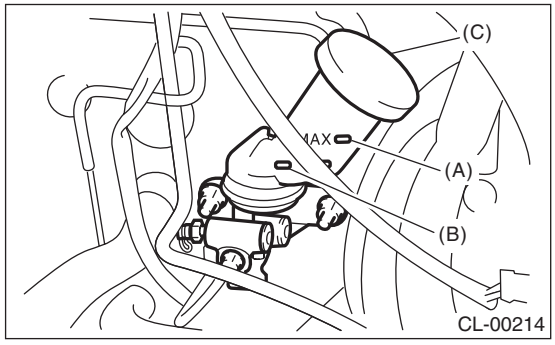
(1) Push rod
(2) Release lever
(3) Operating cylinder

15) If the clutch fluid level increases, hydraulic clutch play is correct.

16) If the clutch fluid level does not increase or push rod does not retract, clutch pedal must be readjusted.

17) Check the fluid level on the outside of the reservoir tank. If the level is below “MIN”, add clutch fluid to bring it up to “MAX”.

Recommended clutch fluid:
FMVSS No. 116, fresh DOT 3 or DOT 4 brake fluid



(A) Max. level
(B) Min. level
(C) Reservoir tank

11.Clutch Switch

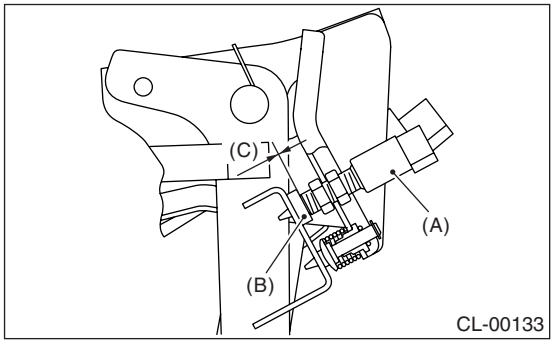
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover.
3) Disconnect the connector from clutch switch.
4) Remove the clutch switch.

B: INSTALLATION

1) Install the clutch switch and clutch pedal stopper so that the gap between them is 0 mm (0 in).

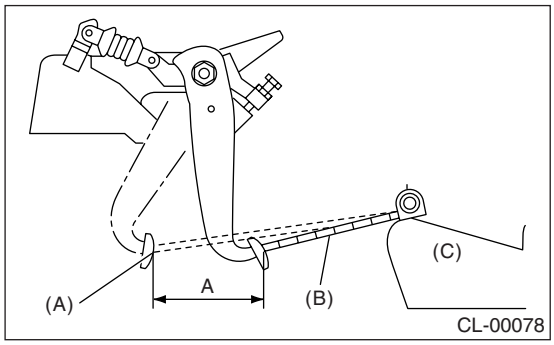
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(A) Clutch switch
(B) Stopper
(C) 0 mm (0 in)

2) Measure the stroke of clutch pedal.

Specified clutch pedal full stroke A:
130 — 135 mm (5.12 — 5.31 in)



(A) Clutch pedal (Full stroke condition)
(B) Scale
(C) Seat

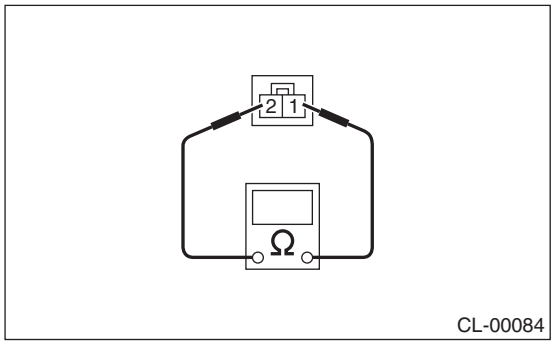
3) If the clutch pedal stroke is out of specification, adjust the stroke. **<Ref. to CL-29,** ADJUSTMENT**, Clutch Pedal.>**
4) Connect the clutch switch connector.

C: INSPECTION

Check the clutch switch continuity. If continuity is not as specified, replace the switch.
(1) Disconnect the clutch switch connector.
(2) Measure the resistance between terminal 1 and 2 of switch.

Terminal / Specified resistance
When clutch pedal depressed:
1 — 2/More than 1 MΩ

Terminal / Specified resistance
When clutch pedal not depressed:
1 — 2/Less than 1Ω



D: ADJUSTMENT

Refer to “ADJUSTMENT” for clutch pedal. **<Ref. to CL-29,** ADJUSTMENT**, Clutch Pedal.>**

12.General Diagnostic Table

A: INSPECTION

1. CLUTCH

Symptom	Possible cause	Corrective action
1. Clutch slippage It is hard to perceive clutch slippage in the early stage, but pay attention to the following symptoms. • Engine speeds up when shifting. • High-speed driving is impossible; especially rapid acceleration is impossible and vehicle speed does not increase in proportion to the increase in engine speed. • Power falls, particularly when ascending a slope, and there is a smell of burning of the clutch facing. • Method of testing: Put the vehicle in a stationary condition with parking brake fully applied. Disengage the clutch and shift the transmission gear into the 1st. Gradually allow the clutch to engage while gradually increasing the engine speed. The clutch function is satisfactory if the engine stalls. However, the clutch is slipping if the vehicle does not start off and the engine does not stall.	(a) Clutch facing smeared by oil	Replace.
	(b) Worn clutch facing	Replace.
	(c) Deteriorated diaphragm spring	Replace.
	(d) Distorted pressure plate or flywheel	Rectify or replace.
	(e) Defective release bearing holder	Rectify or replace.
2. Clutch drags. As a symptom of this trouble, a harsh scratching noise develops and control becomes quite difficult when shifting gears. The symptom becomes more apparent when shifting into the 1st gear. However, because much trouble of this sort is due to defective synchronization mechanism, carry out the following tests. • Method of testing: <Ref. to CL-34, DIAGNOSTIC DIAGRAM OF CLUTCH DRAG, INSPECTION, General Diagnostic Table.> It may be judged as insufficient disengagement of clutch if any noise occurs during this test.	(a) Worn or rusty clutch disc hub spline	Replace clutch disc.
	(b) Excessive deflection of clutch disc facing	Rectify or replace.
	(c) Stick of crankshaft pilot needle bearing	Replace.
	(d) Cracked clutch disc facing	Replace.
	(e) Stuck clutch disc (smeared by oil or water)	Replace.
3. Clutch chatters. Clutch chattering is an unpleasant vibration to the whole body when the vehicle is just started with clutch partially engaged.	(a) Adhesion of oil on the facing	Replace clutch disc.
	(b) Weak or broken damper spring	Replace clutch disc.
	(c) Defective facing contact or excessive disc	Replace the defective clutch disc.
	(d) Warped pressure plate or flywheel	Rectify or replace.
	(e) Loose disc rivets	Replace clutch disc.
	(f) Loose engine mounting	Retighten or replace mounting.
	(g) Improper adjustment of pitching stopper	Adjustment.
4. Noisy clutch Examine whether the noise is generated when the clutch is disengaged, engaged, or partially engaged.	(a) Broken, worn or unlubricated release bearing	Replace the release bearing.
	(b) Insufficient lubrication of pilot bearing	Replace the pilot bearing.
	(c) Loose clutch disc hub	Replace clutch disc.
	(d) Loose damper spring retainer	Replace clutch disc.
	(e) Deteriorated or broken damper spring	Replace clutch disc.

Symptom	Possible cause	Corrective action
5. Clutch grabs. When starting the vehicle with the clutch partially engaged, the clutch grabs suddenly and the vehicle jumps instead of making a smooth start.	(a) Grease or oil on facing	Replace clutch disc.
	(b) Deteriorated cushioning spring	Replace clutch disc.
	(c) Worn or rusted spline of clutch disc or main shaft	Take off rust, apply grease or replace clutch disc or main shaft.
	(d) Deteriorated or broken damper spring	Replace clutch disc.
	(e) Loose engine mounting	Retighten or replace mounting.
	(f) Deteriorated diaphragm spring	Replace.

2. CLUTCH PEDAL

Trouble	Corrective action
Insufficient pedal play	Adjust pedal free play.
Insufficient clutch pedal free play	Adjust pedal free play.
Excessively worn and damaged pedal shaft and/or bushing	Replace the bushing and/or shaft with a new one.

3. DIAGNOSTIC DIAGRAM OF CLUTCH DRAG

	Step	Check	Yes	No
1	**CHECK GEAR NOISE.** 1) Start the engine. 2) Disengage the clutch and shift quickly from neutral to reverse in idling condition.	Is there any abnormal noise from the transmission gear?	Go to step **2.**	Clutch is normal.
2	**CHECK GEAR NOISE.** Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds.	Is there any abnormal noise from the transmission gear?	Go to step **3.**	For defective transmission or excessive clutch drag torque; inspect the pilot bearing, clutch disc, transmission and clutch disc hub spline.
3	**CHECK GEAR NOISE.** 1) Disengage the clutch at idle and shift from neutral to reverse within 0.5 — 1.0 seconds. 2) With the clutch disengaged, shift from neutral to reverse, reverse to neutral several times.	Is there any abnormal noise from the transmission gear?	Defect in clutch disengaging. Inspect clutch disc, clutch cover, clutch release, and clutch pedal free play.	Clutch and flywheel seizure. Inspect clutch disc, spline of clutch disc hub.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

FRONT SUSPENSION

FS

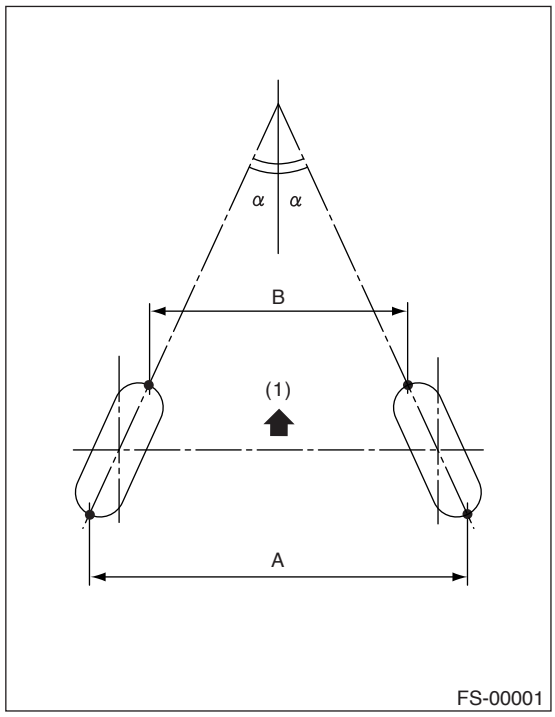
		Page
1.	General Description	2
2.	Wheel Alignment	8
3.	Front Crossmember Support Plate	15
4.	Front Stabilizer	16
5.	Front Ball Joint	17
6.	Front Arm	19
7.	Front Strut	22
8.	Front Crossmember	26
9.	General Diagnostic Table	27

1. General Description

A: SPECIFICATION

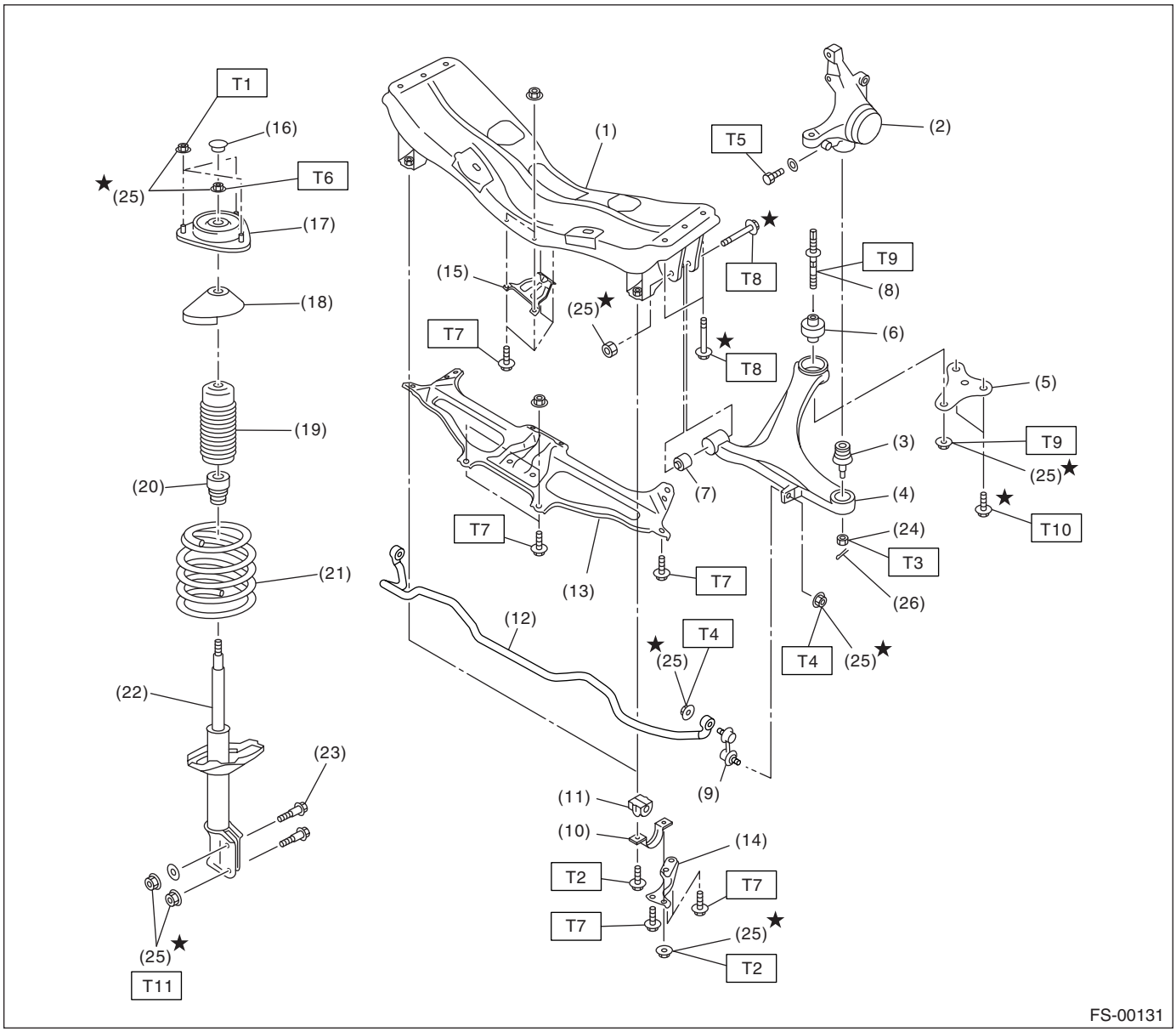
	Model		Sedan				Wagon				
			2.0 i	2.5 i	2.0 GT	3.0 R	2.0 i	2.5 i	2.0 GT	3.0 R	OUTBACK 2.5 i, OUTBACK 3.0 R
Front	Wheel arch height [Tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in)]	mm (in)	376 (14.8)				381 (15.0)		376 (14.8)		429 (16.9)
	Camber (Tolerance: ±0°45′ Differences between RH and LH: 45′ or less)		−0°20′				−0°15′		−0°20′		0°30′
	Caster		6°00′				5°45′				5°05′
	Steering angle (Tolerance: ±1.5°)	Inner wheel	37.3°								37.8°
		Outer wheel	33.0°								33.5°
	Toe-in	mm (in)	0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°15′								
	Kingpin angle		13°50′				13°45′		13°50′		12°25′
	Diameter of stabilizer	mm (in)	20 (0.79)		21 (0.83)		20 (0.79)		21 (0.83)		
Rear	Wheel arch height [Tolerance: $^{+12}_{-24}$ mm ($^{+0.47}_{-0.94}$ in)]	mm (in)	360 (14.2)				375 (14.8)				430 (16.9)
	Camber (Tolerance: ±0°45′ Differences between RH and LH: 45′ or less)		−0°45′				−0°30′				0°00′
	Toe-in	mm (in)	0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°15′								
	Thrust angle (Tolerance: ±0°30′)		0°								
	Diameter of stabilizer	mm (in)	17.3 (0.68)		19.1 (0.75)			20 (0.78)	19.1 (0.75)		17.3 (0.68)

NOTE:
• Front and rear toe-ins and front camber can be adjusted. If the toe-in or camber tolerance exceeds specifications, adjust them.
• Other items indicated in the specification table cannot be adjusted. If those items exceed specifications, check suspension parts and connections for deformities; replace with new ones as required.



(1) Front
A − B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

B: COMPONENT



(1) Front crossmember
(2) Housing
(3) Ball joint
(4) Front arm
(5) Support plate
(6) Rear bushing
(7) Front bushing
(8) Stud bolt
(9) Stabilizer link
(10) Bracket
(11) Bushing
(12) Stabilizer
(13) Crossmember support plate (Large type)
(14) Crossmember support plate (Small type)
(15) Jack-up plate
(16) Dust seal
(17) Strut mount
(18) Upper spring seat
(19) Dust cover
(20) Helper
(21) Coil spring
(22) Damper strut
(23) Adjusting bolt
(24) Castle nut
(25) Self-locking nut
(26) Cotter pin

Tightening torque: N·m (kgf-m, ft-lb)

T1:	***20 (2.0, 14.5)***
T2:	***25 (2.5, 18.1)***
T3:	***39 (4.0, 28.8)***
T4:	***45 (4.6, 33.2)***
T5:	***50 (5.1, 36.9)***
T6:	***55 (5.6, 41)***
T7:	***60 (6.1, 44.3)***
T8:	***95 (9.7, 70.1)***
T9:	***110 (11.2, 81.1)***
T10:	***150 (15.3, 110.6)***
T11:	***175 (17.8, 129)***

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine grease or the equivalent. Do not mix grease, etc. with that of another grade or from other manufacturers.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vice.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOL

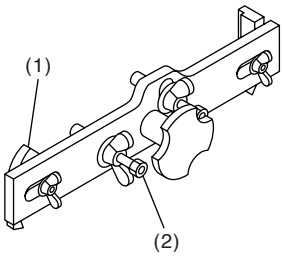
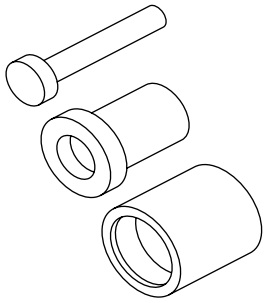
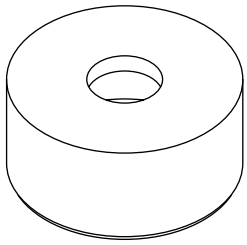
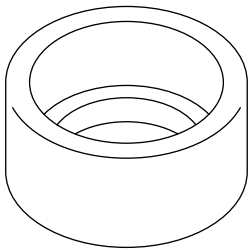
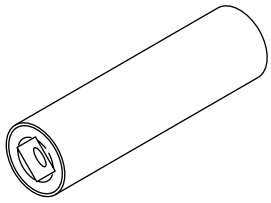
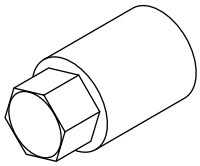
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927380002	927380002	ADAPTER	Used as an adapter for camber & caster gauge when measuring camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 ST-927680000	927680000	INSTALLER & REMOVER SET	Used for replacing the front arm front bushing.
 ST20299AG000	20299AG000 (Newly adopted tool)	REMOVER	Used for replacing the front arm rear bushing. Used with BASE (20999AG010).
 ST20299AG010	20299AG010 (Newly adopted tool)	BASE	Used for replacing the front arm rear bushing. Used with REMOVER (20999AG000).

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20299AG020	20299AG020 (Newly adopted tool)	STUD BOLT SOCKET	Used for removing and installing the stud bolt for front arm installing portion.
 ST20399AG000	20399AG000 (Newly adopted tool)	STRUT MOUNT SOCKET	Used for disassembling and assembling the strut mount.

2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment gauge	Used for wheel alignment measurement.
Turning radius gauge	Used for wheel alignment measurement.
Toe-in gauge	Used for toe-in measurement.
Dial gauge	Used for damper strut measurement.
Coil spring compressor	Used for strut assembly/disassembly.

2. Wheel Alignment

A: INSPECTION

Check the following items before taking wheel alignment measurement.
Check items before taking wheel alignment measurement:

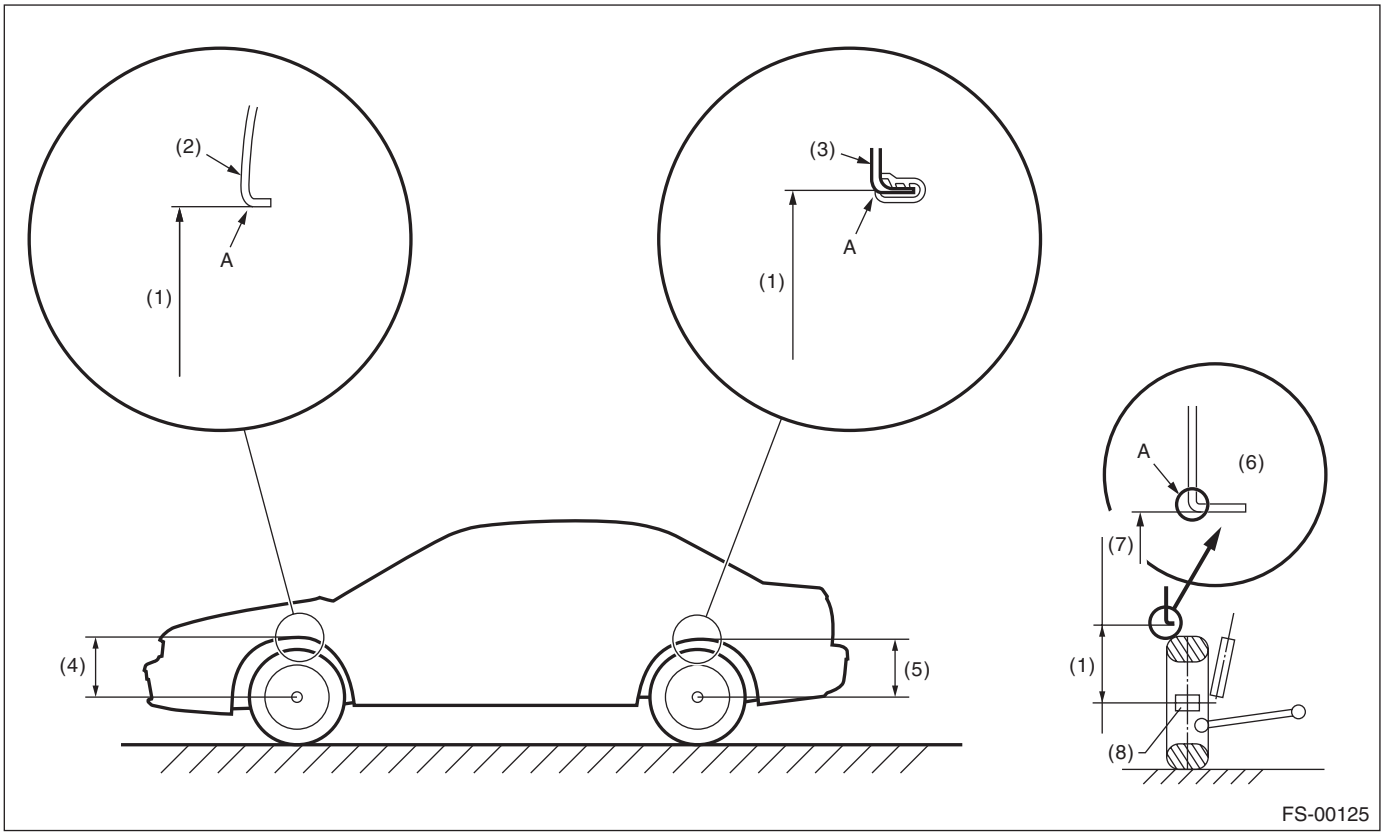
- Tire inflation pressure
- Unbalanced right and left tire wear, size difference
- Tire runout
- Excessive play and wear in ball joint
- Excessive play and wear in tie rod end
- Excessive play in wheel bearing
- Right and left wheel base imbalance
- Deformation and excessive play in steering link
- Deformation and excessive play in suspension parts

Check, adjust and measure the wheel alignment in accordance with the procedures indicated in the figure.

Wheel arch height (front and rear wheels) <Ref. to FS-9, WHEEL ARCH HEIGHT, INSPECTION, Wheel Alignment.>
↓
Camber (front and rear wheels) <Ref. to FS-10, CAMBER, INSPECTION, Wheel Alignment.>
↓
Caster (front wheel) <Ref. to FS-11, CASTER, INSPECTION, Wheel Alignment.>
↓
Steering angle <Ref. to FS-11, STEERING ANGLE, INSPECTION, Wheel Alignment.>
↓
Front wheel toe-in <Ref. to FS-12, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓
Rear wheel toe-in <Ref. to FS-12, REAR WHEEL TOE-IN, INSPECTION, Wheel Alignment.>
↓
Thrust angle <Ref. to FS-14, THRUST ANGLE, INSPECTION, Wheel Alignment.>

1. WHEEL ARCH HEIGHT

1) Park the vehicle on a level surface.
2) Set the vehicle under “curb weight” condition. (Make the luggage compartment empty, install the spare tire, jack and service tools, and top up the fuel tank.)
3) Set the steering wheel in a straight-ahead position, and stabilize the suspensions by moving the vehicle straight more than 5 m (16 ft).
4) Suspend a thread from wheel arch (point “A” in the figure below) to determine the point directly above the center of wheel.
5) Measure the distance between the point “A” and the center of wheel.



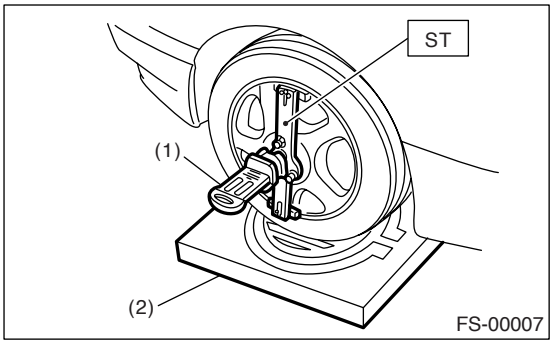
(1) Wheel arch height
(2) Front fender
(3) Rear quarter
(4) Front wheel arch height
(5) Rear wheel arch height
(6) Flange bend line
(7) Point of measurement
(8) Tip end of spindle

Wheel arch height standard value mm (in) (Tolerance ±12 mm)							
Model	Sedan				Wagon		
	2.0 i	2.5 i	2.0 GT	3.0 R	2.0 i, 2.5 i	2.0 GT, 3.0 R	OUTBACK 2.5 i, OUTBACK 3.0 R
Front	376 (14.8)				381 (15.0)	376 (14.8)	429 (16.9)
Rear	360 (14.2)				375 (14.8)		430 (16.9)

2. CAMBER

• INSPECTION

1) Place the front wheel on turning radius gauge. Make sure the ground contacting surfaces of front and rear wheels are set at the same height.
2) Set the ST into the center of wheel, and then set the wheel alignment gauge.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

3) Measure the camber angle in accordance with the operation manual for wheel alignment gauge.

Model		Camber (Differences between RH and LH: 45′ or less)
Sedan		–0°20′±0°45′
Wagon	2.0 i, 2.5 i	–0°15′±0°45′
	2.0 GT, 3.0 R	–0°20′±0°45′
	OUTBACK 2.5 i, OUTBACK 3.0 R	0°30′±0°45′

• FRONT CAMBER ADJUSTMENT

1) When adjusting the camber, adjust it to the following value.

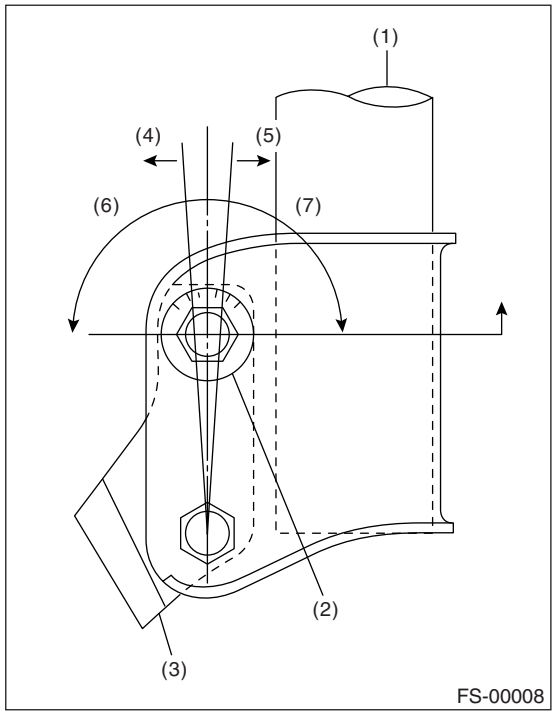
Model		Camber (Differences between RH and LH: 45′ or less)
Sedan		–0°20′±0°30′
Wagon	2.0 i, 2.5 i	–0°15′±0°30′
	2.0 GT, 3.0 R	–0°20′±0°30′
	OUTBACK 2.5 i, OUTBACK 3.0 R	0°30′±0°30′

2) Loosen the two self-locking nuts located at the lower front portion of strut.

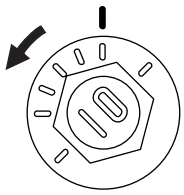
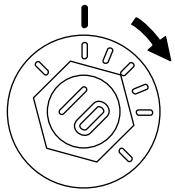
NOTE:
When the adjusting bolt needs to be loosened or tightened, hold its head with a wrench and turn the self-locking nut.

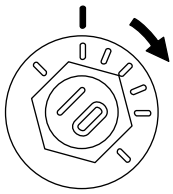
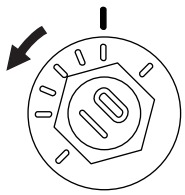
3) Turn the camber adjusting bolt so that the camber is set at specification.

NOTE:
Moving the adjusting bolt by one scale changes the camber by approx. 0°15′.



(1) Strut
(2) Adjusting bolt
(3) Housing
(4) Outer
(5) Inner
(6) Camber is increased.
(7) Camber is decreased.

To increase camber.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00009	 FS-00010

To decrease camber.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00010	 FS-00009

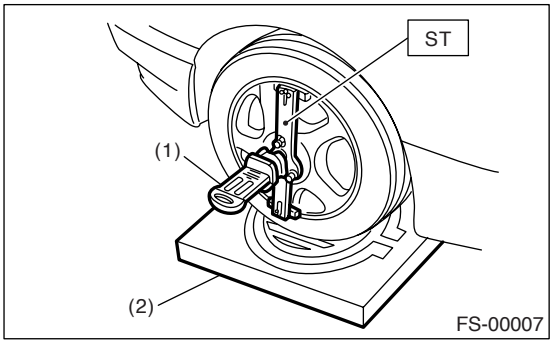
4) Tighten two new self-locking nuts.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3. CASTER

• INSPECTION

1) Place the front wheel on turning radius gauge. Make sure the ground contacting surfaces of front and rear wheels are set at the same height.
2) Set the ST into the center of wheel, and then set the wheel alignment gauge.
ST 927380002 ADAPTER



(1) Alignment gauge
(2) Turning radius gauge

3) Measure the caster angle in accordance with the operation manual for wheel alignment gauge.

Model	Caster
Sedan	6°00′
Wagon	5°45′
OUTBACK	5°05′

4. STEERING ANGLE

• INSPECTION

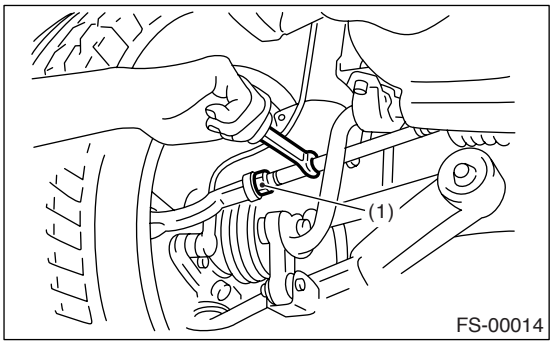
1) Place the vehicle on turning radius gauge.
2) While depressing the brake pedal, turn the steering wheel fully to the left and right. With the steering wheel held at each fully turned position, measure both the inner and outer wheel steering angle.

Model	Inner wheel	Outer wheel
OUTBACK	37.8°±1.5°	33.5°±1.5°
Except for OUTBACK	37.3°±1.5°	33.0°±1.5°

• ADJUSTMENT

1) Turn the tie-rod to adjust the steering angle of both inner and outer wheels.
2) Check the toe-in.

NOTE:
Correct the boot if it is twisted.



(1) Lock nuts

5. FRONT WHEEL TOE-IN

• INSPECTION

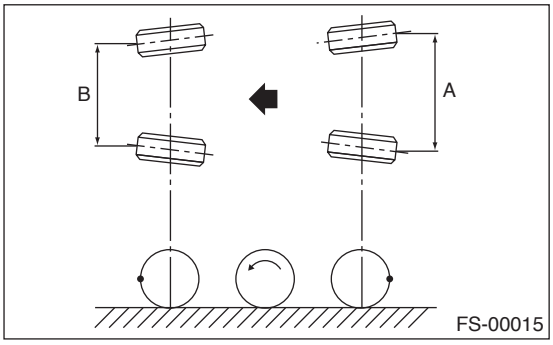
Toe-in:
0±3 mm (0±0.12 in)

1) Set the toe-in gauge in the position at wheel axis center height behind the right and left front tires.
2) Measure the distance “A” between the marks which are put on the centers of left and right tires.
3) Move the vehicle forward and rotate the tires 180°.

NOTE:
Be sure to rotate the tires in the forward direction.

4) Measure the distance “B” between the left and right marks. Detect toe-in by the following equation:

A − B = Toe-in

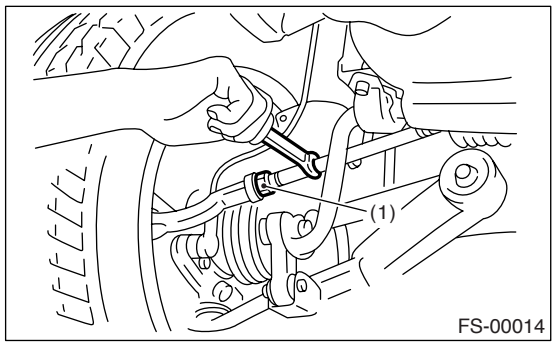


• ADJUSTMENT

When adjusting the toe-in, adjust it to the following value.

Toe-in:
0±2 mm (0±0.08 in)

1) Check that the left and right wheel steering angle is within specifications.
2) Loosen the left and right side steering tie-rod lock nuts.
3) Turn the left and right tie rods equal amounts until the toe-in is at the specification.
Both the left and right tie-rods are right-hand threaded. To increase toe-in, turn both tie-rods clockwise by equal amount (viewing from the inside of vehicle).



(1) Lock nuts

4) Tighten the tie-rod lock nut.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

NOTE:
Check and correct the tie rod boot if twisted.

6. REAR WHEEL TOE-IN

• INSPECTION

Toe-in:
0±3 mm (0±0.12 in)

Refer to “FRONT WHEEL TOE-IN” for rear toe-in inspection procedure.
<Ref. to FS-12, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

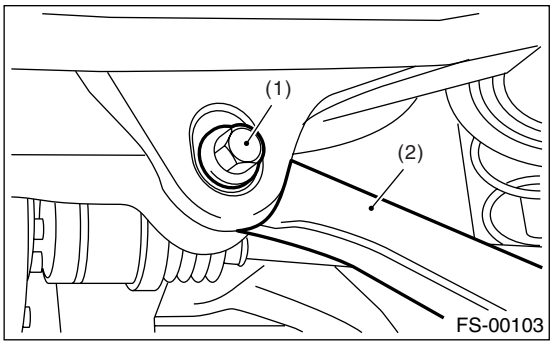
• ADJUSTMENT

When adjusting, adjust it to the following value.

Toe-in:
0±2 mm (0±0.08 in)

1) Loosen the self-locking nut on the inner side of rear link.

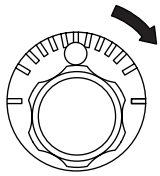
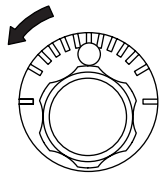
NOTE:
When loosening or tightening the adjusting bolt, hold the bolt head and turn self-locking nut.

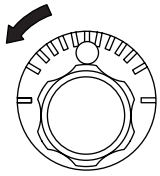
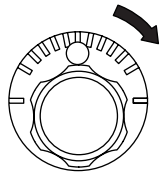


(1) Adjusting bolt
(2) Rear link

2) Turn the adjusting bolt until toe-in is at the specification.

NOTE:
When the left and right wheels are adjusted for toe-in at the same time, the movement of one scale graduation changes toe-in by approx. 0.6 mm (0.02 in).

To increase toe-in.	
Rotate the left side clockwise.	Rotate the right side counterclockwise.
 FS-00018	 FS-00019

To decrease toe-in.	
Rotate the left side counterclockwise.	Rotate the right side clockwise.
 FS-00019	 FS-00018

3) Tighten a new self-locking nut.

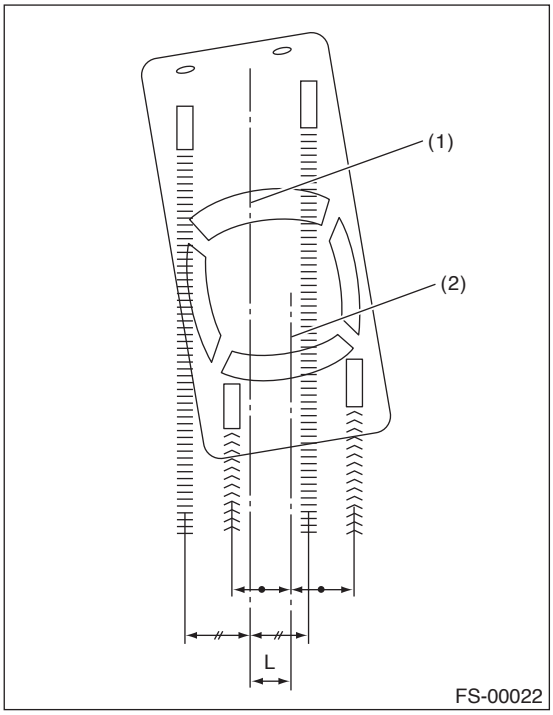
Tightening torque:
120 N·m (12.2 kgf-m, 88.5 ft-lb)

7. THRUST ANGLE

• INSPECTION

1) Park the vehicle on a level surface.
2) Move the vehicle 3 to 4 meters (10 to 13 feet) directly forward.
3) Draw the center of loci of both the front and rear axles.
4) Measure the distance “L” between center lines of the loci of axles.

Thrust angle:
0°±30′
Less than 30′ when “L” is less than 23 mm (0.9 in).



(1) Center line of loci (front axle)
(2) Center line of loci (rear axle)

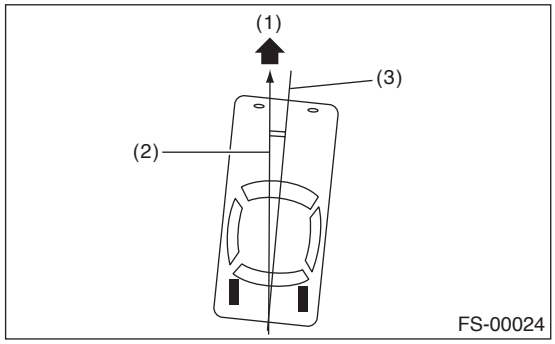
• ADJUSTMENT

When adjusting, adjust it to the following value.

Thrust angle:
0°±20′
Less than 20′ when “L” is less than 15 mm (0.6 in).

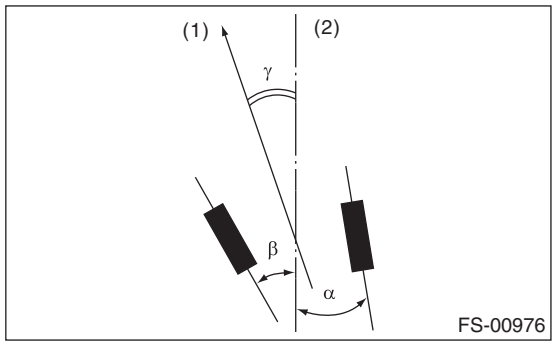
1) Make the thrust angle adjustments by turning the toe-in adjusting bolts of rear suspension equally in the same direction.
2) When one rear wheel is adjusted in a toe-in direction, adjust the other rear wheel equally in toe-out direction, in order to make the thrust angle adjustment.
3) When the left and right adjusting bolts are turned by one graduation, the thrust angle will change approx. 17′ [“L” is approx. 13 mm (0.51 in)].

NOTE:
Thrust angle refers to a mean value of left and right rear wheel toe angles in relation to the vehicle body center line. Vehicle is driven straight in the thrust angle direction while slanting in the oblique direction depending on the degree of the mean thrust angle.



(1) Front
(2) Thrust angle
(3) Body center line

Thrust angle: r = ($\alpha - \beta$)/2
α: Rear RH wheel toe-in angle
β: Rear LH wheel toe-in angle
Use only positive toe-in values from each wheel to substitute for α and β in the equation.



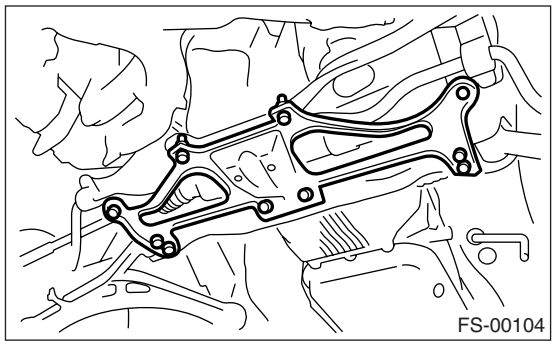
(1) Front
(2) Body center line

3. Front Crossmember Support Plate

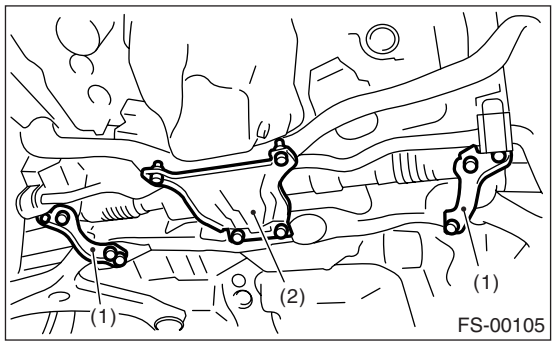
A: REMOVAL

1) Lift-up the vehicle.
2) Remove the front under cover. <Ref. to EI-26, REMOVAL, Front Under Cover.>
3) Remove the bolt and remove front crossmember support plate.

• Large type



• Small type



(1) Crossmember support plate
(2) Jack-up plate

B: INSTALLATION

Install in the reverse order of removal.

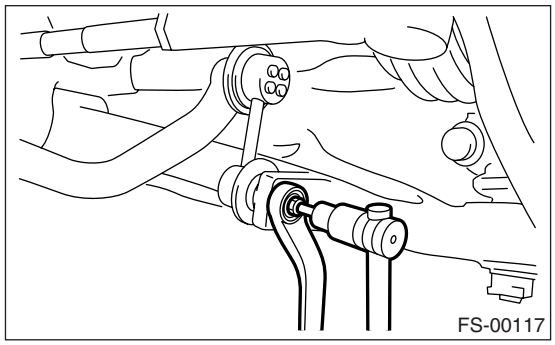
NOTE:
Tighten the small type crossmember support plate together with stabilizer bracket.
After installing the stabilizer bracket to crossmember, tighten the crossmember support plate together.

Tightening torque:
Crossmember support plate:
60 N·m (6.1 kgf-m, 44.3 ft-lb)
Crossmember support plate (Joint tightening portion of stabilizer bracket):
25 N·m (2.5 kgf-m, 18.1 ft-lb)
Jack-up plate:
60 N·m (6.1 kgf-m, 44.3 ft-lb)

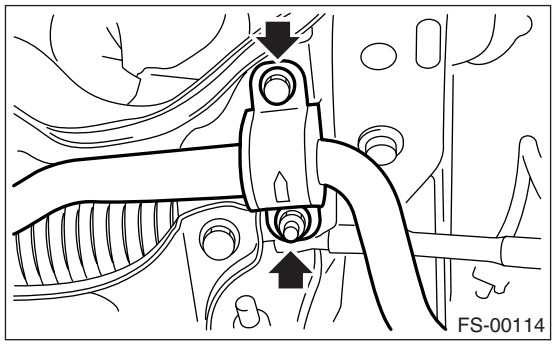
4. Front Stabilizer

A: REMOVAL

1) Lift-up the vehicle, and then remove the front wheels.
2) Remove the front under cover. <Ref. to EI-26, REMOVAL, Front Under Cover.>
3) Remove the front crossmember support plate. <Ref. to FS-15, REMOVAL, Front Crossmember Support Plate.>
4) Remove the stabilizer link.



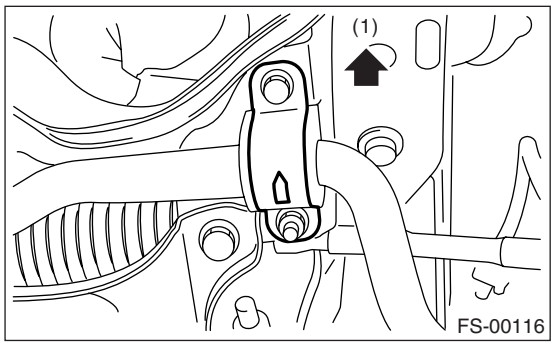
5) Remove the stabilizer bracket.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
• Use a new self-locking nut.
• Ensure that the stabilizer bushing and stabilizer have the same identification colors.
• Install the stabilizer bushing (front crossmember side) while aligning it with the paint mark on stabilizer.
• Stabilizer bracket has an orientation, so install it with the arrow mark faced to the front side of vehicle.



(1) Front side of vehicle

Tightening torque:
Stabilizer link
45 N·m (4.6 kgf-m, 33.2 ft-lb)
Stabilizer bracket
25 N·m (2.5 kgf-m, 18.1 ft-lb)

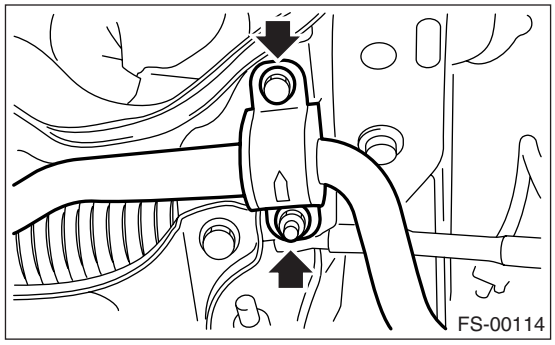
C: INSPECTION

1) Check the bushing for crack, fatigue or damage.
2) Check the stabilizer link for damage.

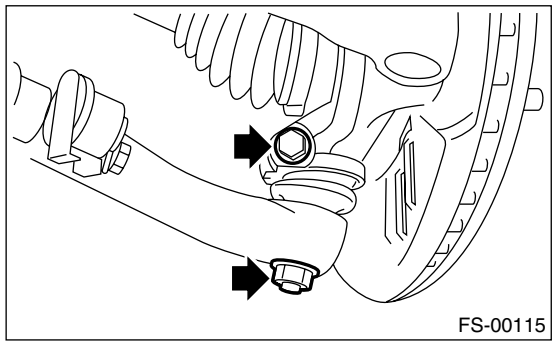
5. Front Ball Joint

A: REMOVAL

1) Lift-up the vehicle and remove the front wheels.
2) Remove the both sides of stabilizer bracket.



3) Pull out the pin from ball stud, remove the castle nut, and extract the ball stud from front arm.
4) Remove the bolt installing ball joint to housing.



5) Extract the ball joint from housing.

B: INSTALLATION

1) Insert the ball joint into housing.

Tightening torque (Bolt):
50 N·m (5.1 kgf-m, 36.9 ft-lb)

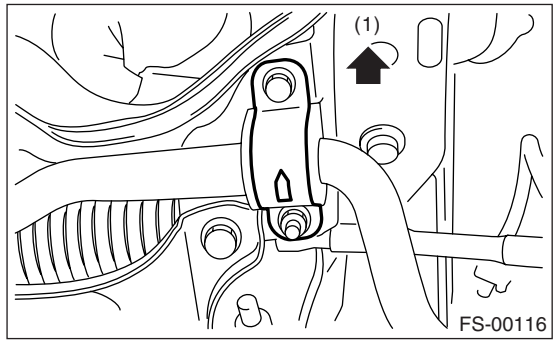
CAUTION:
Do not apply grease to the tapered portion of ball stud.

2) Install the ball joint into front arm.

Tightening torque (Castle nut)
Front arm:
39 N·m (4.0 kgf-m, 28.8 ft-lb)

3) Retighten the castle nut further within 60° until the hole in ball stud is aligned with a slot in castle nut. Then, insert a new cotter pin and bend it around castle nut.
4) Install the stabilizer bracket.

NOTE:
Stabilizer bracket has an orientation, so install it with the arrow mark faced to the front side of vehicle.



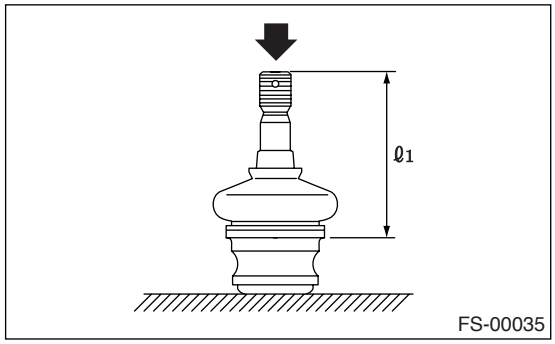
(1) Front side of vehicle

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

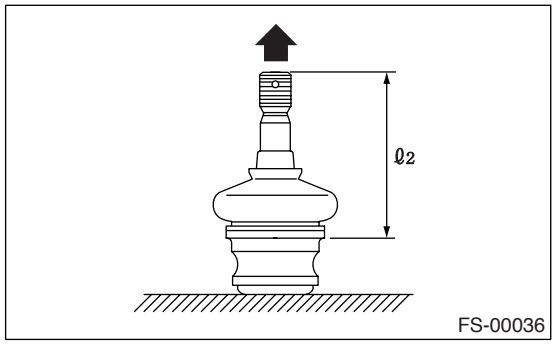
5) Install the front wheels.

C: INSPECTION

1) Measure the play of ball joint by the following procedures. Replace with a new one when the play exceeds specified value.
(1) With 686 N (70 kgf, 154 lb) loaded in direction shown in the figure, measure the dimension ℓ_1.



(2) With 686 N (70 kgf, 154 lb) loaded in direction shown in the figure, measure the dimension ℓ_2.



(3) Determine the plays from the following formula. $S = \ell_2 - \ell_1$

(4) Replace with a new one when the play exceeds specified value.

FRONT BALL JOINT

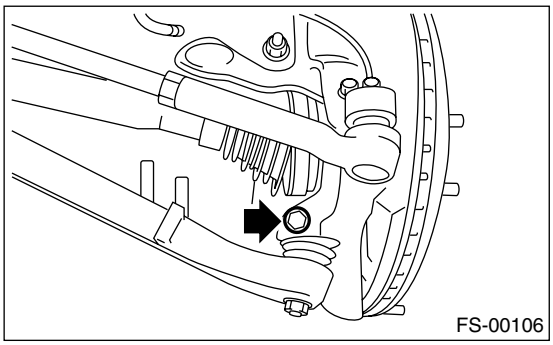
Specified play for replacement S:
Less than 0.3 mm (0.012 in)

2) When the play is within specified value, visually check the dust cover.
3) Remove the ball joint and cover, check them for wear, damage or cracks, and then replace them if any defective part is found.
4) If the dust cover is damaged, replace with a new ball joint.

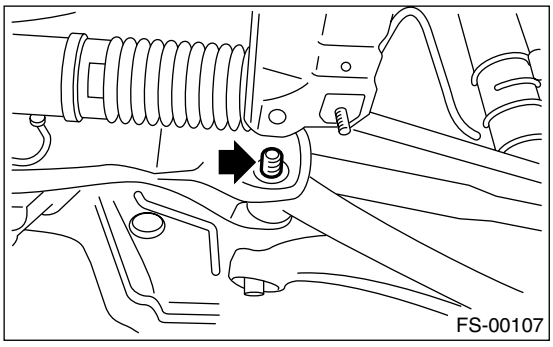
6. Front Arm

A: REMOVAL

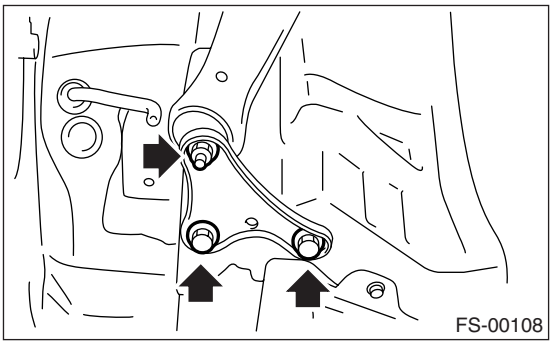
1) Lift-up the vehicle, and then remove the front wheels.
2) Remove the front crossmember support plate. <Ref. to FS-15, REMOVAL, Front Crossmember Support Plate.>
3) Remove the front stabilizer. <Ref. to FS-16, REMOVAL, Front Stabilizer.>
4) Remove the ball joint of front arm.



5) Remove the nut securing the front arm to crossmember. (Do not remove the bolt.)

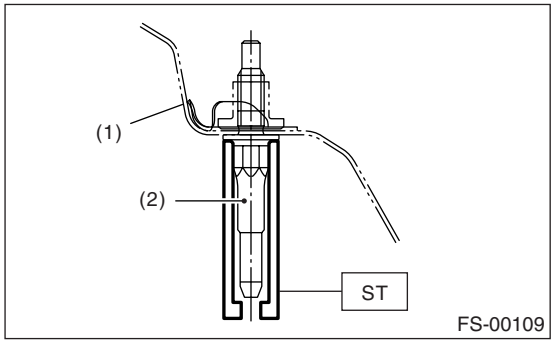


6) Remove the front arm support plate.



7) Remove the bolt securing the front arm to crossmember and extract the front arm from crossmember.
8) To remove the stud bolt, use ST.
ST 20299AG020 STUD BOLT SOCKET

CAUTION:
Do not remove the stud bolt without necessity. Always replace the parts with new ones when removed.



(1) Vehicle body
(2) Stud bolt

B: INSTALLATION

1) Using the ST, install the stud bolt.
ST 20299AG020 STUD BOLT SOCKET

Tightening torque:
110 N·m (11.2 kgf-m, 81.1 ft-lb)

2) Using new bolts and self-locking nuts, temporarily tighten the front arm to crossmember.
3) Secure the front arm to body, and then install the support plate with new bolts and self-locking nuts.

Tightening torque:
Support plate-to-Front arm:
110 N·m (11.2 kgf-m, 81.1 ft-lb)
Support plate-to-Body:
150 N·m (15.3 kgf-m, 110.6 ft-lb)

4) Install the ball joint into housing.

Tightening torque:
50 N·m (5.1 kgf-m, 36.9 ft-lb)

5) Install the stabilizer. <Ref. to FS-16, INSTALLATION, Front Stabilizer.>
6) Lower the vehicle from the lift, and tighten the bolt which secures the front arm to crossmember at the state that wheels are in full contact with the ground and the vehicle is curb weight.

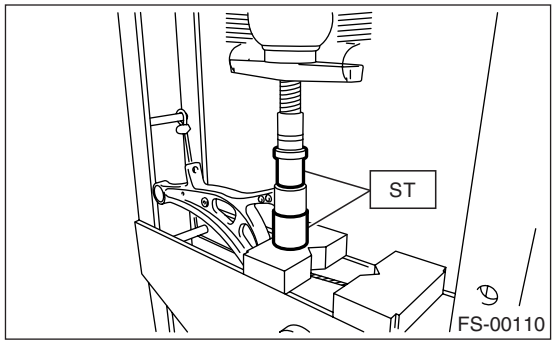
Tightening torque:
95 N·m (9.7 kgf-m, 70.1 ft-lb)

NOTE:
Inspect the wheel alignment and adjust if necessary.

C: DISASSEMBLY

1. FRONT BUSHING

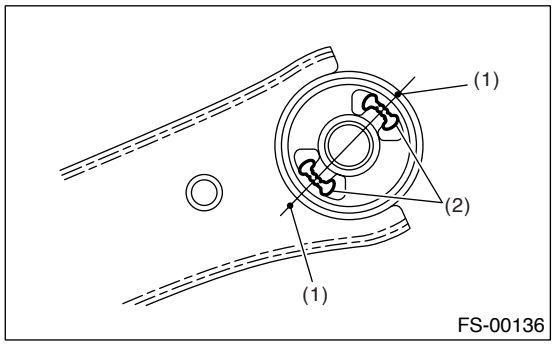
Using the ST and a press, remove the front bushing.
ST 927680000 INSTALLER & REMOVER SET



2. REAR BUSHING

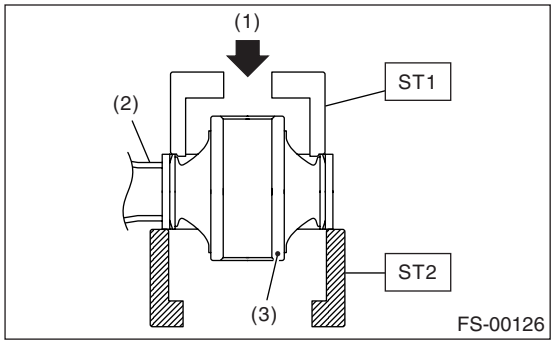
1) Scribe an aligning mark on the front arm based on the center of rear bushing recess portion.

CAUTION:
Always put an alignment mark for aligning the position on bushing installation.



(1) Put an alignment mark.
(2) Recess portion

2) Using the ST and a press, remove the rear bushing.
ST1 20299AG000 REMOVER
ST2 20299AG010 BASE



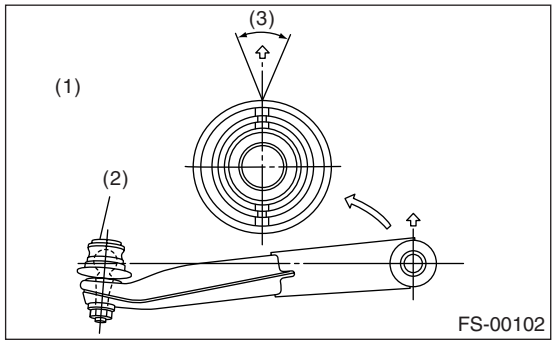
(1) Press
(2) Front arm
(3) Rear bushing

D: ASSEMBLY

1. FRONT BUSHING

Assemble in the reverse order of disassembly.

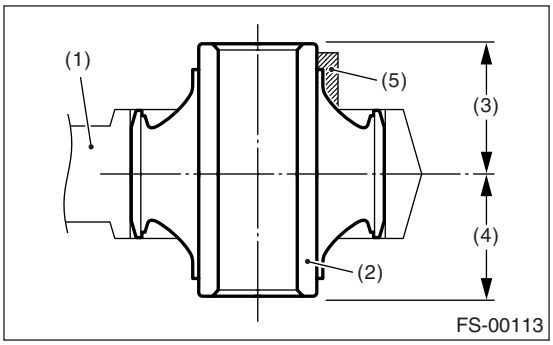
CAUTION:
Install the front bushing in proper direction as shown in the figure.



(1) Face the bushing toward the center of ball joint.
(2) Ball joint
(3) ±3°

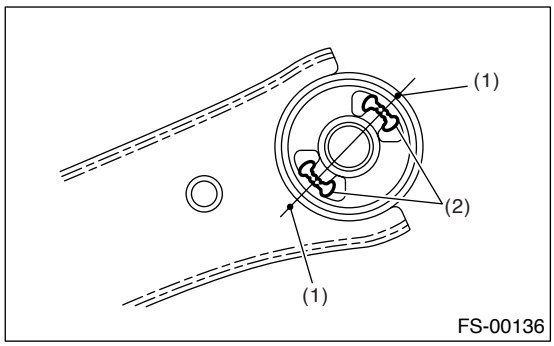
2. REAR BUSHING

1) Install the rear bushing with its longer inner cylinder faced upward and its shorter one faced downward and protruding part rearward as shown in the figure.



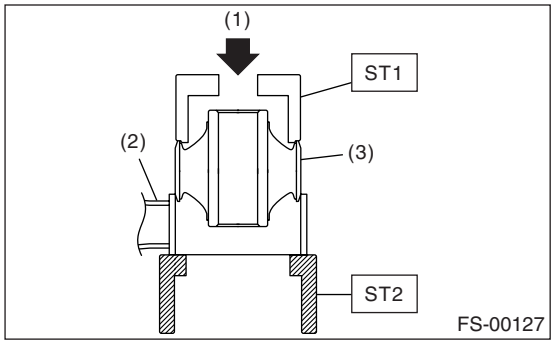
(1) Front arm
(2) Bushing inner cylinder
(3) Longer
(4) Shorter
(5) Protrusion portion

2) Align the center of rear bushing recess portion with the aligning mark on the front arm.



(1) Alignment mark
(2) Recess portion

3) Using the ST and a press, install the rear bushing.
ST1 20299AG000 REMOVER
ST2 20299AG010 BASE



(1) Press
(2) Front arm
(3) Rear bushing

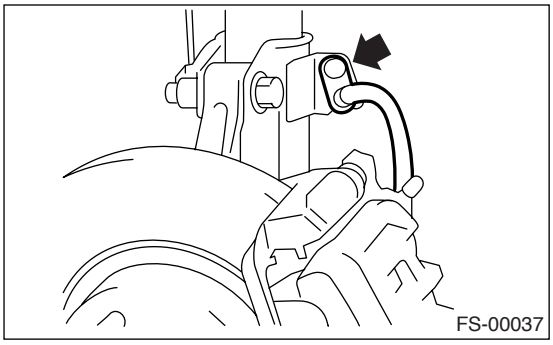
E: INSPECTION

1) Check the front arm for wear, damage or cracks, and correct or replace if defective.
2) Check the bushing for crack, fatigue or damage.

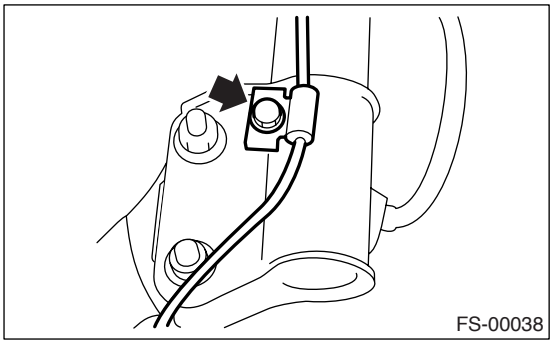
7. Front Strut

A: REMOVAL

1) Lift-up the vehicle, and then remove the front wheels.
2) Scribe an alignment mark on the camber adjusting bolt and strut.
3) Remove the bolt securing brake hose from strut.



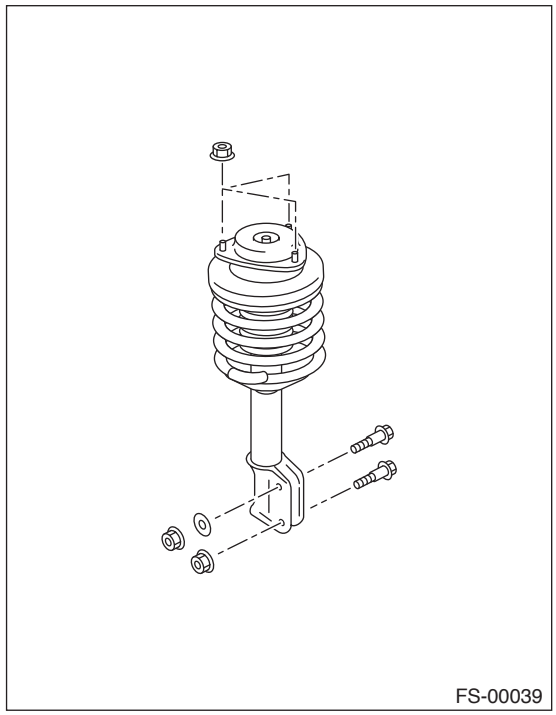
4) Remove the bolt securing ABS wheel speed sensor harness.



5) Remove the two bolts securing housing to strut.

NOTE:
While holding the head of adjusting bolt, loosen the self-locking nut.

6) Remove the three nuts securing strut mount to body.



B: INSTALLATION

1) Install the strut mount at the upper side of strut to body, and tighten it with new self-locking nuts.

Tightening torque:
20 N·m (2.0 kgf-m, 14.5 ft-lb)

2) Align alignment marks on the camber adjusting bolt and strut.
Using new self-locking nuts, install the strut to housing.

NOTE:
While holding the head of adjusting bolt, tighten the self-locking nut.

Tightening torque:
175 N·m (17.8 kgf-m, 129 ft-lb)

3) Secure the ABS wheel speed sensor harness to strut.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

4) Install the bolts which secure the brake hose to strut.

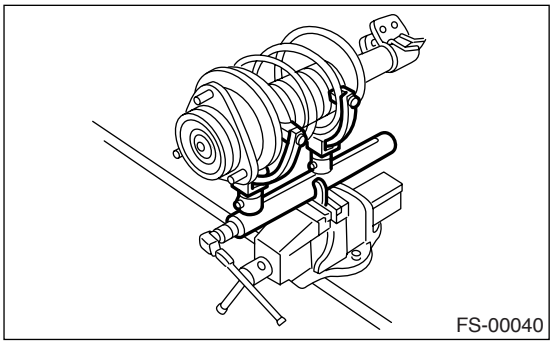
Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

5) Install the front wheels.

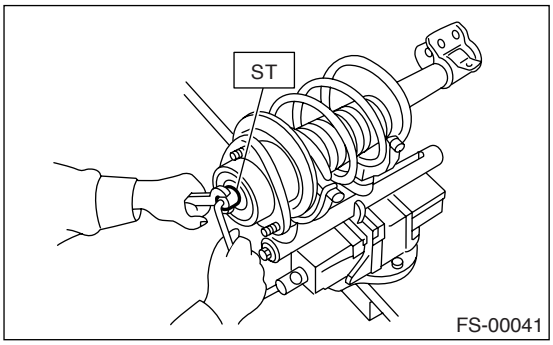
NOTE:
Inspect the wheel alignment and adjust if necessary.

C: DISASSEMBLY

1) Using a coil spring compressor, compress the coil spring.



2) Using the ST, remove the self-locking nut.
ST 20399AG000 STRUT MOUNT SOCKET



3) Remove the strut mount and upper spring seat from strut.
4) Gradually decrease the compression force of compressor, and remove the coil spring.
5) Remove the dust cover and helper spring.

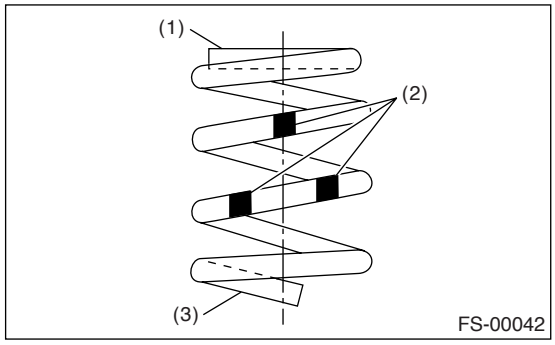
D: ASSEMBLY

1) Before installing the coil spring, strut mount, etc. on strut, check for the presence of air in the dampening force generating mechanism of the strut since air prevents proper dampening force production.
2) Check for presence of air
   (1) Place the strut vertically with the piston rod facing up.
   (2) Move the piston rod to the center of its entire stroke.
   (3) While holding the piston rod end with fingertips, move the rod up and down.
   (4) If the piston rod moves at least 10 mm (0.39 in) in the former step, purge air from the strut.
3) Air purging procedure
   (1) Place the strut vertically with the piston rod facing up.
   (2) Fully extend the piston rod.
   (3) With the piston rod fully extended, place the piston rod side down. The strut must stand vertically.
   (4) Fully contract the piston rod.
   (5) Repeat 3 to 4 times from the step (1).

NOTE:
After completely purging air from the strut, be sure to place the strut with the piston rod facing up. If the strut is laid down and set, check for the entry of air in accordance with “Check for presence of air”.

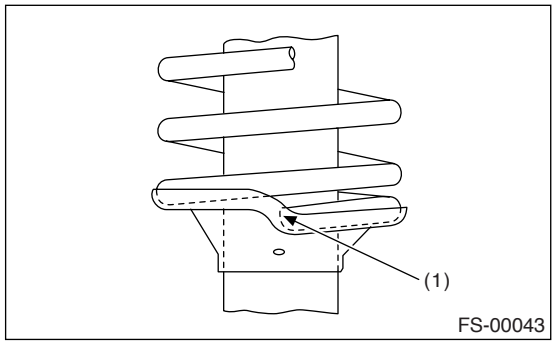
4) Using a coil spring compressor, compress the coil spring.

NOTE:
Make sure that the vertical installing direction of coil spring is as shown in the figure.



(1) Diameter is small (Upper part)
(2) Identification paint
(3) Diameter is large (Bottom part)

5) Set the coil spring correctly so that its end face fits well into the spring seat as shown in the figure.

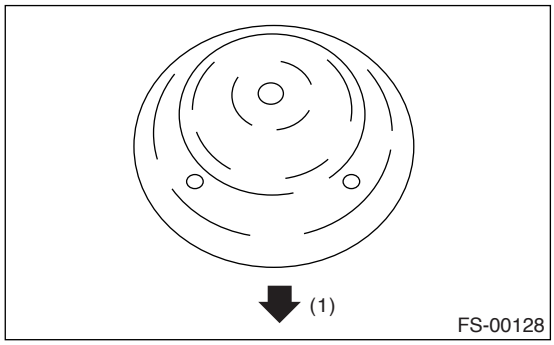


(1) Coil spring end face

6) Install the helper and dust cover to piston rod.

7) Pull the piston rod fully upward, and install the spring seat.

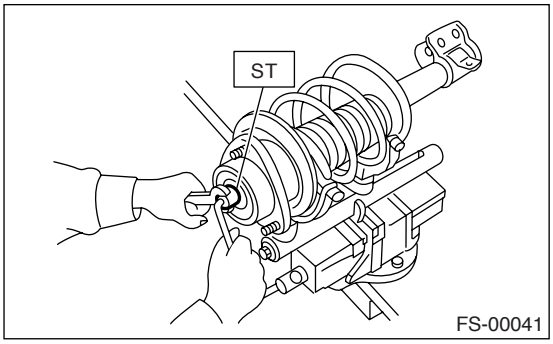
NOTE:
Ensure the upper spring seat is positioned as shown in the figure.



(1) Outside of body

8) Install the strut mount to piston rod, and tighten a new self-locking nut temporarily.
9) Using a hexagon wrench to prevent strut rod from turning, tighten the new self-locking nut with ST.
ST 20399AG000 STRUT MOUNT SOCKET

Tightening torque:
55 N·m (5.6 kgf-m, 41 ft-lb)



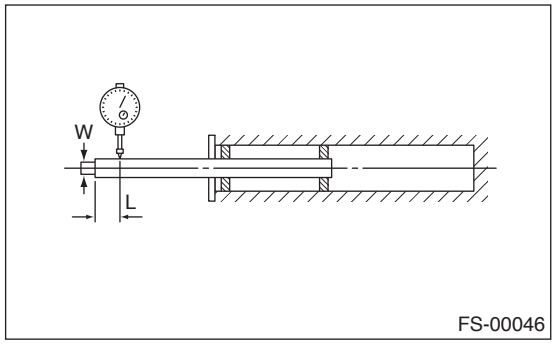
10) Loosen the coil spring carefully.

E: INSPECTION

Check the removed part for wear, damage or cracks, and then repair or replace it if defective.

1. DAMPER STRUT

1) Check for oil leaks.
2) Move the piston rod up and down to check that it operates smoothly without any hitch.
3) Piston rod play
• Measure the play as follows:
Fix the outer shell and fully extend the rod. Set a dial gauge at the end of rod L [10 mm (0.39 in)], and then read the dial gauge indication P_1 while applying a force of W [20 N (2 kgf, 4 lb)] to threaded portion. Apply a force of 20 N (2 kgf, 4 lb) in the opposite direction of “W”, and then read the dial gauge indication P_2.



Play limit ($P_1 + P_2$):
0.8 mm (0.031 in)

If the play exceeds limit, replace the strut.

2. STRUT MOUNT

Check the rubber part for deformation, cracks or deterioration, and then replace it with a new one if defective.

3. DUST COVER

If any cracks or damage are found, replace it with a new one.

4. COIL SPRING

If a permanent strain is found, replaced it with a new one.

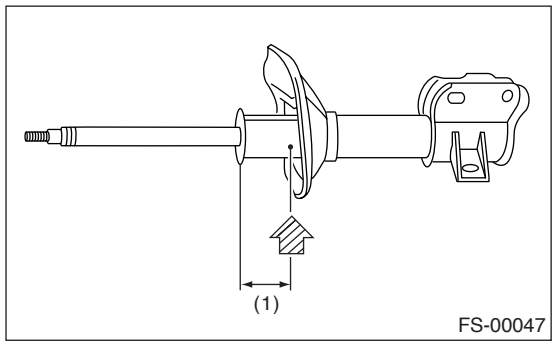
5. HELPER

Replace it with a new one if cracked or damaged.

F: DISPOSAL

CAUTION:
• Before handling struts, be sure to wear goggles to protect eyes from gas, oil and cutting powder.
• Do not disassemble the strut damper or place into a fire.
• Drill a hole into struts in case of discarding struts filled with gas.

1) Place the strut on a level surface with the piston rod fully expanded.
2) Using a 2 to 3 mm (0.08 to 0.12 in) dia. drill, make holes in areas shown in the figure.

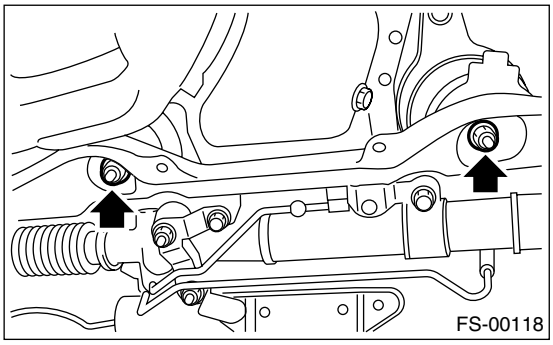


(1) 40 mm (1.57 in)

8. Front Crossmember

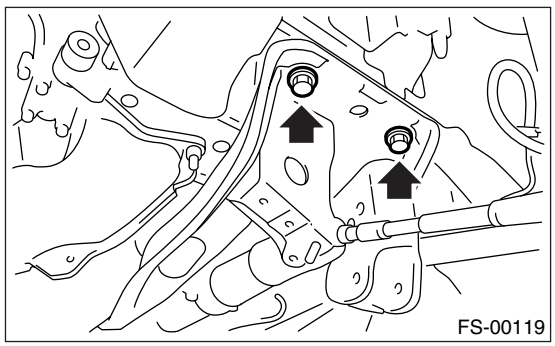
A: REMOVAL

1) Lift-up the vehicle, and then remove the front wheels.
2) Remove the front exhaust pipe.
3) Remove the front crossmember support plate. <Ref. to FS-15, REMOVAL, Front Crossmember Support Plate.>
4) Remove the front stabilizer. <Ref. to FS-16, REMOVAL, Front Stabilizer.>
5) Disconnect the tie-rod end from housing.
6) Remove the front arm. <Ref. to FS-19, REMOVAL, Front Arm.>
7) Remove the nuts attaching the engine mount cushion rubber to crossmember.


FS-00118

8) Remove the steering universal joint.
9) Disconnect the power steering hose from steering gearbox.
10) Lift the engine approx. 10 mm (0.39 in) using a chain block.
11) Support the crossmember with a jack, remove the bolts securing crossmember to body, and then gradually lower the crossmember with steering gearbox as a unit.

CAUTION:
When removing the crossmember downward, be careful that the tie-rod end does not interfere with drive shaft boot.


FS-00119

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
• Use a new bolt and self-locking nut. For the parts which are not reusable, refer to “COMPONENT”. <Ref. to FS-4, COMPONENT, General Description.>
• Always tighten the bushing in the state that wheels are in full contact with the ground and the vehicle is curb weight.

Tightening torque:
Crossmember to body:
95 N·m (9.7 kgf-m, 70.1 ft-lb)
Engine mounting to crossmember:
85 N·m (8.7 kgf-m, 62.7 ft-lb)
Front arm-to-Crossmember:
95 N·m (9.7 kgf-m, 70.1 ft-lb)
Front arm-to-Support plate:
110 N·m (11.2 kgf-m, 81.1 ft-lb)
Support plate body:
150 N·m (15.3 kgf-m, 110.6 ft-lb)
Tie-rod end to housing:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)

Retighten the castle nut further within 60° until the hole in ball stud is aligned with a slot in castle nut after tightening in specified torque.
Universal joint:
24 N·m (2.4 kgf-m, 17.4 ft-lb)
Stabilizer bracket:
25 N·m (4.6 kgf-m, 33.2 ft-lb)
Stabilizer link:
45 N·m (2.5 kgf-m, 18.4 ft-lb)
Power steering hose-to-Steering gearbox:
15 N·m (1.5 kgf-m, 11 ft-lb)

2) Purge air from the power steering system.
3) Inspect the wheel alignment and adjust if necessary.

C: INSPECTION

Check the crossmember for wear, damage or cracks, and then repair or replace if defective.

9. General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Rough operation of damper strut or shock absorber	Replace.
(3) Installation of wrong strut or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and hump.
3) Large shock in bumping

Possible cause	Corrective action
(1) Breakage of coil spring	Replace.
(2) Overinflating pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage of damper strut or shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of damper strut or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Tighten to specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

REAR SUSPENSION

RS

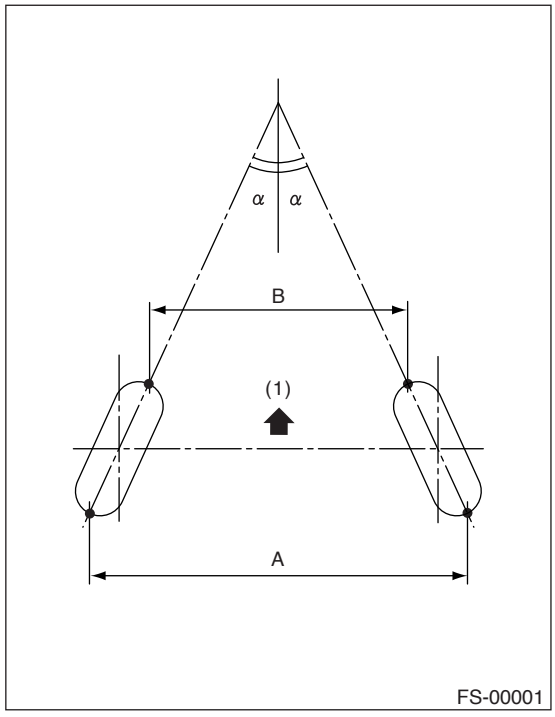
		Page
1.	General Description	2
2.	Wheel Alignment	8
3.	Rear Stabilizer	9
4.	Rear Arm	10
5.	Upper Link	14
6.	Rear Shock Absorber	16
7.	Front Link	18
8.	Rear Link	19
9.	Sub Frame Support Arm	21
10.	Sub Frame Support Plate	22
11.	Rear Sub Frame	23
12.	Helper	24
13.	General Diagnostic Table	25

1. General Description

A: SPECIFICATION

Model	Sedan		Wagon		
	2.0 i, 2.5 i	2.0 GT, 3.0 R	2.0 i	2.5 i	OUTBACK 2.5 i, OUTBACK 3.0 R
Wheel arch height [Tolerance: $^{+12\ mm}_{-24\ mm}$ ($^{+0.47\ in}_{-0.94\ in}$)] mm (in)	360 (14.2)		375 (14.8)		430 (16.9)
Camber (Tolerance: ±0°45′ Differences between RH and LH: 45′ or less)	−0°45′		−0°30′		0°00′
Toe-in mm (in)	0±3 (0±0.12) Toe angle (sum of both wheels): 0°±0°15′				
Thrust angle (tolerance: ±0°30′)	0°				
Diameter of stabilizer mm (in)	17.3 (0.68)	19.1 (0.75)	19.1 (0.75)	20 (0.78)	17.3 (0.68)

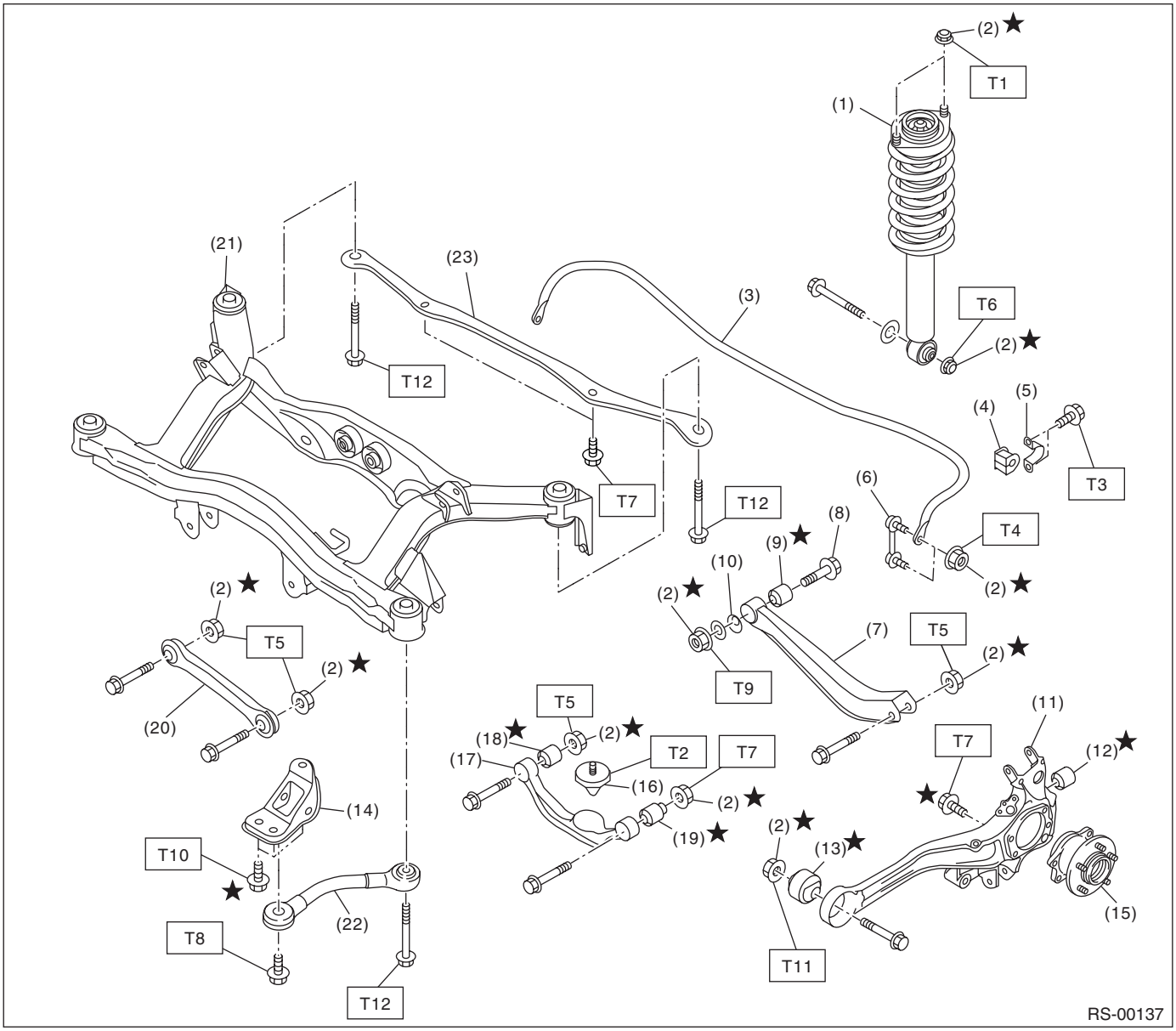
NOTE:
• Front and rear toe-ins and front camber can be adjusted. If the toe-in or camber tolerance exceeds specifications, adjust them.
• Other items indicated in the specification table cannot be adjusted. If other items exceeds specifications, check suspension parts and connections for deformation, and replace with new ones as required.



(1) Front
A − B = Positive: Toe-in, Negative: Toe-out
α = Each toe angle

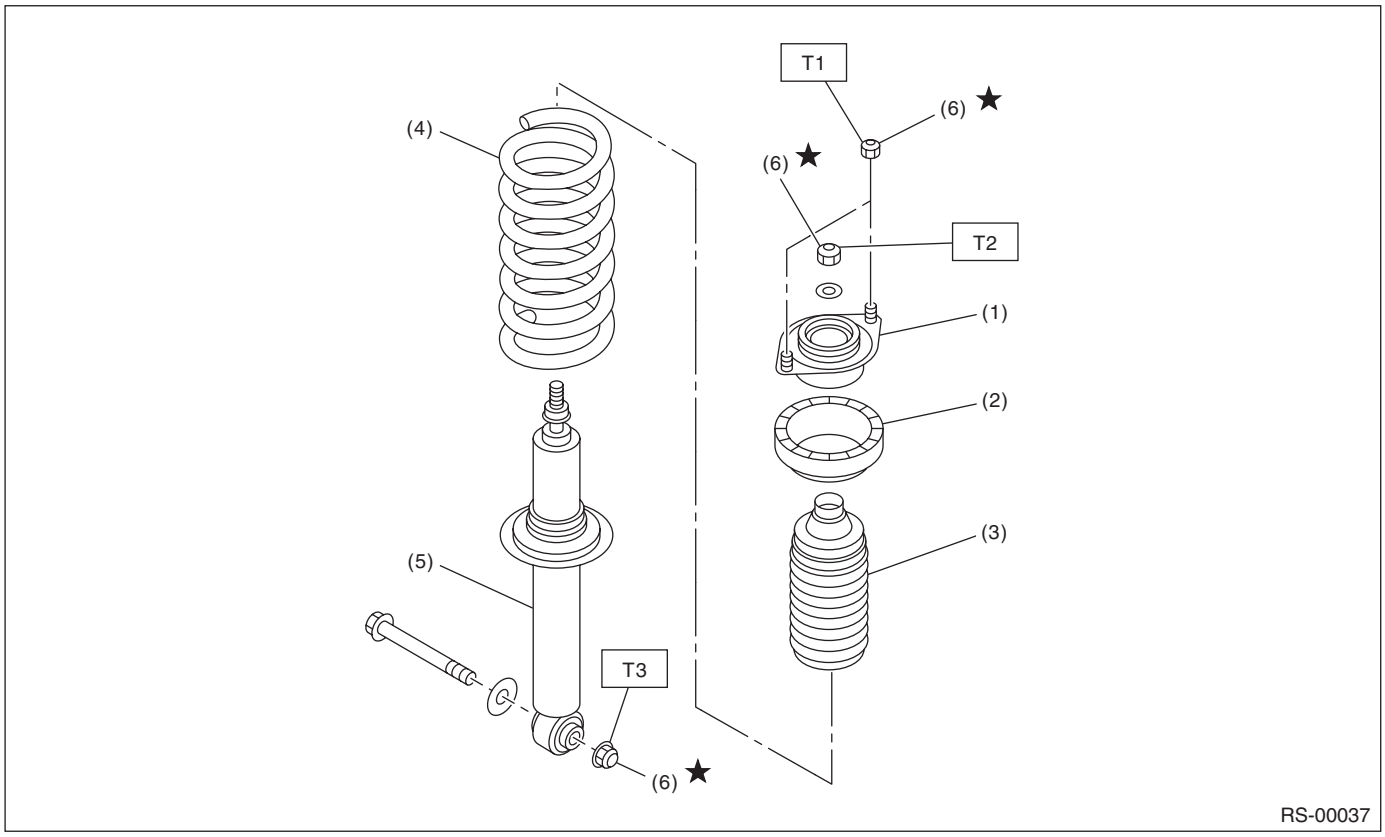
B: COMPONENT

1. REAR SUSPENSION



(1)	Shock absorber	(14)	Rear arm bracket	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Self-locking nut	(15)	Hub bearing unit	***T1: 30 (3.1, 22.4)***
(3)	Stabilizer	(16)	Helper	***T2: 32 (3.3, 24)***
(4)	Stabilizer bushing	(17)	Upper link	***T3: 40 (4.1, 30)***
(5)	Bracket	(18)	Upper link bushing (inner side)	***T4: 44 (4.5, 32.5)***
(6)	Stabilizer link	(19)	Upper link bushing (outer side)	***T5: 57 (5.8, 42)***
(7)	Rear link	(20)	Front link	***T6: 62 (6.3, 48)***
(8)	Adjusting bolt	(21)	Rear sub frame	***T7: 65 (6.6, 48)***
(9)	Rear link bushing	(22)	Sub frame support arm	***T8: 80 (8.2, 59)***
(10)	Adjusting washer	(23)	Sub frame support plate	***T9: 120 (12.2, 89)***
(11)	Rear arm			***T10: 125 (12.7, 92)***
(12)	Rear arm rear bushing			***T11: 150 (15.3, 111)***
(13)	Rear arm front bushing			***T12: 175 (17.8, 129)***

2. SHOCK ABSORBER



(1) Mount
(2) Upper rubber sheet
(3) Dust cover
(4) Coil spring
(5) Shock absorber
(6) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22.4)
T2: 35 (3.6, 26)
T3: 62 (6.3, 48)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Before discarding shock absorbers, be sure to bleed gas completely. Also, do not throw away in fire.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease, etc. with that of another grade or from other manufacturers.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or cloth between the part and the vice.
• Be sure to tighten fasteners including bolts and nuts to specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOL

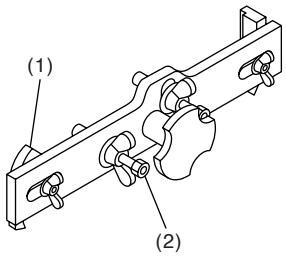
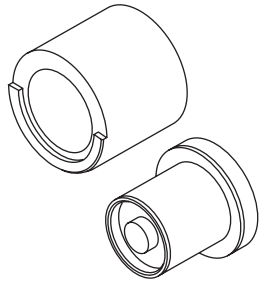
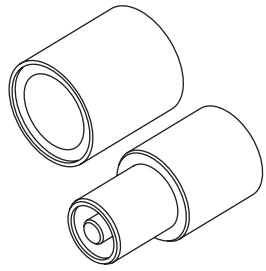
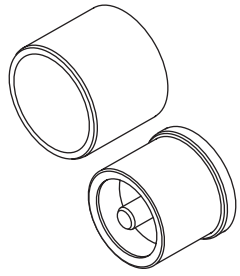
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927380002	927380002	ADAPTER	Used for an adapter of camber & caster gauge when measuring the camber and caster. (1) 28199AC000 PLATE (2) 28199AC010 BOLT
 ST20099AE000	20099AE000	INSTALLER & REMOVER	Used for replacing the rear link bushing.
 ST20099AE010	20099AE010	INSTALLER & REMOVER	Used for replacing the upper link bushing.
 ST20099AE020	20099AE020	INSTALLER & REMOVER SET	Used for replacing the rear arm front bushing.

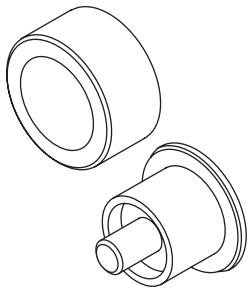
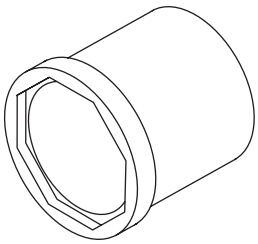
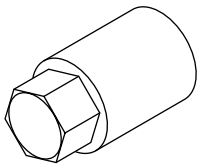
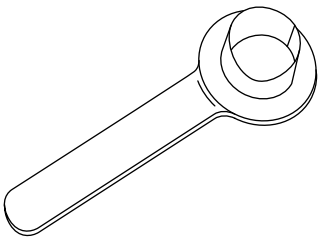
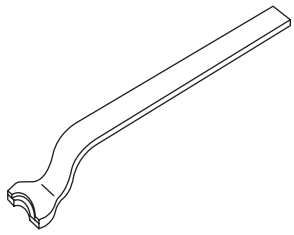
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST20099AE040	20099AE040	INSTALLER & REMOVER SET	Used for replacing the rear arm rear bushing.
 ST20099AE030	20099AE030	HELPER SOCKET WRENCH	Used for replacing the helper.
 ST20399AG000	20399AG000 (New adopted tool)	STRUT MOUNT SOCKET	Used for removing and installing the shock mount.
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear drive shaft to rear differential. • For oil seal protection

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA100	28099PA100	REMOVER	Used for removal of DOJ.

2. GENERAL TOOL

TOOL NAME	REMARKS
Alignment gauge	Used for wheel alignment measurement.
Turning radius gauge	Used for wheel alignment measurement.
Toe-in gauge	Used for toe-in measurement.
Transmission jack	Used for removing and installing suspension.
Bearing puller	Used for removing bushings.
Coil spring compressor	Used for disassembling and assembling shock absorber.

2. Wheel Alignment

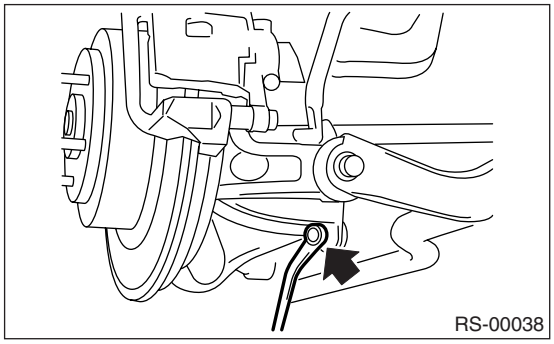
A: INSPECTION

NOTE:
Measure and adjust the front and rear wheel alignment at a time. Refer to “FS” section for measurement and adjustment of wheel alignment. <Ref. to FS-8, INSPECTION, Wheel Alignment.>

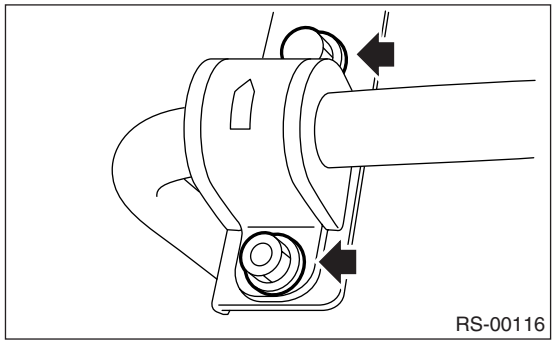
3. Rear Stabilizer

A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the stabilizer link.



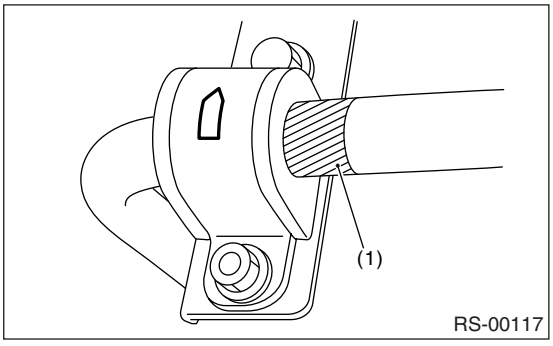
3) Remove the stabilizer bracket.



B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
• Use a new self-locking nut.
• Ensure the stabilizer bushing and stabilizer have the same identification colors.
• To install the stabilizer bushing, align the paint mark end of stabilizer to the end of stabilizer bushing.
• Stabilizer bracket has an orientation, so install it with the arrow mark faced to the upper side of vehicle.



(1) Paint mark

2) Always tighten the stabilizer bushing in the state that wheels are in full contact with the ground and the vehicle is curb weight.

Tightening torque:
Stabilizer link
44 N·m (4.5 kgf-m, 32.5 ft-lb)
Stabilizer bracket
40 N·m (4.1 kgf-m, 30 ft-lb)

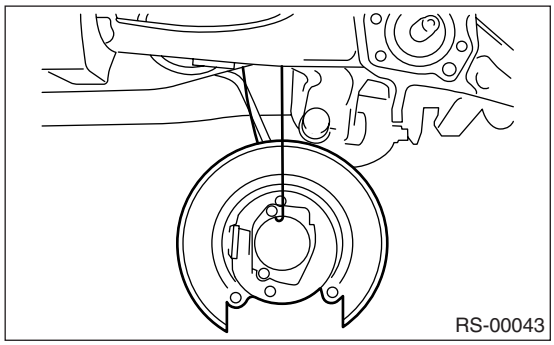
C: INSPECTION

1) Check the bushing for crack, fatigue and damage.
2) Check the stabilizer link for damage.

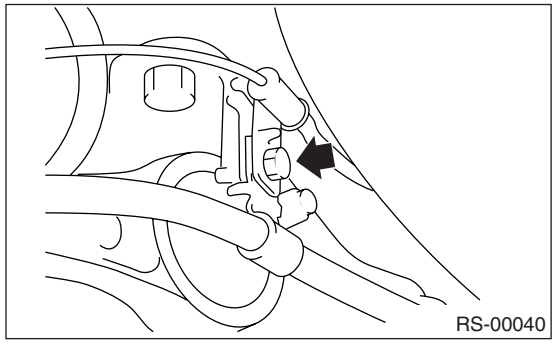
4. Rear Arm

A: REMOVAL

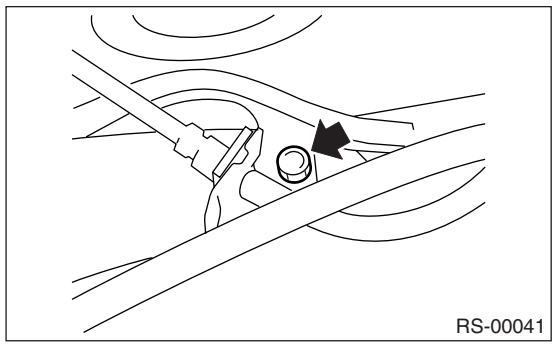
1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the sub frame support arm.
<Ref. to RS-21, REMOVAL, Sub Frame Support Arm.>
3) Remove the bearing unit.
<Ref. to DS-19, REMOVAL, Rear Hub Unit Bearing.>
4) Hang the back plate from sub frame.


RS-00043

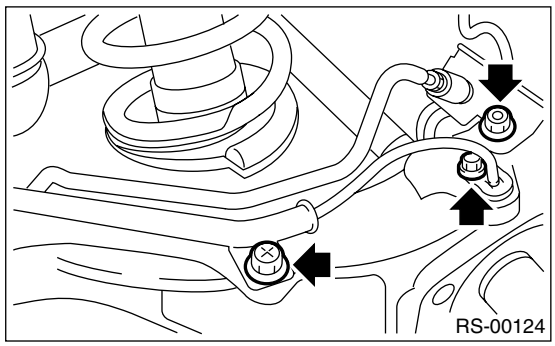
5) Remove the bolts which secure the parking brake cable clamp to rear arm bracket.


RS-00040

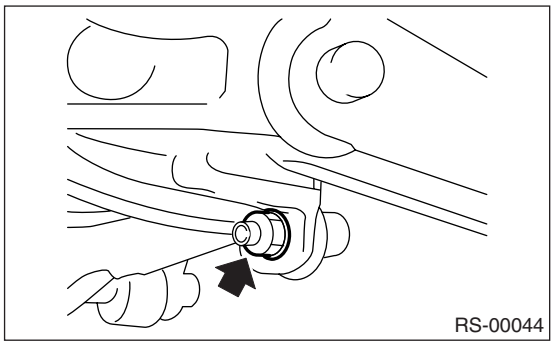
6) Remove the bolt which hold the brake hose bracket and ABS wheel speed sensor bracket to rear arm.


RS-00041

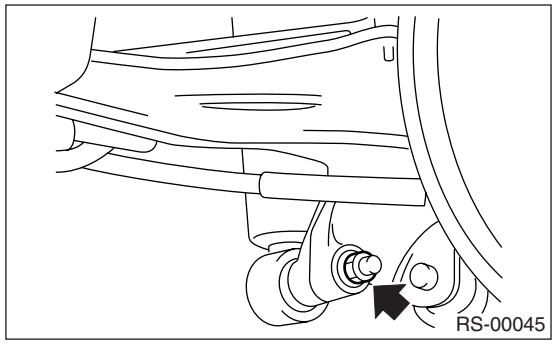
7) Remove the bolts which secure the brake hose bracket to rear arm. Remove the bolts which secure the ABS wheel speed sensor to rear arm.


RS-00124

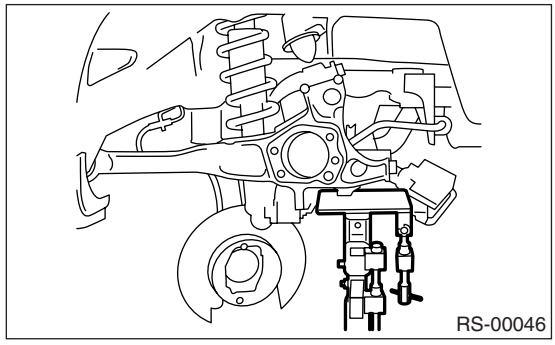
8) Remove the stabilizer link from rear arm.


RS-00044

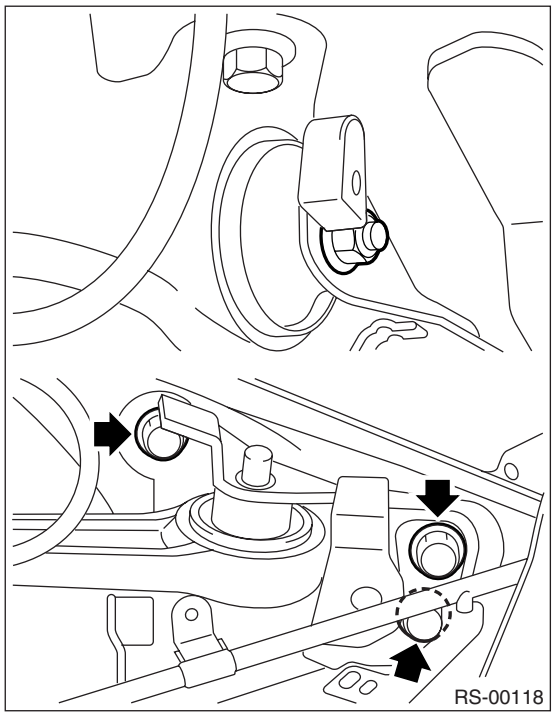
9) Remove the shock absorber from rear arm.


RS-00045

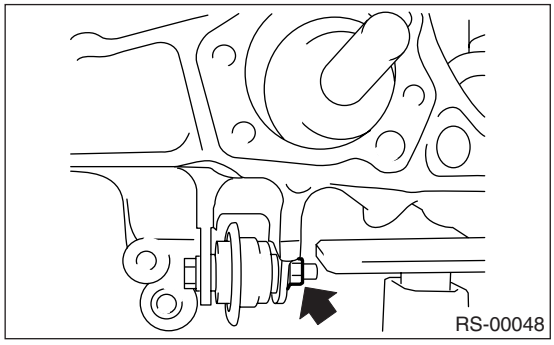
10) Support the rear arm horizontally using a transmission jack.


RS-00046

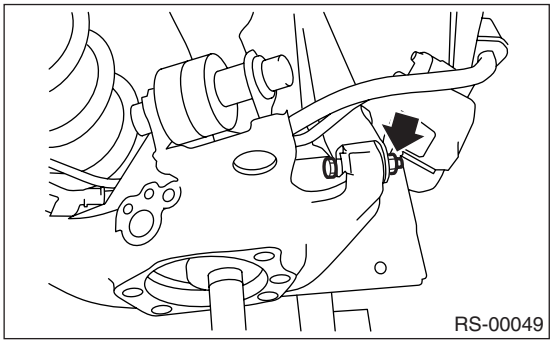
11) Remove the nuts which hold the rear arm to bracket. Remove the rear arm bracket.



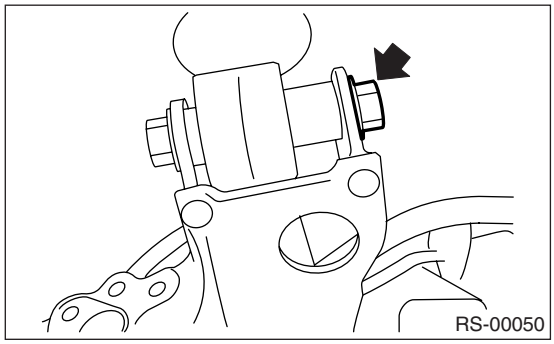
12) Loosen the nut which hold the front link to rear arm.



13) Loosen the nut which hold the rear link to rear arm.



14) Loosen the nut which hold the upper link to rear arm.



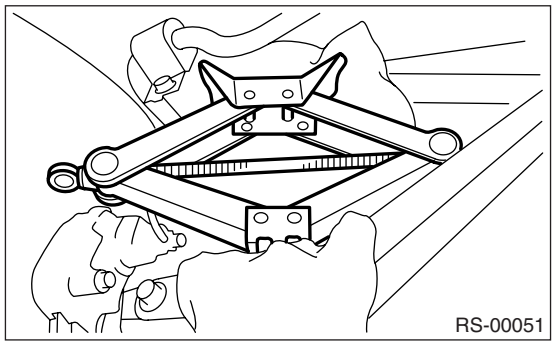
15) Remove the bolt which secure the rear arm to the link, and then remove the rear arm.

B: INSTALLATION

NOTE:
Use a new bolt and self-locking nut. For the parts which are not reusable, refer to “COMPONENT”. <Ref. to RS-3, REAR SUSPENSION, COMPONENT, General Description.>

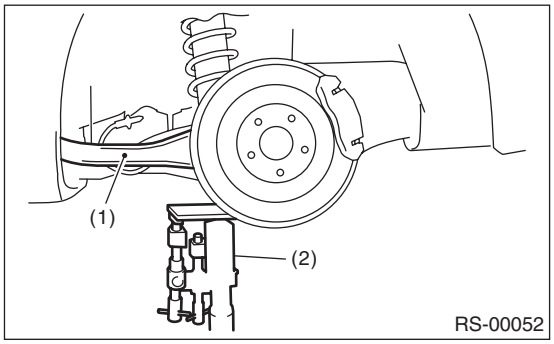
1) Support the rear arm using a transmission jack.
2) Install the rear arm and temporarily tighten the bolts which hold the rear arm to the link.
3) Install the bearing unit.
<Ref. to DS-20, INSTALLATION, Rear Hub Unit Bearing.>
4) Install the bolts which secure the ABS wheel speed sensor to rear arm.
5) Install the bolts which secure the brake hose to rear arm.
6) Install the bolts which secure the parking brake cable clamp to rear arm bracket.
7) Set the jack which is originally equipped to the vehicle under the upside down situation, and place the jack between rear link and sub frame. Align the installing position of rear shock absorber and rear arm by adjusting the jack position, temporarily tighten the bolt and nut.

CAUTION:
Protect the rear link and sub frame from scratch in the way of putting a cloth between the jack and mating portion.



8) Using the transmission jack, support the rear arm horizontally.
9) Tighten the nuts and bolts which hold the rear arm, front link, rear link, upper link and shock absorber.

NOTE:
Always tighten the bushing in the state that wheels are in full contact with the ground and the vehicle is curb weight.



(1) Rear arm
(2) Transmission jack

10) Install the sub frame support arm.

NOTE:
Inspect the wheel alignment and adjust it if necessary.

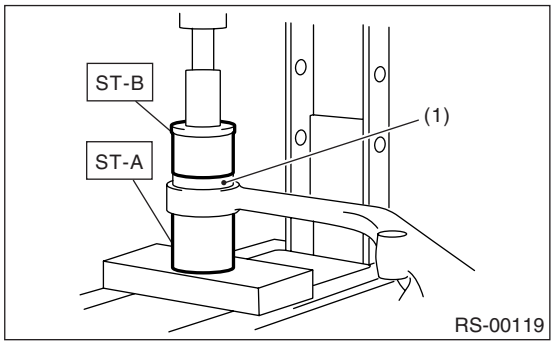
Tightening torque:
Refer to "COMPONENT" of "General Description" for tightening torque. <Ref. to RS-3, REAR SUSPENSION, COMPONENT, General Description.>

C: DISASSEMBLY

1. FRONT BUSHING

1) Set the ST A with the larger side of its inner diameter turned upward.
2) Set the rear arm with the protruding side of bushing turned upward.
3) Place the ST B on bushing, and push the bushing out.

ST A	20099AE020	INSTALLER & REMOVER SET
ST B	20099AE020	INSTALLER & REMOVER SET

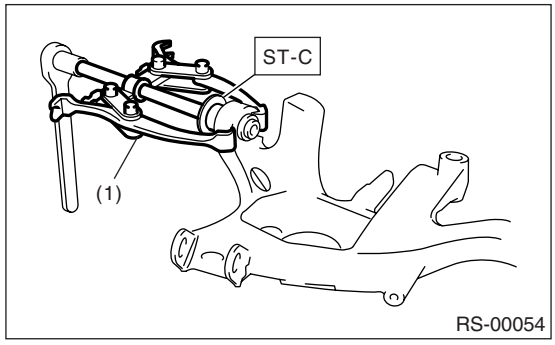


(1) Bushing

2. REAR BUSHING

Using the ST C and bearing puller, press the rear bushing out of place.

ST C	20099AE040	INSTALLER & REMOVER SET



(1) Bearing puller

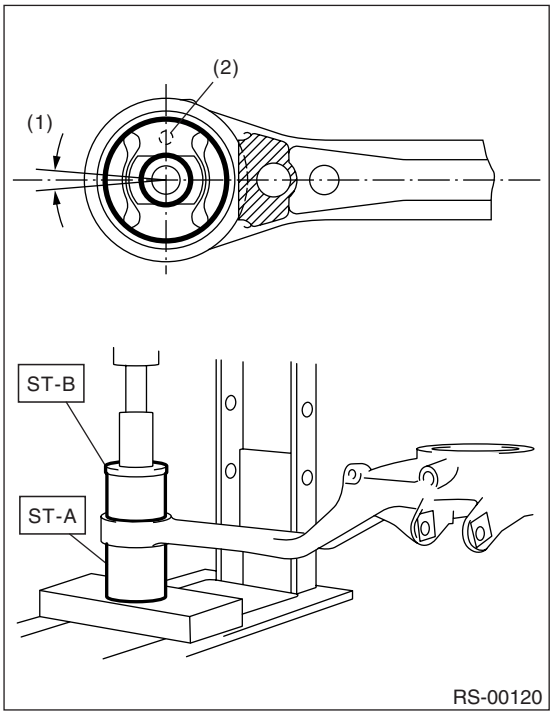
D: ASSEMBLY

1. FRONT BUSHING

1) Set the ST A with the larger side of its inner diameter turned upward.
2) Set the rear arm with the vehicle inner side of arm turned downward.
3) Place the bushing on rear arm as shown in the figure.

4) Place the ST B on bushing, and press-fit until each edge surface of bushing and rear arm comes to be aligned.

ST A 20099AE020 INSTALLER & REMOVER SET
ST B 20099AE020 INSTALLER & REMOVER SET

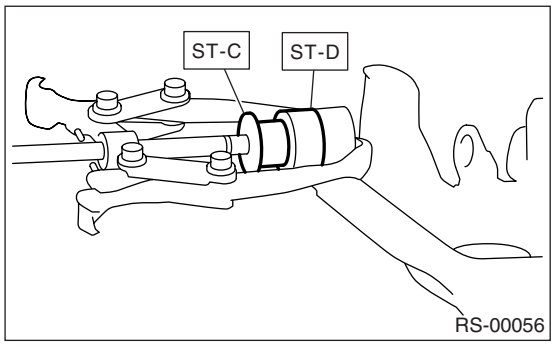


(1) 0±5°
(2) Identification paint: Assemble with the identification paint side faced to the arm inner side.

2. REAR BUSHING

1) Press the bushing into the bore inside of ST D.
2) Set the ST C, ST D and bearing puller in the specified position as shown in the figure, and then press-fit the bush until the outer end of bush and rear end of rear arm in flat.

ST C 20099AE040 INSTALLER & REMOVER SET
ST D 20099AE040 INSTALLER & REMOVER SET



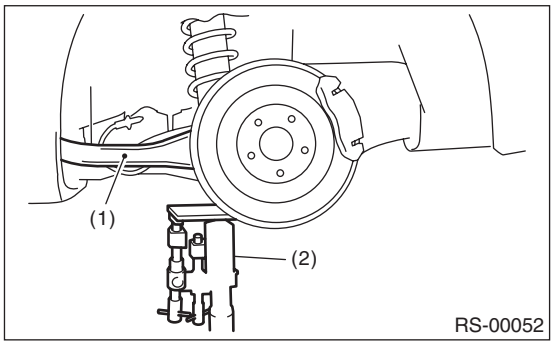
E: INSPECTION

Check the rear arm for bend, corrosion or damage.

5. Upper Link

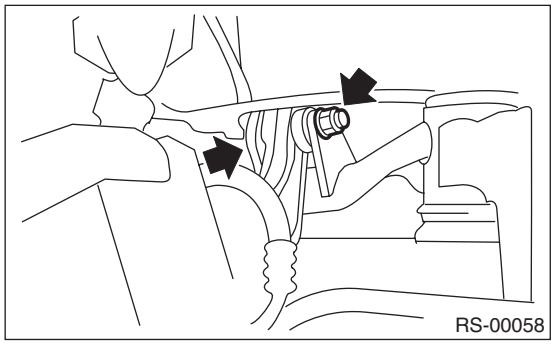
A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Using the transmission jack, support the rear arm horizontally.

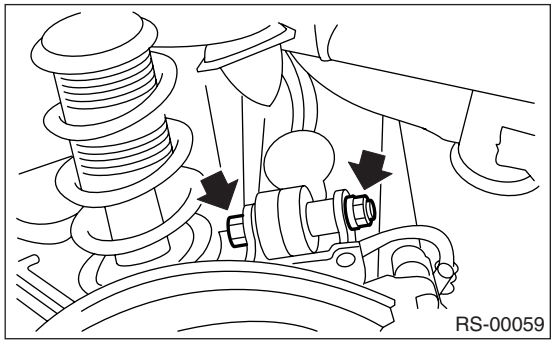


(1) Rear arm
(2) Transmission jack

3) Remove the bolt which secure the upper link to sub frame.

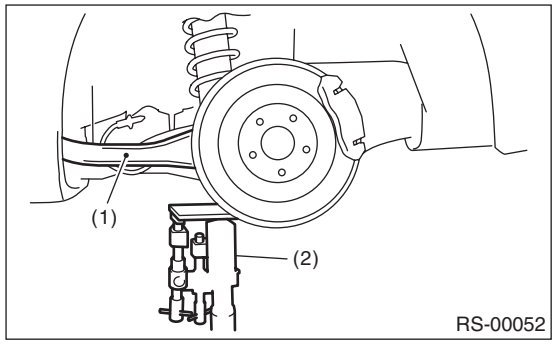


4) Remove the bolts which secure the upper link to rear arm, and then remove the upper link.



B: INSTALLATION

1) Using the transmission jack, support the rear arm horizontally.
2) Using new self-locking nuts, install the upper link.



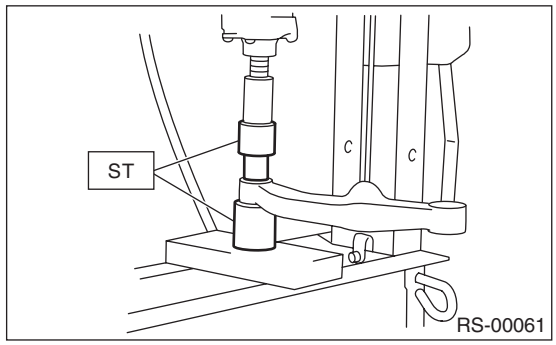
(1) Rear arm
(2) Transmission jack

NOTE:
Inspect the wheel alignment and adjust it if necessary.

Tightening torque:
Upper link to Sub frame
57 N·m (5.8 kgf-m, 42 ft-lb)
Upper link to Rear arm
65 N·m (6.6 kgf-m, 48 ft-lb)

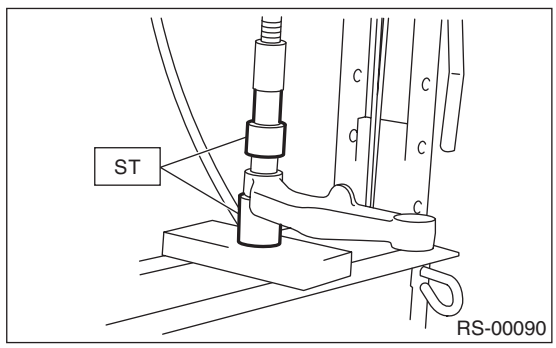
C: DISASSEMBLY

Using the ST, press the bushing out of place.
ST 20099AE010 INSTALLER & REMOVER

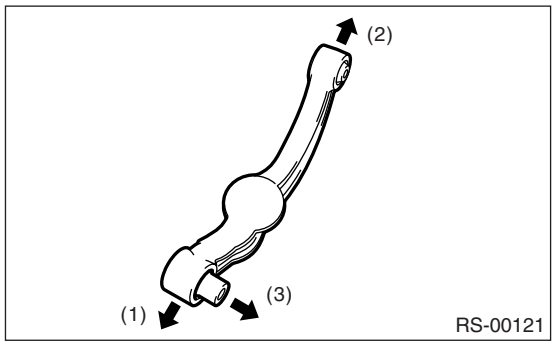


D: ASSEMBLY

Using the ST, press the bushing into place.
ST 20099AE010 INSTALLER & REMOVER



CAUTION:
Outer side bushing has an orientation. Assemble it with the longer protrusion faced to the rear side of vehicle.



(1) Rear arm
(2) Rear sub frame
(3) Rear side of vehicle

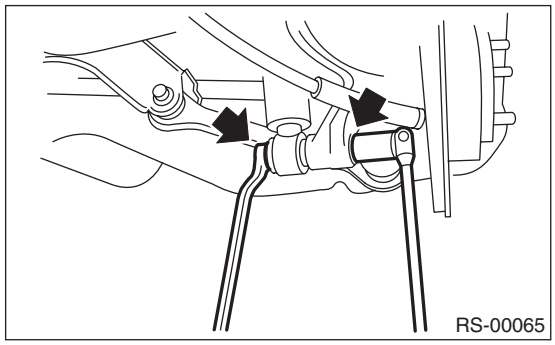
E: INSPECTION

1) Visually check the upper link for damage and deformation.
2) Visually check the bush for crack, damage and fatigue.

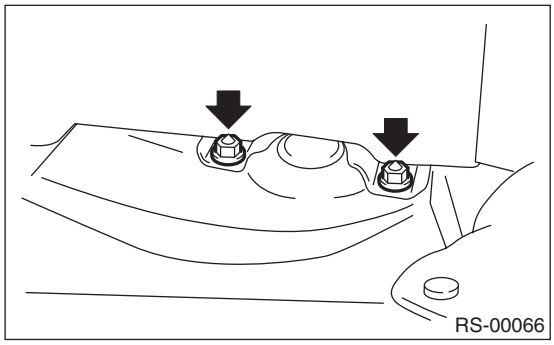
6. Rear Shock Absorber

A: REMOVAL

1) Remove the luggage floor mat. (Wagon model)
2) Roll up the trunk side trim. (Sedan model)
3) Lift-up the vehicle, and then remove the rear wheels.
4) Remove the bolts which secure the shock absorber to rear arm.



5) Support the shock absorber using a jack.
6) Remove the nuts which secure the shock absorber mount to vehicle.



7) Remove the shock absorber.

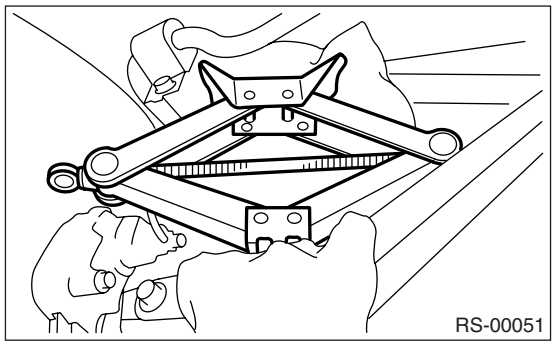
B: INSTALLATION

1) Support the shock absorber using a jack.
2) Using new self-locking nuts, secure the shock absorber to vehicle.

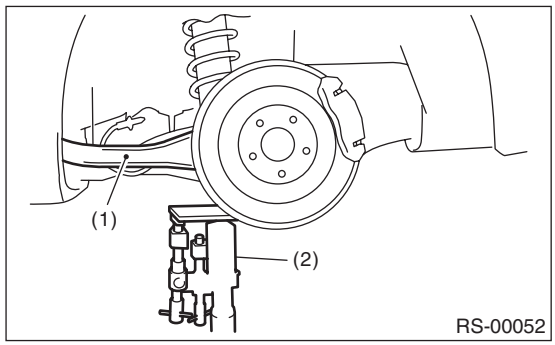
Tightening torque:
30 N·m (3.1 kgf-m, 22.4 ft-lb)

3) Set the jack which is originally equipped to the vehicle under the upside down situation, and place the jack between rear link and sub frame. Align the installing position of rear shock absorber and rear arm by adjusting the jack position. Using new self-locking nuts, temporary tighten the bolt.

CAUTION:
Protect the rear link and sub frame from scratch in the way of putting a shop cloth between the jack and the mating portion.



4) Using the transmission jack, support the rear arm horizontally.
5) Using new self-locking nuts, tighten the bolt and nut which secure the shock absorber.



(1) Rear arm
(2) Transmission jack

Tightening torque:
62 N·m (6.3 kgf-m, 48 ft-lb)

6) Install the floor mat. (Wagon model)
7) Set the trunk side trim. (Sedan model)

NOTE:
Check the wheel alignment and adjust it if necessary.

C: DISASSEMBLY

Refer to Front Strut for disassembly procedures.
<Ref. to FS-23, DISASSEMBLY, Front Strut.>

D: ASSEMBLY

Refer to Front Strut for installation procedures.
<Ref. to FS-23, ASSEMBLY, Front Strut.>

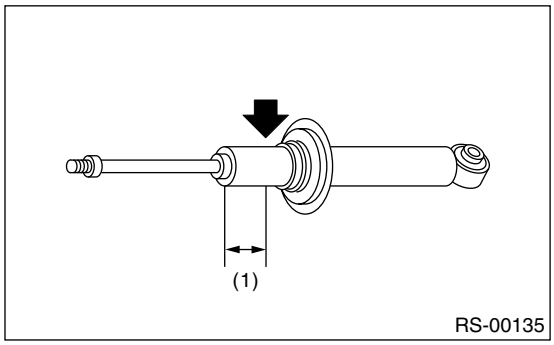
E: INSPECTION

Refer to “Front Strut” for inspection procedures.
<Ref. to FS-24, INSPECTION, Front Strut.>

F: DISPOSAL

CAUTION:
• Before handling shock absorbers, be sure to wear goggles to protect eyes from gas, oil and cutting powder.
• Do not disassemble the shock absorber or place it into a fire.
• Drill a hole into shock absorbers in case of discarding shock absorbers filled with gas.

1) Place the shock absorber on a level surface with the piston rod fully expanded.
2) Make a hole into the specified position 30 mm (1.18 in) deep using a drill with 2 to 3 mm (0.08 to 0.12 in) diameter.

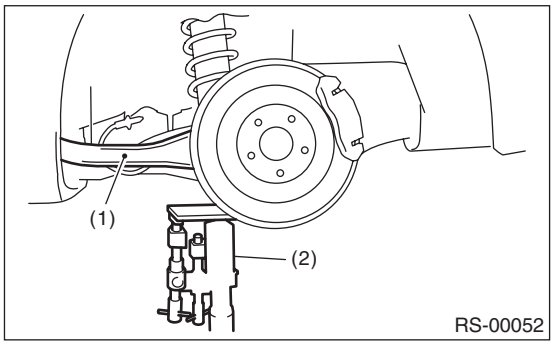


(1) 40 mm (1.57 in)

7. Front Link

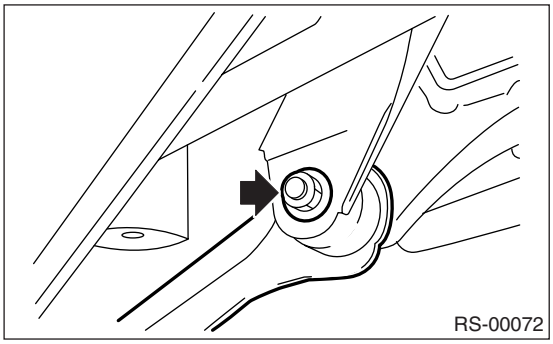
A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Using the transmission jack, support the rear arm horizontally.

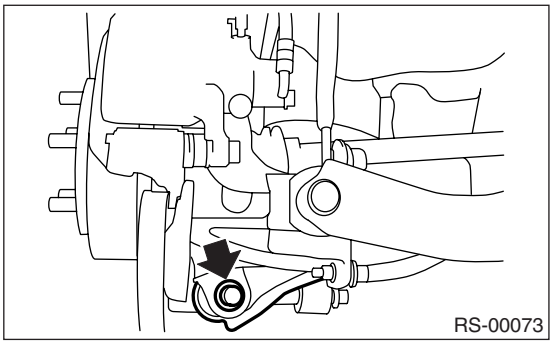


(1) Rear arm
(2) Transmission jack

3) Remove the bolt which secure the front link to sub frame.

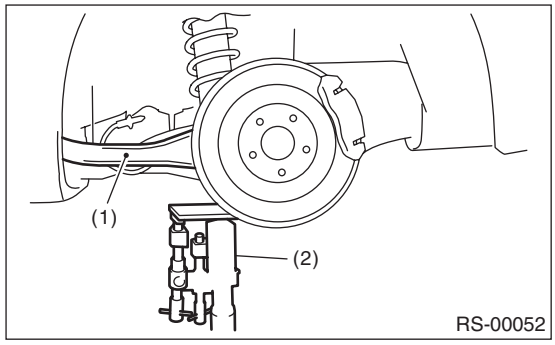


4) Remove the bolt which secure the front link to rear arm, and then remove the front link.



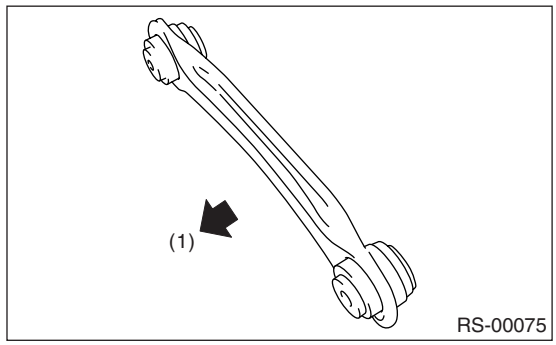
B: INSTALLATION

1) Using the transmission jack, support the rear arm horizontally.
2) Using new self-locking nuts, install the front link.



(1) Rear arm
(2) Transmission jack

CAUTION:
Install the front link with the protrusion side faced to the front side of vehicle.



(1) Front

NOTE:
Inspect the wheel alignment and adjust it if necessary.

Tightening torque:
57 N·m (5.8 kgf-m, 42 ft-lb)

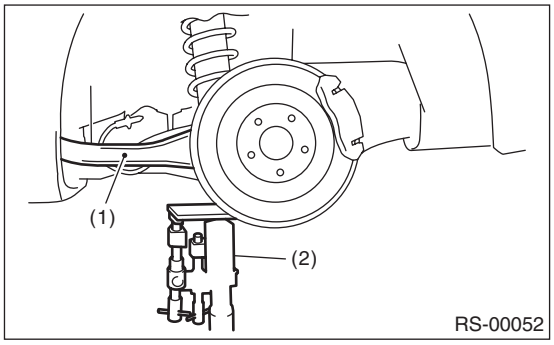
C: INSPECTION

Visually check the front link for damage and deformation.

8. Rear Link

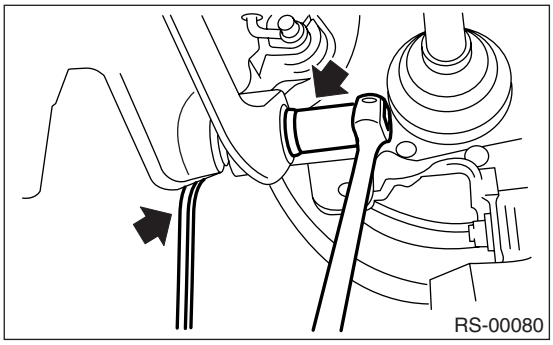
A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the rear stabilizer. <Ref. to RS-9, REMOVAL, Rear Stabilizer.>
3) Using the transmission jack, support the rear arm horizontally.



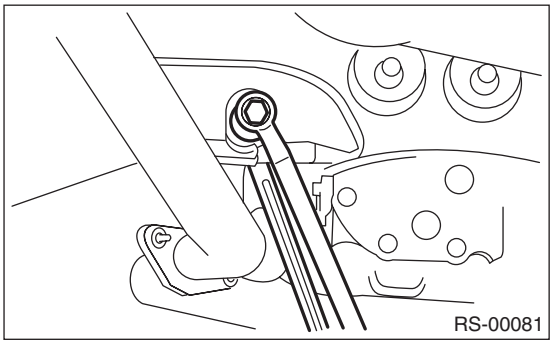
(1) Rear arm
(2) Transmission jack

4) Remove the bolts which secure the rear link to rear arm.



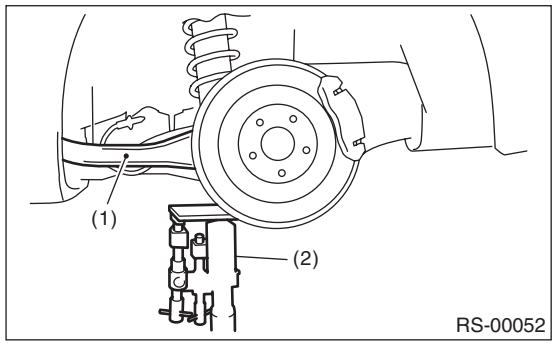
5) Put alignment marks on the rear link adjusting bolt and sub frame.
6) Remove the bolt which secure the rear link to sub frame, and then remove the rear link.

CAUTION:
Loosen the nut with the bolt head secured when loosening the adjusting bolt.



B: INSTALLATION

1) Using the transmission jack, support the rear arm horizontally.
2) Using new self-locking nuts, install the rear link.



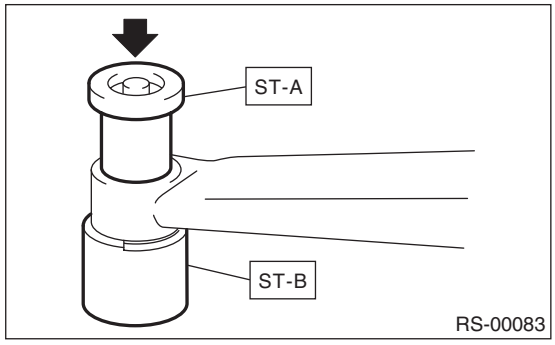
(1) Rear arm
(2) Transmission jack

NOTE:
• Tighten the self-locking nut with the bolt head secured when installing the adjusting bolt.
• Inspect the wheel alignment and adjust it if necessary.

Tightening torque:
Rear link to Sub frame
120 N·m (12.2 kgf-m, 89 ft-lb)
Rear link to Rear arm
57 N·m (5.8 kgf-m, 42 ft-lb)

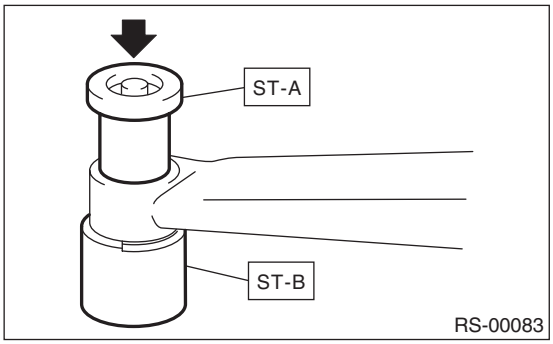
C: DISASSEMBLY

Using the ST A and ST B, press the bushing out of place.
ST A 20099AE000 INSTALLER & REMOVER
ST B 20099AE000 INSTALLER & REMOVER



D: ASSEMBLY

Using the ST A and ST B, press-fit the bushing.
ST A 20099AE000 INSTALLER & REMOVER
ST B 20099AE000 INSTALLER & REMOVER



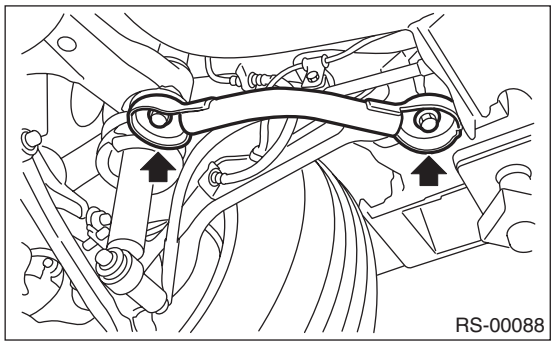
E: INSPECTION

Visually check the rear link for damage and deformation.

9. Sub Frame Support Arm

A: REMOVAL

1) Lift-up the vehicle, and support the rear sub frame with support stand.
2) Remove the sub frame support arm.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Sub frame support arm to Rear arm bracket
80 N·m (8.2 kgf-m, 59 ft-lb)
Sub frame support arm to Rear sub frame
175 N·m (17.8 kgf-m, 129 ft-lb)

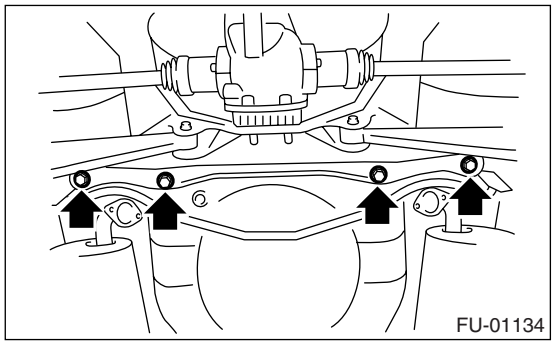
C: INSPECTION

Visually check the sub frame support arm for damage and deformation.

10.Sub Frame Support Plate

A: REMOVAL

1) Lift-up the vehicle, and support the rear sub frame with support stand.
2) Remove the sub frame support plate.



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Support plate to Sub frame
175 N·m (17.8 kgf-m, 129 ft-lb)
Support plate to Body
65 N·m (6.6 kgf-m, 48 ft-lb)

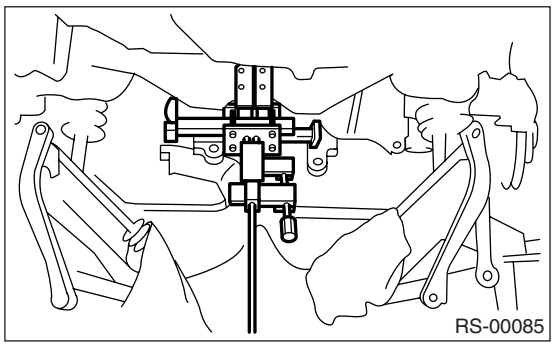
C: INSPECTION

Visually check the support plate for damage.

11.Rear Sub Frame

A: REMOVAL

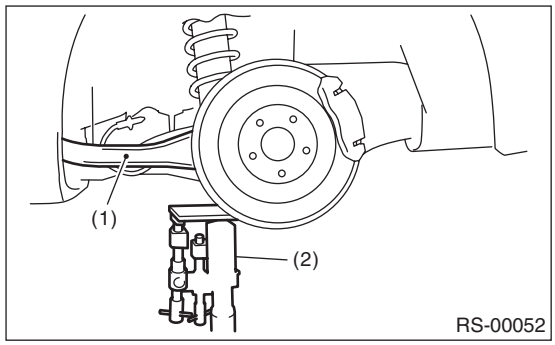
1) Separate the front exhaust pipe from rear exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the rear differential.
T-type
<Ref. to DI-29, REMOVAL, Rear Differential (T-type).>
VA-type
<Ref. to DI-46, REMOVAL, Rear Differential (VA-type).>
4) Remove the rear stabilizer. <Ref. to RS-9, REMOVAL, Rear Stabilizer.>
5) Remove the bolts which secure the rear shock absorber to rear arm.
6) Support the sub frame using a transmission jack.



7) Remove the front link from sub frame.
<Ref. to RS-18, REMOVAL, Front Link.>
8) Remove the rear link from sub frame.
<Ref. to RS-19, REMOVAL, Rear Link.>
9) Remove the upper link from sub frame.
<Ref. to RS-14, REMOVAL, Upper Link.>
10) Remove the sub frame support arm.
11) After removing the bolt, remove the sub frame and sub frame support plate from vehicle.

B: INSTALLATION

1) Install in the reverse order of removal.
2) Follow the procedure below for the rear differential installation and tightening torque.
T-type
<Ref. to DI-30, INSTALLATION, Rear Differential (T-type).>
VA-type
<Ref. to DI-47, INSTALLATION, Rear Differential (VA-type).>
3) Using the transmission jack, support the rear arm horizontally. Then tighten the nuts and bolts which hold the rear arm, front link, rear link, upper link and shock absorber.



(1) Rear arm
(2) Transmission jack

NOTE:
Check the wheel alignment and adjust it if necessary.

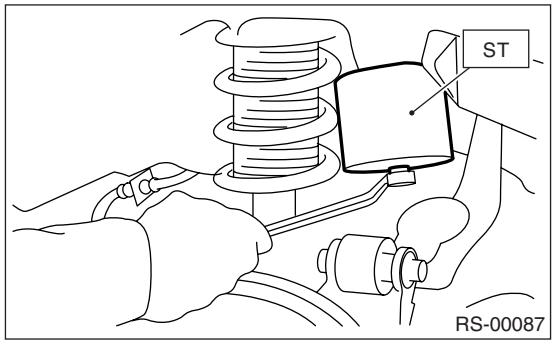
C: INSPECTION

Check the removed parts for wear, damage and crack, and repair or replace them if faulty.

12.Helper

A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the helper using ST.
ST 20099AE030 HELPER SOCKET WRENCH



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
32 N·m (3.3 kgf-m, 24 ft-lb)

C: INSPECTION

Check the helper for crack, fatigue and damage.

13.General Diagnostic Table

A: INSPECTION

1. IMPROPER VEHICLE POSTURE OR IMPROPER WHEEL ARCH HEIGHT

Possible cause	Corrective action
(1) Permanent distortion or breakage of coil spring	Replace.
(2) Rough operation of damper strut or shock absorber	Replace.
(3) Installation of wrong strut or shock absorber	Replace with proper parts.
(4) Installation of wrong coil spring	Replace with proper parts.

2. POOR RIDE COMFORT

1) Large rebound shock
2) Rocking of the vehicle continues too long after running over bump and hump.
3) Large shock in bumping

Possible cause	Corrective action
(1) Breakage of coil spring	Replace.
(2) Overinflating pressure of tire	Adjust.
(3) Improper wheel arch height	Adjust or replace the coil springs with new ones.
(4) Fault in operation of damper strut or shock absorber	Replace.
(5) Damage or deformation of strut mount or shock absorber mount	Replace.
(6) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(7) Deformation or loss of bushing	Replace.
(8) Deformation or damage of helper in strut assembly or shock absorber	Replace.
(9) Oil leakage of damper strut or shock absorber	Replace.

3. NOISE

Possible cause	Corrective action
(1) Wear or damage of damper strut or shock absorber component parts	Replace.
(2) Loosening of suspension link installing bolt	Tighten to the specified torque.
(3) Deformation or loss of bushing	Replace.
(4) Unsuitability of maximum or minimum length of damper strut or shock absorber	Replace with proper parts.
(5) Breakage of coil spring	Replace.
(6) Wear or damage of ball joint	Replace.
(7) Deformation of stabilizer clamp	Replace.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

WHEEL AND TIRE SYSTEM

WT

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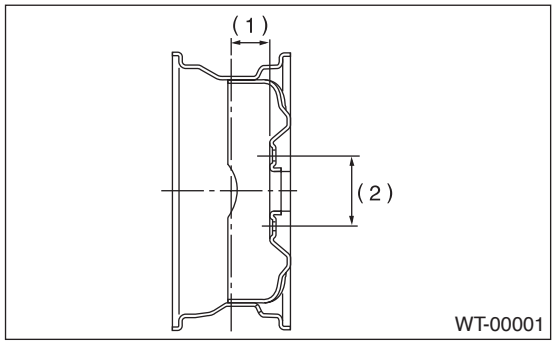
2. Tire 4
3. Steel Wheel 5
4. Aluminum Wheel 6
5. Wheel Balancing 7
6. “T-type” Tire 9
7. General Diagnostic Table 10

1. General Description

A: SPECIFICATION

1. WHEEL AND TIRE SIZE



(1) Offset
(2) P.C.D.

Specification		Tire size	Wheel size	Offset mm (in)	P.C.D. mm (in)	Tire inflation pressure kPa (kgf/cm^2, psi)	
						Front wheel	Rear wheel
Sedan	2.0 i, 2.5 i	205/55R16 89V	16 × 6$^1/_2$JJ	55 (2.17)	100 (3.94)	220 (2.2, 32)	220 (2.2, 32)
	2.5 i (OP)	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	220 (2.2, 32)
	2.5 i (KA model)	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	220 (2.2, 32)
	3.0 R	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	220 (2.2, 32)
	2.0 GT	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	220 (2.2, 32)
Wagon	2.0 i, 2.5 i	205/55R16 89V	16 × 6$^1/_2$JJ			220 (2.2, 32)	220 (2.2, 32)
	2.5 i (OP)	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	210 (2.1, 31)
	2.5 i (KA model)	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	210 (2.1, 31)
	3.0 R	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	210 (2.1, 31)
	2.0 GT	215/45R17 87W	17 × 7JJ			230 (2.3, 33)	210 (2.1, 31)
	OUTBACK 2.5 i	215/60R16 95V	16 × 6$^1/_2$JJ	48 (1.89)		210 (2.1, 31)	200 (2.0, 29)
	OUTBACK 3.0 R	215/55R17 94V	17 × 7JJ			210 (2.1, 31)	200 (2.0, 29)
"T-type" Tire	2.0 GT, 3.0 R	T135/70D17 102M	17 × 4T	40 (1.57)		420 (4.2, 60)	
	2.0 i, 2.5 i	T135/80D16 101M	16 × 4T	50 (1.97)			

NOTE:
- Except for KA, KS model, "T-type" tire for temporary use is supplied as a spare tire.
- For KA, KS model, a spare tire of standard tire size is supplied.

2. SERVICE DATA

Part	Axial runout	Radial runout
Steel wheel	1.5 mm (0.059 in)	
Aluminum wheel	1.0 mm (0.039 in)	

3. ADJUSTING PARTS

Wheel balancing	Standard	Service limit
Dynamic unbalance	10 g (0.35 oz) or less	

Balance weight part number (Knock-on type weight for steel wheel)	Weight
28101TC000	5 g (0.18 oz)
28101SA060	10 g (0.35 oz)
28101SA070	15 g (0.53 oz)
28101SA080	20 g (0.71 oz)
28101SA090	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

Balance weight part number (Knock-on type weight for aluminum wheel)	Weight
28101SA000	5 g (0.18 oz)
28101SA010	10 g (0.35 oz)
28101SA020	15 g (0.53 oz)
28101SA030	20 g (0.71 oz)
28101SA040	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

Balance weight part number (Adhesive type weight for aluminum wheel)	Weight
28101AG000	5 g (0.18 oz)
28101AG010	7.5 g (0.26 oz)
28101AG020	10 g (0.35 oz)
28101AG030	12.5 g (0.44 oz)
28101AG040	15 g (0.53 oz)
28101AG050	17.5 g (0.62 oz)
28101AG060	20 g (0.71 oz)
28101AG070	22.5 g (0.79 oz)
28101AG080	25 g (0.88 oz)
28101AG090	27.5 g (0.97 oz)
28101AG100	30 g (1.06 oz)
28101AG110	32.5 g (1.15 oz)
28101AG120	35 g (1.23 oz)
28101AG130	37.5 g (1.32 oz)
28101AG140	40 g (1.41 oz)
28101AG150	42.5 g (1.50 oz)
28101AG160	45 g (1.59 oz)
28101AG170	47.5 g (1.68 oz)
28101AG180	50 g (1.76 oz)
28101AG190	52.5 g (1.85 oz)
28101AG200	55 g (1.94 oz)
28101AG210	57.5 g (2.03 oz)
28101AG220	60 g (2.12 oz)
28101AG230	62.5 g (2.20 oz)
28101AG240	65 g (2.29 oz)
28101AG250	67.5 g (2.38 oz)
28101AG260	70 g (2.47 oz)
28101AG270	72.5 g (2.56 oz)
28101AG280	75 g (2.65 oz)
28101AG290	77.5 g (2.73 oz)
28101AG300	80 g (2.82 oz)
28101AG310	82.5 g (2.91 oz)
28101AG320	85 g (3.00 oz)
28101AG330	87.5 g (3.09 oz)
28101AG340	90 g (3.17 oz)
28101AG350	92.5 g (3.26 oz)
28101AG360	95 g (3.35 oz)
28101AG370	97.5 g (3.44 oz)
28101AG380	100 g (3.53 oz)

B: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Air pressure gauge	Used for measuring tire inflation pressure.
Dial gauge with magnet stand	Used for measuring wheel runout.
Wheel balancer	Used for adjusting wheel balance.

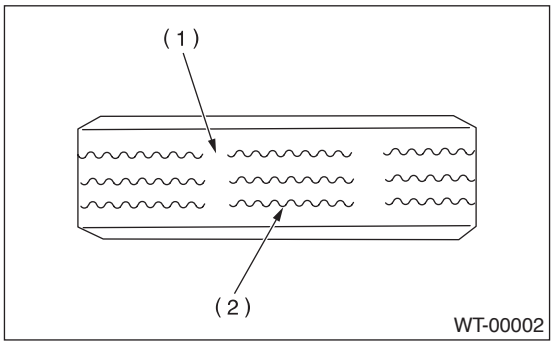
2. Tire

A: INSPECTION

1) Take stones, glass, nails etc. out of the tread groove.
2) Replace the tire if as follows.

CAUTION:
When replacing a tire, make sure to use only the same size, construction and load range as originally installed.

(1) When large crack on side wall, damage or crack on tread is found.
(2) When the “tread wear indicator” appears as a solid band across the tread.

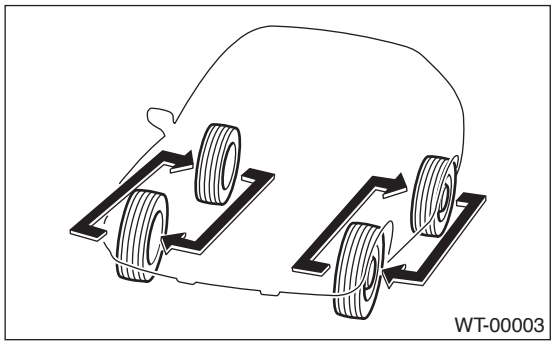


(1) Tread wear indicator
(2) Tire tread

3) When a crack on tire valve is found, replace the tire valve.

1. TIRE ROTATION

Rotate tires periodically (5,000 km/3,100 miles) as shown in the figure, in order to prevent them from uneven wear and to prolong their life.



3. Steel Wheel

A: REMOVAL

1) Apply the parking brake, and position the select lever to “P” or “LOW”.
2) Set the shop jacks or a lift to specified point, and support the vehicle with its wheels slightly contacting the floor.
3) Loosen the wheel nuts.
4) Raise the vehicle until its wheels take off the ground using a jack or a lift.
5) Remove the wheel nuts and wheels.

NOTE:
• When removing the wheels, prevent hub bolts from damage.
• Place the wheels with their outer sides facing upward to prevent wheels from damage.

B: INSTALLATION

1) Remove dirt from the mating surface of wheel and brake rotor.
2) Attach the wheel to the hub by aligning the wheel bolt hole with the hub bolt.
3) Temporarily attach the wheel nuts to the hub bolts. (In the case of aluminum wheel, use SUBARU genuine wheel nut for aluminum wheel.)
4) Manually tighten the nuts making sure the wheel hub hole is aligned correctly to the guide portion of hub.
5) Tighten the wheel nuts in a diagonal selection to the specified torque. Use a wheel nut wrench.

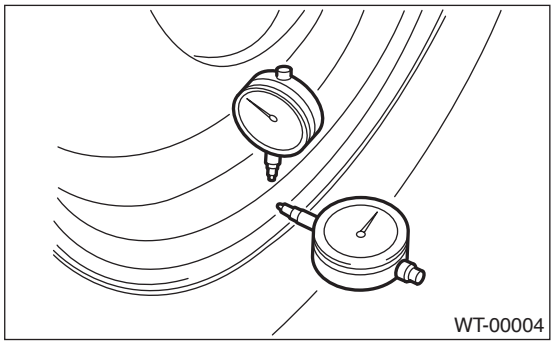
Wheel nut tightening torque:
90 N·m (9.1 kgf-m, 65.7 ft-lb)

CAUTION:
• Tighten the wheel nuts in two or three steps by gradually increasing the torque and working diagonally, until they reach the specified torque.
• Do not depress the wrench with foot. Always use both hands when tightening.
• Make sure the bolt, nut and the nut seating surface of the wheel are free from oil.

6) If a wheel is removed for replacement or for repair of a puncture, retighten the wheel nuts to the specified torque after running 1,000 km (600 miles).

C: INSPECTION

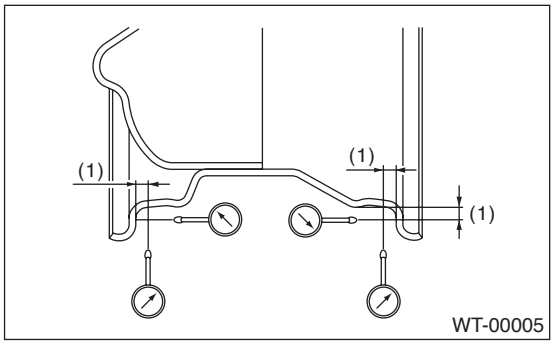
1) Deformation or damage on the rim may cause air leakage. Check the rim flange for deformation, crack or damage, and repair or replace as necessary.
2) Jack-up the vehicle until wheels clear the floor.
3) Slowly rotate the wheel to check rim “runout” using a dial gauge.



Rim runout:

Axial runout limit	Radial runout limit
1.5 mm (0.059 in)	

4) If the rim runout exceeds specifications, remove the tire from wheel and check runout while attaching the dial gauge to positions shown in the figure.



(1) Approx. 7 mm (0.28 in)

5) If the measured runout still exceeds specifications, replace the wheel.

4. Aluminum Wheel

A: REMOVAL

Refer to “Steel Wheel” for removal procedure of aluminum wheels. <Ref. to WT-5, REMOVAL, Steel Wheel.>

B: INSTALLATION

Refer to “Steel Wheel” for installation procedure of aluminum wheels. <Ref. to WT-5, INSTALLATION, Steel Wheel.>

C: INSPECTION

Refer to “Steel Wheel” for inspection procedure of aluminum wheels. <Ref. to WT-5, INSPECTION, Steel Wheel.>

Rim runout:

Axial runout limit	Radial runout limit
1.0 mm (0.039 in)	

D: CAUTION

Aluminum wheels are easily scratched. To maintain their appearance and safety, do the followings:
1) Do not damage the aluminum wheels during removal, installation, wheel balancing, etc. After removing the aluminum wheels, place them on a rubber mat, etc.
2) While driving the vehicle, be careful not to ride over sharp obstacles or allow aluminum wheels to contact the shoulder of the road.
3) When installing a tire chain, be sure to install it properly not to have slack, otherwise it may hit the wheel while driving.
4) When washing the aluminum wheel, use neutral synthetic detergent and water. Avoid using the cleanser including abrasive, hard brushes or an automatic car washer.

5. Wheel Balancing

A: ADJUSTMENT

NOTE:
Change the setting of wheel balancer to adhesive type weight as adhesive type weight is adopted for outside balance weight of 17-inch wheel.

1) Remove the balance weights.

CAUTION:
• Be careful not to damage the wheel.
• Completely remove the two-sided tape of the adhesive type weight from the wheel.

2) Using the wheel balancer, measure the wheel balance.
3) Select a weight close to the value measured by wheel balancer.

CAUTION:
Use SUBARU genuine balance weight.

Balance weight part number (Knock-on type weight for steel wheel)	Weight
28101TC000	5 g (0.18 oz)
28101SA060	10 g (0.35 oz)
28101SA070	15 g (0.53 oz)
28101SA080	20 g (0.71 oz)
28101SA090	25 g (0.88 oz)
723141340	30 g (1.06 oz)
723141350	35 g (1.23 oz)
723141360	40 g (1.41 oz)
723141370	45 g (1.59 oz)
723241380	50 g (1.76 oz)
723241580	55 g (1.94 oz)
723241590	60 g (2.12 oz)

Balance weight part number (Knock-on type weight for aluminum wheel)	Weight
28101SA000	5 g (0.18 oz)
28101SA010	10 g (0.35 oz)
28101SA020	15 g (0.53 oz)
28101SA030	20 g (0.71 oz)
28101SA040	25 g (0.88 oz)
23141GA512	30 g (1.06 oz)
23141GA522	35 g (1.23 oz)
23141GA532	40 g (1.41 oz)
23141GA542	45 g (1.59 oz)
23141GA552	50 g (1.76 oz)
—	55 g (1.94 oz)
23141GA572	60 g (2.12 oz)

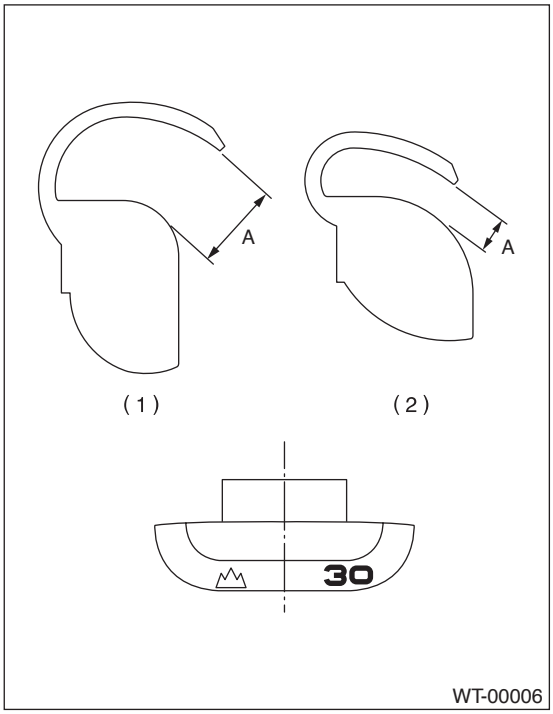
Balance weight part number (Adhesive type weight for aluminum wheel)	Weight
28101AG000	5 g (0.18 oz)
28101AG010	7.5 g (0.26 oz)
28101AG020	10 g (0.35 oz)
28101AG030	12.5 g (0.44 oz)
28101AG040	15 g (0.53 oz)
28101AG050	17.5 g (0.62 oz)
28101AG060	20 g (0.71 oz)
28101AG070	22.5 g (0.79 oz)
28101AG080	25 g (0.88 oz)
28101AG090	27.5 g (0.97 oz)
28101AG100	30 g (1.06 oz)
28101AG110	32.5 g (1.15 oz)
28101AG120	35 g (1.23 oz)
28101AG130	37.5 g (1.32 oz)
28101AG140	40 g (1.41 oz)
28101AG150	42.5 g (1.50 oz)
28101AG160	45 g (1.59 oz)
28101AG170	47.5 g (1.68 oz)
28101AG180	50 g (1.76 oz)
28101AG190	52.5 g (1.85 oz)
28101AG200	55 g (1.94 oz)
28101AG210	57.5 g (2.03 oz)
28101AG220	60 g (2.12 oz)
28101AG230	62.5 g (2.20 oz)
28101AG240	65 g (2.29 oz)
28101AG250	67.5 g (2.38 oz)
28101AG260	70 g (2.47 oz)
28101AG270	72.5 g (2.56 oz)
28101AG280	75 g (2.65 oz)
28101AG290	77.5 g (2.73 oz)
28101AG300	80 g (2.82 oz)
28101AG310	82.5 g (2.91 oz)
28101AG320	85 g (3.00 oz)
28101AG330	87.5 g (3.09 oz)
28101AG340	90 g (3.17 oz)
28101AG350	92.5 g (3.26 oz)
28101AG360	95 g (3.35 oz)
28101AG370	97.5 g (3.44 oz)
28101AG380	100 g (3.53 oz)

4) Install the selected weight to the point designated by wheel balancer.

CAUTION:
• Remove grease from adhesive type weight applying surface of wheel.
• Press the adhesive type weight by 25 N (2.5 kgf, 5.6 lb) or more per 5 g (0.18 oz) for 2 seconds at least to attain close contact.
• Make all amounts of the applied adhesive type weight to be 100 g (3.53 oz) or less.

5) Using the wheel balancer, measure the wheel balance again. Check that wheel balance is correctly adjusted.

NOTE:
• 55 g (1.94 oz) knock-on type weight used with aluminum wheel is not available.
• Balance weights of knock-on type weight for aluminum wheel are available for use with any of 15- to 17-inch aluminum wheels.



(1) Knock-on type weight for aluminum wheel
(2) Knock-on type weight for steel wheel

Service limit: A
Knock-on type weight for steel wheel:
5 — 25 g (0.18 — 0.88 oz) 2.0 mm (0.08 in)
30 g (1.06 oz) or more 1.8 mm (0.07 in)
Knock-on type weight for aluminum wheel:
5 — 25 g (0.18 — 0.88 oz) 5.0 mm (0.20 in)
30 g (1.06 oz) or more 4.5 mm (0.177 in)

6. "T-type" Tire

A: NOTE

"T-type" tire for temporary use is prepared as a spare tire. (Except for KA, KS model)

CAUTION:
• Do not use a tire chain with the "T-type" tire. Because of the smaller tire size, a tire chain will not fit properly and will result in damage to the vehicle and the tire.
• Do not drive at a speed greater than 100 km/h (62 MPH).
• Drive as slowly as possible and avoid passing over bumps.

B: REPLACEMENT

Refer to "Steel Wheel" for installation procedure of "T-type" tire. <Ref. to WT-5, REMOVAL, Steel Wheel.>

CAUTION:
Replace with a conventional tire as soon as possible since the "T-type" tire is only for temporary use.

C: INSPECTION

1) Check the tire air pressure.

Specifications:
420 kPa (4.2 kg/cm^2, 60 psi)

2) Take the stones, glass, nails, etc. out of the tread groove.
3) Check the tires for deformation, cracks, partial wear or wear.

CAUTION:
Replace the tire with a new one if defective.

7. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Corrective action
Wheel wobble.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Front wheel alignment	Check the front wheel alignments. <Ref. to FS-8, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignments. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-24, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-16, INSPECTION, Rear Shock Absorber.>
	Front axle	Check the front axle. <Ref. to DS-15, INSPECTION, Front Axle.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-18, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-21, INSPECTION, Rear Hub Unit Bearing.>
Vehicle is abnormally out of balance.	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Front stabilizer	Check the front stabilizer. <Ref. to FS-16, INSPECTION, Front Stabilizer.>
	Front wheel alignment	Check the front wheel alignments. <Ref. to FS-8, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignments. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
Abnormal wheel vibration	Improperly inflated tire.	Adjust the tire pressure.
	Uneven wear	Check the tire referring to Abnormal tire wear in this table, carry out the procedure and replace the tire.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-7, ADJUSTMENT, Wheel Balancing.>
	Front axle	Check the front axle. <Ref. to DS-15, INSPECTION, Front Axle.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-18, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-21, INSPECTION, Rear Hub Unit Bearing.>

Symptom	Possible cause	Corrective action
Abnormal tire wear	Improperly inflated tire.	Adjust the tire pressure.
	Improper wheel balancing	Check the wheel balance. <Ref. to WT-7, ADJUSTMENT, Wheel Balancing.>
	Front wheel alignment	Check the front wheel alignments. <Ref. to FS-8, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignments. <Ref. to RS-8, INSPECTION, Wheel Alignment.>

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

DIFFERENTIALS

DI

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1. General Description

A: SPECIFICATION

1. REAR DIFFERENTIAL

When replacing a rear differential assembly, select the correct one according to the following table.

NOTE:
- Using the different rear differential assembly causes the drive line and tires to “drag” or emit noise.
- For option code, refer to “ID” section. <Ref. to ID-2, IDENTIFICATION, Identification.>

Model	Sedan, Wagon						
	2.0 L Non-turbo		2.5 L			3.0 L	2.0 L Turbo
	AT	MT	AT	MT		AT	
				KA, KS★1	EC, EK, K4★1		
Rear differential type	VA1-type	T-type				VA2-type	
Classification	XJ	T2			VB	XT	XU
LSD type	—					Viscous coupling	
Type of gear	Hypoid gear						
Gear ratio (Number of gear teeth)	4.111 (37/9)				3.700 (37/10)	3.083 (37/12)	3.272 (36/11)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)						
Rear differential gear oil	GL-5						

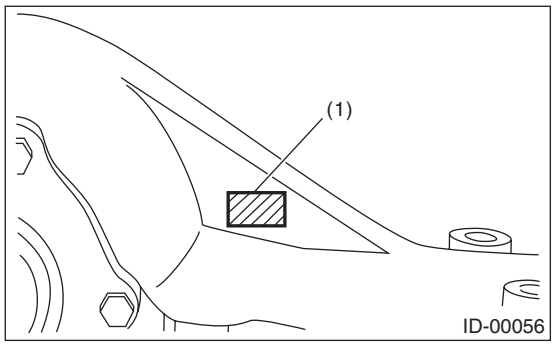
Model	OUTBACK			
	2.5 L			3.0 L
	AT	MT		AT
		EC, EK, K4★1	KS, KA★1	
Rear differential type	T-type			VA2-type
Classification	CF	EZ	JE	XU
LSD type	Viscous coupling			
Type of gear	Hypoid gear			
Gear ratio (Number of gear teeth)	4.444 (40/9)	3.900 (39/10)	4.111 (37/9)	3.272 (36/11)
Oil capacity	0.8 ℓ (0.8 US qt, 0.7 Imp qt)			
Rear differential gear oil	GL-5			

★1: Option code

2. CLASSIFICATION

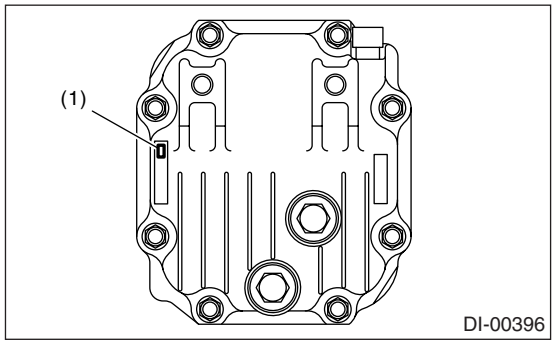
Identification label positions are shown in the following figures. For details concerning identification, refer to “ID” section.

• T-type



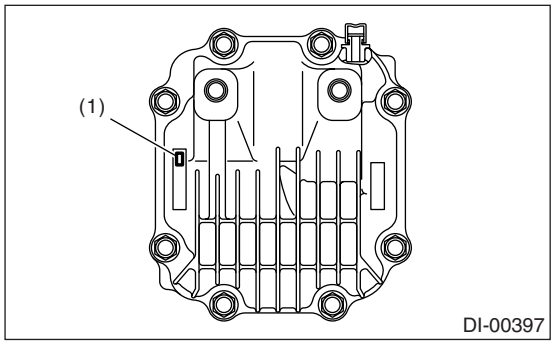
(1) Identification

• VA1-type



(1) Identification

• VA2-type

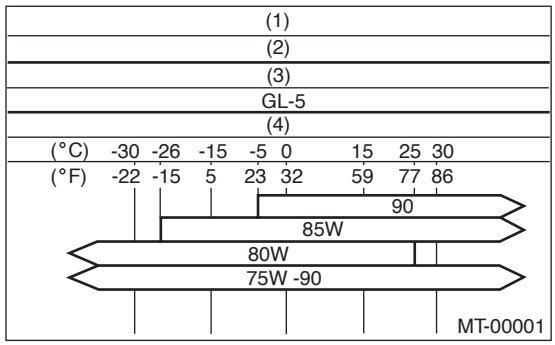


(1) Identification

3. REAR DIFFERENTIAL GEAR OIL

Recommended gear oil:
GL-5 (75W-90)

NOTE:
Each oil manufacturer has its base oil and additives. Thus, do not mix two or more brands.



(1) Item
(2) Rear differential gear oil
(3) API classification
(4) SAE viscosity No. and applicable temperature

4. SERVICE DATA

Drive pinion bearing preload (at companion flange bolt hole)	N (kgf, lb)	T-type	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)
		VA-type	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)
Side gear backlash	mm (in)	T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA1-type only	0.05 — 0.15 (0.0020 — 0.0059)
Side bearing standard width		mm (in)	20.00 (0.7874)
Hypoid driven gear to drive pinion backlash	mm (in)	T-type	0.10 — 0.20 (0.0039 — 0.0079)
		VA-type	0.10 — 0.15 (0.0039 — 0.0059)
Hypoid driven gear runout on its back surface	mm (in)	T-type only	0.05 (0.0020)

5. ADJUSTING PART

• T-type

Drive pinion bearing preload (at companion flange bolt hole) N (kgf, lb)	18.1 — 38.8 (1.8 — 4.0, 4.1 — 8.7)	
Preload adjusting collar	Part No.	Length mm (in)
	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)
Preload adjusting washer	Part No.	Length mm (in)
	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)
Pinion height adjusting washer	Part No.	Thickness mm (in)
	383495200	3.09 (0.1217)
	383505200	3.12 (0.1228)
	383515200	3.15 (0.1240)
	383525200	3.18 (0.1252)
	383535200	3.21 (0.1264)
	383545200	3.24 (0.1276)
	383555200	3.27 (0.1287)
	383565200	3.30 (0.1299)
	383575200	3.33 (0.1311)
	383585200	3.36 (0.1323)
	383595200	3.39 (0.1335)
	383605200	3.42 (0.1346)
	383615200	3.45 (0.1358)
	383625200	3.48 (0.1370)
	383635200	3.51 (0.1382)
	383645200	3.54 (0.1394)
	383655200	3.57 (0.1406)
	383665200	3.60 (0.1417)
	383675200	3.63 (0.1429)
	383685200	3.66 (0.1441)
Side gear backlash mm (in)	0.1 — 0.2 (0.0039 — 0.0079)	

Side gear thrust washer (Model without LSD)	Part No.	Thickness mm (in)
	383445201	0.75 — 0.80 (0.0295 — 0.0315)
	383445202	0.80 — 0.85 (0.0315 — 0.0335)
	383445203	0.85 — 0.90 (0.0335 — 0.0354)
Side bearing standard width mm (in)	—	20.00 (0.7874)
Side bearing retainer shim	Part No.	Thickness mm (in)
	383475201	0.20 (0.0079)
	383475202	0.25 (0.0098)
	383475203	0.30 (0.0118)
	383475204	0.40 (0.0157)
	383475205	0.50 (0.0197)
Hypoid driven gear to drive pinion backlash	Limit mm (in)	0.10 — 0.20 (0.0039 — 0.0079)
Hypoid driven gear runout on its back surface		0.05 (0.0020)

• VA1-type

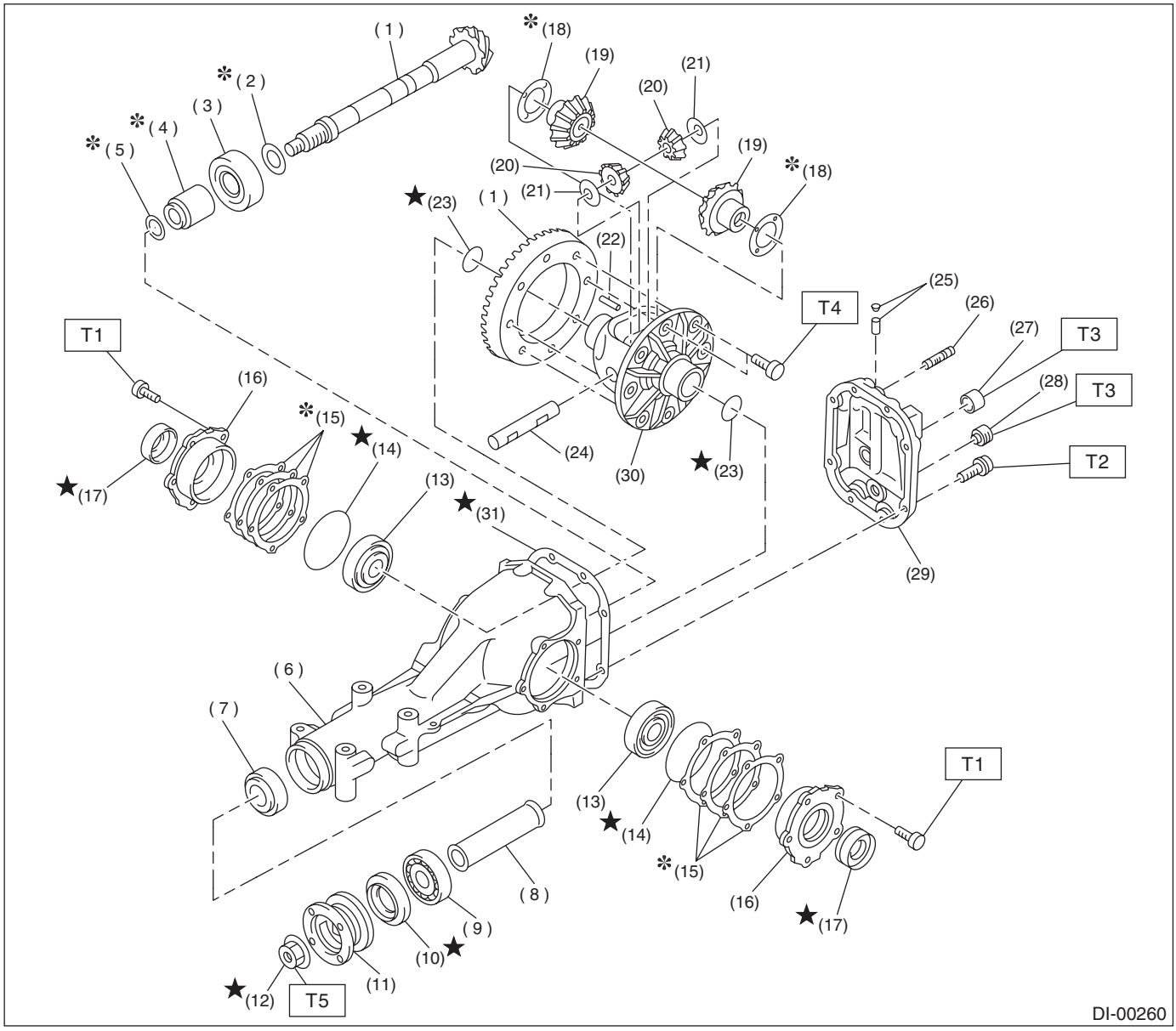
Drive pinion bearing preload (at companion flange bolt hole) N (kgf, lb)	12.7 — 32.4 (1.3 — 3.3, 2.9 — 7.3)	
Preload adjusting collar	Part No.	Length mm (in)
	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)
Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)
Pinion height adjusting washer	Part No.	Thickness mm (in)
	32295AA200	0.150 (0.0059)
	32295AA210	0.175 (0.0069)
	32295AA220	0.200 (0.0079)
	32295AA230	0.225 (0.0089)
	32295AA240	0.250 (0.0098)
	32295AA250	0.275 (0.0108)
Side gear backlash mm (in)	0.05 — 0.15 (0.0020 — 0.0059)	
Side gear thrust washer	803135011	0.925 — 0.950 (0.0364 — 0.0374)
	803135012	0.950 — 0.975 (0.0374 — 0.0384)
	803135013	0.975 — 1.000 (0.0384 — 0.0394)
	803135014	1.000 — 1.025 (0.0394 — 0.0404)
	803135015	1.025 — 1.050 (0.0404 — 0.0413)
Hypoid driven gear to drive pinion backlash	Limit mm (in)	0.10 — 0.15 (0.0039 — 0.0059)

• **VA2-type**

Drive pinion bearing preload (at companion flange bolt hole) N (kgf, lb)	12.7 — 32.4 (1.3 — 3.9, 2.9 — 7.3)	
Preload adjusting collar	Part No.	Length mm (in)
	31454AA250	51.05 (2.010)
	31454AA260	51.25 (2.018)
	31454AA270	51.35 (2.022)
	31454AA280	51.45 (2.026)
	31454AA290	51.55 (2.030)
	31454AA300	51.65 (2.033)
	31454AA310	51.75 (2.037)
	31454AA320	51.85 (2.041)
	31454AA330	52.05 (2.049)
Preload adjusting washer	Part No.	Thickness mm (in)
	38336AA430	1.500 (0.0591)
	38336AA440	1.513 (0.0596)
	38336AA450	1.525 (0.0600)
	38336AA460	1.538 (0.0606)
	38336AA470	1.550 (0.0610)
	38336AA480	1.563 (0.0615)
	38336AA490	1.575 (0.0620)
	38336AA500	1.588 (0.0625)
	38336AA510	1.600 (0.0630)
	38336AA520	1.613 (0.0635)
	38336AA530	1.625 (0.0640)
	38336AA540	1.638 (0.0645)
	38336AA550	1.650 (0.0650)
	38336AA560	1.663 (0.0655)
	38336AA570	1.675 (0.0659)
	38336AA580	1.688 (0.0665)
	38336AA590	1.700 (0.0669)
	38336AA600	1.713 (0.0674)
	38336AA610	1.725 (0.0679)
	38336AA620	1.738 (0.0684)
	38336AA630	1.750 (0.0689)
	38336AA640	1.763 (0.0694)
	38336AA650	1.775 (0.0699)
Pinion height adjusting washer	Part No.	Thickness mm (in)
	32295AA350	0.150 (0.0059)
	32295AA360	0.175 (0.0069)
	32295AA370	0.200 (0.0079)
	32295AA380	0.225 (0.0089)
	32295AA390	0.250 (0.0098)
	32295AA400	0.275 (0.0108)
Hypoid driven gear to drive pinion backlash	Limit mm (in)	0.10 — 0.15 (0.0039 — 0.0059)

B: COMPONENT

1. REAR DIFFERENTIAL WITHOUT LSD (T-TYPE)

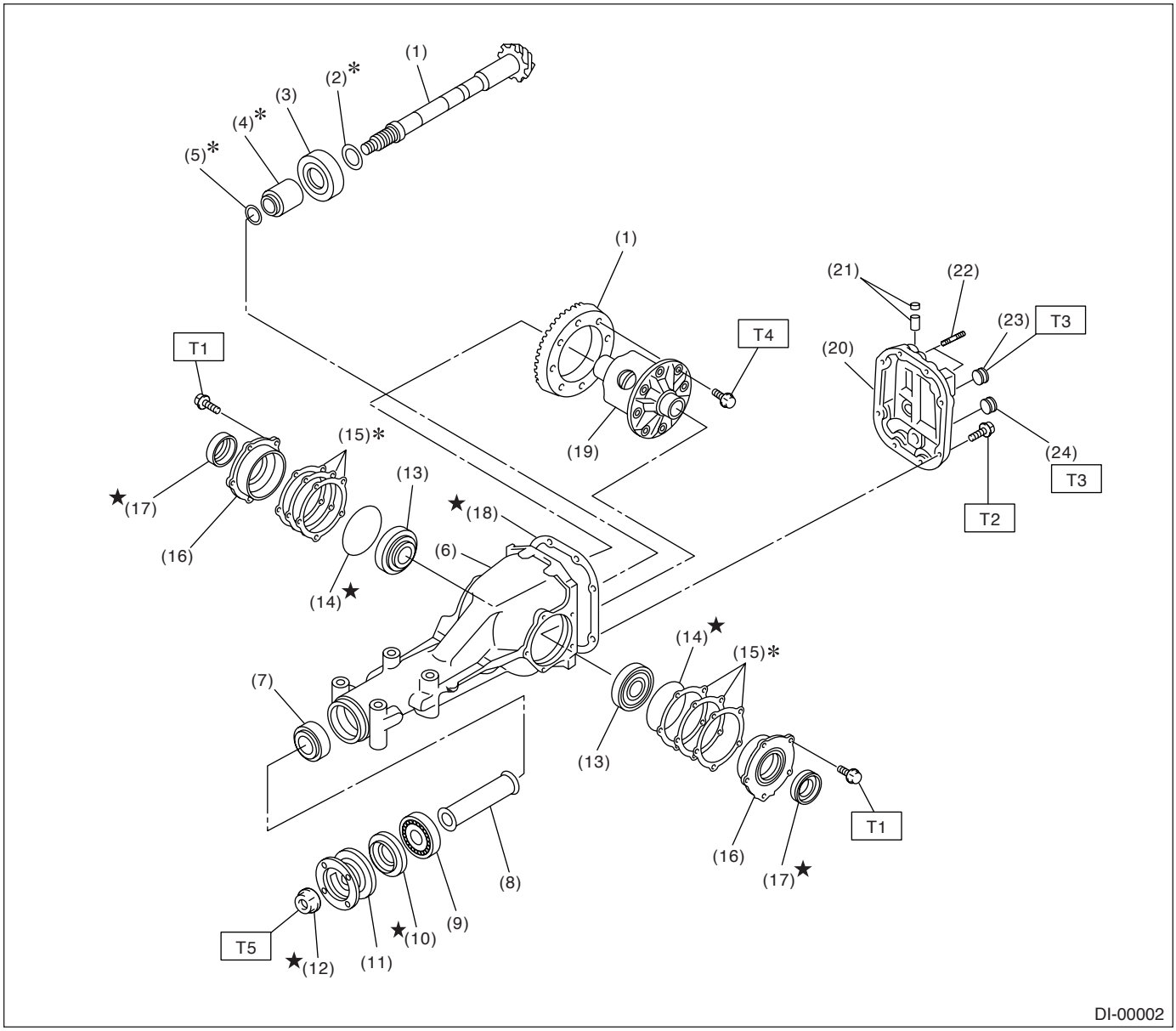


(1)	Hypoid driven gear and drive pinion set	(13)	Side bearing	(26)	Stud bolt
		(14)	O-ring	(27)	Oil filler plug
(2)	Pinion height adjusting washer	(15)	Side bearing retainer shim	(28)	Oil drain plug
(3)	Rear bearing	(16)	Side bearing retainer	(29)	Rear cover
(4)	Bearing preload adjusting collar	(17)	Side oil seal	(30)	Differential case
(5)	Bearing preload adjusting washer	(18)	Side gear thrust washer	(31)	Gasket
(6)	Differential carrier	(19)	Side gear		
(7)	Front bearing	(20)	Pinion mate gear		
(8)	Collar	(21)	Pinion mate gear washer		
(9)	Pilot bearing	(22)	Pinion shaft lock pin		
(10)	Front oil seal	(23)	Snap ring		
(11)	Companion flange	(24)	Pinion mate shaft		
(12)	Self-locking nut	(25)	Air breather cap		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 10.3 (1.05, 7.6)
T2: 29 (3.0, 21.7)
T3: 49 (5.0, 36.2)
T4: 105 (10.7, 77.4)
T5: 181 (18.5, 134)

2. REAR DIFFERENTIAL WITH LSD (T-TYPE)

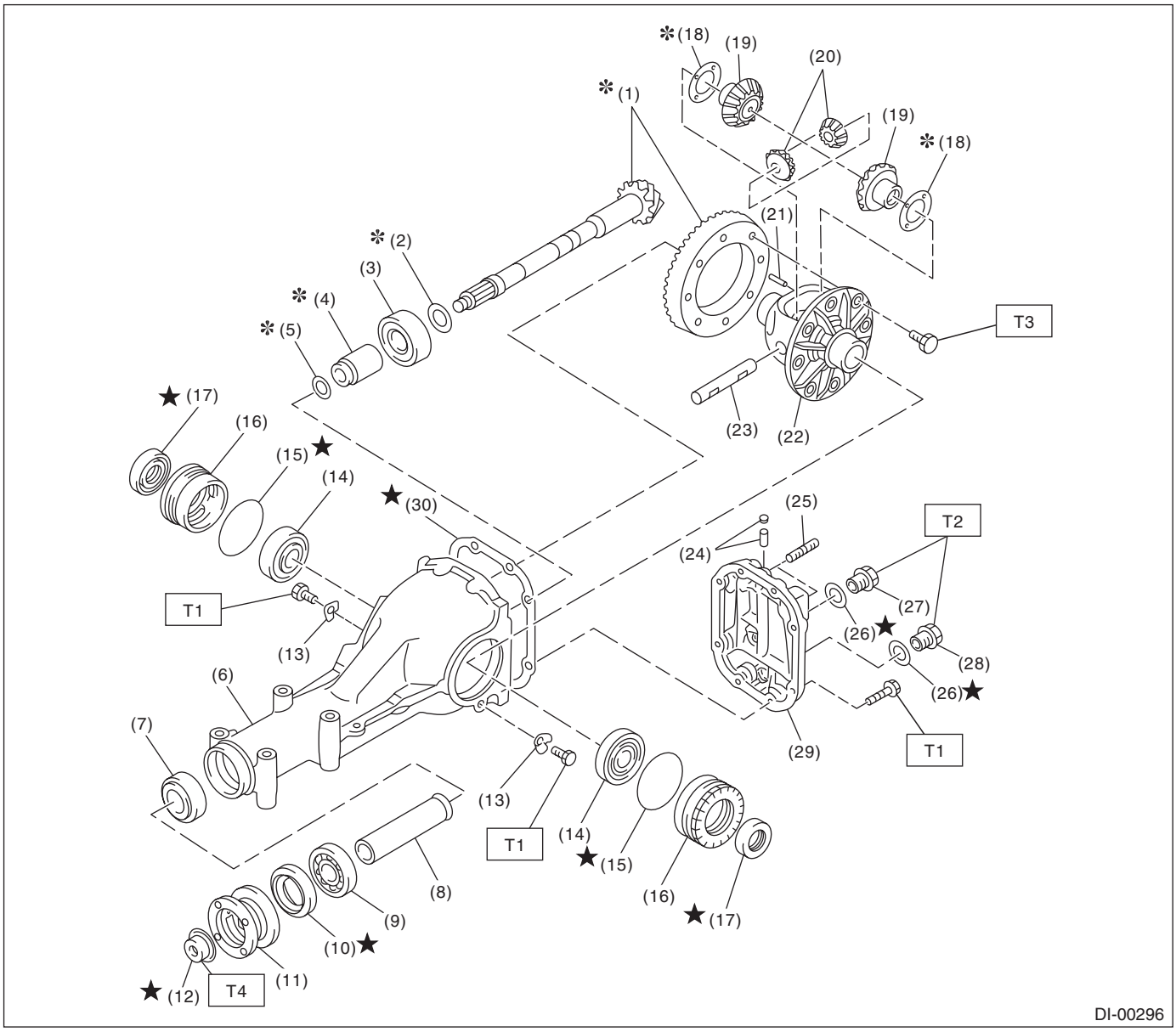


DI-00002

(1)	Hypoid driven gear and drive pinion set	(11)	Companion flange	(22)	Stud bolt
(2)	Pinion height adjusting washer	(12)	Self-locking nut	(23)	Oil filler plug
(3)	Rear bearing	(13)	Side bearing	(24)	Oil drain plug
(4)	Bearing preload adjusting collar	(14)	O-ring		
(5)	Bearing preload adjusting washer	(15)	Side bearing retainer shim		
(6)	Differential carrier	(16)	Side bearing retainer		
(7)	Front bearing	(17)	Side oil seal		
(8)	Collar	(18)	Gasket		
(9)	Pilot bearing	(19)	Differential case ASSY		
(10)	Front oil seal	(20)	Rear cover		
		(21)	Air breather cap		

Tightening torque: N·m (kgf-m, ft-lb)	
T1:	*10.3 (1.05, 7.6)*
T2:	*29 (3.0, 21.7)*
T3:	*49 (5.0, 36.2)*
T4:	*105 (10.7, 77.4)*
T5:	*181 (18.5, 134)*

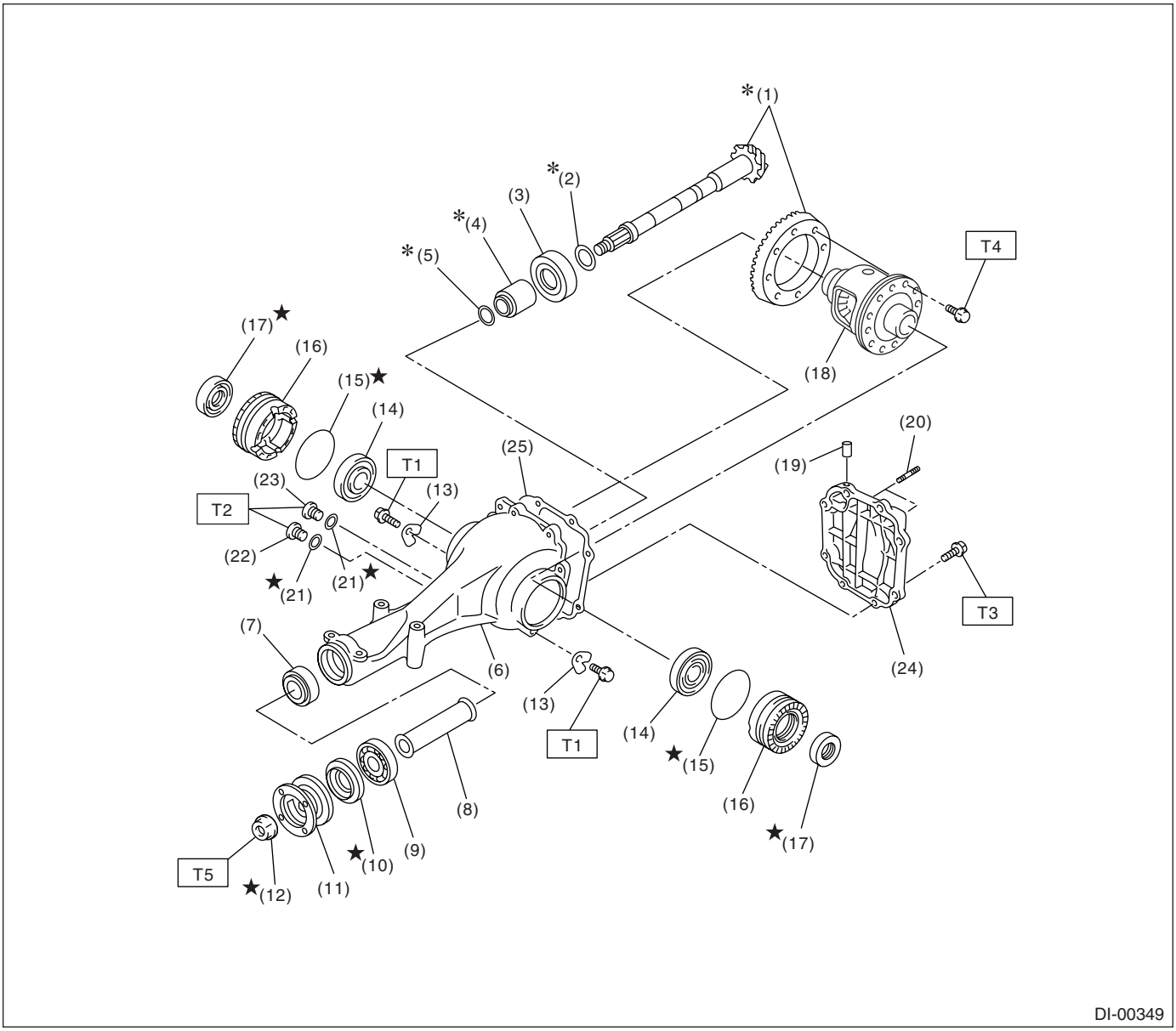
3. REAR DIFFERENTIAL (VA1-TYPE)



(1) Hypoid driven gear and drive pinion set
(2) Pinion height adjusting washer
(3) Rear bearing
(4) Bearing preload adjusting collar
(5) Bearing preload adjusting washer
(6) Differential carrier
(7) Front bearing
(8) Collar
(9) Pilot bearing
(10) Front oil seal
(11) Companion flange
(12) Self-locking nut
(13) Lock plate
(14) Side bearing
(15) O-ring
(16) Axle shaft holder
(17) Side oil seal
(18) Side gear thrust washer
(19) Side gear
(20) Pinion mate gear
(21) Pinion shaft lock pin
(22) Differential case
(23) Pinion mate shaft
(24) Air breather cap
(25) Stud bolt
(26) Gasket
(27) Oil filler plug
(28) Oil drain plug
(29) Rear cover
(30) Gasket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 25 (2.5, 18.1)
T2: 34 (3.5, 25.3)
T3: 62 (6.3, 45.6)
T4: 191 (19.5, 141)

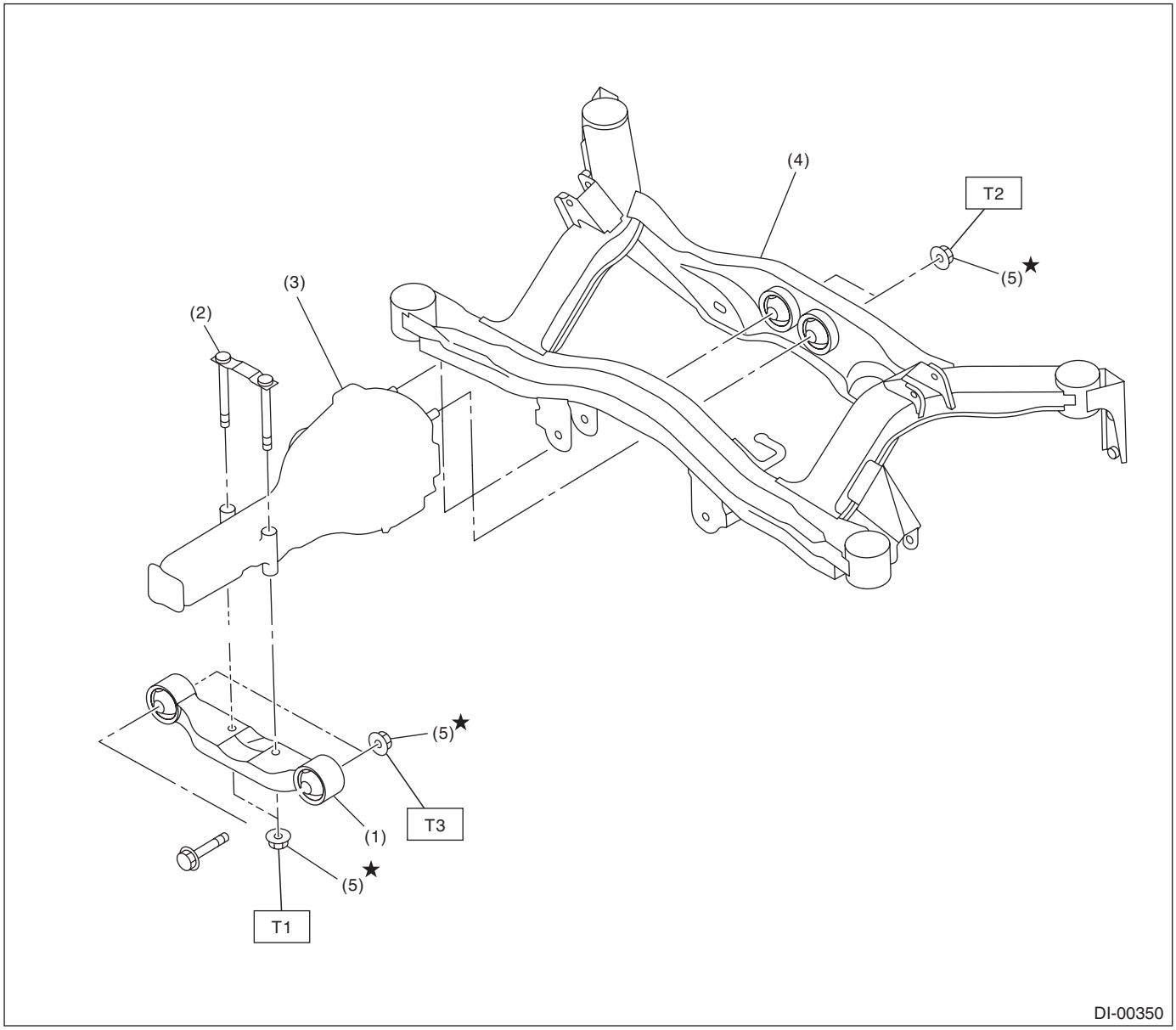
4. REAR DIFFERENTIAL (VA2-TYPE)



DI-00349

(1)	Hypoid driven gear and drive pinion set	(11)	Companion flange	(22)	Oil filler plug
(2)	Pinion height adjusting washer	(12)	Self-locking nut	(23)	Oil drain plug
(3)	Rear bearing	(13)	Lock plate	(24)	Rear cover
(4)	Bearing preload adjusting collar	(14)	Side bearing	(25)	Gasket
(5)	Bearing preload adjusting washer	(15)	O-ring		
(6)	Differential carrier	(16)	Axle shaft holder	***Tightening torque: N·m (kgf-m, ft-lb)***	
(7)	Front bearing	(17)	Side oil seal	***T1:***	***25 (2.5, 18.1)***
(8)	Collar	(18)	Differential case ASSY	***T2:***	***29 (3.0, 21.4)***
(9)	Pilot bearing	(19)	Air breather cap	***T3:***	***34 (3.5, 25.3)***
(10)	Front oil seal	(20)	Stud bolt	***T4:***	***62 (6.3, 45.6)***
		(21)	Gasket	***T5:***	***191 (19.5, 141)***

5. REAR DIFFERENTIAL MOUNTING SYSTEM



(1) Rear differential front member
(2) Rear differential member plate
(3) Rear differential ASSY
(4) Sub frame
(5) Self-locking nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 52 (5.3, 38)
T2: 70 (7.1, 51)
T3: 110 (11.2, 81)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine gear oil, grease etc. or the equivalent. Do not mix gear oil, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply gear oil onto sliding or revolution surfaces before installation.
• Before installing O-rings or snap rings, apply sufficient amount of gear oil to avoid damage and deformation.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
• Avoid damaging the mating surface of the case.

D: PREPARATION TOOL

1. SPECIAL TOOL

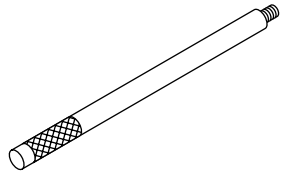
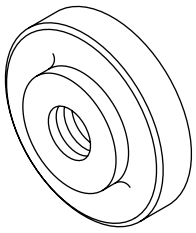
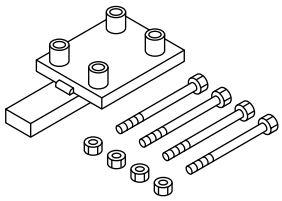
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398477701	398477701	HANDLE	Used for installing front and rear bearing cone.
 ST-398477702	398477702	DRIFT	• Used for press-fitting the bearing cone of differential carrier (front). • For T-type
 ST-398217700	398217700	ATTACHMENT SET	Stand for rear differential carrier disassembly and assembly.

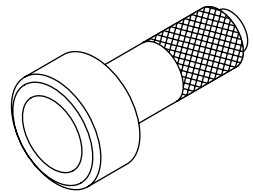
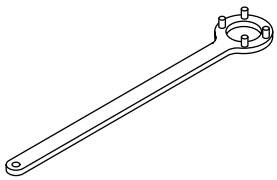
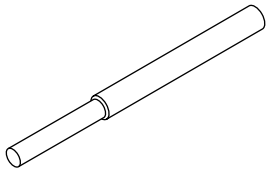
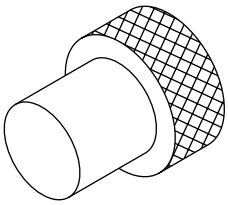
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447120	498447120	INSTALLER	Used for installing front oil seal.
 ST-498427200	498427200	FLANGE WRENCH	Used for stopping rotation of companion flange when removing and tightening self-locking nut.
 ST-398467700	398467700	DRIFT	• Used for removing pinion, pilot bearing and front bearing cone. • For T-type and VA1-type
 ST-399780104	399780104	WEIGHT	Used for installing front bearing cone and pilot bearing companion flange.

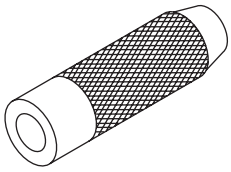
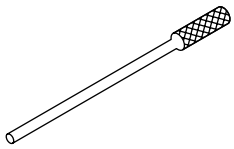
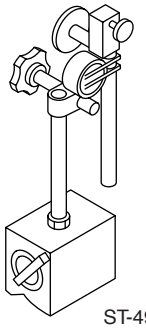
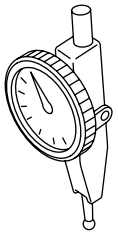
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899580100	899580100	INSTALLER	Used for press-fitting front bearing cone and pilot bearing.
 ST-899904100	899904100	STRAIGHT PIN REMOVER	Used for driving out differential pinion shaft lock pin.
 ST-498247001	498247001	MAGNET BASE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with DIAL GAUGE (498247100).
 ST-498247100	498247100	DIAL GAUGE	• Used for measuring backlash between side gear and pinion, and hypoid gear. • Used with MAGNET BASE (498247001).

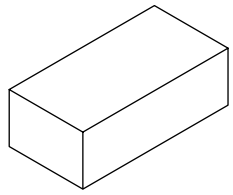
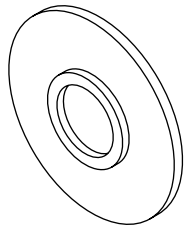
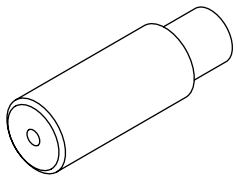
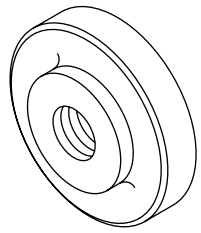
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398507704	398507704	BLOCK	• Used for adjusting pinion height and preload. • For T-type and VA1-type
 ST-398177700	398177700	INSTALLER	• Used for installing rear bearing cone. • For T-type and VA2-type
 ST-398457700	398457700	ATTACHMENT	• Used for removal of side bearing retainer. • For T-type
 ST-398477703	398477703	DRIFT 2	• Used for press-fitting bearing race (rear) of differential carrier. • For T-type and VA2-type

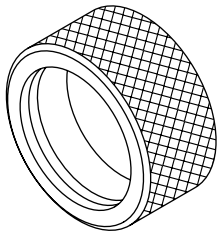
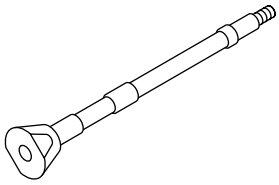
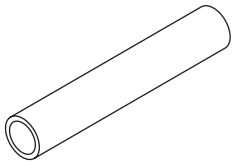
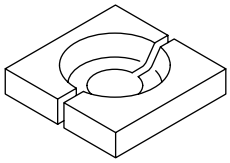
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398437700	398437700	DRIFT	• Used for installing side oil seal. • For T-type and VA2-type
 ST-398507702	398507702	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For T-type
 ST-398507703	398507703	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For T-type
 ST-398517700	398517700	REPLACER	• Used for removing rear bearing cone. • For T-type and VA2-type

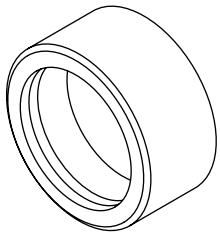
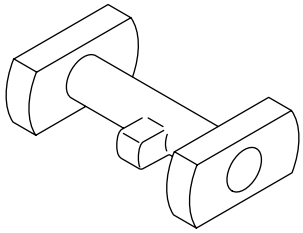
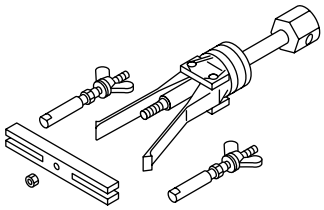
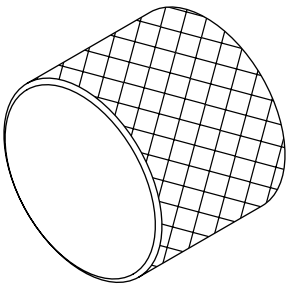
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-398487700	398487700	DRIFT	• Used for press-fitting side bearing cone. • For T-type and VA2-type
 ST-398507701	398507701	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For T-type
 ST-398527700	398527700	PULLER ASSY	• Used for removing front oil seal. • Used for removing side bearing cup. (T-type)
 ST-398227700	398227700	DRIFT	• Used for installing side bearing. • For T-type and VA2-type

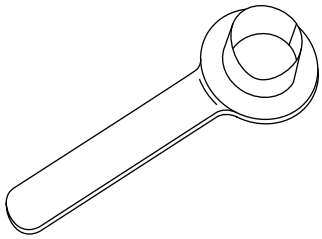
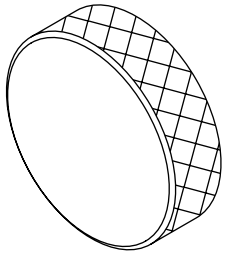
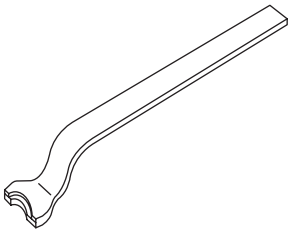
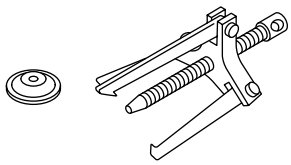
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing the rear drive shaft to rear differential. • For oil seal protection
 ST-398237700	398237700	DRIFT	• Used for installing side bearing. • For T-type
 ST28099PA100	28099PA100	DRIVE SHAFT REMOVER	• Used for removing rear drive shaft from rear differential. • For T-type
 ST-399703600	399703600	PULLER ASSY	Used for removing companion flange.

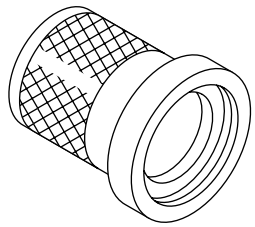
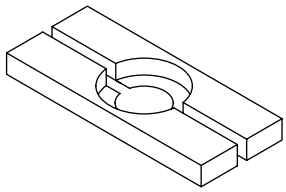
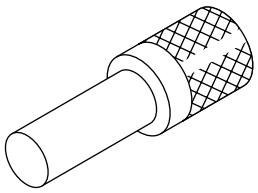
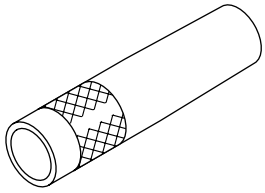
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-899874100	899874100	INSTALLER	Used for installing companion flange.
 ST-498077000	498077000	REMOVER	• Used for removing side bearing cone from differential. • For VA2-type
 ST-899864100	899864100	REMOVER	Used for removing differential side bearing.
 ST-499277200	499277200	INSTALLER	• Used for installing front bearing cone. • For VA2-type

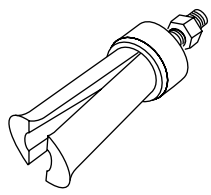
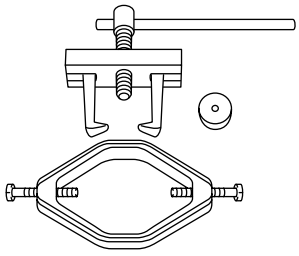
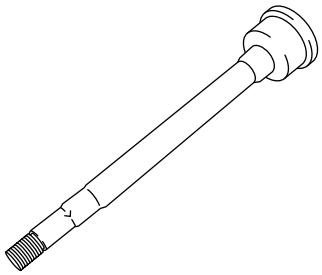
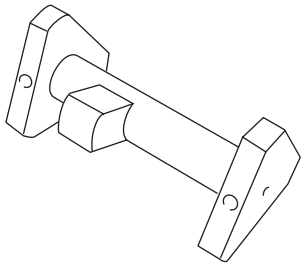
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18758AA000	18758AA000	PULLER	• Used for removing side bearing cup. • For VA2-type
 ST18759AA000	18759AA000 (Newly adopted tool)	PULLER ASSY	• Used for removing differential from side bearing cone. • For T-type
 ST18678AA000	18678AA000 (Newly adopted tool)	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For VA2-type
 ST18831AA010	18831AA010 (Newly adopted tool)	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For VA2-type

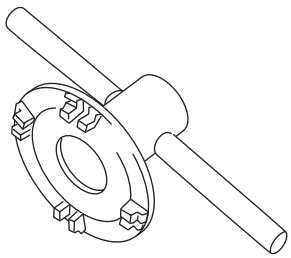
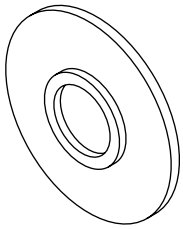
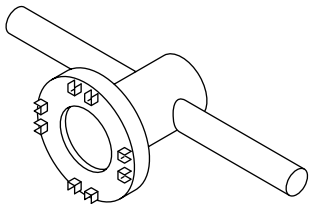
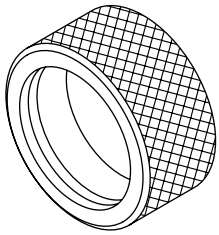
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18630AA010	18630AA010 (Newly adopted tool)	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA2-type NOTE: Also available for VA1-type.
 ST-498175500	498175500	INSTALLER	• Used for installing rear bearing cone. • For VA1-type
 ST-499785500	499785500	WRENCH ASSY	• Used for removing and installing side oil seal holder. • For VA1-type
 ST-498447100	498447100	INSTALLER	• Used for installing oil seal. • For VA1-type

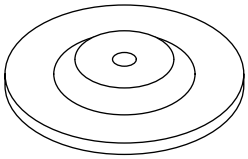
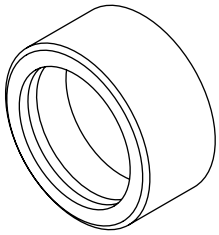
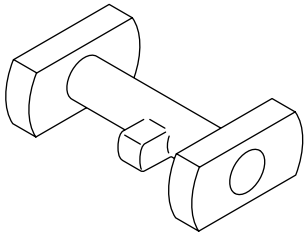
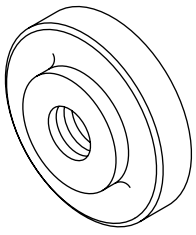
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-399520105	399520105	SEAT	• Used for removing side bearing cone. • Used with PULLER SET (899524100). • For VA-type
 ST-498485400	498485400	DRIFT	• Used for installing side bearing cone. • For VA1-type
 ST-498505501	498505501	DIFFERENTIAL CARRIER GAUGE	• Used for adjusting pinion height. • For VA1-type
 ST-498447110	498447110	DRIFT	• Used for press-fitting the bearing race (front) of differential carrier. • For VA1-type

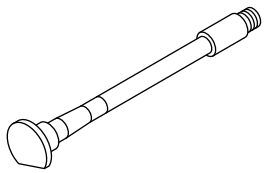
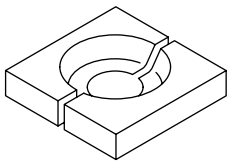
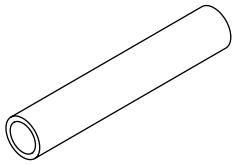
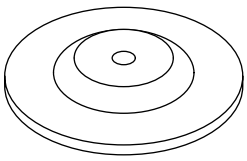
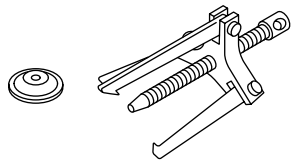
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-498447150	498447150	DUMMY SHAFT	• Used for adjusting pinion height and preload. • For VA1-type
 ST-498515500	498515500	REPLACER	• Used for removing rear bearing cone. • For VA1-type
 ST32285AA000	32285AA000	DUMMY COLLAR	• Used for adjusting pinion height and preload. • For VA1-type
 ST-499705404	499705404	SEAT	• Used for removing side bearing race. • Used with PULLER ASSY (499705401). • For VA1-type

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-499705401	499705401	PULLER ASSY	• Used for removing side bearing race. • Used with SEAT (499705404). • For VA-type

2. GENERAL PURPOSE TOOL

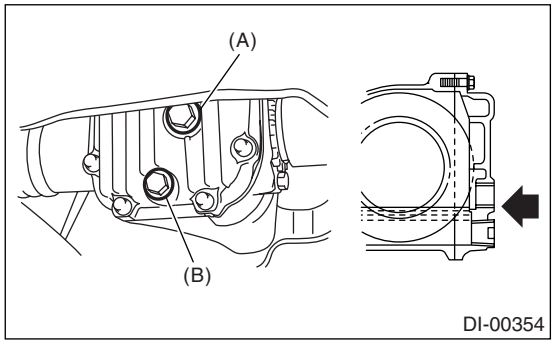
TOOL NAME	REMARKS
Transmission jack	Used for assembly/disassembly of rear differential.
Puller	Used for removal of side bearing retainer.
Thickness gauge	Used for measuring clearance.
Hexagon wrench	Used for installing and removing filler and drain plug.
Tire lever	Used for removal of rear drive shaft. (VA-type)

2. Differential Gear Oil

A: INSPECTION

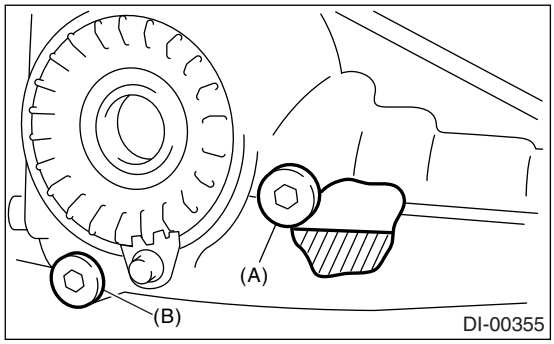
1) Remove the filler plug, and then check the gear oil. If it is contaminated or deteriorated, replace the gear oil. <Ref. to DI-26, REPLACEMENT, Differential Gear Oil.>
2) Check that the gear oil level is up to the bottom of filler plug hole. If the level is low, refill up to the bottom of filler plug hole.

• Except for VA2-type



(A) Filler plug
(B) Drain plug

• VA2-type



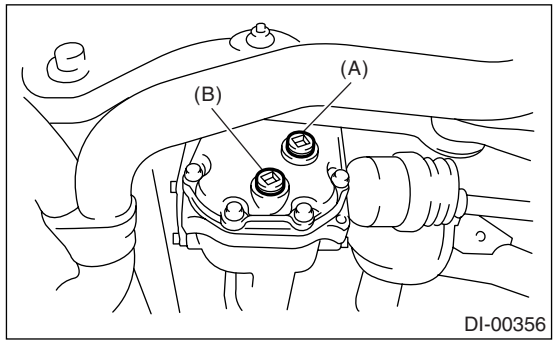
(A) Filler plug
(B) Drain plug

B: REPLACEMENT

1) Jack-up the vehicle and support it with rigid racks.
2) Remove the oil drain plug and filler plug, and drain the gear oil.

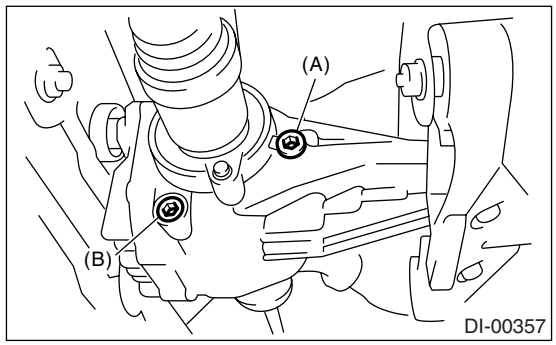
CAUTION:
Be careful not to burn your hands, because gear oil becomes extremely hot after running.

• Except for VA2-type



(A) Filler plug
(B) Drain plug

• VA2-type



(A) Filler plug
(B) Drain plug

3) Tighten the oil drain plug.

NOTE:
• Apply liquid gasket to the drain plug threads for T-type.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

• Use a new aluminum gasket for VA1-type.
• Use a new metal gasket for VA2-type.

Tightening torque:
T-type:
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA1-type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)
VA2-type:
29 N·m (3.0 kgf-m, 21.4 ft-lb)

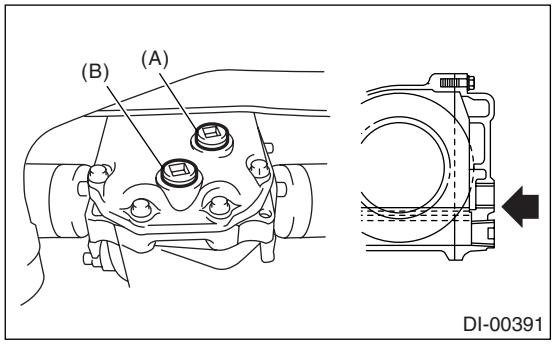
4) Fill the differential carrier with gear oil to the bottom of filler plug.

NOTE:
• Carefully refill oil while watching the level. Excessive or insufficient oil must be avoided.

Recommended gear oil:
<Ref. to DI-2, SPECIFICATION, General Description.>

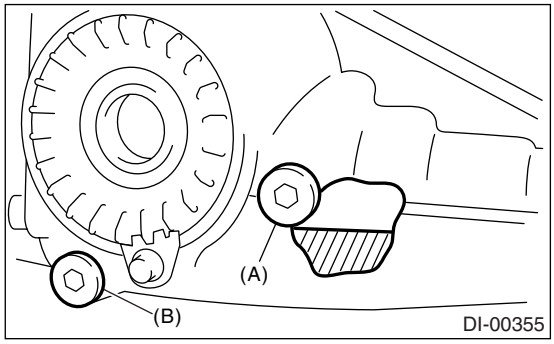
Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)

- Except for VA2-type



(A) Filler plug
(B) Drain plug

- VA2-type



(A) Filler plug
(B) Drain plug

5) Install the filler plug.

NOTE:
- Apply liquid gasket to the filler plug threads for T-type.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

- Use a new aluminum gasket for VA1-type.
- Use a new metal gasket for VA2-type.

Tightening torque:
T-type:
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA1-type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)
VA2-type:
29 N·m (3.0 kgf-m, 21.4 ft-lb)

3. Front Differential Assembly

A: NOTE

1. AT MODEL

• 4AT

For front differential of 4AT model, refer to “4AT” section. <Ref. to 4AT-113, Front Differential Assembly.>

• 5AT

For front differential of 5AT model, refer to “5AT” section. <Ref. to 5AT-94, Front Differential.>

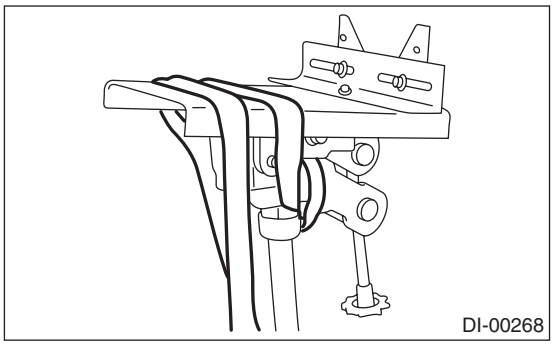
2. MT MODEL

For front differential of manual transmission, refer to “5MT” section. <Ref. to 5MT-85, Front Differential Assembly.>

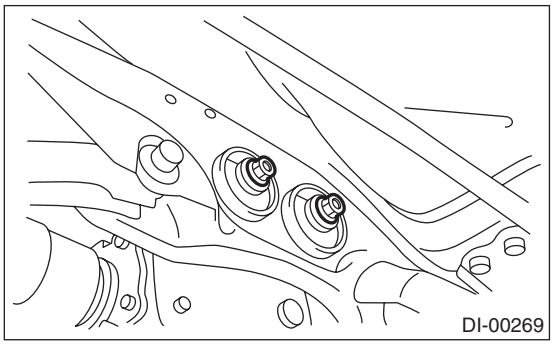
4. Rear Differential (T-type)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to neutral.
3) Loosen the wheel nuts.
4) Release the parking brake.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove the rear wheels.
7) Remove the rear exhaust pipe and muffler.
• 2.0 L SOHC and DOHC non-turbo model
<Ref. to EX(H4SO 2.0)-11, Rear Exhaust Pipe.>
<Ref. to EX(H4SO 2.0)-13, Muffler.>
• 2.0 L DOHC turbo model
<Ref. to EX(H4DOTC)-11, Rear Exhaust Pipe.>
8) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
9) Prepare the transmission jack and band.

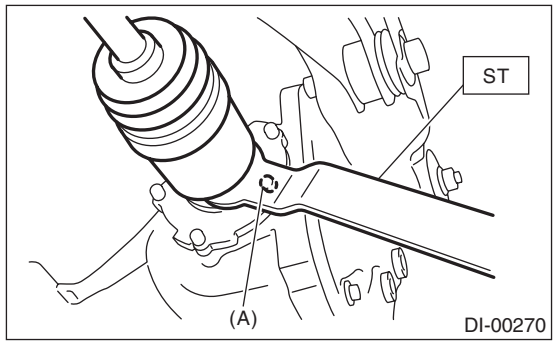

DI-00268

10) Loosen the self-locking nuts which hold the rear differential to rear crossmember.


DI-00269

11) Remove the DOJ of rear drive shaft from rear differential using ST.

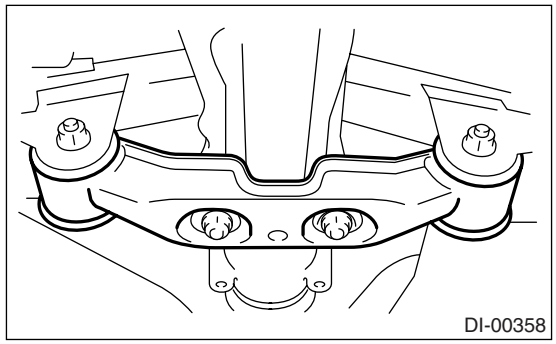
ST 28099PA100 DRIVE SHAFT REMOVER



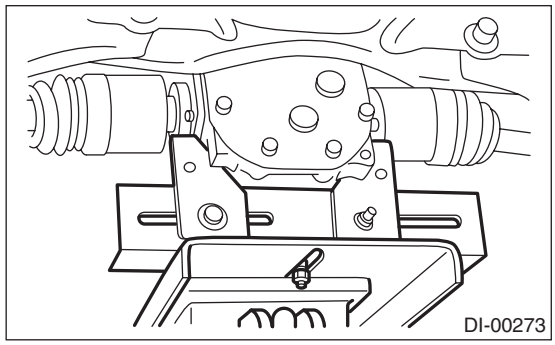
DI-00270

(A) Bolt

12) Remove the rear differential front member.

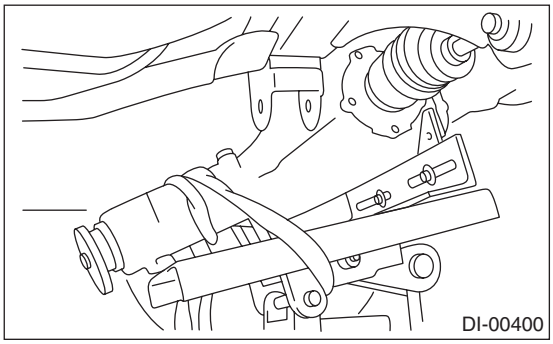

DI-00358

13) Support the rear differential with transmission jack.

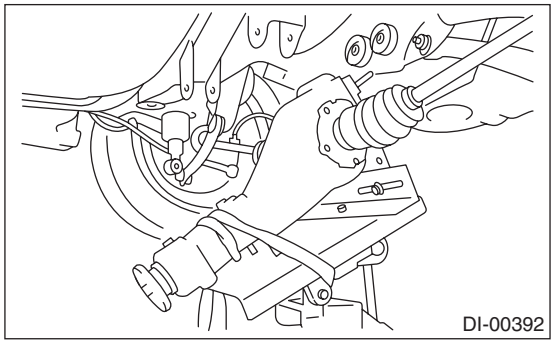

DI-00273

14) Secure the rear differential using band.
15) Remove the self-locking nuts which hold the rear differential to crossmember.
16) Remove the rear differential stud bolt from rear crossmember bushing.

NOTE:
When removing the stud bolt, carefully adjust the angle and location of transmission jack and jack stand, if necessary.



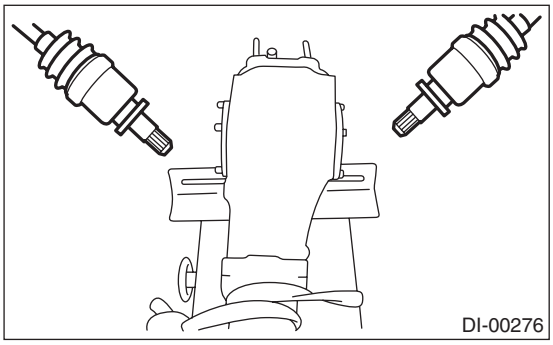
17) Lower the transmission jack stand after removing the rear differential stud bolt from rear crossmember. Rear drive shaft should not come into contact with lateral link bolt.



18) Pull out the axle shaft from rear differential.

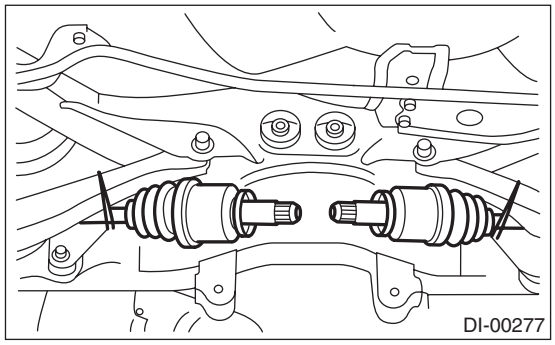
NOTE:
If it is difficult to remove the axle shaft from rear differential, remove it using ST.

ST 28099PA100 DRIVE SHAFT REMOVER

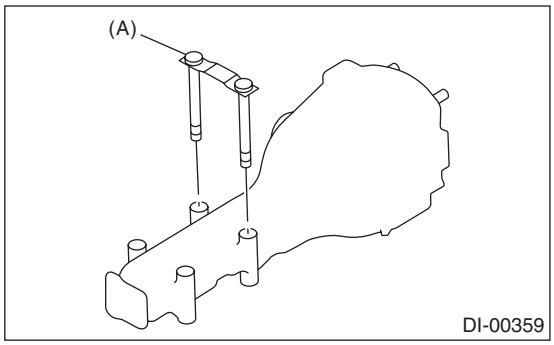


19) Lower the transmission jack.

20) Secure the rear drive shaft to lateral link using wire.



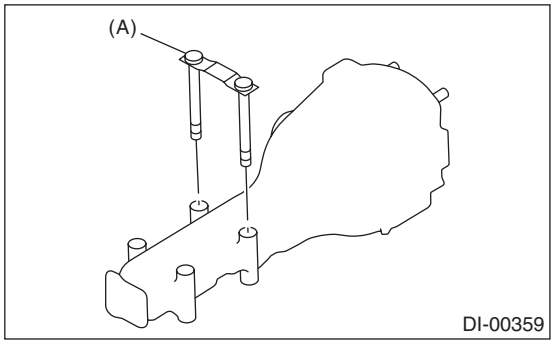
21) Remove the rear differential member plate from rear differential.



(A) Rear differential member plate

B: INSTALLATION

1) Install the rear differential member plate to rear differential.

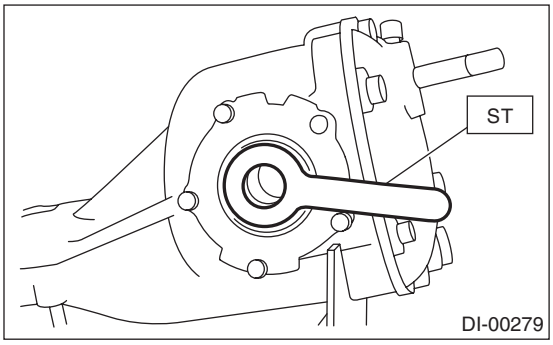


(A) Rear differential member plate

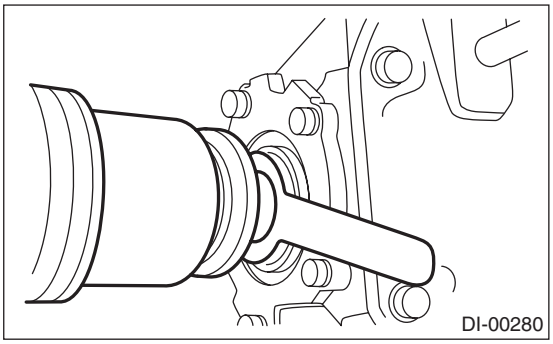
2) Set the rear differential to transmission jack.

NOTE:
Secure the rear differential to transmission jack using band.

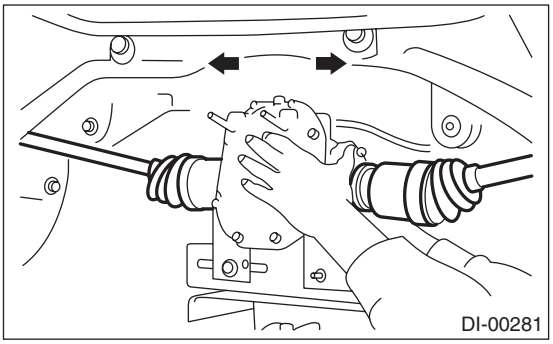
3) Install the ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR



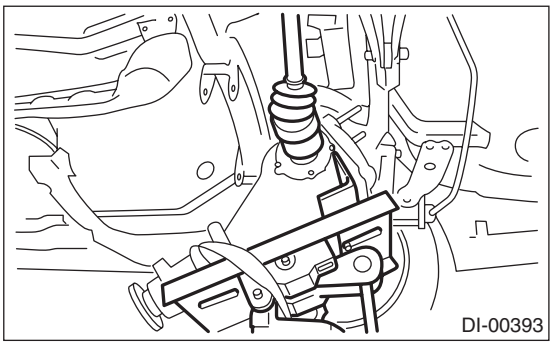
4) Insert the spline shaft until the spline portion comes inside the side oil seal.



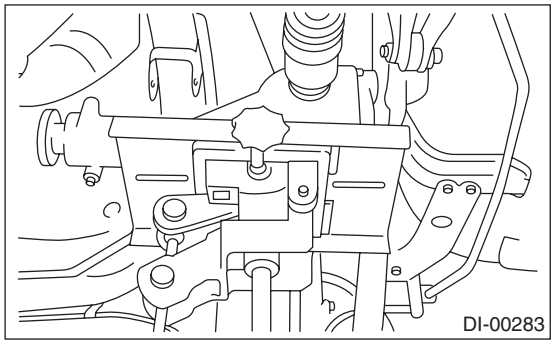
5) Remove ST from rear differential.
ST 28099PA090 OIL SEAL PROTECTOR
6) Push the rear differential to insert the axle shaft into rear differential.



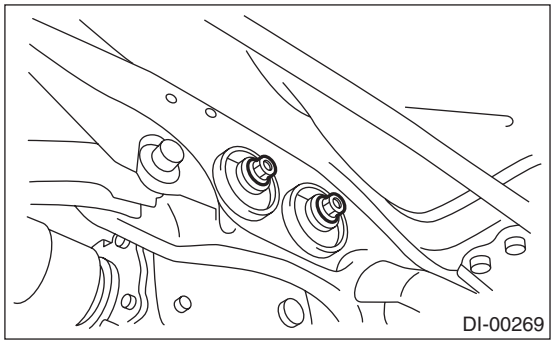
7) Adjust the transmission jack, if necessary, and insert the rear differential stud bolt into rear crossmember bushing properly.



8) After inserting the rear differential stud bolt into rear crossmember bushing, lift up the transmission jack and align the rear differential with its own position.

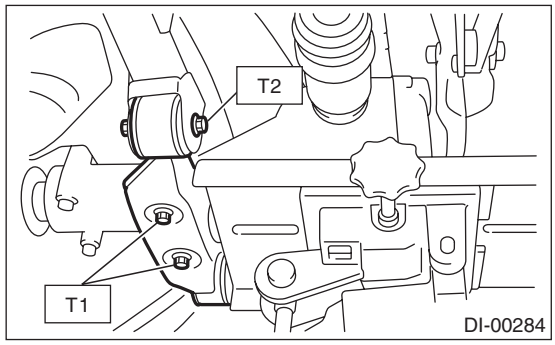


9) Tighten the rear crossmember self-locking nut temporarily.



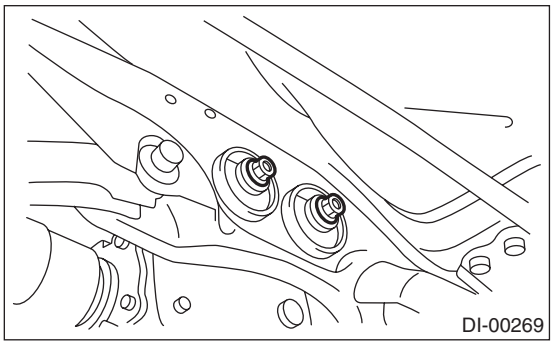
10) Remove the band from rear differential. Lift up the rear differential until the rear differential is separated from the transmission jack.
11) Install the rear differential front member.

Tightening torque:
T1: 52 N·m (5.3 kgf-m, 38 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81 ft-lb)



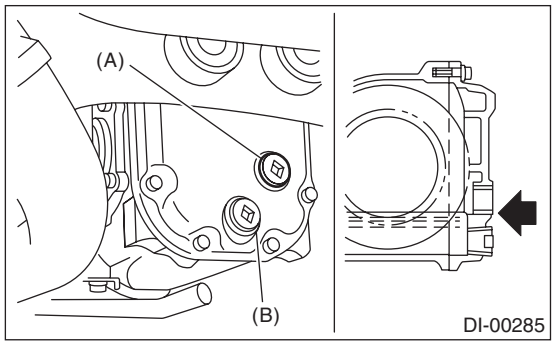
12) Tighten the self-locking nut.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)



13) Lower the transmission jack.
14) Install the propeller shaft. <Ref. to DS-11, INSTALLATION, Propeller Shaft.>
15) Install the heat shield cover.
16) Install the rear exhaust pipe and muffler.
17) After installing the rear differential carrier to the vehicle, remove the filler plug, and refill the gear oil to the bottom of plug hole.

Oil capacity:
0.8 ℓ (0.8 US qt, 0.7 Imp qt)



(A) Filler plug
(B) Drain plug

18) Tighten the filler plug.

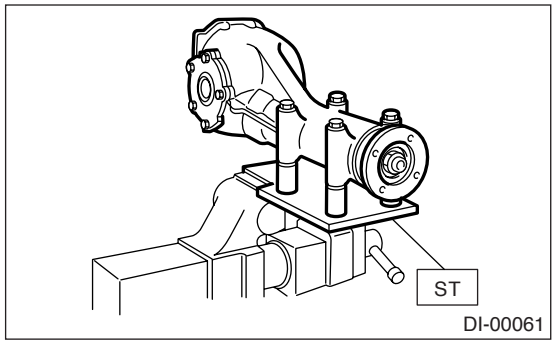
NOTE:
Apply liquid gasket to the drain plug.

Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
49.0 N·m (5.0 kgf-m, 36.2 ft-lb)

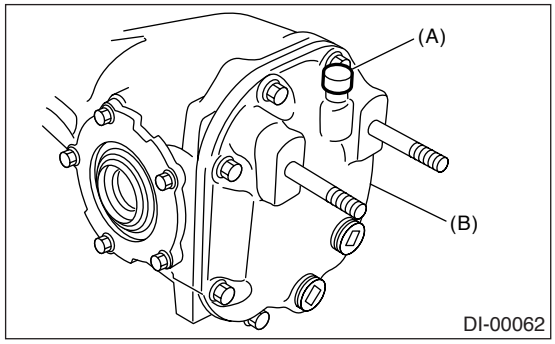
C: DISASSEMBLY

To detect the real cause of trouble, inspect the following items before disassembling.
• Tooth contact of hypoid driven gear and drive pinion, and backlash
• Hypoid driven gear runout on its back surface
• Total preload of drive pinion
1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



2) Drain the gear oil by removing plug.
3) Remove the air breather cap.

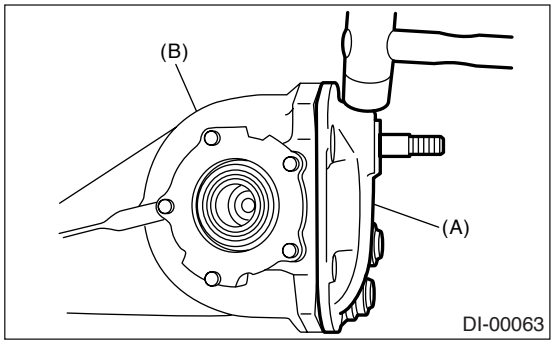
NOTE:
• Do not attempt to replace the air breather cap unless necessary.
• Replace the air breather cap with a new one when removing it.



(A) Air breather cap
(B) Rear cover

4) Remove the bolts, and then remove the rear cover.

NOTE:
Remove it by tapping with plastic hammer.

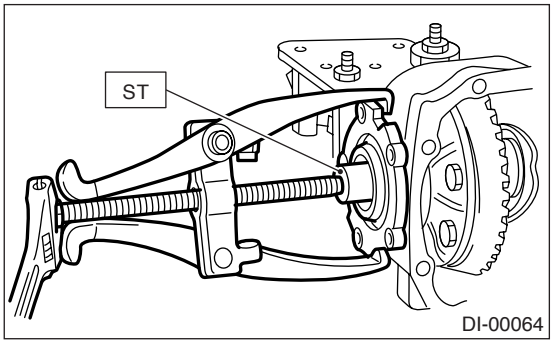


(A) Rear cover
(B) Differential carrier

5) Keep the side bearing retainers RH and LH separately for easier reassembly. Remove the side bearing retainer attaching bolts, set the ST to differential case, and extract the side bearing retainers RH and LH with a puller.

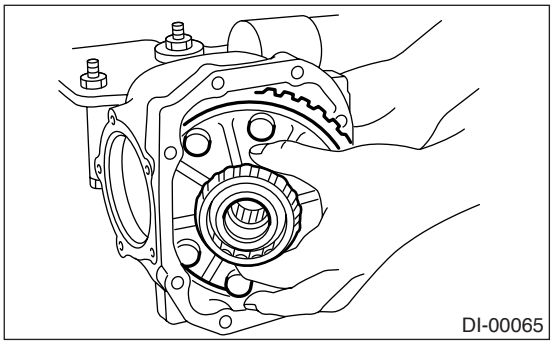
NOTE:
Each shim, which is installed to adjusted the side bearing preload, should be kept together with its mating retainer.

ST 398457700 ATTACHMENT



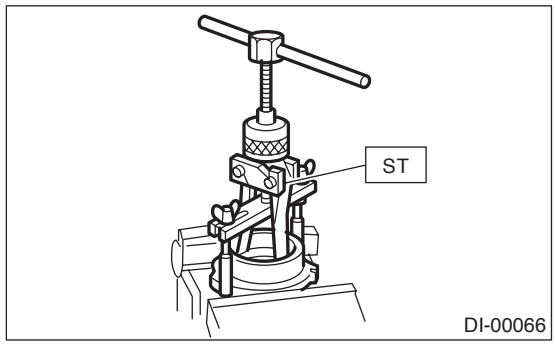
6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



7) When replacing the side bearing, remove the bearing cup from side bearing retainer using ST.

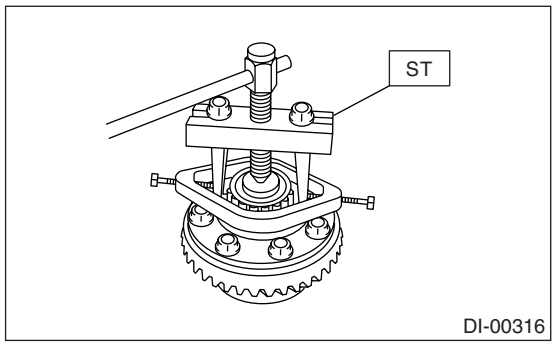
ST 398527700 PULLER ASSY



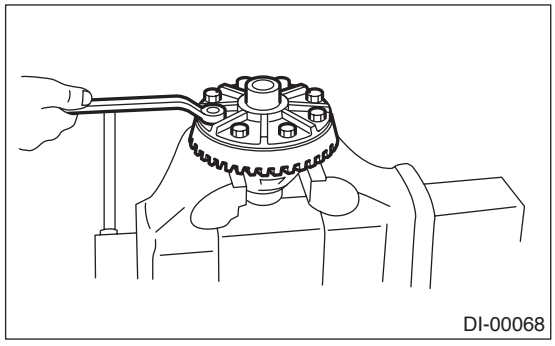
8) Extract the bearing cone with ST.

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the puller so that its claws catch the edge of the bearing cone.
• Never mix up the bearing races RH and LH and cones.

ST 18759AA000 PULLER ASSY



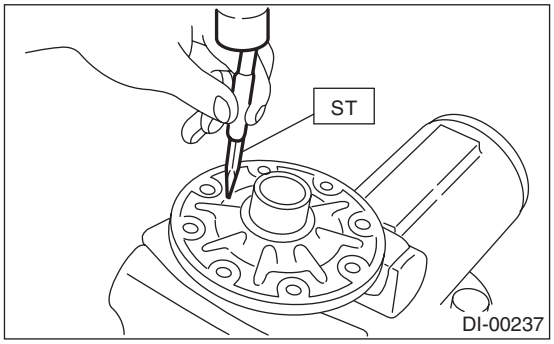
9) Remove the hypoid driven gear by loosening hypoid driven gear bolts.



10) Drive out the pinion shaft lock pin from hypoid driven gear side (Model without LSD).

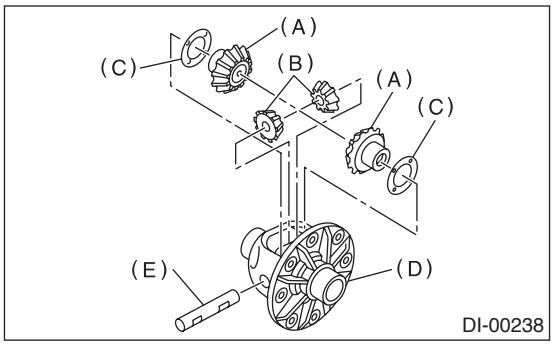
NOTE:
The lock pin is staked at the pin hole end on the differential carrier. Do not drive it out forcibly before removing the stake.

ST 899904100 STRAIGHT PIN REMOVER



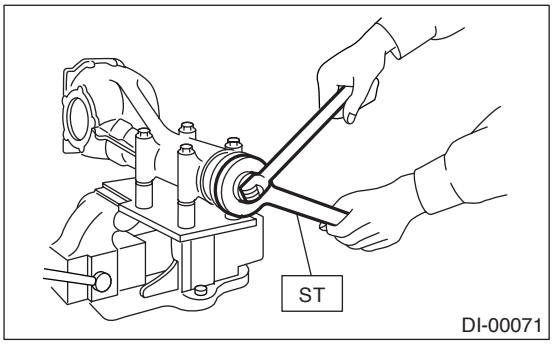
11) Draw out the pinion mate shaft and remove pinion mate gears, side gears and thrust washers. (Model without LSD)

NOTE:
The gears should be marked or kept separated right and left, and front and rear as well as thrust washers.

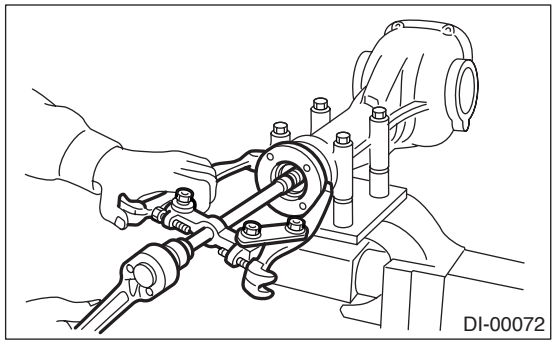


(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

12) Hold the companion flange with ST and remove the self-locking nut.
ST 498427200 FLANGE WRENCH

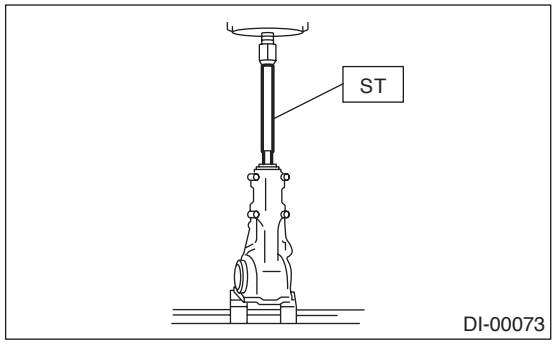


13) Extract the companion flange with a puller.



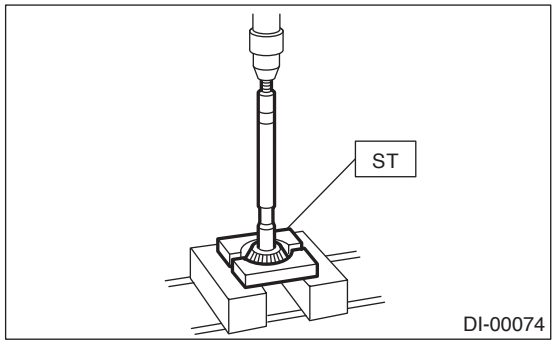
14) Press the end of drive pinion shaft and extract it together with rear bearing cone, pinion height adjust washer and washer.

NOTE:
Hold the drive pinion so as not to drop it.
ST 398467700 DRIFT

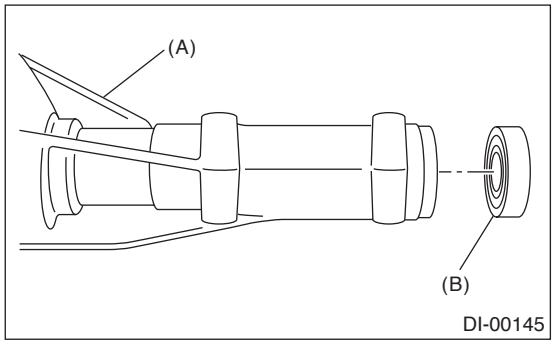


15) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.
ST 398517700 REPLACER

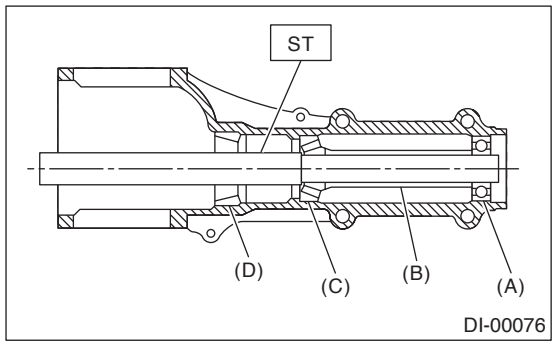


16) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER ASSY



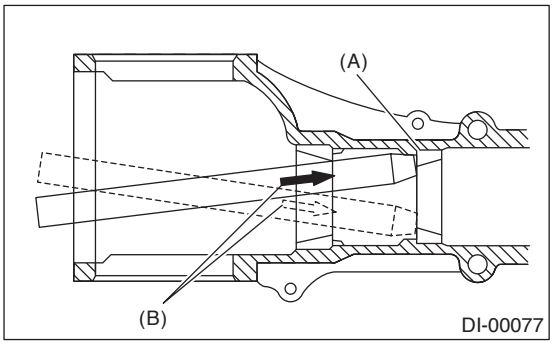
(A) Differential carrier
(B) Front oil seal

17) Remove the pilot bearing together with front bearing cone and collar using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Collar
(C) Front bearing
(D) Rear bearing cup

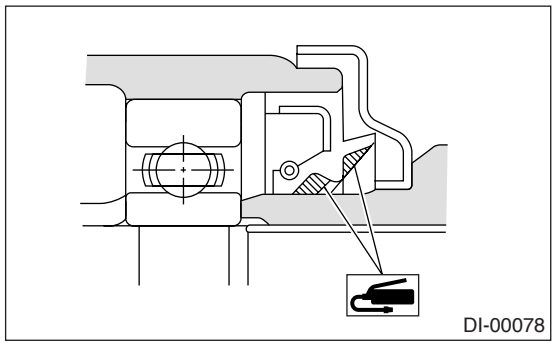
18) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case using a brass bar.



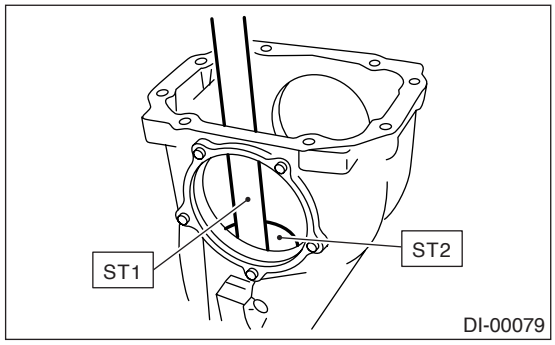
(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar

D: ASSEMBLY

NOTE:
• Assemble in the reverse order of disassembly.
• Check and adjust each part during assembly.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil to the bearings and thrust washers when installing them.
• Be careful not to mix up the bearing races RH and LH.
• Use new O-rings and gasket.
• Replace the oil seals with new ones at every disassembly. Apply grease to the lips when installing the oil seals.
• Be careful not to mix up the differential oil seal RH and LH.



1) Adjusting preload for front and rear bearings:
Adjust the bearing preload with collar and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.
(1) Press the rear bearing race into differential carrier with ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



(2) Install the front bearing race to differential carrier using ST1 and ST2.
ST1 398477701 HANDLE
ST2 398477702 DRIFT

(3) Measure and record the thickness of pinion height adjust washer.

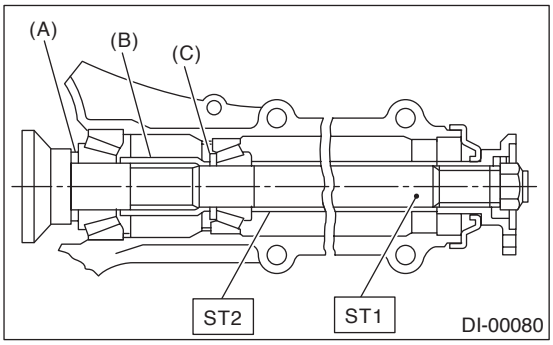
NOTE:
If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

(4) Insert the ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

NOTE:
Use new rear bearing cone.

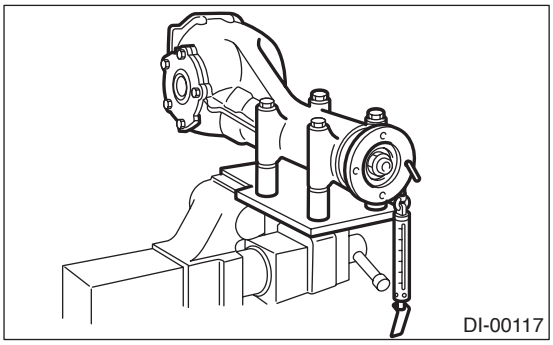
(5) Install the preload adjusting collar and washer, front bearing cone, ST2, companion flange, and washer and drive pinion nut.

ST1 398507702 DUMMY SHAFT
ST2 398507703 DUMMY COLLAR



(A) Pinion height adjusting washer
(B) Preload adjusting collar
(C) Preload adjusting washer

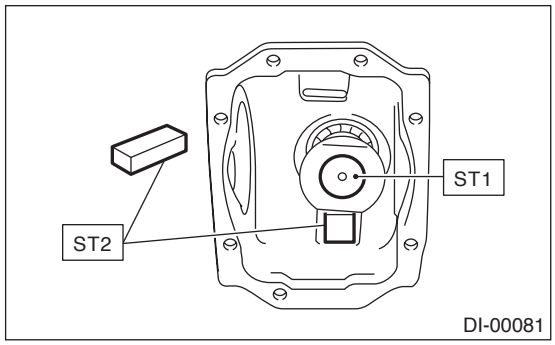
(6) Turn the ST1 with hand to make it seated, and tighten the self-locking nut while measuring the preload with spring balance. Select the preload adjusting washer and collar so that the specified preload is obtained when nut is tightened to the specified torque.



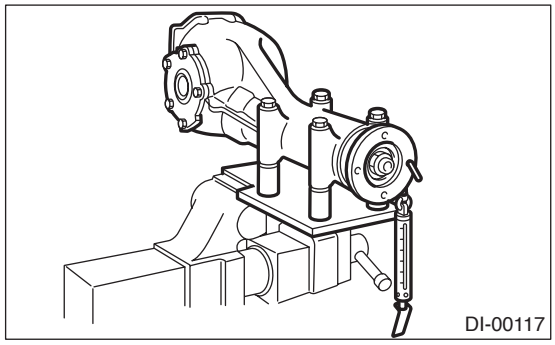
NOTE:
• Use a new self-locking nut.
• Be careful not to give excessive preload.
• When tightening the self-locking nut, lock ST1 with ST2 as shown in the figure.
• Measure the preload in direction of tangent to flange.

ST1 398507702 DUMMY SHAFT
ST2 398507704 BLOCK

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



Drive pinion bearing preload
18.1 — 38.8 N (1.8 — 4.0 kgf, 4.1 — 8.7 lb) at companion flange bolt hole



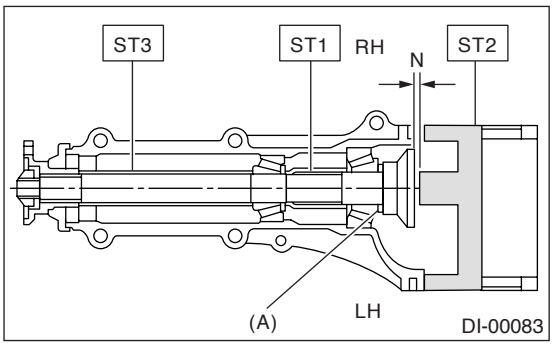
	Part No.	Thickness mm (in)
Preload adjusting washer	383705200	2.59 (0.1020)
	383715200	2.57 (0.1012)
	383725200	2.55 (0.1004)
	383735200	2.53 (0.0996)
	383745200	2.51 (0.0988)
	383755200	2.49 (0.0980)
	383765200	2.47 (0.0972)
	383775200	2.45 (0.0965)
	383785200	2.43 (0.0957)
	383795200	2.41 (0.0949)
	383805200	2.39 (0.0941)
	383815200	2.37 (0.0933)
	383825200	2.35 (0.0925)
	383835200	2.33 (0.0917)
	383845200	2.31 (0.0909)

	Part No.	Length mm (in)
Preload adjusting collar	383695201	56.2 (2.213)
	383695202	56.4 (2.220)
	383695203	56.6 (2.228)
	383695204	56.8 (2.236)
	383695205	57.0 (2.244)
	383695206	57.2 (2.252)

2) Adjusting drive pinion height:
Adjust the drive pinion height with washer installed between the rear bearing cone and the back of pinion gear.

(1) Install the ST2.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE
ST3 398507703 DUMMY COLLAR

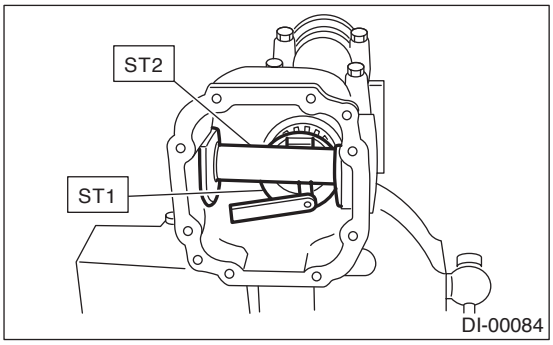


(A) Pinion height adjusting washer

(2) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST2.

ST1 398507702 DUMMY SHAFT
ST2 398507701 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed washer with this one.
$T = To + N - (H \times 0.01) - 0.20$ mm

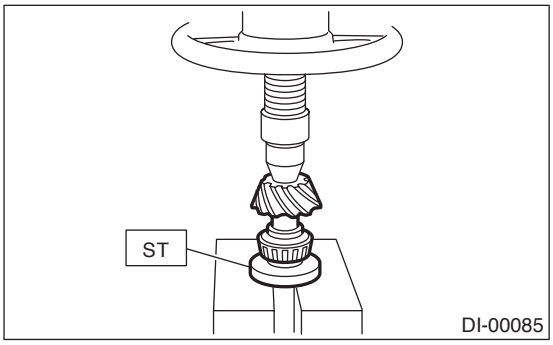
NOTE:
Use copies of this page.

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporally inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
H	Figure marked on drive pinion head	
Memo:		

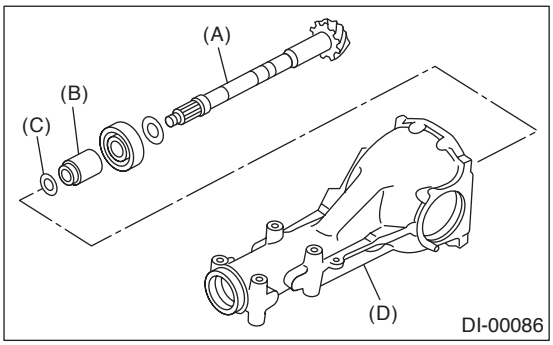
(Example of calculation)
To = 2.20 + 1.20 = 3.40 mm
N = 0.23 mm H = + 1
T = 3.40 + 0.23 − 0.01 − 0.20 = 3.42
Result: Thickness = 3.42 mm
Therefore use the pinion height adjusting washer of part number 383605200.

Pinion height adjusting washer	
Part No.	Thickness mm (in)
383495200	3.09 (0.1217)
383505200	3.12 (0.1228)
383515200	3.15 (0.1240)
383525200	3.18 (0.1252)
383535200	3.21 (0.1264)
383545200	3.24 (0.1276)
383555200	3.27 (0.1287)
383565200	3.30 (0.1299)
383575200	3.33 (0.1311)
383585200	3.36 (0.1323)
383595200	3.39 (0.1335)
383605200	3.42 (0.1346)
383615200	3.45 (0.1358)
383625200	3.48 (0.1370)
383635200	3.51 (0.1382)
383645200	3.54 (0.1394)
383655200	3.57 (0.1406)
383665200	3.60 (0.1417)
383675200	3.63 (0.1429)
383685200	3.66 (0.1441)

3) Install the selected pinion height adjusting washer on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

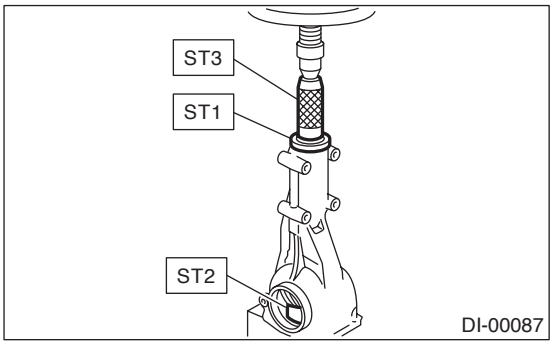


4) Insert the drive pinion into differential carrier, install the selected bearing preload adjusting collar and washer.

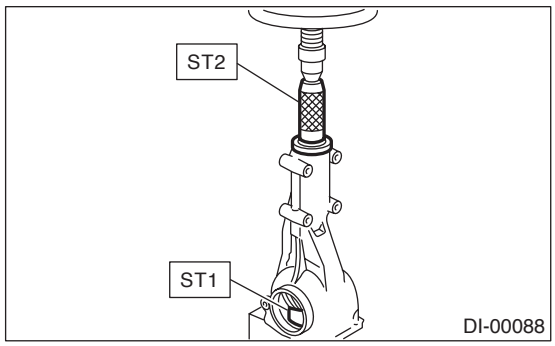


(A) Drive pinion
(B) Bearing preload adjusting collar
(C) Bearing preload adjusting washer
(D) Differential carrier

5) Press-fit the front bearing cone into case with ST1, ST2 and ST3.
ST1 398507703 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER

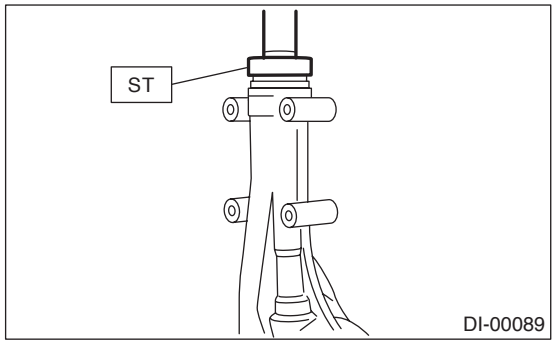


6) Insert the collar, then press-fit the pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



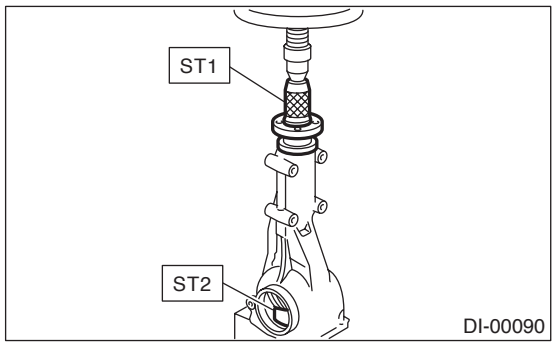
7) Fit a new oil seal with ST.

NOTE:
• Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease to the oil seal lips.
ST 498447120 INSTALLER



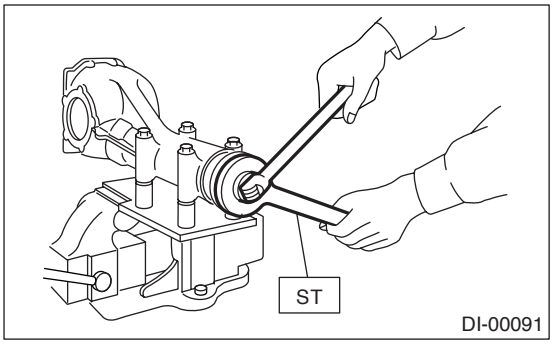
8) Press-fit the companion flange with ST1 and ST2.

NOTE:
Be careful not to damage the bearing.
ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



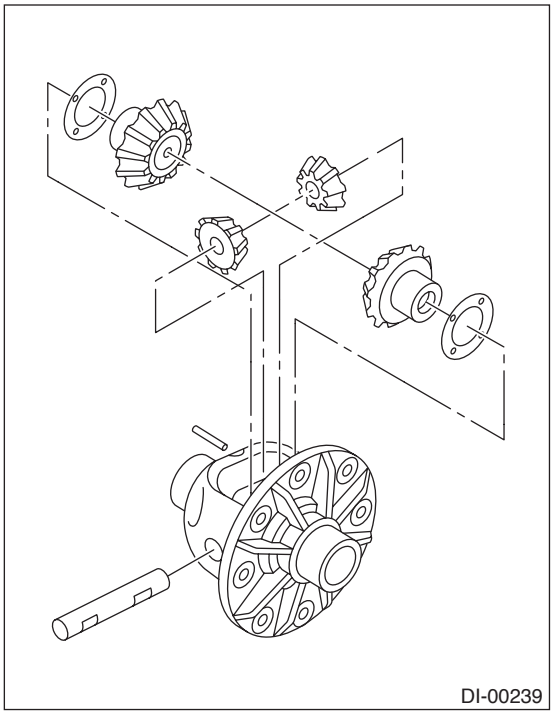
9) Install a new self-locking nut and secure the companion flange using ST and tighten the nut.
ST 498427200 FLANGE WRENCH

Tightening torque:
181 N·m (18.5 kgf-m, 134 ft-lb)



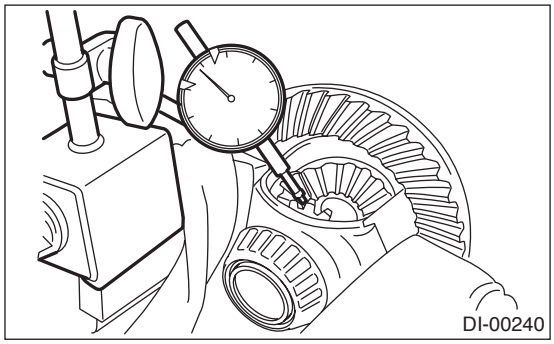
10) Assembling differential case
Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case. (Model without LSD)

NOTE:
• Apply gear oil on both sides of the washer and on the side gear shaft before installing.
• Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



(2) Adjust the side gear backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
383445201	0.75 — 0.80 (0.0295 — 0.0315)
383445202	0.80 — 0.85 (0.0315 — 0.0335)
383445203	0.85 — 0.90 (0.0335 — 0.0354)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting the pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.

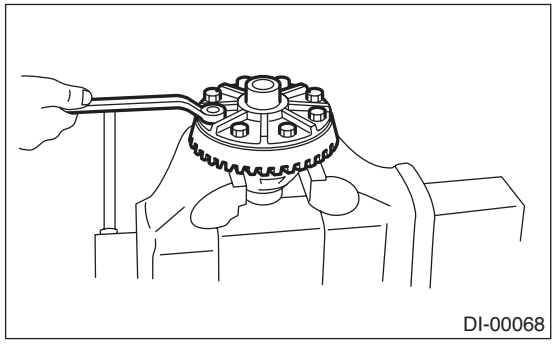
11) Install the hypoid driven gear to differential case.

NOTE:
• Before installing bolts, apply Lock Tite to bolt threads.

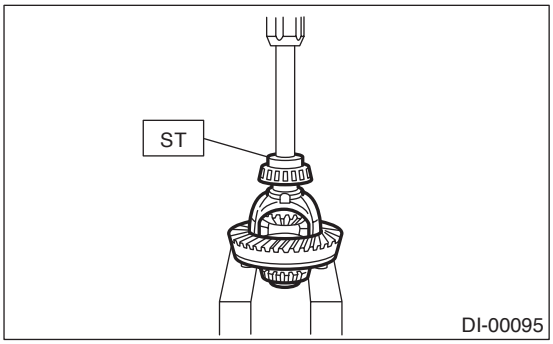
Lock Tite:
THREE BOND 1324 (Part No. 004403042)

• Tighten diagonally while tapping the bolt heads.

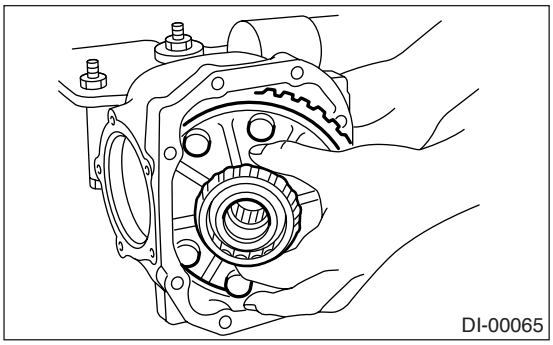
Tightening torque:
105 N·m (10.7 kgf-m, 77.4 ft-lb)



12) Press the side bearing into differential case using ST.
ST 398227700 DRIFT



13) Press-fit the side bearing cone to the side bearing retainer using ST.
ST 398437700 DRIFT
14) Adjusting the side bearing retainer shims
(1) The hypoid driven gear backlash and side bearing preload can be adjusted by the side bearing retainer shim thickness.
(2) Install the differential assembly into differential carrier in the reverse order of disassembly.



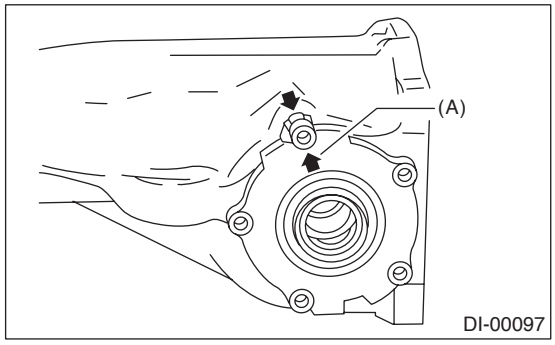
(3) Install the side bearing retainer shims to retainers RH and LH from which they were removed.

NOTE:
Replace the broken or corroded side retainer shim with a new one of same thickness.

Side bearing retainer shim	
Part No.	Thickness mm (in)
383475201	0.20 (0.0079)
383475202	0.25 (0.0098)
383475203	0.30 (0.0118)
383475204	0.40 (0.0157)
383475205	0.50 (0.0197)

(4) Align the arrow mark on differential carrier with the mark on side retainer during installation.

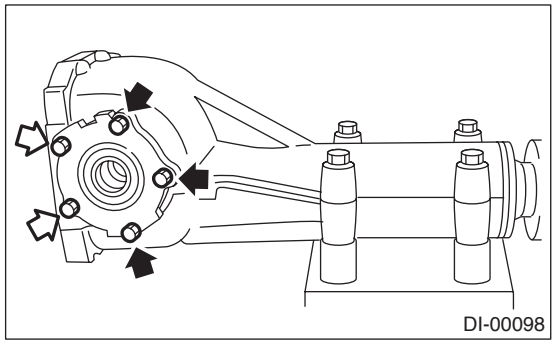
NOTE:
Be careful that side bearing outer race is not damaged by bearing roller.



(A) Arrow mark

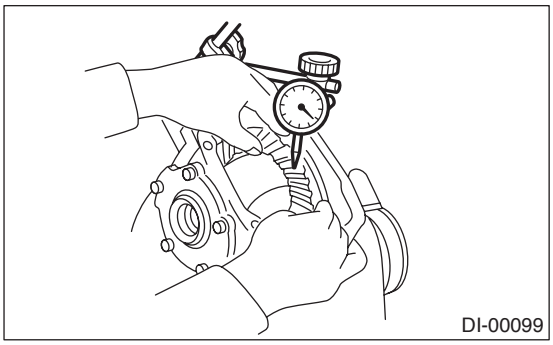
(5) Tighten the side bearing retainer bolts.

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



(6) Measure the hypoid driven gear to drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.
If the backlash exceeds 0.2 mm (0.08 in), reduce the thickness of shim on the back face of hypoid driven gear and increase the thickness of shim on the tooth face of hypoid driven gear. If the backlash is less than 0.1 mm (0.004 in), increase the thickness of shim on the back face of hypoid driven gear and reduce the thickness of shim on the tooth face of hypoid driven gear.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)

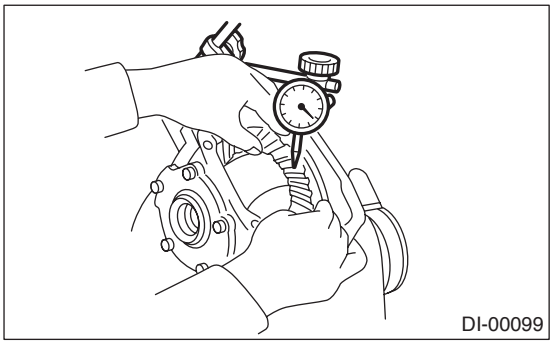


(7) At the same time, measure the total preload of drive pinion. Compared with the resistance when differential case is not installed, if the total preload is not within specification, adjust the thickness of side bearing retainer shims, increasing/reducing by an even amount at a time.

Total preload:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lb)

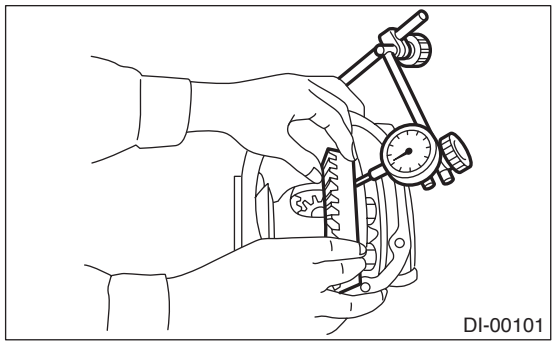
15) Recheck the hypoid driven gear to drive pinion backlash.

Backlash:
0.10 — 0.20 mm (0.0039 — 0.0079 in)



16) Check the hypoid driven gear runout on its back surface, and make sure that pinion and hypoid driven gear rotates smoothly.
If the hypoid driven gear runout on its back surface exceed the specification, verify that there is any foreign material between hypoid driven gear and differential case, and they are not deformed.

Hypoid driven gear runout on its back surface:
0.05 mm (0.0020 in)

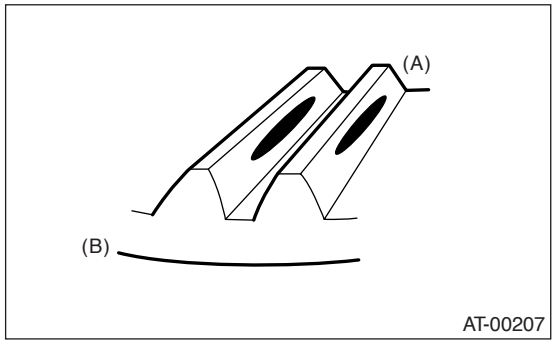


17) Checking and adjusting the tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust.

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

Checking item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

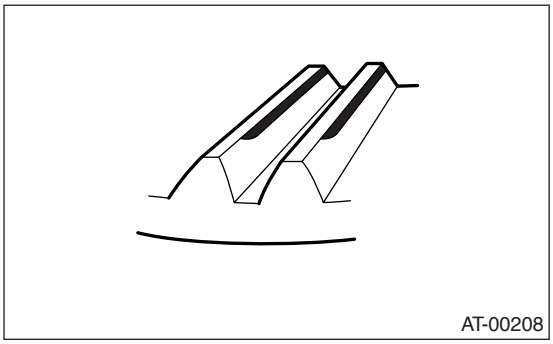


(A) Toe side
(B) Heel side

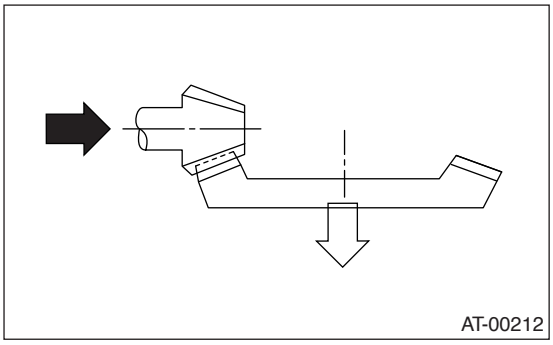
• Face contact

Checking item: Backlash is too large.

Contact pattern



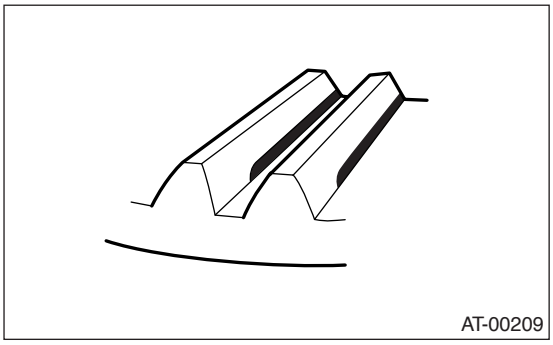
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



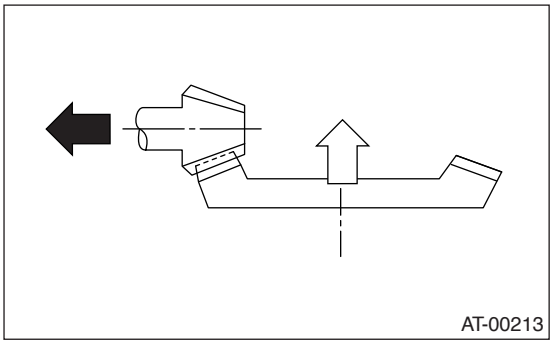
• Flank contact

Checking item: Backlash is too small.

Contact pattern



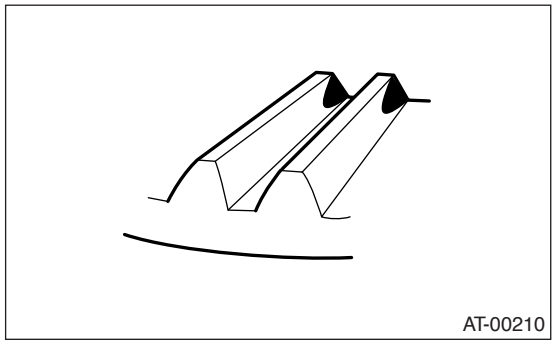
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



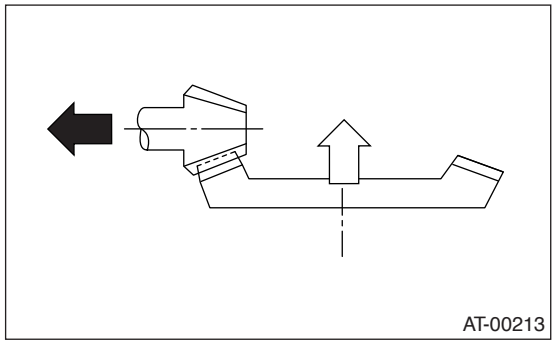
• Toe contact (inside end contact)

Checking item: Contact areas is small

Contact pattern



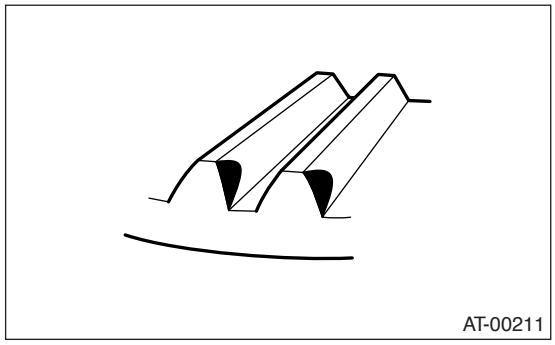
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



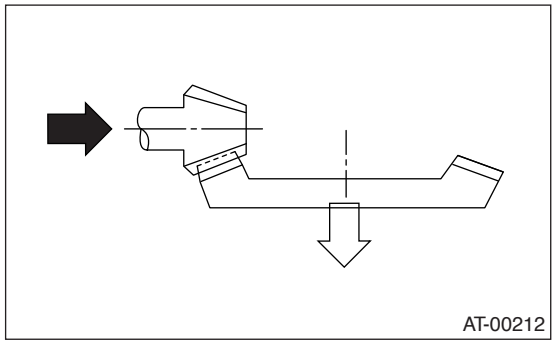
• Heel contact (outside end contact)

Checking item: Contact areas is small

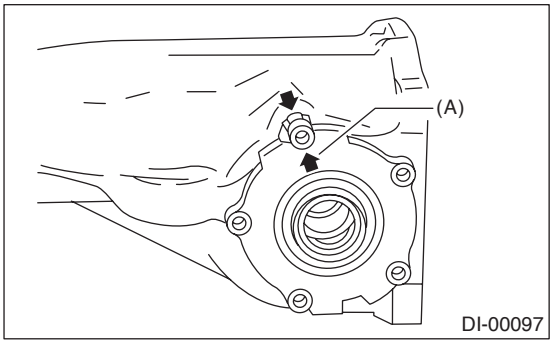
Contact pattern



Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



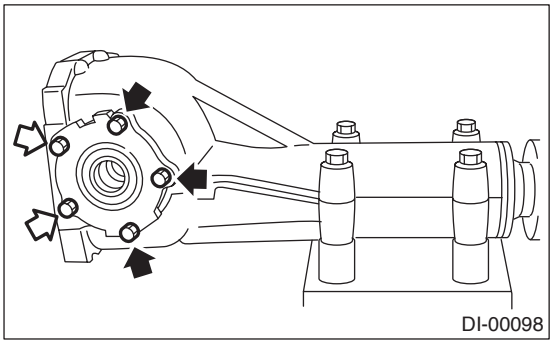
18) If proper tooth contact is not obtained, once again adjust the drive pinion height by changing RH and LH side bearing retainer shims and the hypoid gear backlash.
19) Remove the RH and LH side bearing retainer.
20) Install a new O-ring to side bearing retainer of both side.
21) Using the ST, install the oil seal to the side bearing retainer of both side.
ST 398437700 DRIFT
22) Align the arrow mark on differential carrier with the mark on side retainer during installation.



(A) Arrow mark

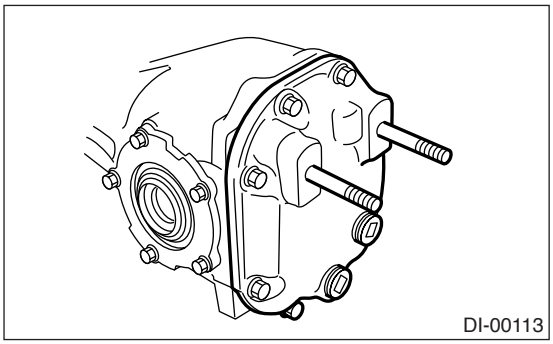
23) Tighten the side bearing retainer bolts.

Tightening torque:
10.3 N·m (1.05 kgf-m, 7.6 ft-lb)



24) Install the new gasket and rear cover to the differential carrier, and tighten the bolts to specified torque.

Tightening torque:
29 N·m (3.0 kgf-m, 21.7 ft-lb)



25) Install the breather cap.
26) Install the drain plug and filler plug.

Tightening torque:
49 N·m (5.0 kgf-m, 36.2 ft-lb)

E: INSPECTION

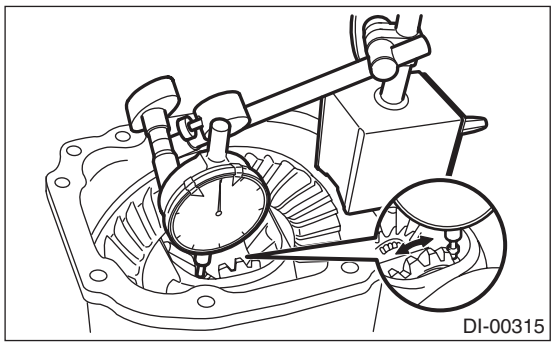
Wash all the disassembled parts clean, and examine them for wear, damage and other defects. Repair or replace the defective parts as necessary.
1) Hypoid driven gear and drive pinion
• If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact. Replace the gear if excessively worn or incapable of adjustment.
• If crack, score or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
• Replace if crack, score or other defects are evident on tooth surface.
• Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearings
Replace if seizure, peeling, wear, rust, dragging during rotation, noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear:
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear. (Model without LSD)

Side gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the side gear backlash is not within the specification, adjust it as specified by selecting side gear thrust washer.

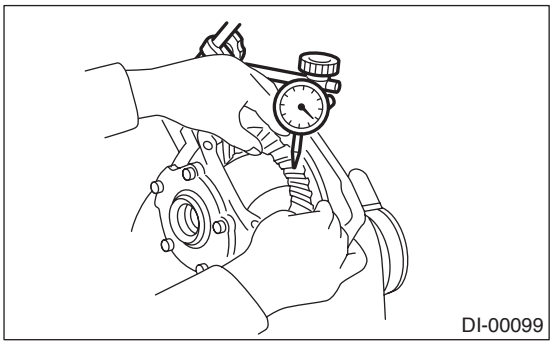

DI-00315

2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of hypoid driven gear.

Hypoid driven gear backlash:
0.1 — 0.2 mm (0.004 — 0.008 in)

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.

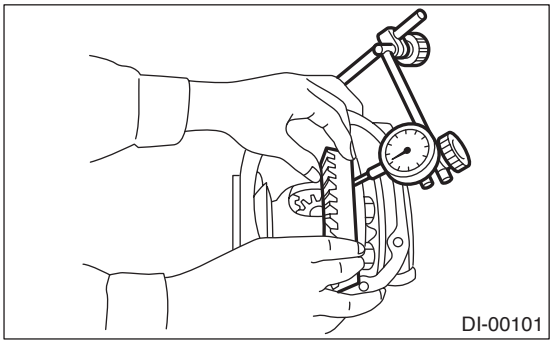

DI-00099

3. HYPOID DRIVEN GEAR RUNOUT ON ITS BACK SURFACE

Using a dial gauge, check the hypoid driven gear runout on its back surface.

Hypoid driven gear runout on its back surface:
0.05 mm (0.0020 in)

If the hypoid driven gear runout exceeds 0.05 mm (0.0020 in), replace the hypoid driven gear.


DI-00101

4. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

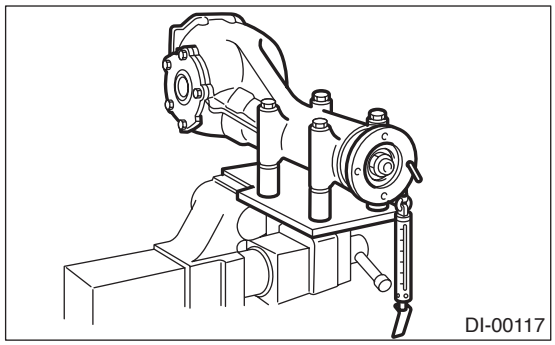
Inspect the tooth contact between hypoid driven gear and drive pinion. <Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

5. TOTAL PRELOAD

Using a spring balance, check the total preload.

Total preload:
20.7 — 54.4 N (2.1 — 5.5 kgf, 4.7 — 12.2 lb)

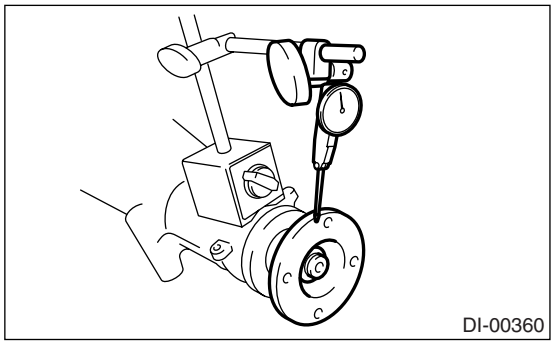
If the total preload is not within the specification, adjust the side bearing retainer shims.


DI-00117

6. COMPANION FLANGE

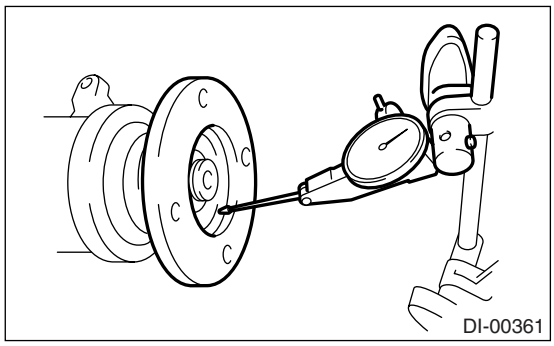
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.0031 in)


DI-00360

3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.0031 in)



4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point where the runout is within the limit.
5) If the runout exceeds the limit after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash.
<Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash.
<Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear.
<Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

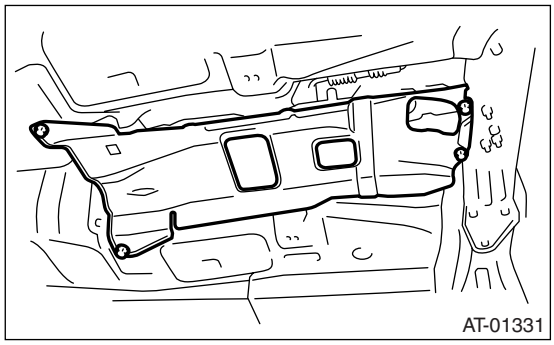
4. TOTAL PRELOAD

Adjust the side bearing shim.
<Ref. to DI-35, ASSEMBLY, Rear Differential (T-type).>

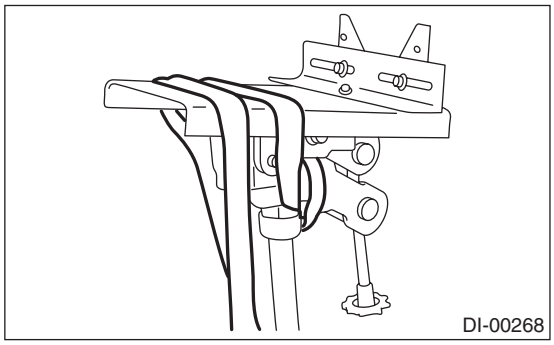
5. Rear Differential (VA-type)

A: REMOVAL

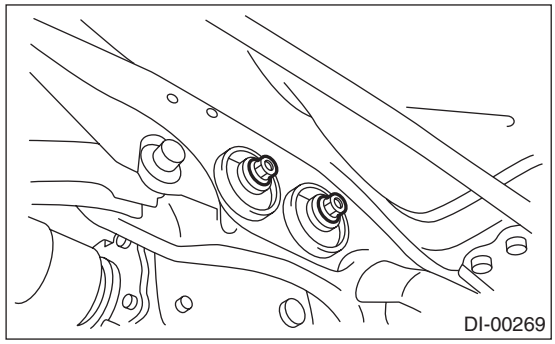
1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to neutral.
3) Loosen the wheel nuts.
4) Release the parking brake.
5) Jack-up the vehicle and support it with rigid racks.
6) Remove the rear wheels.
7) Remove the rear exhaust pipe and muffler.
8) Remove the heat shield cover.



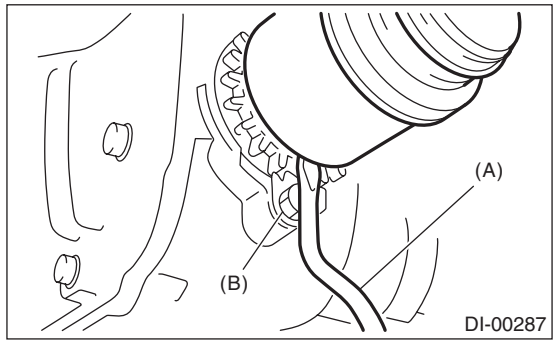
9) Remove the propeller shaft.
<Ref. to DS-10, REMOVAL, Propeller Shaft.>
10) Prepare the transmission jack and band.



11) Loosen the self-locking nuts which hold the rear differential to rear crossmember.

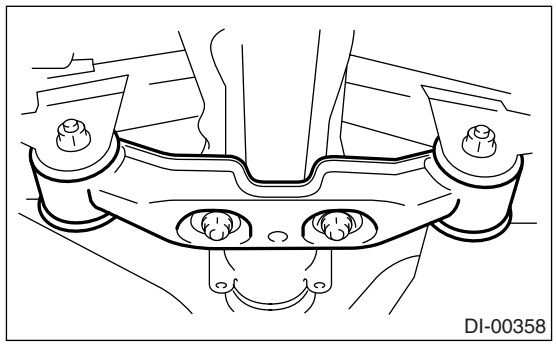


12) Remove the DOJ of rear drive shaft from rear differential.

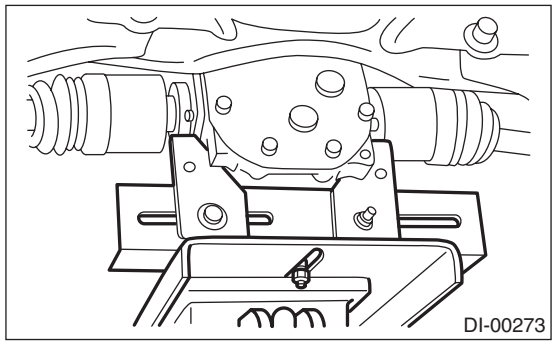


(A) Tire lever
(B) Bolt

13) Remove the nuts which hold the rear differential front member.



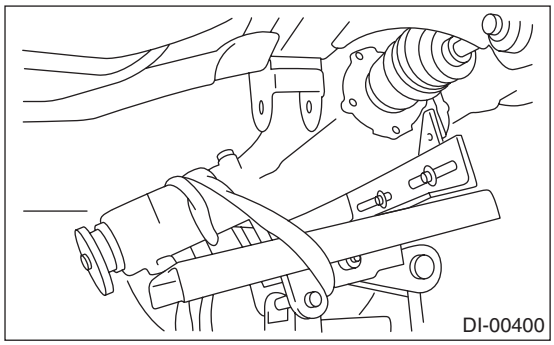
14) Support the rear differential with transmission jack.



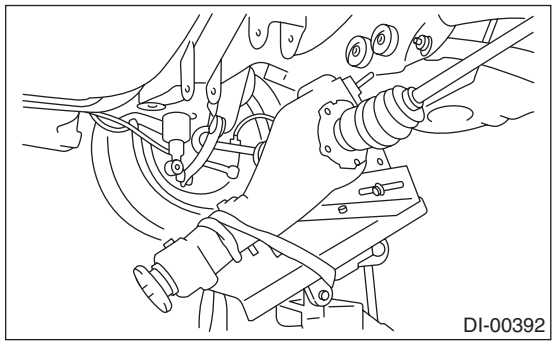
15) Remove the rear differential front member.
16) Secure the rear differential using band.
17) Remove the self-locking nuts which hold the rear differential to rear crossmember.

18) Remove the rear differential stud bolt from rear crossmember bushing.

NOTE:
When removing the stud bolt, carefully adjust the angle and location of transmission jack and jack stand, if necessary.

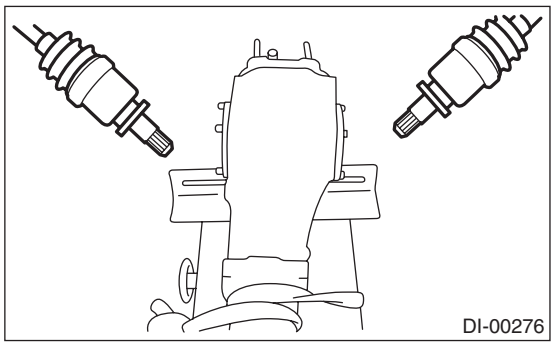


19) Lower the transmission jack stand after removing the rear differential stud bolt from rear crossmember. Rear drive shaft should not come into contact with lateral link bolt.



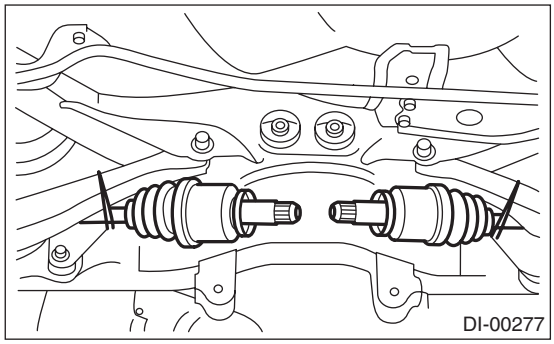
20) Pull out the axle shaft from rear differential.

NOTE:
If it is difficult to remove the axle shaft from rear differential, remove it using tire lever.

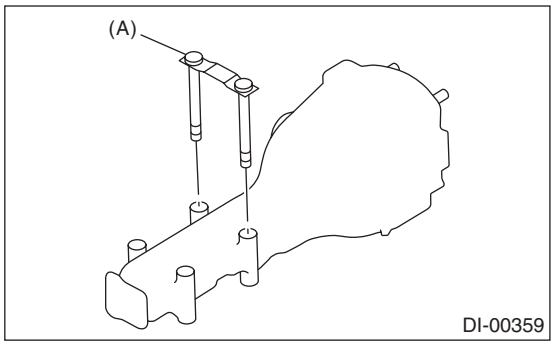


21) Lower the transmission jack.

22) Secure the rear drive shaft to lateral link using wire.



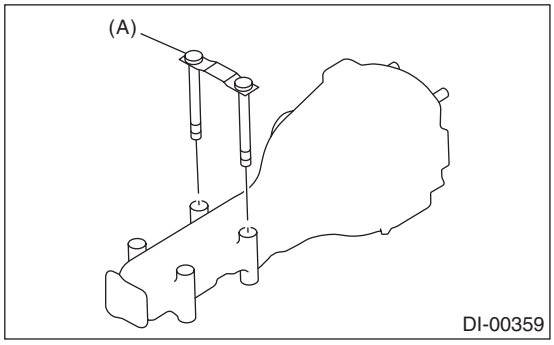
23) Remove the rear differential member plate from rear differential.



(A) Rear differential member plate

B: INSTALLATION

1) Insert the rear differential member plate into rear differential.

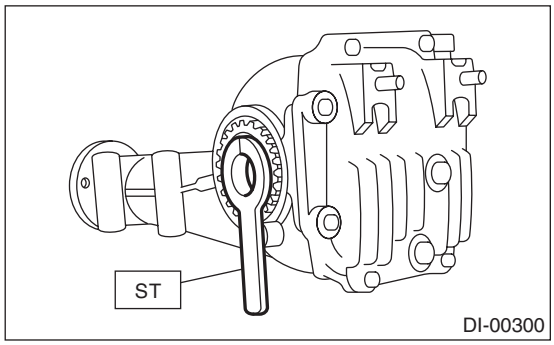


(A) Rear differential member plate

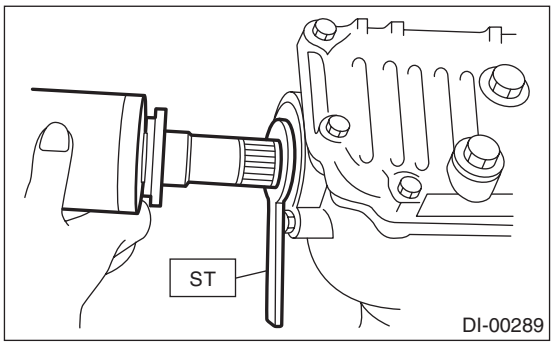
2) Set the rear differential to transmission jack.

NOTE:
Secure the rear differential to transmission jack using band.

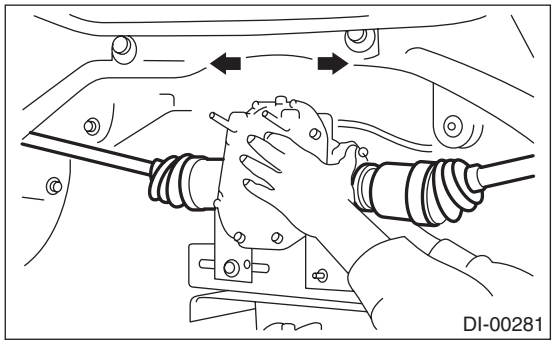
3) Install the ST to rear differential.
ST 28099PA090 OIL SEAL PROTECTOR



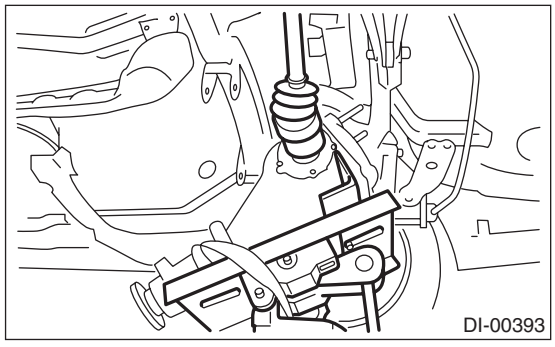
4) Insert the spline shaft until the spline portion comes inside the side oil seal.
ST 28099PA090 OIL SEAL PROTECTOR



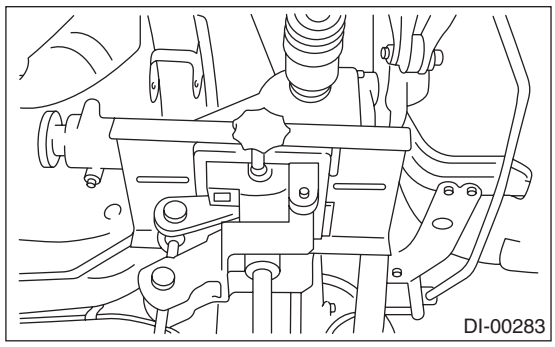
5) Remove ST from rear differential.
ST 28099PA090 OIL SEAL PROTECTOR
6) Push the rear differential to insert the axle shaft into rear differential.



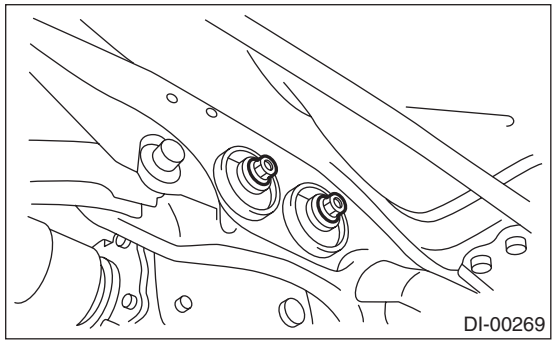
7) Adjust the transmission jack, if necessary, and insert the rear differential stud bolt into rear crossmember bushing properly.



8) After inserting the rear differential stud bolt into rear crossmember bushing, lift up the transmission jack and align the rear differential to the height of rear differential.

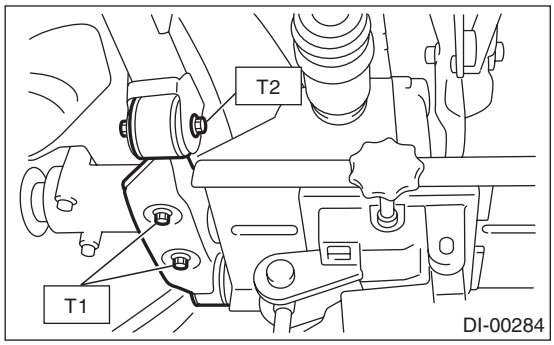


9) Tighten a new self-locking nut temporarily to rear crossmember.



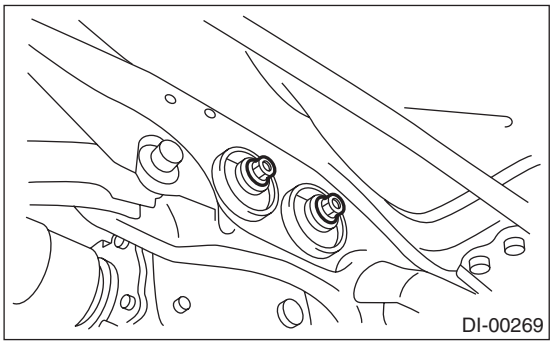
10) Remove the band from rear differential. Lift up the rear differential until the rear differential is left from the transmission jack.
11) Install the rear differential front member with a new self-locking nut.

Tightening torque:
T1: 52 N·m (5.3 kgf-m, 38 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81 ft-lb)



12) Tighten the self-locking nut.

Tightening torque:
70 N·m (7.1 kgf-m, 51 ft-lb)

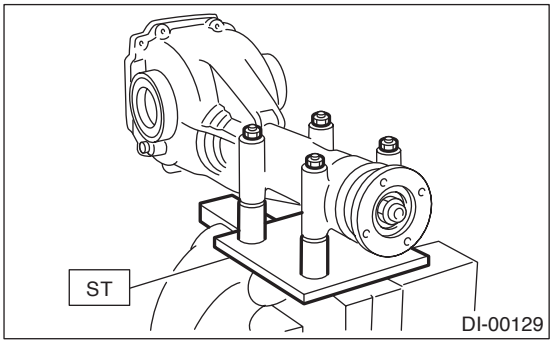


13) Lower the transmission jack.
14) Install the propeller shaft.
<Ref. to DS-11, INSTALLATION, Propeller Shaft.>
15) Install the heat shield cover.
16) Install the rear exhaust pipe and muffler.

C: DISASSEMBLY

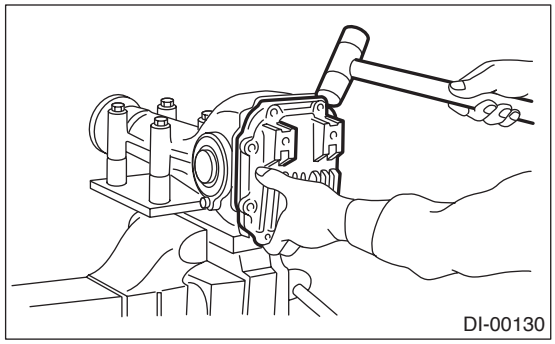
1. VA1-TYPE

To detect the real cause of trouble, inspect the following items before disassembling.
• Tooth contact and backlash between hypoid driven gear and drive pinion
• Hypoid driven gear runout on its back surface
• Total preload of drive pinion
1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



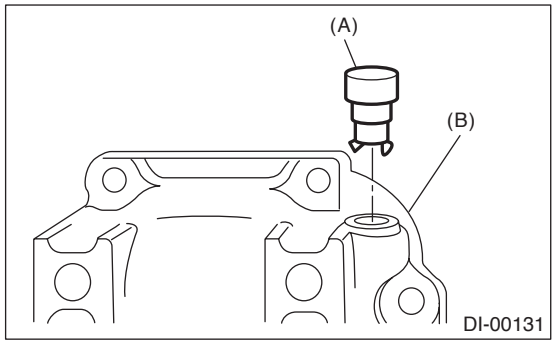
2) Drain the gear oil by removing plug.

3) Remove the rear cover by loosening retaining bolts.



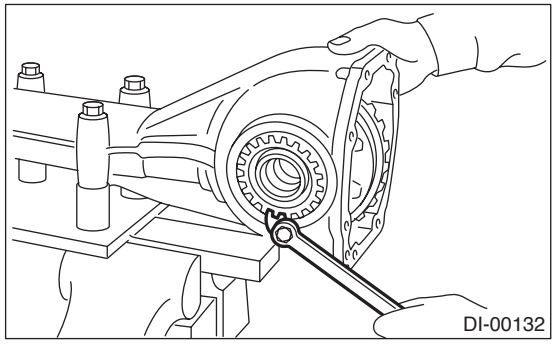
4) Remove the air breather cap.

NOTE:
• Do not attempt to remove the air breather cap unless necessary.
• When removing the air breather cap, replace it with a new one.

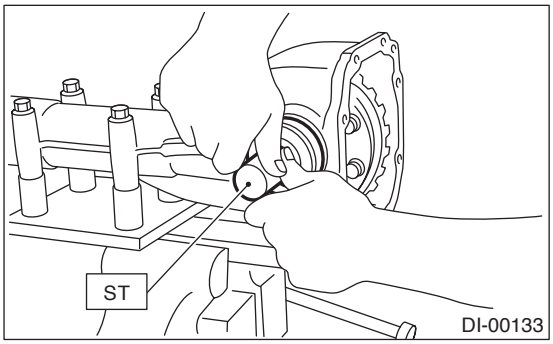


(A) Air breather cap
(B) Rear cover

5) Remove the lock plate RH and LH.

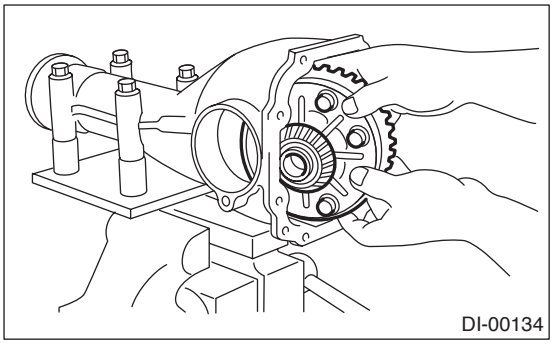


6) Remove the holder RH and LH with ST.
ST 499785500 WRENCH ASSY

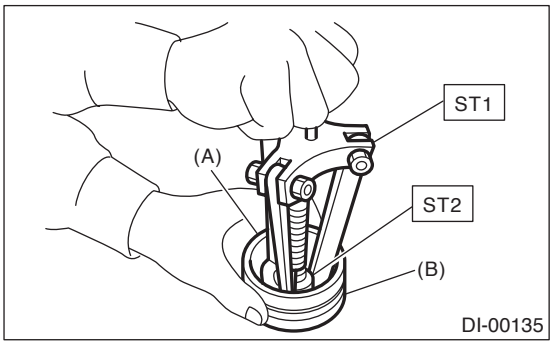


7) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.



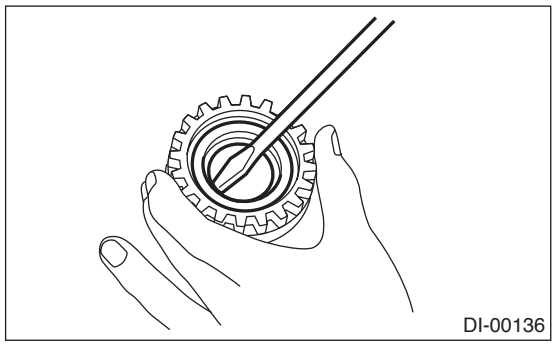
8) Remove the bearing race from holder RH and LH with ST1 and ST2.
ST1 499705401 PULLER ASSY
ST2 499705404 SEAT



(A) Bearing race
(B) Holder

9) Remove the oil seal from holder RH and LH using screwdriver.

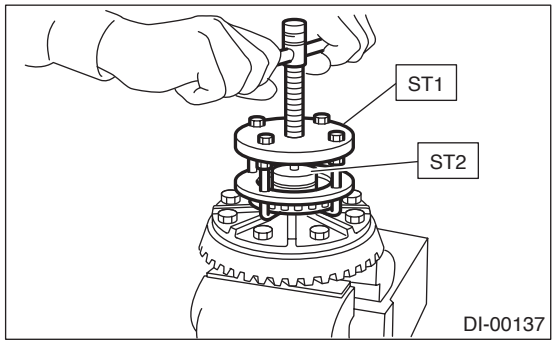
NOTE:
Perform this operation only when changing oil seal.



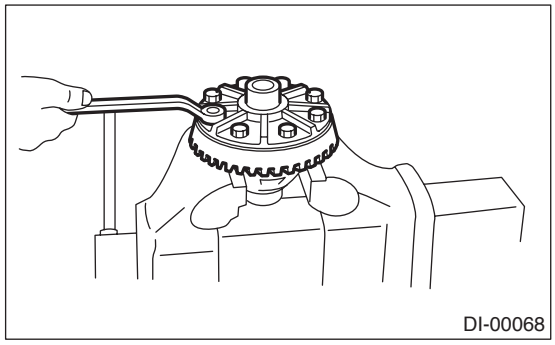
10) Extract the bearing cone with ST1 and ST2.

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Set the puller so that its claws catch the edge of the bearing cone.
• Never mix up the bearing races RH and LH and cones.

ST1 899524100 PULLER SET
ST2 399520105 SEAT



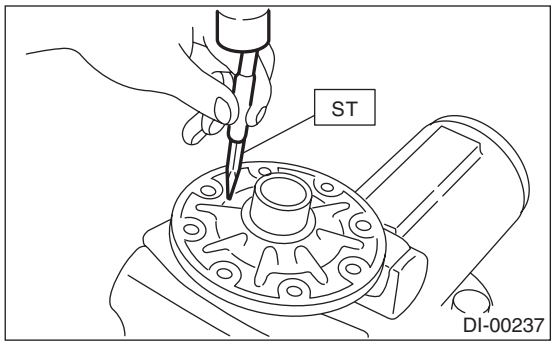
11) Remove the hypoid driven gear by loosening hypoid driven gear bolts.



12) Drive out the pinion shaft lock pin from hypoid driven gear side.

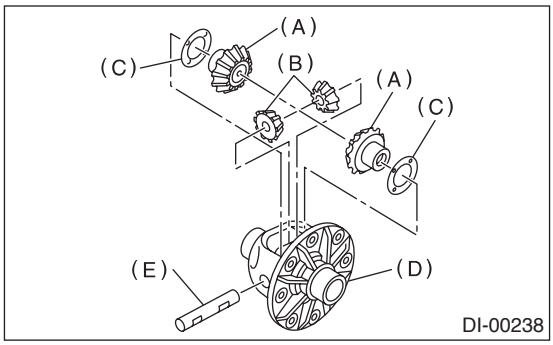
NOTE:
The lock pin is staked at the pin hole end on the differential case. do not drive it out forcibly before unstaking it.

ST 899904100 STRAIGHT PIN REMOVER



13) Draw out the pinion mate shaft and remove pinion mate gears, side gears and thrust washers.

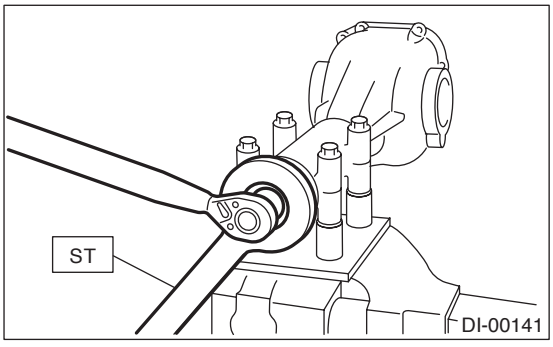
NOTE:
The gears should be marked or kept separated right and left, and front and rear as well as thrust washers.



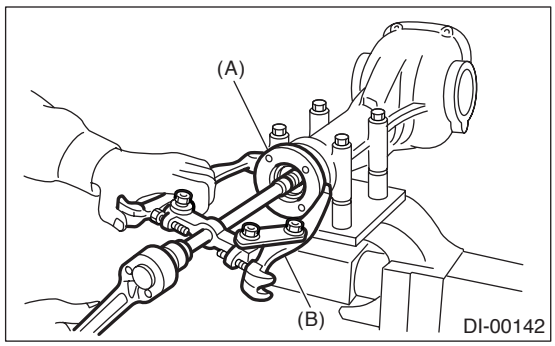
(A) Side gear
(B) Pinion mate gear
(C) Thrust washer
(D) Differential case
(E) Pinion mate shaft

14) Support the companion flange with ST and remove self-locking nut.

ST 498427200 FLANGE WRENCH



15) Extract the companion flange with a puller.

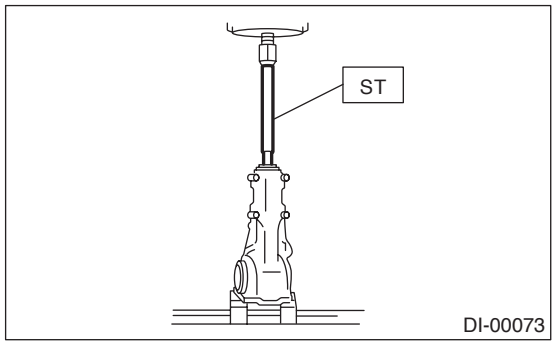


(A) Companion flange
(B) Puller

16) Press the end of drive pinion shaft and extract it together with rear bearing cone, pinion height adjust washer and washer.

NOTE:
Hold the drive pinion so as not to drop it.

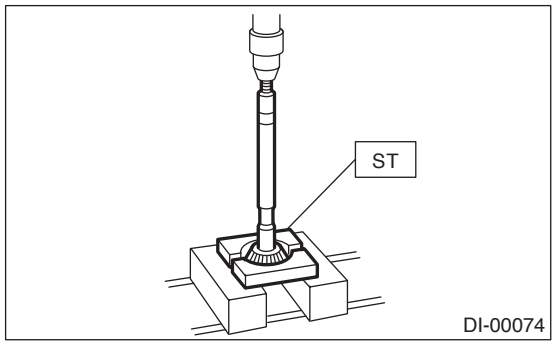
ST 398467700 DRIFT



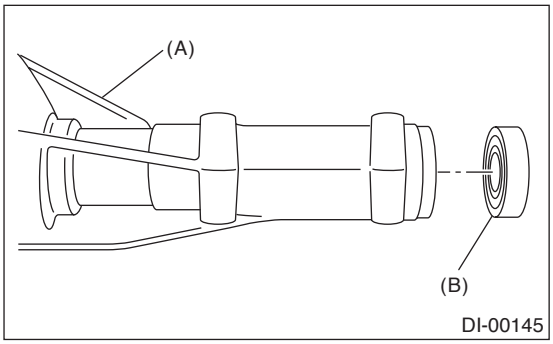
17) Remove the rear bearing cone from drive pinion by supporting the cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.

ST 498515500 REPLACER

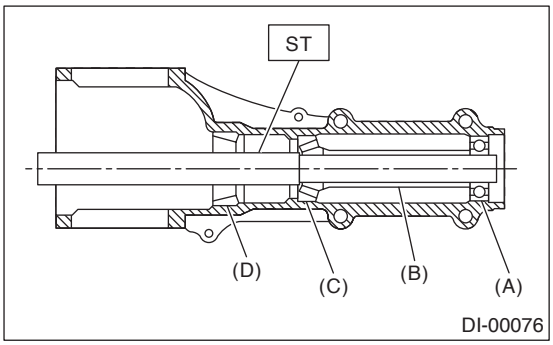


18) Remove the front oil seal from differential carrier using ST.
ST 398527700 PULLER SET



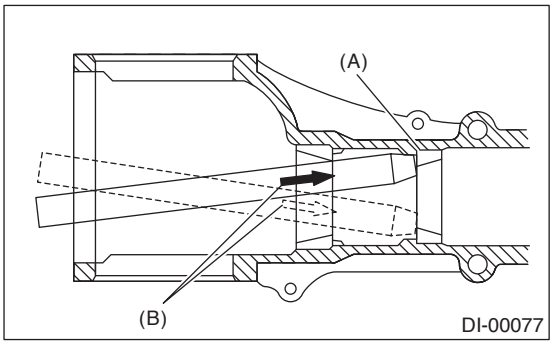
(A) Differential carrier
(B) Front oil seal

19) Remove the pilot bearing together with front bearing cone and collar using ST.
ST 398467700 DRIFT



(A) Pilot bearing
(B) Collar
(C) Front bearing
(D) Rear bearing cup

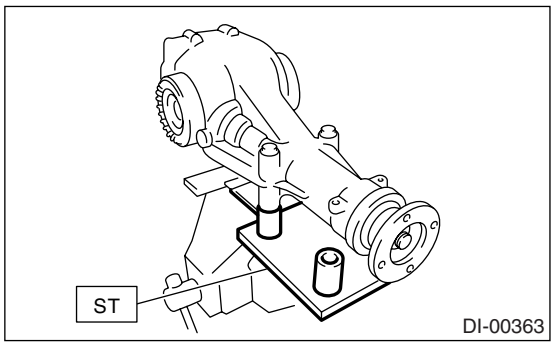
20) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case by using a brass bar.



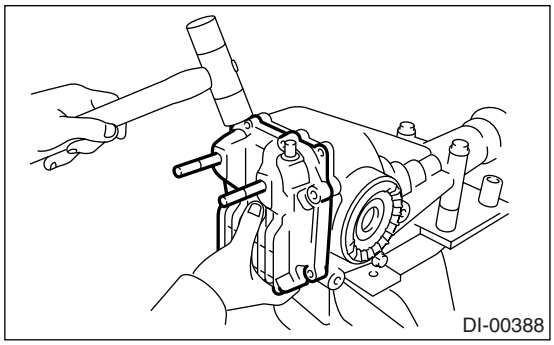
(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar

2. VA2-TYPE

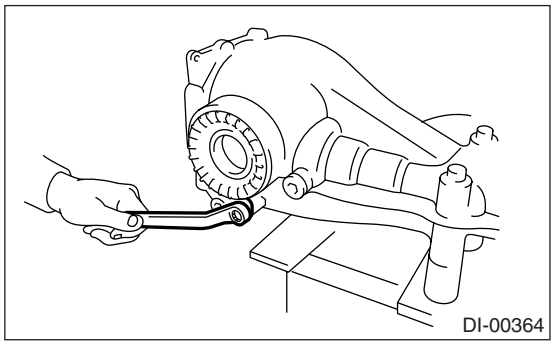
To detect the real cause of trouble, inspect the following items before disassembling.
• Tooth contact and backlash between hypoid driven gear and drive pinion
• Hypoid driven gear runout on its back surface
• Total preload of drive pinion
1) Set the ST on vise and install the differential assembly to ST.
ST 398217700 ATTACHMENT



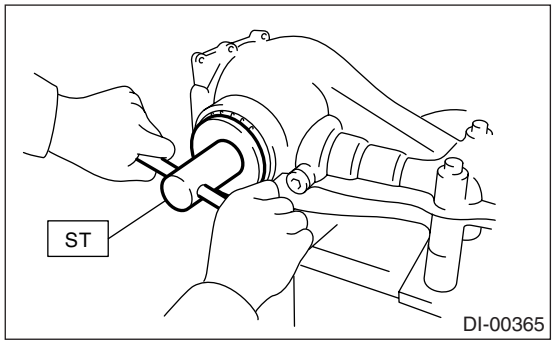
2) Drain the gear oil by removing plug.
3) Remove the rear cover by loosening retaining bolts.



4) Remove the lock plate RH and LH.

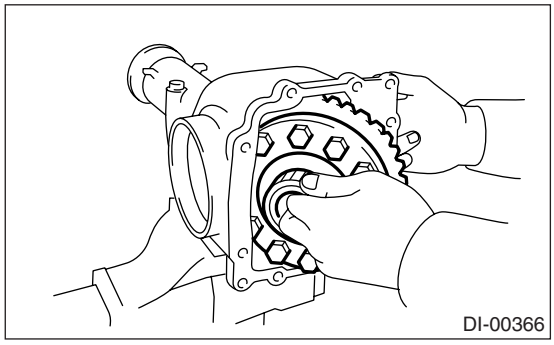


5) Remove the holder RH and LH with ST.
ST 18630AA010 WRENCH



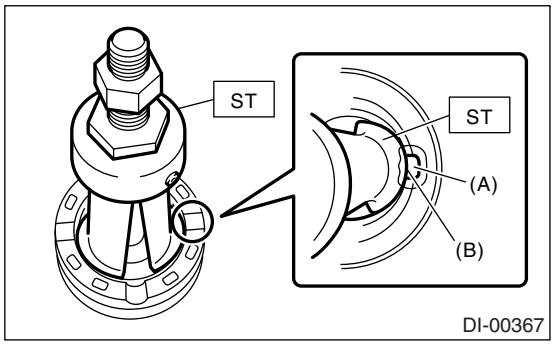
6) Pull out the differential case assembly from differential carrier.

NOTE:
Be careful not to hit the teeth against the case.

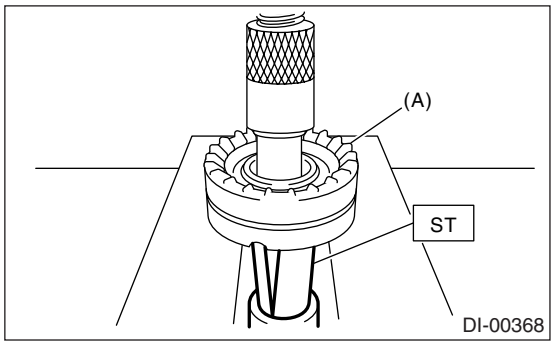


7) Remove the bearing race from holder RH and LH with ST1 and press.
ST 18758AA000 PULLER

NOTE:
• Make sure the bolt of puller turn manually.
• Set the puller so that its claws catch the groove of holder.



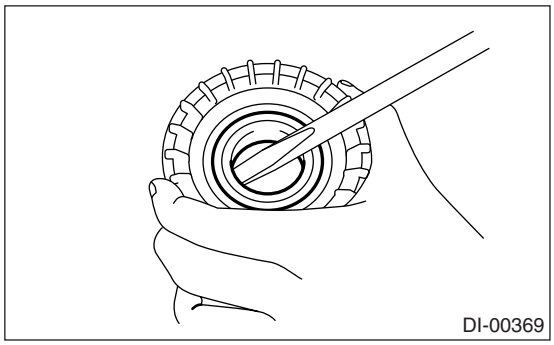
(A) Groove
(B) Claw



(A) Holder

8) Remove the oil seal from holder RH and LH using screwdriver.

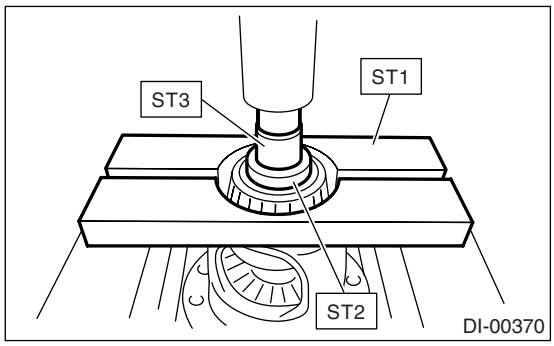
NOTE:
Perform this operation only when changing oil seal.



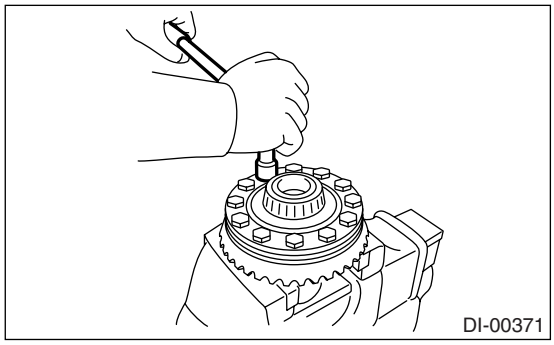
9) Extract the bearing cone with ST1, ST2 and ST3.

NOTE:
• Do not attempt to disassemble the parts unless necessary.
• Never mix up the bearing races RH and LH and cones.

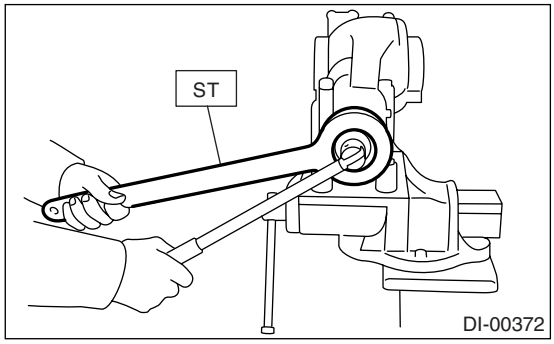
ST1 498077000 REMOVER
ST2 399520105 SEAT
ST3 899864100 REMOVER



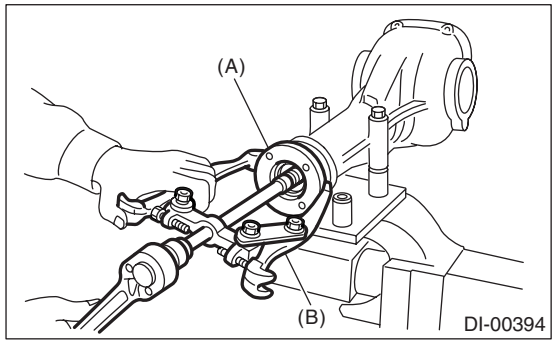
10) Remove the hypoid driven gear by loosening hypoid driven gear bolts.



11) Support the companion flange with ST and remove self-locking nut.
ST 498427200 FLANGE WRENCH



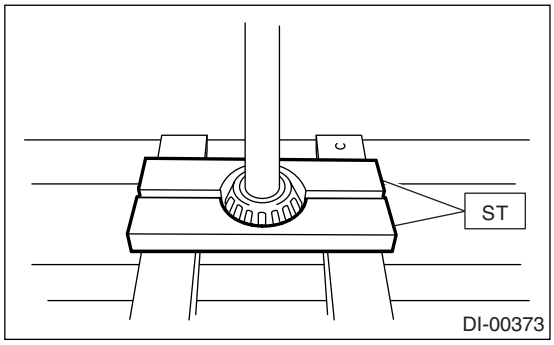
12) Extract the companion flange with a puller.



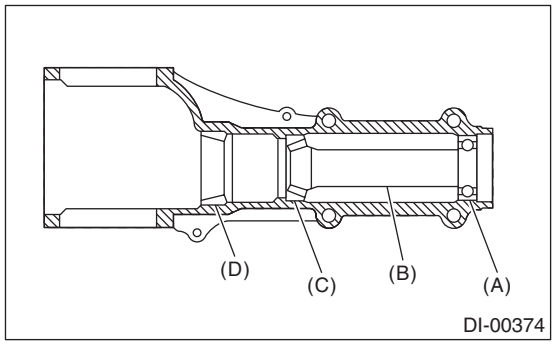
(A) Companion flange
(B) Puller

13) Removes the drive pinion shaft.
14) Remove the rear bearing cone from drive pinion by supporting cone with ST.

NOTE:
Place the replacer so that its center-recessed side faces the pinion gear.
ST 398517700 REPLACER

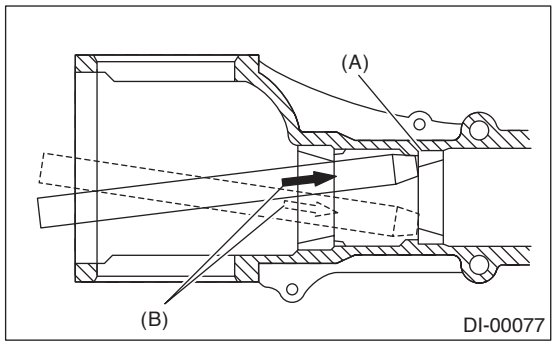


15) Remove the front oil seal from differential carrier using screwdriver.
16) Remove the pilot bearing, front bearing cone and collar.



(A) Pilot bearing
(B) Collar
(C) Front bearing
(D) Rear bearing cup

17) When replacing the bearings, hit out the front bearing cup and rear bearing cup in this order out of case by using a brass bar.

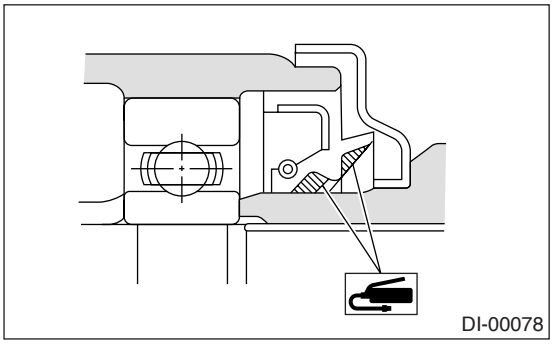


(A) 2 cutouts along diagonal lines
(B) Hit out alternately with brass bar

D: ASSEMBLY

1. VA1-TYPE

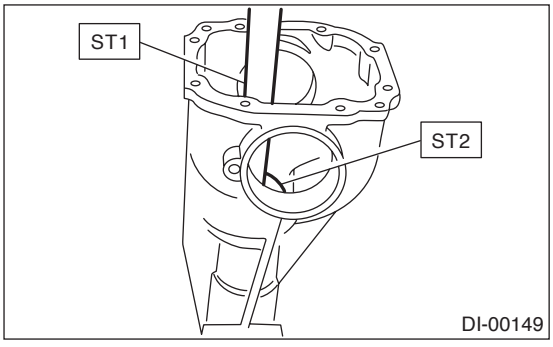
NOTE:
• Assemble in the reverse order of disassembly.
• Check and adjust each part during assembly.
• Use a new gasket.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil when installing the bearings and thrust washers.
• Be careful not to mix up the bearing races RH and LH.
• Replace the oil seal with a new one at every disassembly. Apply grease to the lips when installing the oil seal.
• Be careful not to mix up the differential oil seal RH and LH.



1) Adjusting preload for front and rear bearings:
Adjust the bearing preload with collar and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

(1) Install the rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 498447110 DRIFT



(2) Install the front bearing race to differential carrier using ST1 and ST2.

ST1 398477701 HANDLE
ST2 498447110 DRIFT

(3) Insert the front bearing cone.

NOTE:
Use new front bearing cone.

(4) Measure and record the thickness of pinion height adjust washer.

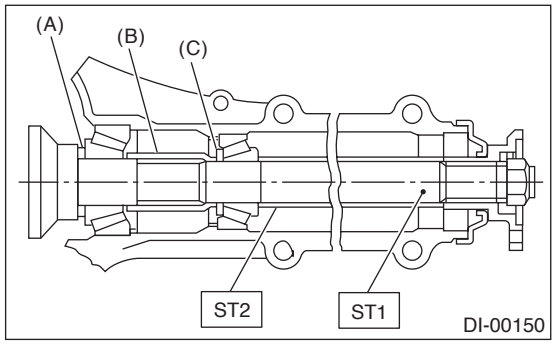
NOTE:
If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

(5) Insert the ST1 into the case with pinion height adjusting washer and rear bearing cone fitted onto it.

NOTE:
Use new rear bearing cone.

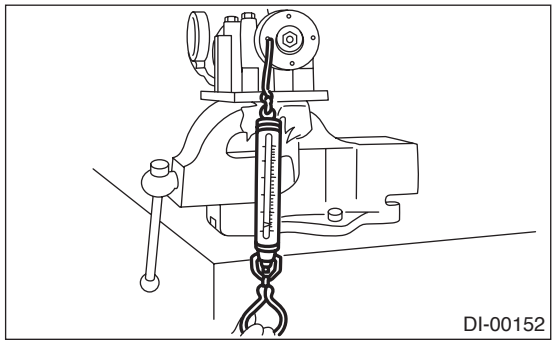
(6) Install the preload adjusting collar and washer, front bearing cone, ST2, companion flange, and washer and self-locking nut.

ST1 498447150 DUMMY SHAFT
ST2 32285AA000 DUMMY COLLAR



(A) Pinion height adjusting washer
(B) Preload adjusting collar
(C) Preload adjusting washer

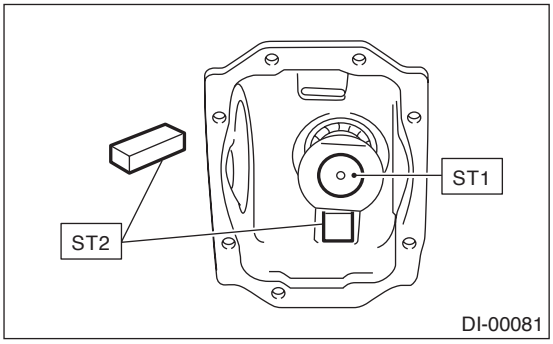
(7) Turn the ST1 with hand to make it seated, and tighten the self-locking nut while measuring the preload with spring balance. Select the preload adjusting washer and collar so that the specified preload is obtained when nut is tightened to the specified torque.



NOTE:
• Use a new self-locking nut.
• Be careful not to give excessive preload.
• When tightening the self-locking nut, lock ST1 with ST2 as shown in the figure.
• Measure the preload in direction of tangent to flange.

ST1 498447150 DUMMY SHAFT
ST2 398507704 BLOCK

Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lb)



Drive pinion bearing preload
For new bearing: 12.7 — 32.2 N (1.3 — 3.3 kgf, 2.9 — 7.3 lb) Measure at companion flange bolt hole

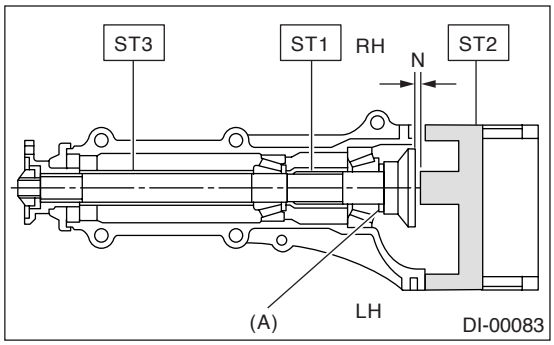
	Part No.	Thickness mm (in)
Preload adjusting washer	38336AA000	1.500 (0.0591)
	38336AA120	1.513 (0.0596)
	38336AA010	1.525 (0.0600)
	38336AA130	1.538 (0.0606)
	38336AA020	1.550 (0.0610)
	38336AA140	1.563 (0.0615)
	38336AA030	1.575 (0.0620)
	38336AA150	1.588 (0.0625)
	38336AA040	1.600 (0.0630)
	38336AA160	1.613 (0.0635)
	38336AA050	1.625 (0.0640)
	38336AA170	1.638 (0.0645)
	38336AA060	1.650 (0.0650)
	38336AA180	1.663 (0.0655)
	38336AA070	1.675 (0.0659)
	38336AA190	1.688 (0.0665)
	38336AA080	1.700 (0.0669)
	38336AA200	1.713 (0.0674)
	38336AA090	1.725 (0.0679)
	38336AA210	1.738 (0.0684)
	38336AA100	1.750 (0.0689)
	38336AA220	1.763 (0.0694)
	38336AA110	1.775 (0.0699)

	Part No.	Length mm (in)
Preload adjusting collar	32288AA040	52.3 (2.059)
	32288AA050	52.5 (2.067)
	31454AA100	52.6 (2.071)
	32288AA060	52.7 (2.075)
	31454AA110	52.8 (2.079)
	32288AA070	52.9 (2.083)
	31454AA120	53.0 (2.087)
	32288AA080	53.1 (2.091)
	32288AA090	53.3 (2.098)

2) Adjusting drive pinion height:
Adjust the drive pinion height with washer installed between the rear bearing cone and the back of pinion gear.

(1) Install the ST2.

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE
ST3 32285AA000 DUMMY COLLAR

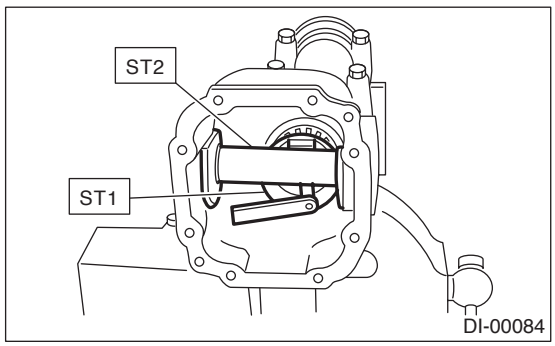


(A) Pinion height adjusting washer

(2) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST2.

ST1 498447150 DUMMY SHAFT
ST2 498505501 DIFFERENTIAL CARRIER GAUGE



(3) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed washer with this one.

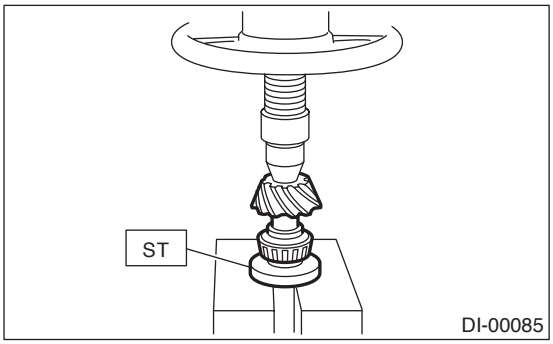
NOTE:
Adjust it using the 1 — 3 washers.
T = To + N − 0.05 (mm)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporally inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
Memo:		

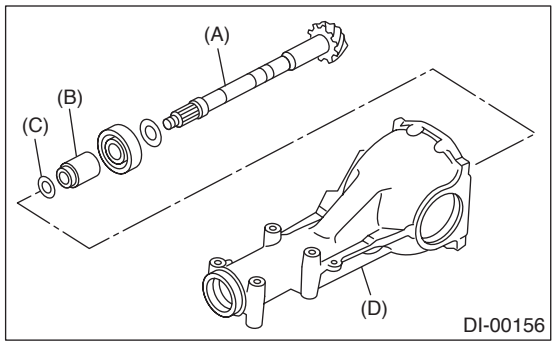
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 − 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the pinion height adjusting washer of part number 32295AA220.

Pinion height adjusting washer	
Part No.	Thickness mm (in)
32295AA200	0.150 (0.0059)
32295AA210	0.175 (0.0069)
32295AA220	0.200 (0.0079)
32295AA230	0.225 (0.0089)
32295AA240	0.250 (0.0098)
32295AA250	0.275 (0.0108)

3) Install the selected pinion height adjusting washer on drive pinion, and press the rear bearing cone into position with ST.
ST 498175500 INSTALLER

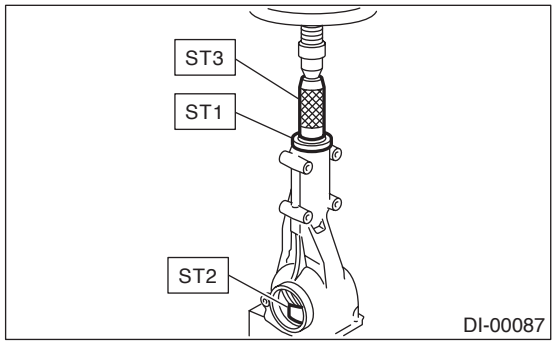


4) Insert the drive pinion into differential carrier, install the selected bearing preload adjusting collar and washer.

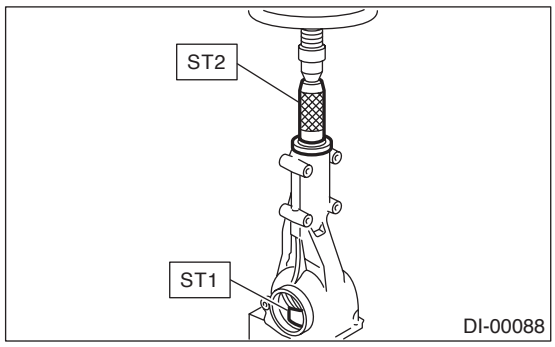


(A) Drive pinion
(B) Bearing preload adjusting collar
(C) Bearing preload adjusting washer
(D) Differential carrier

5) Press-fit the front bearing cone into carrier with ST1, ST2 and ST3.
ST1 32285AA000 DUMMY COLLAR
ST2 399780104 WEIGHT
ST3 899580100 INSTALLER



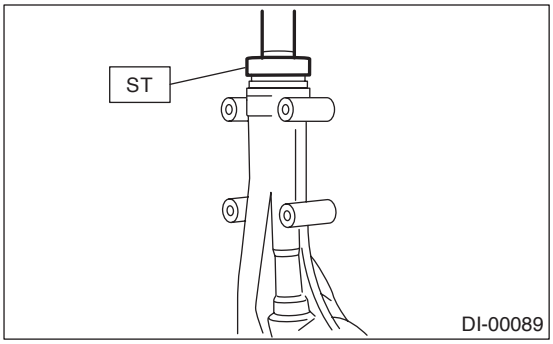
6) Insert the collar, then press-fit the pilot bearing with ST1 and ST2.
ST1 399780104 WEIGHT
ST2 899580100 INSTALLER



7) Fit a new oil seal with ST.

NOTE:
• Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease to the oil seal lips.

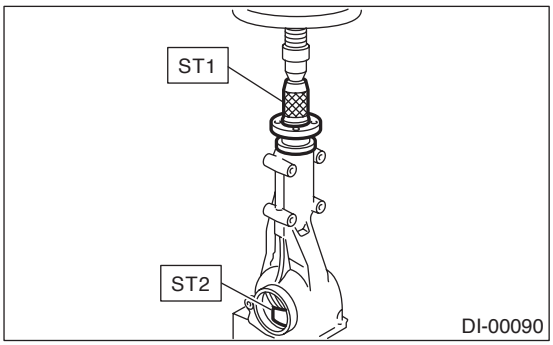
ST 498447120 INSTALLER



8) Press-fit the companion flange with ST1 and ST2.

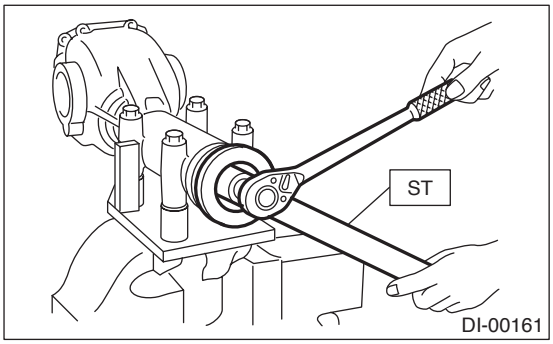
NOTE:
Be careful not to damage the bearing.

ST1 899874100 INSTALLER
ST2 399780104 WEIGHT



9) Install a new self-locking nut, and secure the companion flange using ST, and tighten the nut.
ST 498427200 FLANGE WRENCH

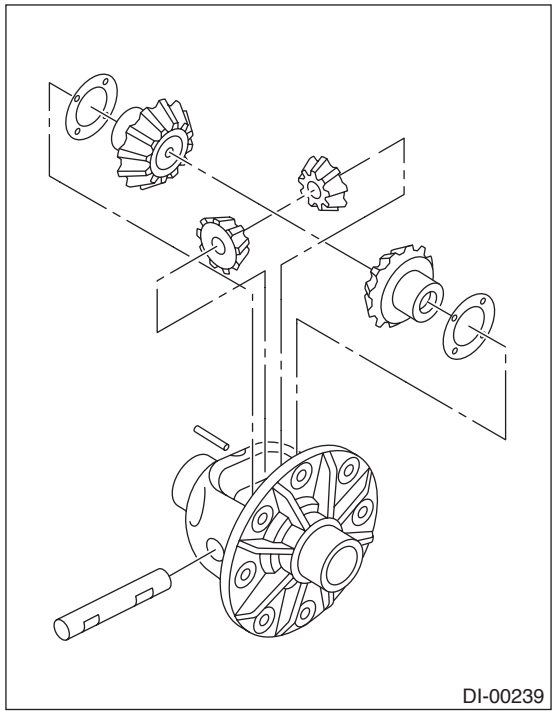
Tightening torque:
191 N·m (19.1 kgf-m, 141 ft-lb)



10) Assembling differential case
Install the side gears and pinion mate gears, with their thrust washers and pinion mate shaft, into differential case.

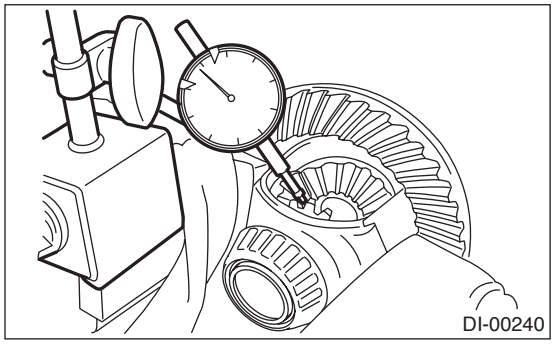
NOTE:
• Apply gear oil to both sides of the washer and the side gear shaft before installing.

• Insert the pinion mate shaft into the differential case by aligning the lock pin holes.



(1) Measure the side gear backlash.

Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)



(2) Adjust the side gear backlash as specified by selecting side gear thrust washer.

Side gear thrust washer	
Part No.	Thickness mm (in)
803135011	0.925 — 0.950 (0.0364 — 0.0374)
803135012	0.950 — 0.975 (0.0374 — 0.0384)
803135013	0.975 — 1.000 (0.0384 — 0.0394)
803135014	1.000 — 1.025 (0.0394 — 0.0404)
803135015	1.025 — 1.050 (0.0404 — 0.0413)

(3) Check the condition of rotation after applying oil to the gear tooth surfaces and thrust surfaces.
(4) After inserting the pinion shaft lock pin into differential case, stake the both sides of the hole to prevent pin from falling off.

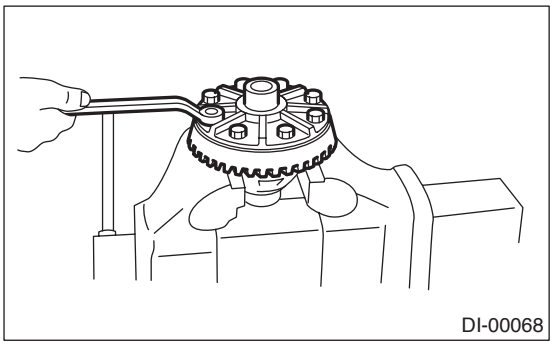
11) Install the hypoid driven gear on differential case.

NOTE:
• Before installing bolts, apply Lock Tite to bolt threads.

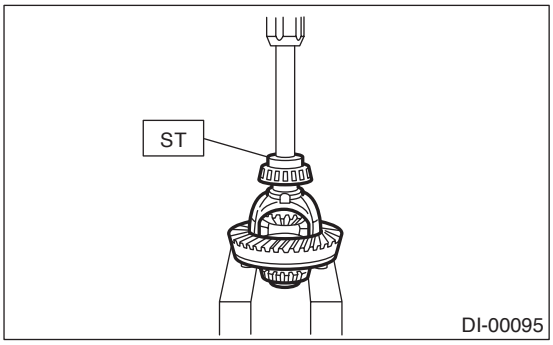
Lock Tite:
THREE BOND 1324 (Part No. 004403042)

• Tighten diagonally while tapping the bolt heads.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

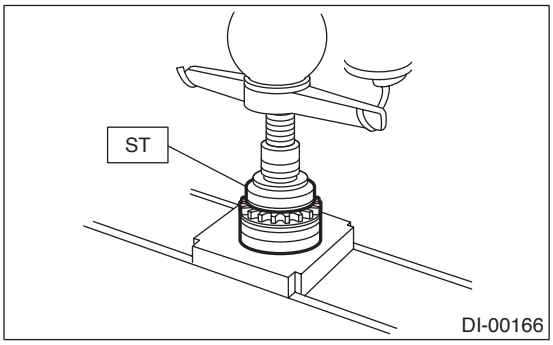

DI-00068

12) Press the side bearing into differential case using ST.
ST 498485400 DRIFT



DI-00095

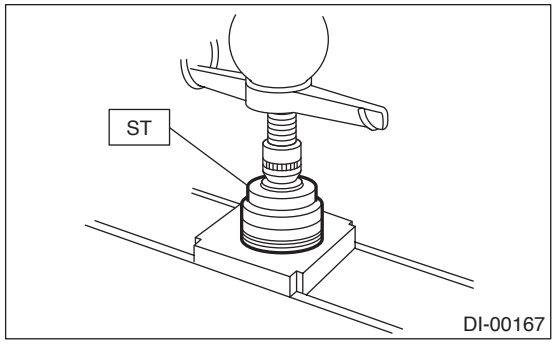
13) Assemble holders.
(1) Install the oil seal into holder RH and LH.
ST 498447100 INSTALLER



DI-00166

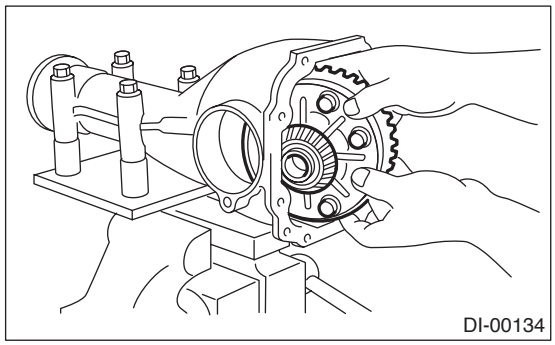
(2) Install the bearing race into holder RH and LH.
ST 398477702 DRIFT

CAUTION:
Make sure that the oil seal, bearing outer race and cone are properly assembled.



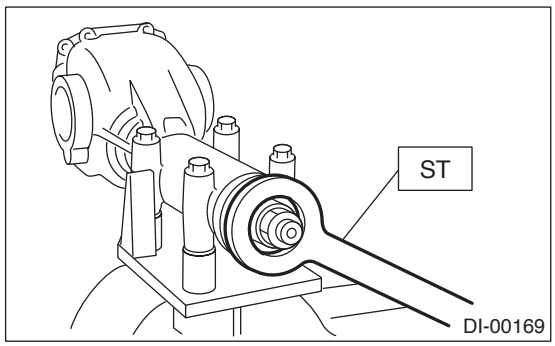
DI-00167

(3) Install the differential assembly into differential carrier in the reverse order of disassembly.


DI-00134

(4) Temporally tighten the side holder RH and LH in differential carrier to install.

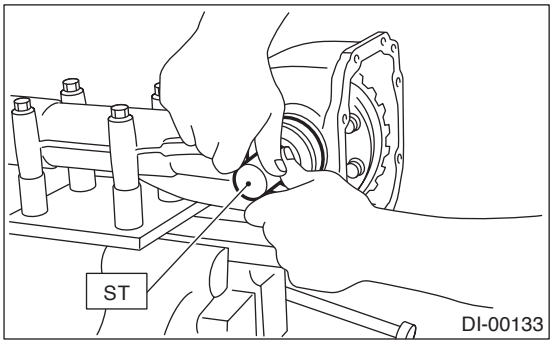
14) Perform the backlash adjustment between the hypoid driven gear and drive pinion, and preload adjustment of differential side bearing.
(1) Turn the drive pinion with ST for better fitting of differential side bearing.
ST 498427200 FLANGE WRENCH



DI-00169

(2) Screw in the side holder LH until light contact is made with ST.

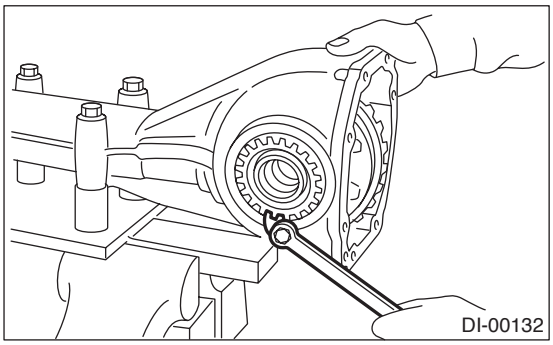
ST 499785500 WRENCH



(3) Back off the side (hypoid driven gear side) holder approx. 1 1/2 teeth of holder, and tighten the other side holder by approx. 2 teeth (approx. 1 1/2 + 1/2 teeth). [Back off amount of side (hypoid driven gear side) holder + 1/2 tooth.]
This + 1/2 tooth gives preload.

(4) Temporarily tighten the lock plate.

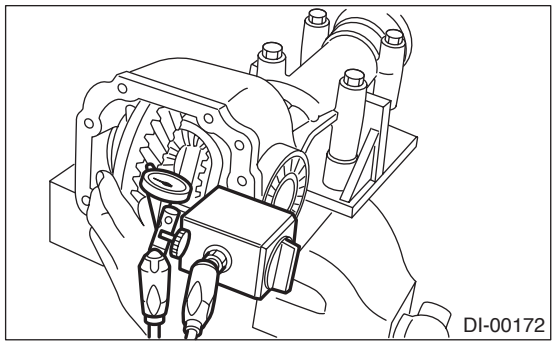
NOTE:
Turn over the lock plate to displace the holder 1/2 tooth.



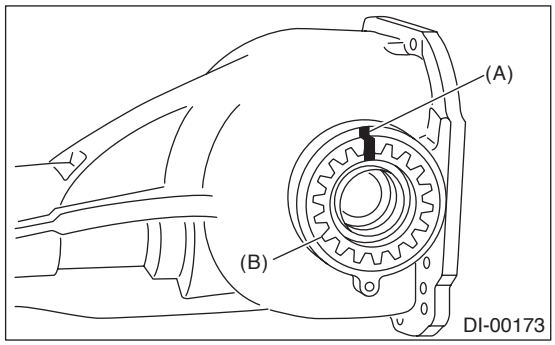
(5) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.

NOTE:
If measured backlash is not within specified range, repeat the procedures for pinion driven gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



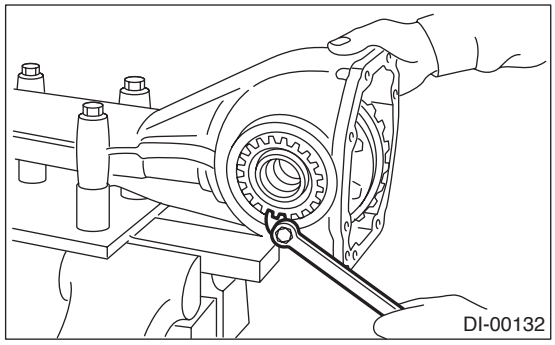
15) Draw a matching mark on both differential carrier and holder. Remove the holder side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



(A) Alignment mark
(B) Holder

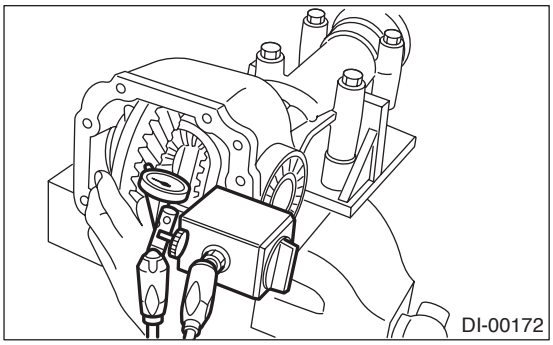
16) Tighten the bolt of lock plate to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



17) Recheck the hypoid driven gear to pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

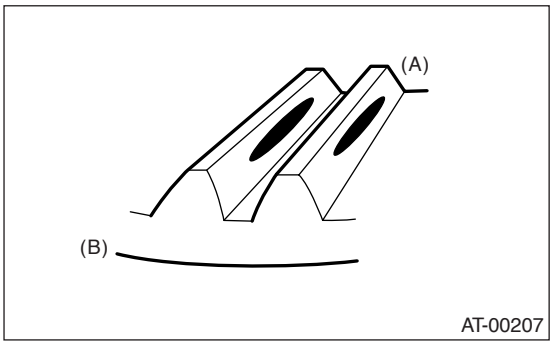


18) Checking and adjusting the tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust.

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

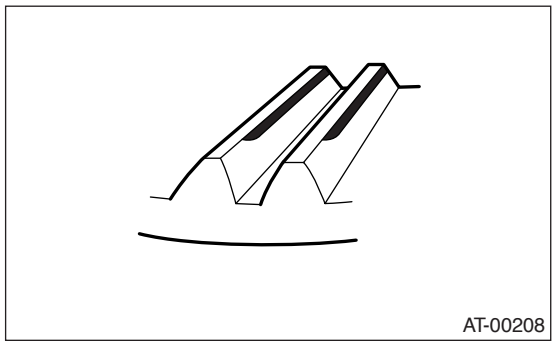
Checking item: Tooth contact pattern is slightly shifted toward to toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]



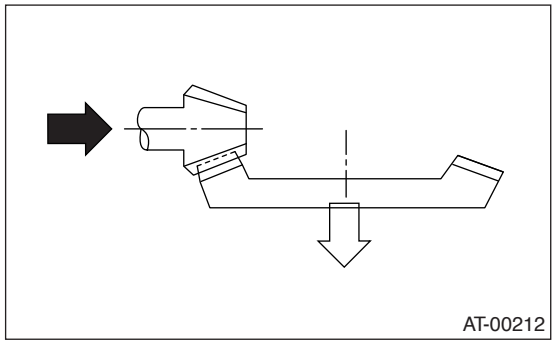
(A) Toe side
(B) Heel side

- Face contact

Checking item: Backlash is too large.
Contact pattern

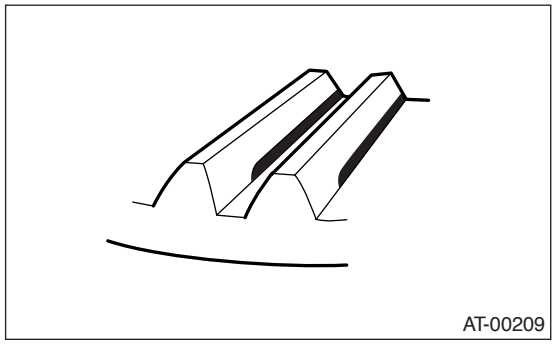


Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.

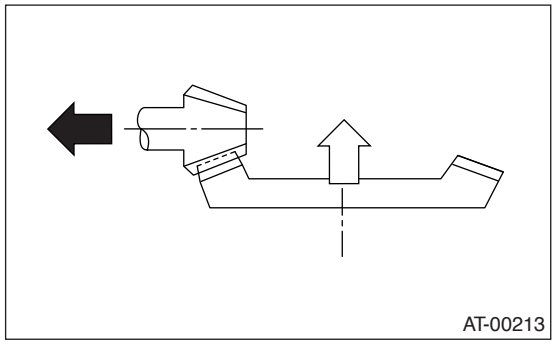


- Flank contact

Checking item: Backlash is too small.
Contact pattern



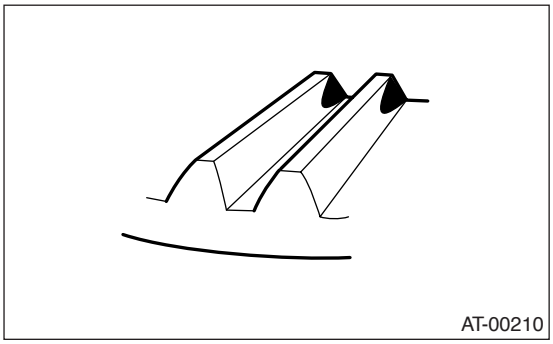
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



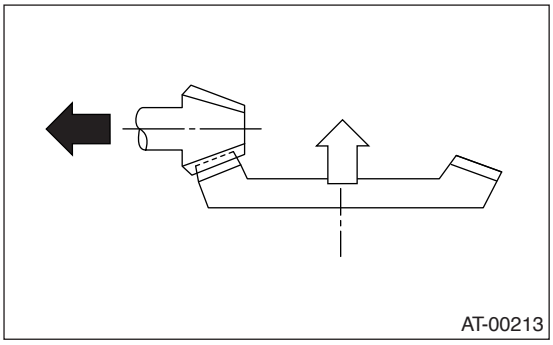
• Toe contact (inside end contact)

Checking item: Contact areas is small

Contact pattern



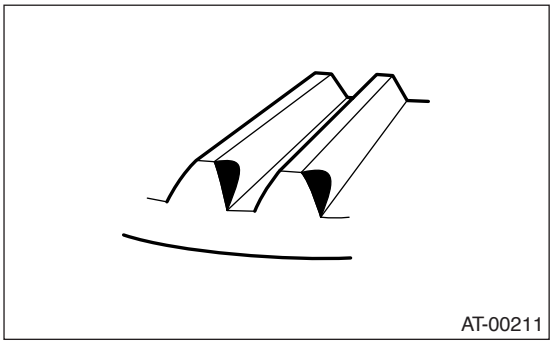
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



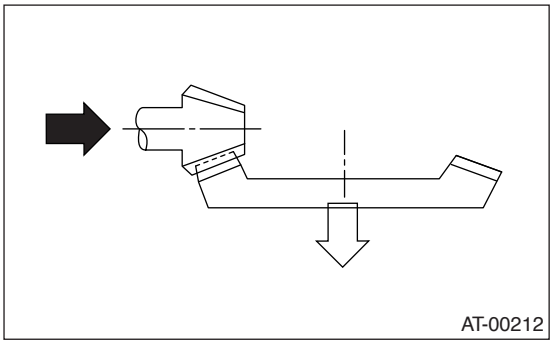
• Heel contact (outside end contact)

Checking item: Contact areas is small

Contact pattern



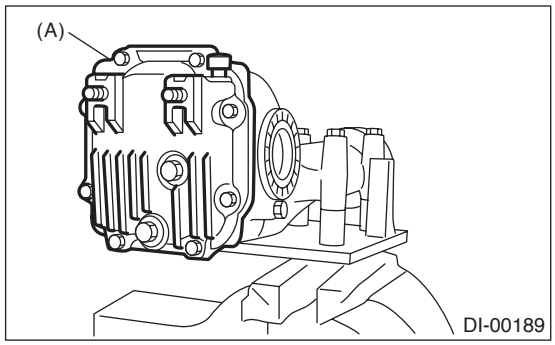
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



19) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.

20) Install the new gasket and rear cover to differential carrier and tighten the bolts to specified torque.

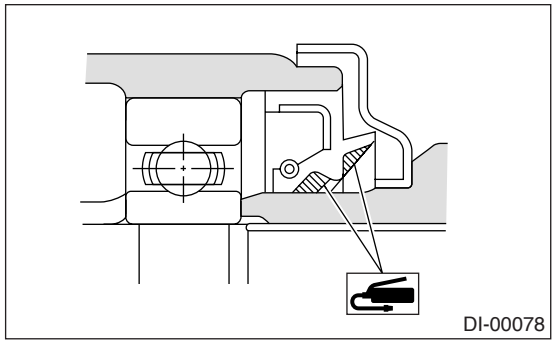
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



(A) Rear cover

2. VA2-TYPE

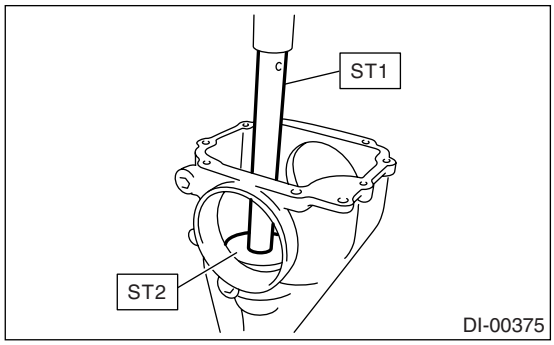
NOTE:
• Assemble in the reverse order of disassembly.
• Check and adjust each part during assembly.
• Use a new gasket.
• Keep the shims and washers in order, so that they are not improperly installed.
• Thoroughly clean the surfaces on which the shims, washers and bearings are to be installed.
• Apply gear oil when installing the bearings and thrust washers.
• Be careful not to mix up the bearing races RH and LH.
• Replace the oil seal with a new one at every disassembly. Apply grease to the lips when installing the oil seal.
• Be careful not to mix up the differential oil seal RH and LH.



1) Adjusting preload for front and rear bearings:
Adjust the bearing preload with collar and washer between front and rear bearings. Pinion height adjusting washer are not affected by this adjustment. The adjustment must be carried out without oil seal inserted.

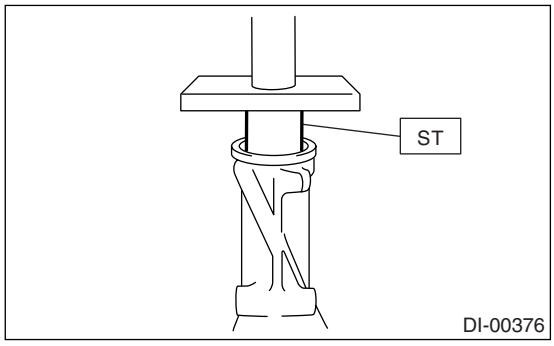
(1) Install the rear bearing race into differential carrier with ST1 and ST2.

ST1 398477701 HANDLE
ST2 398477703 DRIFT 2



(2) Using the ST, install the front bearing race to the differential carrier.

ST 499277200 INSTALLER



(3) Insert the front bearing cone.

NOTE:
Use new front bearing cone.

(4) Measure and record the thickness of pinion adjust washer.

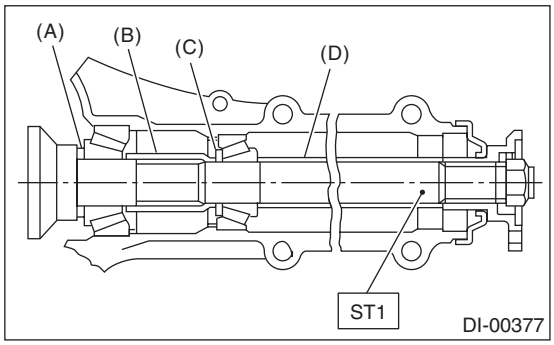
NOTE:
If tooth contact (drive pinion, hypoid driven gear) is normal in the inspection before disassembling, verify that the washer is not deformed, and then re-use the used washer.

(5) Insert the ST1 into carrier with pinion height adjusting washer and rear bearing cone fitted onto it.

NOTE:
Use new rear bearing cone.

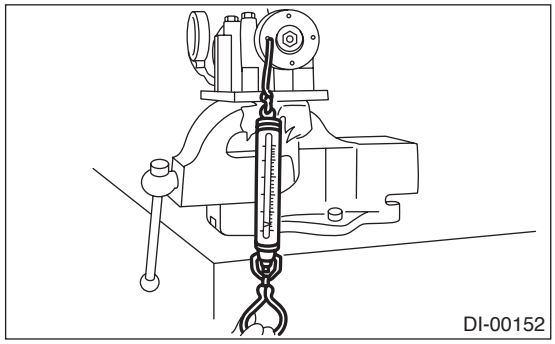
(6) Install the preload adjusting collar and washer, front bearing cone, collar, companion flange, and washer and self-locking nut.

ST1 18678AA000 DUMMY SHAFT



(A) Pinion height adjusting washer
(B) Preload adjusting collar
(C) Preload adjusting washer
(D) Collar

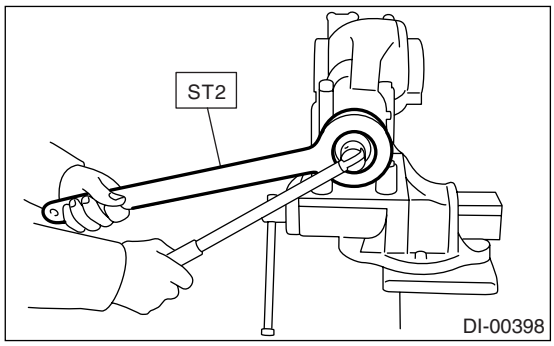
(7) Turn the ST1 with hand to make it seated, and tighten the self-locking nut while measuring the preload with spring balance. Select the preload adjusting washer and collar so that the specified preload is obtained when nut is tightened to the specified torque.



NOTE:
• Use a new self-locking nut.
• Be careful not to give excessive preload.
• When tightening the self-locking nut, lock companion flange with ST2 as shown in the figure.
• Measure the preload in direction of tangent to flange.

ST1 18678AA000 DUMMY SHAFT
ST2 498427200 FLANGE WRENCH

Tightening torque:
191 N·m (19.5 kgf-m, 141 ft-lb)



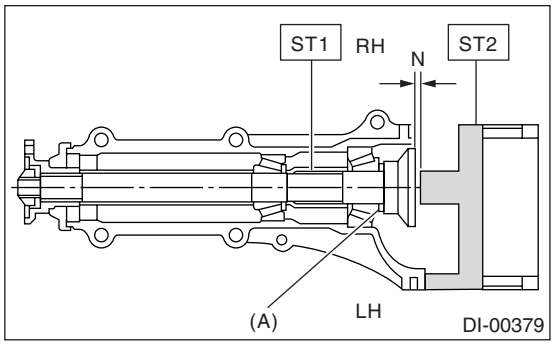
Drive pinion bearing preload
12.7 — 32.4 N (1.3 — 3.3 kgf, 2.9 — 7.3 lb) (at companion flange bolt hole)

	Part No.	Thickness mm (in)
Preload adjusting washer	38336AA430	1.500 (0.0591)
	38336AA440	1.513 (0.0596)
	38336AA450	1.525 (0.0600)
	38336AA460	1.538 (0.0606)
	38336AA470	1.550 (0.0610)
	38336AA480	1.563 (0.0615)
	38336AA490	1.575 (0.0620)
	38336AA500	1.588 (0.0625)
	38336AA510	1.600 (0.0630)
	38336AA520	1.613 (0.0635)
	38336AA530	1.625 (0.0640)
	38336AA540	1.638 (0.0645)
	38336AA550	1.650 (0.0650)
	38336AA560	1.663 (0.0655)
	38336AA570	1.675 (0.0659)
	38336AA580	1.688 (0.0665)
	38336AA590	1.700 (0.0669)
	38336AA600	1.713 (0.0674)
	38336AA610	1.725 (0.0679)
	38336AA620	1.738 (0.0684)
	38336AA630	1.750 (0.0689)
	38336AA640	1.763 (0.0694)
	38336AA650	1.775 (0.0699)
	Part No.	Length mm (in)
Preload adjusting collar	31454AA250	51.05 (2.010)
	31454AA260	51.25 (2.018)
	31454AA270	51.35 (2.022)
	31454AA280	51.45 (2.026)
	31454AA290	51.55 (2.030)
	31454AA300	51.65 (2.033)
	31454AA310	51.75 (2.037)
	31454AA320	51.85 (2.041)
	31454AA330	52.05 (2.049)

2) Adjusting drive pinion height:
Adjust the drive pinion height with washer installed between the rear bearing cone and the back of pinion gear.

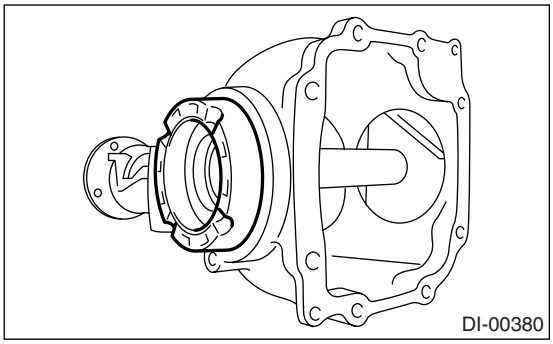
(1) Install the ST2.

ST1 18678AA000 DUMMY SHAFT
ST2 18831AA010 DIFFERENTIAL CARRIER GAUGE



(A) Pinion height adjusting washer

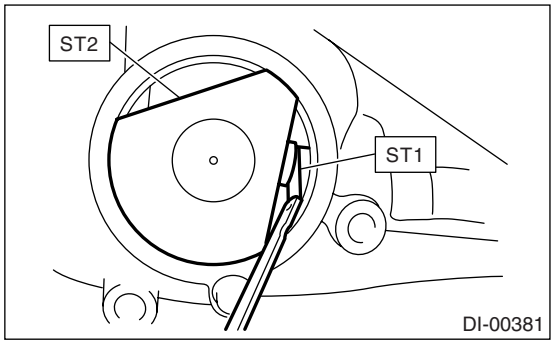
(2) Install the side holder LH to the left side of differential carrier in reverse direction.



(3) Measure the clearance N between the end of ST2 and the end surface of ST1 by using a thickness gauge.

NOTE:
Make sure there is no clearance between the case and ST2.

ST1 18678AA000 DUMMY SHAFT
ST2 18831AA010 DIFFERENTIAL CARRIER GAUGE



(4) Obtain the thickness of pinion height adjusting washer to be inserted from the following formula, and replace the temporarily installed washer with this one.

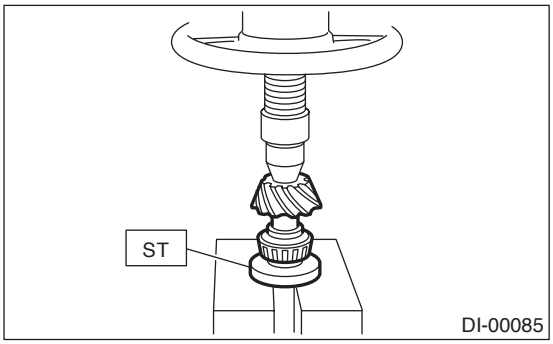
NOTE:
Adjust it using the 1 — 3 washers.
T = To + N − 0.05 (mm)

T	Thickness of pinion height adjusting washer mm (in)	
To	Thickness of washer temporally inserted mm (in)	
N	Clearance of thickness gauge mm (in)	
Memo:		

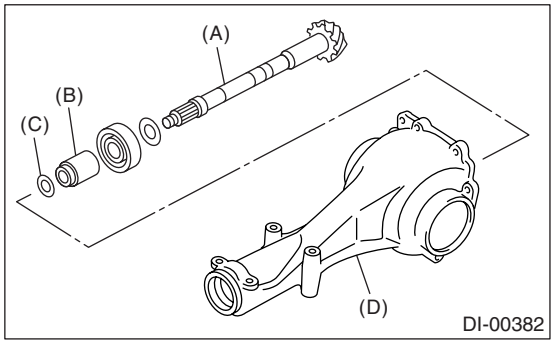
(Example of calculation)
To = 0.15 mm
N = 0.1 mm
T = 0.15 + 0.1 − 0.05 = 0.2 mm
Result: Thickness = 0.2 mm
Therefore use the pinion height adjusting washer of part number 32295AA370.

Pinion height adjusting washer	
Part No.	Thickness mm (in)
32295AA350	0.150 (0.0059)
32295AA360	0.175 (0.0069)
32295AA370	0.200 (0.0079)
32295AA380	0.225 (0.0089)
32295AA390	0.250 (0.0098)
32295AA400	0.275 (0.0108)

3) Install the selected pinion height adjusting washer on drive pinion, and press the rear bearing cone into position with ST.
ST 398177700 INSTALLER

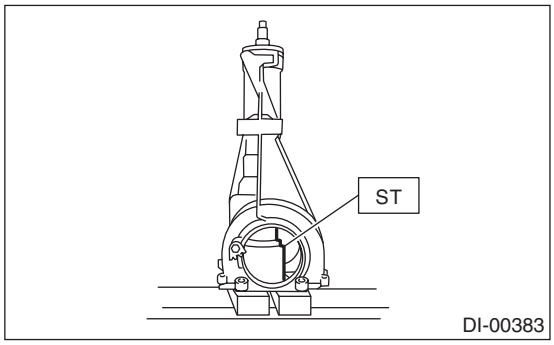


4) Insert the drive pinion into differential carrier, install the previously selected bearing preload adjusting collar and washer.



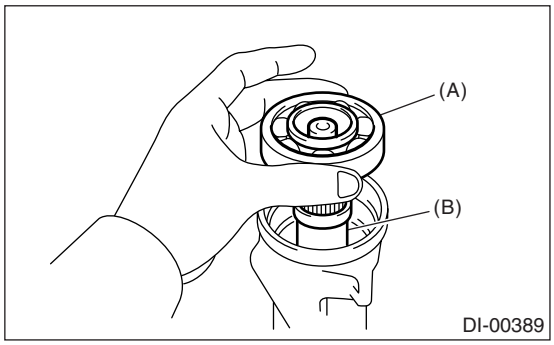
(A) Drive pinion
(B) Bearing preload adjusting collar
(C) Bearing preload adjusting washer
(D) Differential carrier

5) Set ST and differential carrier to the press and install the front bearing cone.
ST 399780104 WEIGHT



NOTE:
Set the carrier to the press until the companion flange is installed.

6) Insert the collar, then install the pilot bearing.

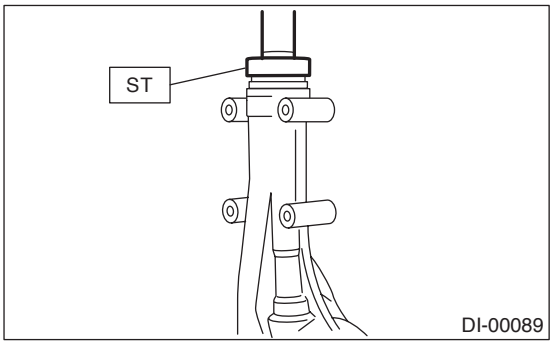


(A) Pilot bearing
(B) Collar

7) Fit a new oil seal with ST.

NOTE:
• Press-fit until end of oil seal is 1 mm (0.04 in) inward from end of carrier.
• Apply grease to the oil seal lips.

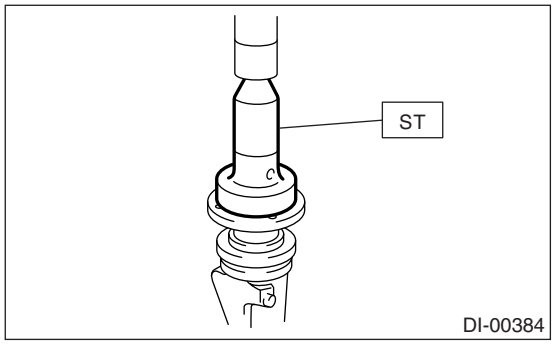
ST 499277200 INSTALLER



8) Press-fit the companion flange with ST.

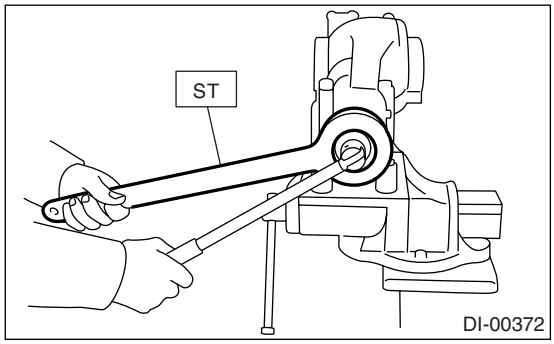
NOTE:
Be careful not to damage the bearing.

ST 899874100 INSTALLER



9) Install a new self-locking nut, and secure the companion flange using ST, and tighten the nut.
ST 498427200 FLANGE WRENCH

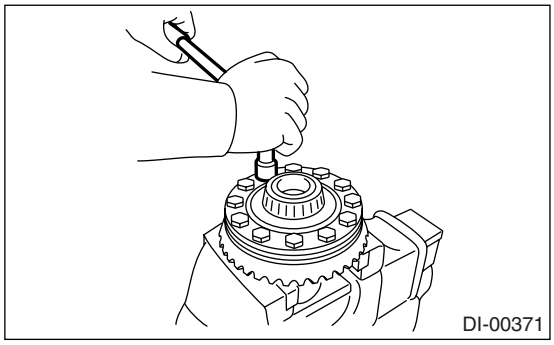
Tightening torque:
191 N·m (19.1 kgf-m, 141 ft-lb)



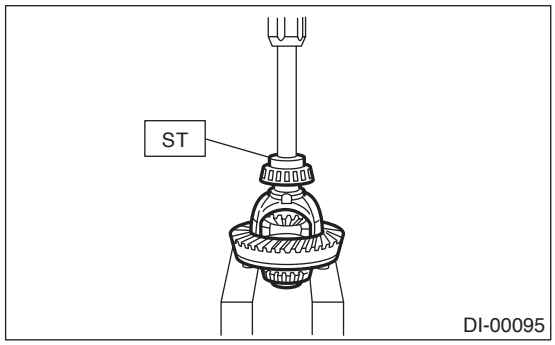
10) Install the hypoid driven gear on differential case.

NOTE:
• Tighten diagonally while tapping the bolt heads.
• Set a cushioning such as wooden block, aluminum plate or shop cloth between vise and differential case if the side gear comes into contact with vise.

Tightening torque:
62 N·m (6.3 kgf-m, 45.6 ft-lb)

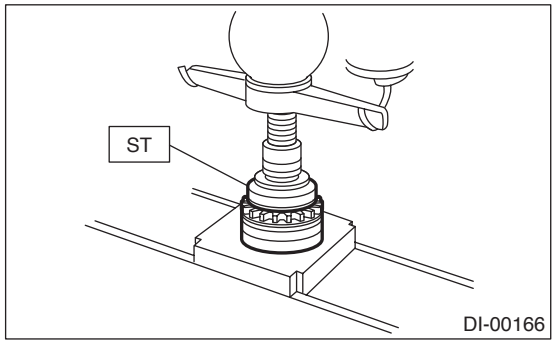


11) Press the side bearing into differential case using ST.
ST 398227700 DRIFT



12) Assemble holders.
(1) Install the new oil seal into holder RH and LH.

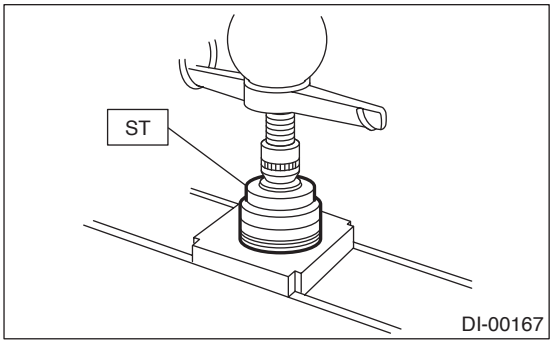
ST 498447100 INSTALLER



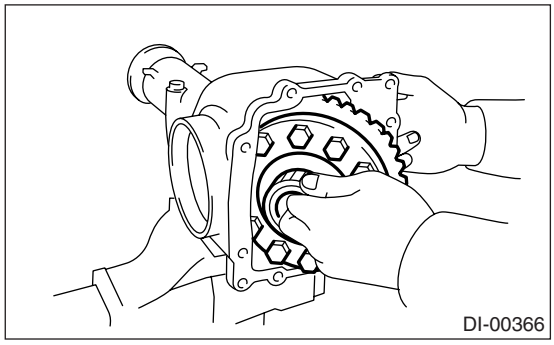
(2) Install the bearing race into holder RH and LH.

ST 398487700 DRIFT

CAUTION:
Make sure that the oil seal, bearing outer race and cone are properly assembled.



(3) Install the differential assembly into differential carrier in the reverse order of disassembly.

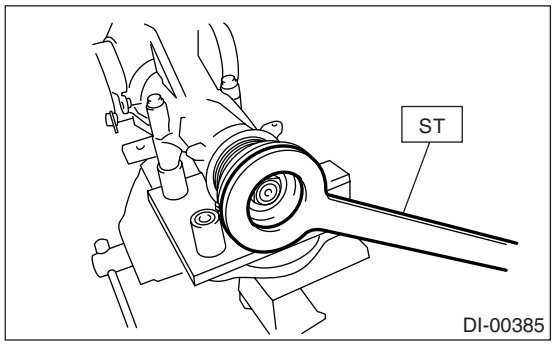


(4) Temporally tighten the side holder RH and LH in differential carrier to install.

13) Perform the backlash adjustment between the hypoid driven gear and drive pinion, and preload adjustment of differential side bearing.

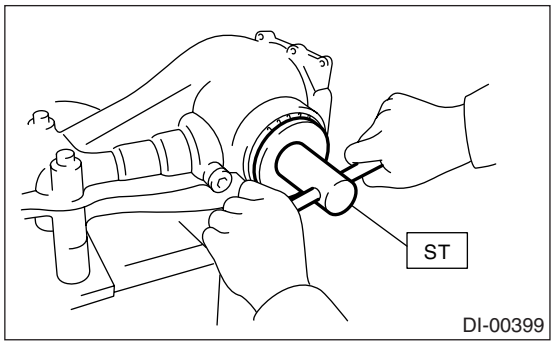
(1) Turn the drive pinion with ST for better fitting of differential side bearing.

ST 498427200 FLANGE WRENCH



(2) Screw in the side holder LH until light contact is made with ST.

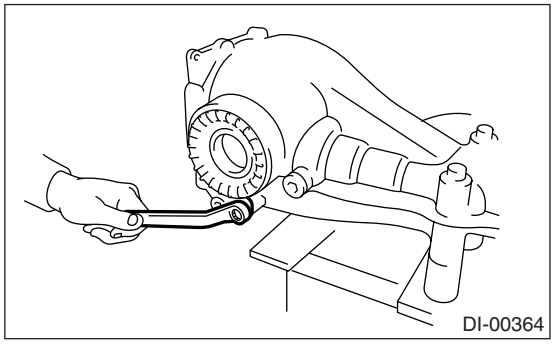
ST 18630AA010 WRENCH



(3) Back off the side (hypoid driven gear side) holder approx.1 1/2 teeth of holder, and tighten the other side holder by approx. 2 teeth (approx. 1 1/2 + 1/2 teeth). [Back off amount of side (hypoid driven gear side) holder + 1/2 tooth.]
This + 1/2 tooth gives preload.

(4) Temporarily tighten the lock plate.

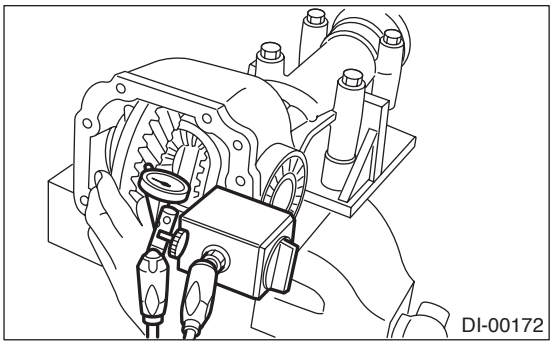
NOTE:
Turn over the lock plate to displace the holder 1/2 tooth.



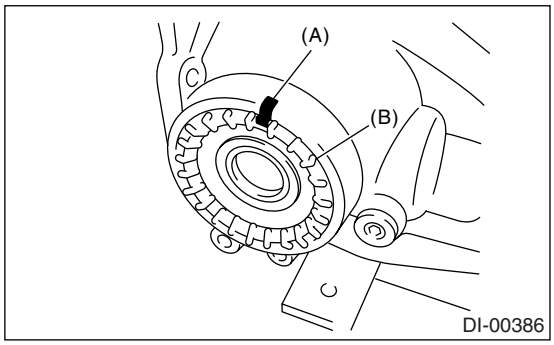
(5) Measure the hypoid driven gear-to-drive pinion backlash. Set the magnet base on differential carrier. Align the contact point of dial gauge with tooth face of hypoid driven gear, and move hypoid driven gear while holding drive pinion still. Read the value indicated on dial gauge.

NOTE:
If measured backlash is not within specified range, repeat the procedures for pinion driven gear set backlash adjustment and differential side bearing preload adjustment.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)



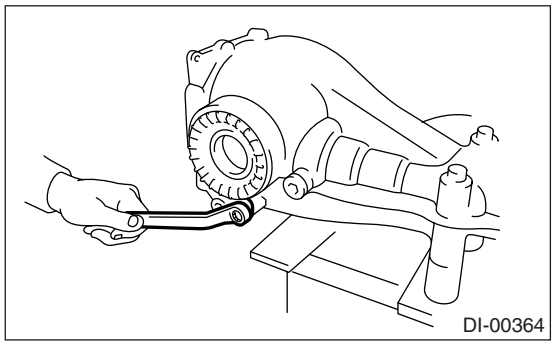
14) Draw a matching mark on both differential carrier and holder. Remove the holder side at a time. Replace in the original position after inserting an O-ring and applying grease to threaded portion.



(A) Alignment mark
(B) Holder

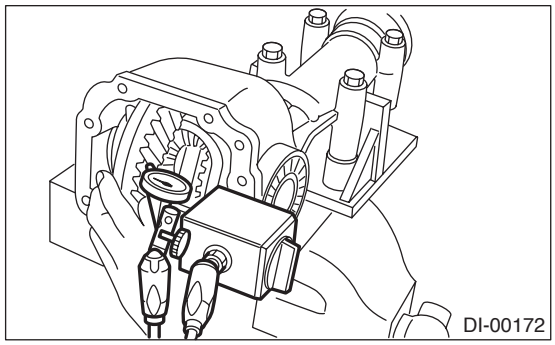
15) Tighten the bolt of lock plate to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)



16) Recheck the hypoid driven gear to pinion backlash.

Backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

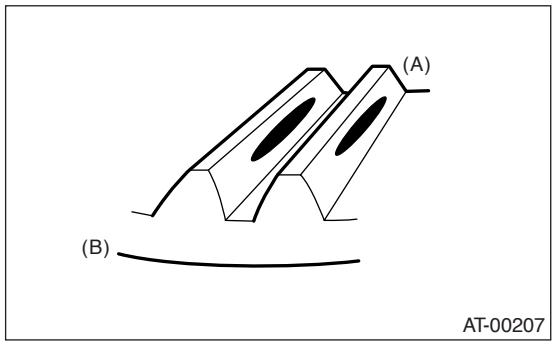


17) Checking and adjusting the tooth contact of hypoid driven gear
(1) Apply an even coat of red lead on both sides of three or four teeth on the hypoid driven gear. Check the contact pattern after rotating the hypoid driven gear several revolutions back and forth until a definite contact pattern appears on the hypoid driven gear.
(2) When the contact pattern is incorrect, readjust.

NOTE:
Be sure to wipe off red lead completely after adjustment is completed.

- Correct tooth contact

Checking item: Tooth contact pattern is slightly shifted toward toe side under no-load rotation. [When loaded, contact pattern moves toward heel.]

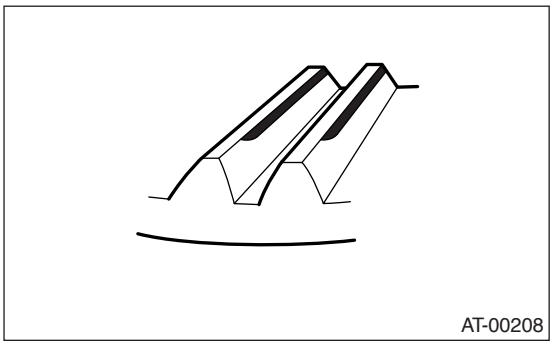


(A) Toe side
(B) Heel side

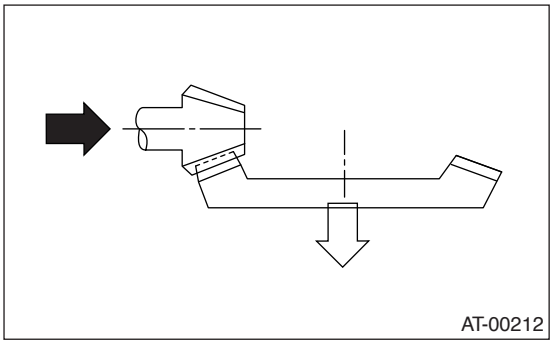
• Face contact

Checking item: Backlash is too large.

Contact pattern



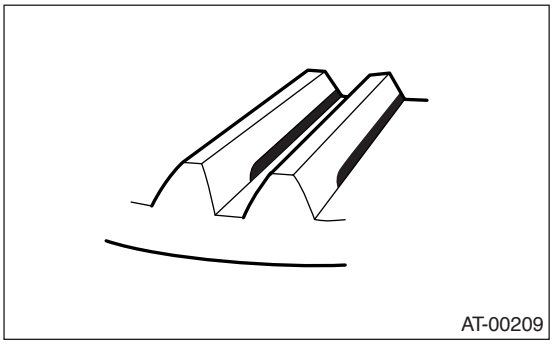
Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



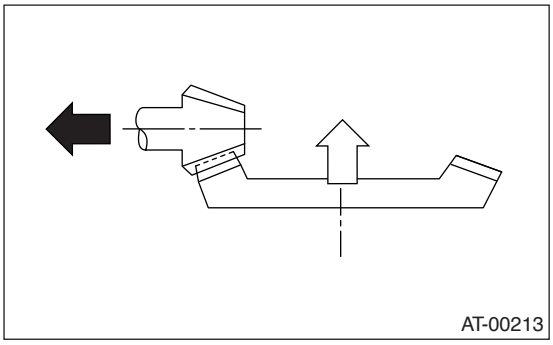
• Flank contact

Checking item: Backlash is too small.

Contact pattern



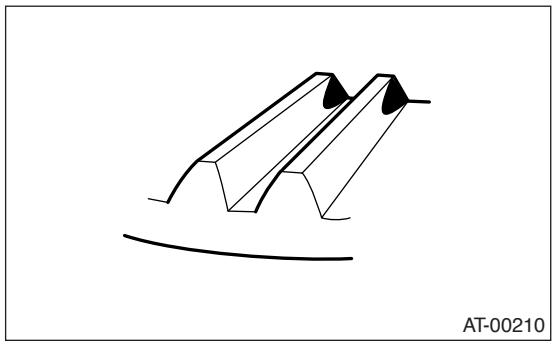
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



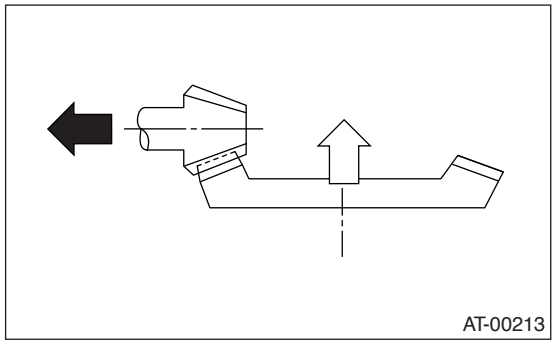
• Toe contact (inside end contact)

Checking item: Contact areas is small

Contact pattern



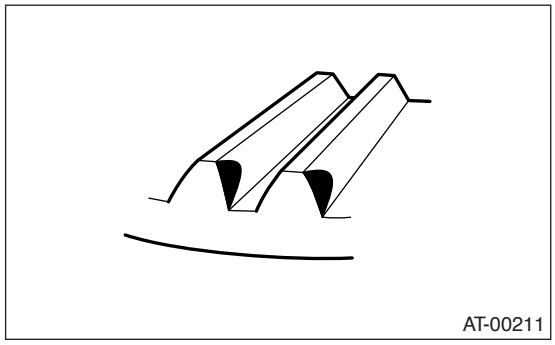
Corrective action: Reduce thickness of drive pinion height adjusting washer in order to bring drive pinion away from hypoid driven gear.



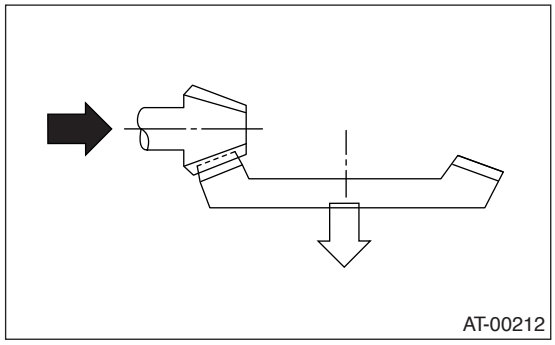
• Heel contact (outside end contact)

Checking item: Contact areas is small

Contact pattern

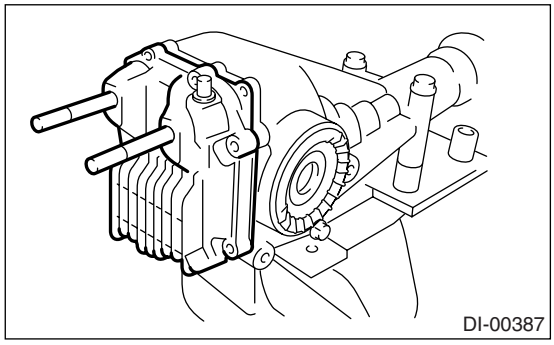


Corrective action: Increase thickness of drive pinion height adjusting washer in order to bring drive pinion close to hypoid driven gear.



18) If proper tooth contact is not obtained, once again adjust the drive pinion height and the differential side bearing preload (already mentioned) and the hypoid gear backlash.
19) Install the new gasket and rear cover to differential carrier and tighten the bolts to specified torque.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)


DI-00387

E: INSPECTION

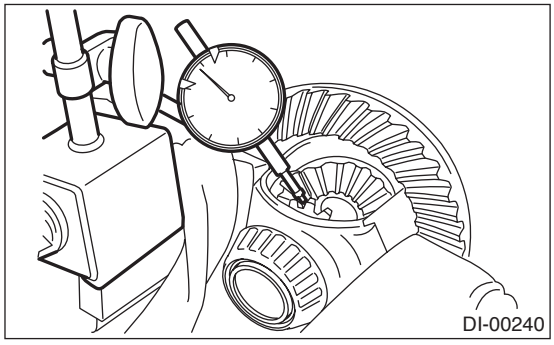
Wash all the disassembled parts clean, and examine them for wear, damage and other defects. Repair or replace the defective parts as necessary.
1) Hypoid driven gear and drive pinion
• If abnormal tooth contact is evident, find out the cause and adjust to give correct tooth contact. Replace the gear if excessively worn or incapable of adjustment.
• If crack, score or seizure is evident, replace as a set. Slight damage of tooth can be corrected by oil stone or the like.
2) Side gear and pinion mate gear
• Replace if crack, score or other defects are evident on tooth surface.
• Replace if thrust washer contacting surface is worn or seized. Slight damage of the surface can be corrected by oil stone or the like.
3) Bearings
Replace if seizure, peeling, wear, rust, dragging during rotation, noise or other defect is evident.
4) Thrust washers of side gear and pinion mate gear:
Replace if seizure, flaw, abnormal wear or other defect is evident.
5) Oil seal
Replace if deformed or damaged, and at every disassembling.
6) Differential carrier
Replace if the bearing bores are worn or damaged.
7) Differential case
Replace if its sliding surfaces are worn or cracked.
8) Companion flange
Replace if the oil seal lip contacting surfaces have flaws.

1. SIDE GEAR BACKLASH

Using a dial gauge, check the backlash of the side gear. (VA1-type only)

Side gear backlash:
0.05 — 0.15 mm (0.0020 — 0.0059 in)

If the side gear backlash is not within the specification, adjust it as specified by selecting side gear thrust washer.

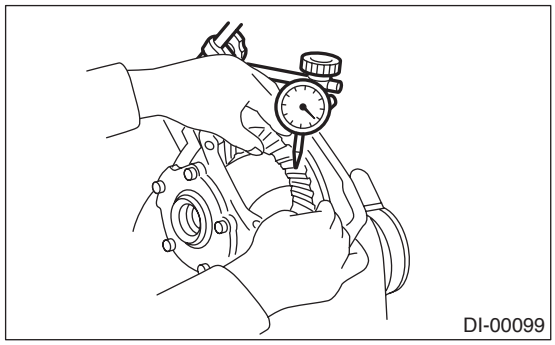

DI-00240

2. HYPOID DRIVEN GEAR BACKLASH

Using a dial gauge, check the backlash of hypoid driven gear.

Hypoid driven gear backlash:
0.10 — 0.15 mm (0.0039 — 0.0059 in)

If the hypoid driven gear backlash is not within the specification, adjust the side bearing preload or repair if necessary.


DI-00099

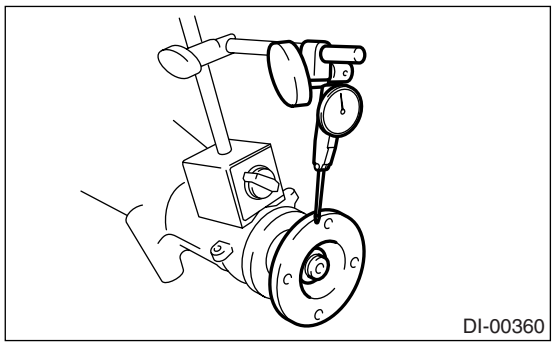
3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Inspect the tooth contact between hypoid driven gear and drive pinion. <Ref. to DI-55, ASSEMBLY, Rear Differential (VA-type).>

4. COMPANION FLANGE

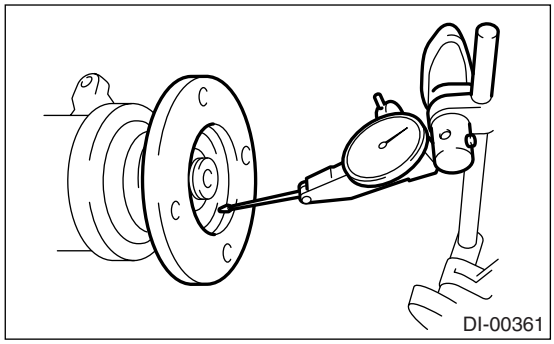
1) If rust or dirt is attached to the companion flange, remove them.
2) Set a dial gauge at a companion flange surface (mating surface of propeller shaft and companion flange), and then measure the companion flange runout.

Limit of runout:
0.08 mm (0.003 in)



3) Set the gauge inside of the companion flange, and measure the runout.

Limit of runout:
0.08 mm (0.003 in)



4) If either runout exceeds the limit, move the phase of companion flange and drive pinion 90° each, and find the point that the runout is within the limit.
5) If the runout exceeds the limit after changing the phase, replace the companion flange and recheck the runout.
6) If the runout exceeds the limit after replacing the companion flange, the drive pinion may be assembled incorrectly or bearing is faulty.

F: ADJUSTMENT

1. SIDE GEAR BACKLASH

Adjust the side gear backlash. (VA1-type)
<Ref. to DI-55, ASSEMBLY, Rear Differential (VA-type).>

2. HYPOID DRIVEN GEAR BACKLASH

Adjust hypoid driven gear backlash.
<Ref. to DI-55, ASSEMBLY, Rear Differential (VA-type).>

3. TOOTH CONTACT BETWEEN HYPOID DRIVEN GEAR AND DRIVE PINION

Adjust the tooth contact between hypoid driven gear and drive pinion gear.
<Ref. to DI-55, ASSEMBLY, Rear Differential (VA-type).>

6. Rear Differential Front Oil Seal

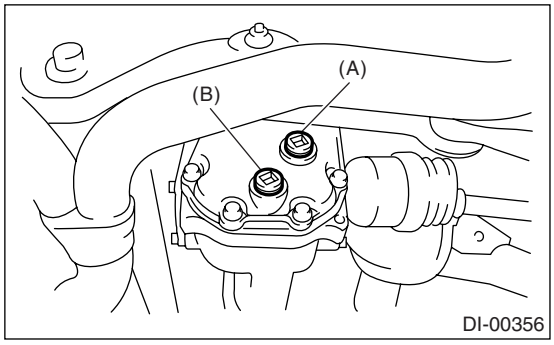
A: INSPECTION

Make sure that there is no leakage from front oil seal portion. If there is any leakage, replace the oil seal and inspect the propeller shaft.

B: REPLACEMENT

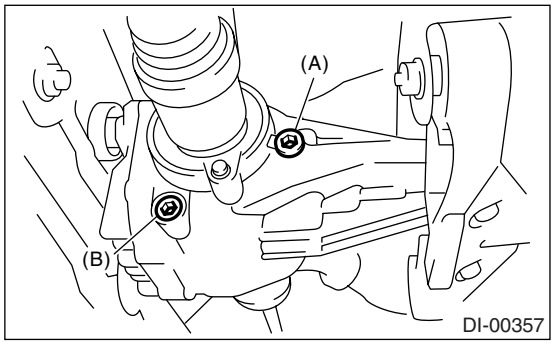
1) Disconnect the ground cable from battery.
2) Move the select lever or gear shift lever to neutral.
3) Release the parking brake.
4) Remove the oil drain plug, and drain gear oil.

• Except for VA2-type



(A) Filler plug
(B) Drain plug

• VA2-type



(A) Filler plug
(B) Drain plug

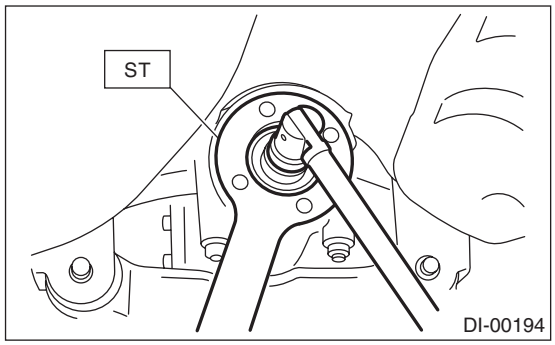
5) Install the oil drain plug.

NOTE:
• Apply liquid gasket to the oil drain plug for T-type.
• Use a new aluminum gasket for VA1-type.
• Use a new metal gasket for VA2-type.

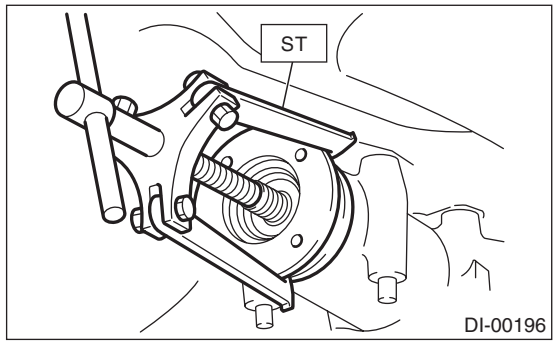
Liquid gasket:
THREE BOND 1105 (Part No. 004403010) or equivalent

Tightening torque:
T-type:
49 N·m (5.0 kgf-m, 36.2 ft-lb)
VA1-type:
34 N·m (3.5 kgf-m, 25.3 ft-lb)
For VA2-type:
29 N·m (3.0 kgf-m, 21.4 ft-lb)

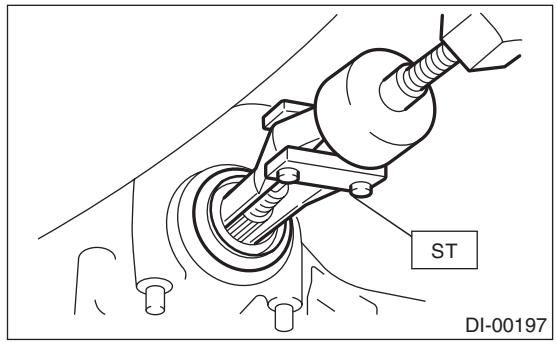
6) Jack-up the rear wheel and support the body with rigid racks.
7) Remove the rear exhaust pipe and muffler.
8) Remove the propeller shaft. <Ref. to DS-10, REMOVAL, Propeller Shaft.>
9) Remove the self-locking nut while holding the companion flange with ST.
ST 498427200 FLANGE WRENCH



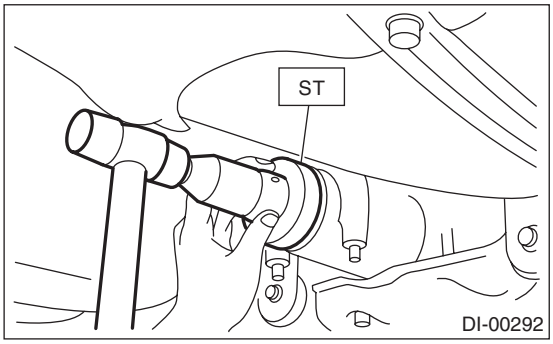
10) Extract the companion flange using ST.
ST 399703600 PULLER ASSY



11) Remove the oil seal using ST or screwdriver.
ST 398527700 PULLER ASSY



12) Install a new oil seal with ST.
ST 498447120 OIL SEAL INSTALLER



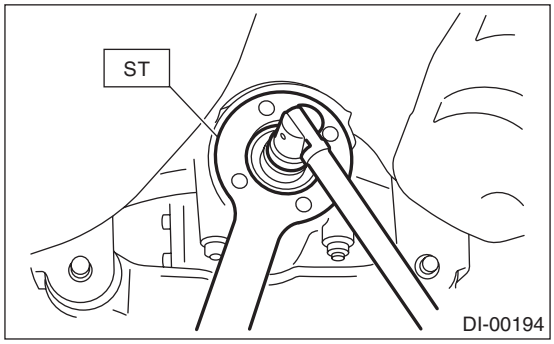
13) Install the companion flange.

NOTE:
Use a plastic hammer to install companion flange.

14) Tighten the self-locking nut within the specified torque range so that the turning resistance of companion flange becomes the same as that of before oil seal replacement.
ST 498427200 FLANGE WRENCH

NOTE:
Use a new self-locking nut.

Tightening torque:
T-type:
181 N·m (18.5 kgf-m, 134 ft-lb)
VA-type:
191 N·m (19.5 kgf-m, 141 ft-lb)



15) Hereafter, reassemble in the reverse order of disassembly.

7. Rear Differential Side Oil Seal

A: INSPECTION

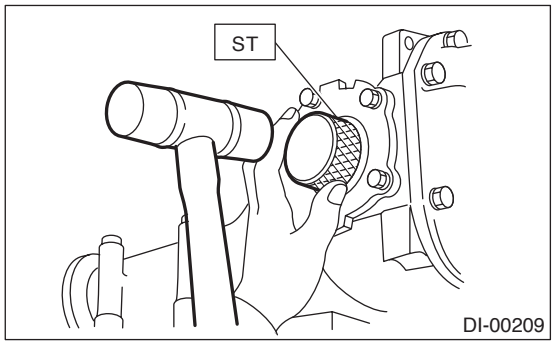
Make sure that there is no leakage from side oil seal. If there is any leakage, replace the oil seal.

B: REPLACEMENT

1) Remove the rear differential. <Ref. to DI-29, REMOVAL, Rear Differential (T-type).><Ref. to DI-46, REMOVAL, Rear Differential (VA-type).>
2) Remove the rear differential side oil seal using a screwdriver wrapped with vinyl tape to prevent the side retainer from scratches.
3) Using the ST, install the oil seal to the side retainer.

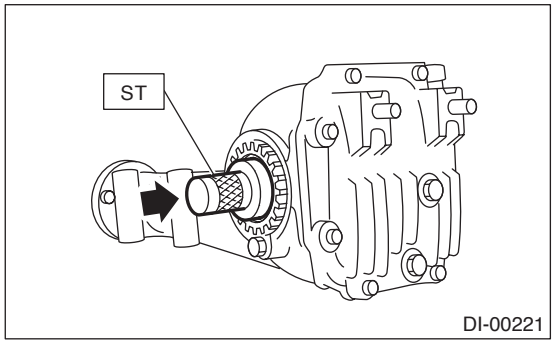
• T-type and VA2-type

ST 398437700 DRIFT



• VA1-type

ST 498447100 INSTALLER

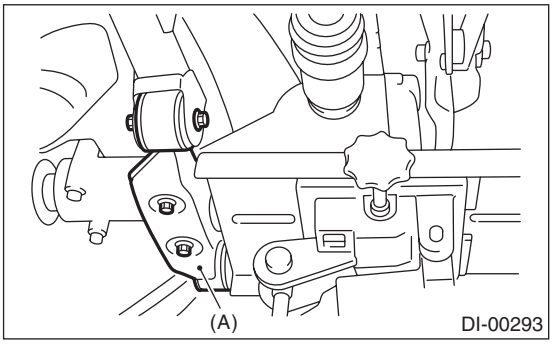


4) Install the rear differential. <Ref. to DI-30, INSTALLATION, Rear Differential (T-type).><Ref. to DI-47, INSTALLATION, Rear Differential (VA-type).>

8. Rear Differential Front Member

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle.
3) Support the rear differential using transmission jack, and then remove the rear differential front member.

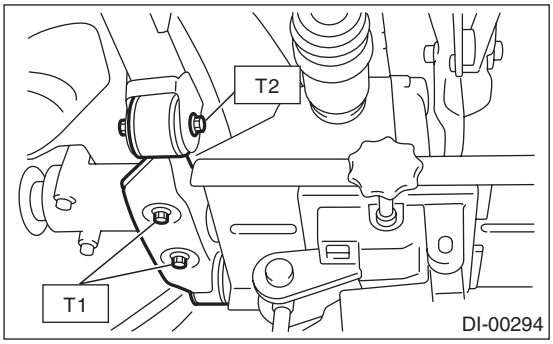


(A) Rear differential front member

B: INSTALLATION

Install the rear differential front member with a new self-locking nut.

Tightening torque:
T1: 52 N·m (5.3 kgf-m, 38 ft-lb)
T2: 110 N·m (11.2 kgf-m, 81 ft-lb)



C: INSPECTION

1) Check the rear differential front member for damage, bend and corrosion.
If damage, bend or corrosion is excessive, replace the rear differential front member.
2) Check the bushings of rear differential member for cracking, hardening and damage.
If cracking, hardening or damage is excessive, replace rear differential front member.

9. General Diagnostic Table

A: INSPECTION

Symptom or trouble	Possible cause	Remedy
1. Oil leakage	(1) Worn, scratched or incorrectly seated front or side oil seal. Scored, battered or excessively worn sliding surface of companion flange.	Correct or replace.
	(2) Clogged or damaged air breather.	Clean, repair or replace.
	(3) Loose bolts on differential spindle or side retainer, or incorrectly fitted O-ring.	Tighten the bolts to specified torque. Replace the O-ring.
	(4) Loose rear cover attaching bolts or damaged gasket.	Tighten the bolts to specified torque. Replace gasket and apply liquid gasket.
	(5) Loose oil filler or drain plug.	Retighten and apply liquid gasket.
	(6) Wear, damage or incorrectly fitting for spindle, side retainer and oil seal.	Correct or replace.
2. Seizure NOTE: Seized or damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Insufficient backlash for hypoid gear.	Readjust or replace.
	(2) Excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Insufficient or improper oil used.	Replace seized part and fill with specified oil to specified level.
3. Damage NOTE: Damaged parts should be replaced, and also other parts should be thoroughly checked for any defect and should be repaired or replaced as required.	(1) Improper backlash for hypoid gear.	Replace.
	(2) Insufficient or excessive preload for side, rear or front bearing.	Readjust or replace.
	(3) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(4) Loose bolts and nuts such as hypoid driven gear bolt.	Retightening.
	(5) Damage due to overloading.	Replace.
4. Noises when starting or shifting gears NOTE: Noises may be caused by differential assembly, universal joint, wheel bearing, etc. Find out what is actually making noise before disassembling.	(1) Excessive backlash for hypoid gear.	Readjust.
	(2) Excessive backlash for differential gear.	Replace gear or thrust washer.
	(3) Insufficient preload for front or rear bearing.	Readjust.
	(4) Loose drive pinion nut.	Tighten to specified torque.
	(5) Loose bolts and nuts such as side bearing retainer attaching bolt.	Tighten to specified torque.
5. Noises when cornering	(1) Damaged differential gear.	Replace.
	(2) Excessive wear or damage of thrust washer.	Replace.
	(3) Broken pinion mate shaft.	Replace.
	(4) Seized or damaged side bearing.	Replace.

Symptom or trouble	Possible cause	Remedy
6. Gear noise NOTE: Since noises from engine, muffler, transmission, propeller shaft, wheel bearings, tires, and body are sometimes mistaken for noises from differential assembly, be careful in checking them. Inspection methods to locate noises include coasting, accelerating, cruising, and jacking-up all four wheels. Perform these inspections according to condition of trouble. When listening to noises, shift gears into four wheel drive and fourth speed position, trying to pick up only differential noise.	(1) Improper tooth contact of hypoid gear.	Readjust or replace hypoid gear set.
	(2) Improper backlash for hypoid gear.	Readjust.
	(3) Scored or chipped teeth of hypoid gear.	Replace hypoid gear set.
	(4) Seized hypoid gear.	Replace hypoid gear set.
	(5) Improper preload for front or rear bearings.	Readjust.
	(6) Seized, scored or chipped front or rear bearing.	Replace.
	(7) Seized, scored or chipped side bearing.	Replace.
	(8) Vibrating differential carrier.	Replace.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

TRANSFER CASE

TC

		Page
1.	General Description	2
2.	Transfer Case and Extension Case Assembly	3
3.	Transfer Clutch	4
4.	Extension Case	5
5.	Extension Case and Intermediate Case	6
6.	Oil Seal	7
7.	Transfer Drive Gear	8
8.	Transfer Driven Gear	9
9.	Reduction Drive Gear	10
10.	Center Differential Carrier	11
11.	Reduction Driven Gear	12
12.	Center Differential	13
13.	Transfer Clutch Pressure Test	14

1. General Description

A: NOTE

For general description, refer to “4AT”, “5AT” or “5MT” section.
4AT model:
<Ref. to 4AT-2, General Description.>
5AT model:
<Ref. to 5AT-2, General Description.>
5MT model:
<Ref. to 5MT-2, General Description.>

2. Transfer Case and Extension Case Assembly

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-44, Transfer Case and Extension Case Assembly.>

3. Transfer Clutch

A: NOTE

For removal, installation and inspection, refer to "4AT" or "5AT" section.
4AT model:
<Ref. to 4AT-86, Transfer Clutch.>
5AT model:
<Ref. to 5AT-74, Transfer Clutch.>

4. Extension Case

A: NOTE

For removal, installation and inspection, refer to “4AT” section. <Ref. to 4AT-82, Extension Case.>

5. Extension Case and Intermediate Case

A: NOTE

For removal, installation and inspection, refer to “5AT” section. <Ref. to 5AT-72, Extension Case & Intermediate Case.>

6. Oil Seal

A: NOTE

For replacement and inspection, refer to “4AT”, “5AT” or “5MT” section.
4AT model:
<Ref. to 4AT-50, Extension Case Oil Seal.> <Ref. to 4AT-51, Differential Side Retainer Oil Seal.>
5AT model:
<Ref. to 5AT-49, Extension Case Oil Seal.> <Ref. to 5AT-50, Differential Side Retainer Oil Seal.>
5MT model:
<Ref. to 5MT-39, Oil Seal.> <Ref. to 5MT-40, Differential Side Retainer Oil Seal.>

7. Transfer Drive Gear

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-48, Transfer Drive Gear.>

8. Transfer Driven Gear

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-50, Transfer Driven Gear.>

9. Reduction Drive Gear

A: NOTE

For removal, installation and inspection, refer to “4AT” section. <Ref. to 4AT-96, Reduction Drive Gear.>

10.Center Differential Carrier

A: NOTE

For removal, installation and inspection, refer to “4AT” or “5AT” section.
4AT model:
<Ref. to 4AT-98, Center Differential Carrier.>
5AT model:
<Ref. to 5AT-80, Center Differential Carrier.>

11.Reduction Driven Gear

A: NOTE

For removal, installation and inspection, refer to “4AT” or “5AT” section.
4AT model:
<Ref. to 4AT-94, Reduction Driven Gear.>
5AT model:
<Ref. to 5AT-78, Reduction Driven Gear.>

12.Center Differential

A: NOTE

For removal, installation and inspection, refer to “5MT” section. <Ref. to 5MT-52, Center Differential.>

13. Transfer Clutch Pressure Test

A: NOTE

For inspection, refer to “4AT” or “5AT” section.
4AT model:
<Ref. to 4AT-39, Transfer Clutch Pressure Test.>
5AT model:
<Ref. to 5AT-36, Transfer Clutch Pressure Test.>

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

DRIVE SHAFT SYSTEM

DS

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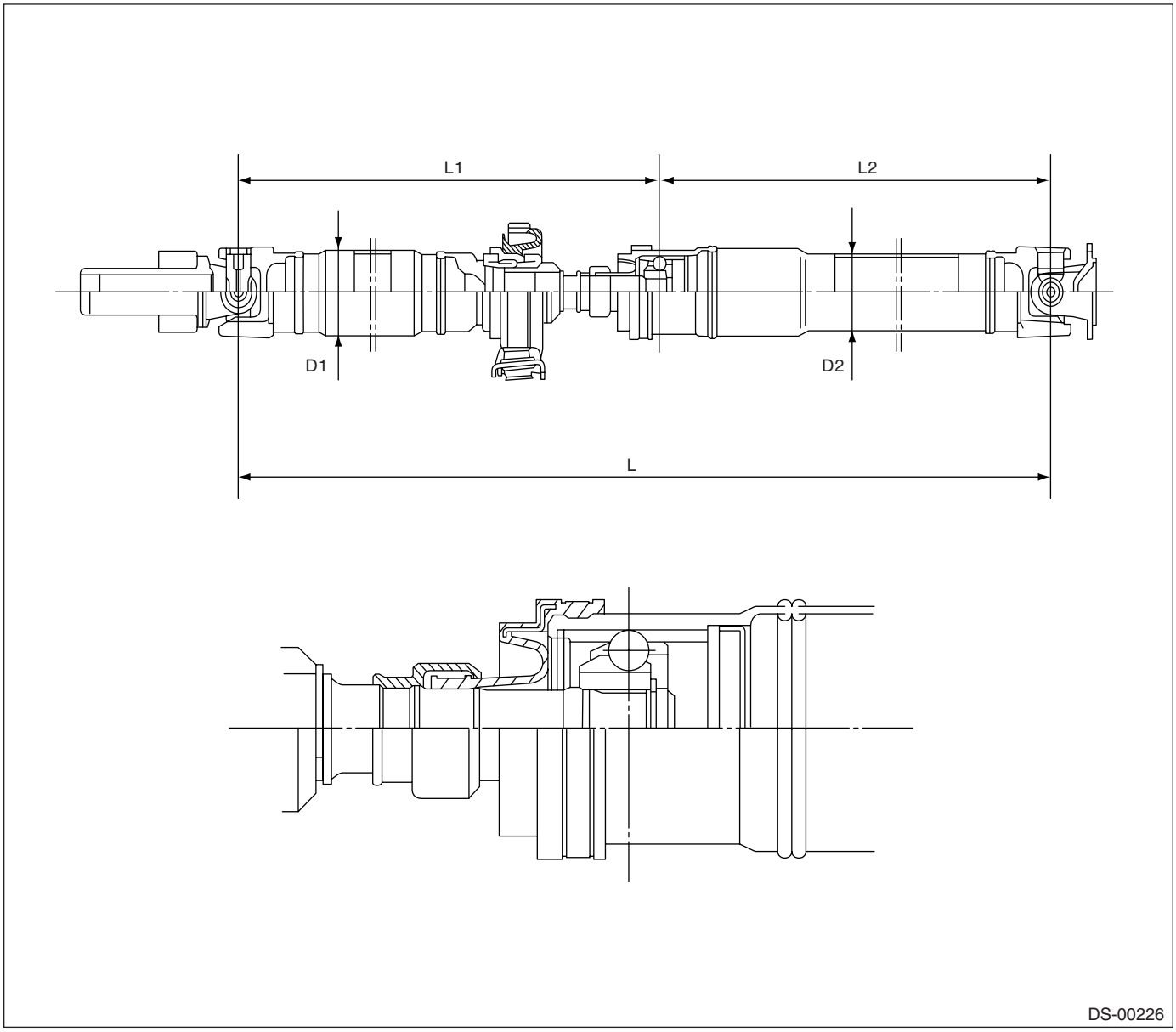
1. General Description

A: SPECIFICATION

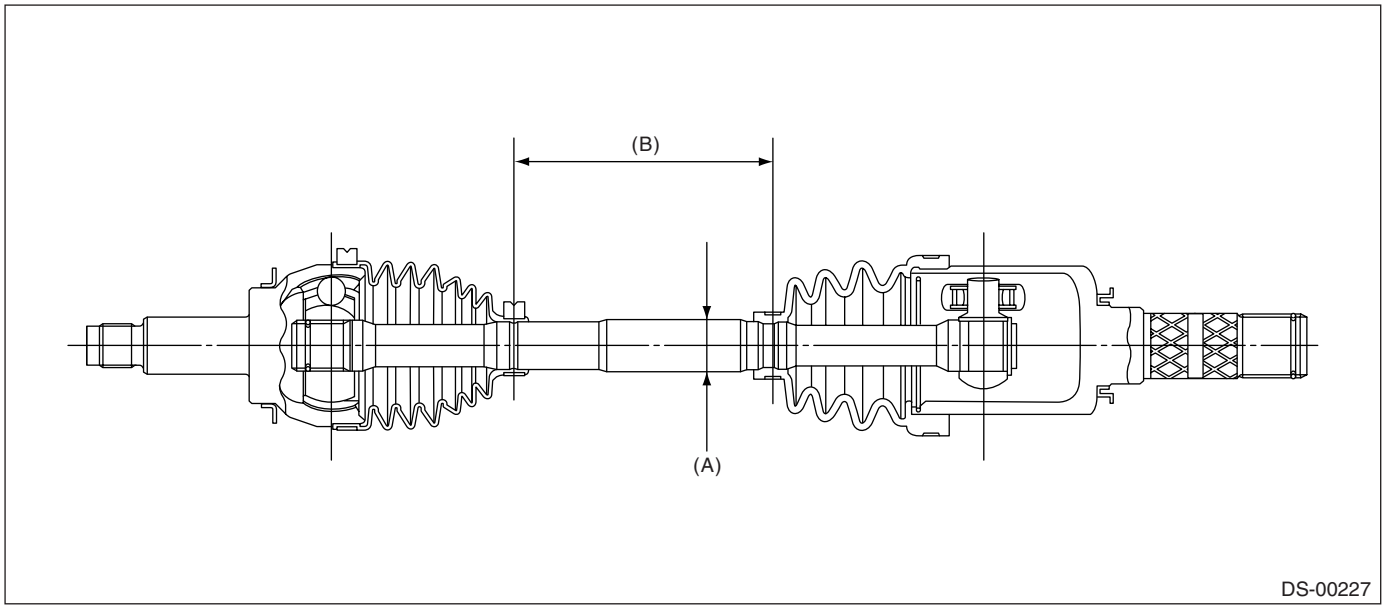
1. PROPELLER SHAFT

Model			5MT	4AT	5AT
Propeller shaft type			EDJ		
Propeller shaft length: L		mm (in)	1490 (58.66)	1430 (56.30)	1317 (51.85)
Front propeller shaft Joint-to-joint length: L_1		mm (in)	735 (28.9)	675 (26.6)	562 (22.1)
Rear propeller shaft Joint-to-Joint length: L_2		mm (in)	755 (29.7)		
Outer diameter of tube:	mm (in)	D_1	63.5 (2.50)		
		D_2	57.5 (2.26)		



2. FRONT DRIVE SHAFT ASSEMBLY

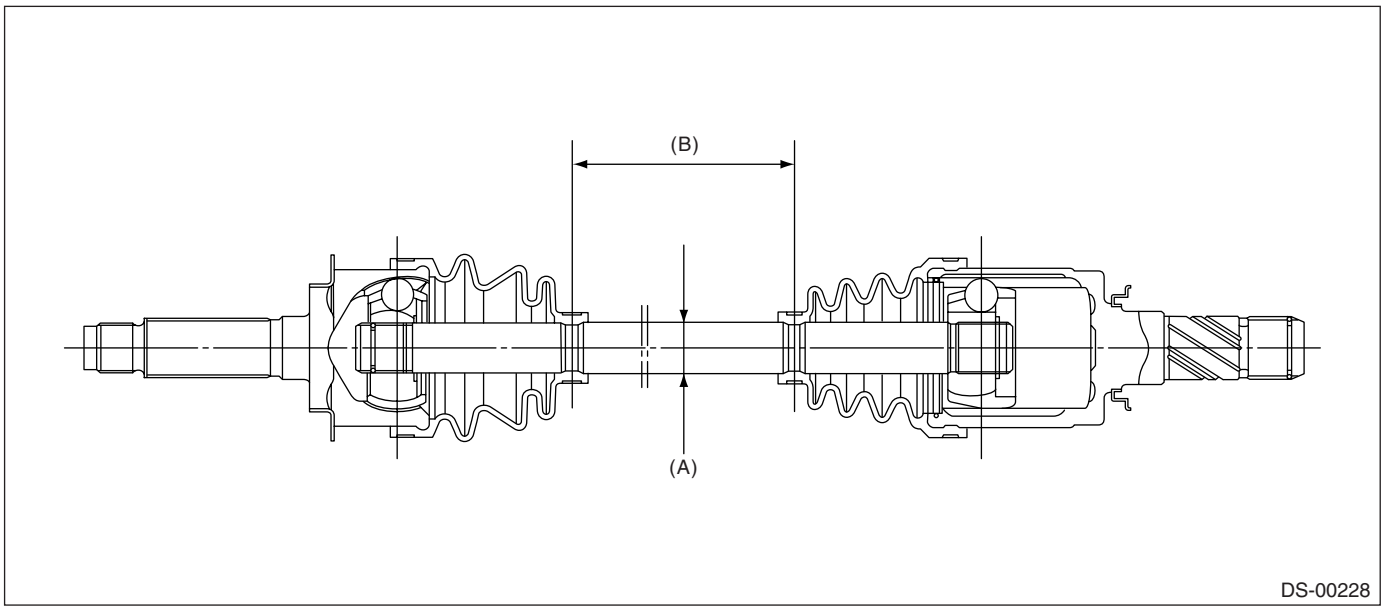
Model	Type of drive shaft	Axle diameter ϕ D mm (in)	Axle length L mm (in)
Turbo AT, 3.0 L	EBJ87+PTJ82	32 (1.3)	349.6 (13.76)
Except turbo AT, 3.0 L	EBJ87+PTJ82	26 (1.0)	349.6 (13.76)



(A) Axle diameter (B) Axle length

3. REAR DRIVE SHAFT ASSEMBLY

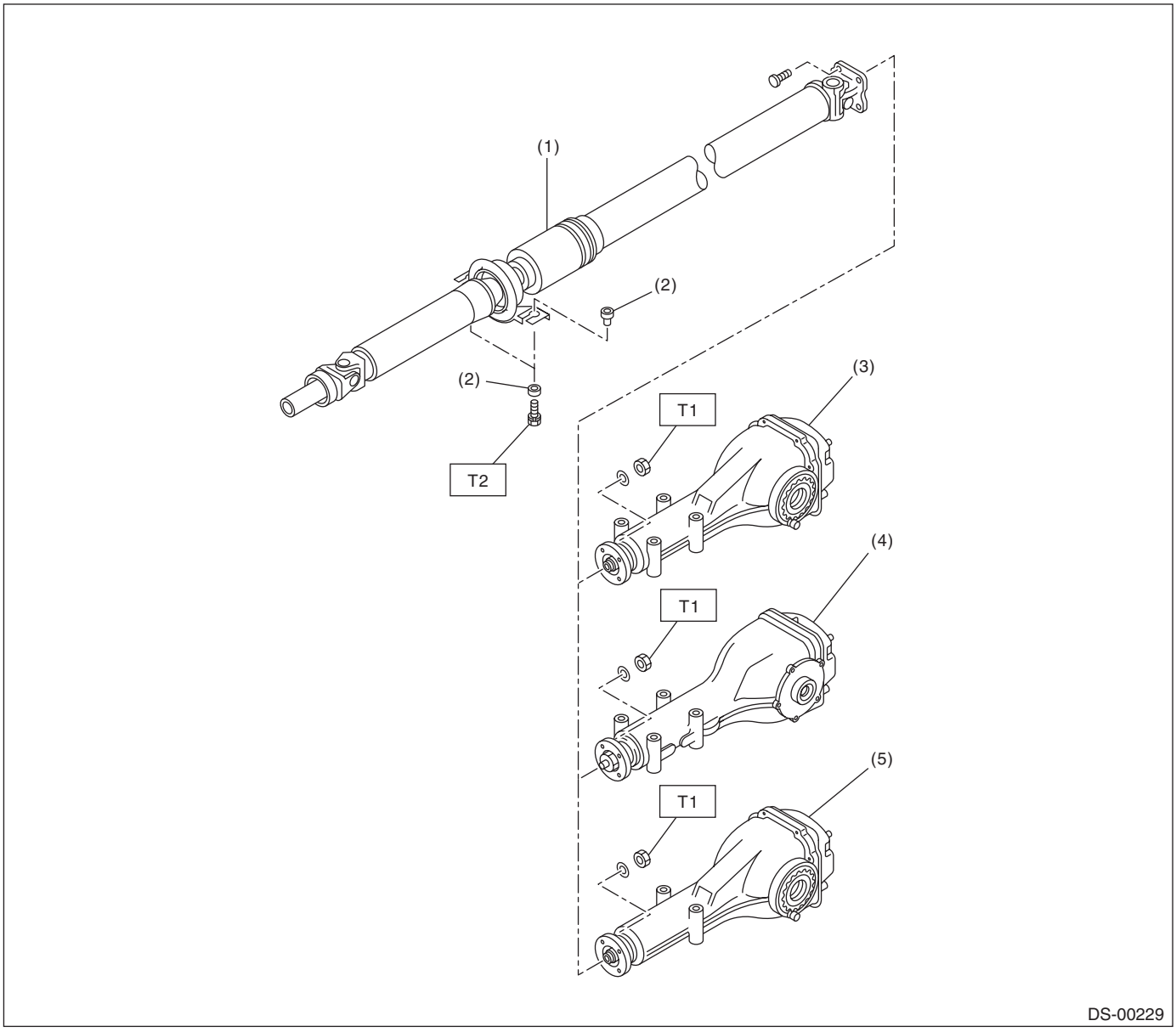
Model	Type of drive shaft	Axle diameter ϕ D mm (in)	Axle length L mm (in)
2.0 L Non-turbo AT	BJ75+DOJ75	22 (0.87)	366.5 (14.43)
Except 2.0 L Non-turbo AT	EBJ82+DOJ79	22 (0.87)	375.1 (14.77)



(A) Axle diameter (B) Axle length

B: COMPONENT

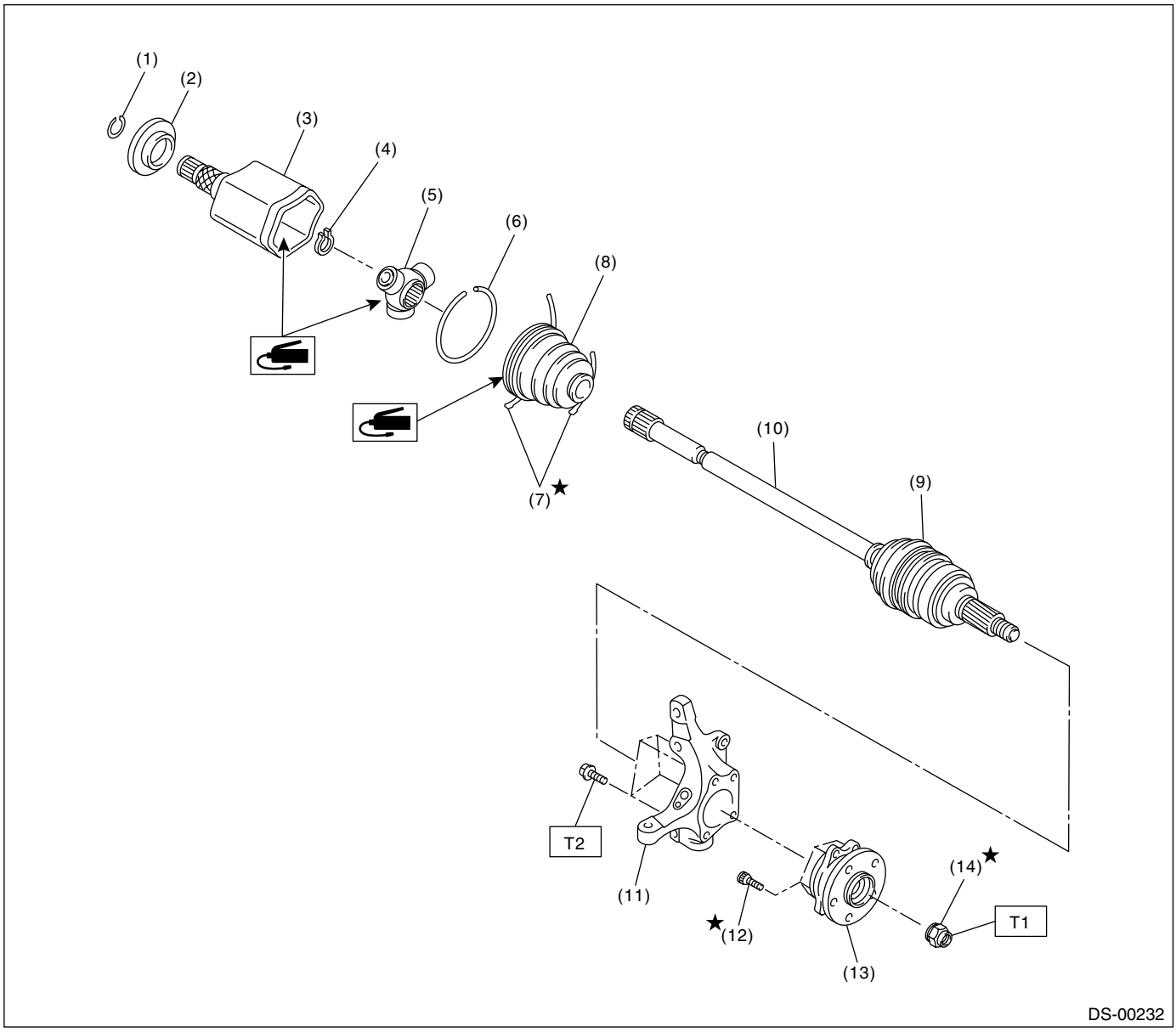
1. PROPELLER SHAFT



(1) Propeller shaft
(2) Bushing
(3) Rear differential (VA1-type)
(4) Rear differential (T-type)
(5) Rear differential (VA2-type)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 31 (3.2, 23.1)
T2: 52 (5.3, 38.3)

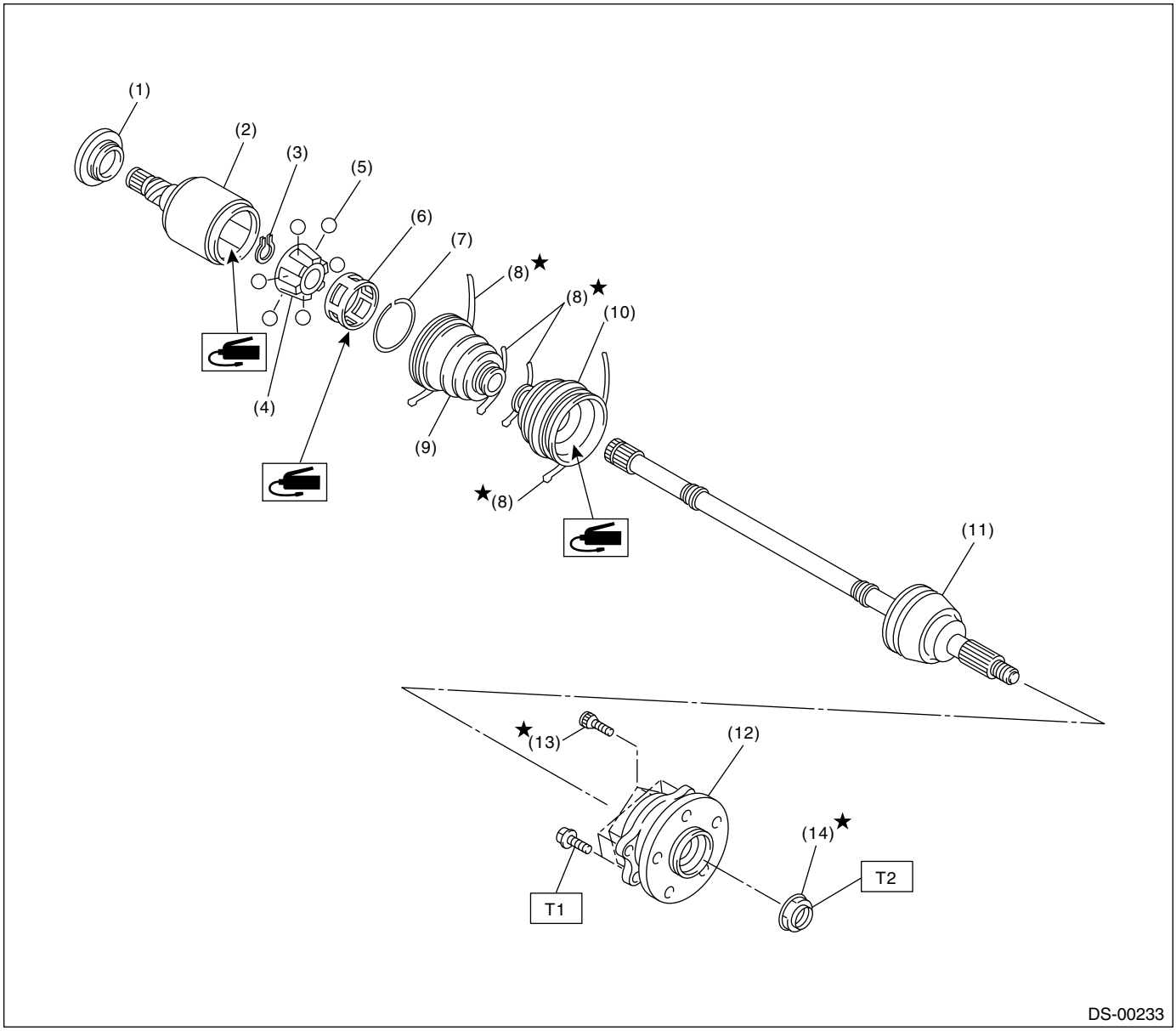
2. FRONT AXLE



(1) Spring pin
(2) Baffle plate
(3) Outer race (PTJ)
(4) Snap ring
(5) Trunnion
(6) Circlip
(7) Boot band
(8) Boot (PTJ)
(9) Boot (EBJ)
(10) EBJ shaft ASSY
(11) Housing
(12) Hub bolt
(13) Front hub unit bearing
(14) Axle nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 220 (22.4, 162)
T2: 65 (6.6, 47.9)

3. REAR AXLE



(1) Baffle plate (DOJ)
(2) Outer race (DOJ)
(3) Snap ring
(4) Inner race
(5) Ball
(6) Cage
(7) Snap ring
(8) Boot band
(9) Boot (DOJ)
(10) Boot (BJ)
(11) BJ shaft ASSY (2.0 L Non-turbo AT model)
EBJ shaft ASSY (Except 2.0 L Non-turbo AT model)
(12) Rear hub unit bearing
(13) Hub bolt
(14) Axle nut (olive color)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 65 (6.6, 47.9)
T2: 190 (19.4, 140)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease, etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Apply grease onto sliding or revolution surfaces before installation.
• Before installing snap rings, apply sufficient amount of grease to avoid damage and deformation.
• Before securing a part on a vise, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOL

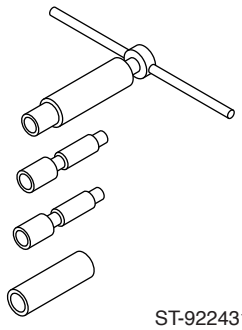
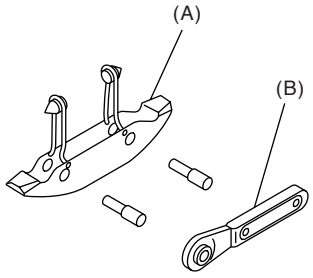
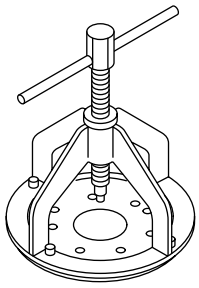
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-922431000	922431000	AXLE SHAFT INSTALLER	• Used for installing axle shaft into housing. • Used with ADAPTER (927390000).
 ST-925091000	925091000	BAND TIGHTENING TOOL	Used for tightening boot band. (A) Jig for band (B) Ratchet wrench
 ST-926470000	926470000	AXLE SHAFT PULLER	Used for removing axle shaft.

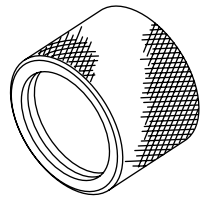
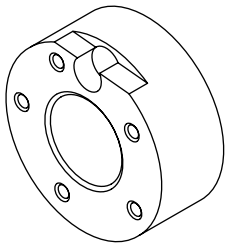
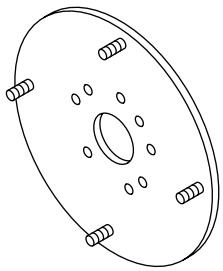
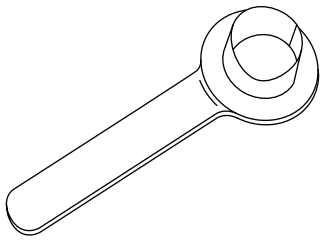
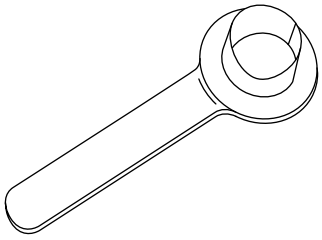
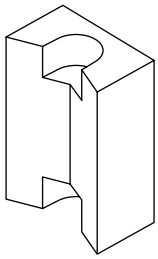
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST18675AA000	18675AA000	DIFFERENTIAL SIDE OIL SEAL INSTALLER	Used for installing differential side retainer oil seal.
 ST-927080000	927080000	HUB STAND	Used for assembling hub bolt in hub.
 ST-927140000	927140000	AXLE SHAFT PULLER PLATE	Same as plate 2 included in AXLE SHAFT PULLER (926470000).
 ST28099PA090	28099PA090	OIL SEAL PROTECTOR	• Used for installing rear drive shaft into rear differential. • For protecting oil seal.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST28399SA010	28399SA010	OIL SEAL PROTECTOR	• Used for installing front drive shaft into front differential. • For protecting oil seal.
 ST28399AG000	28399AG000 (New adopted tool)	HUB STAND	Used for extracting hub bolt.

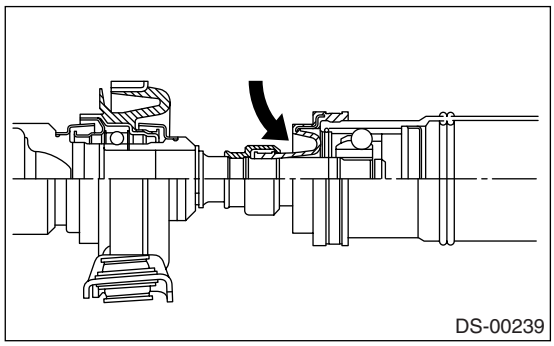
2. GENERAL TOOL

DESCRIPTION	REMARKS
Puller	Used for removing ball joint from knuckle arm.
Dial gauge	Used for inspecting propeller shaft run-out.
Extension cap	Used for preventing leak of gear oil or ATF.
Bar	Used for extracting drive shaft.

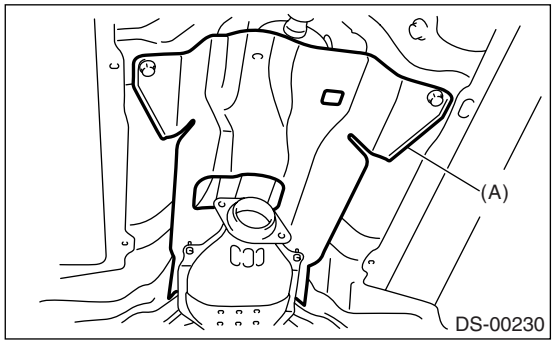
2. Propeller Shaft

A: REMOVAL

NOTE:
• Before removing propeller shaft, wrap metal parts with a cloth or rubber material.
• In case of DOJ type, before removing propeller shaft, wrap metal parts (installed at the rubber boot of center DOJ) with a cloth or rubber material, as shown in the figure. Rubber boot may be damaged due to interference with adjacent metal parts while bending the DOJ during removal.

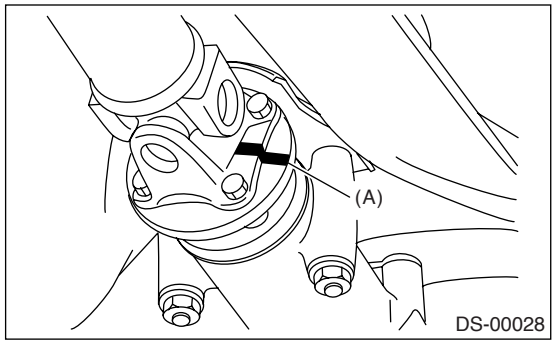


1) Disconnect the ground cable from battery.
2) Shift the select lever or gear shift lever to neutral.
3) Release the parking brake.
4) Lift-up the vehicle.
5) Remove the center exhaust pipe.
6) Remove the rear exhaust pipe and muffler.
7) Remove the heat shield cover.



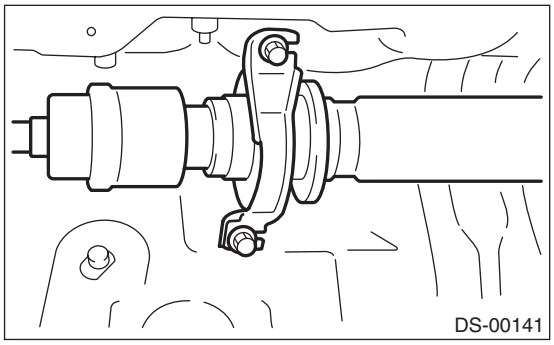
(A) Heat shield cover

8) Make matching marks on the flange yoke and rear differential before removal.



(A) Alignment mark

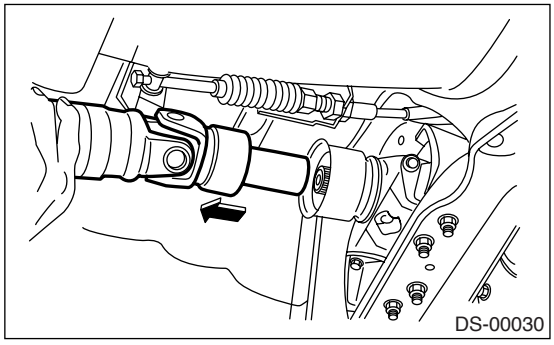
9) Remove the three bolts which hold propeller shaft to rear differential.
10) Remove the remaining bolt.
11) Remove the two bolts which hold center bearing to vehicle body.



12) Remove the propeller shaft from transmission.

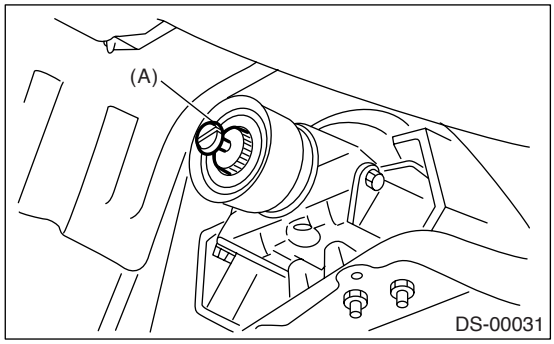
CAUTION:
• Be careful not to damage oil seals and frictional surface of sleeve yoke.
• Cover the center exhaust pipe with a cloth to keep off any ATF or oil spilled from transmission when removing propeller shaft.

NOTE:
Use a container to catch ATF or oil flowing from propeller shaft.



13) Install the extension cap to transmission.

NOTE:
If extension cap is not available, place vinyl bag over opening and fasten with string to prevent gear oil or ATF from leaking.

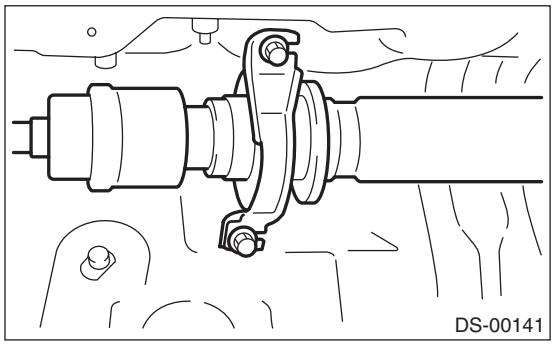


(A) Extension cap

B: INSTALLATION

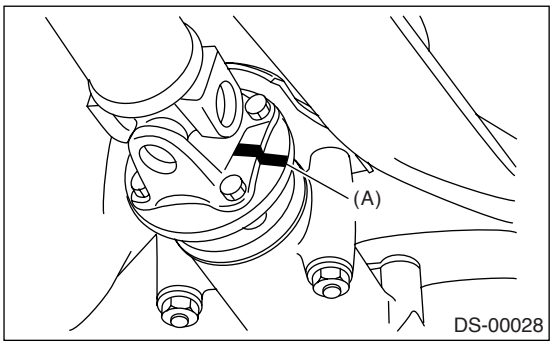
1) Insert the sleeve yoke into the transmission and attach center bearing to body.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



2) Align the matching marks and connect the flange yoke and rear differential.

Tightening torque:
31 N·m (3.2 kgf-m, 23.1 ft-lb)



(A) Alignment mark

3) Install the heat shield cover.
4) Install the center exhaust pipe.
5) Install the rear exhaust pipe and muffler.
6) Lower the vehicle.
7) Connect the battery ground cable to battery.

C: INSPECTION

NOTE:
Do not disassemble propeller shaft. Check the following and replace if necessary.

- Tube surface for dents of cracks
- Splines for deformation or abnormal wear
- Joints for non-smooth operation or abnormal noise
- Center bearing for free play, noise or non-smooth operation.
- Oil seals for abnormal wear or damage
- Center bearing for breakage

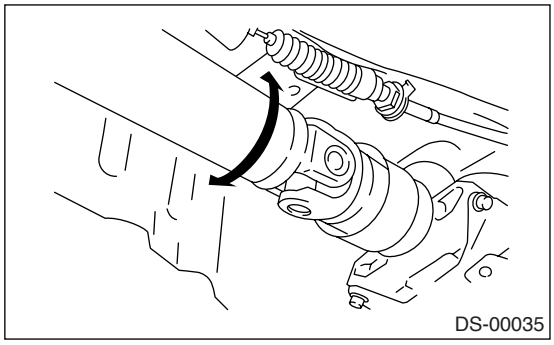
Check the following points with propeller shaft installed in vehicle.

1. JOINTS AND CONNECTIONS

1) Remove the center exhaust pipe.
2) Remove the heat shield cover.
3) Check for any looseness of the yoke flange mounting bolts which connect to rear differential and center bearing bracket mounting bolts.

2. SPLINES AND BEARING

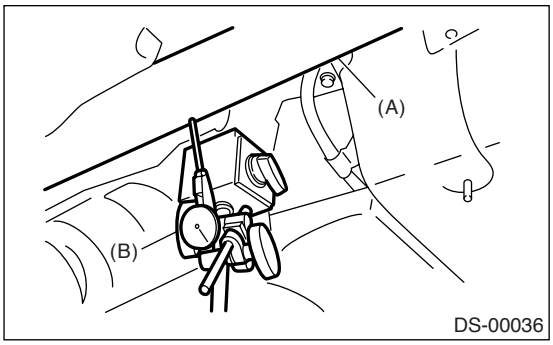
1) Remove the center exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Turn the propeller shaft by hand to see if abnormal free play exists at splines. Also move yokes to see if abnormal free play exists at spiders and bearings.



3. RUNOUT OF PROPELLER SHAFT

1) Remove the center exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Set the dial gauge with its indicator stem at center of propeller shaft tube.
5) Turn the propeller shaft slowly by hands to check for “runout” of propeller shaft.

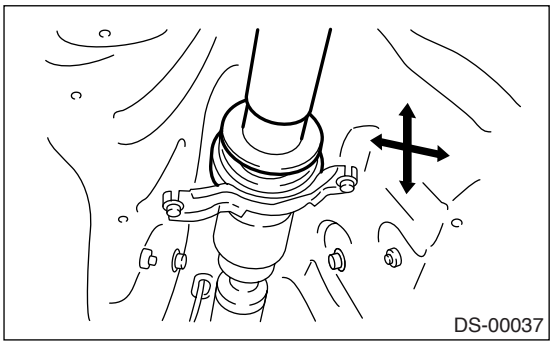
Runout:
Service limit 0.6 mm (0.024 in)



(A) Propeller shaft
(B) Dial gauge

4. CENTER BEARING FREE PLAY

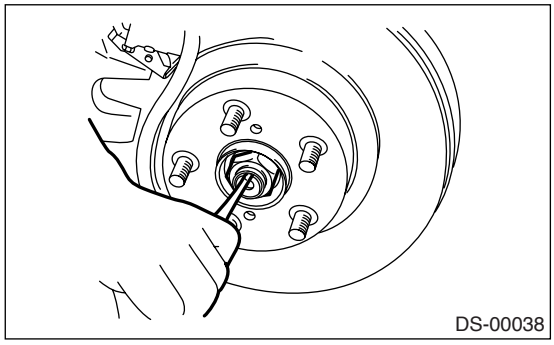
1) Remove the front and center exhaust pipe.
2) Remove the rear exhaust pipe and muffler.
3) Remove the heat shield cover.
4) Move the propeller shaft near center bearing up and down, and left and right with your hand to check for any abnormal bearing free play.



3. Front Axle

A: REMOVAL

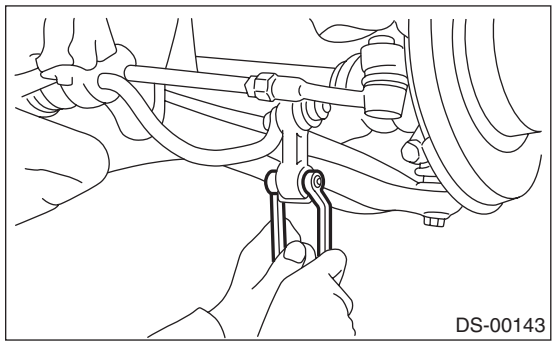
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle and remove the front wheels.
3) Unlock the axle nut.



4) Remove the axle nut using a socket wrench while depressing the brake pedal.

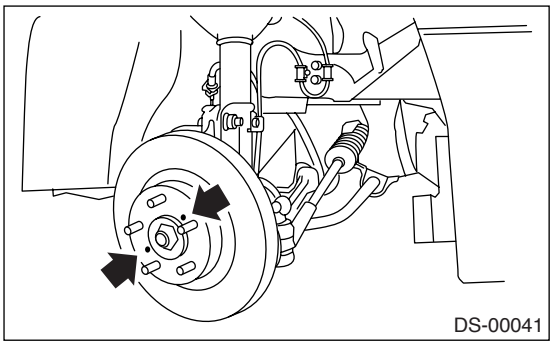
CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the stabilizer link.

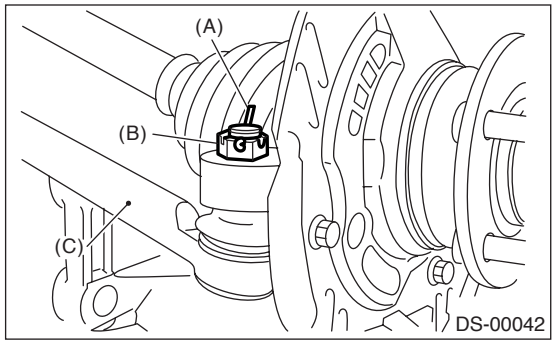


6) Remove the disc brake caliper from housing, and suspend it from strut using a wire.
7) Remove the disc rotor from hub.

NOTE:
If the disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on rotor.

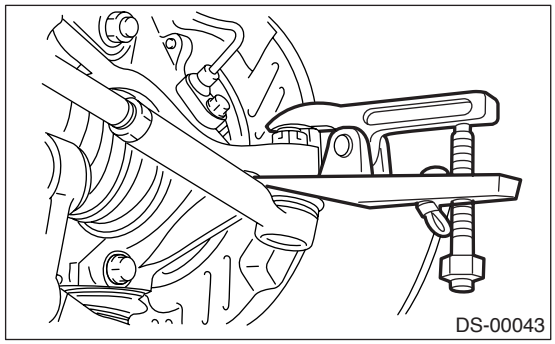


8) Remove the cotter pin and castle nut which secure tie-rod end to housing knuckle arm.

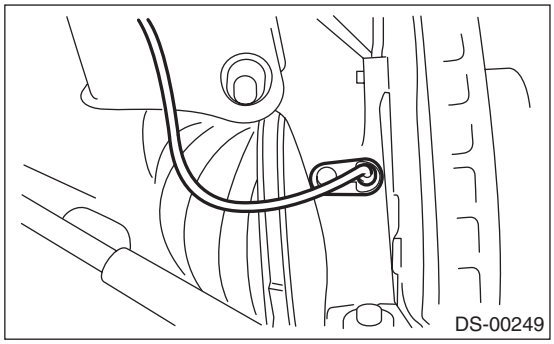


(A) Cotter pin
(B) Castle nut
(C) Tie-rod

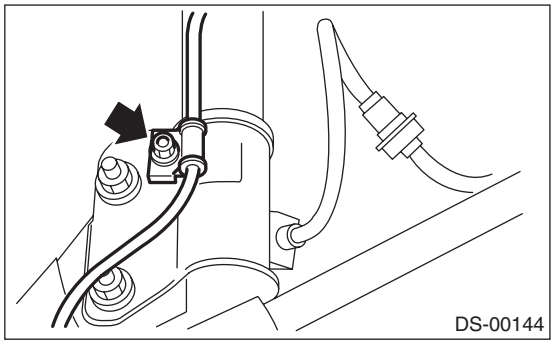
9) Using a puller, remove the tie-rod ball joint from knuckle arm.



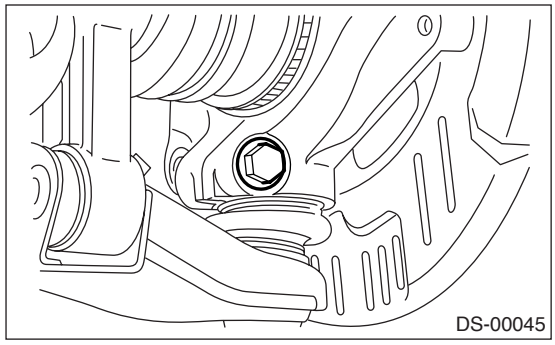
10) Remove the ABS wheel speed sensor assembly and harness.



11) Remove the bolts which secure sensor harness to strut.

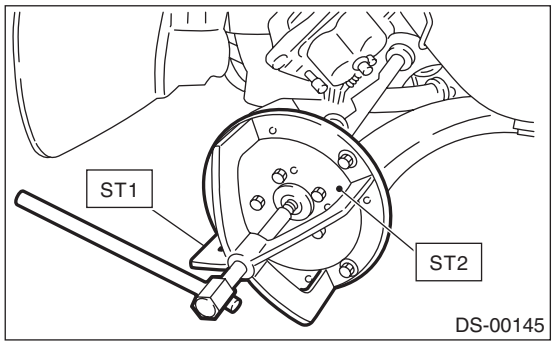


12) Remove the front arm ball joint from housing.

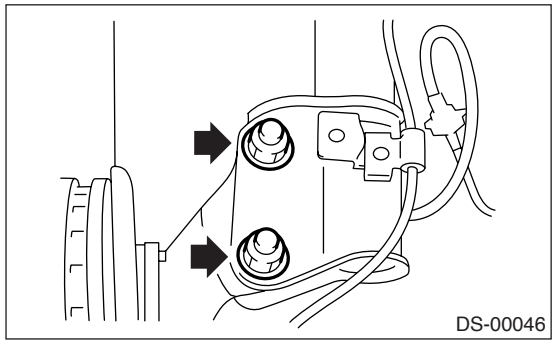


13) Remove the PTJ from transmission.
14) Remove the front drive shaft assembly from hub. If it is hard to remove, use STs.

ST1	926470000	AXLE SHAFT PULLER
ST2	927140000	AXLE SHAFT PULLER PLATE



15) After scribing an alignment mark on camber adjusting bolt head, remove the bolts which connect housing and strut, and disconnect the housing from strut.



B: INSTALLATION

1) While aligning the alignment mark on the camber adjusting bolt head, tighten the housing and strut using a new self-locking nut.

Tightening torque:
177 N·m (18.0 kgf-m, 130 ft-lb)

2) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>

3) Install the front arm ball joint to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

4) Install the ABS wheel speed sensor harness to strut.
5) Install the ABS wheel speed sensor on housing.

Tightening torque:
32 N·m (3.3 kgf-m, 23.9 ft-lb)

6) Install the disc rotor on hub.
7) Install the disc brake caliper on housing.

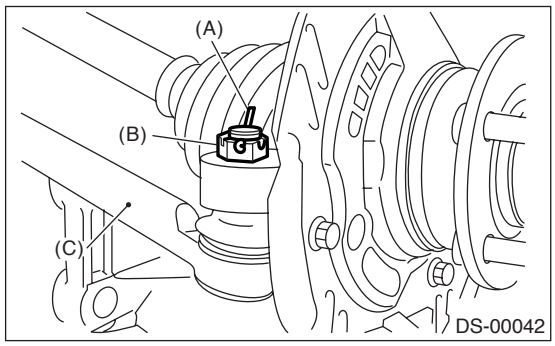
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

8) Install the stabilizer link.
9) Connect the tie-rod end ball joint to the knuckle arm with a castle nut.

Tightening torque:
27.0 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit the cap at bottom of tie-rod end with hammer.

10) Tighten the castle nut to specified torque and tighten further within 60° until the pin hole is aligned with the slot in nut. Bend the cotter pin to lock.



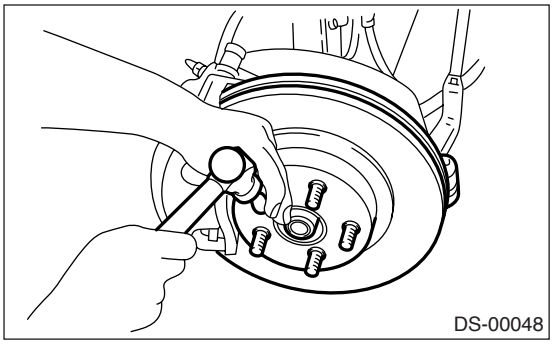
(A) Cotter pin
(B) Castle nut
(C) Tie-rod

11) While depressing the brake pedal, tighten a new axle nut (olive color) to specified torque and lock it securely.

Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

CAUTION:
• Install the wheel after installation of axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

12) After tightening the axle nut, lock it securely.

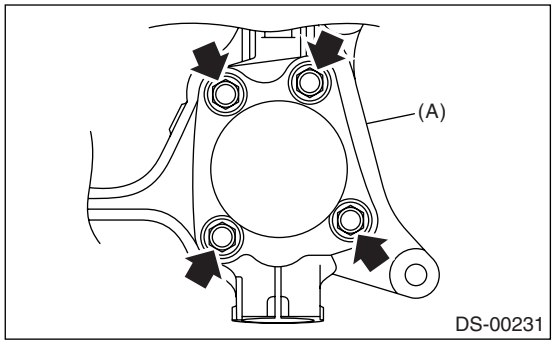


13) Install the wheel and tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

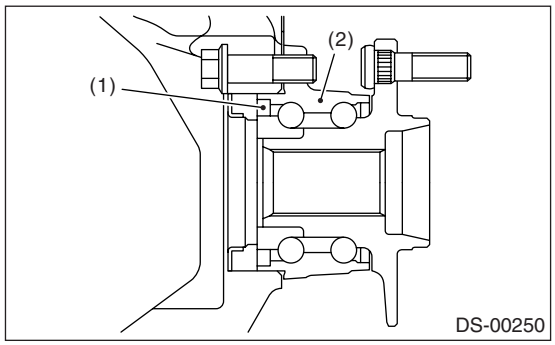
C: DISASSEMBLY

1) Remove the four bolts from housing, and remove the front hub unit bearing and disc cover.



(A) Housing

CAUTION:
• Do not get closer the tool which charged magnetism to magnetic encorder.
• Be careful not to damage the magnetic encoder.



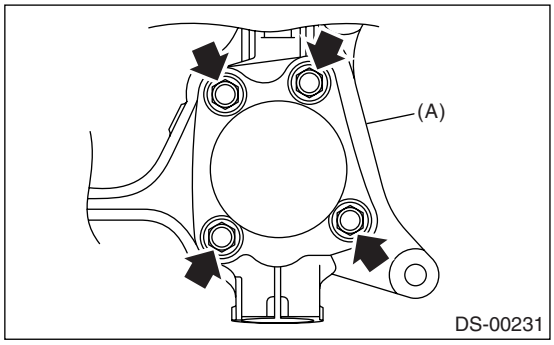
(1) Magnetic encoder
(2) Front hub unit bearing

2) Disassemble the front hub unit bearing. <Ref. to DS-18, DISASSEMBLY, Front Hub Unit Bearing.>

D: ASSEMBLY

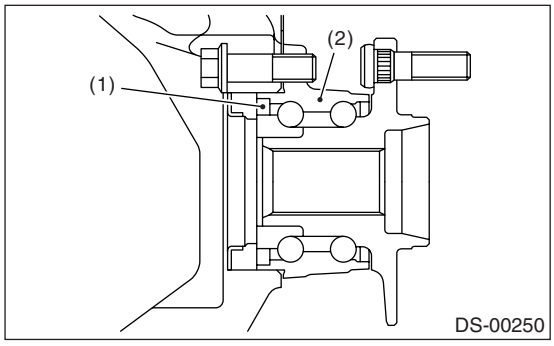
1) Assemble the front hub unit bearing. <Ref. to DS-18, ASSEMBLY, Front Hub Unit Bearing.>
2) Place the disc cover between housing and front hub unit, and tighten the four bolts.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)



(A) Housing

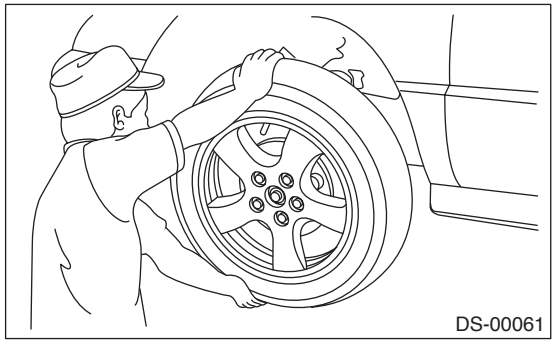
CAUTION:
• Do not get closer the tool which charged magnetism to magnetic encorder.
• Be careful not to damage the magnetic encoder.



(1) Magnetic encoder
(2) Front hub unit bearing

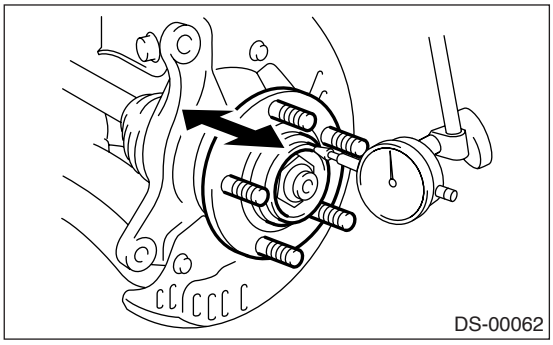
E: INSPECTION

1) Moving the front tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.



2) Inspect the lean of axis direction using a dial gauge. Replace the bearing if the load range exceeds the limitation.

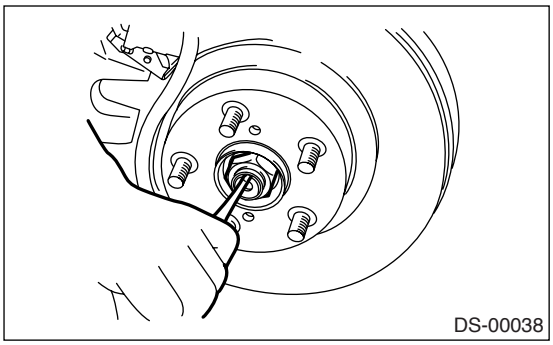
Service limit:
Maximum: 0.05 mm (0.0020 in)



4. Front Hub Unit Bearing

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle and remove the front wheels.
3) Unlock the axle nut.

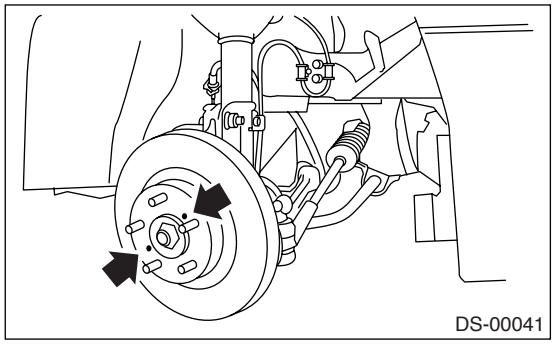


4) Remove the axle nut using a socket wrench while depressing the brake pedal.

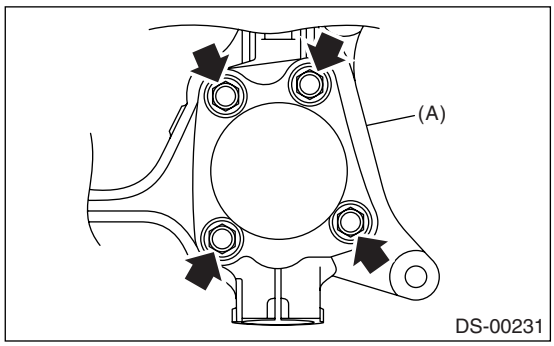
CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the disc brake caliper from housing, and suspend it from strut using a wire.
6) Remove the disc rotor from hub.

NOTE:
If the disc rotor seizes up within hub, drive disc rotor out by installing an 8-mm bolt in screw hole on rotor.

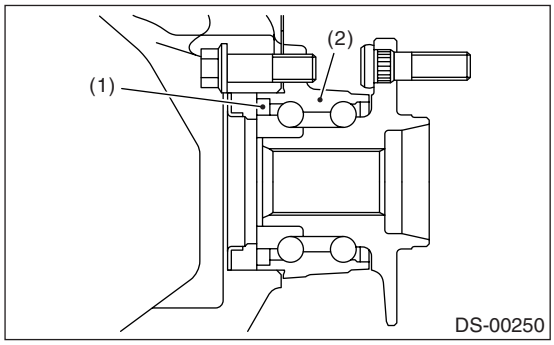


7) Remove four bolts from housing.



(A) Housing

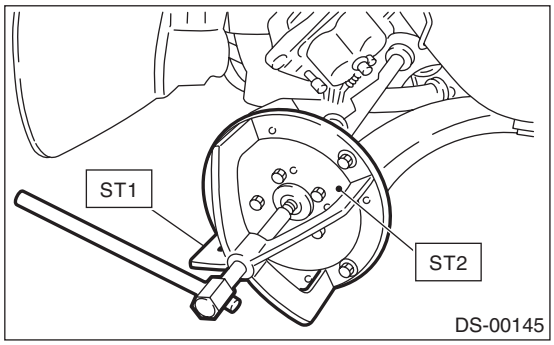
CAUTION:
• Do not get closer the tool which charged magnetism to magnetic encorder.
• Be careful not to damage the magnetic encoder.



(1) Magnetic encoder
(2) Front hub unit bearing

8) Remove the front hub unit bearing. If it is hard to remove, use STs.

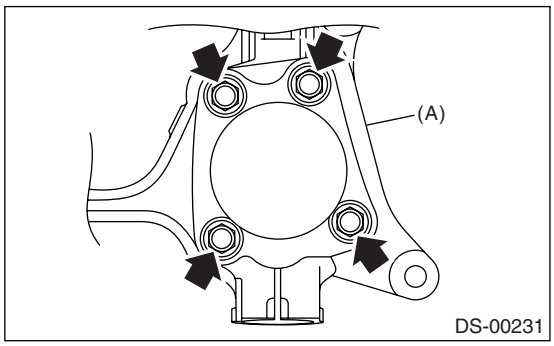
ST1	926470000	AXLE SHAFT PULLER
ST2	927140000	AXLE SHAFT PULLER PLATE



B: INSTALLATION

1) Place the disc cover between housing and front hub unit, and tighten the four bolts.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)



(A) Housing

2) Install the front drive shaft. <Ref. to DS-22, INSTALLATION, Front Drive Shaft.>
3) Tighten the axle nut temporarily.
4) Install the disc rotor on hub.
5) Install the disc brake caliper on the housing.

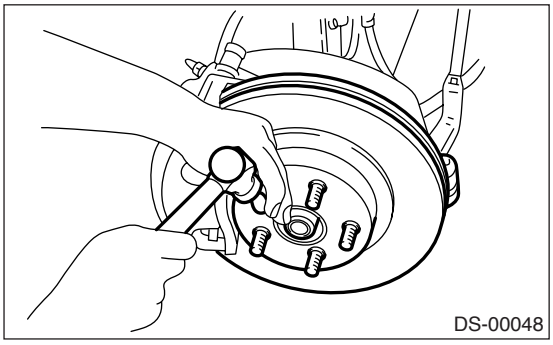
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)

6) While depressing the brake pedal, tighten a new axle nut (olive color) to specified torque and lock it securely.

Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

CAUTION:
• Install the wheel after installation of the axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

7) After tightening the axle nut, lock it securely.



8) Install the wheel and tighten the wheel nuts to specified torque.

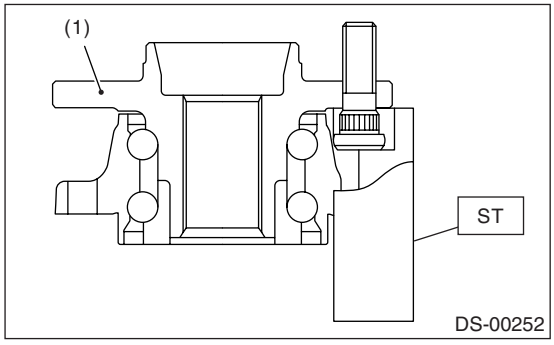
Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

C: DISASSEMBLY

Using the ST and a hydraulic press, drive hub bolts out.
ST 28399AG000 HUB STAND

CAUTION:
• Be careful not to hammer the hub bolts. This may deform the hub.
• Do not reuse the hub bolt.

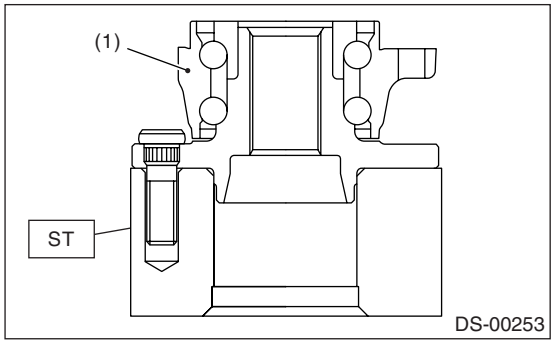
NOTE:
Since the hub unit bearing can not be disassembled, only hub bolts can be removed.



(1) Front hub unit bearing

D: ASSEMBLY

1) Attach the hub to ST securely.
ST 927080000 HUB STAND



(1) Front hub unit bearing

2) Using a press, press new hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

E: INSPECTION

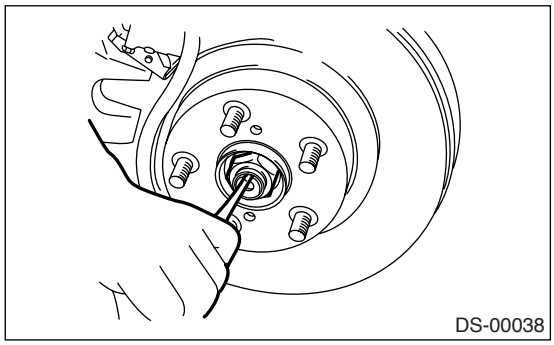
Refer to “FRONT AXLE” for inspection procedures. <Ref. to DS-15, INSPECTION, Front Axle.>

CAUTION:
If there is any fault in the bearing, replace hub unit bearing.

5. Rear Hub Unit Bearing

A: REMOVAL

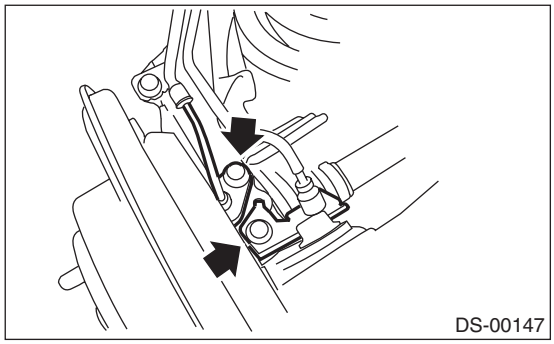
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Unlock the axle nut.



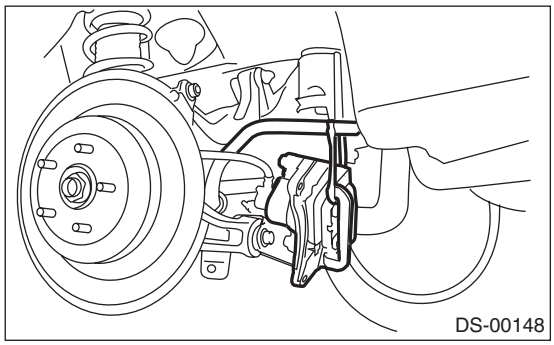
4) While applying the parking brake, remove the axle nut using the socket wrench.

CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Release the parking brake.
6) Remove the rear ABS wheel speed sensor.



7) Remove the disc brake caliper from back plate, and suspend it from stabilizer using wire.

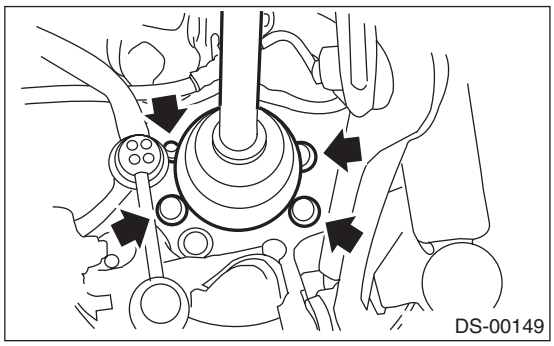


8) Remove the disc rotor from hub.

NOTE:
• Mark the mating surface of hub and disc rotor before removing the disc rotor to avoid confusing when installing.

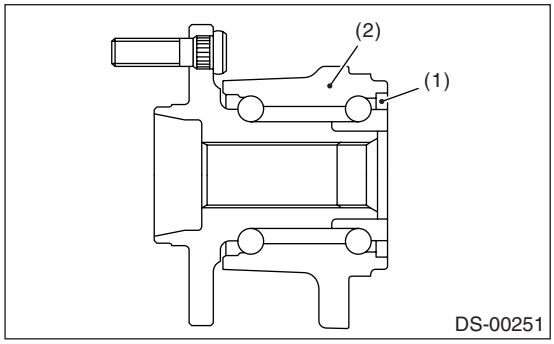
• If the disc rotor seizes up within hub, drive the disc rotor out by installing an 8-mm bolt in screw hole on rotor.

9) Remove the four bolts from rear arm.

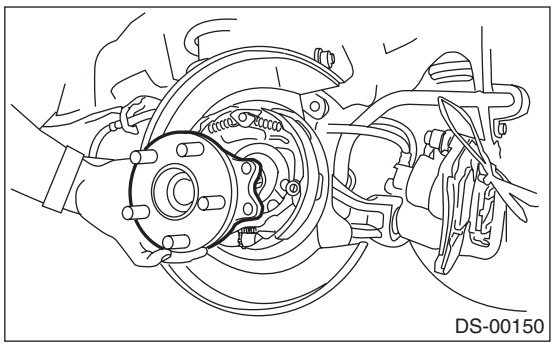


10) Remove the hub unit bearing.

CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encorder.

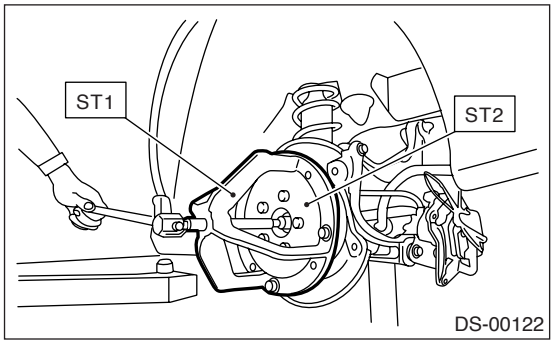


(1) Magnetic encoder
(2) Rear hub unit bearing



NOTE:
If it is hard to remove, use STs.

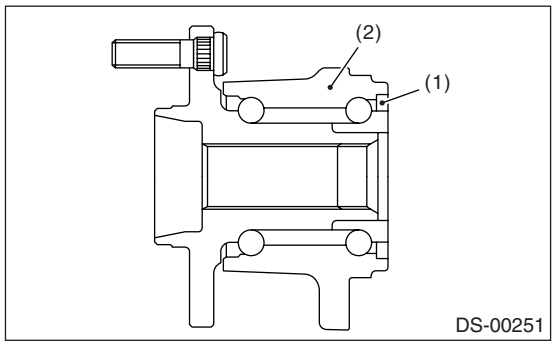
ST1	926470000	AXLE SHAFT PULLER
ST2	927140000	AXLE SHAFT PULLER PLATE



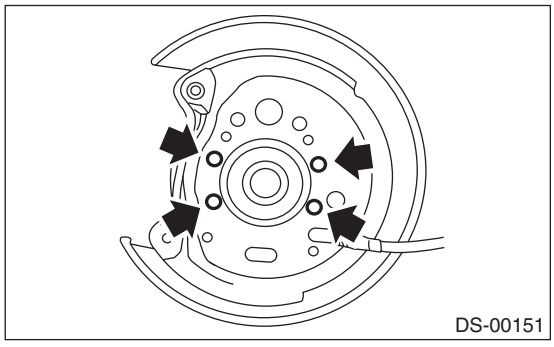
B: INSTALLATION

1) Aligning the hub unit bearing to the mounting hole of the back plate, install the hub unit assembly and back plate. Tighten the axle nut temporarily.

CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encorder.

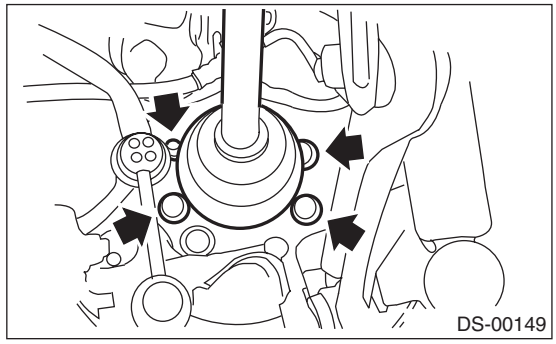


(1) Magnetic encoder
(2) Rear hub unit bearing



2) Tighten the four bolts to the back plate.

Tightening torque:
65 N·m (6.6 kgf-m, 47.9 ft-lb)

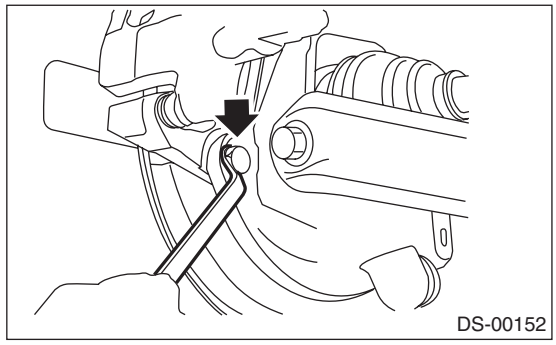


3) Remove the axle nut.
4) Draw the rear drive shaft into specified position.
5) Tighten the new axle nut temporarily.

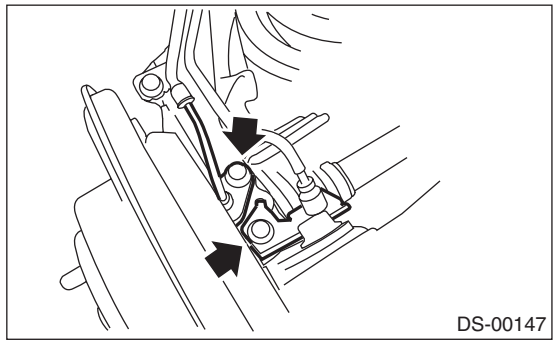
CAUTION:
Use a new axle nut (olive color).

6) Install the disc rotor on hub.
7) Install the disc brake caliper on back plate.

Tightening torque:
52 N·m (5.3 kgf-m, 38.3 ft-lb)



8) Install the rear ABS wheel speed sensor and brake cable bracket.



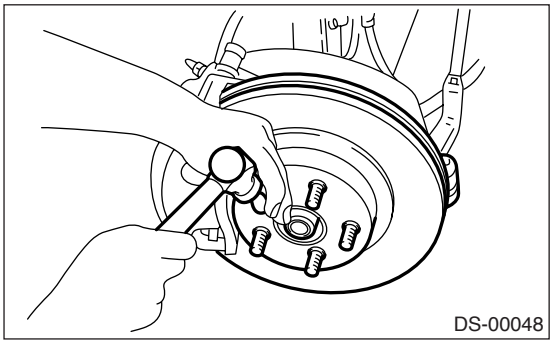
9) Adjust the parking brake lever stroke by turning adjuster. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

10) While applying the parking brake and depressing the brake pedal, tighten a new axle nut (olive color) to the specified torque and lock it securely.

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

CAUTION:
• Install the wheel after installation of the axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

11) After tightening the axle nut, lock it securely.


DS-00048

12) Install the wheel and tighten the wheel nuts to specified torque.

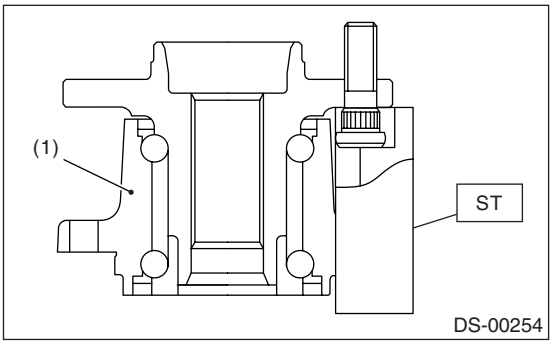
Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

C: DISASSEMBLY

Using the ST and a hydraulic press, drive hub bolts out.
ST 28399AG000 HUB STAND

CAUTION:
• Be careful not to hammer the hub bolts. This may deform the hub.
• Do not reuse the hub bolt.

NOTE:
Since the hub unit bearing can not be disassembled, only hub bolts can be removed.

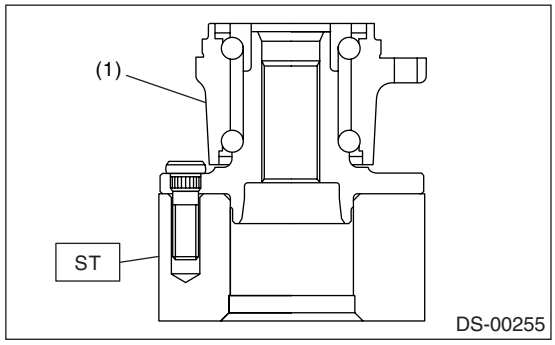


DS-00254

(1) Rear hub unit bearing

D: ASSEMBLY

1) Attach the hub to ST securely.
ST 927080000 HUB STAND



DS-00255

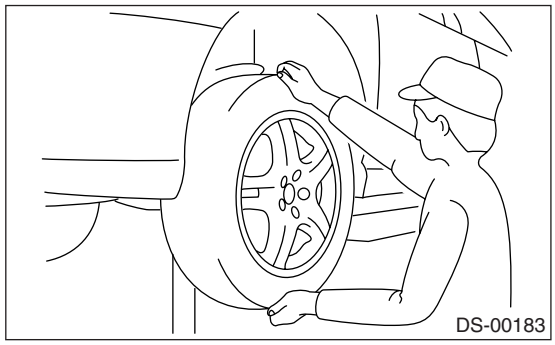
(1) Rear hub unit bearing

2) Using a press, press the new hub bolts until their seating surfaces contact the hub.

NOTE:
Use 12 mm (0.47 in) dia. holes in HUB STAND to prevent bolts from tilting.

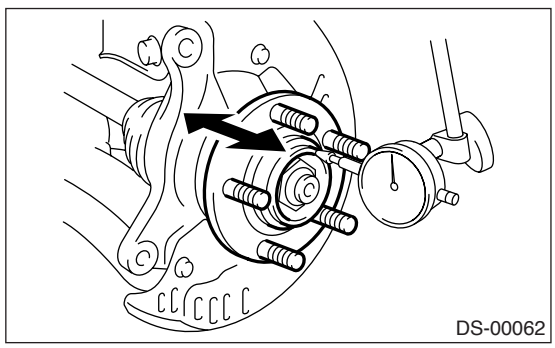
E: INSPECTION

1) Moving the rear tire up and down by hand, check there is no backlash in bearing, and check the wheel rotates smoothly.


DS-00183

2) Inspect the lean of axis direction using a dial gauge. Replace the hub bearing if the lean range exceed the limitation.

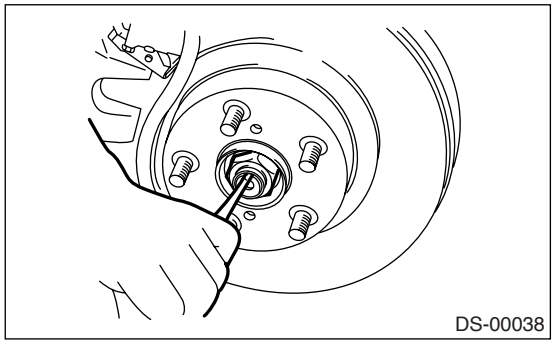
Service limit:
Maximum: 0.05 mm (0.0020 in)


DS-00062

6. Front Drive Shaft

A: REMOVAL

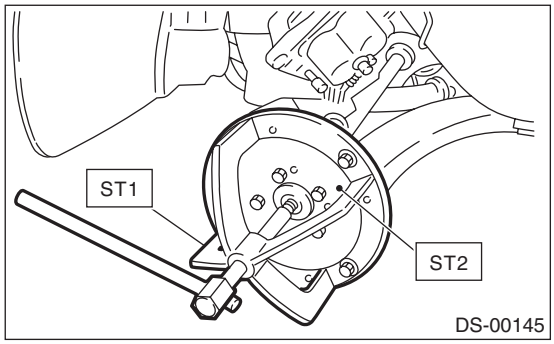
1) Disconnect the ground cable from battery.
2) Lift-up the vehicle and remove the front wheels.
3) Unlock the axle nut.



4) Remove the axle nut using a socket wrench while depressing the brake pedal.

CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the stabilizer link from front arm.
6) Disconnect the front arm from housing.
7) Remove the front drive shaft assembly. If it is hard to remove, use ST1 and ST2.
ST1 926470000 AXLE SHAFT PULLER
ST2 927140000 AXLE SHAFT PULLER PLATE



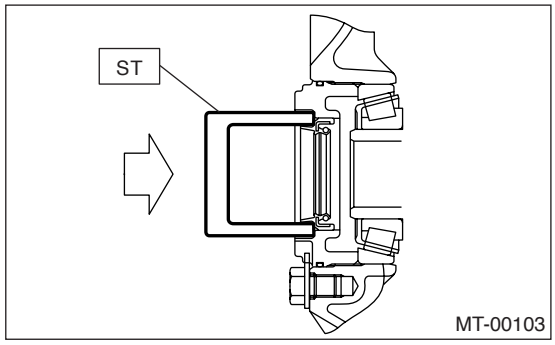
8) Using a bar, remove the front drive shaft from transmission.

CAUTION:
Be careful not to allow the bar to damage holder area.

B: INSTALLATION

1) Using the ST, replace the differential side retainer oil seal with a new one.
ST 18675AA000 DIFFERENTIAL SIDE OIL SEAL INSTALLER

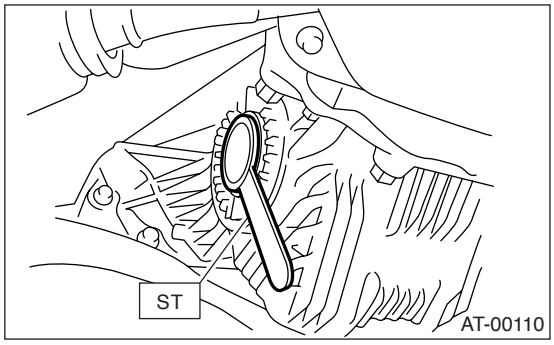
NOTE:
After pulling out the drive shaft, be sure to replace with a new oil seal.



2) Insert the EBJ into hub splines.
3) Draw the drive shaft into specified position.

CAUTION:
Do not hammer drive shaft when installing it.

4) Tighten the axle nut temporarily.
5) Using the ST, install the front drive shaft to transmission.
ST 28399SA010 OIL SEAL PROTECTOR



6) Connect the front arm to housing.

Tightening torque:
49 N·m (5.0 kgf-m, 36 ft-lb)

CAUTION:
Be sure to use a new self-locking nut.

7) Install the stabilizer bracket.
8) While depressing the brake pedal, tighten a new axle nut (olive color) to the specified torque and lock it securely.

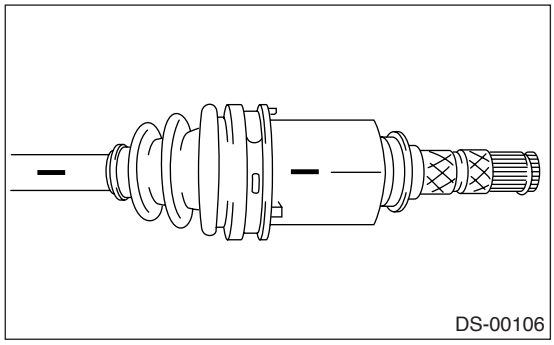
Tightening torque:
220 N·m (22.4 kgf-m, 162 ft-lb)

CAUTION:
• Install the wheel after installation of the axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

9) After tightening axle nut, lock it securely.

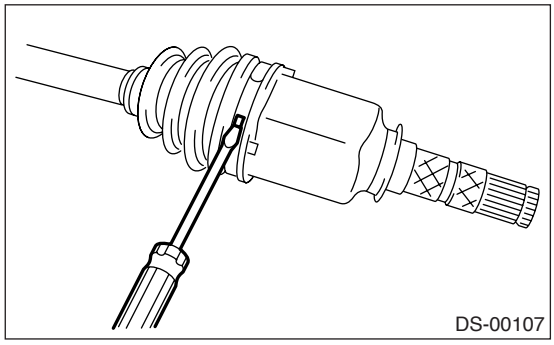
C: DISASSEMBLY

1) Place alignment marks on the shaft and outer race.

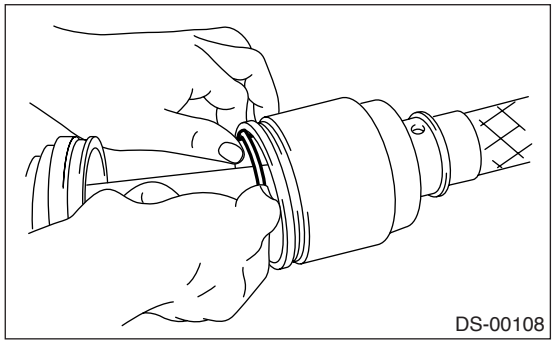


2) Remove the PTJ boot band and boot.

CAUTION:
Be careful not to damage boot.



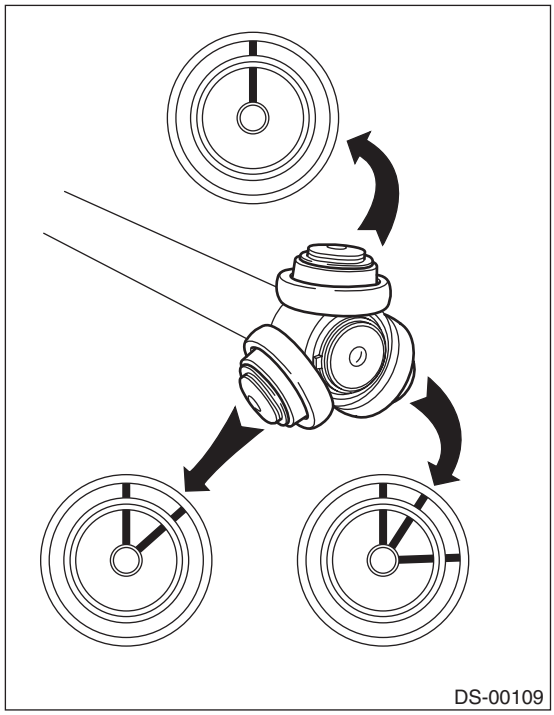
3) Remove the snap ring from PTJ outer race.



4) Remove the PTJ outer race from shaft assembly.
5) Wipe off grease.

CAUTION:
The grease is a special grease. Do not confuse with other greases.

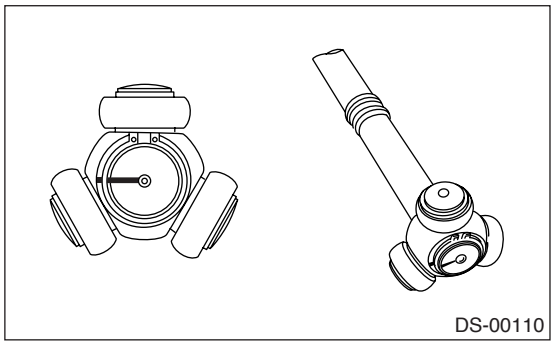
6) Place alignment marks on the roller kit and trunnion.



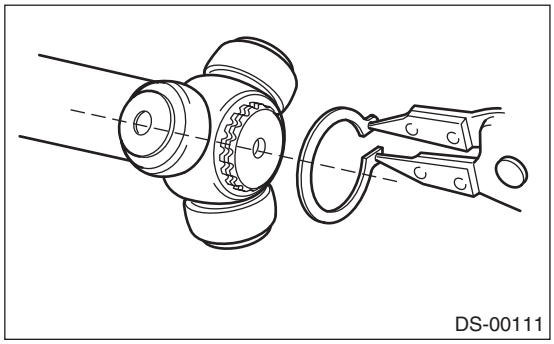
7) Remove the roller kit from trunnion.

CAUTION:
Be careful with the roller kit position.

8) Place alignment marks on the trunnion and shaft.



9) Remove the snap ring and trunnion.



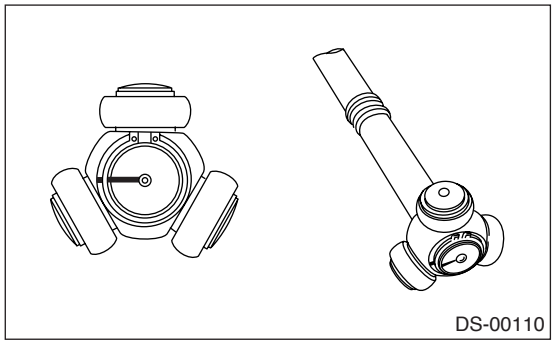
CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

10) Remove the PTJ boot.

NOTE:
Further disassembly of axle is impossible because the BJ cannot be disassembled.

D: ASSEMBLY

1) Place the PTJ boot at the center of shaft.
2) Align alignment marks and install the trunnion on the shaft.

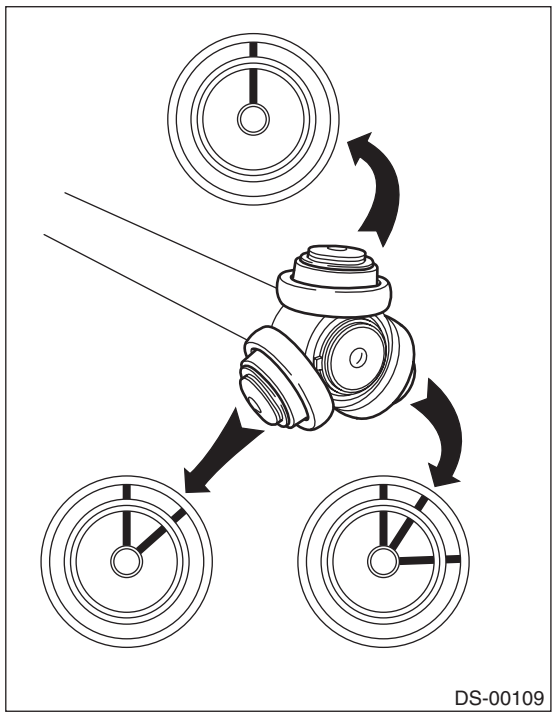

DS-00110

3) Install the snap ring to shaft.

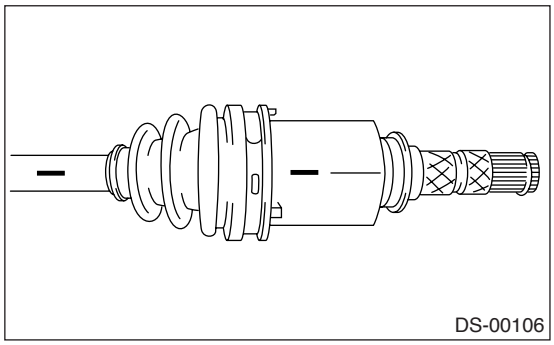
CAUTION:
Confirm that the snap ring is completely fitted in shaft groove.

4) Fill 100 to 110 g (3.53 to 3.88 oz.) of specified grease into the interior of PTJ outer race.
5) Apply a thin coat of specified grease to the roller kit and trunnion.
6) Align alignment marks on roller kit and trunnion and install the roller kit.

CAUTION:
Be careful with the roller kit position.


DS-00109

7) Align alignment marks on the shaft and outer race, and install outer race.


DS-00106

8) Install the snap ring in the groove on PTJ outer race.

CAUTION:
Pull the shaft lightly and assure that the snap ring is completely fitted in the groove.

9) Apply an even coat of the specified grease 30 to 40 g (1.06 to 1.41 oz.) to the entire inner surface of boot.
10) Install the PTJ boot taking care not to twist it.

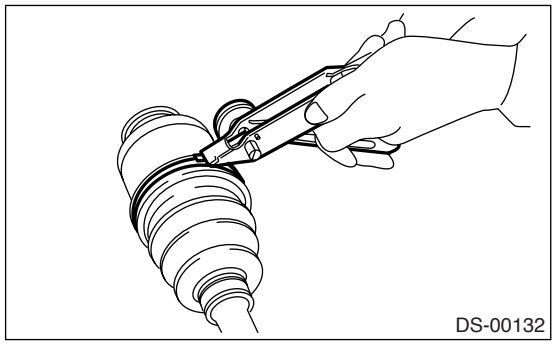
CAUTION:
• The large end of PTJ boot and the boot groove shall be cleaned completely so as to be free from grease and other substances.
• When installing PTJ boot, position outer race of PTJ at center of its travel.

11) Put a new band through the clip and wind twice in alignment with band groove of boot.
12) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, use care so that the air within the boot is appropriate.

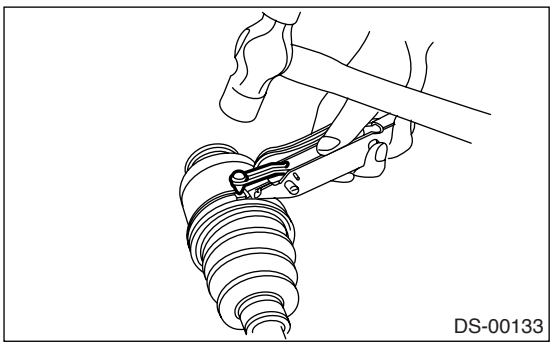
13) Tighten the band using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten the band until it cannot be moved by hand.


DS-00132

14) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

CAUTION:
Tap to an extent that the boot underneath is not damaged.



15) Cut off the band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

CAUTION:
Be careful so that the end of the band is in close contact with clip.

16) Extend and retract the PTJ to provide equal grease coating.

E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. If faulty, repair or replace.

- PTJ (pillow tripod joint)

Check for seizure, corrosion, damage, wear and excessive play.

- EBJ (high-efficiency compact ball fixed joint)

Check for seizure, corrosion, damage and excessive play.

- Shaft

Check for excessive bending, twisting, damage and wear.

- Boot

Check for wear, warping, breakage and scratches.

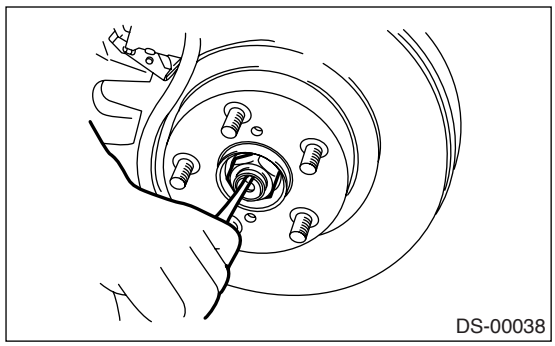
- Grease

Check for discoloration and fluidity.

7. Rear Drive Shaft

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the rear wheels.
3) Unlock the axle nut.



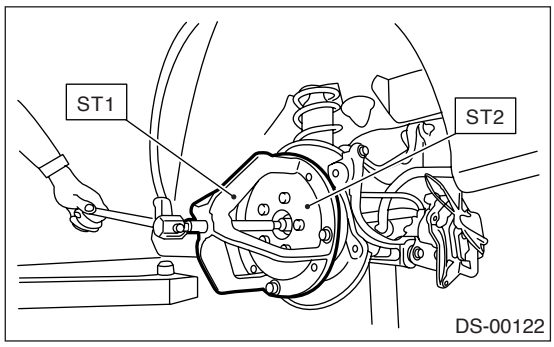
4) While applying the parking brake, remove the axle nut using the socket wrench.

CAUTION:
Remove the wheel before loosening the axle nut. Failure to follow this rule may damage the wheel bearings.

5) Remove the rear differential assembly.
• T-type
<Ref. to DI-29, REMOVAL, Rear Differential (T-type).>
• VA-type
<Ref. to DI-46, REMOVAL, Rear Differential (VA-type).>
6) Remove the axle nut and rear drive shaft. If it is hard to remove, use ST1 and ST2.

ST1	926470000	AXLE SHAFT PULLER
ST2	927140000	AXLE SHAFT PULLER PLATE

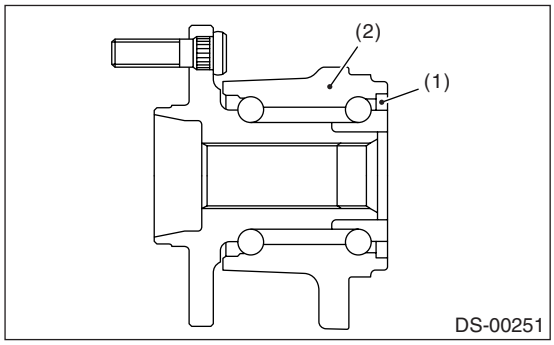
CAUTION:
• Do not hammer drive shaft when removing.
• Do not damage the oil seal and magnetic encoder.



B: INSTALLATION

1) Insert the BJ or EBJ into rear hub splines.

CAUTION:
• Be careful not to damage the magnetic encoder.
• Do not get closer the tool which charged magnetism to magnetic encorder.



(1) Magnetic encoder
(2) Rear hub unit bearing

2) Draw the rear drive shaft into specified position.

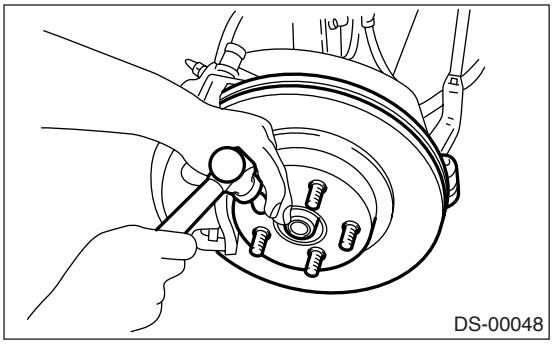
CAUTION:
Do not hammer drive shaft when installing it.

3) Tighten the axle nut temporarily.
4) Install the rear differential assembly.
• T-type
<Ref. to DI-30, INSTALLATION, Rear Differential (T-type).>
• VA-type
<Ref. to DI-47, INSTALLATION, Rear Differential (VA-type).>
5) While applying the parking brake and depressing the brake pedal, tighten a new axle nut (olive color) to specified torque and lock it securely.

Tightening torque:
190 N·m (19.4 kgf-m, 140 ft-lb)

CAUTION:
• Install the wheel after installation of the axle nut. Failure to follow this rule may damage the wheel bearing.
• Be sure to tighten the axle nut to specified torque. Do not overtighten it as this may damage wheel bearing.

6) Lock the axle nut securely.



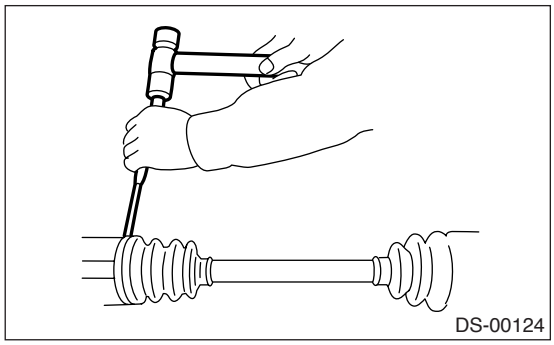
7) Install the wheel.

Tightening torque:
90 N·m (9.2 kgf-m, 66 ft-lb)

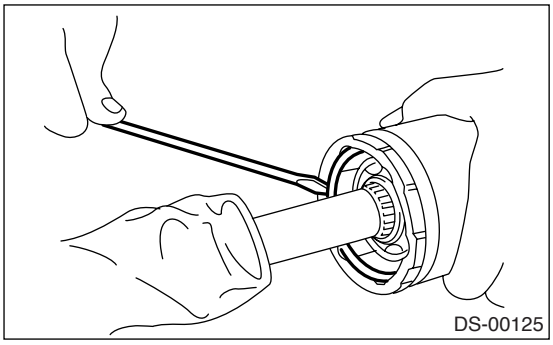
C: DISASSEMBLY

1) Straighten the bent claw of larger end of DOJ boot.
2) Loosen the band by means of screwdriver or pliers.

CAUTION:
Be careful not to damage boot.



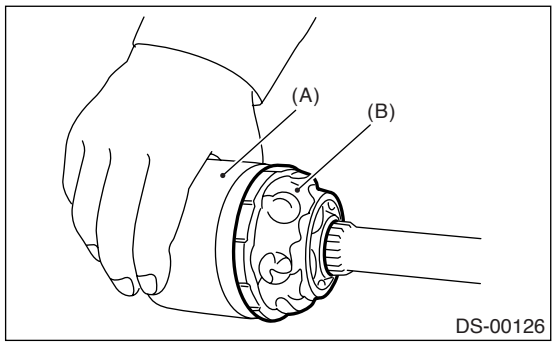
3) Remove the boot band on the small end of DOJ boot in the same manner.
4) Remove the larger end of DOJ boot from DOJ outer race.
5) Pry and remove the round circlip located at the neck of DOJ outer race with a screwdriver.



6) Take out the DOJ outer race from shaft assembly.
7) Wipe off the grease and take out balls.

CAUTION:
The grease is a special grease (grease for constant velocity joint). Do not confuse with other greases.

NOTE:
Disassemble exercising care not to lose balls (6 pcs).



(A) Outer race
(B) Grease

8) To remove the cage from inner race, turn the cage by a half pitch to the track groove of inner race and shift the cage.
9) Remove the snap ring, which fixes inner race to shaft, using pliers.
10) Take out the DOJ inner race.
11) Take off the DOJ cage from shaft and remove DOJ boot.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

12) Remove the BJ boot or EBJ boot in the same procedure as DOJ boot.

NOTE:
Further disassembly of axle is impossible because the BJ and EBJ cannot be disassembled.

D: ASSEMBLY

NOTE:
Use specified grease.

BJ side:
NTG2218-M (Part No. 28395AG010)

EBJ side:
NTG2218-M (Part No. 28395AG000)

DOJ side:
NKG205 (Part No. 28495AG000)

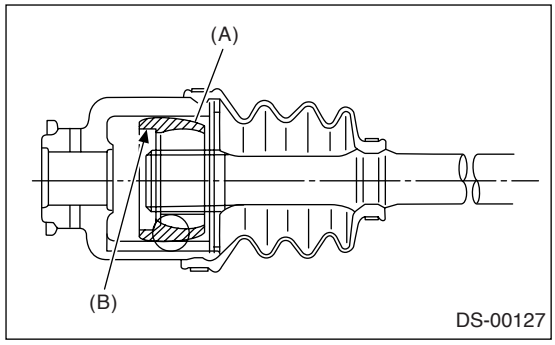
1) Install the BJ or EBJ boot in specified position, and fill it with 60 to 70 g (2.12 to 2.47 oz.) of specified grease.

2) Place the DOJ boot at the center of shaft.

CAUTION:
Be sure to wrap shaft splines with vinyl tape to prevent boot from scratches.

3) Insert the DOJ cage onto shaft.

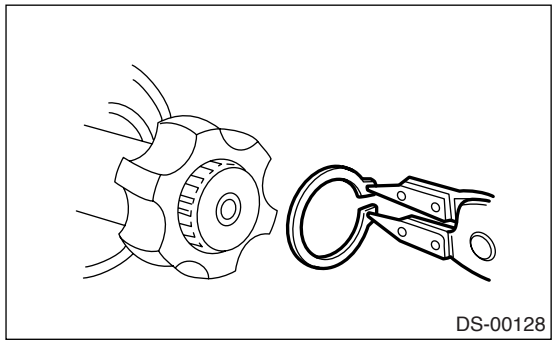
NOTE:
Insert the cage with the cut-out portion facing the shaft end, since the cage has an orientation.



(A) Cage
(B) Cutout

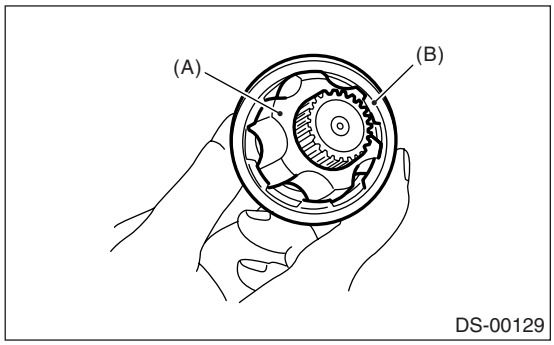
4) Install the DOJ inner race on shaft and fit the snap ring with pliers.

NOTE:
Confirm that the snap ring is completely fitted in the shaft groove.



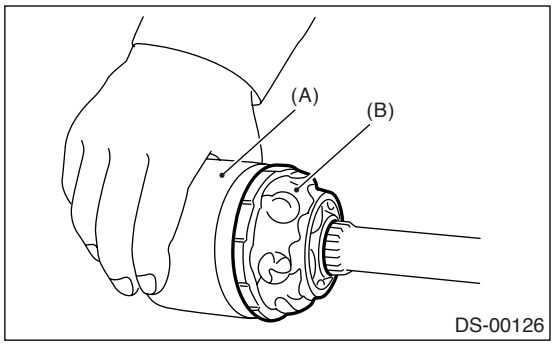
5) Install the cage to inner race fixed upon shaft.

NOTE:
Fit the cage with the protruded part aligned with the track on the inner race and then turn by a half pitch.



(A) Inner race
(B) Cage

6) Fill 80 to 90 g (2.82 to 3.17 oz.) of specified grease into the interior of DOJ outer race.
7) Apply a coat of specified grease to the cage pocket and six balls.
8) Insert six balls into the cage pocket.
9) Align the outer race track and ball positions, and place the shaft, inner race, cage and balls in the original positions and then fit outer race.

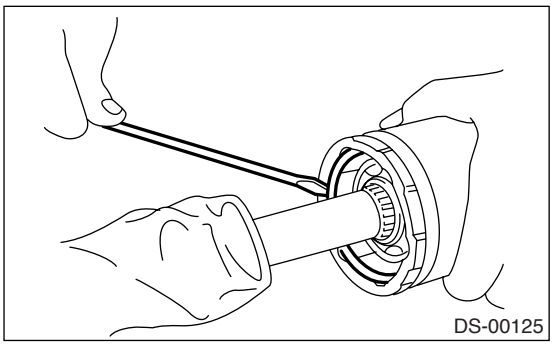


(A) Outer race
(B) Grease

10) Install the snap ring in the groove on DOJ outer race.

NOTE:
• Assure that the balls, cage and inner race are completely fitted in the outer race of DOJ.
• Use care not to place the matched position of snap ring in the ball groove of outer race.

• Pull the shaft lightly and assure that the circlip is completely fitted in the groove.


DS-00125

11) Apply an even coat of the specified grease [20 to 30 g (0.71 to 1.06 oz.)] to the entire inner surface of boot. Also apply grease to shaft.
12) Install the DOJ boot taking care not to twist it.

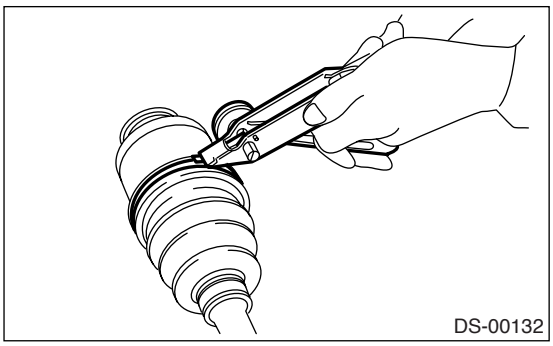
NOTE:
• The inside of the larger end of DOJ boot and the boot groove shall be cleaned so as to be free from grease and other substances.
• When installing DOJ boot, position outer race of DOJ at center of its travel.

13) Put a new band through the clip and wind twice in alignment with band groove of boot.
14) Pinch the end of band with pliers. Hold the clip and tighten securely.

NOTE:
When tightening boot, exercise care so that the air within the boot is appropriate.

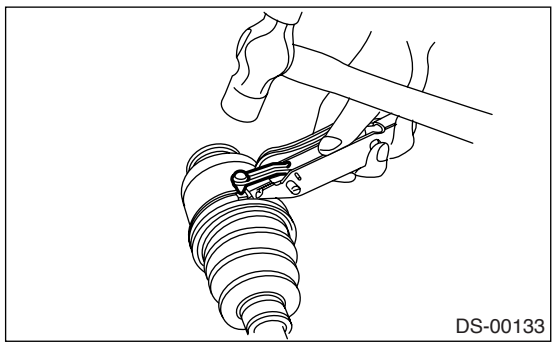
15) Tighten the band by using ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tighten the band until it cannot be moved by hand.


DS-00132

16) Tap on the clip with the punch provided at the end of ST.
ST 925091000 BAND TIGHTENING TOOL

NOTE:
Tap to an extent that the boot underneath is not damaged.


DS-00133

17) Cut off the band with an allowance of about 10 mm (0.39 in) left from the clip and bend this allowance over the clip.

NOTE:
Be careful so that the end of the band is in close contact with clip.

18) Install the BJ boot or EBJ boot in the same procedure as DOJ boot.
19) Extend and retract the DOJ to provide equal grease coating.

E: INSPECTION

Check the removed parts for damage, wear, corrosion etc. Repair or replace if defective.
• DOJ (Double Offset Joint)
Check for seizure, corrosion, damage, wear and excessive play.
• EBJ (high-efficiency compact ball fixed joint)
Check for seizure, corrosion, damage, wear and excessive play.
• Shaft
Check for excessive bending, twisting, damage and wear.
• BJ (Bell Joint)
Check for seizure, corrosion, damage and excessive play.
• Boot
Check for wear, warping, breakage and scratches.
• Grease
Check for discoloration and fluidity.

8. General Diagnostic Table

A: INSPECTION

NOTE:
Vibration while cruising may be caused by an unbalanced tire, improper tire inflation pressure, improper wheel alignment, etc.

Symptom	Possible cause	Corrective action
Noise or vibration from propeller shaft	Center bearing	Check the center bearing. <Ref. to DS-12, CENTER BEARING FREE PLAY, INSPECTION, Propeller Shaft.>
	Runout of propeller shaft	Check the vibration of propeller shaft. <Ref. to DS-11, RUNOUT OF PROPELLER SHAFT, INSPECTION, Propeller Shaft.>
	Loose or free play of connection	Check joint and connector. <Ref. to DS-11, JOINTS AND CONNECTIONS, INSPECTION, Propeller Shaft.>
		Check splines and bearing. <Ref. to DS-11, SPLINES AND BEARING, INSPECTION, Propeller Shaft.>
Abnormal wheel vibration	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-7, ADJUSTMENT, Wheel Balancing.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-8, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-24, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-16, INSPECTION, Rear Shock Absorber.>
	Front drive shaft	Check the front drive shaft. <Ref. to DS-25, INSPECTION, Front Drive Shaft.>
	Rear drive shaft	Check the rear drive shaft. <Ref. to DS-29, INSPECTION, Rear Drive Shaft.>
	Front hub unit bearing	Check the front hub unit bearing. <Ref. to DS-18, INSPECTION, Front Hub Unit Bearing.>
	Rear hub unit bearing	Check the rear hub unit bearing. <Ref. to DS-21, INSPECTION, Rear Hub Unit Bearing.>
Noise from the underbody	Wheel is out of balance.	Check the wheel balance. <Ref. to WT-7, ADJUSTMENT, Wheel Balancing.>
	Front wheel alignment	Check the front wheel alignment. <Ref. to FS-8, INSPECTION, Wheel Alignment.>
	Rear wheel alignment	Check the rear wheel alignment. <Ref. to RS-8, INSPECTION, Wheel Alignment.>
	Front strut	Check the front strut. <Ref. to FS-24, INSPECTION, Front Strut.>
	Rear shock absorber	Check the rear shock absorber. <Ref. to RS-16, INSPECTION, Rear Shock Absorber.>

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

ABS

Page

1. General Description 2
2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U) 6
3. ABS Sequence Control 10
4. Front ABS Wheel Speed Sensor 13
5. Rear ABS Wheel Speed Sensor 15
6. Front Magnetic Encoder 16
7. Rear Magnetic Encoder 17
8. G Sensor 18

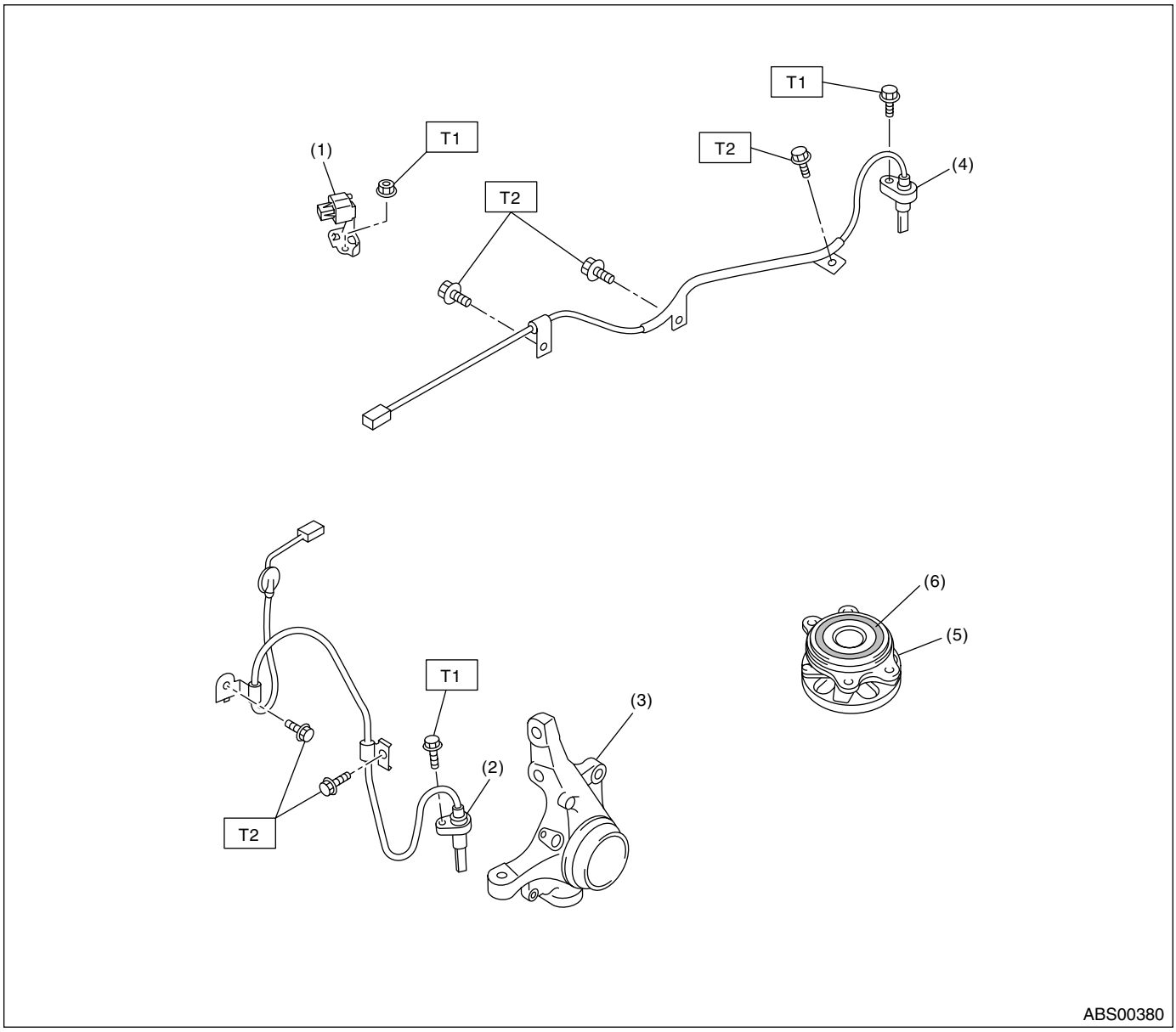
1. General Description

A: SPECIFICATION

Item				Standard value or identification
ABS wheel speed sensor	ABS wheel speed sensor gap (for reference)		Front	0.77 — 1.43 mm (0.030 — 0.056 in)
			Rear	0.64 — 1.56 mm (0.025 — 0.061 in)
	Marks of harness (Marks, Color)	Front	RH	K1 (White)
			LH	K2 (Yellow)
		Rear	RH	K5 (White)
			LH	K6 (Yellow)
G sensor	G sensor voltage			2.3±0.2 V
ABSCM&H/U identification	AT (Except for OUTBACK)			J1
	MT (Except for OUTBACK)			J2
	AT (OUTBACK)			J3
	MT (OUTBACK)			J4

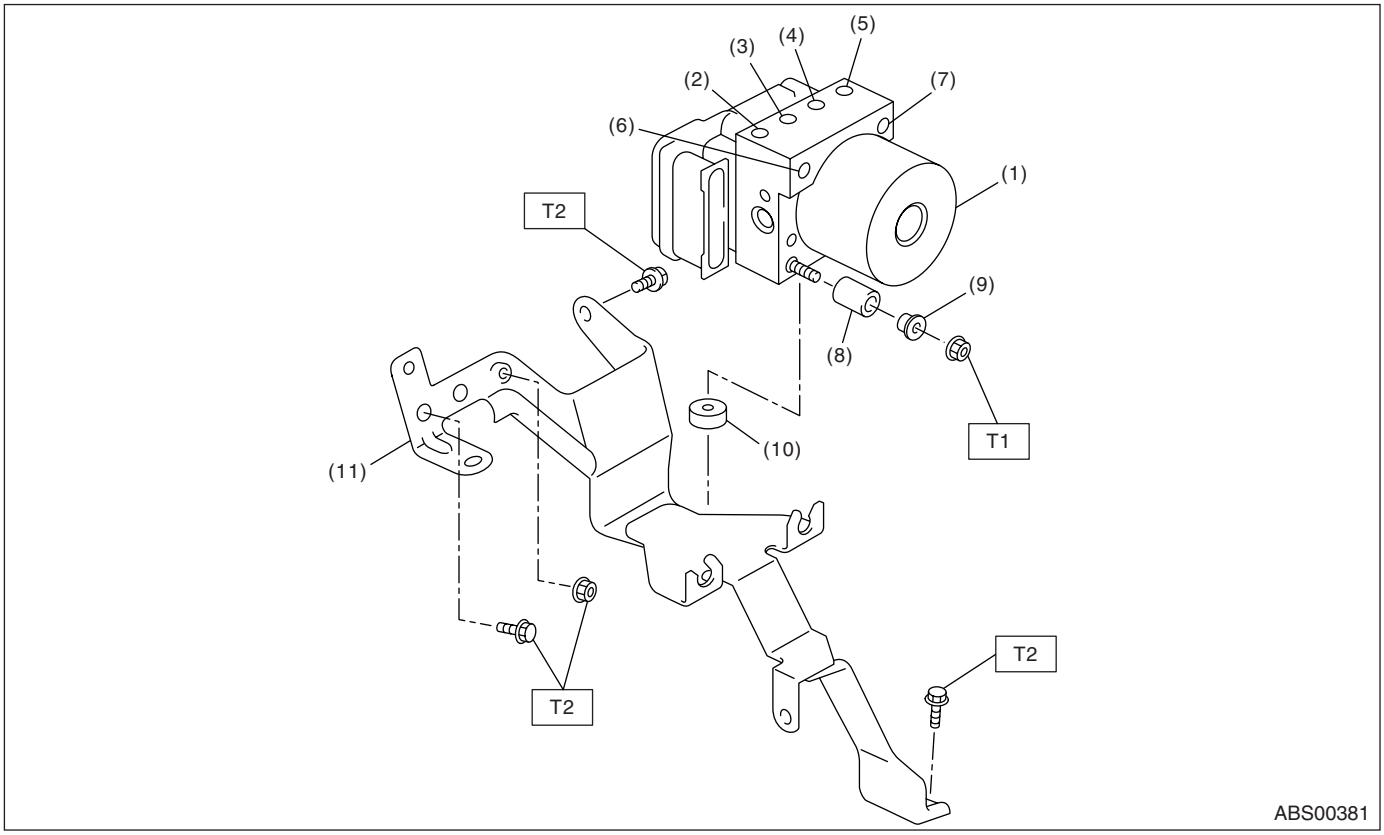
B: COMPONENT

1. ABS WHEEL SPEED SENSOR



(1)	G sensor	(4)	Rear ABS wheel speed sensor LH	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Front ABS wheel speed sensor LH	(5)	Hub unit bearing	***T1: 7.5 (0.76, 5.5)***
(3)	Front housing	(6)	Magnetic encoder	***T2: 33 (3.3, 24)***

2. ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)



(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Front outlet RH
(3) Rear outlet LH
(4) Rear outlet RH
(5) Front outlet LH
(6) Primary inlet
(7) Secondary inlet
(8) Damper
(9) Spacer
(10) Damper
(11) Bracket

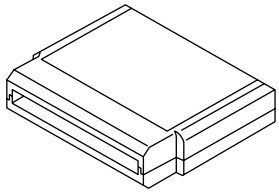
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.3, 24)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Pressure gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring sensor.

2. ABS Control Module and Hydraulic Control Unit (ABSCM&H/U)

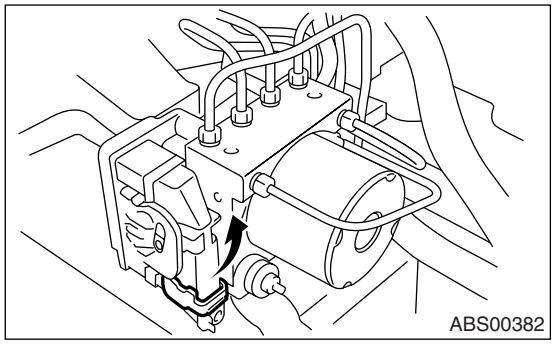
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Use compressed air to get rid of water around the ABSCM&H/U.

NOTE:
When dust and dirt are attached to the terminal, they may cause poor contact.

3) Disconnect the ABSCM&H/U connector pulling up the lock lever.

CAUTION:
Do not pull the harness when disconnecting connector.

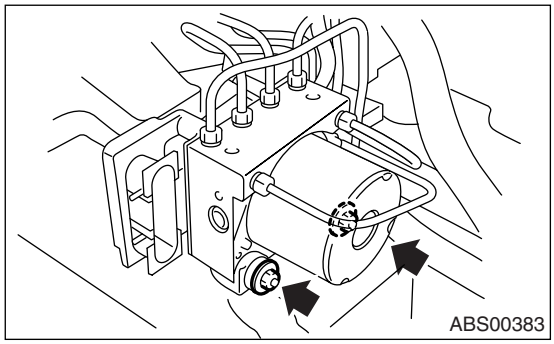


4) Remove the harness clip.
5) Disconnect the brake pipes from ABSCM&H/U.
6) Wrap the brake pipe using a vinyl bag not to spill the brake fluid on the vehicle body.

CAUTION:
When brake fluid is attached to the vehicle body, wash it off with water and wipe the water.

7) Remove the nuts and remove the ABSCM&H/U.

CAUTION:
• Do not drop or bump the ABSCM&H/U.
• Do not turn ABSCM&H/U upside down or place it sideways for storage.
• Be careful that no foreign objects are mixed in ABSCM&H/U.
• Be careful that no water enters inside the connectors.



8) Remove the ABSCM&H/U bracket.

B: INSTALLATION

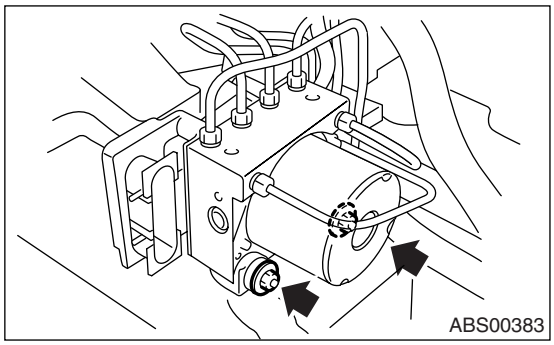
1) Install the ABSCM&H/U bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

2) Install the ABSCM&H/U aligning the groove of damper on ABSCM&H/U side with the pawl of bracket.

NOTE:
Check the identification mark of ABSCM&H/U.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)



3) Connect the brake pipes to their correct ABSCM&H/U positions.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

4) Using a harness clip, secure the ABSCM&H/U harness to bracket.
5) Connect the connector to ABSCM&H/U.

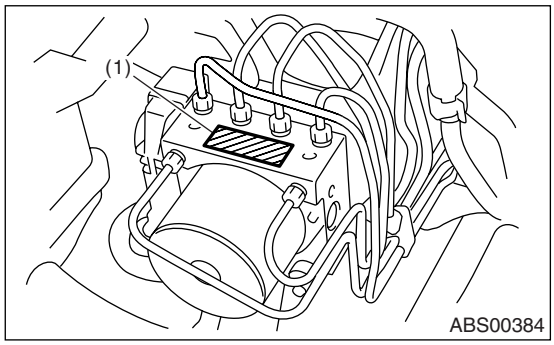
NOTE:
• Be sure to remove all foreign matters from inside the connector before connecting.
• Ensure the ABSCM&H/U connector is securely locked.

6) Bleed air from the brake system.

C: INSPECTION

1) Check the connected and fixed condition of connector.
2) Check the mark used for ABSCM&H/U identification.

Refer to “SPECIFICATION” for mark. <Ref. to ABS-2, SPECIFICATION, General Description.>



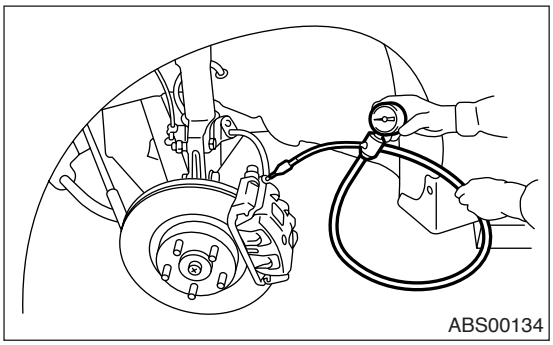
(1) Mark

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

1) Lift-up the vehicle, and then remove the wheels.
2) Disconnect the air bleeder screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:
• Pressure gauges used exclusively for brake fluid must be used.
• Do not use the pressure gauge for the measurement of transmission oil pressure since the piston seal may be expanded and deformed.

NOTE:
Wrap a sealing tape around the pressure gauge.



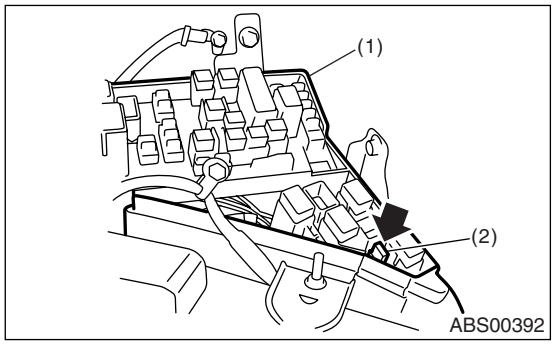
4) Bleed air from the pressure gauges and the FL and FR caliper bodies.
5) Perform ABS sequence control.
<Ref. to ABS-10, ABS Sequence Control.>
6) When the hydraulic unit begins to work, first the FL side performs decompression, holding and compression, and then the FR side performs decompression, holding and compression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.

	Front wheel	Rear wheel
Initial value	3,500 kPa (36 kgf/cm^2, 511 psi)	3,500 kPa (36 kgf/cm^2, 511 psi)
When decompressed	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less
When compressed	3,500 kPa (36 kgf/cm^2, 511 psi) or more	3,500 kPa (36 kgf/cm^2, 511 psi) or more

8) Remove the pressure gauges from the FL and FR caliper bodies.
9) Connect the air bleeder screws of the FL and FR caliper bodies.
10) Remove the air bleeder screws from the RL and RR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the brake system.
13) Bleed air from the pressure gauges and the RL and RR caliper bodies.
14) Perform ABS sequence control.
<Ref. to ABS-10, ABS Sequence Control.>
15) When the hydraulic unit begins to work, first the RR side performs decompression, holding and compression, and then the RL side performs decompression, holding and compression.
16) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Depress the brake pedal and check that the kick-back is normal, and tightness is normal.
17) Remove the pressure gauge from the RL and RR caliper bodies.
18) Connect the air bleeder screws of the RL and RR caliper bodies.
19) Bleed air from the brake system.

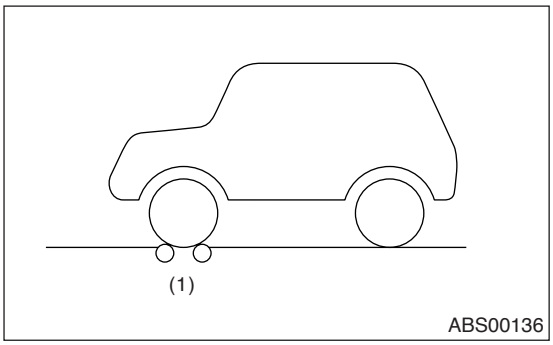
2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

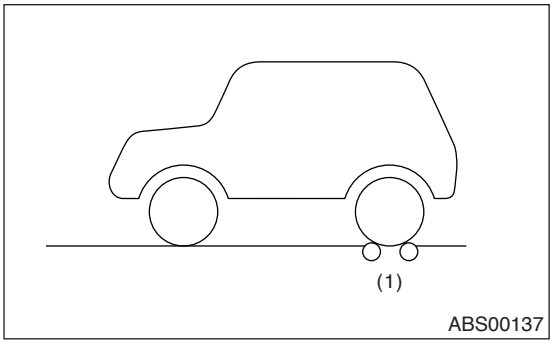
1) Install the spare fuse to the FWD connector located in the main fuse box for the model without AT VTD.



(1) Main fuse box
(2) FWD connector

2) Since the MT model and AT VTD model cannot cut off the AWD circuit forcibly, set the wheels other than measured one onto free rollers.
3) Prepare for the ABS sequence control.
<Ref. to ABS-10, ABS Sequence Control.>
4) Set the front wheels or rear wheels on the brake tester and set the select lever to “neutral”.





(1) Brake tester

5) Operate the brake tester.
6) Perform ABS sequence control.
<Ref. to ABS-10, ABS Sequence Control.>
7) When the hydraulic unit begins to work, check the following working sequence.

(1) The FL wheel performs decompression, holding and compression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs decompression, holding and compression in sequence, and subsequently the RL wheel repeats the cycle.

8) Read values indicated on the brake tester and check if the fluctuation of the values between decompression and compression meets the standard values.

	Front wheel	Rear wheel
Initial value	1,000 N (102 kgf, 225 lb)	1,000 N (102 kgf, 225 lb)
When decompressed	500 N (51 kgf, 112 lb) or less	500 N (51 kgf, 112 lb) or less
When compressed	1,000 N (102 kgf, 225 lb) or more	1,000 N (102 kgf, 225 lb) or more

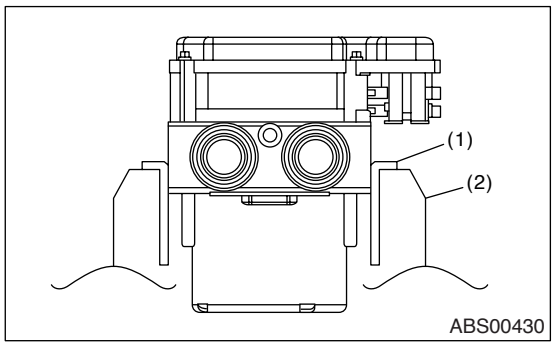
9) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

D: REPLACEMENT

CAUTION:
• Because the seal of ABSCM cannot be replaced, do not pull or peel it with lifting up.
• Because the screw part of H/U deteriorates in every replacement procedure, do not perform the replacement more than five times on it. When the malfunction is found though the replacement that performed is less than five times, replace the H/U body.
• Use new screws for installation of ABSCM.
• When the sealing surface of ABSCM or H/U is dirty or damaged and it cannot be removed or repaired, replace it with new one.

1) Remove the ABSCM&H/U. <Ref. to ABS-6, REMOVAL, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
2) To prevent entering foreign matter and brake fluid leakage, plug the oil pressure port of ABSCM&H/U using screw plug and etc.
3) Set the pump motor part of removed ABSCM&H/U faces down on a vise.

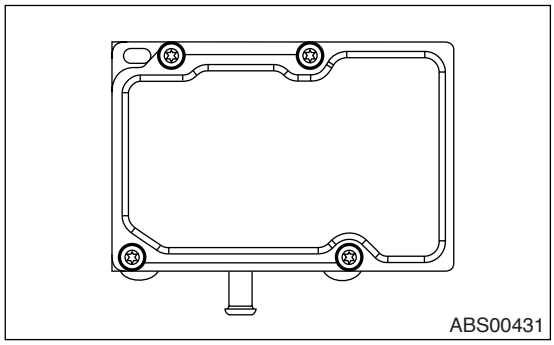
NOTE:
Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate or cloth between the part and vice.



(1) Aluminum plate or etc.
(2) Vise

4) Using TORX® bit T20, remove the four screws of ABSCM.

NOTE:
Always use new screws.



5) Slowly remove the ABSCM upward from H/U.

NOTE:
To prevent damaging of coil part, remove the ABSCM straightly from H/U.

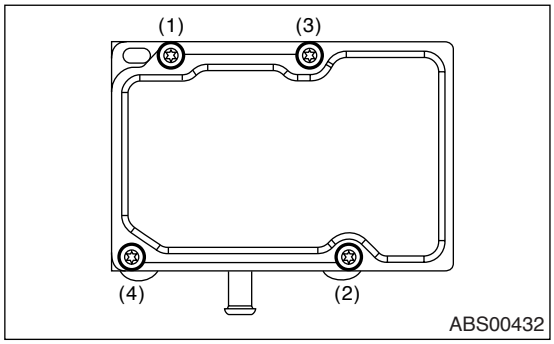
6) Ensure there are no dirt or damage on sealing surface of H/U.

CAUTION:
• Do not clean the ABSCM & H/U with applying compressed air.
• Do not repair the damages of H/U sealing surface using file or metal scraper. To remove the sealing, use resin scraper. Do not use the chemical materials (thinner and etc.).

7) Position the coil of new ABSCM to align H/U valve.
8) To prevent deforming of ABSCM housing cover, hold the corner of ABSCM and install it to the H/U without tilting.
9) Using TORX® bit T20, tighten the screws stepwise in the order of (1) through (4).

CAUTION:
Always use new screws.

Tightening torque:
1.5 N·m (0.15 kgf-m, 1.1 ft-lb)



10) Check that there is no foreign matter in aligning part between ABSCM and H/U.
11) Using TORX® bit T20, tighten the screws stepwise in the order of (1) through (4) again.

Tightening torque:
3 N·m (0.3 kgf-m, 2.2 ft-lb)

12) Check that there is no clearance in aligning part between ABSCM and H/U.
13) Install the ABSCM&H/U to vehicle.

3. ABS Sequence Control

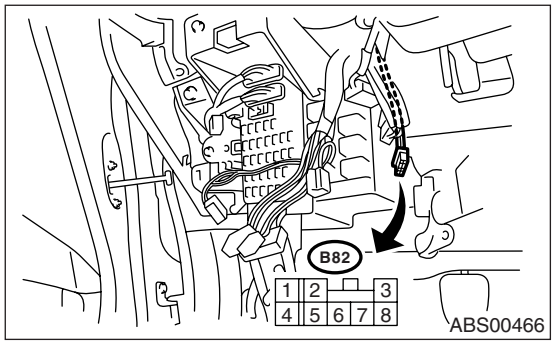
A: OPERATION

1) While the ABS sequence control is performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve operation.
2) ABS sequence control can be started by diagnosis connector or Subaru Select Monitor.

1. ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

NOTE:
In the event of any trouble, the ABS sequence control is not operated.

1) Turn the ignition switch to OFF at the vehicle stationary mode.
2) Take out the diagnosis connector from the inside of instrument panel lower cover on the driver's side, and connect one of ground terminal to connector terminal No. 8.



3) Turn the ignition switch to ON without depressing the brake pedal.
4) After the ABS warning light is turned off, perform the brake pedal operation as follows; press it within 3 seconds, → release it, → press it again, → release it again, → and then press it.

NOTE:
Engine must not start.

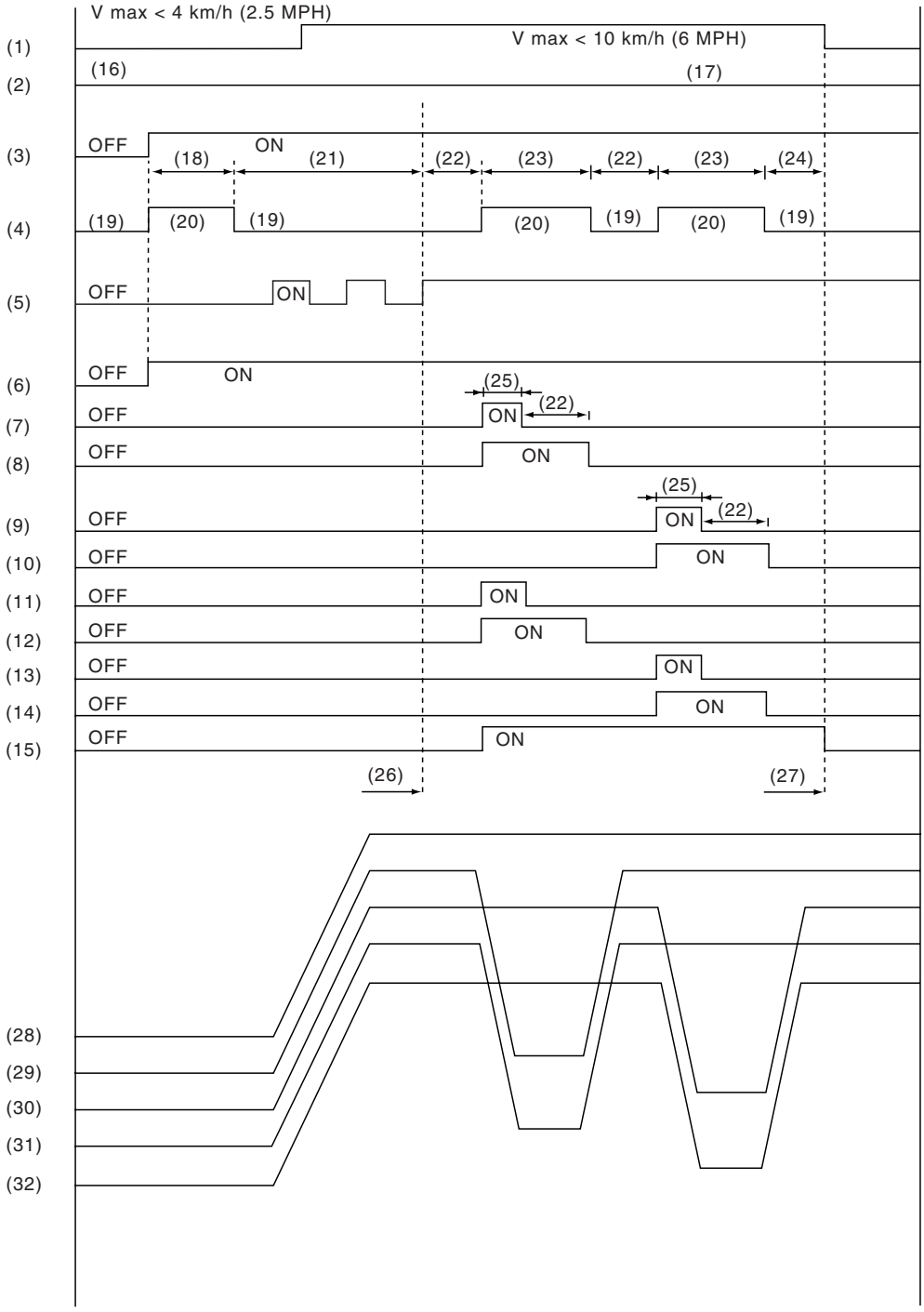
5) After completion of ABS sequence control, turn the ignition switch to OFF.

2. ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

NOTE:
In the event of any trouble, the ABS sequence control is not operated.

1) Connect the Subaru Select Monitor to data link connector under the driver's side instrument panel lower cover.
2) Turn the ignition switch to ON.
3) Set the Subaru Select Monitor switch to ON.
4) Set the Subaru Select Monitor to "Brake Control" mode.
5) When the "Function check sequence" is selected, the "ABS sequence control" will start.
6) Execute the following operations when the message "Press the brake pedal so that the brake pedal force is between 100 and 150 kgf" is displayed.
   (1) When the brake tester is used, press brake pedal pad with a force of 1,000 N (102 kgf, 225 lb).
   (2) When using the pressure gauge, press the brake pedal so as to make the pressure gauge indicate 3,500 kPa (36 kg/cm^2, 511 psi).
7) "Press the [YES] key" will be displayed. Press the [YES] key.
8) The brake line being operated is displayed on the Subaru Select Monitor.

3. CONDITIONS FOR ABS SEQUENCE CONTROL



ABS00385

(1) All wheel speed
(2) DL terminal
(3) Ignition key
(4) ABS warning light
(5) Stop light switch
(6) Valve relay
(7) FL decompression valve
(8) FL compression valve
(9) FR decompression valve
(10) FR compression valve
(11) RR decompression valve
(12) RR compression valve
(13) RL decompression valve
(14) RL compression valve
(15) Pump motor
(16) Diagnosis connector and connection
(17) When using the Subaru Select Monitor, both connection and non-connection of diagnosis connector are acceptable.
(18) 1.5 seconds
(19) Light OFF
(20) Light ON
(21) Within 3 seconds
(22) 1.0 second
(23) 1.4 seconds
(24) 0.6 second
(25) 0.4 second
(26) Point A
(27) Reset
(28) Master cylinder pressure
(29) FL wheel cylinder pressure
(30) FR wheel cylinder pressure
(31) RR wheel cylinder pressure
(32) RL wheel cylinder pressure

NOTE:
When using the Subaru Select Monitor, the control operation starts from point A. The patterns from ignition key ON to the point A show that operation is started by diagnosis connector. (However, it is required to turn the stop light switch to ON before point A.)

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

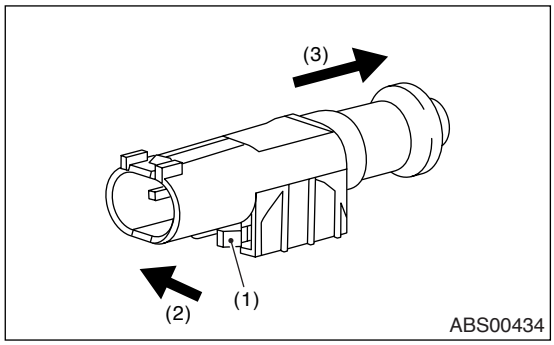
When the following conditions develop, the ABS sequence control stops and ABS operation is returned to the normal control mode.
1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When the diagnosis connector is disconnected. (Without Subaru Select Monitor)
3) When the brake pedal is released during ABS sequence control and the stop light switch goes OFF.
4) When the brake pedal is depressed after the ignition key is turned to ON, but before ABS warning light goes out. (Without Subaru Select Monitor)
5) When the ignition key is turned to ON, but the brake pedal is not depressed within 3 seconds after ABS warning light goes OFF. (Without Subaru Select Monitor)
6) After completion of ABS sequence control.
7) When malfunction is detected.

4. Front ABS Wheel Speed Sensor

A: REMOVAL

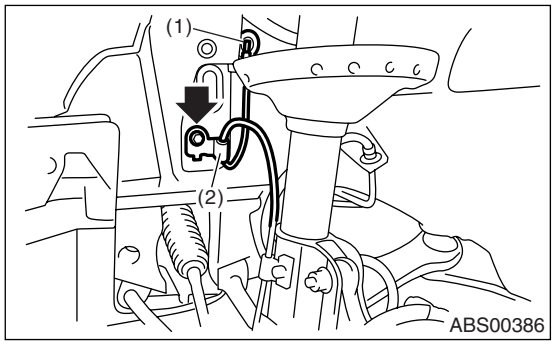
1) Disconnect the ground cable from battery.
2) Disconnect the ABS wheel speed sensor connector located next to the front strut mounting house in engine compartment.
3) Separate the sensor connector and vehicle securing clip. Apply force in the direction of (2) to unlock the pawl, and then slide the connector in the direction of (3). Pull out the connector to the tire side from grommet hole.

CAUTION:
Clip would break when removing the clip without separating sensor connector and clip.



(1) Pawl

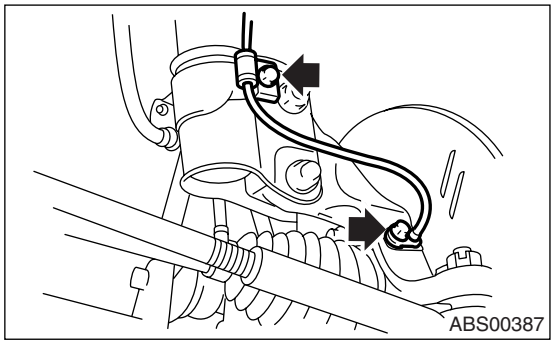
4) Remove the sensor harness bracket.



(1) To front ABS wheel speed sensor connector
(2) Sensor harness bracket

5) Remove the bolts which secure sensor harness to front strut.
6) Remove the front ABS wheel speed sensor from housing.

CAUTION:
- **Be careful not to damage the sensor portion.**
- **Do not apply excessive force to the sensor harness.**



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Sensor:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Bracket:
33 N·m (3.3 kgf-m, 24 ft-lb)

CAUTION:
Be careful not to damage the sensor portion.

NOTE:
- Check the identification (mark) on the harness to make sure that no warp exists. (RH: K1 (White), LH: K2 (Yellow))
- Check if the harness is not pulled and does not come in contact with the suspension or body during steering wheel effort.

C: INSPECTION

1. INSPECTION WITH SUBARU SELECT MONITOR

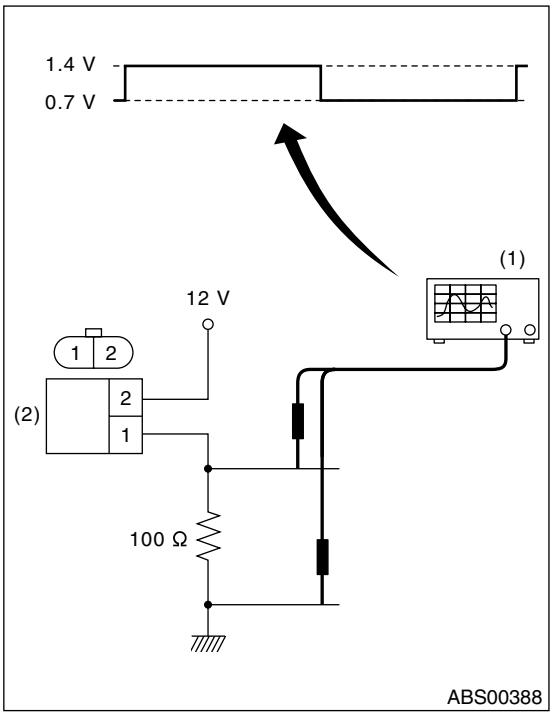
1) Connect the Subaru Select Monitor to data link connector.
2) Select {Current Data Display & Save}. Check if the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position.
3) If the speed indicated on the display does not change, check the ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>

2. ABS WHEEL SPEED SENSOR

1) Check the pole piece of the ABS wheel speed sensor for foreign particles or damage. If necessary, clean the pole piece or replace the ABS wheel speed sensor.

2) Charge a 12 V power supply to the No. 2 terminal of sensor connector as shown in the figure, and then install the resistance to No. 1 terminal. Rotate the wheel about 2.75 km/h (2 MPH) or equivalent, measure the voltage using oscilloscope.

Standard value of output voltage:
0.7 — 1.4 V



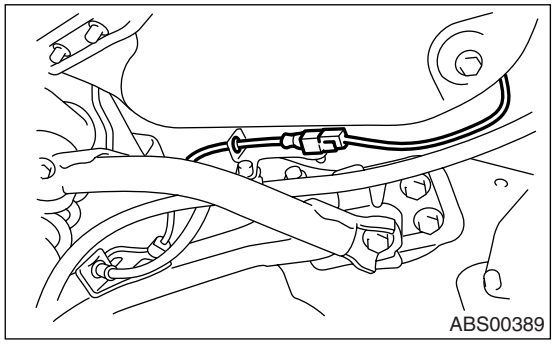
(1) Oscilloscope
(2) ABS wheel speed sensor

NOTE:
Check the ABS wheel speed sensor cable for discontinuity. If necessary, replace with a new one.

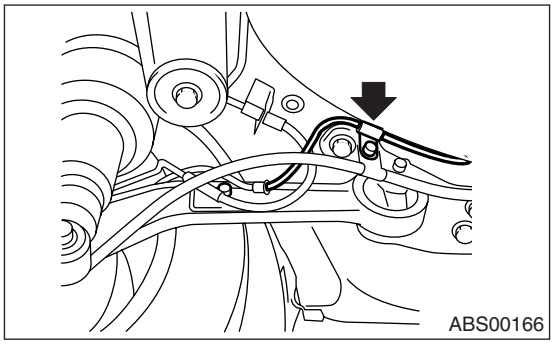
5. Rear ABS Wheel Speed Sensor

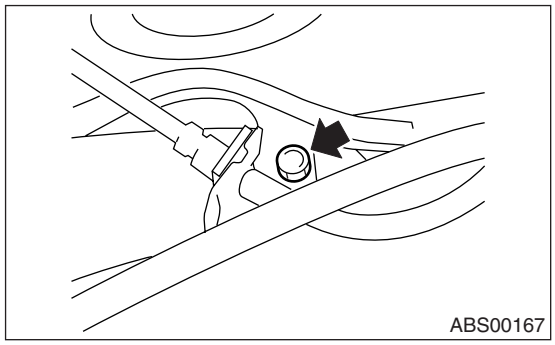
A: REMOVAL

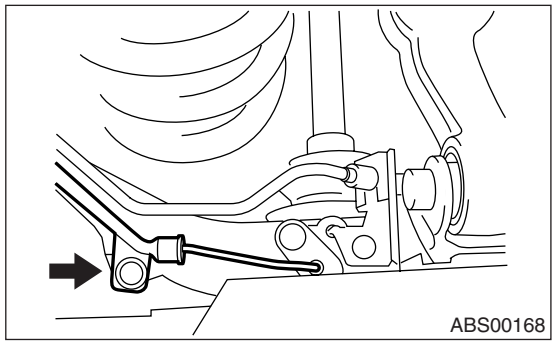
1) Disconnect the ground cable from battery.
2) Disconnect the connector from rear ABS wheel speed sensor.



3) Remove the sensor harness bracket from rear arm.

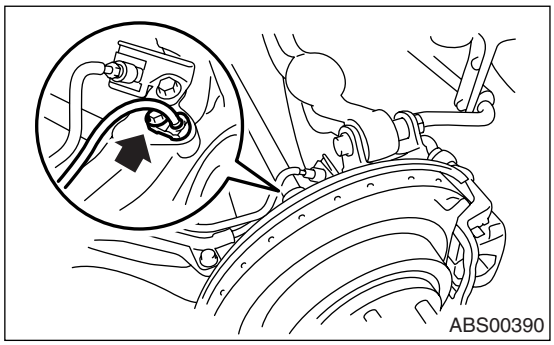






4) Remove the rear ABS wheel speed sensor from rear arm.

CAUTION:
• Be careful not to damage the sensor portion.
• Do not apply excessive force to the sensor harness.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be careful not to damage the sensor portion.

Tightening torque:
Sensor:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)
Bracket:
33 N·m (3.3 kgf-m, 24 ft-lb)

NOTE:
Check the identification (mark) on the harness to make sure that no warp exists. (RH:K5(White), LH:K6(Yellow))

C: INSPECTION

1. ABS WHEEL SPEED SENSOR

<Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>

6. Front Magnetic Encoder

A: REMOVAL

Refer to “Front Hub Bearing” for removal, because the front magnetic encoder is integrated with front hub bearing.
<Ref. to DS-17, REMOVAL, Front Hub Unit Bearing.>

B: INSTALLATION

Refer to “Front Hub Bearing” for installation, because the front magnetic encoder is integrated with front hub bearing.
<Ref. to DS-17, INSTALLATION, Front Hub Unit Bearing.>

C: INSPECTION

Visually check the magnetic encoder for any damage. If necessary, replace with a new hub unit bearing.

NOTE:
Replace the hub unit bearing with a new one if there is any defect found on the magnetic encoder, since the magnetic encoder is integrated with hub unit bearing assembly.

7. Rear Magnetic Encoder

A: REMOVAL

Refer to “Rear Hub Unit Bearing” for removal, because the rear magnetic encoder is integrated with rear hub unit bearing.
<Ref. to DS-19, REMOVAL, Rear Hub Unit Bearing.>

B: INSTALLATION

Refer to “Rear Hub Unit Bearing” for installation, because the rear magnetic encoder is integrated with rear hub unit bearing.
<Ref. to DS-20, INSTALLATION, Rear Hub Unit Bearing.>

C: INSPECTION

Visually check the magnetic encoder for any damage. If necessary, replace with a new hub unit bearing.

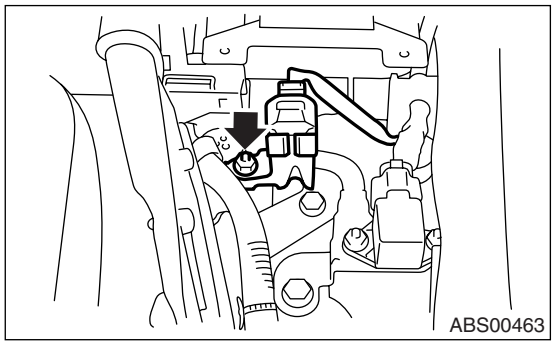
NOTE:
Replace the hub unit bearing with a new one if there is any defect found on the magnetic encoder, since the magnetic encoder is integrated with hub unit bearing assembly.

8. G Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console box.
<Ref. to EI-53, REMOVAL, Console Box.>
3) Disconnect the connector from G sensor.
4) Remove the G sensor from body.

CAUTION:
• Do not drop or bump the G sensor.
• Since G sensor is a unit with the bracket, do not disassemble them.



B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Do not drop or bump the G sensor.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

C: INSPECTION

Step		Check	Yes	No
1	**CHECK G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Set the Subaru Select Monitor to the {Brake Control} mode. 4) Set the display in the {Current Data Display & Save} mode. 5) Read the G sensor output value.	Is the value −1.2 — 1.2 m/s^2 when the vehicle is in horizontal position?	Go to step **2.**	Repair the harness connector between G sensor and ABSCM&H/U. Or replace G sensor.
2	**CHECK G SENSOR.** 1) Remove the console box. 2) Remove the G sensor from vehicle. (Do not disconnect connector.) 3) Read the Subaru Select Monitor display.	Is the value 8.1 — 11.2 m/s^2 when G sensor is inclined forward to 90°?	Go to step **3.**	Repair the harness connector between G sensor and ABSCM&H/U. Or replace G sensor.
3	**CHECK G SENSOR.** Read the Subaru Select Monitor display.	Is the value −8.1 — −11.2 m/s^2 when G sensor is inclined backward to 90°?	G sensor is normal.	Repair the harness connector between G sensor and ABSCM&H/U. Or replace G sensor.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

ABS (DIAGNOSTICS)

ABS(diag)

		Page
1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	4
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4.	Electrical Component Location	10
5.	Control Module I/O Signal	12
6.	Subaru Select Monitor	15
7.	Read Diagnostic Trouble Code (DTC)	25
8.	Inspection Mode	26
9.	Clear Memory Mode	27
10.	ABS Warning Light / Brake Warning Light Illumination Pattern	28
11.	List of Diagnostic Trouble Code (DTC)	39
12.	Diagnostic Procedure with Diagnostic Trouble Code (DTC)	42
13.	General Diagnostic Table	82

1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
Remove foreign matters (dust, water, oil, etc.) from the ABSCM&H/U connector during removal and installation.

NOTE:
- To check harness for broken wires or short circuits, shake trouble spot or connector.
- Refer to “Check List for Interview”. <Ref. to ABS(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview checklist. <Ref. to ABS(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the component which might affect ABS problems. <Ref. to ABS(diag)-8, INSPECTION, General Description.>	Is the component that might influence the ABS problem normal?	Go to step **2.**	Repair or replace each unit.
2	**CHECK INDICATION OF DTC ON SCREEN.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON and Subaru Select Monitor to ON. NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to ABS(diag)-18, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 4) Read the DTC. <Ref. to ABS(diag)-25, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Record all DTCs and Freeze Frame Data.	Is DTC displayed?	Go to step **4.**	Go to step **3.**
3	**PERFORM THE GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostic Table”. <Ref. to ABS(diag)-82, General Diagnostic Table.> 2) Perform clear memory mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Perform the inspection mode. <Ref. to ABS(diag)-26, Inspection Mode.> 4) Read the DTC. <Ref. to ABS(diag)-15, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> Check the DTC does not displayed.	Does the ABS warning light go off after turning the ignition switch to ON?	Finish the diagnosis.	Check in accordance with “Diagnostic Procedure for ABS”. <Ref. to ABS(diag)-21, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>

Step		Check	Yes	No
4	**PERFORM THE DIAGNOSIS.** 1) Refer to the “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, LIST, List of Diagnostic Trouble Code (DTC).> 2) Fix the wrong part. 3) Perform clear memory mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Perform the inspection mode. <Ref. to ABS(diag)-26, Inspection Mode.> 5) Read the DTC. <Ref. to ABS(diag)-15, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Repeat step 1 to 4 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items about the vehicle's state.

1. STATE OF ABS WARNING LIGHT

ABS warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on • When / how long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after Engine starting, engine is running) ❑ ON (after Engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition to ON ❑ Immediately after turning the ignition to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

2. STATE OF BRAKE WARNING LIGHT

Brake warning light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on ❑ When pulling the parking brake lever up. ❑ When releasing the parking brake lever down. • When / how long does it come on?
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after Engine starting, engine is running) ❑ ON (after Engine starting, engine is at a standstill)

Timing	❑ Immediately after turning the ignition to ON ❑ Immediately after turning the ignition to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Parts name: • Operating condition:		

3. SYMPTOMS

ABS operating condition	❑ Does not move.		
	❑ Operates only when applying an abrupt brake.	Vehicle speed:	km/h
			MPH
	• How to step on brake pedal:		
	a) Operating time:		Sec.
	b) Operating noise: ❑ Occurs. / ❑ Does not occur.		
	• What kind of noise?	❑ Knocking ❑ Gong gong ❑ Bong ❑ Buzz ❑ Gong gong buzz ❑ Others:	
	c) Reaction force of brake pedal		
		❑ Stick ❑ Weak pedal resistance ❑ Strong pedal resistance ❑ Others:	

Behavior of vehicle	a) Directional stability cannot be obtained or the steering refuses to work when applying brakes: ❑ Yes / ❑ No	
	• When:	❑ When turning to the right ❑ When turning to the left ❑ When spinning ❑ Others:
	a) Directional stability cannot be obtained or the steering refuses to work when accelerating: ❑ Yes / ❑ No	
	• When:	❑ When turning to the right ❑ When turning to the left ❑ When spinning ❑ Others:
	c) Poor brake performance: ❑ Yes / ❑ No	
	• What kind:	❑ Long braking/stopping distance ❑ Brakes lock or drag ❑ Long pedal stroke ❑ Pedal sticks. ❑ Others:
	d) Poor acceleration: ❑ Yes / ❑ No	
	• What kind:	❑ Not accelerate ❑ Engine stalls. ❑ Others:
	e) Occurrence of vibration: ❑ Yes / ❑ No	
	• Where • What kind:	
	f) Occurrence of noise: ❑ Yes / ❑ No	
	• Where • What kind:	
	g) Other troubles occurred: ❑ Yes / ❑ No	
	• What kind:	

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ Local street ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Others:
	d) Road surface	❑ Dried ❑ Wet ❑ Covered with fresh snow ❑ Covered with hardened snow ❑ Frozen slope ❑ Others:

Check List for Interview

Condition	a) Brakes	Deceleration:	G
		❑ Intermittent / ❑ Temporary	
	b) Accelerator	Acceleration:	G
		❑ Intermittent / ❑ Temporary	
	c) Vehicle speed	km/h	MPH
		❑ Advancing ❑ When accelerating ❑ When decelerating ❑ At low speed ❑ When turning ❑ Others:	
	d) Tire inflation pressure	Front RH tire:	kPa
		Front LH tire:	kPa
		Rear RH tire:	kPa
		Rear LH tire:	kPa
	e) Degree of wear	Front RH tire:	
		Front LH tire:	
		Rear RH tire:	
		Rear LH tire:	
	f) Genuine parts are used.: ❑ Yes / ❑ No		
	g) Tire chain is attached.: ❑ Yes / ❑ No		
	h) T-type tire is used.: ❑ Yes / ❑ No		
	i) Condition of suspension alignment:		
	j) Loading state:		
	k) Repair parts are used.: ❑ Yes / ❑ No		
	• Contents:		
	l) Others:		

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS wheel speed sensor and ABSCM&H/U.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor and ABSCM&H/U.

B: INSPECTION

Before performing diagnosis, check the following items which might affect ABS problems.

1. BATTERY

Measure battery voltage and check electrolyte.

Standard voltage: 12 V or more

Specific gravity: More than 1.260

2. BRAKE FLUID

1) Check the brake fluid level.
2) Check the brake fluid for leaks.

3. HYDRAULIC UNIT

Check the hydraulic unit.
• With brake tester <Ref. to ABS-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
• Without brake tester <Ref. to ABS-7, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

4. BRAKE DRAG

Check for brake drag.

5. BRAKE PAD AND ROTOR

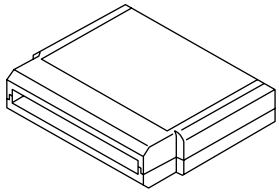
Check the brake pad and rotor.
• FRONT <Ref. to BR-18, INSPECTION, Front Brake Pad.> <Ref. to BR-19, INSPECTION, Front Disc Rotor.>
• REAR <Ref. to BR-25, INSPECTION, Rear Brake Pad.> <Ref. to BR-26, INSPECTION, Rear Disc Rotor.>

6. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

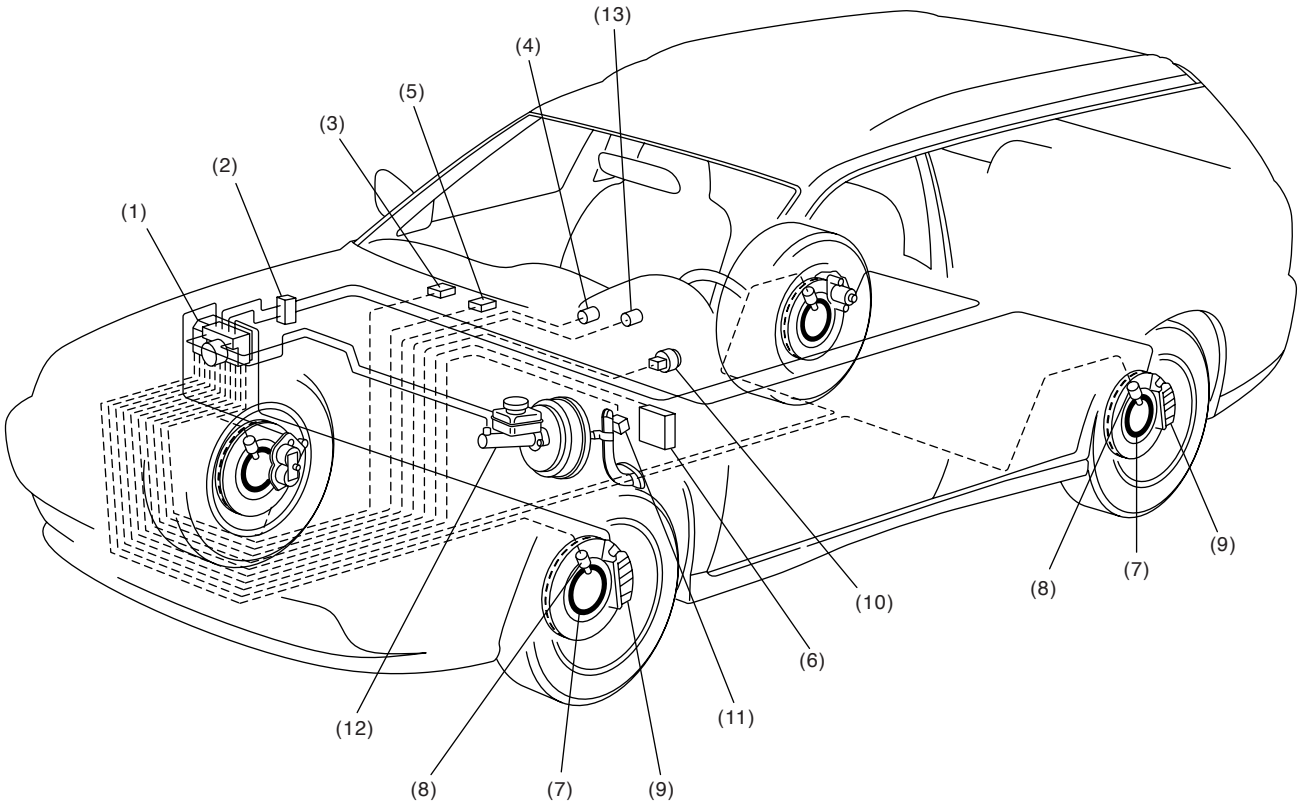
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

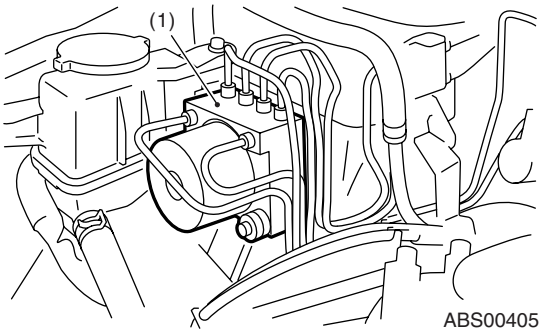
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Oscilloscope	Used for measuring sensor.

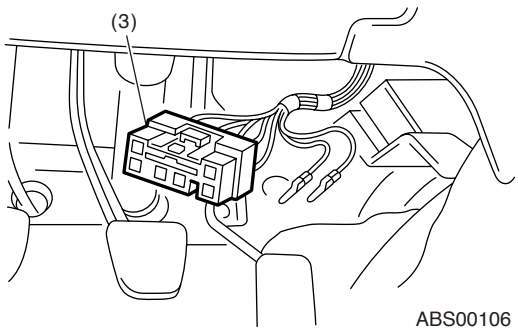
4. Electrical Component Location

A: LOCATION



(1) ABS control module and hydraulic control unit (ABSCM&H/U)
(2) Two-way connector
(3) Diagnosis connector (Used for ABS sequence control.)
(4) ABS warning light
(5) Data link connector (For Subaru Select Monitor)
(6) Transmission control module (TCM) (AT model)
(7) Magnetic encoder seal
(8) ABS wheel speed sensor
(9) Caliper body
(10) G sensor
(11) Stop light switch
(12) Master cylinder
(13) Brake and EBD warning light


(1)
ABS00405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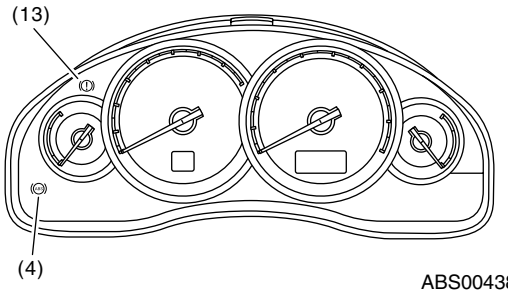
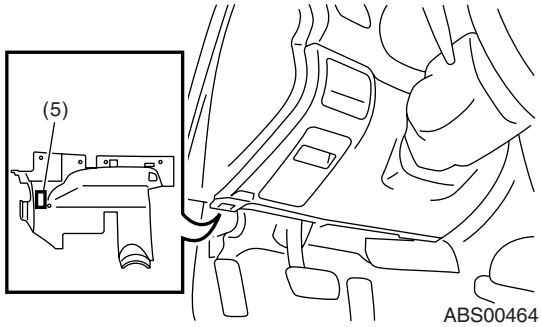
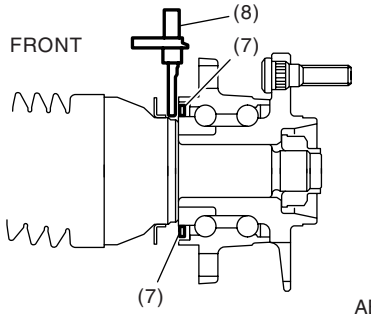
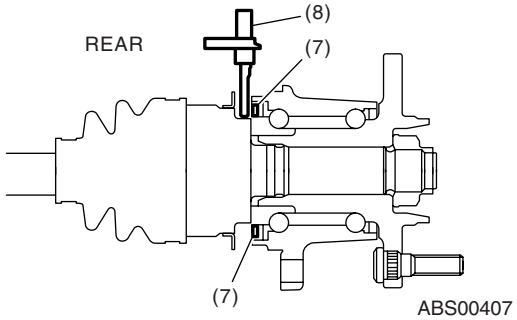
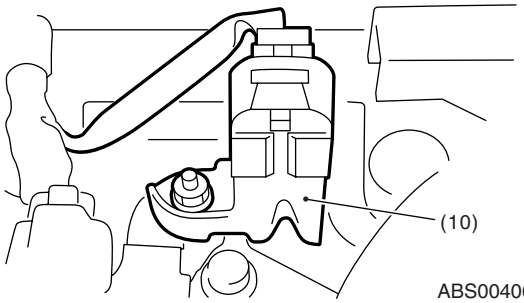
ABS00106


(13)
(4)
ABS00438


(5)
ABS00464

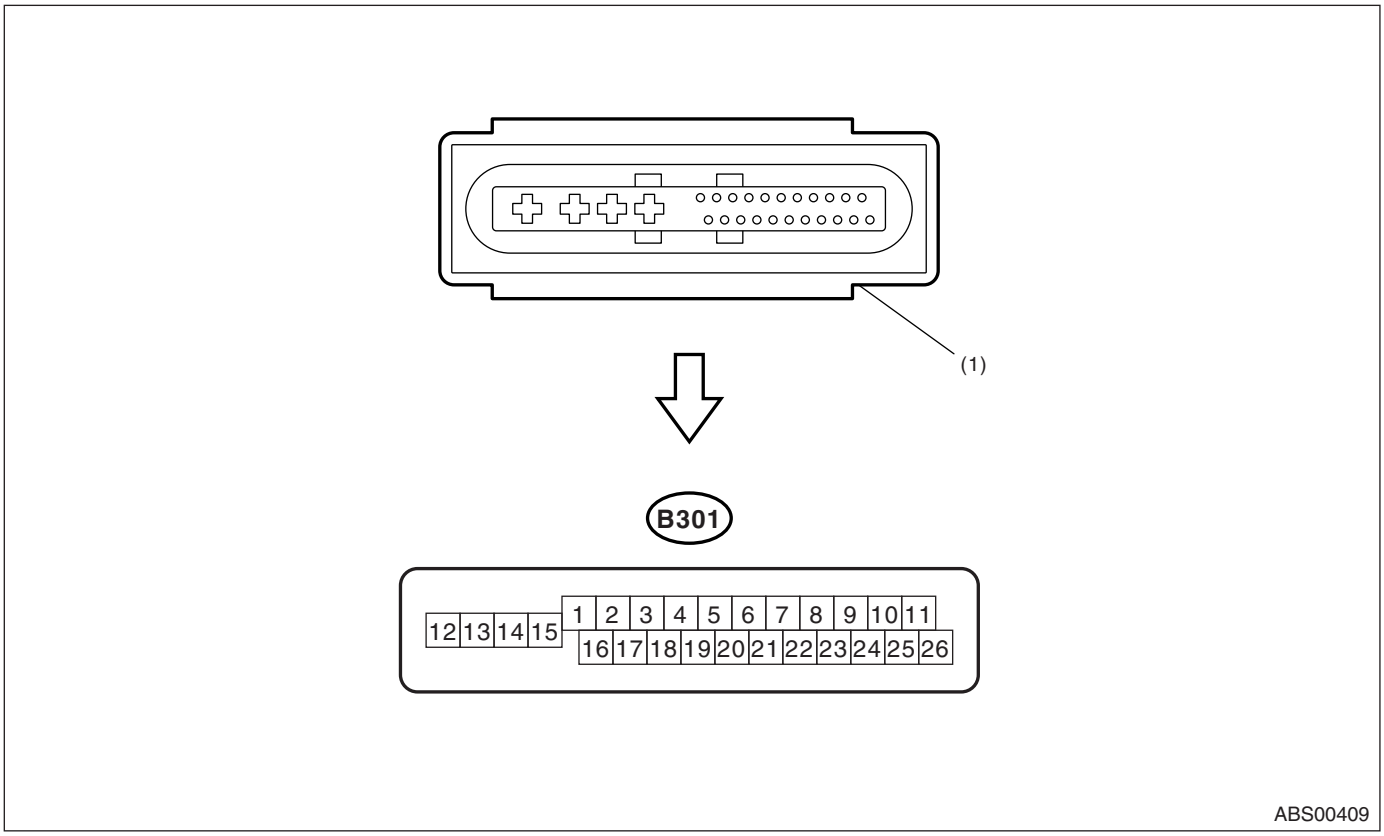

FRONT
(8)
(7)
(7)
ABS00408


REAR
(8)
(7)
(7)
ABS00407


(10)
ABS00406

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



(1) ABS control module and hydraulic control unit (ABSCM&H/U) connector

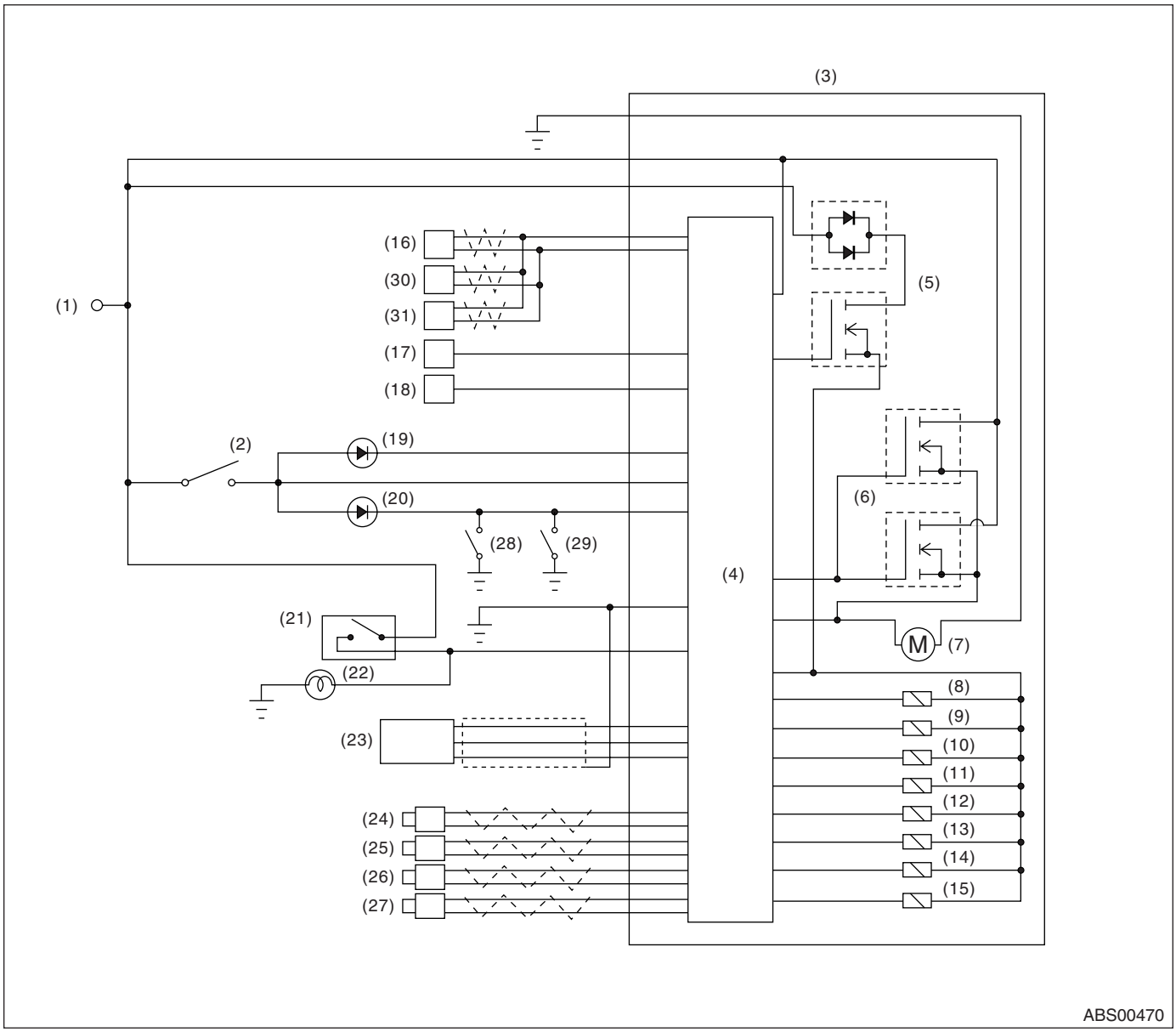
NOTE:
- Terminal numbers in ABSCM&H/U connector are as shown in the figure.
- ABS warning light is illuminates when the connector is removed from ABSCM&H/U.

Control Module I/O Signal

Description			Terminal No. (+) — (–)	Input/Output signal Measured value and measuring conditions
ABS wheel speed sensor (Wheel speed sensor)	Front LH wheel	Power supply	16 — 15	4.5 — 16.5 V
		Signal	1	5.9 — 16.8 mA: Rectangle waveform
	Front RH wheel	Power supply	5 — 15	4.5 — 16.5 V
		Signal	6	5.9 — 16.8 mA: Rectangle waveform
	Rear LH wheel	Power supply	2 — 15	4.5 — 16.5 V
		Signal	17	5.9 — 16.8 mA: Rectangle waveform
	Rear RH wheel	Power supply	3 — 15	4.5 — 16.5 V
		Signal	4	5.9 — 16.8 mA: Rectangle waveform
CAN communication line (+)			26	2.5 — 1.5 V pulse signal
CAN communication line (–)			11	3.5 — 2.5 V pulse signal
Valve relay power supply *1			14 — 15	10 — 15 V
Motor relay power supply *1			13 — 15	10 — 15 V
G sensor	Power supply		24 — 10	4.75 — 5.25 V
	Ground		10	—
	Output		21 — 10	2.1 — 2.5 V when the vehicle is on a level surface
Stop light switch *1			20 — 15	Less than 1.5 V when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
ABS warning light			22 — 15	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Brake warning light (EBD warning light)			8 — 15	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Subaru Select Monitor			7 — 15	Less than 1.5 V when no data is received. 0 ←→ 12 V pulse (in communication)
ABS diagnosis connector			25 — 15	When the ignition switch is ON, 10 — 15 V.
Power supply *1			18 — 15	When the ignition switch is ON, 10 — 15 V.
Grounding line			15	—
Vehicle speed output signal			23 — 15	0 ←→ 5 V pulse

*1: Measure the I/O signal voltage after removing the connector from the ABSCM&H/U terminal.

B: WIRING DIAGRAM



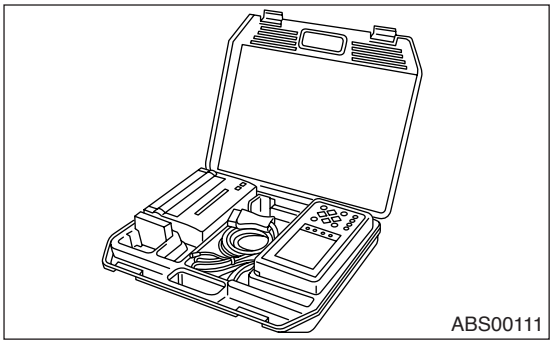
(1) Battery
(2) Ignition switch
(3) ABS control module and hydraulic control unit (ABSCM&H/U)
(4) ABS control module
(5) Valve relay
(6) Motor relay
(7) Motor
(8) Front inlet solenoid valve LH
(9) Front outlet solenoid valve LH
(10) Front inlet solenoid valve RH
(11) Front outlet solenoid valve RH
(12) Rear inlet solenoid valve LH
(13) Rear outlet solenoid valve LH
(14) Rear inlet solenoid valve RH
(15) Rear outlet solenoid valve RH
(16) Body integrated unit
(17) Diagnosis connector
(18) Data link connector
(19) ABS warning light
(20) Brake warning light
(21) Stop light switch
(22) Stop light
(23) G sensor
(24) Front ABS wheel speed sensor LH
(25) Front ABS wheel speed sensor RH
(26) Rear ABS wheel speed sensor LH
(27) Rear ABS wheel speed sensor RH
(28) Parking brake switch
(29) Brake fluid level switch
(30) Engine control module (ECM)
(31) Transmission control module (TCM)

6. Subaru Select Monitor

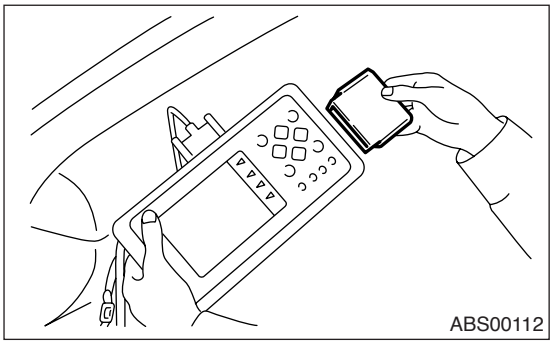
A: OPERATION

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to ABS(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>

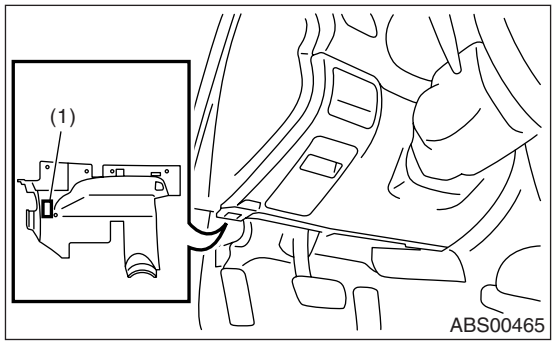


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to ABS(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).

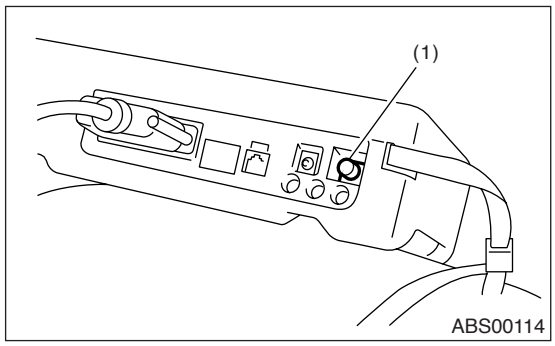


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
8) Press the [YES] key after the {ABS} is displayed.
9) On the «ABS Diagnosis» display screen, select the {DTC Display} and press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to the "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the "List of Diagnostic Trouble Code (DTC)". <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>
• DTCs are displayed up to three in detected order.
• If a particular DTC is not properly stored in memory (due to a drop in ABSCM&H/U power supply, etc.) on the occurrence of a problem, the DTC which is suffixed with a question mark "?" appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

10) If ABS and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to ABS(diag)-18, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

11) When DTC is not displayed, check the meter circuit or CAN communication circuit. <Ref. to ABS(diag)-21, WITHOUT DTC, INSPECTION, Subaru Select Monitor.>

Display	Contents to be monitored
Current	Indicate the latest DTC on the Subaru Select Monitor display.
Old	Indicate the latest DTC in previous trouble on the Subaru Select Monitor display.
Older	Indicate the latest DTC in second previous trouble on the Subaru Select Monitor display.
Before 3	Indicate the latest DTC in third previous trouble on the Subaru Select Monitor display.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after the {ABS} is displayed.
4) On the «Brake Control Diagnosis» screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» screen, select the data display style and press the [YES] key.
6) Using a scroll key, move the display screen up or down until necessary data is shown.
• A list of the support data is shown in the following table.

Display	Contents to be monitored	Unit of measure
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
BLS Signal	Brake ON/OFF is displayed.	ON or OFF
G Sensor	Vehicle acceleration detected by analog G sensor is displayed.	m/s (m/s^2)
Valve Relay Signal	Valve relay operation signal is displayed.	ON or OFF
ABS Warning Light	ON operation of the ABS warning light is displayed.	ON or OFF
EBD Warning Light	ON operation of the EBD warning light is displayed.	ON or OFF
Motor Relay Monitor	Motor relay monitor voltage is displayed.	V
IG power supply voltage	Voltage supplied to ABSCM&H/U is displayed.	V
ABS Control Flag	ABS control condition is displayed.	ON or OFF
ABS OK B Signal	ABS system normal/abnormal is displayed.	OK or NG

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after the {ABS} is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.

Display	Contents to be monitored
Clear memory?	Function of clearing DTC.

5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to the “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. ABS SEQUENCE CONTROL

Display	Contents to be monitored	Index No.
ABS sequence control	Operate the valve and pump motor continuously to perform the ABS sequence control.	<Ref. to ABS-10, ABS Sequence Control.>

5. FREEZE FRAME DATA

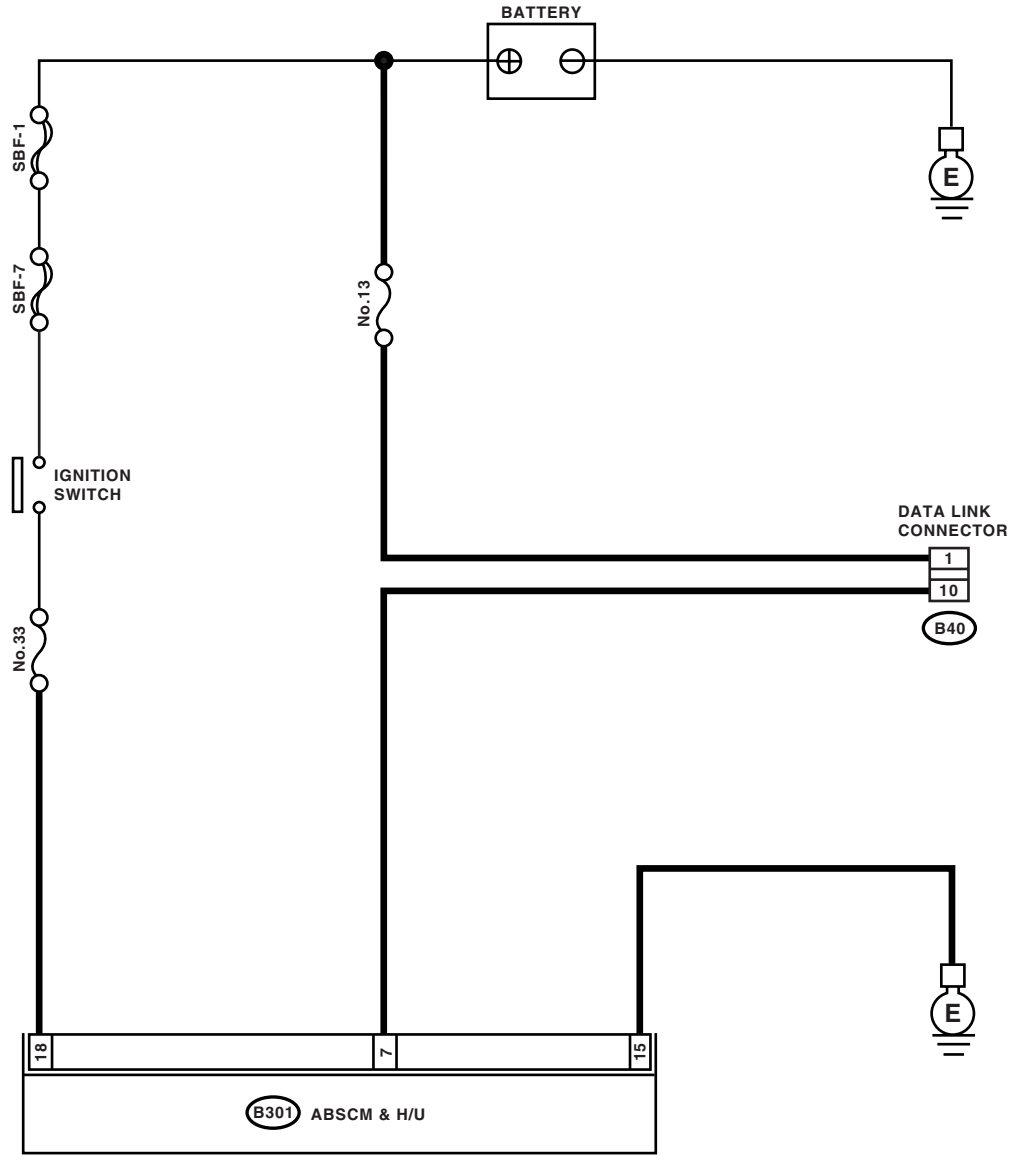
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
• Freeze frame data will be memorized up to three.
• If a Freeze Frame Data is not properly stored in memory (due to a drop in ABS control module power supply, etc.), the DTC which is suffixed with a question mark “?” appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

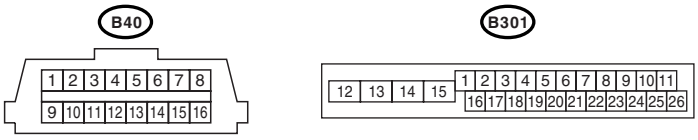
Display	Contents to be monitored
FR Wheel	Wheel speed detected by the Front ABS wheel speed sensor RH is displayed in km/h or MPH.
FL Wheel	Wheel speed detected by the Front ABS wheel speed sensor LH is displayed in km/h or MPH.
RR Wheel	Wheel speed detected by the Rear ABS wheel speed sensor RH is displayed in km/h or MPH.
RL Wheel	Wheel speed detected by the Rear ABS wheel speed sensor LH is displayed in km/h or MPH.
IG power supply voltage	Voltage supplied (V) to ABSCM&H/U is displayed.
G Sensor	Vehicle acceleration detected by analog G sensor is displayed.
Motor relay monitor	Motor relay condition is displayed.
BLS Signal	Brake ON/OFF is displayed.
Vehicle speed	Vehicle speed calculated by ABS control module is displayed.
ABS Control Flag	ABS control condition is displayed.
Power Supply Failure	Whether abnormal voltage occurred or not is displayed during malfunction.

B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Defective harness connector
TROUBLE SYMPTOM:
Communication is impossible between ABS and Subaru Select Monitor.
WIRING DIAGRAM:





ABS00411

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Does the ignition switch turn to ON?	Go to step **2.**	Turn the ignition switch to ON, and select ABS mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using Subaru Select Monitor, check whether communication to other system can be executed normally.	Is the system name and model year displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **5.**
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Is the system name and model year displayed on Subaru Select Monitor?	Replace ABSCM&H/U. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect ABSCM&H/U, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL FOR ABSCM&H/U.** 1) Turn the ignition switch to ON. 2) Measure the voltage between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness and connector between each control module and data link connector.
8	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND DATA LINK CONNECTOR.** Measure the resistance between ABSCM&H/U connector and data link connector. ***Connector & terminal*** ***(B301) No. 7 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness and connector between ABSCM&H/U and data link connector.
9	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the ABSCM&H/U connector inserted into ABSCM&H/U until it is locked by clamps?	Go to step **10.**	Insert ABSCM&H/U connector into ABSCM&H/U.
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **11.**	Repair the open circuit in harness between ABSCM&H/U and battery.

	Step	Check	Yes	No
11	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance of harness between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12.**	Repair the open circuit in harness between ABSCM&H/U and inhibitor side connector, and poor contact in coupling connector.
12	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

2. WITHOUT DTC

DETECTING CONDITION:

- Defective combination meter
- Open in harness

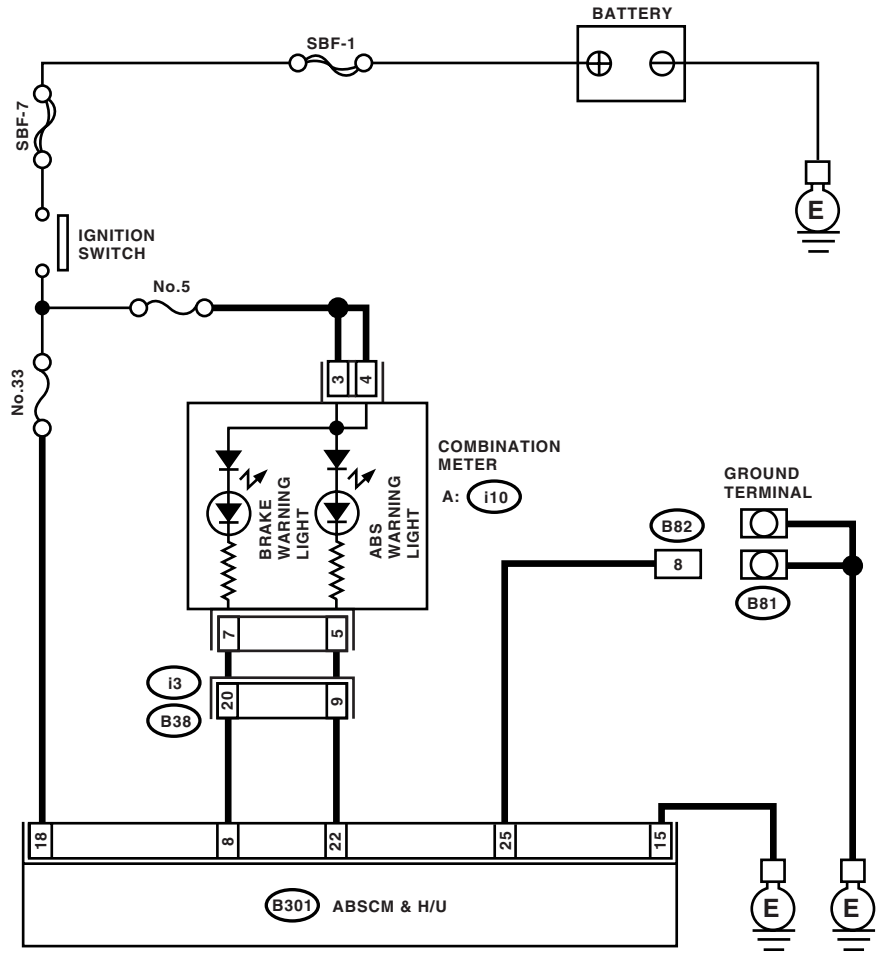
TROUBLE SYMPTOM:

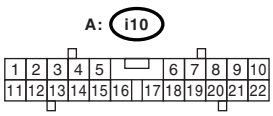
- ABS warning light does not go off.
- “NO TROUBLE CODE” will be displayed on the Subaru Select Monitor.

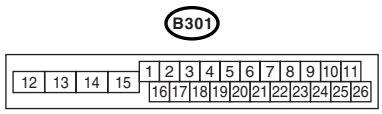
NOTE:
When the ABS warning light is OFF and “NO TROUBLE CODE” is displayed on Subaru Select Monitor, the system is in normal condition.

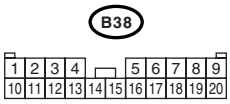
WIRING DIAGRAM:

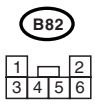
- LHD model





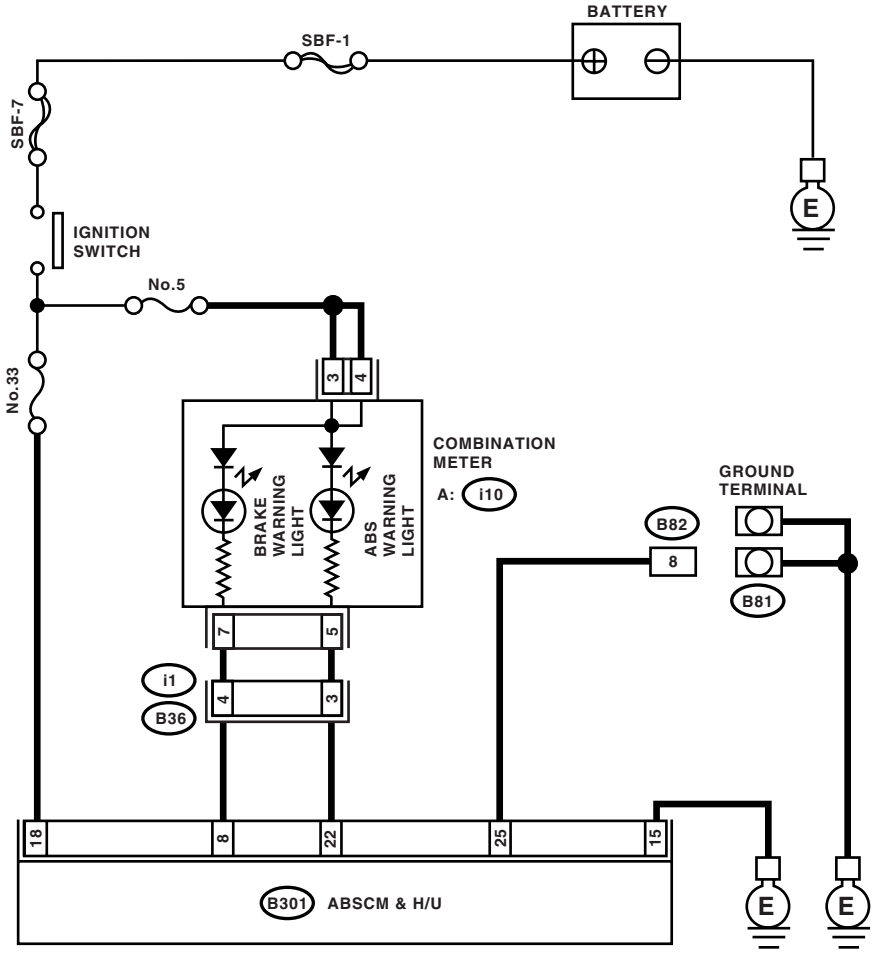


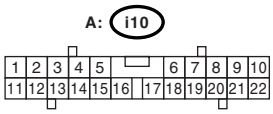


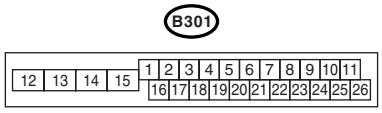


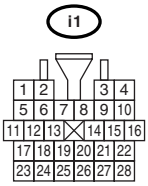
ABS00459

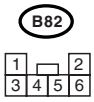
• RHD model











ABS00440

	Step	Check	Yes	No
1	**DATA CHECK SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the condition of “ABS warning light”.	Is “ON” indicated?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **2.**
2	**CHECK WIRING HARNESS.** Measure the resistance between ABSCM connector and combination meter connector. ***Connector & terminal*** ***(i10) No. 5 — (B301) No. 22:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the harness and connector between ABSCM&H/U and combination meter connector.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in ABSCM connector and combination meter connector?	Repair the connector.	Check the combination meter.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details about reading of DTCs, refer to “Subaru Select Monitor”. <Ref. to ABS(diag)-15, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as possible.
Drive the vehicle at a speed more than 40 km/h (25 MPH) for at least one minute.

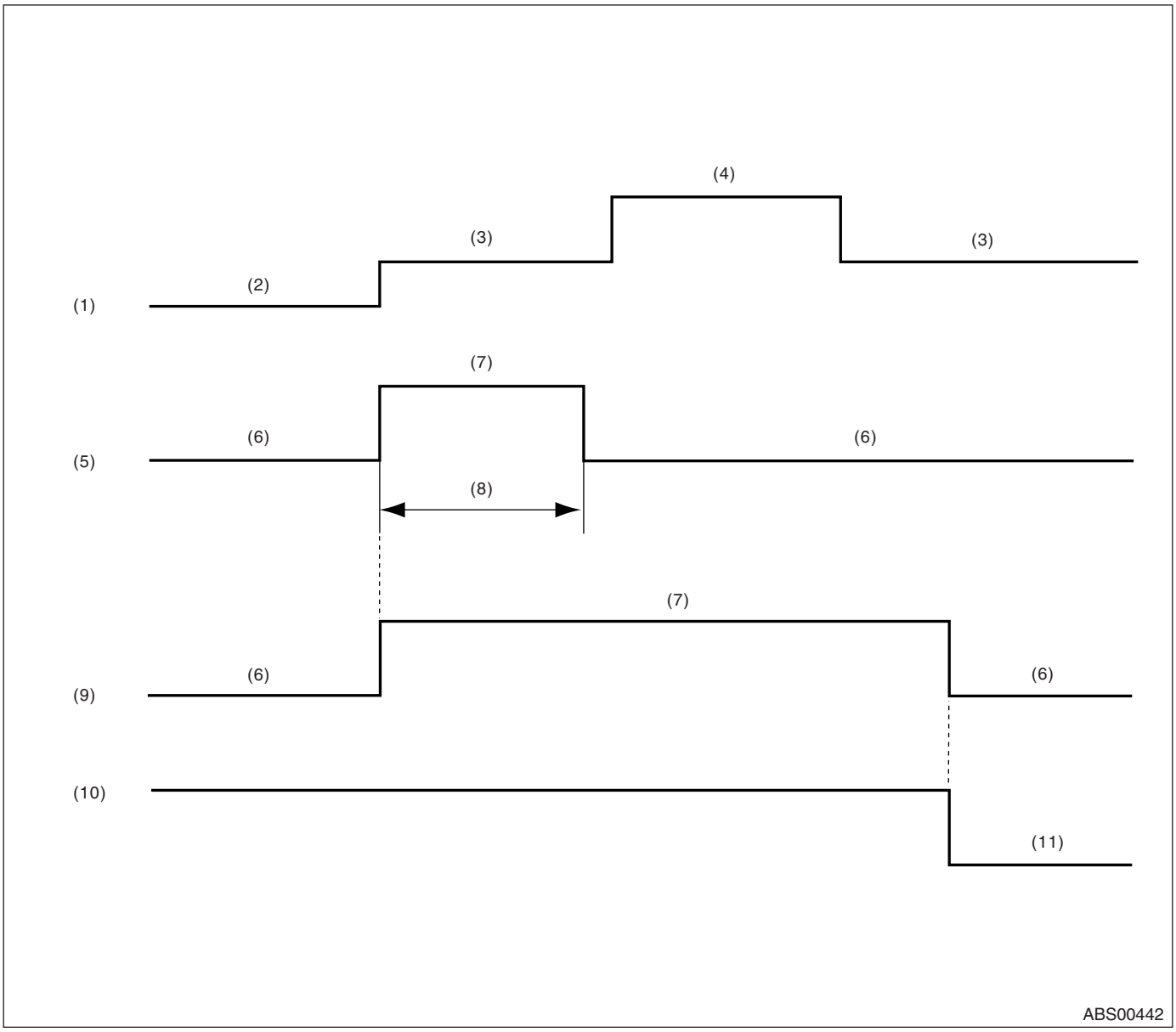
9. Clear Memory Mode

A: OPERATION

For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to ABS(diag)-15, Subaru Select Monitor.>

10.ABS Warning Light / Brake Warning Light Illumination Pattern

A: INSPECTION



(1) Ignition switch
(2) OFF
(3) ON
(4) Start
(5) ABS warning light
(6) Light OFF
(7) Light ON
(8) 1.5 seconds
(9) Brake warning light (EBD warning light)
(10) Parking brake
(11) Released

ABS Warning Light / Brake Warning Light Illumination Pattern

1) When the ABS warning light and brake warning light do not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When ABS warning light remains constantly OFF, check the combination meter circuit. <Ref. to ABS(diag)-30, ABS WARNING LIGHT DOES NOT COME ON, ABS Warning Light / Brake Warning Light Illumination Pattern.>
3) When ABS warning light does not go off, check the combination meter circuit. <Ref. to ABS(diag)-33, ABS WARNING LIGHT DOES NOT GO OFF, ABS Warning Light / Brake Warning Light Illumination Pattern.>
4) When brake warning light does not go off, check the brake warning light circuit, combination meter circuit. <Ref. to ABS(diag)-36, BRAKE WARNING LIGHT DOES NOT GO OFF, ABS Warning Light / Brake Warning Light Illumination Pattern.>

NOTE:
Even though the ABS warning light does not go off after 1.5 seconds from ABS warning light illumination, the ABS function operates normally when the warning light goes off while driving at approximately 12km/h (7 MPH). However, the ABS function does not operate while the ABS warning light is illuminated.

B: ABS WARNING LIGHT DOES NOT COME ON

DETECTING CONDITION:

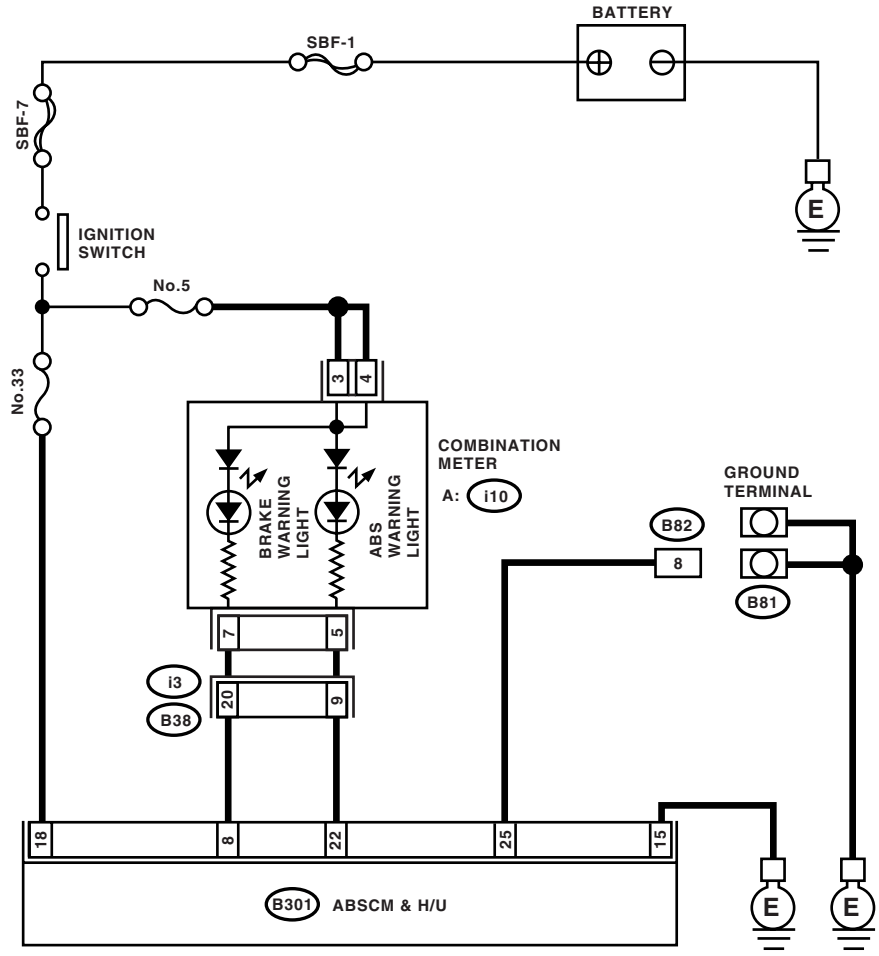
- Defective combination meter
- Defective harness

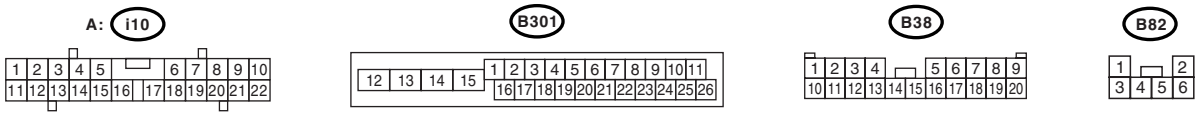
TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:

- LHD model

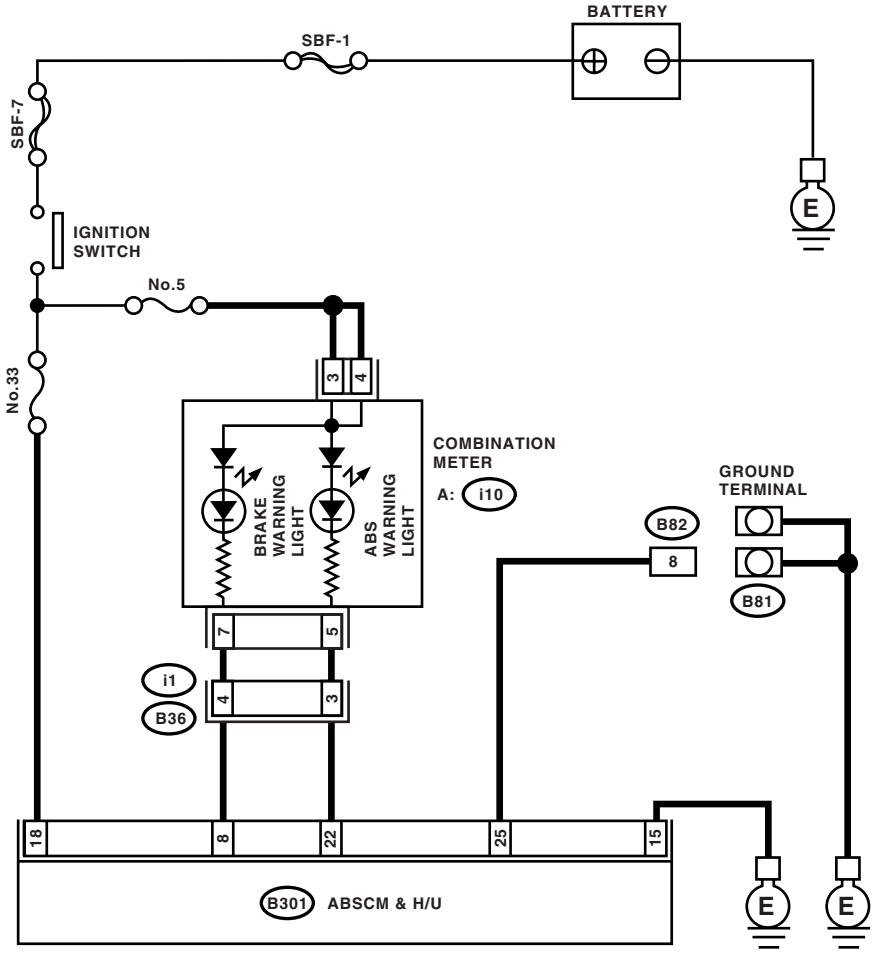


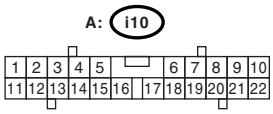


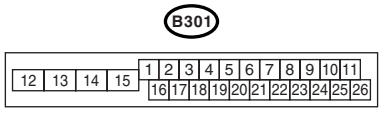
ABS00459

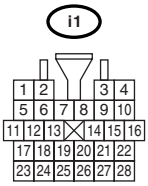
ABS Warning Light / Brake Warning Light Illumination Pattern

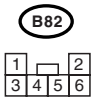
- RHD model











ABS00440

ABS Warning Light / Brake Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**CHECK ILLUMINATION OF OTHER LIGHTS.** Turn the ignition switch to ON. (engine OFF)	Do other warning lights illuminate?	Go to step **2.**	Check the combination meter.
2	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK GROUND SHORT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B301) from ABSCM&H/U. 3) Disconnect the connector (i10) from the combination meter. 4) Measure the resistance between ABSCM connector and chassis ground. ***Connector & terminal*** ***(B301) No. 22 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the harness and connector between ABSCM&H/U and combination meter connector.
4	**CHECK ABSCM.** 1) Connect the connector (B301) to the ABSCM&H/U. 2) Turn the ignition to ON. 3) Immediately after turning ignition switch to ON (within 1.5 seconds), measure the resistance of harness between the combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

C: ABS WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

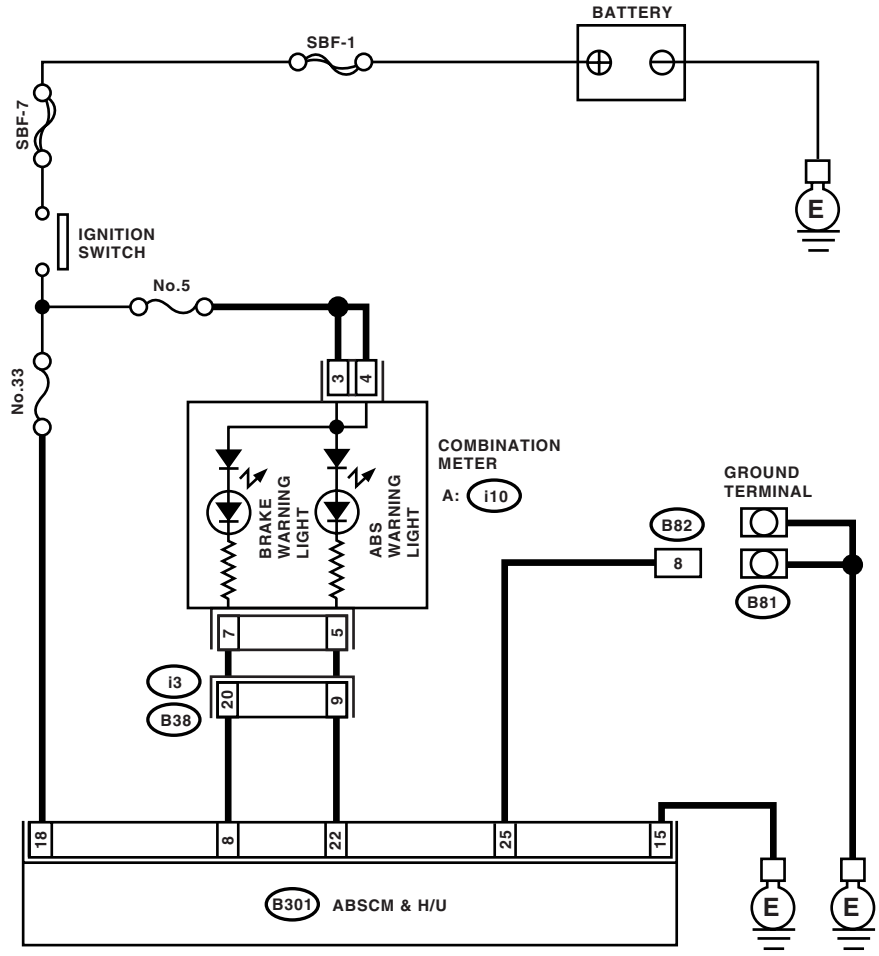
- Defective combination meter
- Open in harness

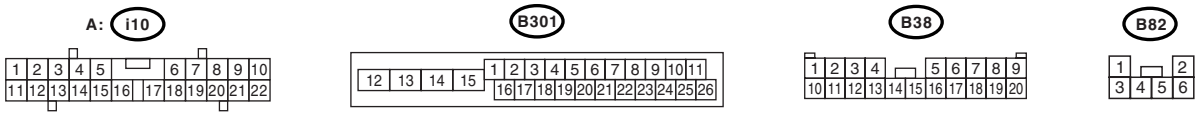
TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept on.

WIRING DIAGRAM:

- LHD model

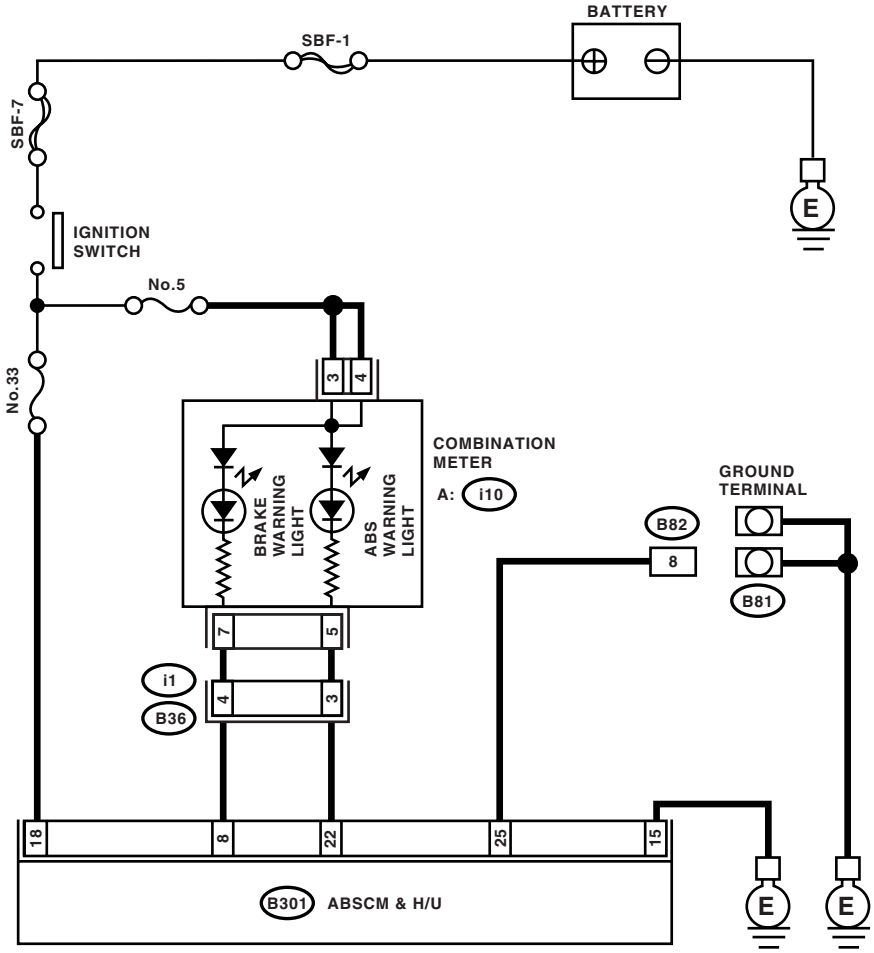


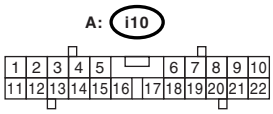


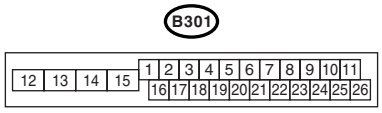
ABS00459

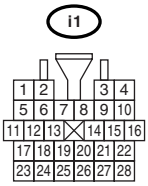
ABS Warning Light / Brake Warning Light Illumination Pattern

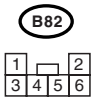
- RHD model











ABS00440

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B301) from ABSCM&H/U. 3) Disconnect the connector (i10) from the combination meter. 4) Measure the resistance between ABSCM connector and combination meter connector. ***Connector & terminal*** ***(B301) No. 22 — (i10) No. 5:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the harness and connector between ABSCM&H/U and combination meter connector.
3	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM.** 1) Connect the connector (B301) to the ABSCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 5 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

D: BRAKE WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

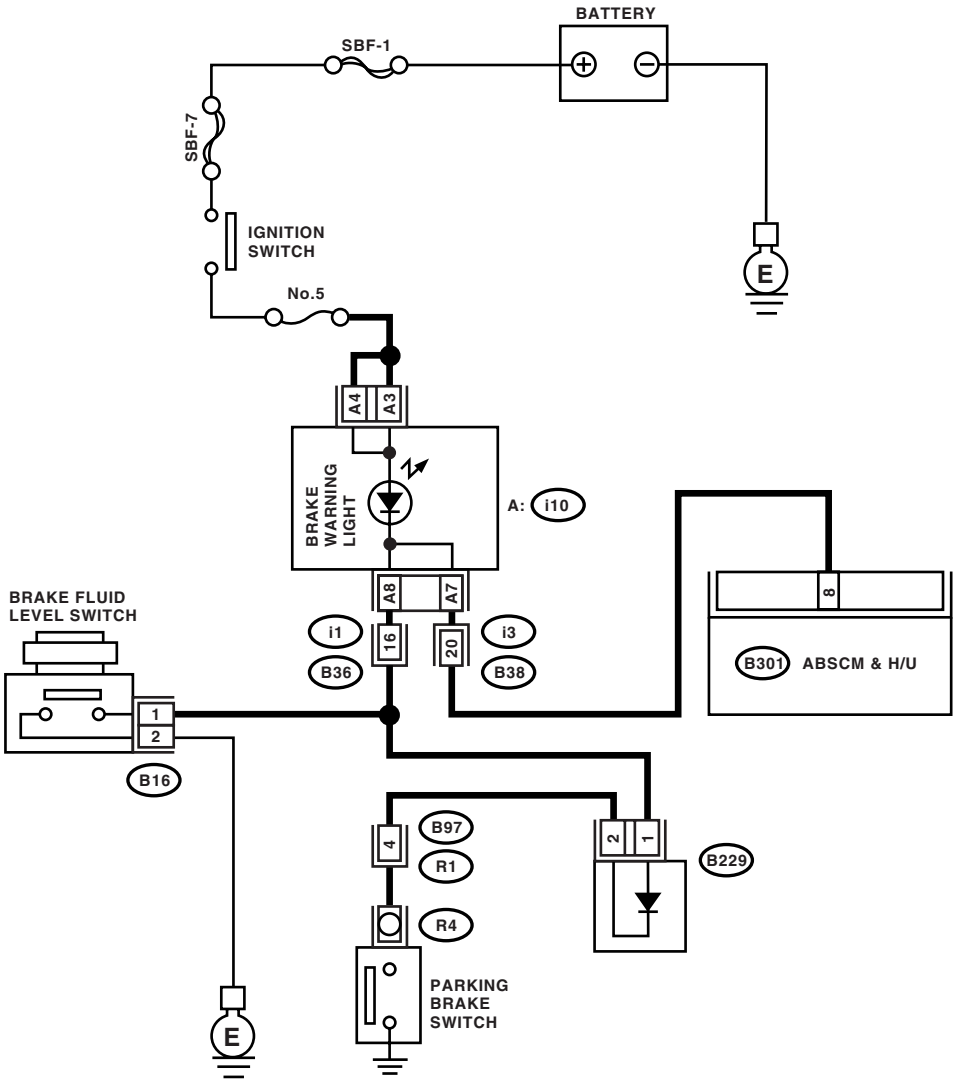
- Brake warning light circuit is shorted.
- Defective sensor/connector

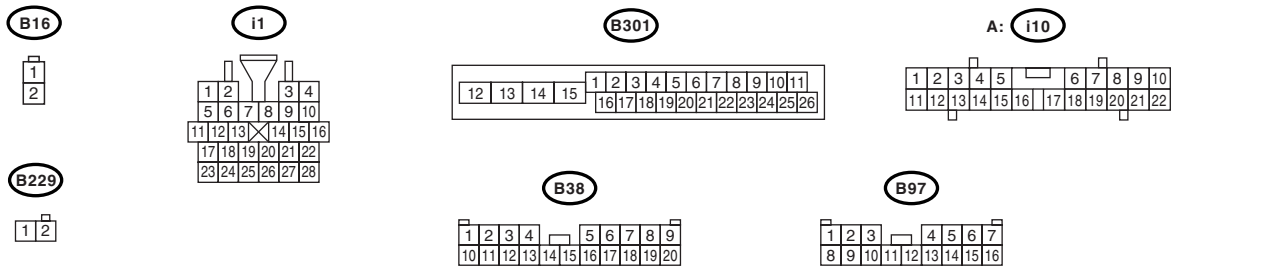
TROUBLE SYMPTOM:

After starting the engine, the brake warning light is kept on though the parking lever is released.

WIRING DIAGRAM:

- LHD model

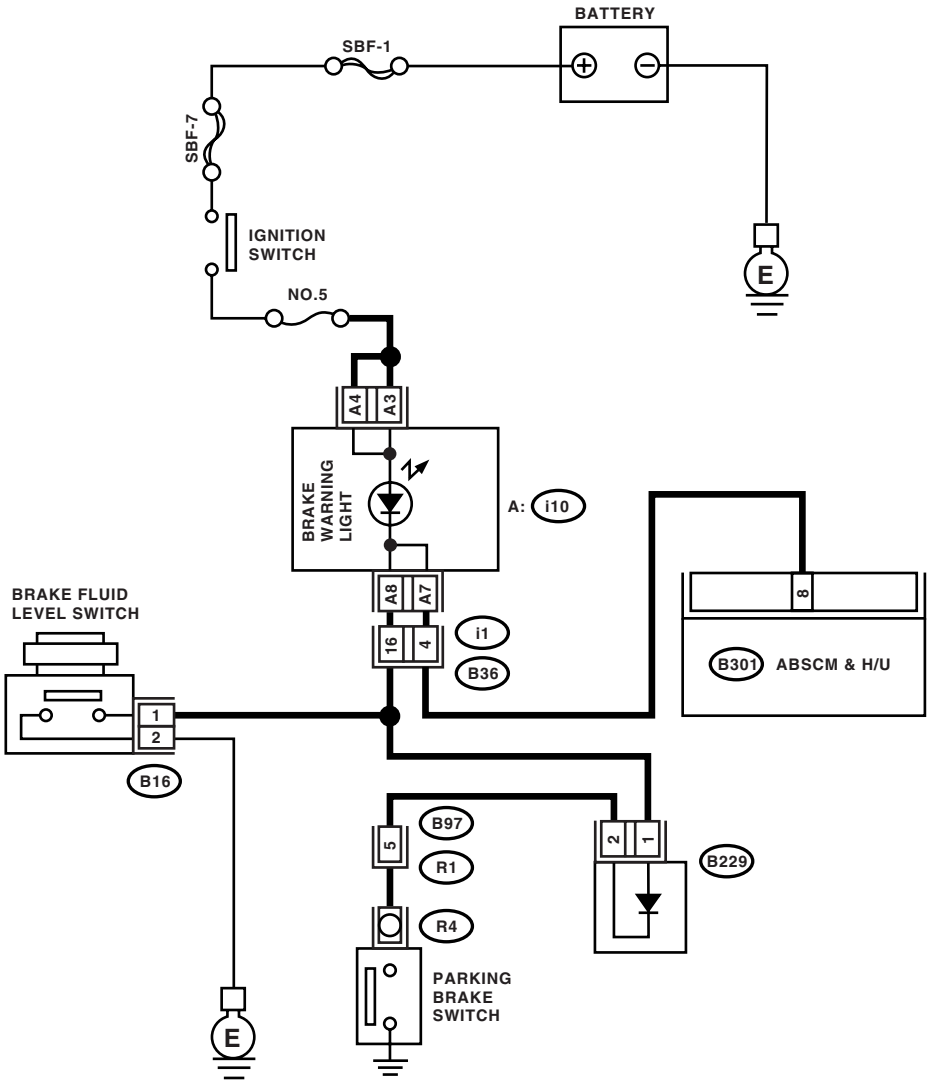


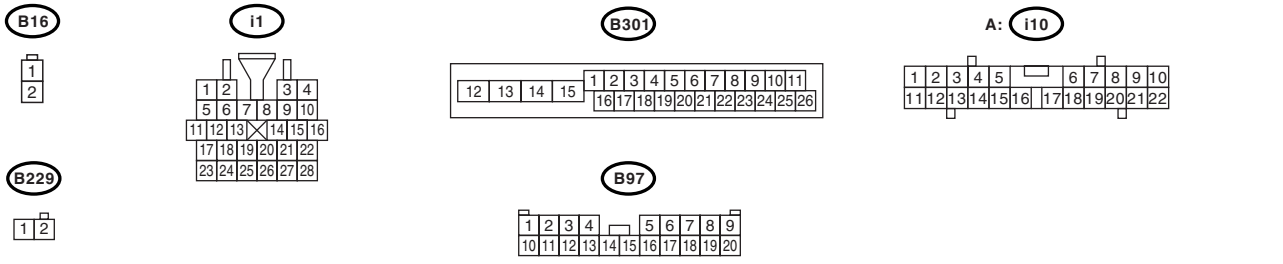


ABS00460

ABS Warning Light / Brake Warning Light Illumination Pattern

- RHD model





ABS00412

ABS Warning Light / Brake Warning Light Illumination Pattern

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF ABSCM&H/U CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Check that the ABSCM&H/U connector is inserted to ABSCM&H/U until the clamp locks onto it.	Is the connector correctly inserted?	Go to step **2.**	Insert the ABSCM&H/U connector until the clamp locks onto it.
2	**READ DTC.** Read the DTC. <Ref. to ABS(diag)-25, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK THE BRAKE FLUID AMOUNT.** Check the amount of brake fluid in the reservoir tank of master cylinder.	Is the amount of brake fluid between the lines of MAX and MIN?	Go to step **4.**	Replenish brake fluid to the specified value.
4	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Disconnect the level switch connector (B16) from master cylinder. 2) Measure the resistance of master cylinder terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the master cylinder.
5	**CHECK PARKING BRAKE SWITCH.** 1) Disconnect the connector (R4) from parking brake switch. 2) Release the parking brake. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the parking brake switch.
6	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i10) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness connector between combination meter and parking brake switch.
7	**CHECK HARNESS.** 1) Disconnect the connector (B301) from ABSCM&H/U. 2) Disconnect the connector (i10) from the combination meter. 3) Measure the resistance between ABSCM&H/U connector and combination meter connector. ***Connector & terminal*** ***(B301) No. 8 — (i10) No. 7:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Repair harness between ABSCM&H/U and combination meter connector.
8	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **9.**
9	**CHECK ABSCM.** 1) Connect the connector to the ABSCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 7 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Content of diagnosis		Display	Reference target
C0101	ABS wheel speed sensor malfunction (Broken wire, short)	Rear ABS wheel speed sensor RH	Rear Right ABS Sensor Circuit Open or Shorted Battery	<Ref. to ABS(diag)-42, DTC C0101 ABS WHEEL SPEED SENSOR RR MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0102		Rear ABS wheel speed sensor LH	Rear Left ABS Sensor Circuit Open or Shorted Battery	<Ref. to ABS(diag)-42, DTC C0102 ABS WHEEL SPEED SENSOR RL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0103		Front ABS wheel speed sensor RH	Front Right ABS Sensor Circuit Open or Shorted Battery	<Ref. to ABS(diag)-42, DTC C0103 ABS WHEEL SPEED SENSOR FR MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0104		Front ABS wheel speed sensor LH	Front Left ABS Sensor Circuit Open or Shorted Battery	<Ref. to ABS(diag)-43, DTC C0104 ABS WHEEL SPEED SENSOR FL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0105	ABS wheel speed sensor malfunction (ABS wheel speed sensor abnormal signal)	Abnormal signal of rear ABS wheel speed sensor RH	Rear Right ABS Sensor Signal	<Ref. to ABS(diag)-46, DTC C0105 ABS WHEEL SPEED SENSOR RR MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0106		Abnormal signal of rear ABS wheel speed sensor LH	Rear Left ABS Sensor Signal	<Ref. to ABS(diag)-46, DTC C0106 ABS WHEEL SPEED SENSOR RL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0107		Abnormal signal of front ABS wheel speed sensor RH	Front Right ABS Sensor Signal	<Ref. to ABS(diag)-46, DTC C0107 ABS WHEEL SPEED SENSOR FR MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0108		Abnormal signal of front ABS wheel speed sensor LH	Front Left ABS Sensor Signal	<Ref. to ABS(diag)-47, DTC C0108 ABS WHEEL SPEED SENSOR FL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0109	Power voltage malfunction		Power Supply Voltage Failure	<Ref. to ABS(diag)-65, DTC C0109 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0110	ABS control module malfunction		ECM	<Ref. to ABS(diag)-63, DTC C0110 ABS CONTROL MODULE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0111	Motor/motor relay on failure		Motor and Motor Relay	<Ref. to ABS(diag)-71, DTC C0111 MOTOR/MOTOR RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0114	Valve relay on failure		Valve Relay	<Ref. to ABS(diag)-69, DTC C0114 VALVE RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

List of Diagnostic Trouble Code (DTC)

DTC	Content of diagnosis		Display	Reference target
C0115	ABS wheel speed sensor malfunction (ABS wheel speed sensor abnormal signal)	Abnormal ABS wheel speed sensor on any one of four sensors	Any One of Four ABS Sensors Signal	<Ref. to ABS(diag)-51, DTC C0115 ABS WHEEL SPEED SENSOR SIGNAL MALFUNCTION IN ONE OF FOUR WHEELS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0116	Stop light switch signal circuit malfunction		Brake Light Switch	<Ref. to ABS(diag)-74, DTC C0116 FAULTY STOP LIGHT SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0118	Faulty G sensor output voltage		G Sensor Failure	<Ref. to ABS(diag)-76, DTC C0118 G SENSOR OUTPUT VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0119	Abnormal G sensor output voltage		G Sensor Signal	<Ref. to ABS(diag)-79, DTC C0119 G SENSOR OUTPUT VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0120	Inlet valve malfunction in hydraulic unit	Front inlet valve LH	FL Hold Valve malfunction	<Ref. to ABS(diag)-55, DTC C0120 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0121	Outlet valve malfunction in hydraulic unit	Front outlet valve LH	FL Pressure Reducing Valve malfunction	<Ref. to ABS(diag)-59, DTC C0121 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0122	Inlet valve malfunction in hydraulic unit	Front inlet valve RH	FR Hold Valve malfunction	<Ref. to ABS(diag)-55, DTC C0122 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0123	Outlet valve malfunction in hydraulic unit	Front outlet valve RH	FR Pressure Reducing Valve malfunction	<Ref. to ABS(diag)-59, DTC C0123 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0124	Inlet valve malfunction in hydraulic unit	Rear inlet valve LH	RL Hold Valve malfunction	<Ref. to ABS(diag)-55, DTC C0124 REAR INLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0125	Outlet valve malfunction in hydraulic unit	Rear outlet valve LH	RL Pressure Reducing Valve malfunction	<Ref. to ABS(diag)-59, DTC C0125 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0126	Inlet valve malfunction in hydraulic unit	Rear inlet valve RH	RR Hold Valve malfunction	<Ref. to ABS(diag)-56, DTC C0126 REAR INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Content of diagnosis		Display	Reference target
C0127	Outlet valve malfunction in hydraulic unit	Rear outlet valve RH	RR Pressure Reducing Valve malfunction	<Ref. to ABS(diag)-60, DTC C0127 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0140	CAN communication malfunction		Improper CAN communication	<Ref. to ABS(diag)-68, DTC C0140 CAN COMMUNICATION MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC C0101 ABS WHEEL SPEED SENSOR RR MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH)

NOTE:
For the diagnostic procedure, refer to DTC C0104. <Ref. to ABS(diag)-43, DTC C0104 ABS WHEEL SPEED SENSOR FL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC C0102 ABS WHEEL SPEED SENSOR RL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH)

NOTE:
For the diagnostic procedure, refer to DTC C0104. <Ref. to ABS(diag)-43, DTC C0104 ABS WHEEL SPEED SENSOR FL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C0103 ABS WHEEL SPEED SENSOR FR MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH)

NOTE:
For the diagnostic procedure, refer to DTC C0104. <Ref. to ABS(diag)-43, DTC C0104 ABS WHEEL SPEED SENSOR FL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC C0104 ABS WHEEL SPEED SENSOR FL MALFUNCTION (BROKEN WIRE, INPUT VOLTAGE TOO HIGH)

DTC DETECTING CONDITION:

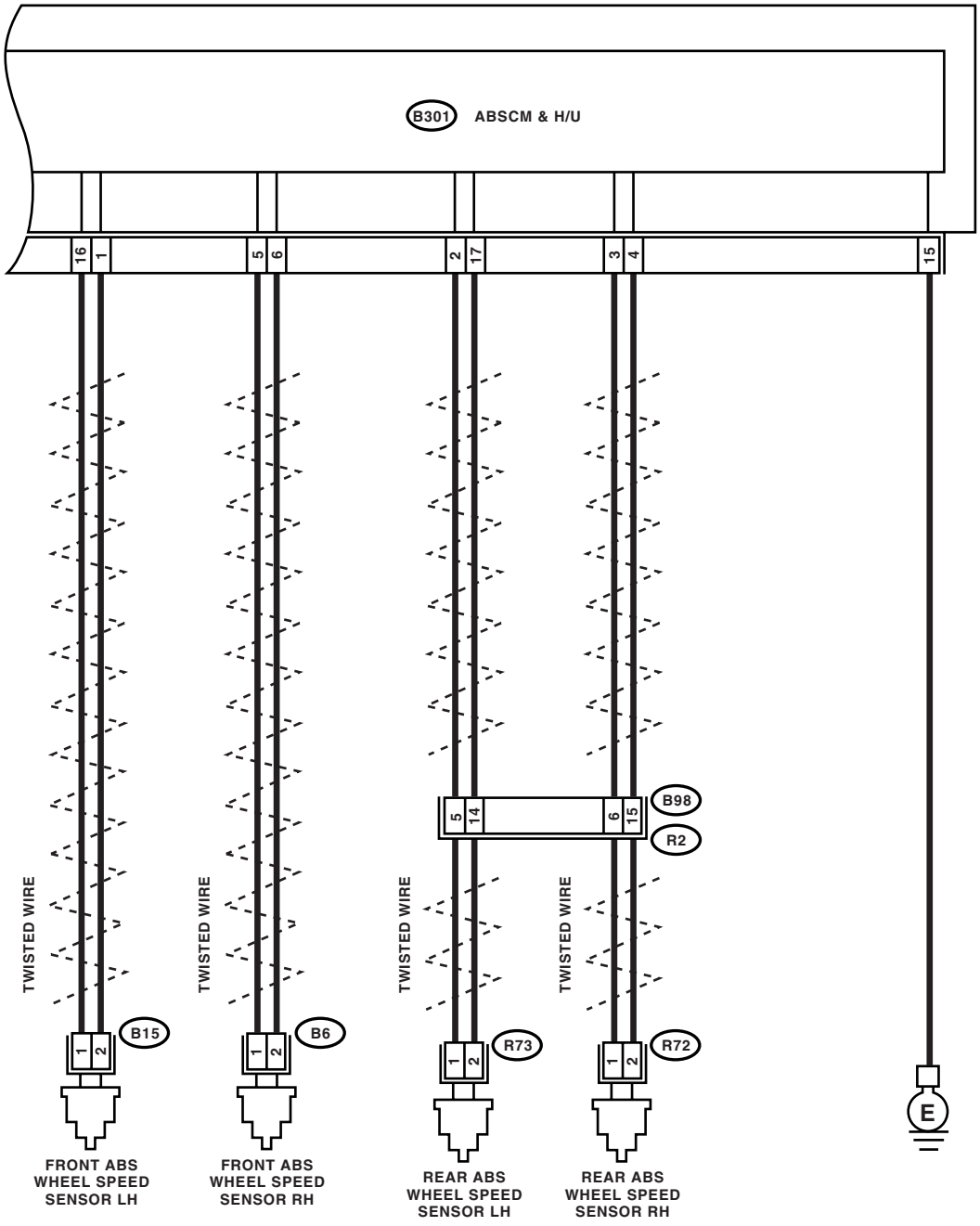
- Defective ABS wheel speed sensor (broken wire, input voltage too high)
- Defective harness connector

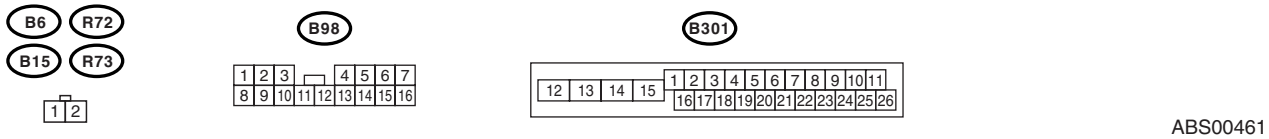
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

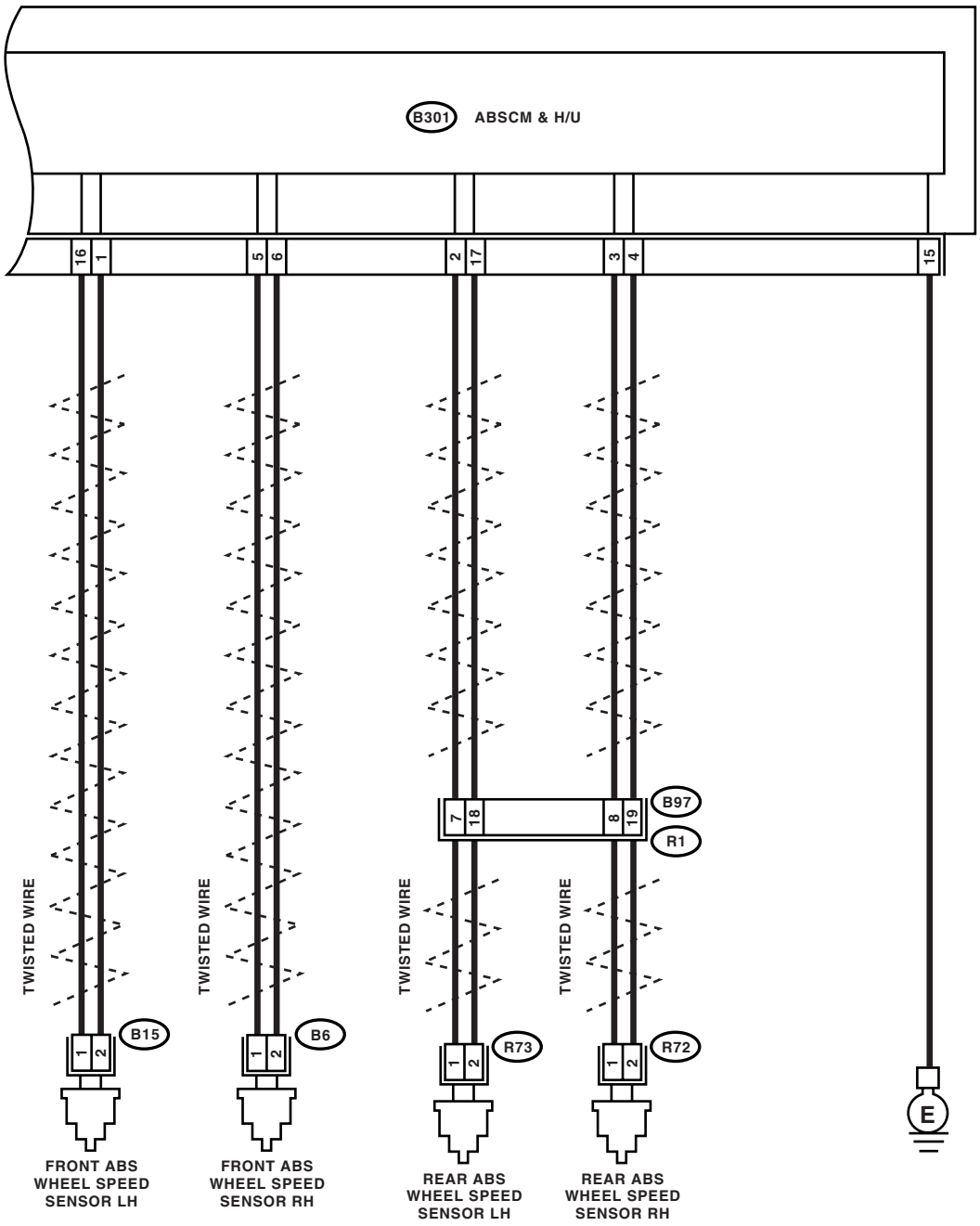
- LHD model

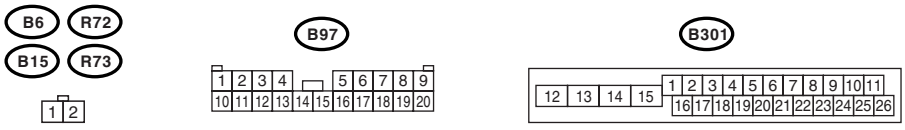




ABS00461

- RHD model





ABS00413

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTOR.** Check the poor contact between ABSCM&H/U and ABS wheel speed sensor.	Is there poor contact?	Repair the connector.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN ABSCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Disconnect the connector (B301) from ABSCM&H/U. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between ABSCM&H/U connector and ABS wheel speed sensor connector. ***Connector & terminal*** ***DTC C0101*** ***(B301) No. 3 — (R72) No. 1:*** ***(B301) No. 4 — (R72) No. 2:*** ***DTC C0102*** ***(B301) No. 2 — (R73) No. 1:*** ***(B301) No. 17 — (R73) No. 2:*** ***DTC C0103*** ***(B301) No. 5 — (B6) No. 1:*** ***(B301) No. 6 — (B6) No. 2:*** ***DTC C0104*** ***(B301) No. 16 — (B15) No. 1:*** ***(B301) No. 1 — (B15) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the harness connector between ABSCM&H/U and ABS wheel speed sensor.
3	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC C0101*** ***(B301) No. 4 — Chassis ground:*** ***DTC C0102*** ***(B301) No. 17 — Chassis ground:*** ***DTC C0103*** ***(B301) No. 6 — Chassis ground:*** ***DTC C0104*** ***(B301) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the harness connector between ABSCM&H/U and ABS wheel speed sensor.
4	**CHECK ABS WHEEL SPEED SENSOR POWER SUPPLY CIRCUIT.** 1) Connect the ABSCM&H/U connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ABS wheel speed sensor connector and chassis ground. ***Connector & terminal*** ***DTC C0101*** ***(R72) No. 1 — Chassis ground (–):*** ***DTC C0102*** ***(R73) No. 1 — Chassis ground (–):*** ***DTC C0103*** ***(B6) No. 1 (+) — Chassis ground (–):*** ***DTC C0104*** ***(B15) No. 1 (+) — Chassis ground (–):***	Is the voltage 5 — 16 V?	Go to step **6.**	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK ABSCM&H/U POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the ABSCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — (B301) No. 15 (–):***	Is the voltage 10 — 15 V?	Go to step **7.**	Check the generator, battery, ABSCM&H/U power circuit.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Is the pattern the same waveform as shown in the figure?	Go to step **7.**	Replace the speed sensor.
7	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8.**
8	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

E: DTC C0105 ABS WHEEL SPEED SENSOR RR MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL)

NOTE:
For the diagnostic procedure, refer to DTC C0108. <Ref. to ABS(diag)-47, DTC C0108 ABS WHEEL SPEED SENSOR FL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC C0106 ABS WHEEL SPEED SENSOR RL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL)

NOTE:
For the diagnostic procedure, refer to DTC C0108. <Ref. to ABS(diag)-47, DTC C0108 ABS WHEEL SPEED SENSOR FL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC C0107 ABS WHEEL SPEED SENSOR FR MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL)

NOTE:
For the diagnostic procedure, refer to DTC C0108. <Ref. to ABS(diag)-47, DTC C0108 ABS WHEEL SPEED SENSOR FL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC C0108 ABS WHEEL SPEED SENSOR FL MALFUNCTION (ABS WHEEL SPEED SENSOR ABNORMAL SIGNAL)

DTC DETECTING CONDITION:

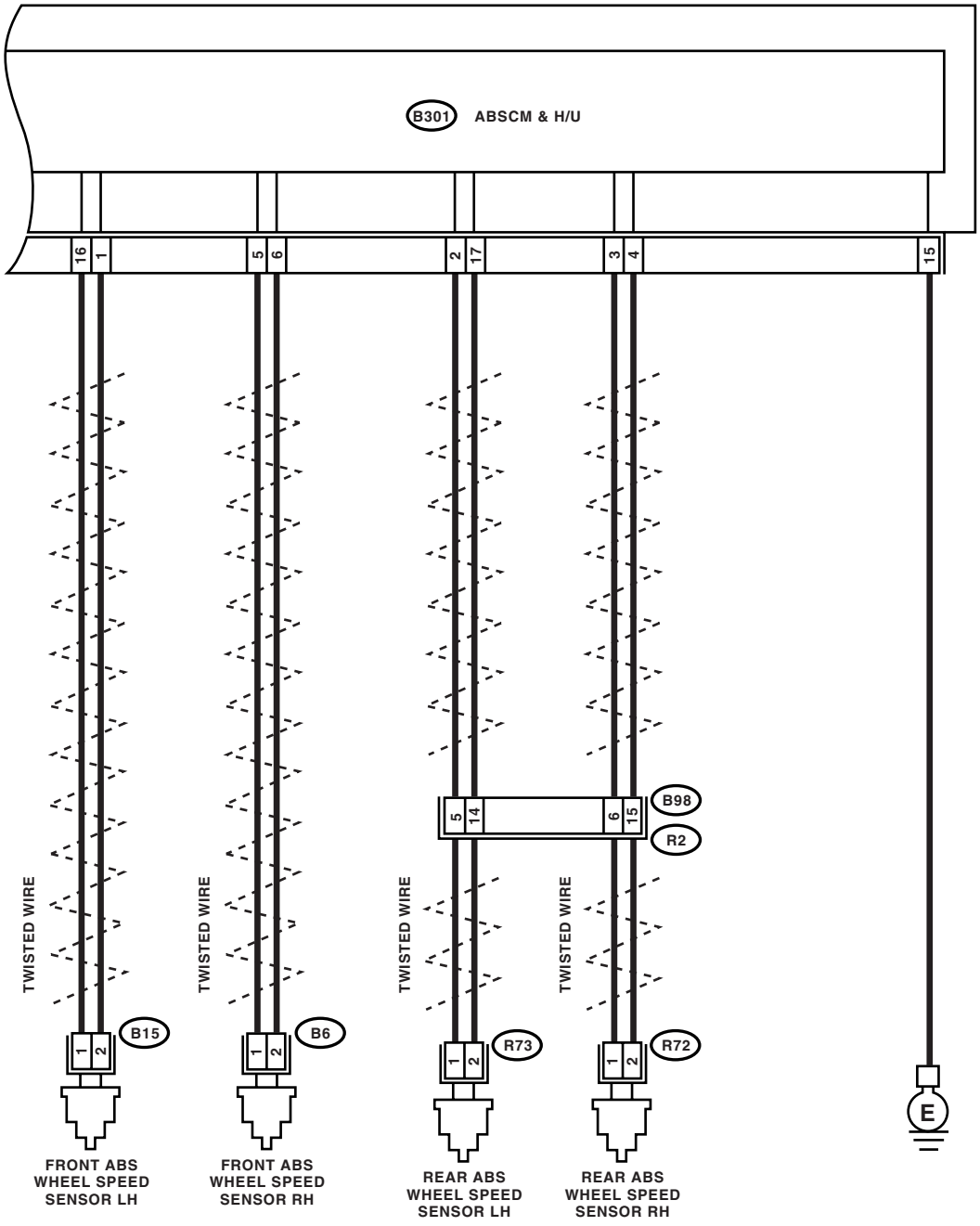
- Defective ABS wheel speed sensor signal (noise, abnormal signal, etc.)
- Defective harness connector

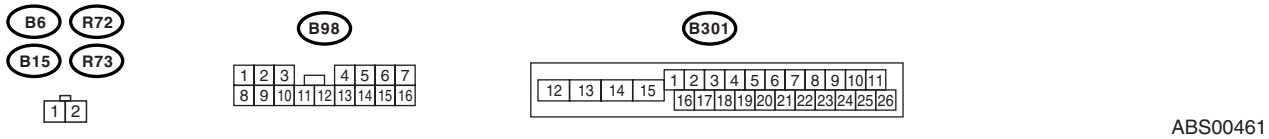
TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:

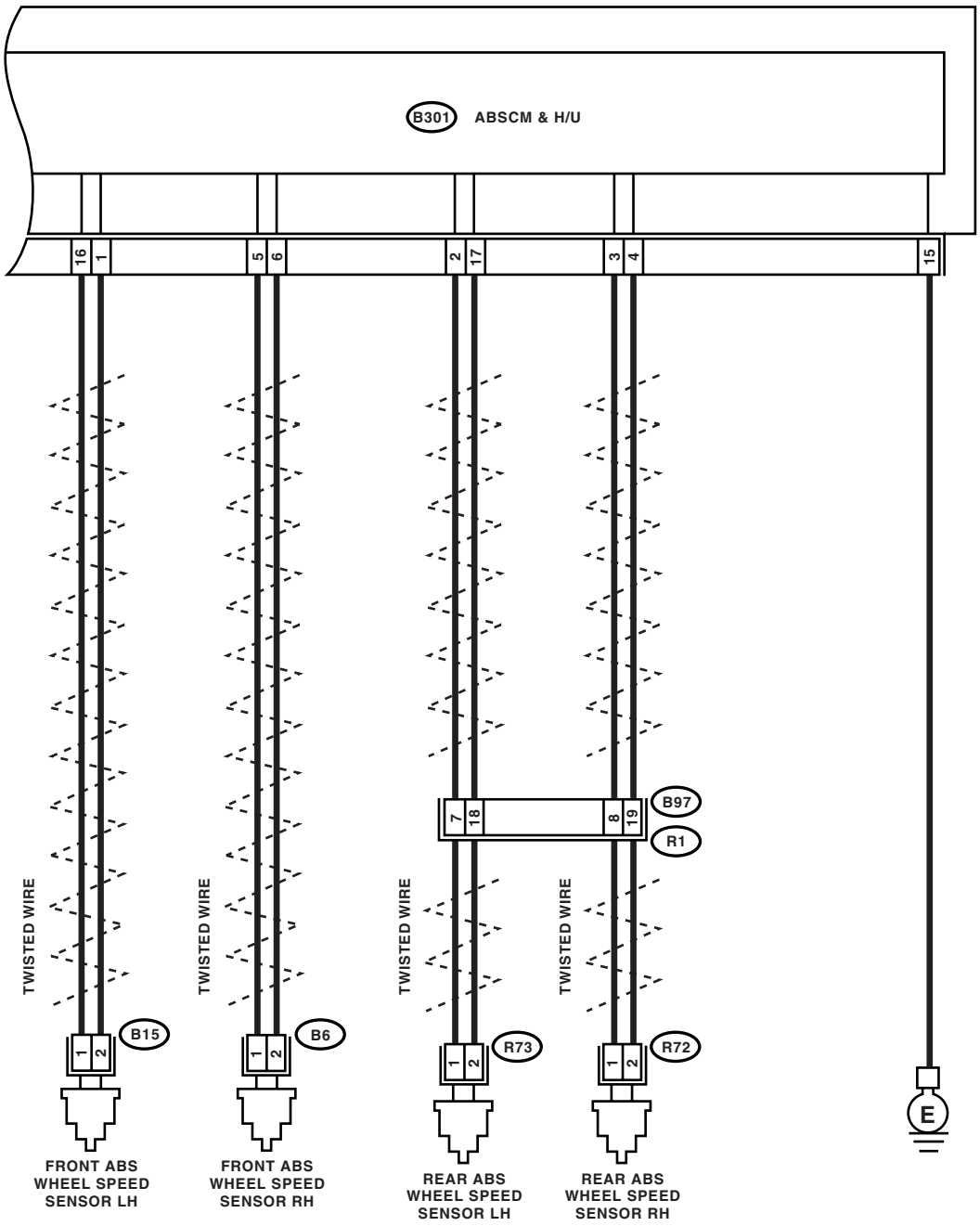
- LHD model

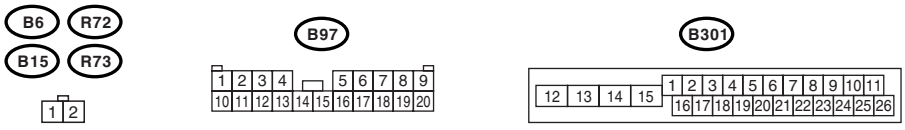




ABS00461

• RHD model





ABS00413

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to the faulty wheel in Subaru Select Monitor data display mode.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2.**	Go to step **7.**
2	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connectors between ABSCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the car phone, radio wave device like radio and etc., electric components are installed correctly.	Is the car phone, radio wave device like radio and etc., electric components installed correctly?	Go to step **4.**	Install the radio wave device and electric components properly.
4	**CHECK SOURCES OF SIGNAL NOISE.** Check that the noise sources are (such as an antenna) installed near the sensor harness.	Is the noise sources installed?	Install the noise sources apart from the sensor harness.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.
7	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Is the ABS wheel speed sensor installation bolt tightened 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **8.**	Tighten the ABS wheel speed sensor installation bolts.
8	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Does the oscilloscope indicate the waveform pattern like shown in the figure when the tire is slowly turned? Does the oscilloscope indication repeat the waveform pattern like shown in the figure when the tire is slowly turned in equal speed for more one rotation?	Go to step **10.**	Go to step **9.**
9	**CHECK ABS WHEEL SPEED SENSOR AND MAGNETIC ENCODER.**	Is there foreign particles, breakage or damage in the pole piece of ABS wheel speed sensor or magnetic encoder?	Remove dirt completely. Replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing when it is broken or damaged.	Go to step **10.**
10	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the car phone, radio wave device like CB and etc., electric components are installed correctly.	Is the car phone, radio wave device like radio and etc., electric components installed correctly?	Go to step **11.**	Install the radio wave device and electric components properly.

	Step	Check	Yes	No
11	**CHECK SOURCES OF SIGNAL NOISE.** Check if the noise sources are (such as an antenna) installed near the sensor harness.	Are noise sources installed?	Go to step **12.**	Install the noise sources apart from the sensor harness.
12	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference. NOTE: Though ABS warning light remains to illuminate at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to make ABS warning light go off. Be sure to drive the vehicle and check the warning light goes off.

I: DTC C0115 ABS WHEEL SPEED SENSOR SIGNAL MALFUNCTION IN ONE OF FOUR WHEELS

DTC DETECTING CONDITION:

- Defective ABS wheel speed sensor signal (noise, abnormal signal, etc.)
- Defective magnetic encoder
- When a wheel is turned freely for a long time

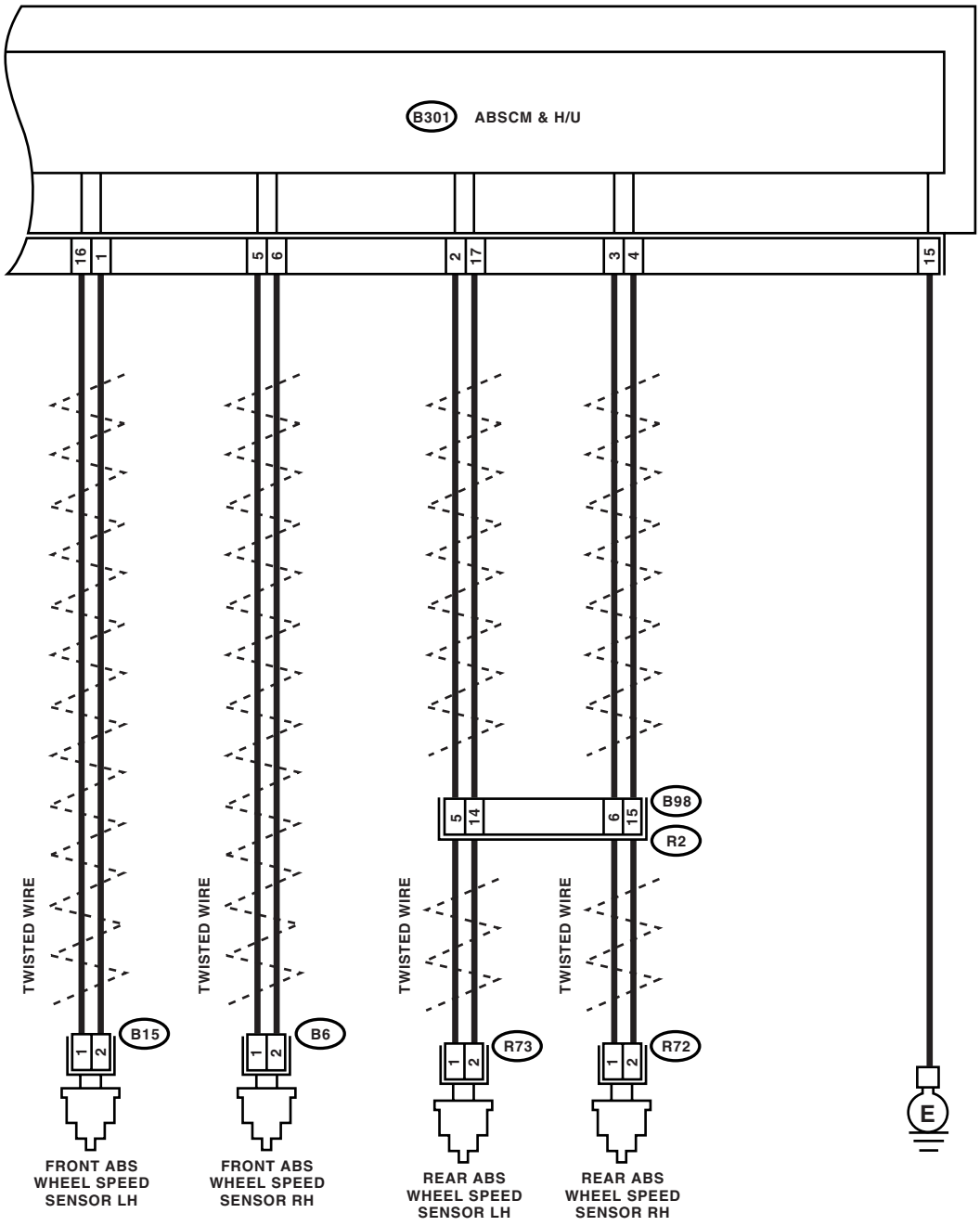
TROUBLE SYMPTOM:

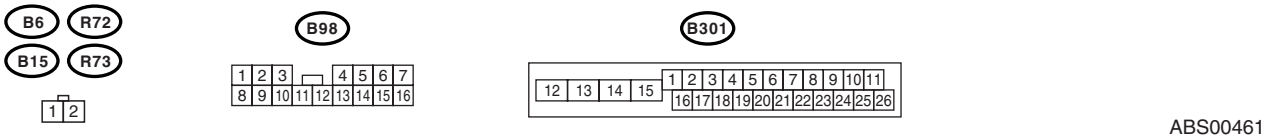
- ABS does not operate.
- EBD does not operate.

NOTE:
Brake warning light comes on as well as ABS warning light.

WIRING DIAGRAM:

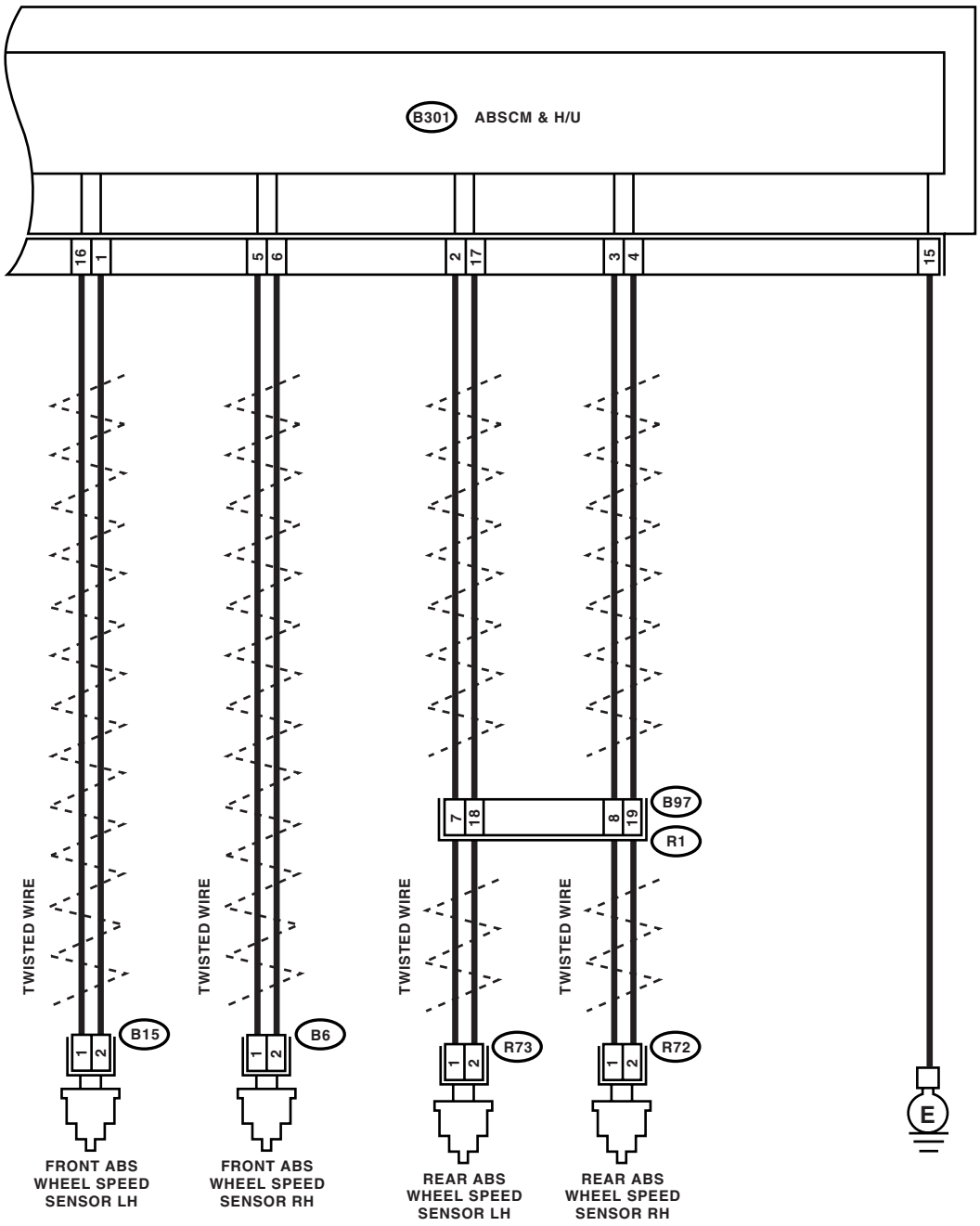
- LHD model

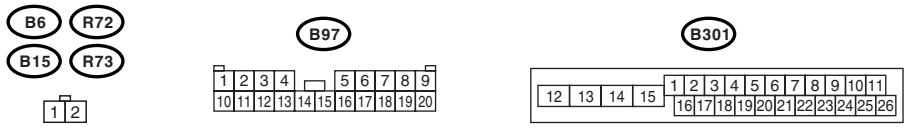




ABS00461

• RHD model





ABS00413

	Step	Check	Yes	No
1	**WHETHER A WHEEL TURNED FREELY OR NOT.** Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when the wheels are not in contact with road surface.	Did the wheels turn freely?	ABS is normal. Erase the memory. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this diagnostic trouble code may sometimes occur.	Go to step **2.**
2	**CHECK TIRE SPECIFICATIONS.** Turn the ignition switch to OFF.	Are the tire specifications correct?	Go to step **3.**	Replace the tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace the tire.	Go to step **4.**
4	**CHECK TIRE INFLATION PRESSURE.**	Is the tire pressure correct?	Go to step **5.**	Adjust the tire pressure.
5	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Is the ABS wheel speed sensor installation bolt tightened 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)? (four of them)	Go to step **6.**	Tighten the ABS wheel speed sensor installation bolts.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Does the oscilloscope indicate the waveform pattern like shown in the figure when the tire is slowly turned? Does the oscilloscope indication repeat the waveform pattern like shown in the figure when the tire is slowly turned in equal speed for more one rotation?	Go to step **8.**	Go to step **7.**
7	**CHECK ABS WHEEL SPEED SENSOR AND MAGNETIC ENCODER.**	Is there foreign particles, breakage or damage in the pole piece of ABS wheel speed sensor or magnetic encoder?	Remove dirt completely. Replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing when it is broken or damaged.	Go to step **8.**
8	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to ABS(diag)-17, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **9.**

	Step	Check	Yes	No
9	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference. NOTE: Though ABS warning light remains to illuminate at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to make ABS warning light go off. Be sure to drive the vehicle and check the warning light goes off.

J: DTC C0120 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0126. <Ref. to ABS(diag)-56, DTC C0126 REAR INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC C0122 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0126. <Ref. to ABS(diag)-56, DTC C0126 REAR INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC C0124 REAR INLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0126. <Ref. to ABS(diag)-56, DTC C0126 REAR INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

M: DTC C0126 REAR INLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

DTC DETECTING CONDITION:

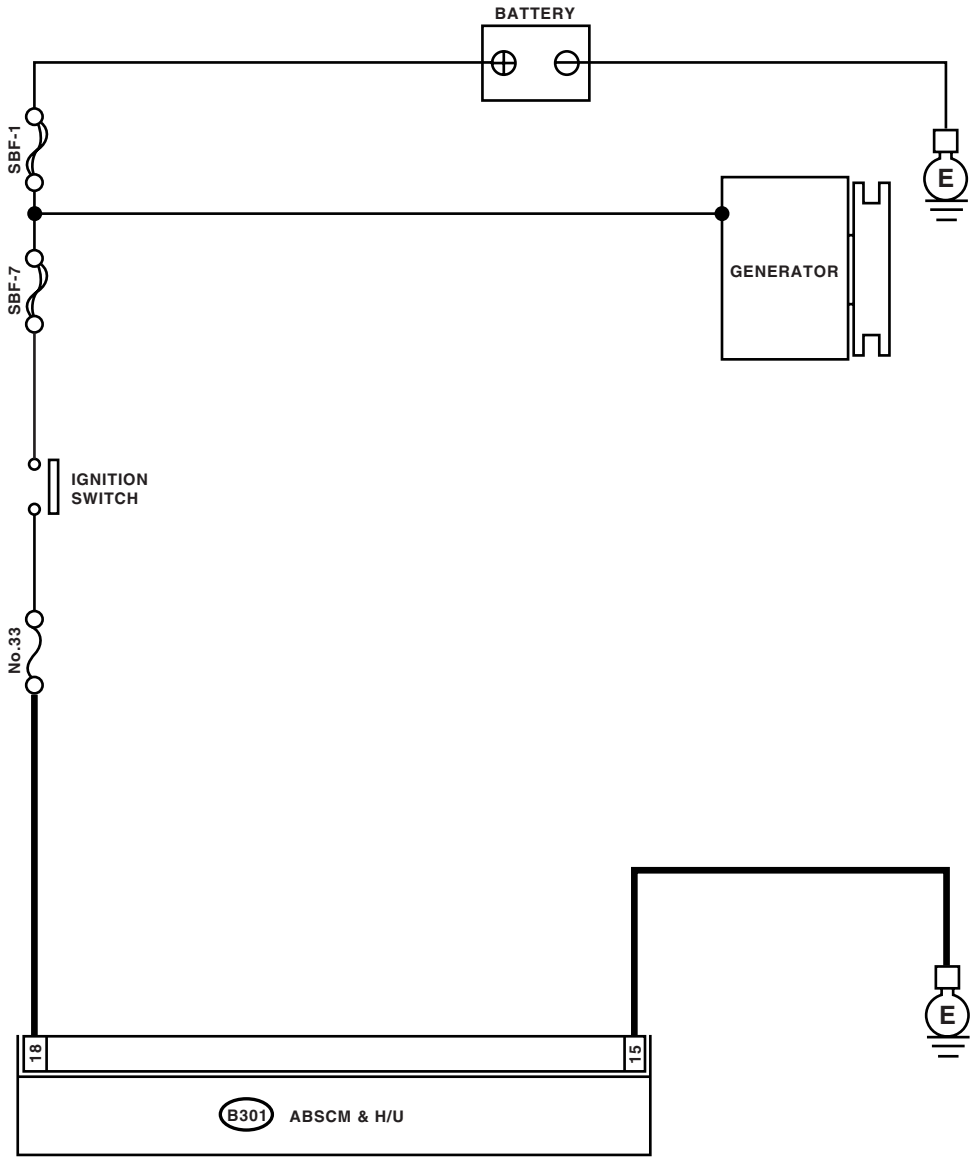
- Defective harness connector
- Defective inlet solenoid valve in ABSCM&H/U

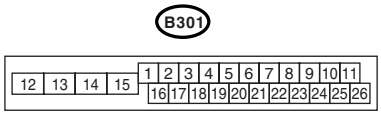
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:
Brake warning light comes on as well as ABS warning light.

WIRING DIAGRAM:





ABS00414

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the ABSCM&H/U power circuit.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace ABSCM&H/U. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

N: DTC C0121 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0127. <Ref. to ABS(diag)-60, DTC C0127 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC C0123 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0127. <Ref. to ABS(diag)-60, DTC C0127 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC C0125 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

NOTE:
For the diagnostic procedure, refer to DTC C0127. <Ref. to ABS(diag)-60, DTC C0127 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Q: DTC C0127 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN ABS CONTROL MODULE AND HYDRAULIC CONTROL UNIT (ABSCM&H/U)

DTC DETECTING CONDITION:

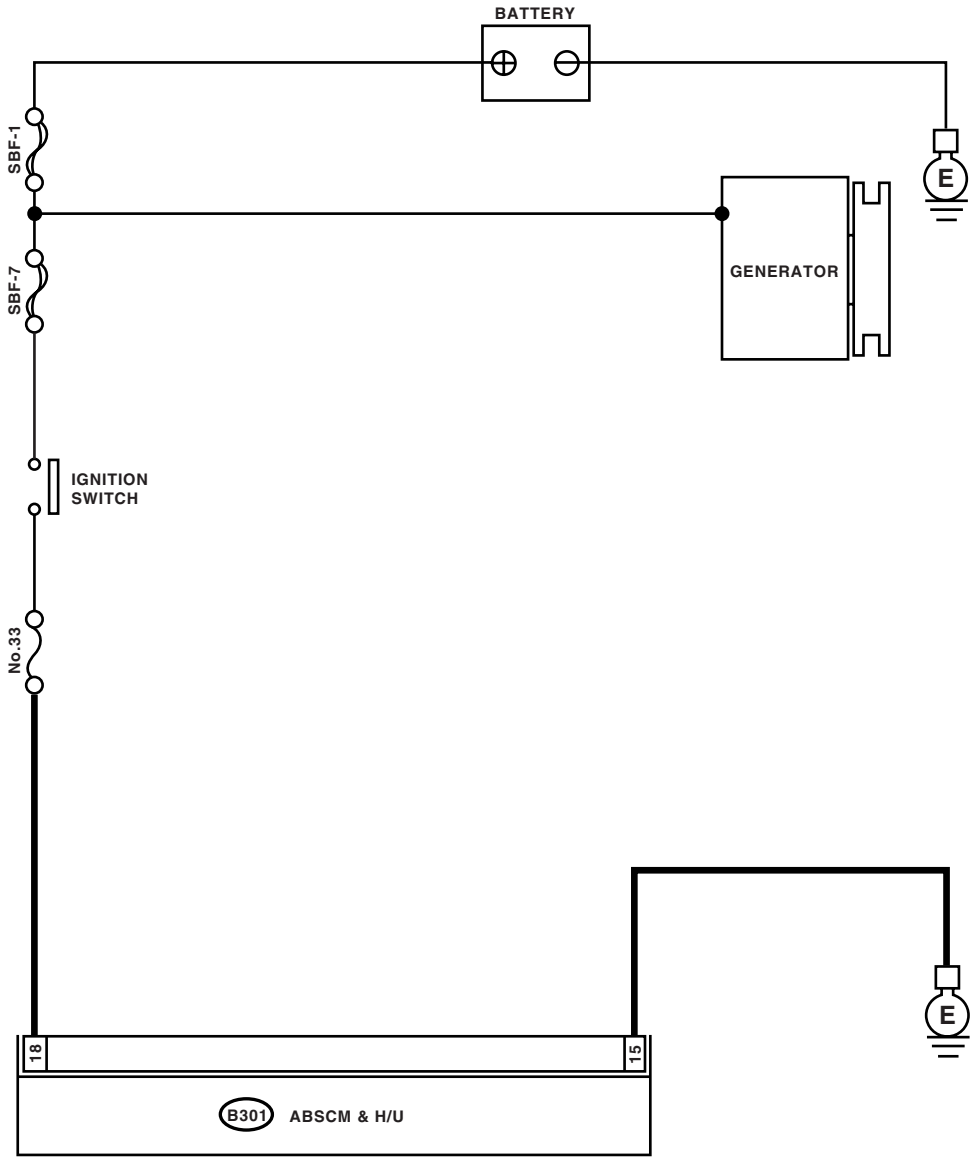
- Defective harness connector
- Defective outlet solenoid valve in ABSCM&H/U

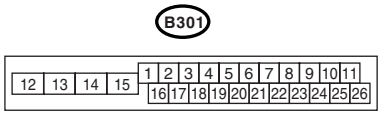
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:
Brake warning light comes on as well as ABS warning light.

WIRING DIAGRAM:





ABS00414

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the ABSCM&H/U power circuit.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace ABSCM&H/U. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **5.**
5	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

R: DTC C0110 ABS CONTROL MODULE MALFUNCTION

DTC DETECTING CONDITION:

Defective ABSCM&H/U

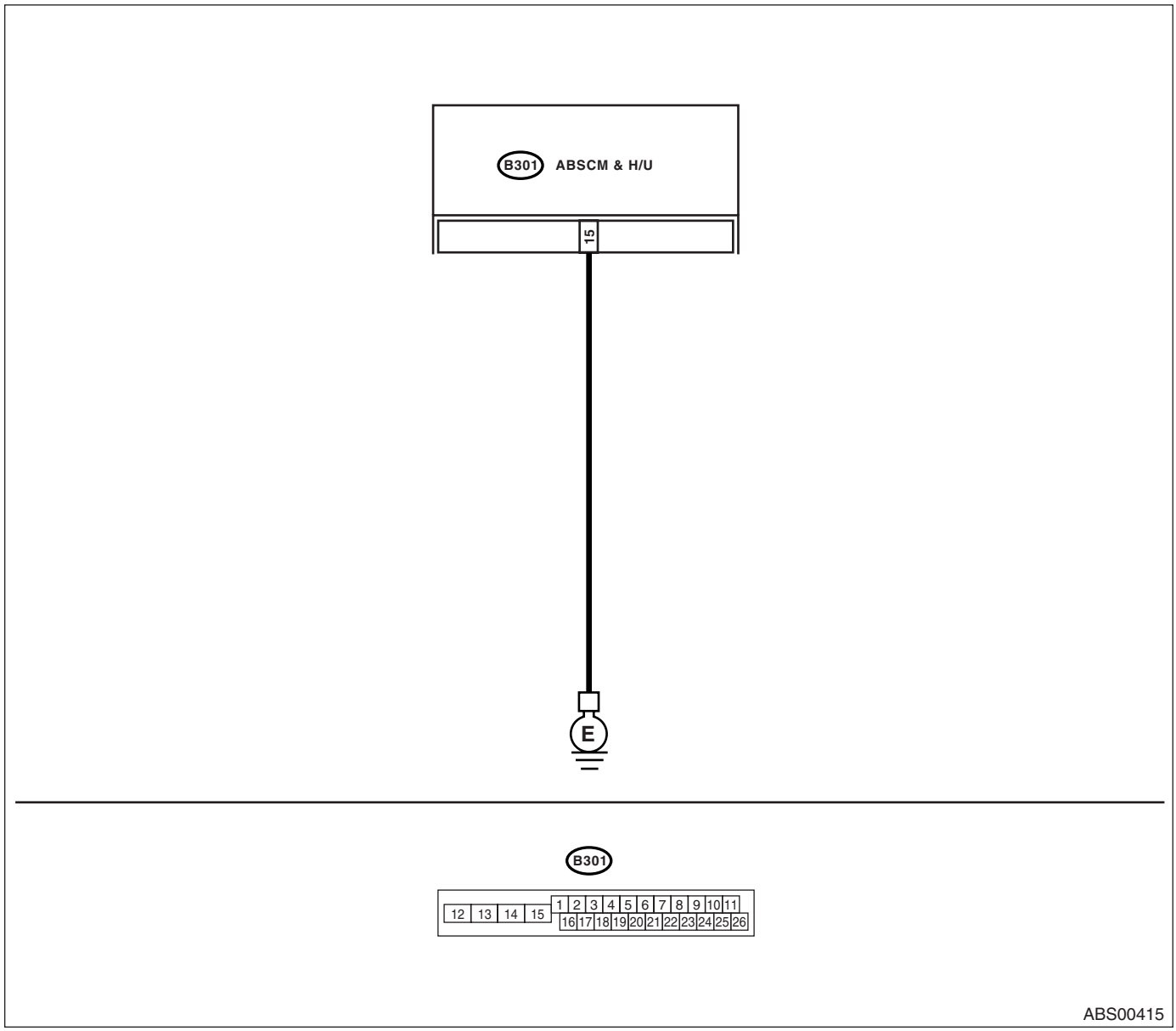
TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.

NOTE:

Brake warning light comes on as well as ABS warning light.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2.**	Repair the ABSCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connectors between battery, ignition switch and ABSCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car telephone or the radio properly installed?	Go to step **4.**	Properly install the car telephone or the wireless transmitter.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

S: DTC C0109 POWER VOLTAGE MALFUNCTION

DTC DETECTING CONDITION:

Power voltage of the ABSCM&H/U is too low or too high.

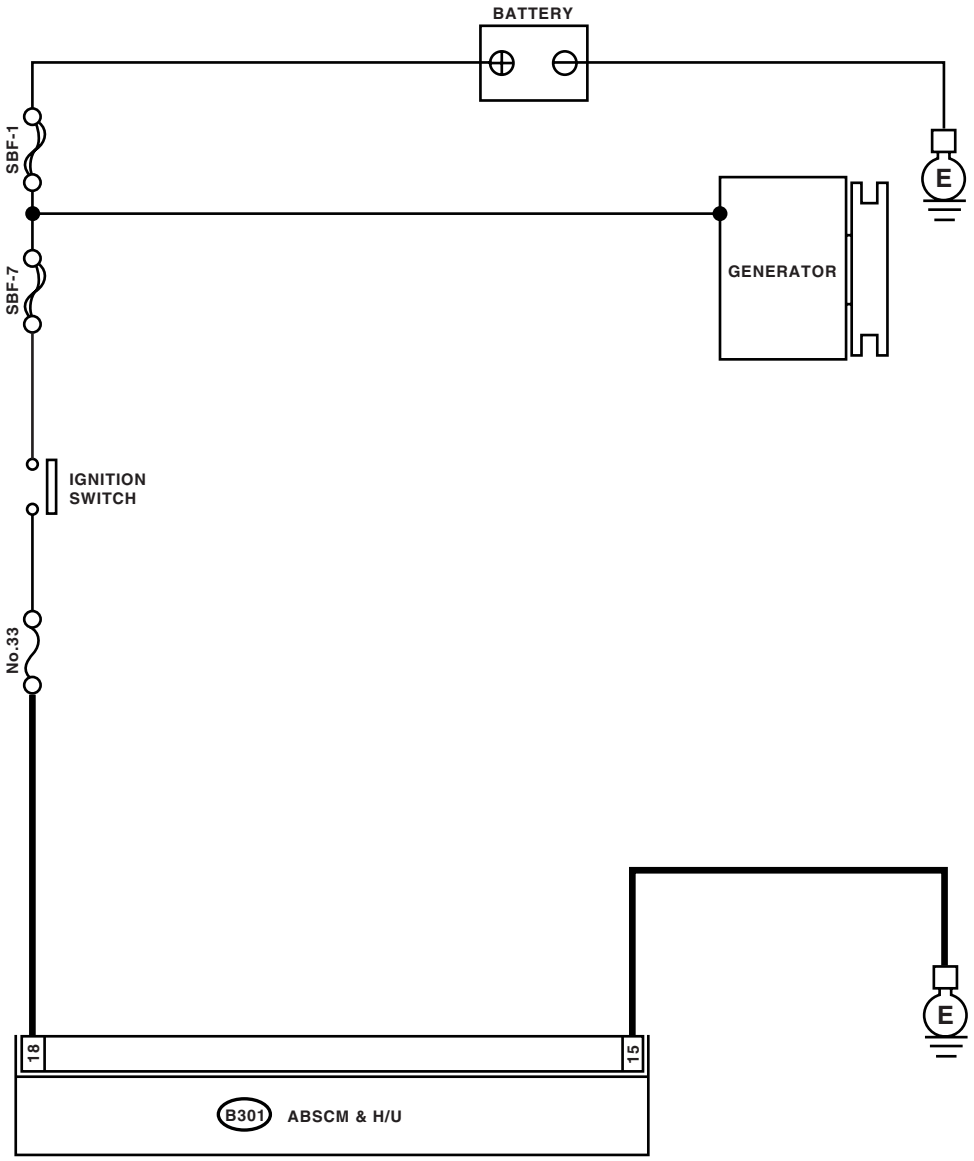
TROUBLE SYMPTOM:

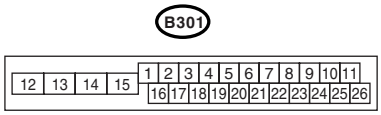
- ABS does not operate.
- EBD may not operate.

NOTE:

If EBD does not operate, brake warning light comes on as well as ABS warning light. Both warning lights go off if voltage returns.

WIRING DIAGRAM:





ABS00414

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the generator.
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals clamped tightly?	Go to step **3.**	Tighten the terminal.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Disconnect the connector from ABSCM&H/U. 2) Run the engine at idle. 3) Operate the devices such as headlights, air conditioner, defogger, etc. which produce much electrical loading. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the ABSCM&H/U power circuit.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

T: DTC C0140 CAN COMMUNICATION MALFUNCTION

DTC DETECTING CONDITION:

Defective CAN communication

TROUBLE SYMPTOM:

Possibly the vehicle speed cannot output on CAN.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Repair it according to DTC of LAN system.	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

U: DTC C0114 VALVE RELAY MALFUNCTION

DTC DETECTING CONDITION:

Defective valve relay

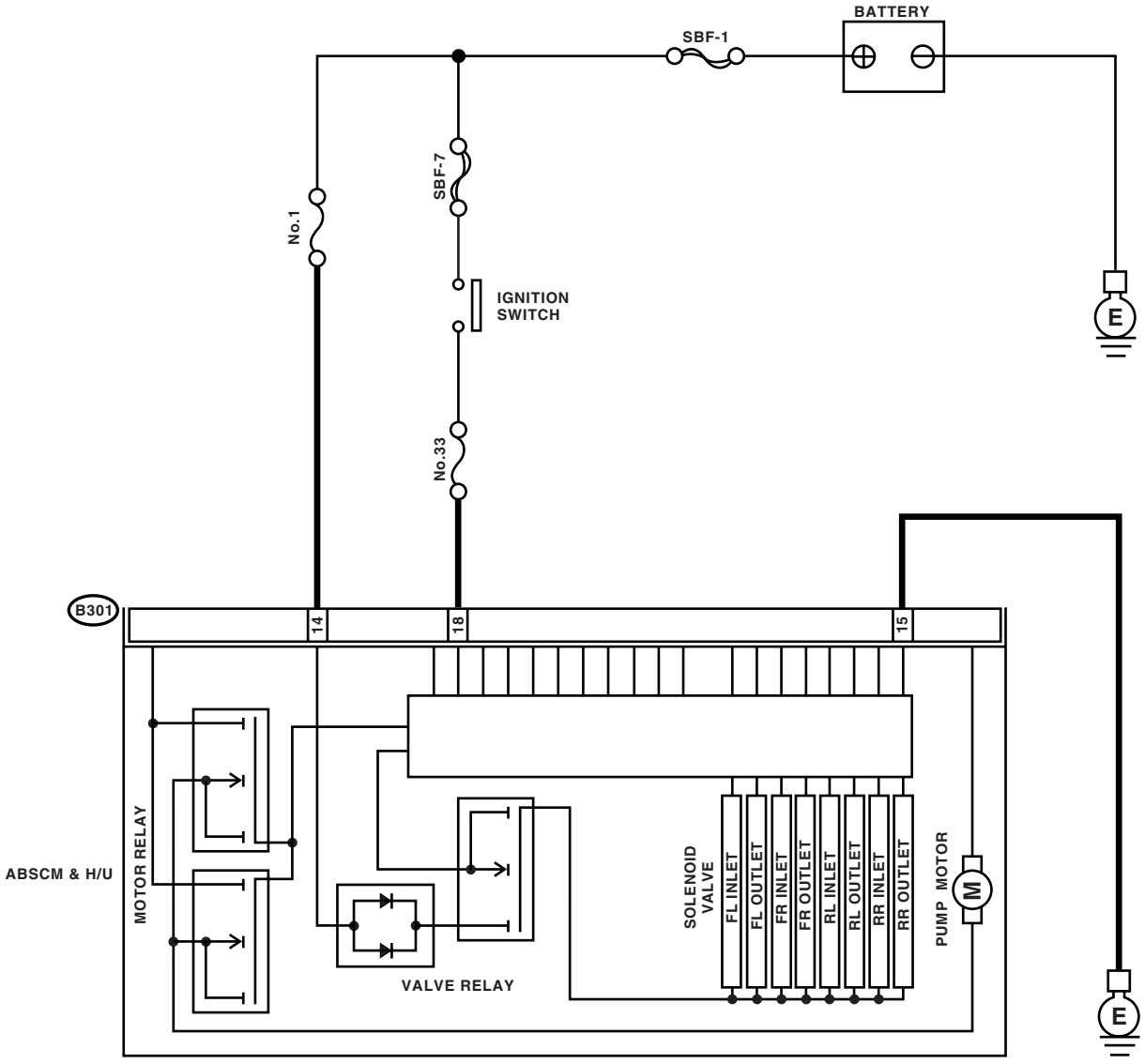
TROUBLE SYMPTOM:

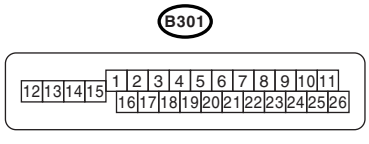
- ABS does not operate.
- EBD does not operate depending on the trouble contents.

NOTE:

Brake warning light comes on as well as ABS warning light when EBD does not operate.

WIRING DIAGRAM:





ABS00416

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (–):*** ***(B301) No. 14 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK VALVE RELAY IN ABSCM&H/U.** Measure the resistance between ABSCM&H/U terminals. ***Terminals*** ***No. 14 — No. 15:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
4	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **5.**
5	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **6.**
6	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

V: DTC C0111 MOTOR/MOTOR RELAY MALFUNCTION

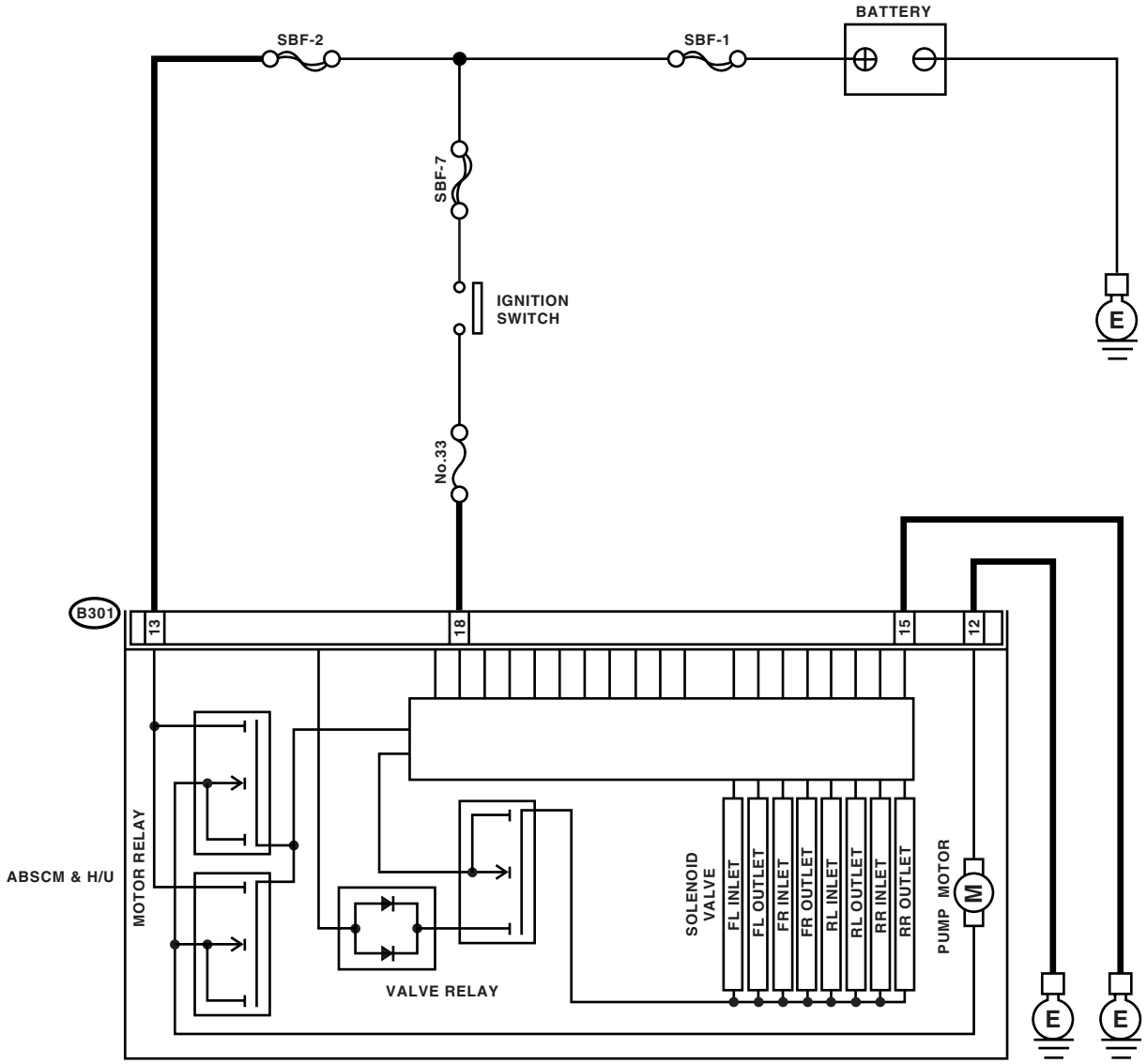
DTC DETECTING CONDITION:

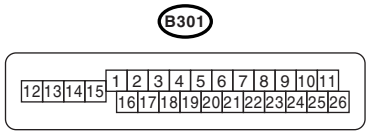
- Defective motor
- Defective motor relay
- Defective harness connector

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:





ABS00417

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 13 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and ABSCM&H/U.
2	**CHECK GROUND CIRCUIT OF MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 12 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ABSCM&H/U ground harness.
3	**CHECK INPUT VOLTAGE OF ABSCM&H/U.** 1) Run the engine at idle. 2) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 18 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the harness connector between battery, ignition switch and ABSCM&H/U.
4	**CHECK GROUND CIRCUIT OF ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 15 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the ABSCM&H/U ground harness.
5	**CHECK MOTOR OPERATION.** Operate the ABS sequence control. <Ref. to ABS-10, ABS Sequence Control.> NOTE: Use the diagnosis connector to operate the ABS sequence control.	Can the motor revolution noise (buzz) be heard when carrying out the ABS sequence control?	Go to step **6.**	Replace ABSCM&H/U. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>
6	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and ABSCM&H/U?	Repair the connector.	Go to step **7.**
7	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace ABSCM&H/U. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **8.**

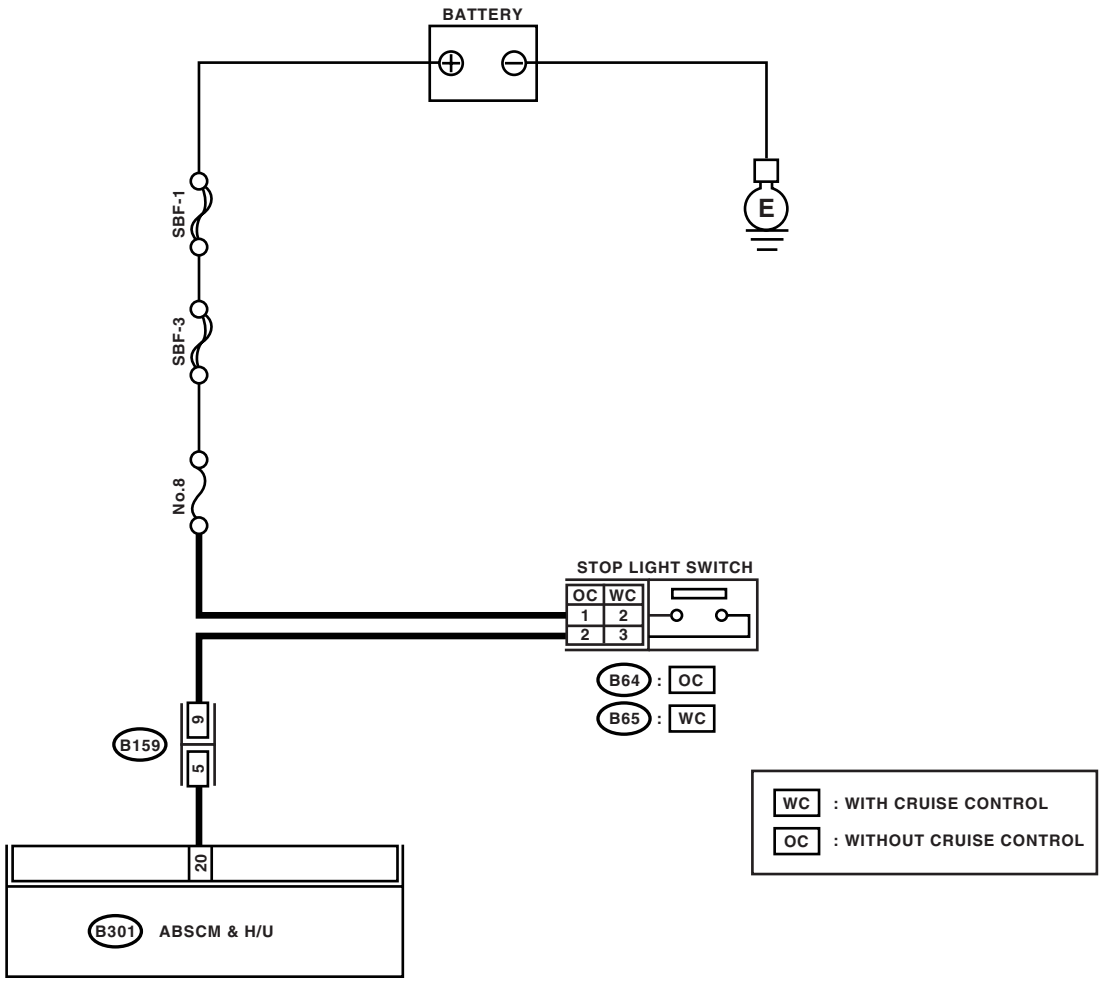
Step		Check	Yes	No
8	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs. NOTE: Though ABS warning light remains to illuminate at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to make ABS warning light go off. Be sure to drive the vehicle and check the warning light goes off.

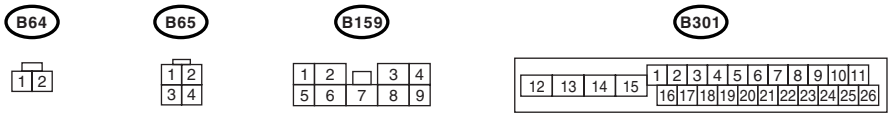
W: DTC C0116 FAULTY STOP LIGHT SWITCH

DTC DETECTING CONDITION:

Defective stop light switch

WIRING DIAGRAM:





ABS00462

	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Release the brake pedal. 3) Read the stop light switch signal in Subaru Select Monitor.	Is "OFF" displayed on the display?	Go to step **2.**	Go to step **3.**
2	**CHECK OUTPUT OF STOP LIGHT SWITCH USING SUBARU SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the stop light switch output in Subaru Select Monitor.	Is "ON" displayed on the display?	Go to step **5.**	Go to step **3.**
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Does the stop light illuminate?	Go to step **4.**	Repair the stop lights circuit.
4	**CHECK OPEN CIRCUIT IN HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Depress the brake pedal. 4) Measure the voltage between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 20 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **5.**	Repair harness between stop light switch and ABSCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between stop light switch and ABSCM&H/U?	Go to step **6.**	Repair the connector.
6	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using "List of Diagnostic Trouble Code (DTC)". <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

X: DTC C0118 G SENSOR OUTPUT VOLTAGE MALFUNCTION

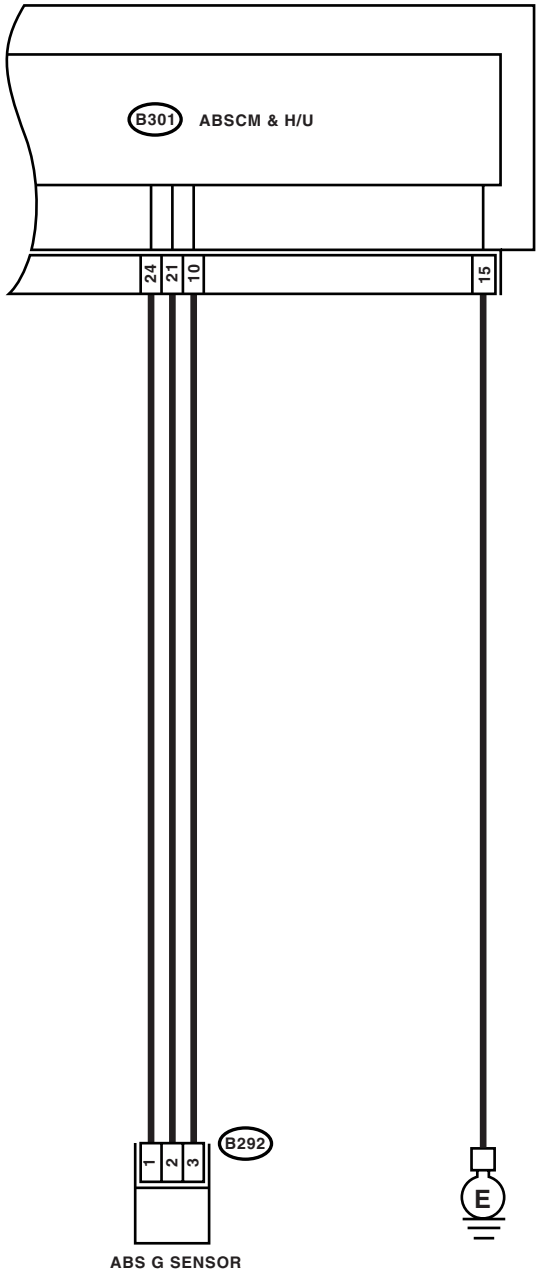
DTC DETECTING CONDITION:

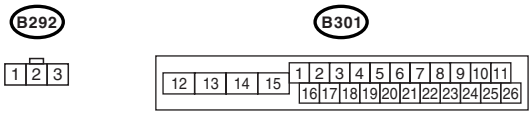
Defective G sensor

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:





ABS00419

	Step	Check	Yes	No
1	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the G sensor output on Subaru Select Monitor.	Is the reading indicated on display –1.2 — 1.2 m/s when G sensor is horizontal?	Go to step **2.**	Go to step **5.**
2	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **3.**
3	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **4.**
4	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
5	**CHECK INPUT VOLTAGE OF G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 1 (+) — No. 3 (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **6.**	Repair the harness connector between G sensor and ABSCM&H/U.
6	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(B301) No. 21 — No. 10:***	Is the resistance 1.8 — 2.4 kΩ?	Go to step **7.**	Repair the harness connector between G sensor and ABSCM&H/U.
7	**CHECK GROUND SHORT IN G SENSOR OUTPUT HARNESS.** 1) Disconnect the connector from G sensor. 2) Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness between G sensor and ABSCM&H/U.
8	**CHECK G SENSOR.** 1) Connect the connector to G sensor. 2) Connect the connector to ABSCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when G sensor is on a level?	Go to step **9.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>

	Step	Check	Yes	No
9	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.6 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **10.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
10	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 1.0 V when G sensor is inclined backward to 90°?	Go to step **11.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
11	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **12.**
12	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **13.**
13	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

Y: DTC C0119 G SENSOR OUTPUT VOLTAGE MALFUNCTION

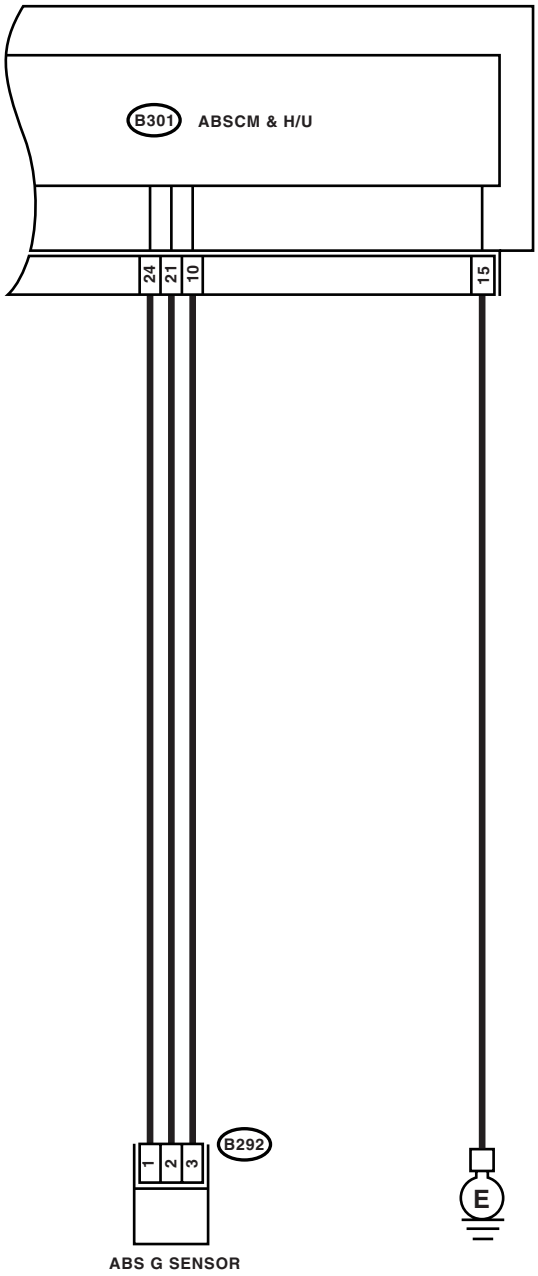
DTC DETECTING CONDITION:

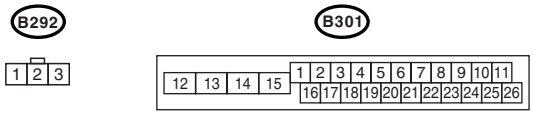
Defective G sensor output signal

TROUBLE SYMPTOM:

ABS does not operate.

WIRING DIAGRAM:





ABS00419

	Step	Check	Yes	No
1	**WHETHER A WHEEL TURNED FREELY OR NOT.**	Have the wheels been turned freely when the vehicle is lifted up or drove on a rolling road?	ABS is normal. Erase the memory.	Go to step **2.**
2	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the Subaru Select Monitor display.	Is the reading indicated on display −1.2 — 1.2 m/s when G sensor is on a level?	Go to step **3.**	Go to step **8.**
3	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Remove the console box. 3) Remove the G sensor from vehicle. (Do not disconnect connector.) 4) Turn the ignition switch to ON. 5) Select {Current Data Display & Save} in Subaru Select Monitor. 6) Read the Subaru Select Monitor display.	Is the reading indicated on display 8.1 — 11.2 m/s when G sensor is inclined forward to 90°?	Go to step **4.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
4	**CHECK OUTPUT OF G SENSOR USING SUBARU SELECT MONITOR.** Read the Subaru Select Monitor display.	Is the reading indicated on display −8.1 — −11.2 m/s when G sensor is inclined backward to 90°?	Go to step **5.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
5	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connector between ABSCM&H/U and G sensor?	Repair the connector.	Go to step **6.**
6	**CHECK ABSCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **7.**
7	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.
8	**CHECK OPEN CIRCUIT IN G SENSOR OUTPUT HARNESS AND GROUND HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM&H/U. 3) Measure the resistance between ABSCM&H/U connector terminals. ***Connector & terminal*** ***(B301) No. 21 — No. 10:***	Is the resistance 1.8 — 2.4 kΩ?	Go to step **9.**	Repair the harness connector between G sensor and ABSCM&H/U.
9	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between ABSCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B301) No. 21 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the harness connector between G sensor and ABSCM&H/U.

	Step	Check	Yes	No
10	**CHECK G SENSOR.** 1) Remove the console box. 2) Remove the G sensor from vehicle. 3) Connect the connector to G sensor. 4) Connect the connector to ABSCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 2.1 — 2.5 V when G sensor is on a level?	Go to step **11.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
11	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 3.6 — 4.1 V when G sensor is inclined forwards to 90°?	Go to step **12.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
12	**CHECK G SENSOR.** Measure the voltage between G sensor connector terminals. ***Connector & terminal*** ***(B292) No. 2 (+) — No. 3 (–):***	Is the voltage 0.5 — 1.0 V when G sensor is inclined backward to 90°?	Go to step **13.**	Replace G sensor. <Ref. to ABS-18, G Sensor.>
13	**CHECK ABSCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the ABSCM only. <Ref. to ABS-8, REPLACEMENT, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>	Go to step **14.**
14	**CHECK ANY OTHER DTC ON DISPLAY.**	Is any other DTC displayed?	Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. <Ref. to ABS(diag)-39, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

13.General Diagnostic Table

A: INSPECTION

Symptom		Problem parts
Vehicle instability during braking	Vehicle is pulled to either right or left side.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper, piston and pads) • Wheel Alignment • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven, camber)
	Vehicle spins.	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
Poor brake performance	Long braking/stopping distance	• ABSCM&H/U (solenoid valve) • Brake (pads) • Air in brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections
	Wheel locks.	• ABSCM&H/U (solenoid valve, motor) • ABS wheel speed sensor • Incorrect wiring or piping connections
	Brake drag	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Master cylinder • Brake (caliper and piston) • Parking Brake • Axle and wheels • Brake pedal play
	Long brake pedal stroke	• Air in brake line • Brake pedal play
	Vehicle vertical pitching	• Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections • Road surface (uneven)
	Unstable or uneven braking	• ABSCM&H/U (solenoid valve) • ABS wheel speed sensor • Brake (caliper, piston and pads) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Road surface (uneven)
Vibration and/or noise (while driving on slippery roads)	Excessive pedal vibration	• Incorrect wiring or piping connections • Road surface (uneven)
	Noise from ABSCM&H/U	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Brake line
	Noise from front of vehicle	• ABSCM&H/U (mount bushing) • ABS wheel speed sensor • Master cylinder • Brake (caliper, piston, pads and rotor) • Brake line • Brake booster and check valve • Suspension play or fatigue
	Noise from rear of vehicle	• ABS wheel speed sensor • Brake (caliper, piston, pads and rotor) • Parking Brake • Brake line • Suspension play or fatigue

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

VEHICLE DYNAMICS CONTROL (VDC)

VDC

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10.	Rear Magnetic Encoder	21
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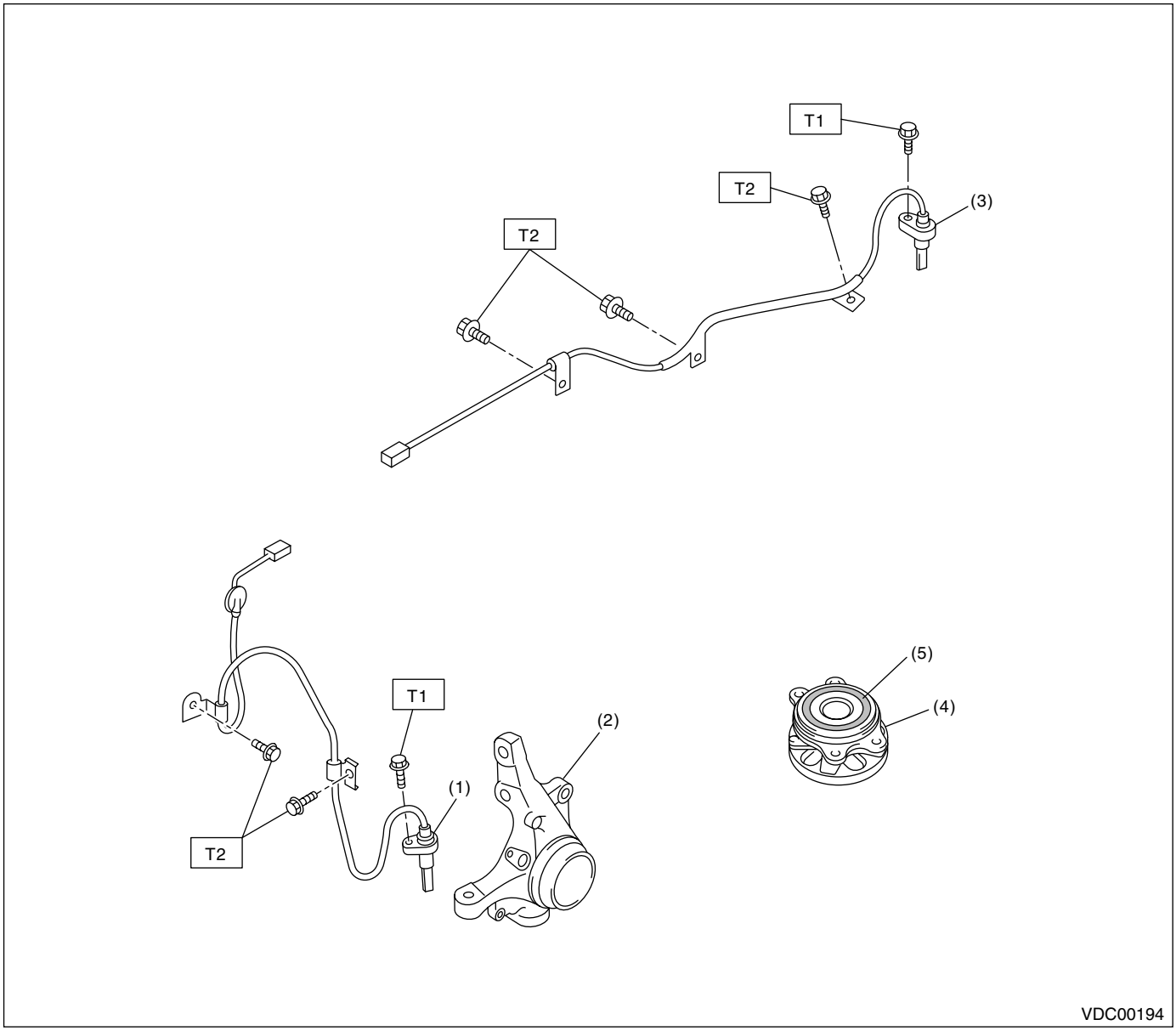
1. General Description

A: SPECIFICATION

Item				Standard values or identification
ABS wheel speed sensor	ABS wheel speed sensor gap (for reference)	Front		0.77 — 1.43 mm (0.030 — 0.056 in)
		Rear		0.64 — 1.56 mm (0.025 — 0.061 in)
	Marks of harness (Marks, Color)	Front	RH	K1 (White)
			LH	K2 (Yellow)
		Rear	RH	K5 (White)
			LH	K6 (Yellow)
Yaw rate & lateral G sensor	Lateral G sensor voltage			2.5±0.2 V
Marks of VDCCM&H/U		Wagon 2.5 i		G3
		Sedan 2.5 i		G9
		Wagon 3.0 R		G4
		Sedan 3.0 R		GA
		OUTBACK 3.0 R		G2

B: COMPONENT

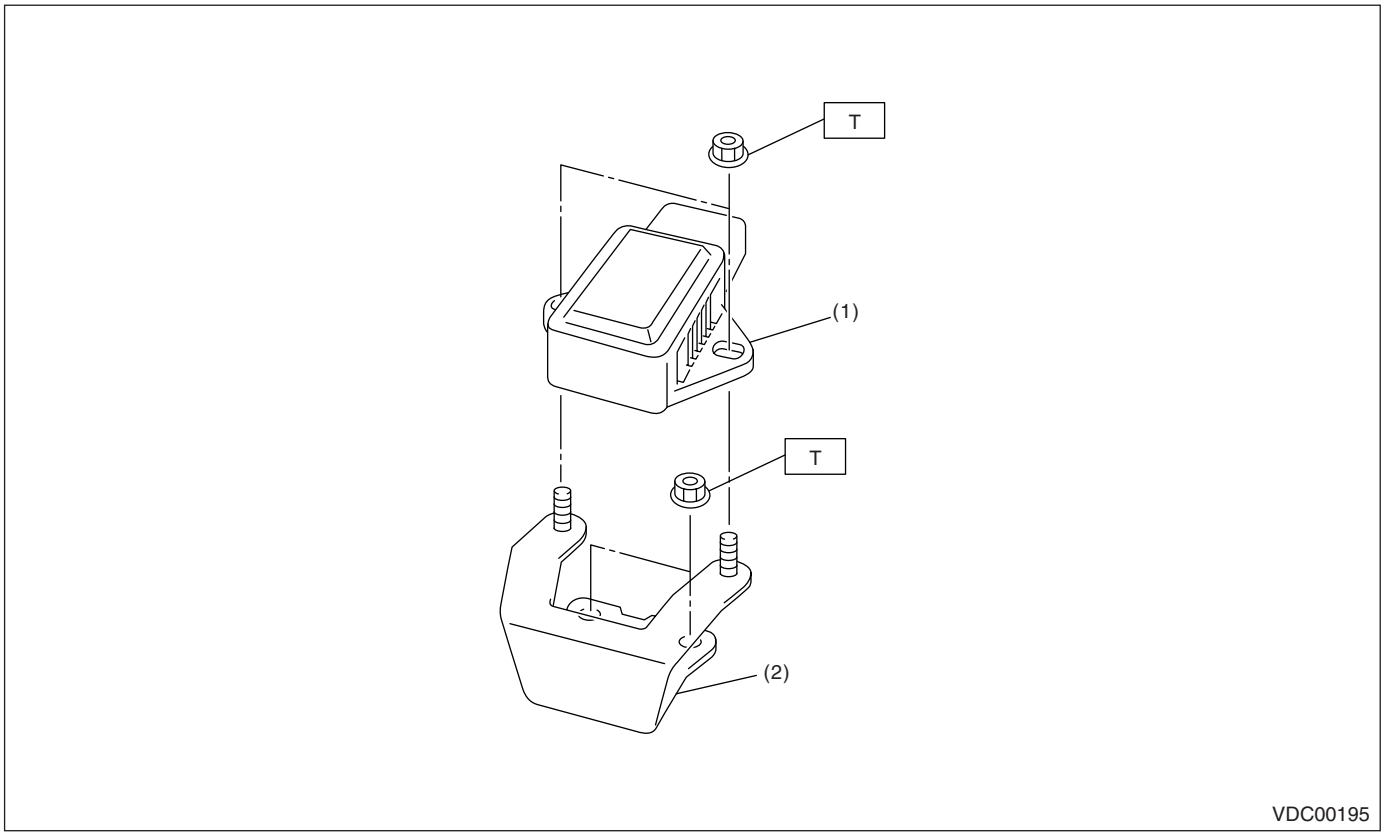
1. ABS WHEEL SPEED SENSOR



(1) Front ABS wheel speed sensor
(2) Front housing
(3) Rear ABS wheel speed sensor
(4) Hub unit bearing
(5) Magnetic encoder

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 33 (3.4, 24)

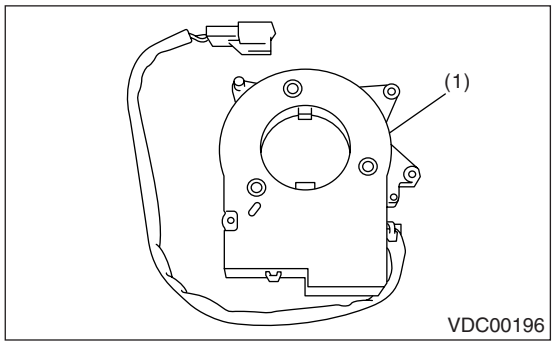
2. YAW RATE & LATERAL G SENSOR



(1) Yaw rate & lateral G sensor (2) Bracket

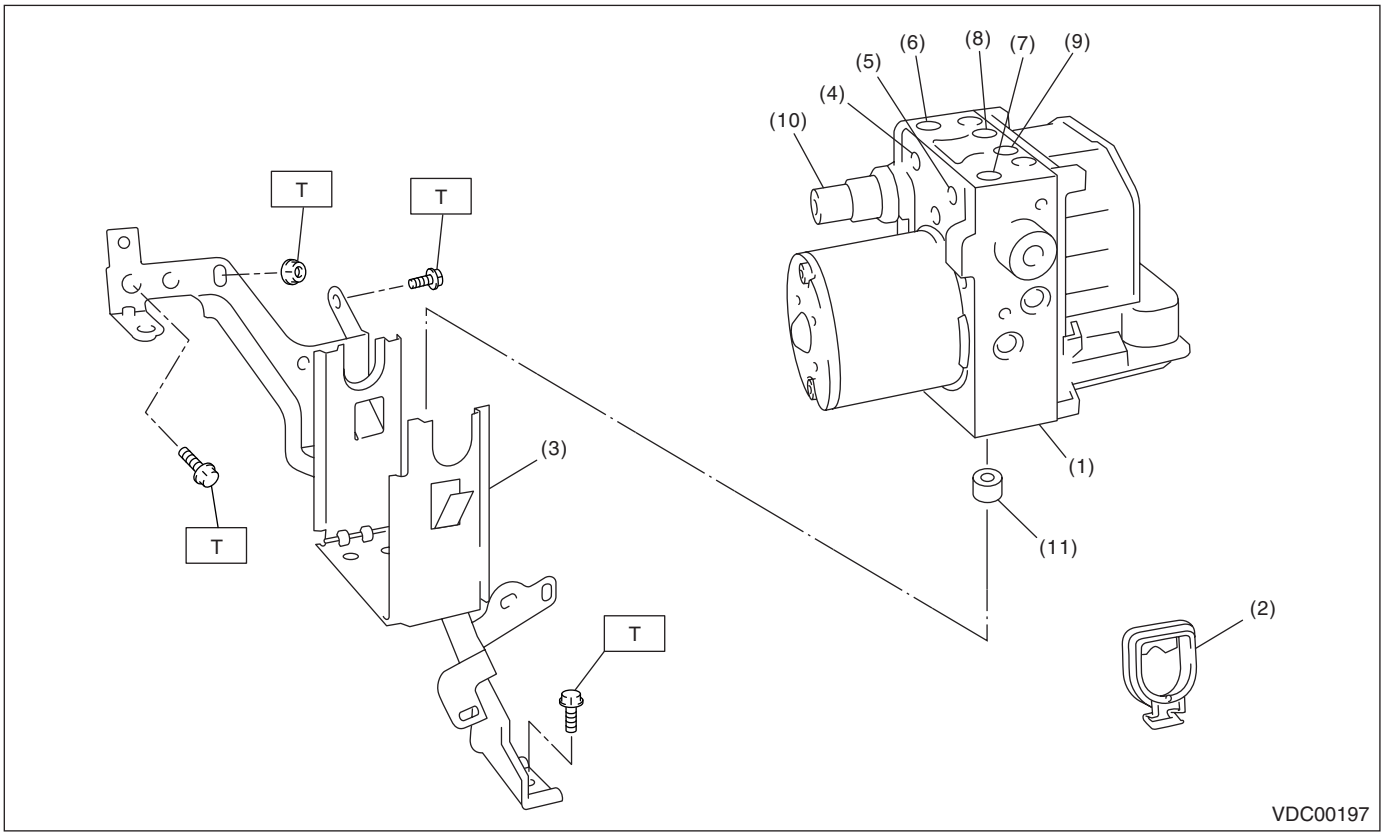
Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

3. STEERING ANGLE SENSOR



(1) Steering angle sensor

4. VDC CONTROL MODULE & HYDRAULIC CONTROL UNIT (VDCCM&H/U)



(1) VDC control module and hydraulic control unit (VDCCM&H/U)
(2) Clip
(3) Bracket
(4) Rear RH outlet
(5) Rear LH outlet
(6) Secondary inlet
(7) Primary inlet
(8) Front LH outlet
(9) Front RH outlet
(10) Pressure sensor
(11) Damper

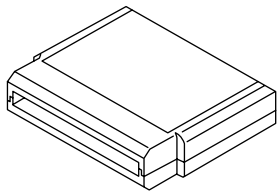
Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 24)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Remove contamination including dirt and corrosion before removal, installation or disassembly.
• Keep the disassembled parts in order and protect them from dust and dirt.
• Before disconnecting electrical connectors of sensors or units, be sure to disconnect the ground cable from battery.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.
Pressure gauge	Used for measuring oil pressure.
Oscilloscope	Used for measuring sensor.

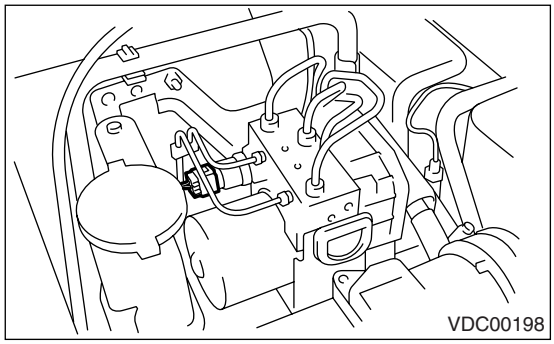
2. VDC Control Module & Hydraulic Control Unit (VDCCM&H/U)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Use compressed air to get rid of water and dust around the VDCCM&H/U.

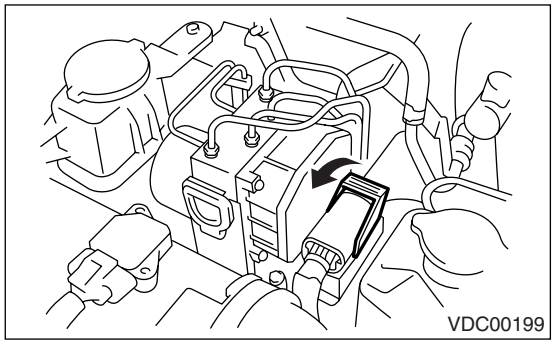
NOTE:
When dust and dirt are attached to the terminal, they may cause poor contact.

3) Disconnect the pressure sensor connector.


VDC00198

4) Disconnect the VDCCM&H/U connector with pulling up the lock lever.

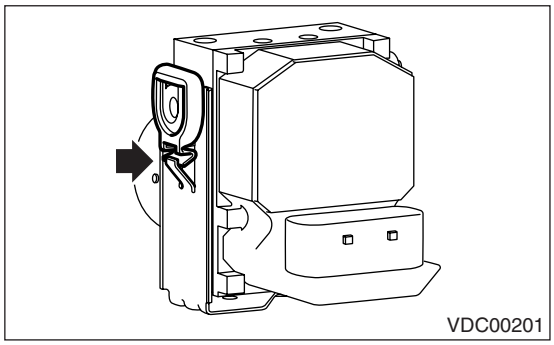
CAUTION:
Do not pull the harness when disconnecting connector.


VDC00199

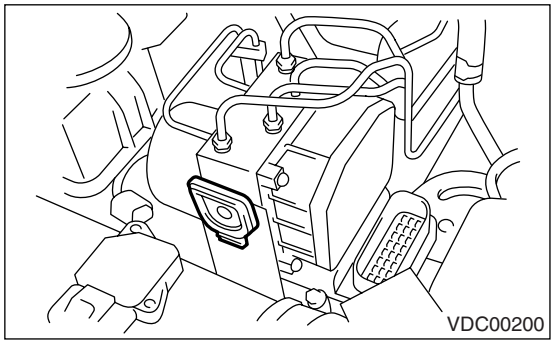
5) Disconnect the brake pipes from VDCCM&H/U.
6) Wrap the brake pipe using a vinyl bag not to spill the brake fluid on the vehicle body.

CAUTION:
When the brake fluid is attached to vehicle body, wash it off with water and wipe the water.

7) Remove the clips, and then remove the VDCCM&H/U.


VDC00201

CAUTION:
• VDCCM&H/U cannot be disassembled. Do not attempt to loosen the bolts and nuts.
• Do not drop or bump the VDCCM&H/U.
• Do not turn VDCCM&H/U upside down or place it sideways for storage.
• Be careful that no foreign objects are mixed in VDCCM&H/U.
• Be careful that no water enters connectors.


VDC00200

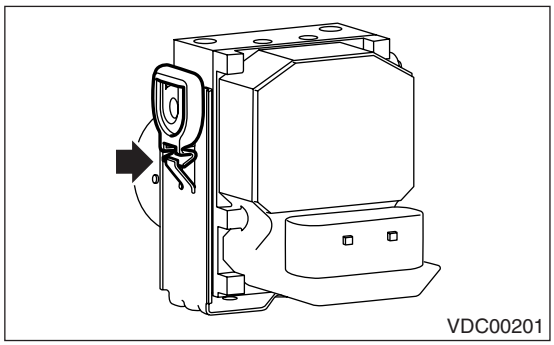
8) Remove the VDCCM&H/U bracket.

B: INSTALLATION

1) Install the VDCCM&H/U bracket.

Tightening torque:
33 N·m (3.3 kgf-m, 24 ft-lb)

2) Install the VDCCM&H/U to bracket.
3) Install the clip.


VDC00201

NOTE:
Hook the clip on the pawl of bracket securely.

4) Connect the brake pipes to their specified VDCCM&H/U positions.

Tightening torque:
15 N·m (1.5 kgf-m, 11.1 ft-lb)

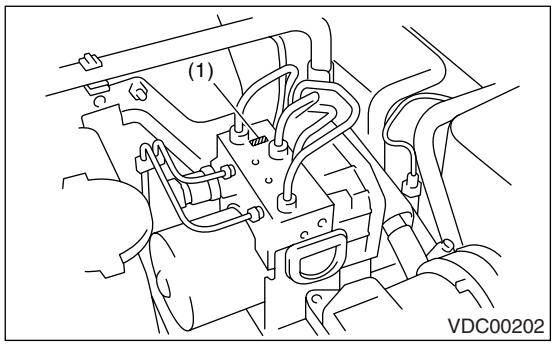
5) Connect the connector to VDCCM&H/U.

NOTE:
• Be sure to remove all foreign matters from inside the connector before connecting.
• Ensure that the VDCCM&H/U connector is securely locked.

6) Connect the pressure sensor connector.
7) Bleed air from the brake system.

C: INSPECTION

1) Check the connected and fixed condition of connector.
2) Check the mark used for VDCCM&H/U identification.
Refer to "SPECIFICATION" for mark. <Ref. to VDC-2, SPECIFICATION, General Description.>



(1) Mark

1. CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE

<Ref. to ABS-7, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

2. CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER

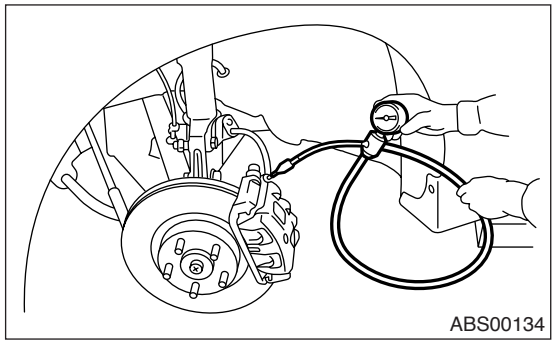
<Ref. to ABS-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).>

3. CHECKING THE HYDRAULIC UNIT VDC OPERATION BY PRESSURE GAUGE

1) Lift-up the vehicle, and then remove the wheels.
2) Remove the air bleeder screws from the FL and FR caliper bodies.
3) Connect two pressure gauges to the FL and FR caliper bodies.

CAUTION:
• Pressure gauges used exclusively for brake fluid must be used.
• Do not use the pressure gauge for the measurement of transmission oil pressure since the piston seal may be expanded and deformed.

NOTE:
Wrap a sealing tape around the pressure gauge.



4) Bleed air from the pressure gauges.
5) Perform VDC sequence control.
<Ref. to VDC-11, VDC Sequence Control.>
6) When the hydraulic unit begins to work, first the FL side performs compression, holding, and decompression, and then the FR side performs compression, holding, and decompression.
7) Read values indicated on the pressure gauge and check if the fluctuation of the values between decompression and compression meets the standard values. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

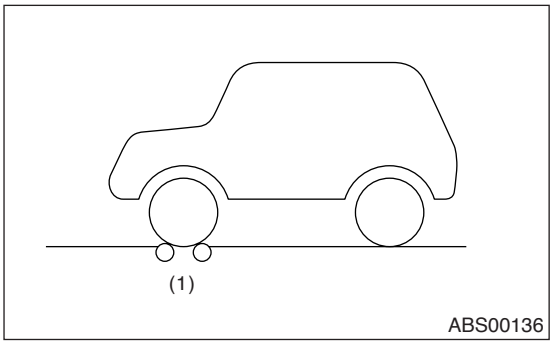
	Front wheel	Rear wheel
When compressed	3,000 kPa (31 kgf/cm^2, 441 psi) or more	2,000 kPa (20 kgf/cm^2, 284 psi) or more
When decompressed	500 kPa (5 kgf/cm^2, 73 psi) or less	500 kPa (5 kgf/cm^2, 73 psi) or less

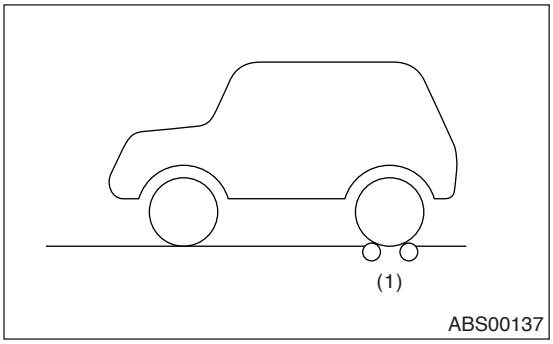
8) Disconnect the pressure gauges from FL and FR caliper bodies.
9) Install the air bleeder screws of FL and FR caliper bodies.
10) Remove the air bleeder screws from the RL and RR caliper bodies.
11) Connect two pressure gauges to the RL and RR caliper bodies.
12) Bleed air from the pressure gauges and the RL and RR caliper bodies.
13) Perform VDC sequence control.
<Ref. to VDC-11, VDC Sequence Control.>

14) When the hydraulic unit begins to work, first the RR side performs compression, holding, and decompression, and then the RL side performs compression, holding, and decompression.
15) Read the values indicated on the pressure gauges and check it within specified. Depress the brake pedal and check that it is not abnormally hard, and tightness is normal.
16) Disconnect the pressure gauge from the RL and RR caliper bodies.
17) Install the air bleeder screws of RL and RR caliper bodies.
18) Bleed air from the brake line.

4. CHECK HYDRAULIC UNIT VDC OPERATION WITH BRAKE TESTER

1) Set the wheels other than the measured one on free rollers.
2) Prepare for operating the VDC sequence control.
<Ref. to VDC-11, VDC Sequence Control.>
3) Set the front wheels or rear wheels on the brake tester and set the select lever position to “N” range.





(1) Brake tester

4) Operate the brake tester.
5) Perform VDC sequence control.
<Ref. to VDC-11, VDC Sequence Control.>
6) When the hydraulic unit begins to work; check the following working sequence.
(1) The FL wheel performs compression, holding and decompression in sequence, and subsequently the FR wheel repeats the cycle.
(2) The RR wheel performs compression, holding and decompression in sequence, and subsequently the RL wheel repeats the cycle.
7) Read values indicated on the brake tester and check if the fluctuation of the values between decompression and compression meets the standard values.

	Front wheel	Rear wheel
When compressed	2,000 N (203 kgf, 447 lb) or more	1,000 N (102 kgf, 225 lb) or more
When decompressed	500 N (51 kgf, 112 lb) or less	500 N (51 kgf, 112 lb) or less

8) After the inspection, depress the brake pedal and check that it is not abnormally hard, and tightness is normal.

D: ADJUSTMENT

When the following replacement, removal and installation is performed, be sure to perform the centering setting of steering angle sensor and zero point setting of yaw rate & lateral G sensor.
- VDCCM&H/U
- Steering angle sensor
- Yaw rate & lateral G sensor
- Steering wheel parts (Including airbag)
- Suspension parts
- Wheel alignment adjustment

1) Park the vehicle straight on a level surface. (Engine operation on “P” or “N” range)
2) Check that steering wheels are positioned in center. (When the center position is not correct, adjust the wheel alignment.)
3) Set the Subaru Select Monitor to vehicle, select the {Set up mode for Neutral of Steering Angle Sensor & Lateral G Sensor 0 point} on «Function check sequence» display. (Follow the step on display.)
4) On the «Brake Control System» display screen, select the {Current Data Display & Save}, and check that the steering angle sensor is displayed “0 deg”.
5) When the “0 deg” is not displayed, repeat the above steps and check that the “0 deg” is displayed.
6) Drive the vehicle for 10 minutes, and check that the ABS and VDC warning light is not illuminated.
7) Check that the unnecessary operation of VDC, or losing control of steering is not occurred. And when the malfunction occurred, repeat the above steps.

3. ABS Sequence Control

A: OPERATION

<Ref. to ABS-10, OPERATION, ABS Sequence Control.>

1. ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

<Ref. to ABS-10, ABS SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR, OPERATION, ABS Sequence Control.>

2. ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

<Ref. to ABS-10, ABS SEQUENCE CONTROL WITH SUBARU SELECT MONITOR, OPERATION, ABS Sequence Control.>

3. CONDITIONS FOR ABS SEQUENCE CONTROL

<Ref. to ABS-11, CONDITIONS FOR ABS SEQUENCE CONTROL, OPERATION, ABS Sequence Control.>

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL

<Ref. to ABS-12, CONDITIONS FOR COMPLETION OF ABS SEQUENCE CONTROL, SPECIFICATION, ABS Sequence Control.>

4. VDC Sequence Control

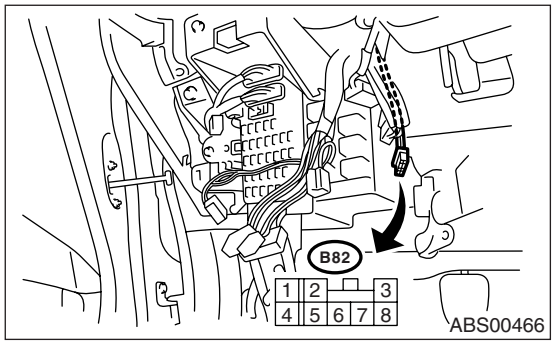
A: OPERATION

1) While the VDC sequence control is performed, the operation of the hydraulic unit can be checked using the brake tester or pressure gauge after the hydraulic unit solenoid valve is operated.
2) VDC sequence control can be started by diagnosis connector or Subaru Select Monitor.

1. VDC SEQUENCE CONTROL WITH DIAGNOSIS CONNECTOR

NOTE:
In the event of any trouble, the VDC sequence control is not operated.

1) Turn the ignition switch to OFF at the vehicle stationary mode.
2) Take out the diagnosis connector from the inside of instrument panel lower cover on the driver's side and connect one of the ground terminals to connector terminal No. 8.



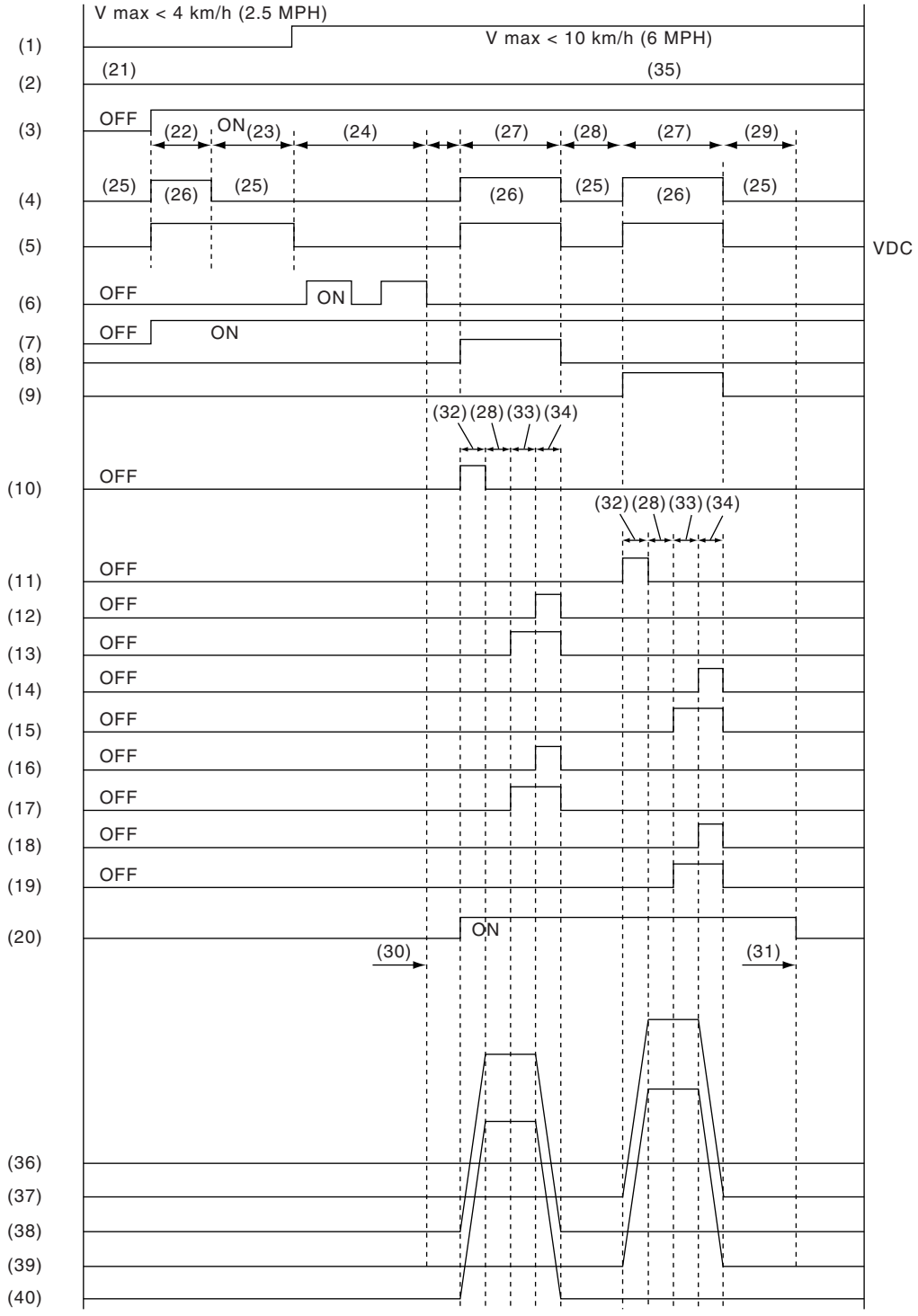
3) Turn the ignition switch to ON and start the engine immediately without pressing the brake pedal.
4) After VDC warning light goes out and starting the engine, perform the brake pedal operation as follows; depress it within 3 seconds, → release it, → depress it again, → release it again.
5) After completion of VDC sequence control, turn the ignition switch to OFF.

2. VDC SEQUENCE CONTROL WITH SUBARU SELECT MONITOR

NOTE:
In the event of any trouble, the sequence control may not be operative.

1) Connect the Subaru Select Monitor to data link connector under the driver's side instrument panel lower cover.
2) Turn the ignition switch to ON.
3) Set the Subaru Select Monitor switch to ON.
4) Set the Subaru Select Monitor to the "Brake Control" mode.
5) When the "VDC Inspection Mode" is selected from the "Function check sequence" menu, the "VDC sequence control" will start.
6) Since "Press the [YES] key" is displayed, press the YES key.
7) Operation points will be displayed on the Subaru Select Monitor.

3. CONDITIONS FOR VDC SEQUENCE CONTROL



VDC00203

(1) All wheel speed
(2) DL terminal
(3) Ignition key
(4) ABS warning light
(5) VDC warning light
(6) Stop light switch
(7) Valve relay
(8) VDC switching valve 1 FL
(9) VDC switching valve 1 FR
(10) VDC switching valve 2 FL
(11) VDC switching valve 2 FR
(12) FL decompression valve
(13) FL compression valve
(14) FR decompression valve
(15) FR compression valve
(16) RR decompression valve
(17) RR compression valve
(18) RL decompression valve
(19) RL compression valve
(20) Pump motor
(21) Diagnosis connector and connection
(22) 1.5 sec.
(23) Approx. 3 sec.
(24) Within 3 sec.
(25) Light OFF
(26) Light ON
(27) 3.4 sec.
(28) 1 sec.
(29) 1.6 sec.
(30) Point A
(31) Reset
(32) 0.8 sec.
(33) 1.2 sec.
(34) 0.4 sec.
(35) When using the Subaru Select Monitor, both connection and non-connection of diagnosis connector are acceptable.
(36) Master cylinder pressure
(37) FR wheel cylinder pressure
(38) FL wheel cylinder pressure
(39) RL wheel cylinder pressure
(40) RR wheel cylinder pressure

NOTE:
When using the Subaru Select Monitor, the control operation starts from point A. The patterns from ignition key ON to the point A show that operation is started by diagnosis connector.

B: SPECIFICATION

1. CONDITIONS FOR COMPLETION OF VDC SEQUENCE CONTROL

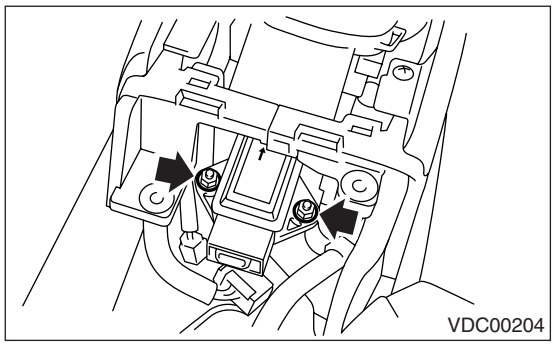
When the following conditions develop, the VDC sequence control stops and VDC operation is returned to the normal control mode.
1) When the speed of at least one wheel reaches 10 km/h (6 MPH).
2) When the diagnosis connector is disconnected. (Without Subaru Select Monitor)
3) When the brake pedal is pressed during sequence control and the stop light switch is set to ON.
4) When the brake pedal is pressed after the ignition key is turned to ON, and before VDC warning light goes out. (Without Subaru Select Monitor)
5) Turn the ignition key to ON and when 3 seconds or more have elapsed after the VDC warning light goes OFF.
6) After completion of VDC sequence control.
7) When malfunction is detected.

5. Yaw Rate & Lateral G Sensor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console box.
<Ref. to EI-53, Console Box.>
3) Disconnect the connector from the yaw rate & lateral G sensor.
4) Remove the yaw rate & lateral G sensor.

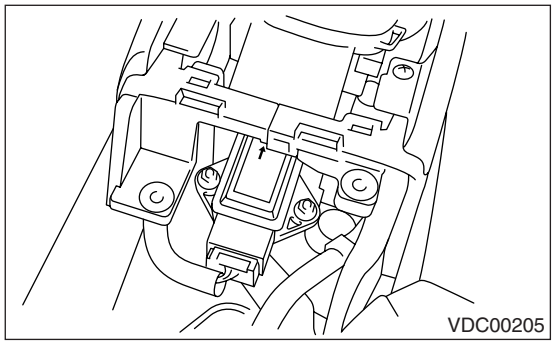
CAUTION:
Do not drop or bump the yaw rate & lateral G sensor.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Install the yaw rate & lateral G sensor to body with directing the arrow mark on sensors to vehicle front.



Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

CAUTION:
After completion of installation, set the following two positions.
• Positioning to the center of steering angle sensor
• Positioning of the yaw rate & lateral G sensor to zero
The above procedure is required VDCCM&H/U to identify the vehicle position afterward. For the setting procedure of step 2 above, refer to "VDC Control Module & Hydraulic Control Unit". <Ref. to VDC-9, ADJUSTMENT, VDC Control Module & Hydraulic Control Unit (VDC-CM&H/U).>

C: INSPECTION

1. YAW RATE & LATERAL G SENSOR SIGNAL

	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor connector to data link connector. 3) Turn the ignition switch to ON. 4) Set the Subaru Select Monitor connector to the {Brake Control} mode. 5) Select {Current Data Display & Save}. 6) Read the output voltage of yaw rate & lateral G sensor.	Are the indicated values when the vehicle is placed horizontally Lateral G sensor: −1.5 — 1.5 m/s Yaw rate sensor: −4 — 4 deg/s?	Go to step **2.**	Repair the harness connector between yaw rate & lateral G sensor and VDCCM&H/U. Or replace the yaw rate & lateral G sensor.
2	**CHECK LATERAL G SENSOR.** 1) Remove the console box. 2) Remove the yaw rate & lateral G sensor from vehicle. (Do not disconnect the connector.) 3) Read the display of Subaru Select Monitor. NOTE: When the yaw rate & lateral G sensor is moved with its power supply on, DTC of yaw rate & lateral G sensor may be recorded.	Is the value 6.8 — 12.8 m/s when the yaw rate & lateral G sensor are inclined rightward to 90°?	Go to step **3.**	Repair the harness connector between yaw rate & lateral G sensor and VDCCM&H/U. Or replace the yaw rate & lateral G sensor.
3	**CHECK LATERAL G SENSOR.** Read the display of Subaru Select Monitor. NOTE: When the yaw rate & lateral G sensor is moved with its power supply on, DTC of yaw rate & lateral G sensor may be recorded.	Is the value −6.8 — −12.8 m/s when the yaw rate & lateral G sensor are inclined leftward to 90°?	Yaw rate & lateral G sensor is normal.	Repair the harness connector between yaw rate & lateral G sensor and VDCCM&H/U. Or replace the yaw rate & lateral G sensor.

6. Steering Angle Sensor

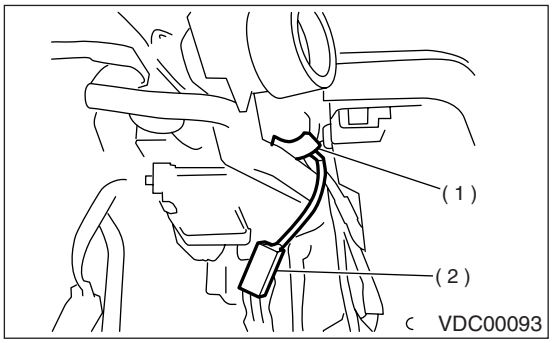
A: REPLACEMENT

CAUTION:
• Do not perform the removal except when the replacement.
• When replacing more than three times, replace the combination switch as assembly to protect screw part.

1) Set the steering wheel in a wheel-forward position.
2) Disconnect the ground cable from battery.
3) Remove the airbag module.
<Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

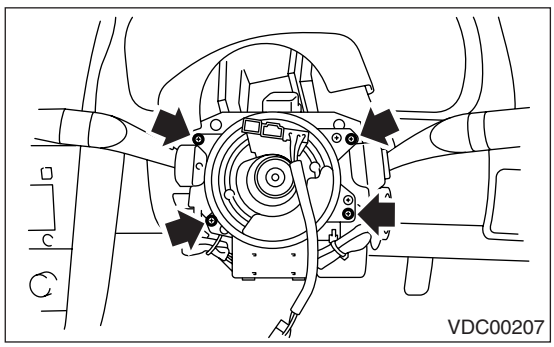
WARNING:
Always refer to "Airbag System" when performing the airbag module repair service.
<Ref. to AB-4, CAUTION, General Description.>

4) Remove the steering wheel.
<Ref. to PS-20, REMOVAL, Steering Wheel.>
5) Remove the screws and detach the steering column lower cover.
6) Remove the two screws securing the steering column upper cover.
7) Unlock the harness band and disconnect the connector of steering angle sensor.

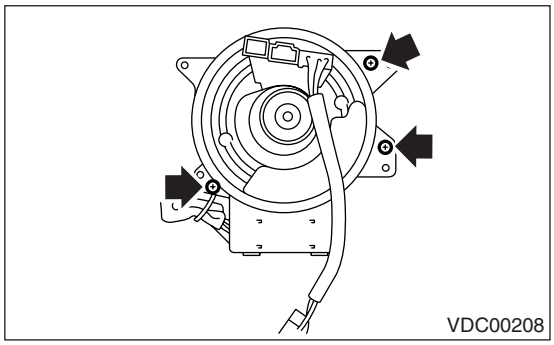


(1) Harness band
(2) Connector

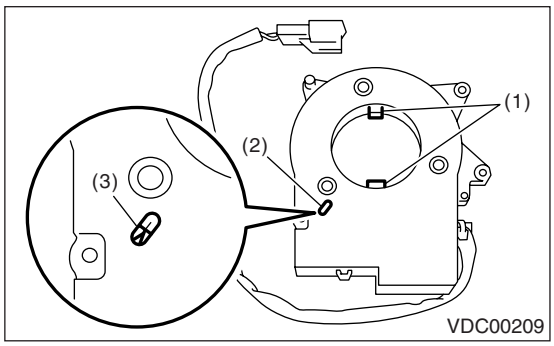
8) Remove the screws which secure the roll connector to steering column.



9) Remove the steering angle sensor from roll connector.



10) Turn the protrusion portion of new steering angle sensor to match the alignment mark of inspection hole.

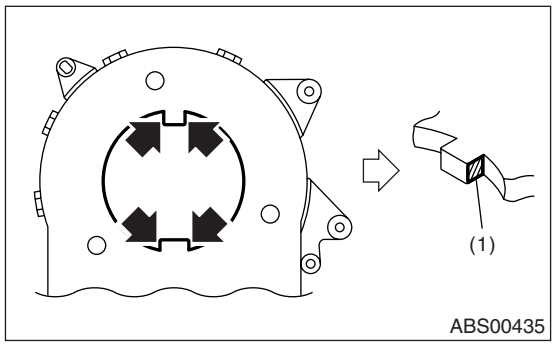


(1) Protrusion portion
(2) Inspection hole
(3) Alignment mark

CAUTION:
Be careful not to allow foreign particles to enter from inspection hole.

11) Align the center of roll connector.
<Ref. to AB-23, INSTALLATION, Roll Connector.>

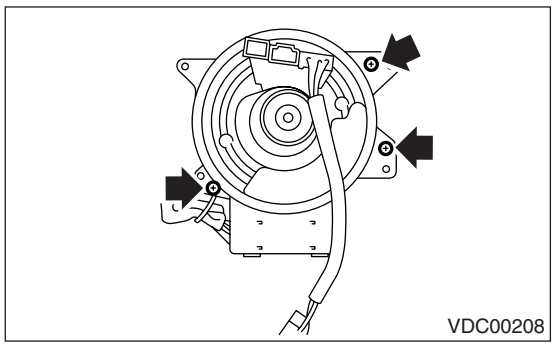
12) Apply thin coat of grease which is enclosed with new part to the protruding parts (four) of steering angle sensor.



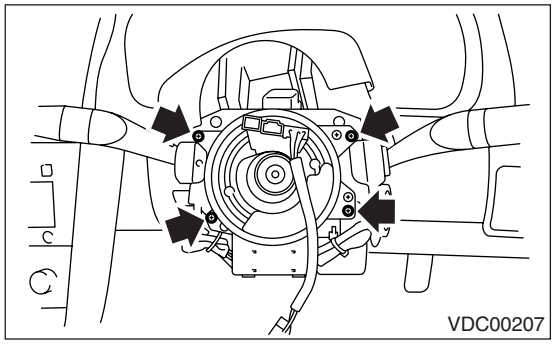
(1) Apply grease.

13) Align the position of protrusion portion and install the roll connector to the steering angle sensor.

Tightening torque:
0.5 N·m (0.05 kgf-m, 0.36 ft-lb)



14) Install the roll connector to combination switch.



15) Install the steering wheel.
<Ref. to PS-20, INSTALLATION, Steering Wheel.>

Tightening torque:
44 N·m (4.5 kgf-m, 32.5 ft-lb)

16) Install the airbag module to steering wheel.
<Ref. to AB-14, INSTALLATION, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing the service operation.
<Ref. to AB-4, CAUTION, General Description.>

17) Connect the battery ground cable to battery.

CAUTION:
After completion of installation, adjust the following two positions.
• Positioning to the center of steering angle sensor
• Positioning of the yaw rate & lateral G sensor to zero
The above procedure is required for VDCCM to identify the vehicle position afterward. For the setting procedure of step 2 above, refer to "VDC Control Module & Hydraulic Control Unit". <Ref. to VDC-9, ADJUSTMENT, VDC Control Module & Hydraulic Control Unit (VDC-CM&H/U).>

7. Front ABS Wheel Speed Sensor

A: NOTE

For the vehicle equipped with VDC, it has the same ABS wheel speed sensor as installed to the vehicle equipped with ABS. For removal, installation and inspection procedure, refer to ABS section.
<Ref. to ABS-13, Front ABS Wheel Speed Sensor.>

8. Rear ABS Wheel Speed Sensor

A: NOTE

For the vehicle equipped with VDC, it has the same ABS wheel speed sensor as installed to the vehicle equipped with ABS. For removal, installation and inspection procedure, refer to ABS section.
<Ref. to ABS-15, Rear ABS Wheel Speed Sensor.>

9. Front Magnetic Encoder

A: NOTE

For the vehicle equipped with VDC, it has the same magnetic encoder as installed to the vehicle equipped with ABS. For removal, installation and inspection procedure, refer to ABS section.
<Ref. to ABS-16, Front Magnetic Encoder.>

10.Rear Magnetic Encoder

A: NOTE

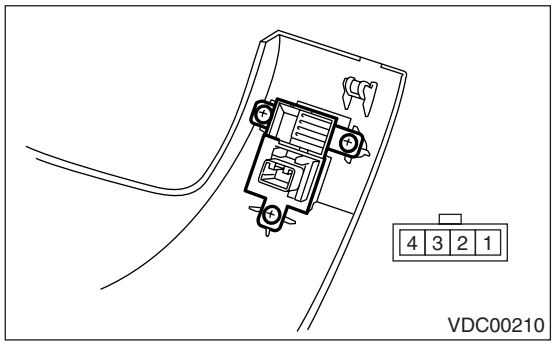
For the vehicle equipped with VDC, it has the same magnetic encoder as installed to the vehicle equipped with ABS. For removal, installation and inspection procedure, refer to ABS section.
<Ref. to ABS-17, Rear Magnetic Encoder.>

11.VDC OFF Switch

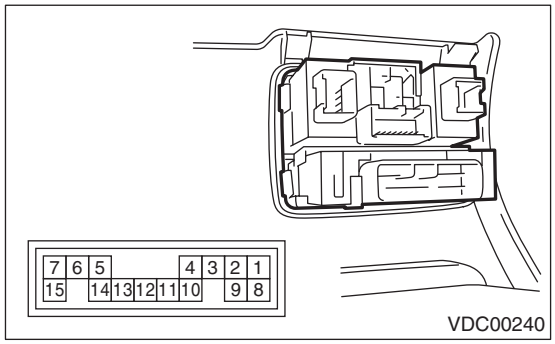
A: REMOVAL

1) Remove the instrument panel lower cover.
2) Remove the screws, and then remove the VDC OFF switch.

• RHD model



• LHD model



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance between VDC OFF switch terminals.

• RHD model

Switch position	Terminal No.	Standard
OFF	2 — 3	More than 1 MΩ
ON	2 — 3	Less than 1 Ω

• LHD model

Switch position	Terminal No.	Standard
OFF	2 — 15	More than 1 MΩ
ON	2 — 15	Less than 1 Ω

If NG, replace the VDC OFF switch.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS) VDC(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

CAUTION:
When the Subaru Select Monitor is communicating (except when displaying the data), the ABS warning light flashes and VDC warning light illuminates in the combination meter. Do not communicate with the Subaru Select Monitor while driving, because the ABS and VDC functions are disabled. Carefully drive the vehicle, when you have to communicate with the Subaru Select Monitor. When the data is displayed by the {Current Data Display & Save} menu, both the ABS and VDC warning lights are turned off and ABS and VDC functions are enabled.

NOTE:
- To check the harness for broken wires or short circuits, shake problem spot or connector.
- Refer to “Check List for Interview”. <Ref. to VDC(diag)-4, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using the interview checklist. <Ref. to VDC(diag)-4, Check List for Interview.> 2) Before performing diagnostics, check the component which might affect VDC problems. <Ref. to VDC(diag)-8, INSPECTION, General Description.>	Is the component that might influence the VDC problem normal?	Go to step **2.**	Repair or replace each component.
2	**CHECK INDICATION OF DTC.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. 3) Turn the ignition switch to ON, and the Subaru Select Monitor switch to ON. 4) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).> NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to VDC(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.> 5) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step **4.**	Go to step **3.**
3	**PERFORM GENERAL DIAGNOSTICS.** 1) Inspect using “General Diagnostic Table”. <Ref. to VDC(diag)-132, INSPECTION, General Diagnostic Table.> 2) Perform the clear memory mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).> 5) Check the DTC does not displayed.	Do the VDC warning light and ABS warning light go off after starting the engine?	Finish the diagnosis.	Check the combination meter circuit. <Ref. to VDC(diag)-30, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.> <Ref. to VDC(diag)-33, VDC WARNING LIGHT AND VDC OFF INDICATOR LIGHT DO NOT GO OFF, Warning Light Illumination Pattern.>

	Step	Check	Yes	No
4	**PERFORM DIAGNOSIS.** 1) Refer to “List of Diagnostic Trouble Code (DTC)”. NOTE: For the DTC list, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to VDC(diag)-37, LIST, List of Diagnostic Trouble Code (DTC).> 2) Fix the wrong part. 3) Perform the clear memory mode. <Ref. to VDC(diag)-24, OPERATION, Clear Memory Mode.> 4) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 5) Read the DTC. <Ref. to VDC(diag)-22, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Repeat step 4 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Check the following items about the vehicle's state.

1. STATE OF ABS WARNING LIGHT

ABS warning light come on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on • When / How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after engine starting, engine is running) ❑ ON (after engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Part name: • Operating condition:		

2. STATE OF VDC WARNING LIGHT AND VDC OFF INDICATOR LIGHT

VDC warning light and VDC OFF indicator light come on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on • When / How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after engine starting, engine is running) ❑ ON (after engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Part name: • Operating condition:		

3. STATE OF VDC INDICATOR LIGHT

VDC operation indicator light comes on.	❑ Always ❑ Sometimes ❑ Only once ❑ Not come on • When / How long does it come on?		
Ignition key position	❑ LOCK ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after engine starting, engine is running) ❑ ON (after engine starting, engine is at a standstill)		
Timing	❑ Immediately after turning the ignition switch to ON ❑ Immediately after turning the ignition switch to START		
	❑ When accelerating	—	km/h
		—	MPH
	❑ When driving at a constant speed	km/h	MPH
	❑ When decelerating	—	km/h
		—	MPH
	❑ When turning to the right	Steering angle:	deg
		Steering time:	Sec.
	❑ When turning to the left	Steering angle:	deg
		Steering time:	Sec.
	❑ When operating other electrical parts		
	• Part name: • Operating condition:		

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Environment	a) Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Others:
	b) Ambient temperature	°C (°F)
	c) Road	❑ Inner city ❑ Suburbs ❑ Highway ❑ Local street ❑ Uphill ❑ Downhill ❑ Paved road ❑ Gravel road ❑ Muddy road ❑ Sandy place ❑ Straight road ❑ Sharp curve ❑ Gentle curve ❑ S-curve ❑ Road with a slope on both sides ❑ Others:
	d) Road surface	❑ Dried ❑ Wet ❑ Covered with fresh snow ❑ Covered with hardened snow ❑ Frozen slope ❑ Others:

Condition	a) Brakes	Deceleration:	G
		❑ continuous / ❑ intermittent	
	b) Accelerator	Acceleration:	G
		❑ continuous / ❑ intermittent	
	c) Vehicle speed	km/h	MPH
		❑ Advancing ❑ When accelerating ❑ When decelerating ❑ At low speed ❑ When turning ❑ Others:	
	d) Tire inflation pressure	Front RH tire:	kPa
		Front LH tire:	kPa
		Rear RH tire:	kPa
		Rear LH tire:	kPa
	e) Degree of wear	Front RH tire:	
		Front LH tire:	
		Rear RH tire:	
		Rear LH tire:	
	f) Steering wheel	❑ Sharp turning ❑ Gentle turning ❑ Straight forward motion ❑ Gentle return ❑ Sharp return	
	g) Tire/Wheel size	❑ Specified size ❑ Except specification ( )	
	h) Tire variation	❑ Summer tire ❑ Studless tire (Brand:)	
	i) Tire chains are fitted: ❑ Yes / ❑ No		
	j) T-type tire is used: ❑ Yes / ❑ No		
	k) Condition of suspension alignment:		
	l) Loading state:		
	m) Repair parts are used: ❑ Yes / ❑ No		
	• Contents:		
	n) Others:		

3. General Description

A: CAUTION

1. SUPPLEMENTAL RESTRAINT SYSTEM "AIRBAG"

Airbag system wiring harness is routed near the ABS wheel speed sensor and VDCCM&H/U.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ABS wheel speed sensor and VDCCM&H/U.

B: INSPECTION

Before performing diagnosis, check the following items which might affect VDC problems.

1. BATTERY

Measure battery voltage and check electrolyte.

Standard voltage: 12 V or more

Specific gravity: More than 1.260

2. BRAKE FLUID

1) Check the brake fluid level.
2) Check the brake fluid for leaks.

3. HYDRAULIC UNIT

Check the hydraulic unit.
• With brake tester <Ref. to VDC-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION WITH BRAKE TESTER, INSPECTION, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
• Without brake tester <Ref. to VDC-8, CHECKING THE HYDRAULIC UNIT ABS OPERATION BY PRESSURE GAUGE, INSPECTION, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

4. BRAKE DRAG

Check for brake drag.

5. BRAKE PAD AND ROTOR

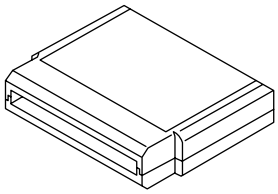
Check the brake pad and rotor.
• FRONT <Ref. to BR-18, INSPECTION, Front Brake Pad.> <Ref. to BR-19, INSPECTION, Front Disc Rotor.>
• REAR <Ref. to BR-25, INSPECTION, Rear Brake Pad.> <Ref. to BR-26, INSPECTION, Rear Disc Rotor.>

6. TIRE

Check the tire specifications, tire wear and air pressure. <Ref. to WT-2, SPECIFICATION, General Description.>

C: PREPARATION TOOL

1. SPECIAL TOOL

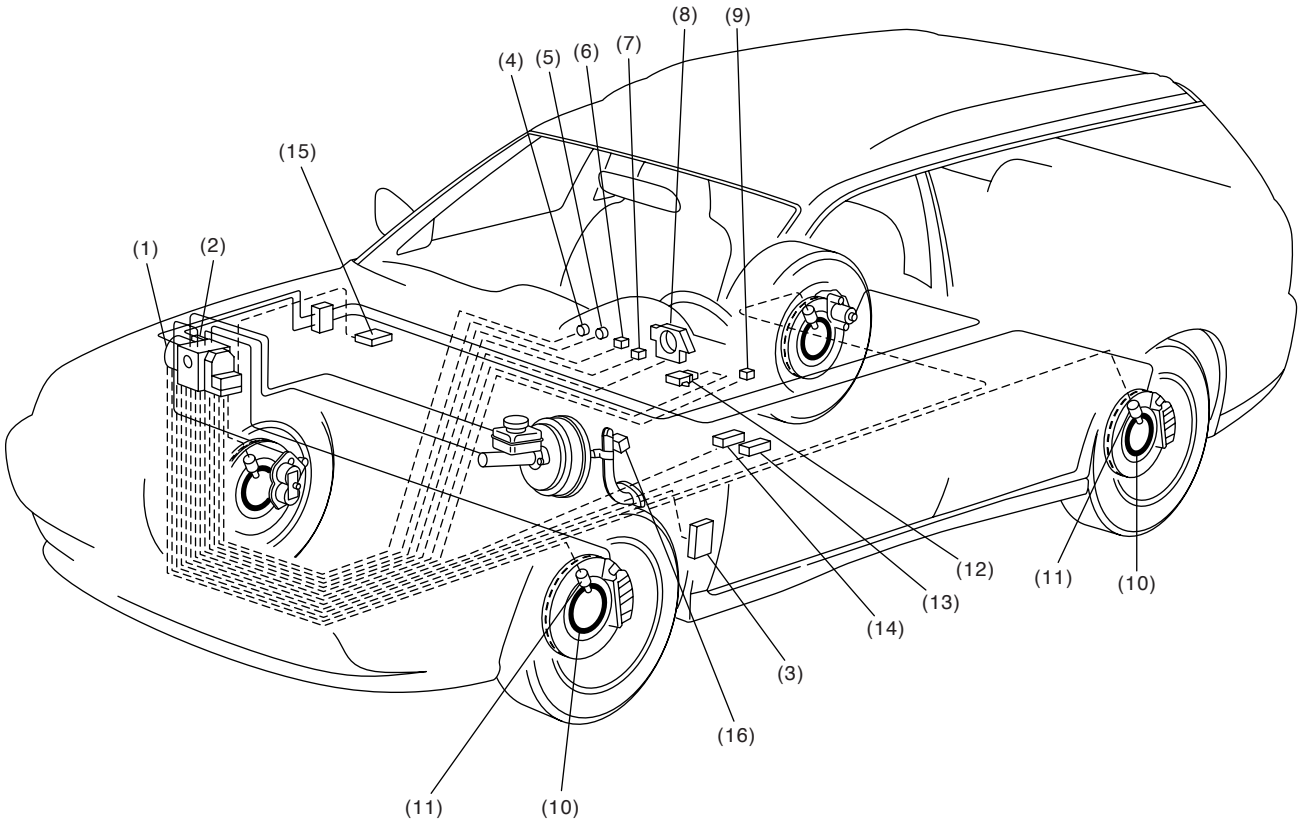
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring sensor.

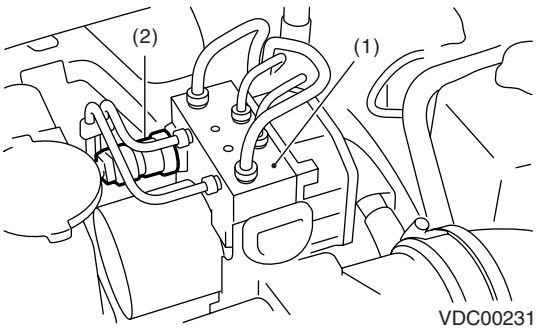
4. Electrical Component Location

A: LOCATION

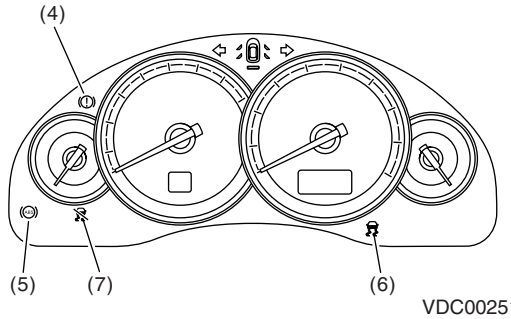


VDC00241

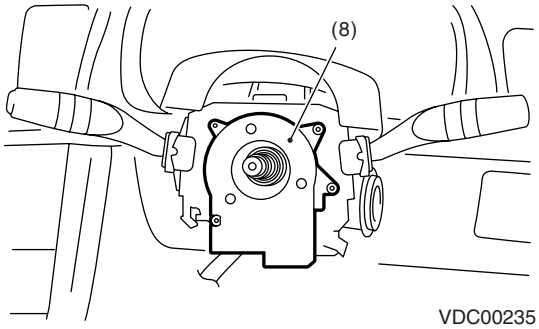
(1) VDC control module and hydraulic control unit (VDCCM&H/U)
(2) Pressure sensor
(3) Transmission control module (TCM)
(4) Brake warning light (EBD warning light)
(5) ABS warning light
(6) VDC indicator light
(7) VDC warning light and VDC OFF indicator light
(8) Steering angle sensor
(9) VDC OFF switch
(10) Magnetic encoder
(11) ABS wheel speed sensor
(12) Yaw rate & lateral G sensor
(13) Data link connector
(14) Diagnosis connector (Used for ABS sequence control)
(15) Engine control module (ECM)
(16) Stop light switch



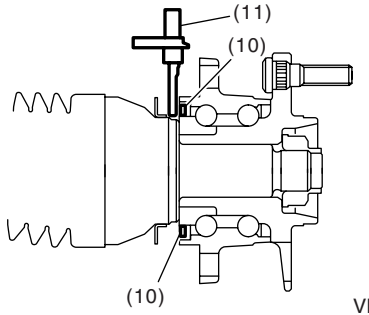
VDC00231



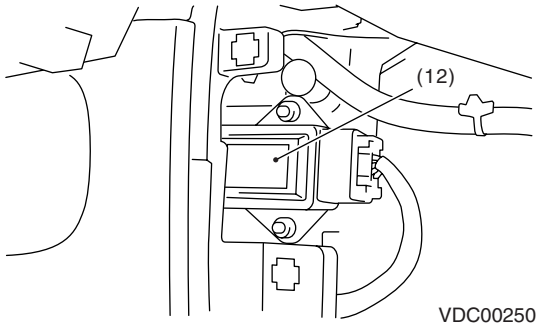
VDC00251



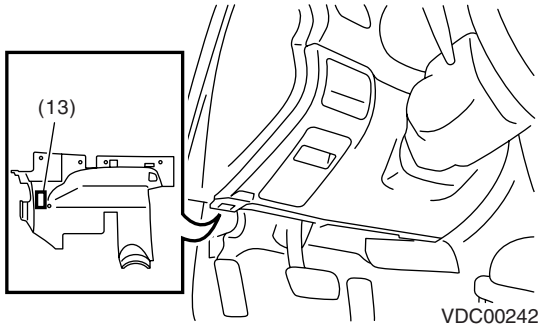
VDC00235



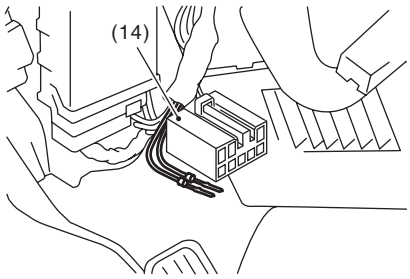
VDC00234



VDC00250



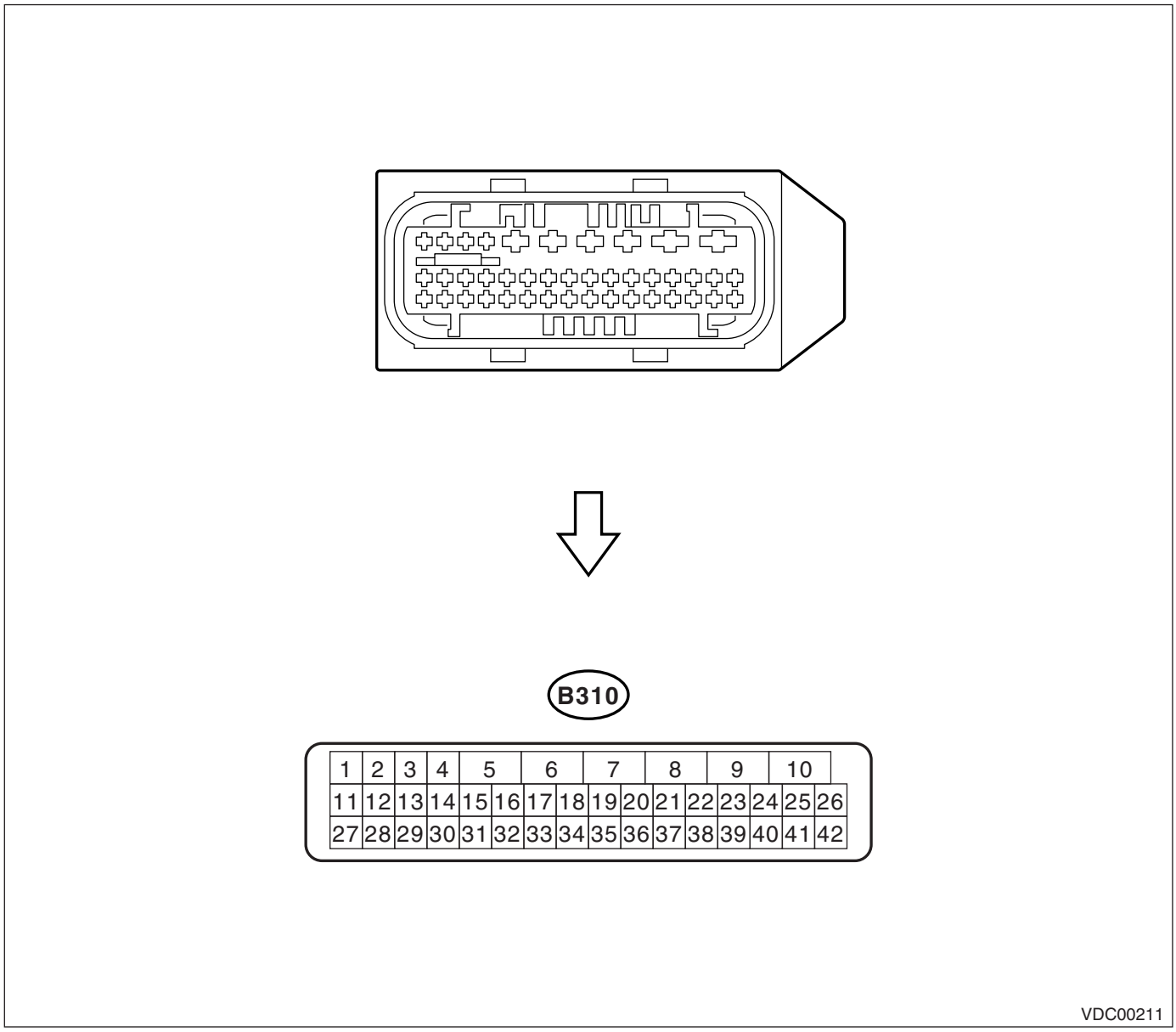
VDC00242



VDC00230

5. Control Module I/O Signal

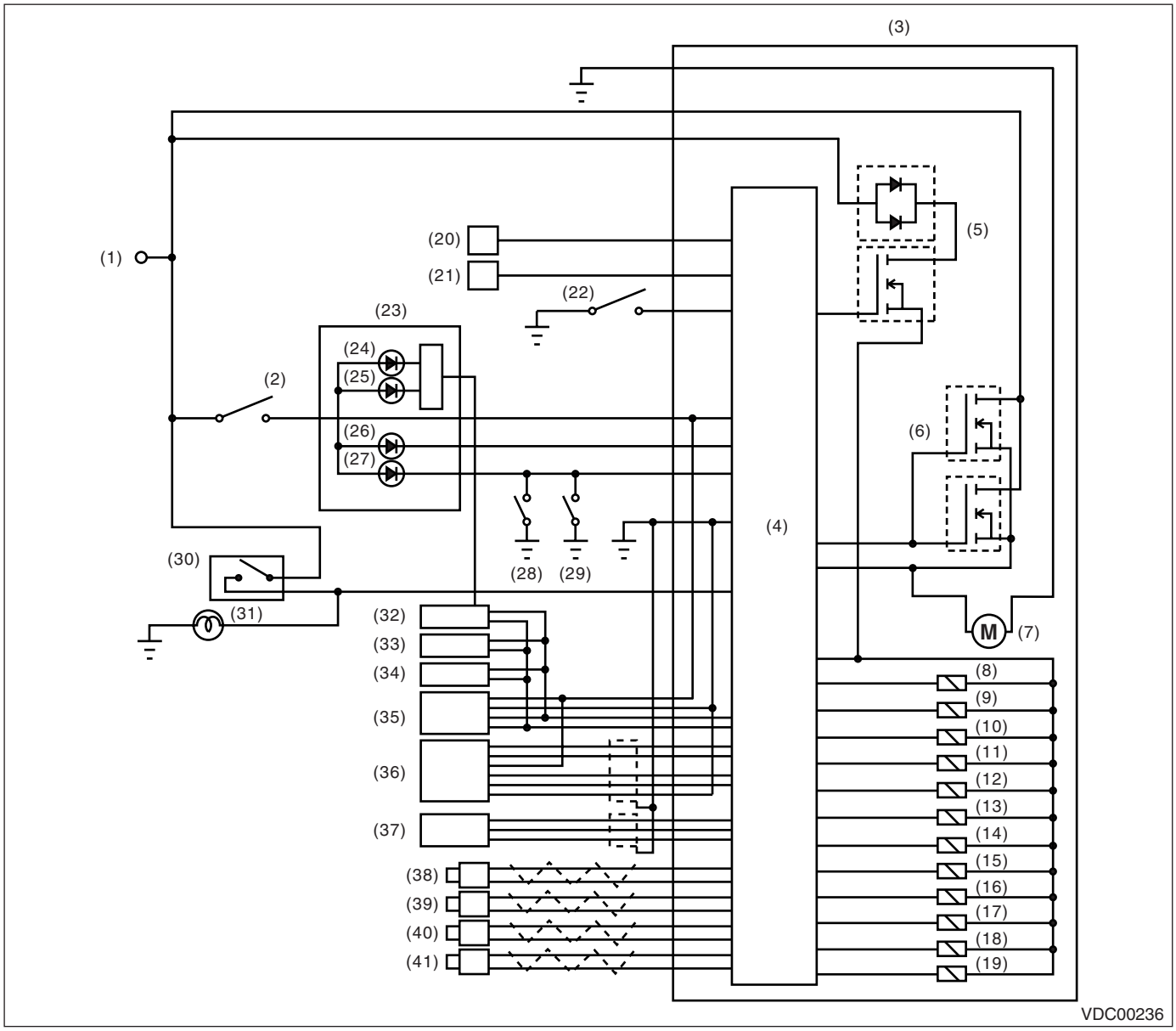
A: ELECTRICAL SPECIFICATION



NOTE:
• Terminal numbers in VDCCM&H/U connector are as shown in the figure.
• When the connector is removed from VDCCM&H/U, the ABS warning light and VDC warning light illuminate.

Content			Terminal No. (+) — (–)	Input/Output signal Measured value and measuring conditions
Power supply			14 — 6	When the ignition switch is ON, 10 — 15 V.
ABS wheel speed sensor	Front LH wheel	Power supply	41 — 6	4.5 — 16.5 V
		Signal	25	5.9 — 16.8 mA: Rectangle waveform
	Front RH wheel	Power supply	22 — 6	4.5 — 16.5 V
		Signal	21	5.9 — 16.8 mA: Rectangle waveform
	Rear LH wheel	Power supply	24 — 6	4.5 — 16.5 V
		Signal	40	5.9 — 16.8 mA: Rectangle waveform
	Rear RH wheel	Power supply	23 — 6	4.5 — 16.5 V
		Signal	38	5.9 — 16.8 mA: Rectangle waveform
Yaw rate & lateral G sensor	Output (Lateral G sensor)		3 — 16	When the vehicle is on level, 2.35 — 2.65 V.
	Power supply		30 — 16	When the ignition switch is ON, 8 — 16 V.
	Output (Yaw rate sensor)		28 — 16	Waveform <Ref. to VDC(diag)-15, WAVEFORM, MEASUREMENT, Control Module I/O Signal.>
	Standard (Yaw rate sensor)		1 — 16	2.1 — 2.9 V
	Test		2 — 16	5 — 1 V cycle for 40 ms pulse signal. <Ref. to VDC(diag)-15, WAVEFORM, MEASUREMENT, Control Module I/O Signal.>
	Ground		16	—
CAN communication line (+)			13	2.5 — 1.5 V pulse signal
CAN communication line (–)			29	3.5 — 2.5 V pulse signal
Valve relay power supply			5 — 6	When the ignition switch is ON, 10 — 15 V.
Motor relay power supply			9 — 10	When the ignition switch is ON, 10 — 15 V.
Pressure sensor	Power supply		27 — 12	When the ignition switch is ON, 4.75 — 5.25 V.
	Output voltage		11 — 12	0.48 — 0.72 V (when releasing the brake pedal)
	Ground		12	—
ABS warning light			35 — 6	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Brake warning light (EBD warning light)			20 — 6	After turning the ignition switch to ON, 10 — 15 V during 1.5 seconds and less than 1.5 V after 1.5 seconds passed.
Stop light switch			37 — 6	Less than 1.5 V when the stop light is OFF; otherwise, 10 — 15 V when the stop light is ON.
Diagnosis connector			17	When the ignition switch is ON, 10 — 15 V.
Subaru Select Monitor			26 — 6	0 ←→ 12 V pulse (in communication)
Vehicle speed output signal			36	0 ←→ 5 V pulse
Ground			6	—

B: WIRING DIAGRAM

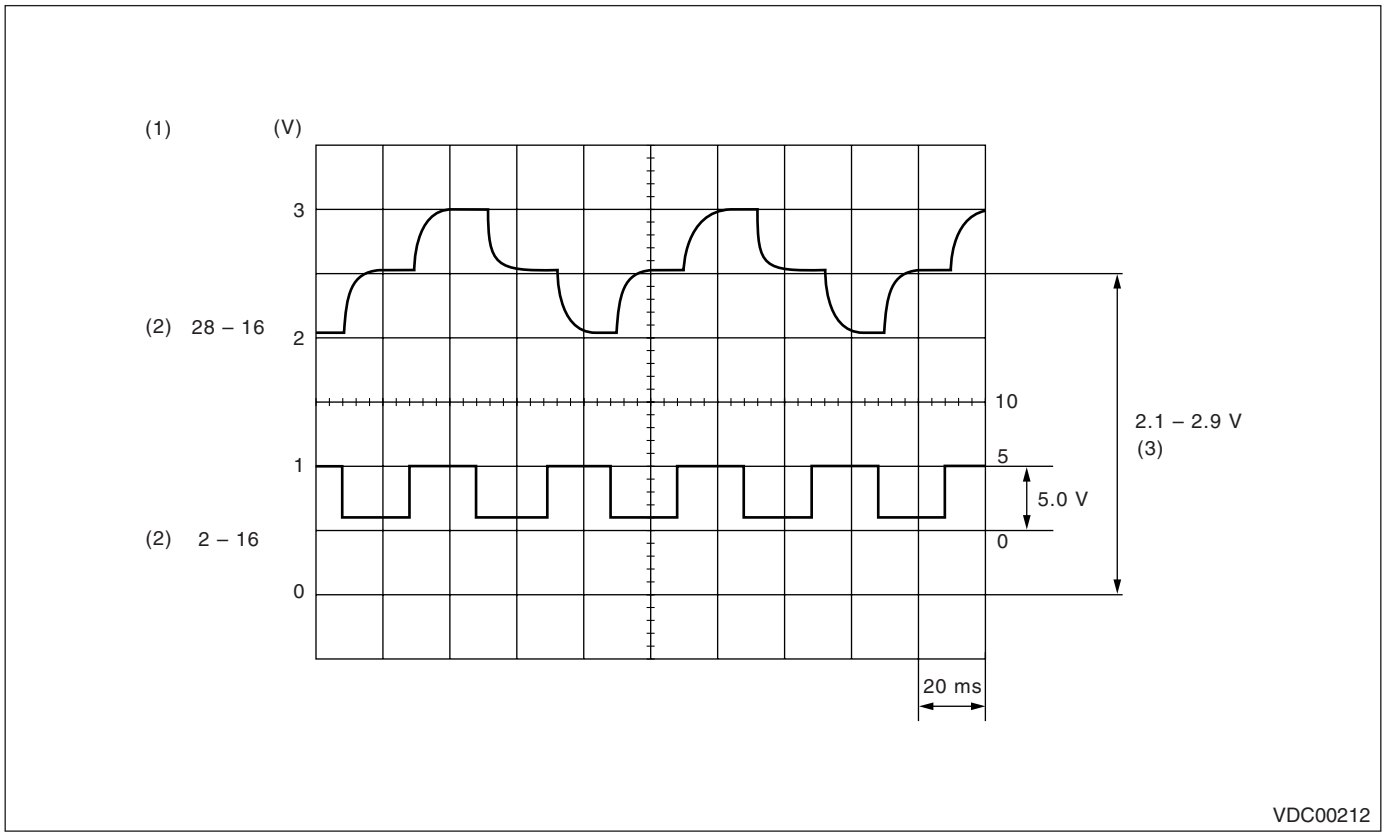


(1) Battery
(2) Ignition switch
(3) VDC control module and hydraulic control unit (VDCCM&H/U)
(4) VDC control module
(5) Valve relay
(6) Motor relay
(7) Motor
(8) Front inlet solenoid valve LH
(9) Front outlet solenoid valve LH
(10) Front inlet solenoid valve RH
(11) Front outlet solenoid valve RH
(12) Rear inlet solenoid valve LH
(13) Rear outlet solenoid valve LH
(14) Rear inlet solenoid valve RH
(15) Rear outlet solenoid valve RH
(16) Primary cut solenoid valve
(17) Primary suction solenoid valve
(18) Secondary cut solenoid valve
(19) Secondary suction solenoid valve
(20) Diagnosis connector
(21) Data link connector
(22) VDC OFF switch
(23) Combination meter
(24) VDC indicator light
(25) VDC warning light and VDC OFF indicator light
(26) ABS warning light
(27) Brake warning light
(28) Parking brake switch
(29) Brake fluid level switch
(30) Stop light switch
(31) Stop light
(32) Body integrated unit
(33) Engine control module (ECM)
(34) Transmission control module (TCM)
(35) Steering angle sensor
(36) Yaw rate & lateral G sensor
(37) Pressure sensor
(38) Front ABS wheel speed sensor LH
(39) Front ABS wheel speed sensor RH
(40) Rear ABS wheel speed sensor LH
(41) Rear ABS wheel speed sensor RH

C: MEASUREMENT

Measure input and output signal voltage.

1. WAVEFORM



(1) Yaw rate sensor
(2) Terminal No.
(3) Vehicle is at a standstill.

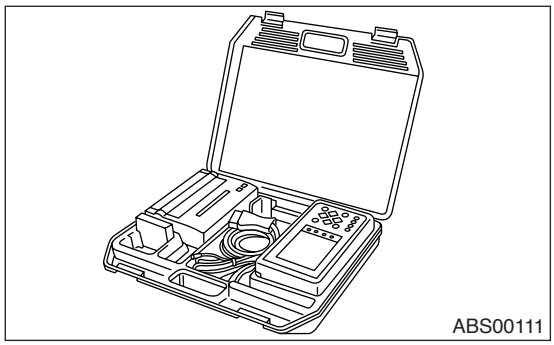
6. Subaru Select Monitor

A: OPERATION

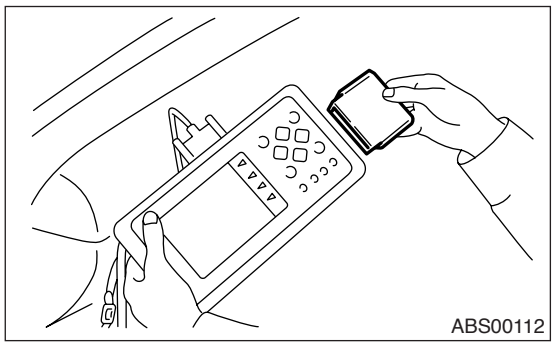
CAUTION:
When the Subaru Select Monitor is communicating (except when displaying the data), the ABS warning light flashes and VDC warning light illuminates in the combination meter. Do not communicate with the Subaru Select Monitor while driving, because the ABS and VDC functions are disabled. Carefully drive the vehicle, when you have to communicate with the Subaru Select Monitor. When the data is displayed by the {Current Data Display & Save} menu, both the ABS and VDC warning lights are turned off and ABS and VDC functions are enabled.

1. READ DIAGNOSTIC TROUBLE CODE (DTC)

1) Prepare the Subaru Select Monitor kit. <Ref. to VDC(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>

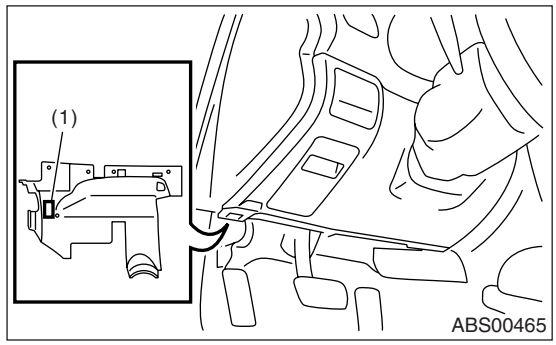


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to VDC(diag)-9, SPECIAL TOOL, PREPARATION TOOL, General Description.>



4) Connect the Subaru Select Monitor to data link connector.

(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).

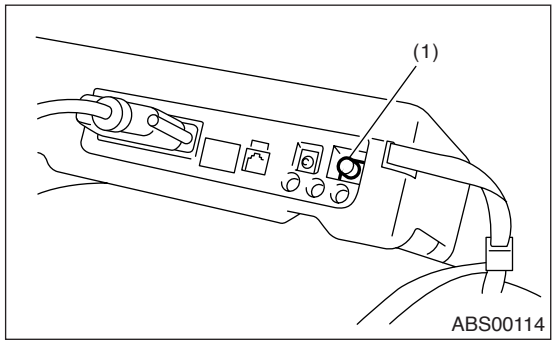


(1) Data link connector

(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(1) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
8) Press the [YES] key after the {VDC AWD AT} is displayed.
9) On the «VDC Diagnosis» display screen, select the {Diagnostic Code(s) Display}, and then press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to "List of Diagnostic Trouble Code (DTC)". <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>
• DTCs are displayed up to three in detected order.

• If a particular DTC is not properly stored in memory (due to a drop in VDCCM&H/U power supply, etc.) on the occurrence of a problem, the DTC which is suffixed with a question mark "?" appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

10) If VDC and Subaru Select Monitor cannot communicate, check the communication circuit. <Ref. to VDC(diag)-19, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, INSPECTION, Subaru Select Monitor.>

Display	Contents to be monitored
Current	Indicate the latest DTC on the Subaru Select Monitor display.
Old	Indicate the latest DTC in previous trouble on the Subaru Select Monitor display.
Older	Indicate the latest DTC in second previous trouble on the Subaru Select Monitor display.
Before 3	Indicate the latest DTC in third previous trouble on the Subaru Select Monitor display.

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after {VDC 4WD AT} is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
5) On the «Data Display Menu» display screen, select the display method, and press the [YES] key.
6) Using a scroll key, scroll the display screen up or down until necessary data is shown.
• A list of the support data is shown in the following table.

Display	Contents to be monitored	Unit of measure
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed.	km/h or MPH
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed.	km/h or MPH
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed.	km/h or MPH
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed.	km/h or MPH
Steering Angle Sensor	Steering angle detected by steering angle sensor is displayed.	deg
Yaw Rate Sensor	Vehicle angular speed detected by yaw rate sensor is displayed.	deg/s
Pressure Sensor	Brake fluid pressure detected by pressure sensor is displayed.	bar
Lateral G Sensor	Vehicle lateral acceleration detected by lateral G sensor is displayed.	m/s (m/s^2)
IG power supply voltage	Voltage supplied to VDCCM&H/U is displayed.	V
EMA signal	Engine control command signal is displayed.	1 or 0
TCS Operation Light	TCS operation condition is displayed.	ON or OFF
VDC Operation Light	VDC operation condition is displayed.	ON or OFF
VDC OFF Light	ON/OFF condition of VDC OFF indicator light is displayed.	ON or OFF
EBD Warning Light	ON operation of the EBD warning light is displayed.	ON or OFF
ABS Warning Light	ON operation of the ABS warning light is displayed.	ON or OFF
VDC Warning Light	ON operation of the VDC warning light is displayed.	ON or OFF
VDC OK-B signal	Malfunction of VDC sensor (except for vehicle speed sensor) is displayed.	1 or 0
Valve Relay Signal	Valve relay operation signal is displayed.	ON or OFF
Motor Relay Signal	Motor relay operation signal is displayed.	ON or OFF
Motor Relay Monitor	Motor relay monitor signal is displayed.	ON or OFF
PATA Signal	Operation condition of VDC OFF switch is displayed.	ON or OFF
BLS Signal	Brake ON/OFF is displayed.	ON or OFF
Gear position	Present gear position is displayed.	—
Engine Speed	Current engine speed is displayed.	rpm
PW Signal	Acceleration opening is displayed.	%

NOTE:
For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

3. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Brake Control} and press the [YES] key.
3) Press the [YES] key after {VDC 4WD AT} is displayed.
4) On the «Brake Control Diagnosis» display screen, select the {Memory Clear} and press the [YES] key.

Display	Contents to be monitored
Clear memory?	DTC deleting function

5) When “Done” and “Turn ignition switch OFF” are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

4. ABS SEQUENCE CONTROL

Display	Contents to be monitored	Reference target
ABS sequence control	Operate the valve and pump motor continuously to perform the ABS sequence control.	<Ref. to ABS-10, ABS Sequence Control.>
VDC confirmation mode	Operate the valve and pump motor continuously to perform the VDC sequence control.	<Ref. to VDC-11, VDC Sequence Control.>

5. FREEZE FRAME DATA

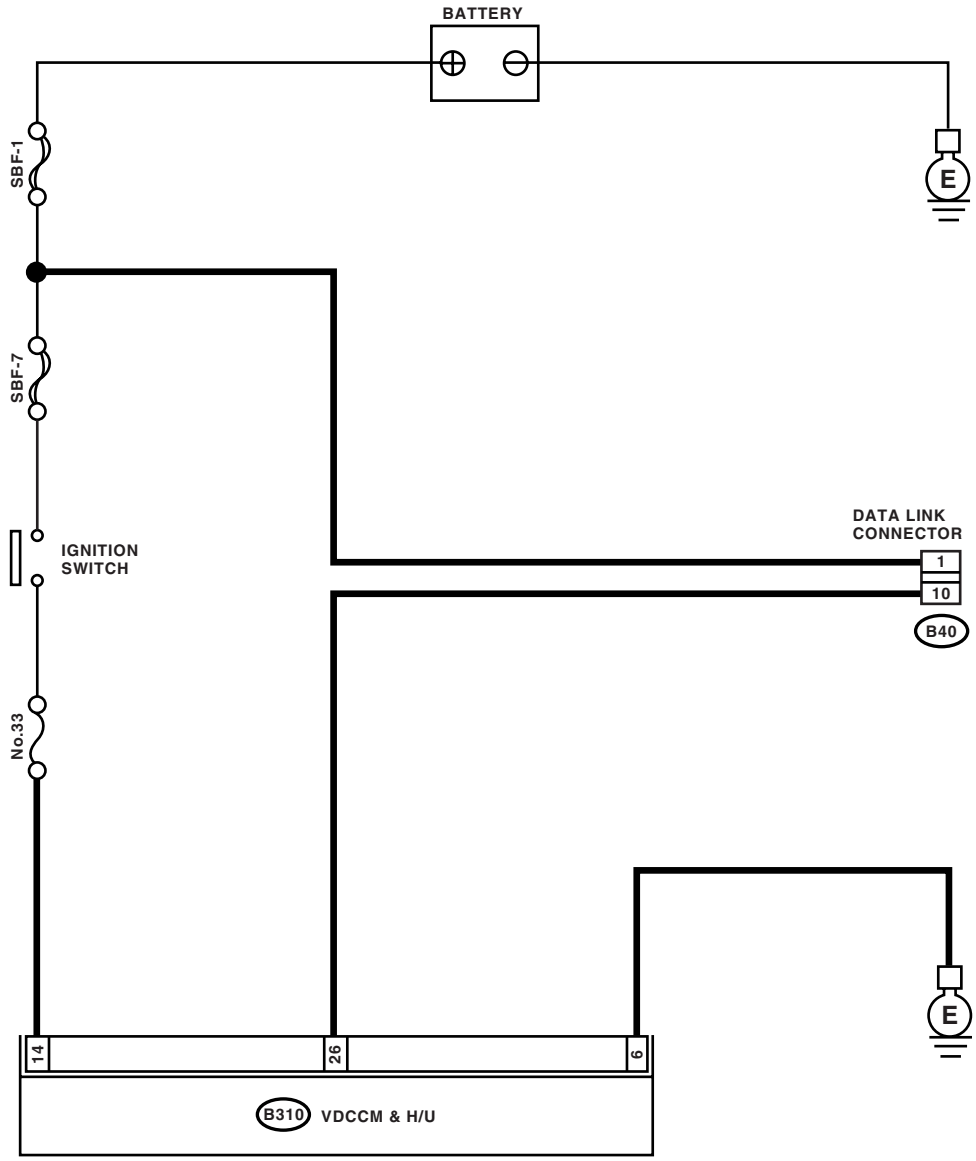
NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Each time trouble occurs, the latest information is stored in the freeze frame data in memory.
• If a freeze frame data is not properly stored in memory (due to a drop in VDC control module power supply, etc.), the DTC which is suffixed with a question mark “?” appears on the Subaru Select Monitor display. This shows it may be an unreliable reading.

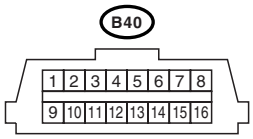
Display	Contents to be monitored
Steering angle sensor	Steering angle detected by steering angle sensor is displayed.
Yaw rate sensor	Vehicle angular speed detected by yaw rate sensor is displayed.
Lateral G sensor	Vehicle lateral acceleration detected by lateral G sensor is displayed.
Pressure sensor	Brake fluid pressure detected by pressure sensor is displayed.
Vehicle Speed	Vehicle speed calculated by VDC control module is displayed.
FR Wheel Speed	Wheel speed detected by front ABS wheel speed sensor RH is displayed in km/h or MPH.
FL Wheel Speed	Wheel speed detected by front ABS wheel speed sensor LH is displayed in km/h or MPH.
RR Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor RH is displayed in km/h or MPH.
RL Wheel Speed	Wheel speed detected by rear ABS wheel speed sensor LH is displayed in km/h or MPH.
Required torque	Engine required torque is displayed.
Current torque	Current engine torque on malfunction occurrence is displayed.
Target torque	Engine target torque is displayed.
PW signal	Acceleration opening is displayed.
Engine Speed	Engine speed on malfunction occurrence is displayed.
Gear position	Gear position on malfunction occurrence is displayed.
IG power supply voltage	Voltage supplied to VDC control module is displayed.
Absolute angle recognition flag	Whether the absolute angle was determined is displayed.
Decreasing required torque	Whether the torque decrease is required to engine is displayed.
EMA signal	Engine control command signal is displayed.
VDC O control flag	VDC oversteer control condition is displayed.
VDC U control flag	VDC understeer control condition is displayed.
BMR control flag	Brake control condition is displayed.
AMR control flag	Engine control condition is displayed.
ABS control flag	ABS control condition is displayed.
VDC OFF light	ON/OFF condition of VDC OFF indicator light is displayed.
Valve Relay Signal	Valve relay operation signal is displayed.
Motor Relay Monitor	Motor relay monitor signal is displayed.
BLS signal	Brake ON/OFF is displayed.

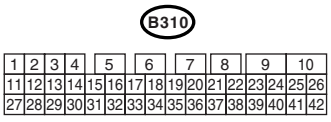
B: INSPECTION

1. COMMUNICATION FOR INITIALIZING IMPOSSIBLE

DETECTING CONDITION:
Defective harness connector
TROUBLE SYMPTOM:
Communication is impossible between VDC and Subaru Select Monitor.
WIRING DIAGRAM:







VDC00244

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2.**	Turn the ignition switch to ON, and select VDC mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other system can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Go to step **8.**	Go to step **5.**
5	**CHECK SUBARU SELECT MONITOR COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are the system name and model year displayed on Subaru Select Monitor?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL MODULE AND DATA LINK CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U, ECM and TCM. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control module and data link connector.
7	**CHECK OUTPUT SIGNAL FOR VDCCM&H/U.** 1) Turn the ignition switch to ON. 2) Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness and connector between each control module and data link connector.
8	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND DATA LINK CONNECTOR.** Measure the resistance between VDCCM&H/U connector and data link connector. ***Connector & terminal*** ***(B310) No. 26 — (B40) No. 10:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness and connector between VDCCM&H/U and data link connector.
9	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** Turn the ignition switch to OFF.	Is the VDCCM&H/U connector inserted into VDCCM&H/U until the clamp locks onto it?	Go to step **10.**	Insert the VDCCM&H/U connector into VDCCM&H/U.

	Step	Check	Yes	No
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the ignition power supply voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **11.**	Repair the open circuit in harness between VDCCM&H/U and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance of harness between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **12.**	Repair the open circuit in harness between VDCCM&H/U and inhibitor side connector, and poor contact in coupling connector.
12	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in control module power supply, ground circuit and data link connector?	Repair the connector.	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

For details concerning DTC reading procedure, refer to “Subaru Select Monitor”. <Ref. to VDC(diag)-16, Subaru Select Monitor.>

8. Inspection Mode

A: PROCEDURE

Reproduce the malfunction occurrence condition as possible.
Drive the vehicle at least ten minutes.

NOTE:
Make sure the vehicle is not dragged to one side under usual driving condition.

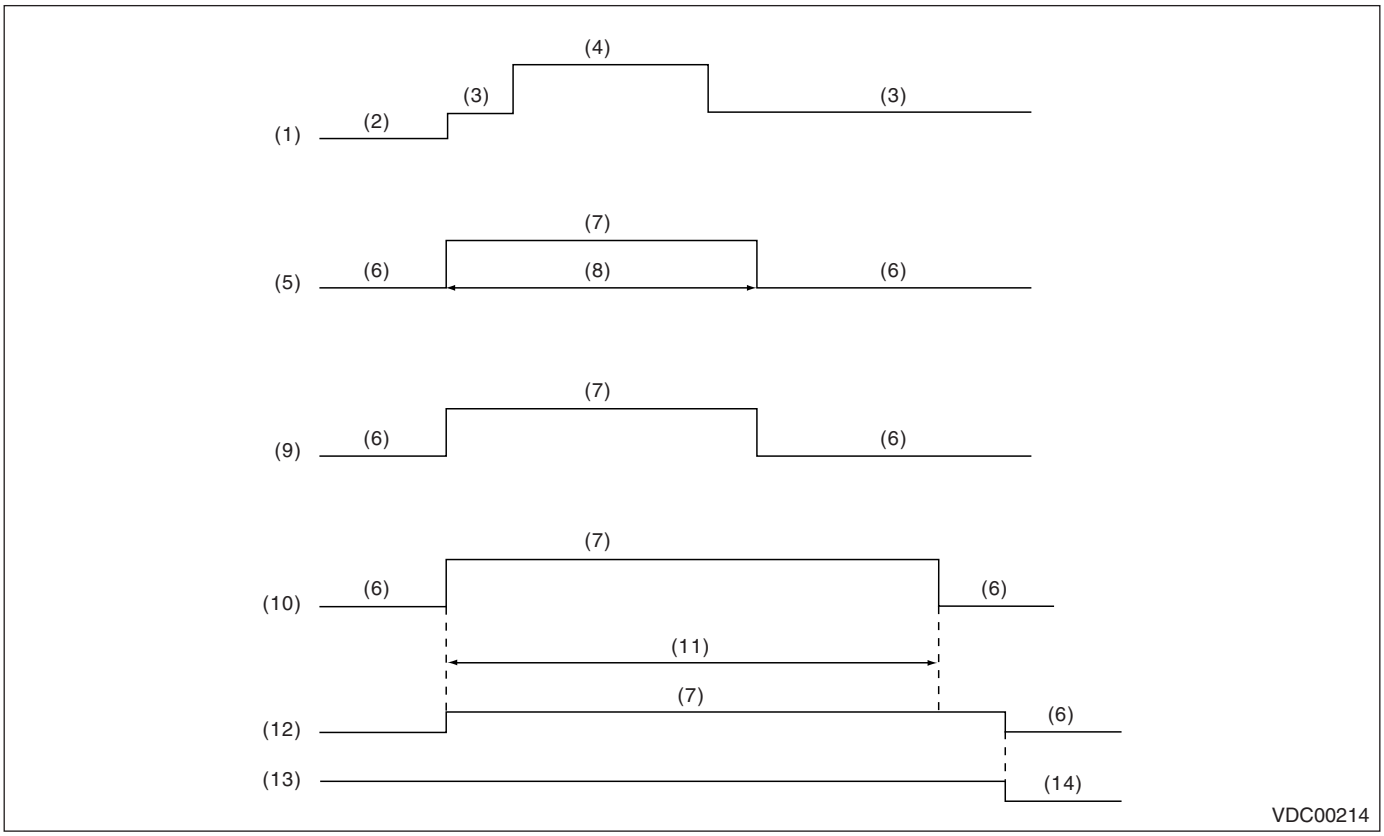
9. Clear Memory Mode

A: OPERATION

For details concerning DTC clear operation, refer to “Subaru Select Monitor”. <Ref. to VDC(diag)-16, Subaru Select Monitor.>

10.Warning Light Illumination Pattern

A: INSPECTION



(1) Ignition switch
(2) OFF
(3) ON
(4) Engine start
(5) ABS warning light
(6) Light OFF
(7) Light ON
(8) 1.5 sec.
(9) VDC indicator light
(10) VDC warning light and VDC OFF indicator light
(11) Several seconds (depending on engine coolant temperature)
(12) Brake warning light (EBD warning light)
(13) Parking brake
(14) Released

1) When warning lights or indicator lights do not illuminate in accordance with this illumination pattern, there must be an electrical malfunction.
2) When warning lights or indicator lights remain constantly OFF, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-26, VDC WARNING LIGHT, VDC OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON, Warning Light Illumination Pattern.>
3) When ABS warning light does not go off, check the combination meter circuit. <Ref. to VDC(diag)-30, ABS WARNING LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>
4) When the VDC indicator light, VDC warning light and VDC OFF indicator light do not go off, check the combination meter circuit or CAN communication circuit. <Ref. to VDC(diag)-32, VDC INDICATOR LIGHT DOES NOT GO OFF, Warning Light Illumination Pattern.>

NOTE:
• Even though the ABS warning light does not go off after 1.5 seconds from ABS warning light illumination, the ABS system operates normally when the warning light goes off while driving at approximately 12 km/h (7 MPH). However, the ABS system does not work while the ABS warning light is illuminated.
• It may take several minutes before VDC warning light and VDC OFF indicator light goes off if the vehicle is parked under low temperature for a specified time. This is not defective because it is resulted from low engine coolant temperature.

• With the vehicle jack-up/lift-up or set on free rollers, when the wheels lock or spin after starting the engine, ABS warning light, VDC warning light and VDC OFF indicator light may illuminate because VDCCM&H/U detects the abnormal conditions from ABS wheel speed sensors. In this case, this is not a malfunction. Perform the clear memory mode.

B: VDC WARNING LIGHT, VDC OFF INDICATOR LIGHT AND VDC INDICATOR LIGHT DO NOT COME ON

DETECTING CONDITION:

• Defective combination meter
• Defective CAN communication

TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), VDC indicator light, VDC warning light and VDC OFF indicator light do not come on.

NOTE:
When pressing VDC OFF switch for more than 10 seconds, VDC OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

	Step	Check	Yes	No
1	**CHECK OTHER INDICATOR LIGHT.** Turn the ignition switch to ON.	Does other indicator light illuminate soon after “ON”?	Go to step **2.**	Perform the self-diagnosis of combination meter.
2	**CHECK VDCCM.** When the engine does not start, display the current data of VDCCM using Subaru Select Monitor.	Is “VDC warning light” output set to “ON”?	Go to step **3.**	Replace the VDCCM.
3	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **4.**
4	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter assembly.

C: ABS WARNING LIGHT DOES NOT COME ON

DETECTING CONDITION:

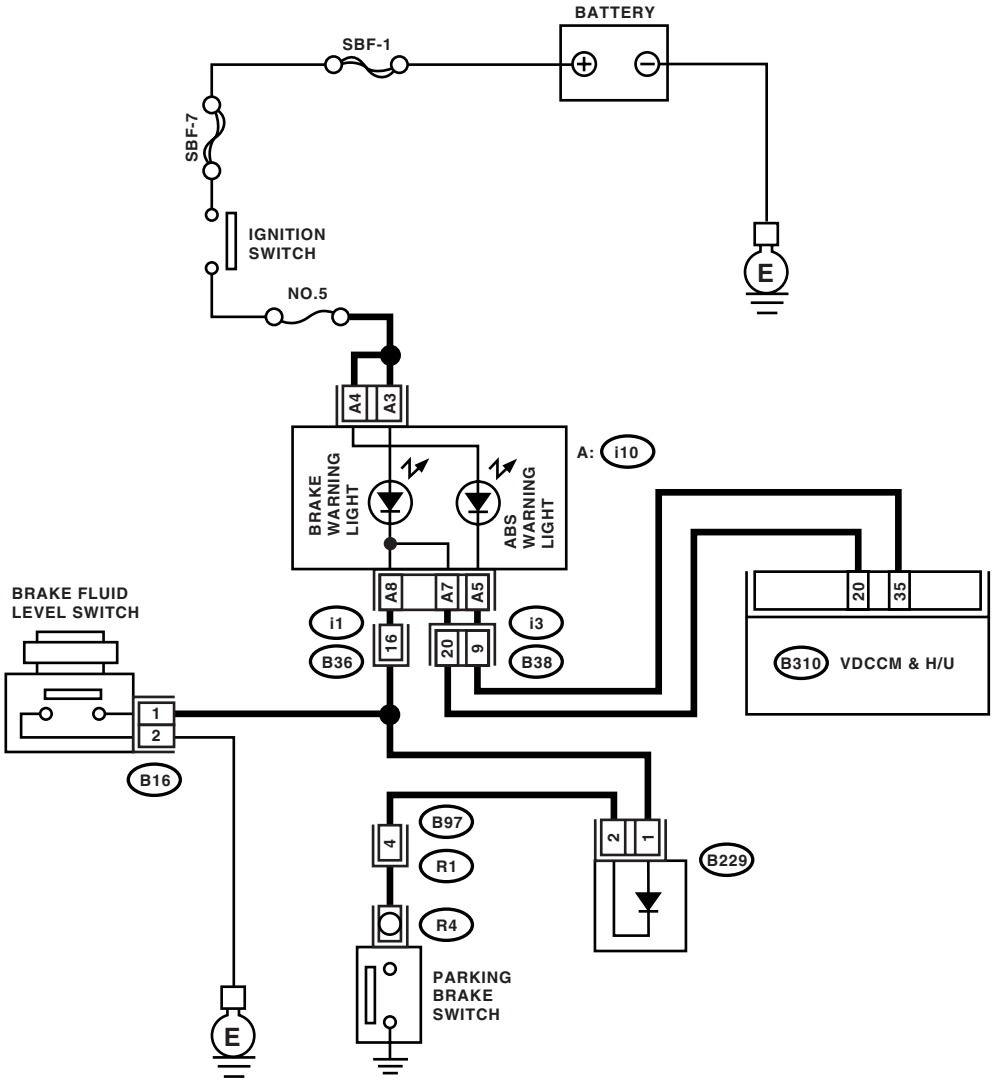
- Defective combination meter
- Defective harness

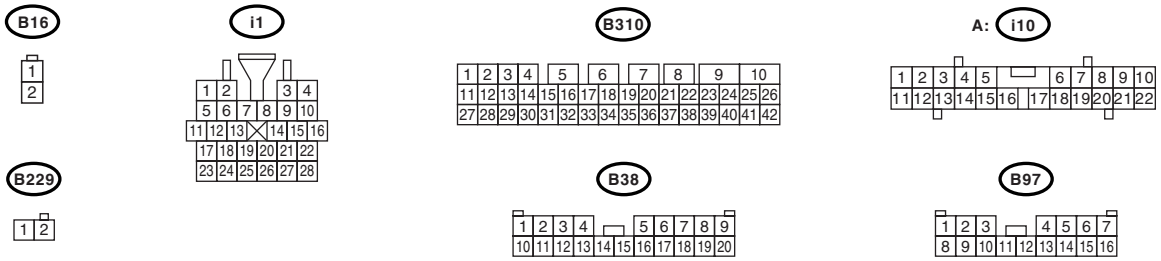
TROUBLE SYMPTOM:

When the ignition switch is turned to ON (engine OFF), ABS warning light does not come on.

WIRING DIAGRAM:

- LHD model

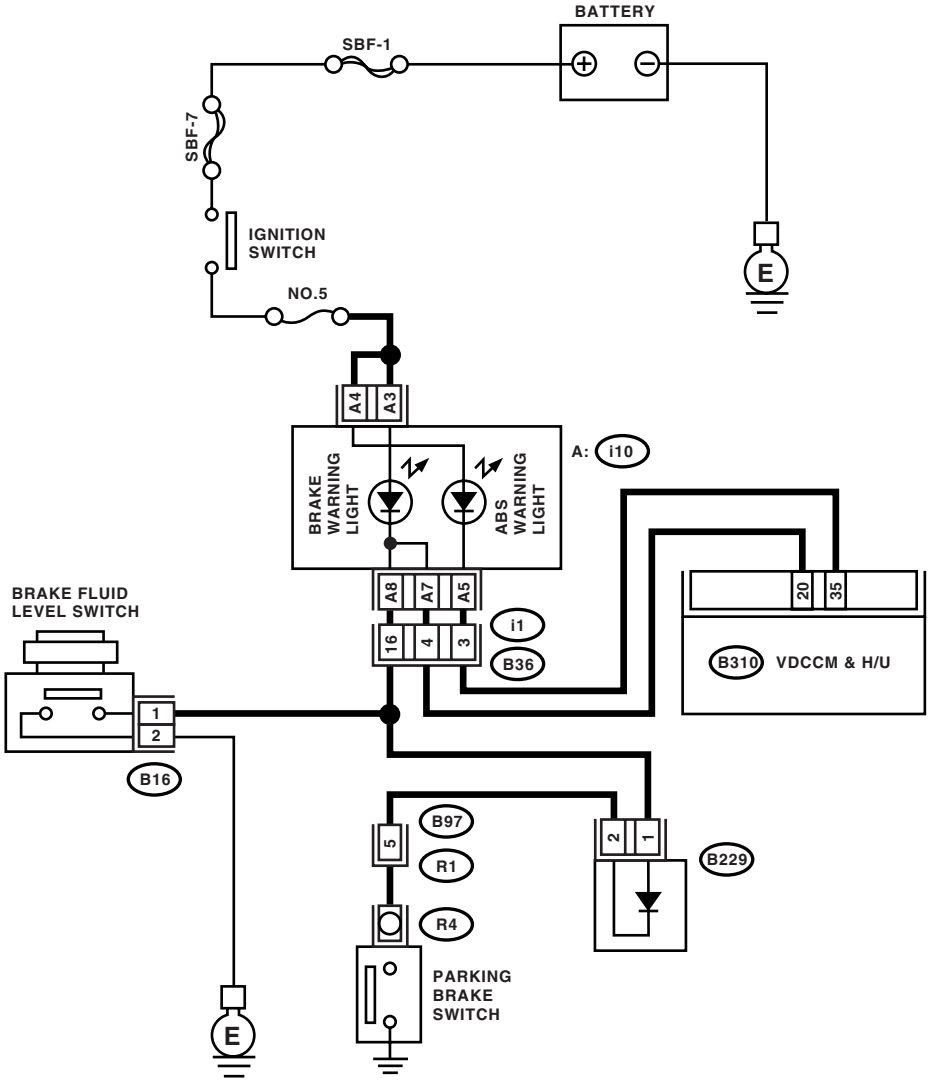


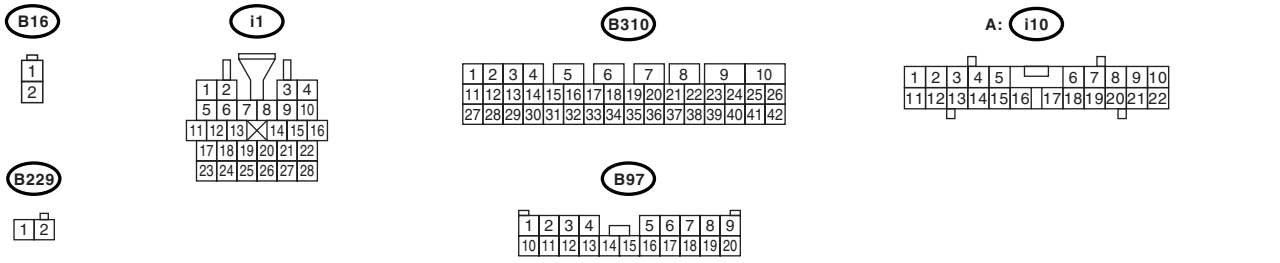


VDC00245

Warning Light Illumination Pattern

- RHD model





VDC00238

	Step	Check	Yes	No
1	**CHECK OTHER LIGHTS TURN ON.** Turn the ignition switch to ON. (engine OFF)	Do other warning lights illuminate?	Go to step **2.**	Check the combination meter.
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK GROUND SHORT CIRCUIT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B310) from VDCCM&H/U. 3) Disconnect the connector (i10) from combination meter. 4) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 35 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the harness connector between VDCCM&H/U and combination meter.
4	**CHECK VDCCM.** 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition switch to ON. 3) Measure the resistance between the combination meter connector and chassis ground soon after the ignition switch is turned to ON (within 1.5 seconds). ***Connector & terminal*** ***(i10) No. A5 — Chassis ground:***	Is the resistance more than 1 MΩ?	Check the combination meter.	Replace VDCCM&H/U.

D: ABS WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

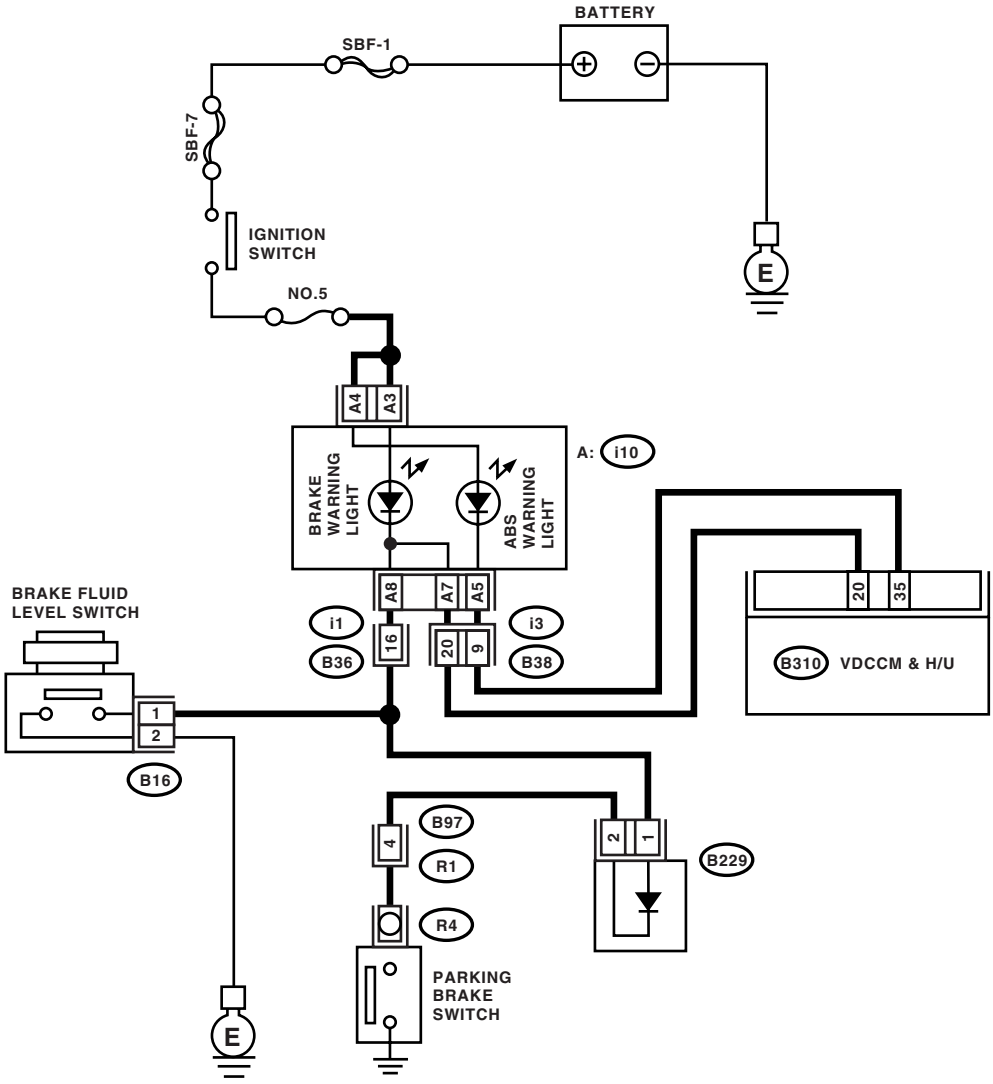
- Defective combination meter
- Open in harness

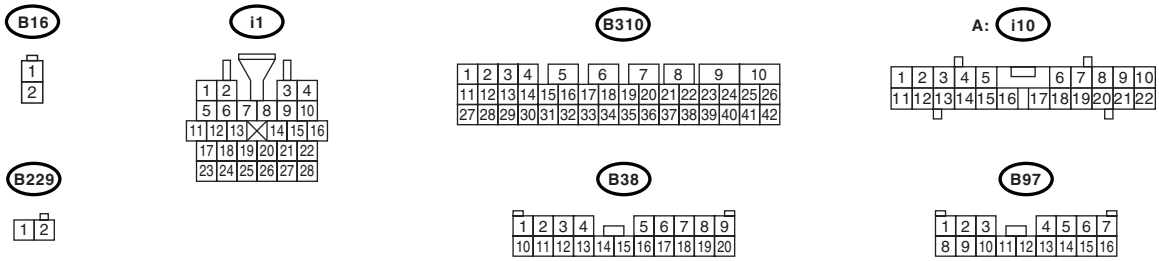
TROUBLE SYMPTOM:

When starting the engine, the ABS warning light is kept ON.

WIRING DIAGRAM:

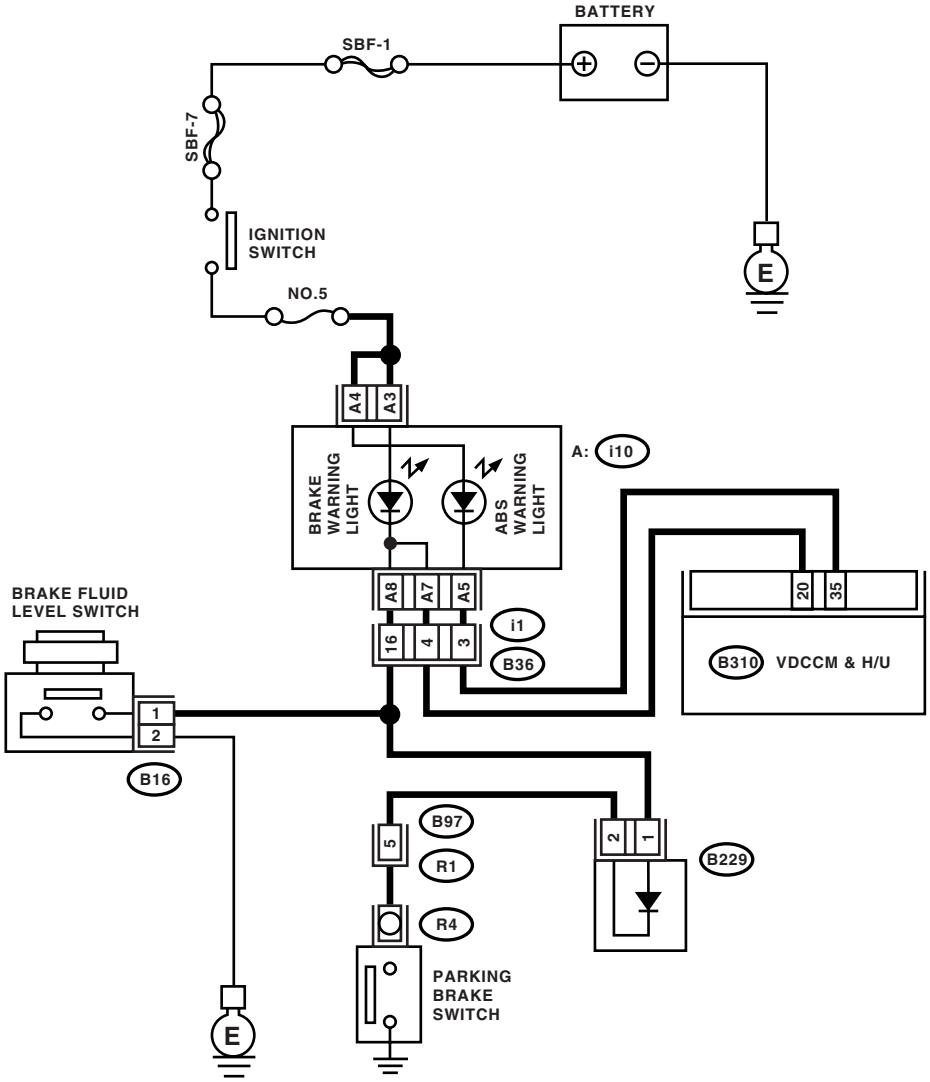
- LHD model

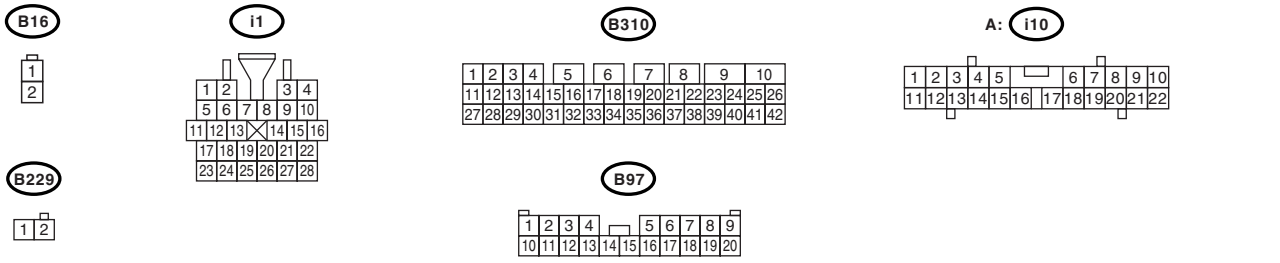




VDC00245

• RHD model





VDC00238

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK WIRING HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector (B310) from VDCCM&H/U. 3) Disconnect the connector (i10) from combination meter. 4) Measure the resistance between VDCCM&H/U connector and combination meter connector. ***Connector & terminal*** ***(B310) No. 35 — (i10) No. A5:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the harness connector between VDCCM&H/U and combination meter.
3	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **4.**
4	**CHECK VDCCM.** 1) Connect the connector to VDCCM&H/U (B310). 2) Turn the ignition switch to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. A5 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the VDCCM&H/U.

E: VDC INDICATOR LIGHT DOES NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication

TROUBLE SYMPTOM:

When starting the engine, VDC indicator light is kept ON.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **3.**
3	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter.

F: VDC WARNING LIGHT AND VDC OFF INDICATOR LIGHT DO NOT GO OFF

DETECTING CONDITION:

- Defective combination meter
- Defective CAN communication
- Defective engine
- VDC OFF switch is shorted.

TROUBLE SYMPTOM:

When starting the engine, VDC OFF indicator light is kept ON.

NOTE:
When pressing the VDC OFF switch for more than 10 seconds, the VDC OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the OFF operation enabled status is restored.

	Step	Check	Yes	No
1	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK ENGINE.**	Does the malfunction indicator light illuminate?	Repair the engine.	Go to step **3.**
3	**CHECK ENGINE COOLANT.** Warm up the engine and check if VDC warning light and VDC OFF indicator light illumination condition changes.	When the engine coolant temperature is too low, VDC warning light and VDC OFF indicator light illuminate. Does the lights go off when the engine is warmed-up?	Normal Operation	Go to step **4.**
4	**CHECK VDC OFF SWITCH.** Remove and check VDC OFF switch.	Is VDC OFF switch normal?	Go to step **5.**	Replace the VDC OFF switch.
5	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **6.**
6	**CHECK COMBINATION METER.** Check the combination meter.	Is combination meter OK?	Replace the VDCCM&H/U.	Repair the combination meter.

G: BRAKE WARNING LIGHT DOES NOT GO OFF

DETECTING CONDITION:

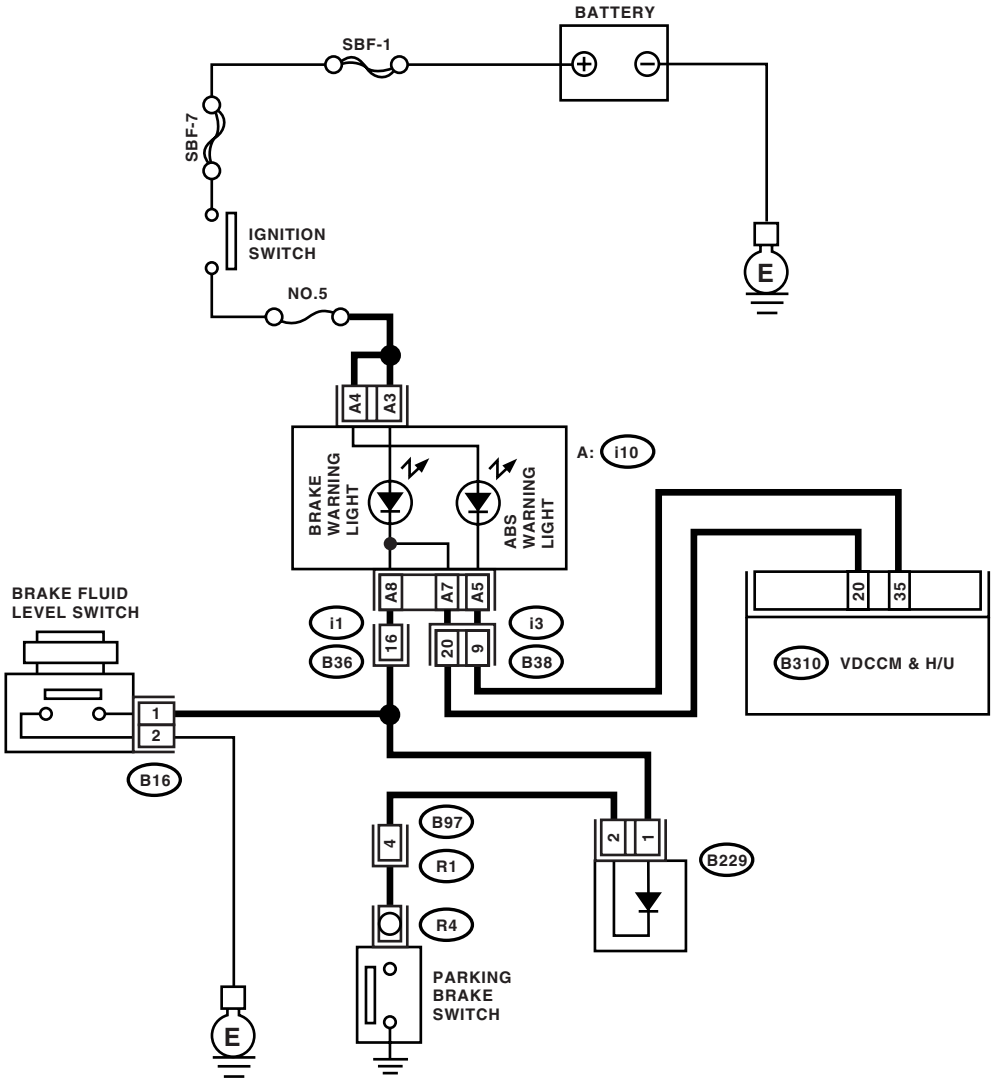
- Brake warning light circuit is shorted.
- Defective sensor/connector

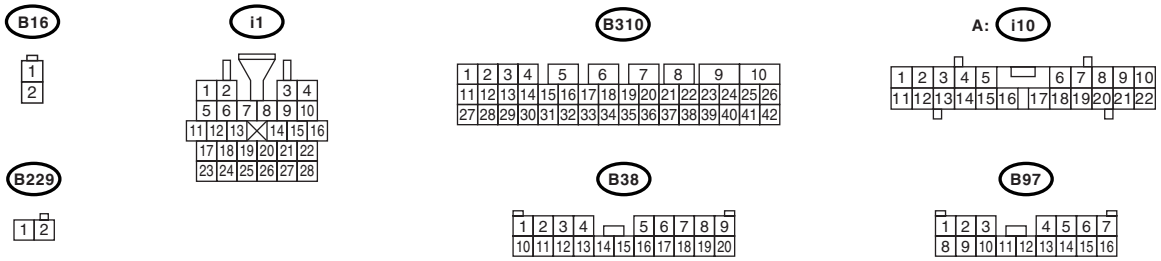
TROUBLE SYMPTOM:

After starting the engine, the brake warning light is kept on though the parking lever is released.

WIRING DIAGRAM:

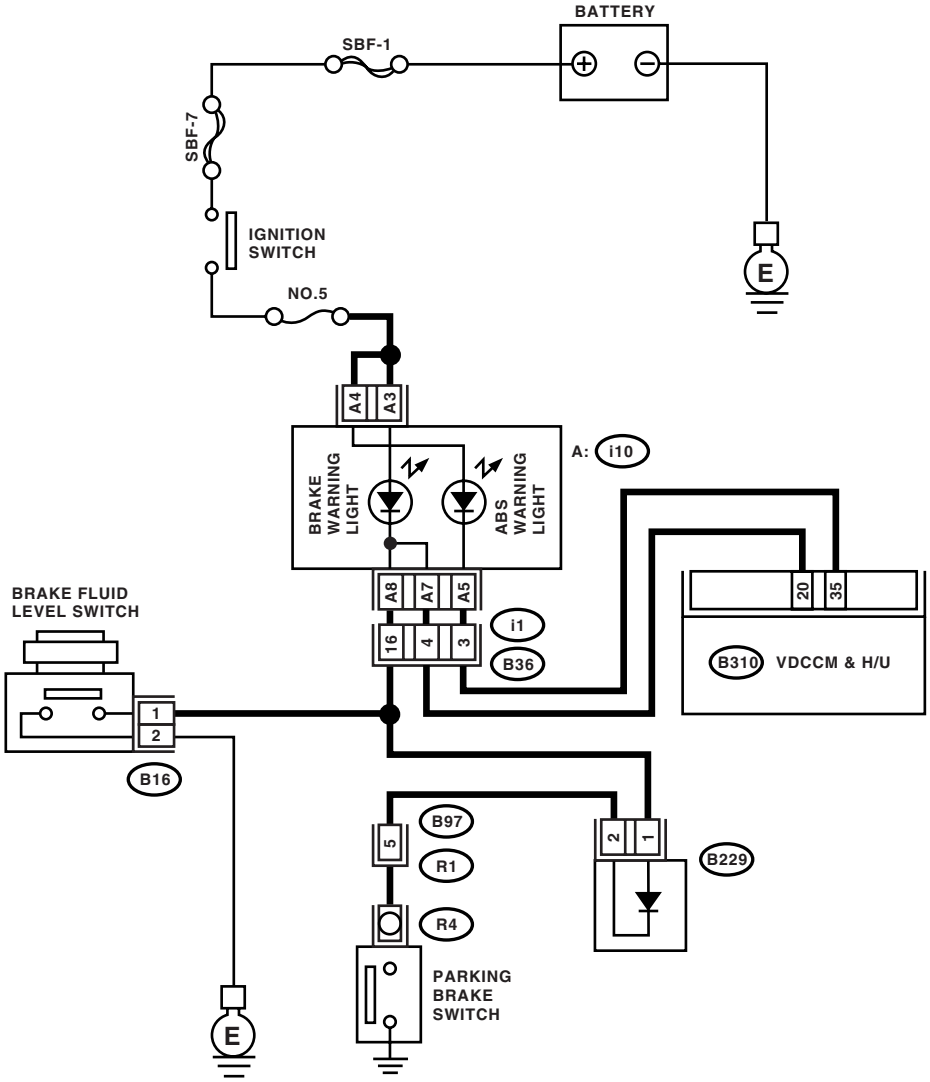
- LHD model

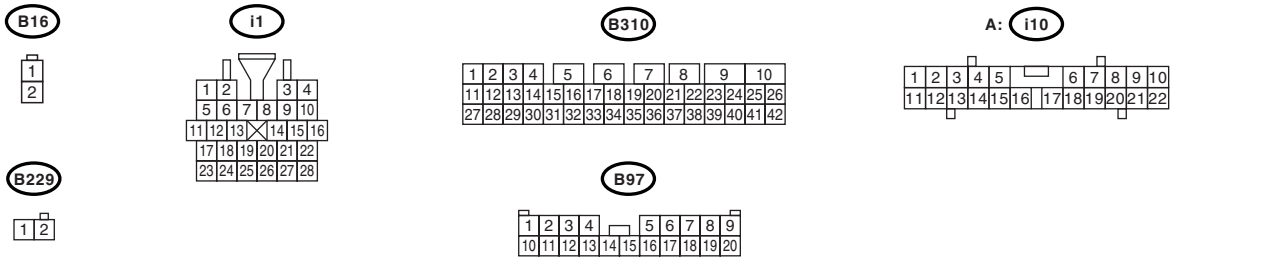




VDC00245

• RHD model





VDC00238

	Step	Check	Yes	No
1	**CHECK INSTALLATION OF VDCCM&H/U CONNECTOR.** 1) Turn the ignition switch to OFF. 2) Check that VDCCM&H/U connector is inserted until it is locked by clamp.	Is the connector firmly inserted?	Go to step **2.**	Insert the VDCCM&H/U connector until it is locked by clamp.
2	**READ DTC.** Read the DTC. <Ref. to VDC(diag)-22, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK BRAKE FLUID AMOUNT.** Check the amount of brake fluid in the reservoir tank of master cylinder.	Is the amount of brake fluid between the lines of “MAX” and “MIN”?	Go to step **4.**	Replenish brake fluid to the specified value.
4	**CHECK BRAKE FLUID LEVEL SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the level switch connector (B16) from master cylinder. 3) Measure the resistance of master cylinder terminals. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the master cylinder.
5	**CHECK PARKING BRAKE SWITCH.** 1) Disconnect the connector (R4) from parking brake switch. 2) Release the parking brake. 3) Measure the resistance between parking brake switch terminal and chassis ground.	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the parking brake switch.
6	**CHECK GROUND SHORT OF HARNESS.** 1) Disconnect the connector (i10) from combination meter. 2) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. A7 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness connector between combination meter brake fluid level switch and parking brake switch.
7	**CHECK HARNESS CONNECTOR.** 1) Disconnect the connector (B310) from VDCCM&H/U. 2) Disconnect the connector (i10) from combination meter. 3) Measure the resistance between VDCCM&H/U connector and combination connector. ***Connector & terminal*** ***(B310) No. 20 — (i10) No. A7:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Repair the harness connector between VDCCM&H/U and combination meter.
8	**CHECK POOR CONTACT IN CONNECTOR.** Check poor contact in all connectors.	Is there poor contact?	Repair the connector.	Go to step **9.**
9	**CHECK VDCCM.** 1) Connect the connector (B310) to VDCCM&H/U. 2) Turn the ignition to ON. 3) Measure the resistance between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. A7 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Check the combination meter.	Replace the VDCCM&H/U.

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0021	698XH	FR sensor power supply failure	Abnormal power supply of front ABS wheel speed sensor RH	<Ref. to VDC(diag)-43, DTC C0021 FRONT ABS WHEEL SPEED SENSOR RH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	6A0XH	Front Right ABS Sensor Circuit Open or Shorted Battery	Open/high input of front ABS wheel speed sensor RH	<Ref. to VDC(diag)-46, DTC C0021 OPEN/HIGH INPUT OF FRONT ABS WHEEL SPEED SENSOR RH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0022	68CXH 68EXH 690XH 694XH 696XH	Front Right ABS Sensor Signal	Front ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-51, DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0023	618XH	FL sensor power supply failure	Front ABS wheel speed sensor LH power supply malfunction	<Ref. to VDC(diag)-43, DTC C0023 FRONT ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	620XH	Front Left ABS Sensor Circuit Open or Shorted Battery	Open/high input of front ABS wheel speed sensor LH	<Ref. to VDC(diag)-46, DTC C0023 OPEN/HIGH INPUT OF FRONT ABS WHEEL SPEED SENSOR LH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0024	60CXH 60EXH 610XH 614XH 616XH	Front Left ABS Sensor Signal	Front ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-51, DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0025	658XH	RR sensor power supply failure	Rear ABS wheel speed sensor RH power supply malfunction	<Ref. to VDC(diag)-43, DTC C0025 REAR ABS WHEEL SPEED SENSOR RH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	660XH	Rear Right ABS Sensor Circuit Open or Shorted Battery	Open/high input of rear ABS wheel speed sensor RH	<Ref. to VDC(diag)-46, DTC C0025 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR RH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0026	64CXH 64EXH 650XH 654XH 656XH	Rear Right ABS Sensor Signal	Rear ABS wheel speed sensor RH signal malfunction	<Ref. to VDC(diag)-51, DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0027	6D8XH	RL sensor power supply failure	Rear ABS wheel speed sensor LH power supply malfunction	<Ref. to VDC(diag)-44, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	6E0XH	Rear Left ABS Sensor Circuit Open or Shorted Battery	Open/high input of rear ABS wheel speed sensor LH	<Ref. to VDC(diag)-47, DTC C0027 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0028	6CCXH 6CEXH 6D0XH 6D4XH 6D6XH	Rear Left ABS Sensor Signal	Rear ABS wheel speed sensor LH signal malfunction	<Ref. to VDC(diag)-52, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0029	608XH 648XH 688XH 6C8XH 704XH 606XH 646XH 686XH 6C6XH 702XH 604XH 644XH 684XH 6C4XH 70CXH 720XH 710XH	Any One of Four ABS Sensors Signal	ABS wheel speed sensor signal malfunction in one of four wheels	<Ref. to VDC(diag)-57, DTC C0029 ABS WHEEL SPEED SENSOR SIGNAL MALFUNCTION IN ONE OF FOUR WHEELS, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0031	320XH	FR hold valve malfunction	Front inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-61, DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0032	360XH	FR pressure reducing valve malfunction	Front outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-61, DTC C0032 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0033	220XH	FL hold valve malfunction	Front inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-61, DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0034	260XH	FL pressure reducing valve malfunction	Front outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-61, DTC C0034 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0035	2A0XH	RR hold valve malfunction	Rear inlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-61, DTC C0035 REAR INLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0036	2E0XH	RR pressure reducing valve malfunction	Rear outlet solenoid valve RH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0036 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0037	3A0XH	RL hold valve malfunction	Rear inlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0037 REAR INLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0038	3E0XH	RL pressure reducing valve malfunction	Rear outlet solenoid valve LH malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0038 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0061	4A0XH	Normal opening valve 1 malfunction	Secondary cut valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0061 SECONDARY CUT VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0062	4E0XH	Normal opening valve 2 malfunction	Primary cut valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0062 PRIMARY CUT VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0063	520XH	Normal closing valve 1 malfunction	Secondary suction valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-62, DTC C0063 SECONDARY SUCTION VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0064	560XH	Normal closing valve 2 malfunction	Primary suction valve malfunction in VDCCM&H/U	<Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDCCM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0041	000XH 002XH 004XH 006XH 010XH 012XH 014XH 016XH 018XH 01AXH 01EXH 024XH 026XH 028XH 02AXH 02CXH 02EXH 030XH 03AXH 03CXH 03DXH 03EXH 034XH 036XH 038XH	ECM	VDC control module (VDCCM) malfunction	<Ref. to VDC(diag)-65, DTC C0041 VDC CONTROL MODULE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0042	7CEXH 7D0XH	Power supply voltage failure	Power voltage malfunction	<Ref. to VDC(diag)-67, DTC C0042 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	7CCXH	Speed sen. power supply failure	ABS wheel speed sensor power malfunction	<Ref. to VDC(diag)-70, DTC C0042 ABS WHEEL SPEED SENSOR POWER MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0044	9A0XH	TCM communication circuit	CAN communication malfunction of transmission control module	<Ref. to VDC(diag)-70, DTC C0044 AT COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0045	970XH 822XH	Incorrect VDC Control Module specifications	Different VDC control module specification	<Ref. to VDC(diag)-71, DTC C0045 DIFFERENT VDC CONTROL MODULE SPECIFICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	972XH	TCM malfunction	AT control module malfunction	<Ref. to VDC(diag)-72, DTC C0045 AT CONTROL MODULE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0047	788XH 78CXH 7A0XH 7A4XH	Improper CAN communication	Improper CAN communication	<Ref. to VDC(diag)-73, DTC C0047 IMPROPER CAN COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0051	048XH	Valve relay OFF failure	Valve relay OFF malfunction	<Ref. to VDC(diag)-75, DTC C0051 VALVE RELAY OFF MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	04AXH 04CXH	Valve relay	Valve relay system	<Ref. to VDC(diag)-77, DTC C0051 VALVE RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	06AXH	Valve relay test failure	Valve relay test malfunction	<Ref. to VDC(diag)-79, DTC C0051 VALVE RELAY TEST MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	00DXH	Valve relay ON failure	Valve relay ON malfunction	<Ref. to VDC(diag)-81, DTC C0051 VALVE RELAY ON MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0052	58AXH	Motor and motor relay	Motor/motor relay system	<Ref. to VDC(diag)-83, DTC C0052 MOTOR/ MOTOR RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	5A0XH	Motor and motor relay OFF failure	Motor/motor relay OFF malfunction	<Ref. to VDC(diag)-85, DTC C0052 MOTOR/ MOTOR RELAY OFF MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	58EXH	Motor and motor relay ON failure	Motor/motor relay ON malfunction	<Ref. to VDC(diag)-86, DTC C0052 MOTOR/ MOTOR RELAY ON MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	58CXH	Motor malfunction	Motor	<Ref. to VDC(diag)-88, DTC C0052 MOTOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0054	0A0XH	Brake Light Switch	BLS open circuit	<Ref. to VDC(diag)-89, DTC C0054 BLS OPEN CIRCUIT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	08CXH	BLS ON malfunction	BLS ON malfunction	<Ref. to VDC(diag)-91, DTC C0054 BLS ON MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0057	820XH	EGI communication circuit	CAN communication malfunction of engine control module	<Ref. to VDC(diag)-93, DTC C0057 EGI COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0071	148XH	Steering angle sensor offset is too big	Excessive steering angle sensor output offset	<Ref. to VDC(diag)-94, DTC C0071 EXCESSIVE STEERING ANGLE SENSOR OUTPUT OFFSET, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	14AXH	Change range of steering angle sensor is too big	Excessive variation amount of steering angle sensor output	<Ref. to VDC(diag)-96, DTC C0071 EXCESSIVE VARIATION AMOUNT OF STEERING ANGLE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	142XH 144XH 146XH 14EXH 158XH 15AXH 15CXH 15EXH 14CXH 164XH 166XH 16AXH 16CXH 16EXH 170XH	Steering angle sensor malfunction	Steering angle sensor output	<Ref. to VDC(diag)-98, DTC C0071 STEERING ANGLE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	160XH	No signal from steering angle sensor	Steering angle sensor communication	<Ref. to VDC(diag)-100, DTC C0071 STEERING ANGLE SENSOR COMMUNICATION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	764XH	Steering angle sensor malfunction	Steering angle sensor power supply malfunction	<Ref. to VDC(diag)-103, DTC C0071 STEERING ANGLE SENSOR POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0072	184XH 188XH 18EXH	Abnormal yaw rate sensor output	Yaw rate sensor output	<Ref. to VDC(diag)-106, DTC C0072 YAW RATE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	180XH 182XH 186XH 190XH 194XH 196XH 198XH 19AXH	Abnormal yaw rate sensor output	Yaw rate sensor output	<Ref. to VDC(diag)-106, DTC C0072 YAW RATE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	192XH	Abnormal yaw rate sensor output	Yaw rate sensor output	<Ref. to VDC(diag)-106, DTC C0072 YAW RATE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	1A0XH 18BXH	Voltage inputted to yaw rate sensor exceeds specification	Yaw rate sensor power supply/output	<Ref. to VDC(diag)-108, DTC C0072 YAW RATE SENSOR POWER/OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	19CXH	Abnormal yaw rate sensor reference voltage	Yaw rate sensor reference	<Ref. to VDC(diag)-111, DTC C0072 YAW RATE SENSOR REFERENCE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	18CXH	Change range of yaw rate sensor signal is too big	Excessive variation amount of yaw rate sensor output	<Ref. to VDC(diag)-114, DTC C0072 EXCESSIVE VARIATION AMOUNT OF YAW RATE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Detailed code	Display	Content of diagnosis	Reference target
C0073	1C8XH 1CAXH	Lateral G sensor offset is too big	Excessive amount of lateral G sensor output offset	<Ref. to VDC(diag)-117, DTC C0073 EXCESSIVE AMOUNT OF LATERAL G SENSOR OUTPUT OFFSET, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	1C0XH 1C6XH 1D8XH	Abnormal lateral G sensor output	Lateral G sensor output	<Ref. to VDC(diag)-117, DTC C0073 LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	1CCXH	Change range of lateral G sensor is too big	Excessive variation amount of lateral G sensor output	<Ref. to VDC(diag)-117, DTC C0073 EXCESSIVE VARIATION AMOUNT OF LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	1D2XH	Excessive lateral G sensor signal	Excessive lateral G sensor output	<Ref. to VDC(diag)-118, DTC C0073 EXCESSIVE LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	1E0XH	Voltage inputted to lateral G sensor exceeds specification	Lateral G sensor power/output	<Ref. to VDC(diag)-120, DTC C0073 LATERAL G SENSOR POWER/OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0074	118XH	Pressure sensor test failure	Pressure sensor test malfunction	<Ref. to VDC(diag)-123, DTC C0074 PRESSURE SENSOR TEST MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	110XH	Pressure sensor offset is too big	Excessive pressure sensor output offset	<Ref. to VDC(diag)-125, DTC C0074 EXCESSIVE PRESSURE SENSOR OUTPUT OFFSET, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	120XH 113XH	Pressure sensor power/output	Pressure sensor power/output	<Ref. to VDC(diag)-126, DTC C0074 PRESSURE SENSOR POWER/OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	102XH 108XH	Pressure sensor output	Pressure sensor output	<Ref. to VDC(diag)-127, DTC C0074 PRESSURE SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
	124XH	Pressure sensor power supply malfunction	Pressure sensor power supply malfunction	<Ref. to VDC(diag)-130, DTC C0074 PRESSURE SENSOR POWER MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
C0081	746XH	System failure	System malfunction	<Ref. to VDC(diag)-131, DTC C0081 SYSTEM MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC C0021 FRONT ABS WHEEL SPEED SENSOR RH POWER SUPPLY MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0027 “REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION”. <Ref. to VDC(diag)-44, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: DTC C0023 FRONT ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0027 “REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION”. <Ref. to VDC(diag)-44, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

C: DTC C0025 REAR ABS WHEEL SPEED SENSOR RH POWER SUPPLY MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0027 “REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION”. <Ref. to VDC(diag)-44, DTC C0027 REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

D: DTC C0027 REAR ABS WHEEL SPEED SENSOR LH POWER SUPPLY MALFUNCTION

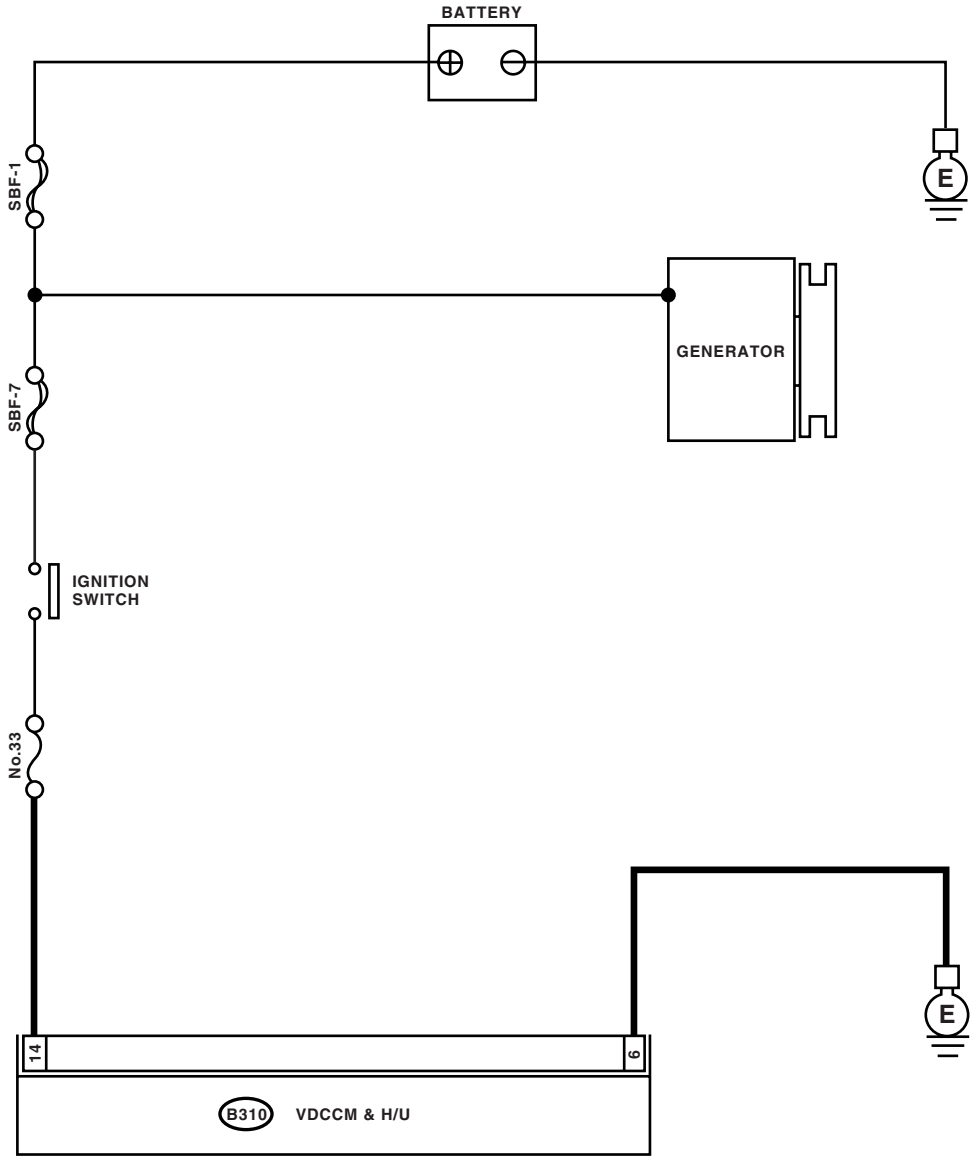
DTC DETECTING CONDITION:

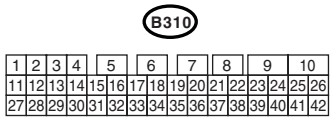
Defective ABS wheel speed sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00216

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTOR.** Check if there is poor contact in VDCCM&H/U power supply circuit.	Is there poor contact?	Repair the connector.	Go to step **2.**
2	**CHECK VDCCM&H/U POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. ***Terminals*** ***(B310) No. 14 (+) — (B310) No. 6 (–):***	Is the voltage 10 — 15 V?	Go to step **3.**	Check the generator, battery and VDCCM&H/U power supply circuit.
3	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

E: DTC C0021 OPEN/HIGH INPUT OF FRONT ABS WHEEL SPEED SENSOR RH

NOTE:
For the diagnostic procedure, refer to DTC C0027 “OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH”. <Ref. to VDC(diag)-47, DTC C0027 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

F: DTC C0023 OPEN/HIGH INPUT OF FRONT ABS WHEEL SPEED SENSOR LH

NOTE:
For the diagnostic procedure, refer to DTC C0027 “OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH”. <Ref. to VDC(diag)-47, DTC C0027 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

G: DTC C0025 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR RH

NOTE:
For the diagnostic procedure, refer to DTC C0027 “OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH”. <Ref. to VDC(diag)-47, DTC C0027 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

H: DTC C0027 OPEN/HIGH INPUT OF REAR ABS WHEEL SPEED SENSOR LH

DTC DETECTING CONDITION:

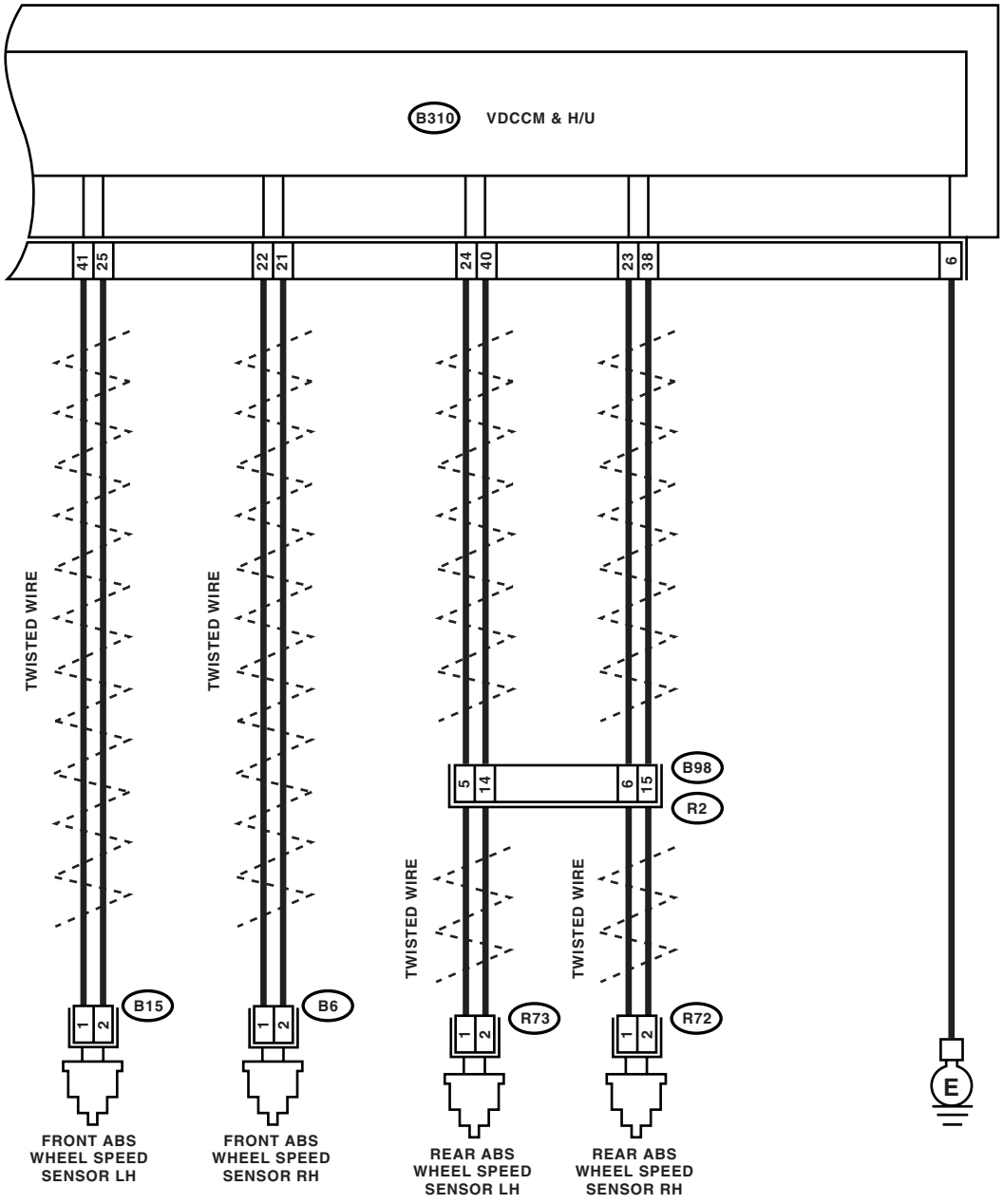
- Defective ABS wheel speed sensor (broken wire, input voltage too high)
- Defective harness connector

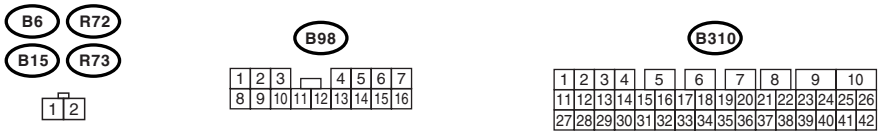
TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:

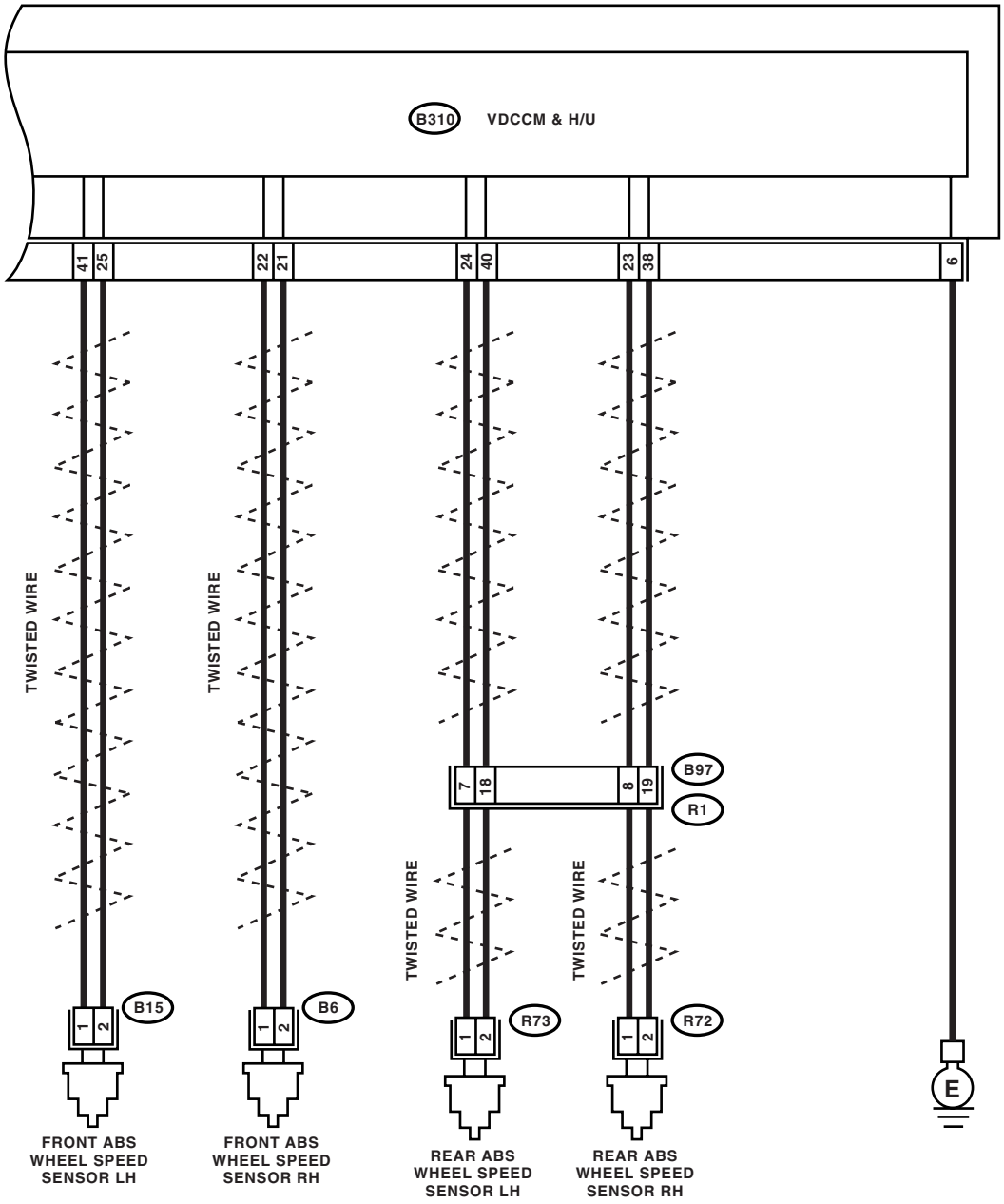
- LHD model

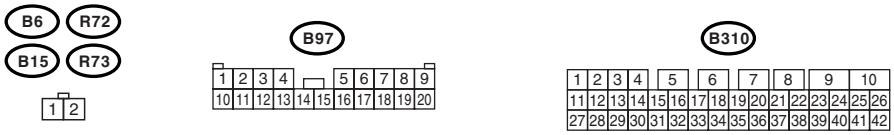




VDC00246

• RHD model





VDC00215

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTOR.** Check if there is poor contact between VDCCM&H/U and ABS wheel speed sensor.	Is there poor contact?	Repair the connector.	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN VDCCM&H/U AND ABS WHEEL SPEED SENSOR.** 1) Disconnect the connector (B310) from VDCCM&H/U. 2) Disconnect the connector from ABS wheel speed sensor. 3) Measure the resistance between VDCCM&H/U connector and ABS wheel speed sensor connector. ***Connector & terminal*** ***DTC C0021*** ***(B310) No. 22 — (B6) No. 1:*** ***(B310) No. 21 — (B6) No. 2:*** ***DTC C0023*** ***(B310) No. 41 — (B15) No. 1:*** ***(B310) No. 25 — (B15) No. 2:*** ***DTC C0025*** ***(B310) No. 23 — (R72) No. 1:*** ***(B310) No. 38 — (R72) No. 2:*** ***DTC C0027*** ***(B310) No. 24 — (R73) No. 1:*** ***(B310) No. 40 — (R73) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
3	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***DTC C0021*** ***(B310) No. 21 — Chassis ground:*** ***DTC C0023*** ***(B310) No. 25 — Chassis ground:*** ***DTC C0025*** ***(B310) No. 38 — Chassis ground:*** ***DTC C0027*** ***(B310) No. 40 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Repair the harness connector between VDCCM&H/U and ABS wheel speed sensor.
4	**CHECK ABS WHEEL SPEED SENSOR POWER SUPPLY CIRCUIT.** 1) Connect the VDCCM&H/U connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between ABS wheel speed sensor connector and chassis ground. ***Connector & terminal*** ***DTC C0021*** ***(B6) No. 1 (+) — Chassis ground (−):*** ***DTC C0023*** ***(B15) No. 1 (+) — Chassis ground (−):*** ***DTC C0025*** ***(R72) No. 1 (+) — Chassis ground (−):*** ***DTC C0027*** ***(R73) No. 1 (+) — Chassis ground (−):***	Is the voltage 5 — 16 V?	Go to step **6.**	Go to step **5.**

	Step	Check	Yes	No
5	**CHECK VDCCM&H/U POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 14 (+) — (B310) No. 6 (–):***	Is the voltage 10 — 15 V?	Go to step **7.**	Check the generator, battery and VDCCM&H/U power supply circuit.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to ABS-15, ABS WHEEL SPEED SENSOR, INSPECTION, Rear ABS Wheel Speed Sensor.>	Is waveform pattern same as shown in the figure.	Go to step **7.**	Replace the ABS wheel speed sensor.
7	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8.**
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

I: DTC C0022 FRONT ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-52, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

J: DTC C0024 FRONT ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-52, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

K: DTC C0026 REAR ABS WHEEL SPEED SENSOR RH SIGNAL MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0028 “REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION”. <Ref. to VDC(diag)-52, DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

L: DTC C0028 REAR ABS WHEEL SPEED SENSOR LH SIGNAL MALFUNCTION

DTC DETECTING CONDITION:

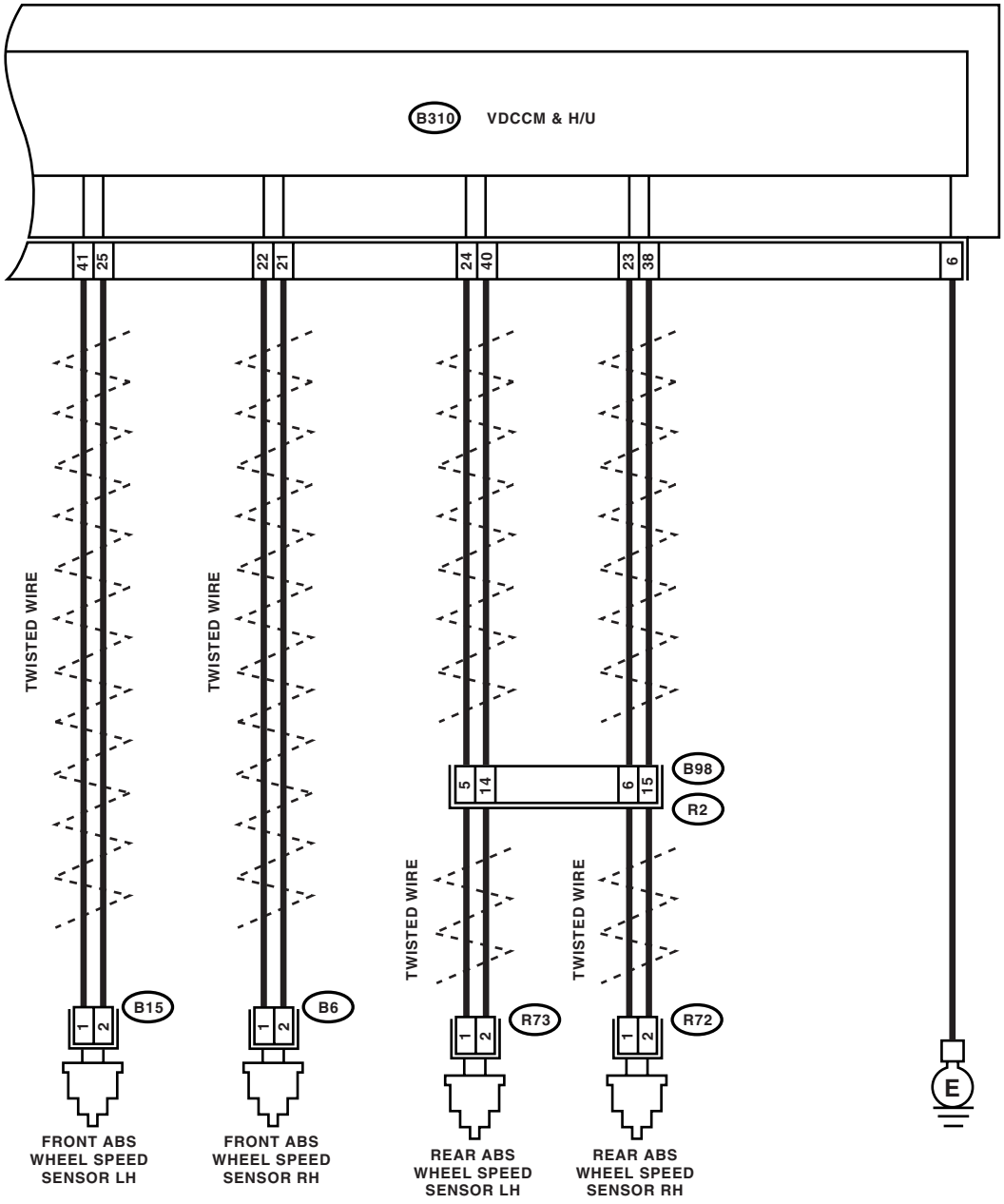
- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective harness connector

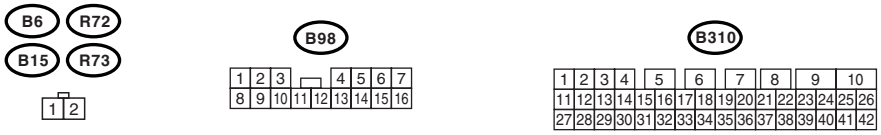
TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:

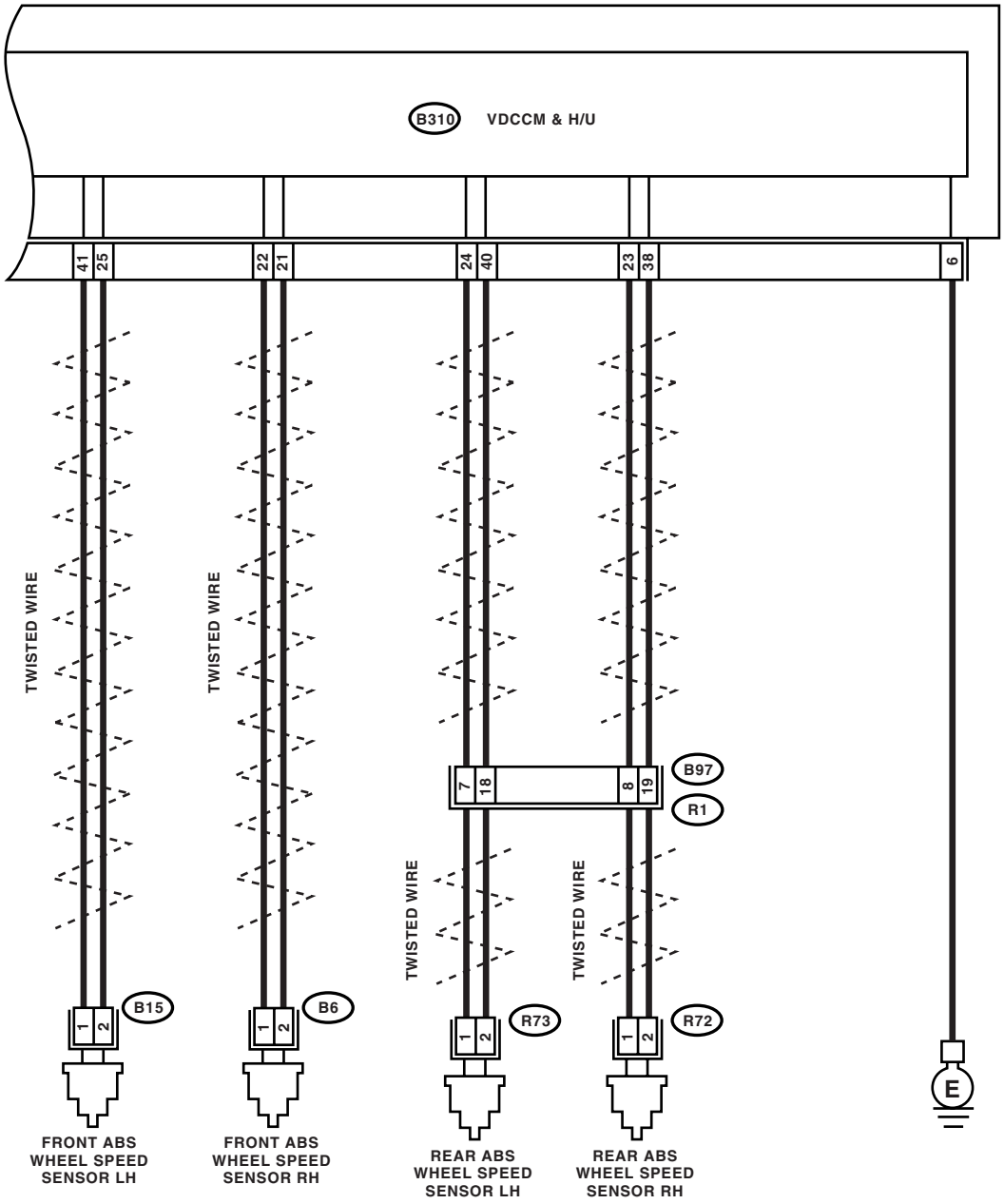
- LHD model

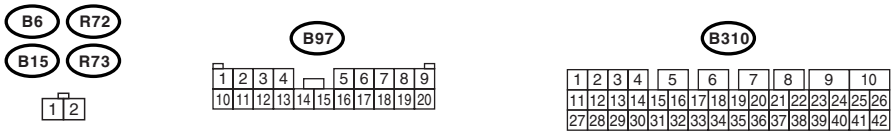




VDC00246

• RHD model





VDC00215

	Step	Check	Yes	No
1	**CHECK OUTPUT OF ABS WHEEL SPEED SENSOR USING SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the ABS wheel speed sensor output corresponding to the faulty wheel in Subaru Select Monitor data display mode.	Does the speed indicated on the display change in response to the speedometer reading during acceleration/deceleration when the steering wheel is in the straight-ahead position?	Go to step **2.**	Go to step **7.**
2	**CHECK POOR CONTACT IN CONNECTOR.** Turn the ignition switch to OFF.	Is there poor contact in connectors between VDCCM&H/U and ABS wheel speed sensor?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the car phone, radio wave device like radio and etc., or electric device are installed correctly.	Are the car phone, radio wave device like radio and etc., or electric device installed correctly?	Go to step **4.**	Install the radio wave device and electric device properly.
4	**CHECK SOURCES OF SIGNAL NOISE.** Check if the noise sources (such as an antenna) are installed near the sensor harness.	Are noise sources installed?	Install the noise sources apart from the sensor harness.	Go to step **5.**
5	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.
7	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Is the ABS wheel speed sensor installation bolt tightened 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **8.**	Tighten the ABS wheel speed sensor installation bolts.
8	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Is the oscilloscope pattern the same waveform as shown in the figure when the tire is rotated? Is the pattern as shown in the figure displayed regularly in the oscilloscope when the tire is slowly rotated more than one revolution with even speed?	Go to step **9.**	Go to step **13.**
9	**CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.**	Are there foreign materials, breakage or damage in the protrusion of ABS wheel speed sensor or magnetic encoder?	Remove dirt thoroughly. Replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing when it is broken or damaged.	Go to step **10.**
10	**CHECK SOURCES OF SIGNAL NOISE.** Make sure the car phone, radio wave device like radio and etc., or electric device are installed correctly.	Is the car phone, radio wave device like radio and etc., or electric device installed correctly?	Go to step **11.**	Install the radio wave device and electric device properly.
11	**CHECK SOURCES OF SIGNAL NOISE.** Check if the noise sources are (such as an antenna) installed near the sensor harness.	Are noise sources installed?	Go to step **12.**	Install the noise sources apart from the sensor harness.

	Step	Check	Yes	No
12	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **13.**
13	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference. NOTE: Though the ABS warning light remains on at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to turn ABS warning light off. Be sure to drive the vehicle and check the warning light goes off.

M: DTC C0029 ABS WHEEL SPEED SENSOR SIGNAL MALFUNCTION IN ONE OF FOUR WHEELS

DTC DETECTING CONDITION:

- Defective ABS wheel speed sensor signal (noise, irregular signal, etc.)
- Defective magnetic encoder
- When a wheel is turned freely for a long time

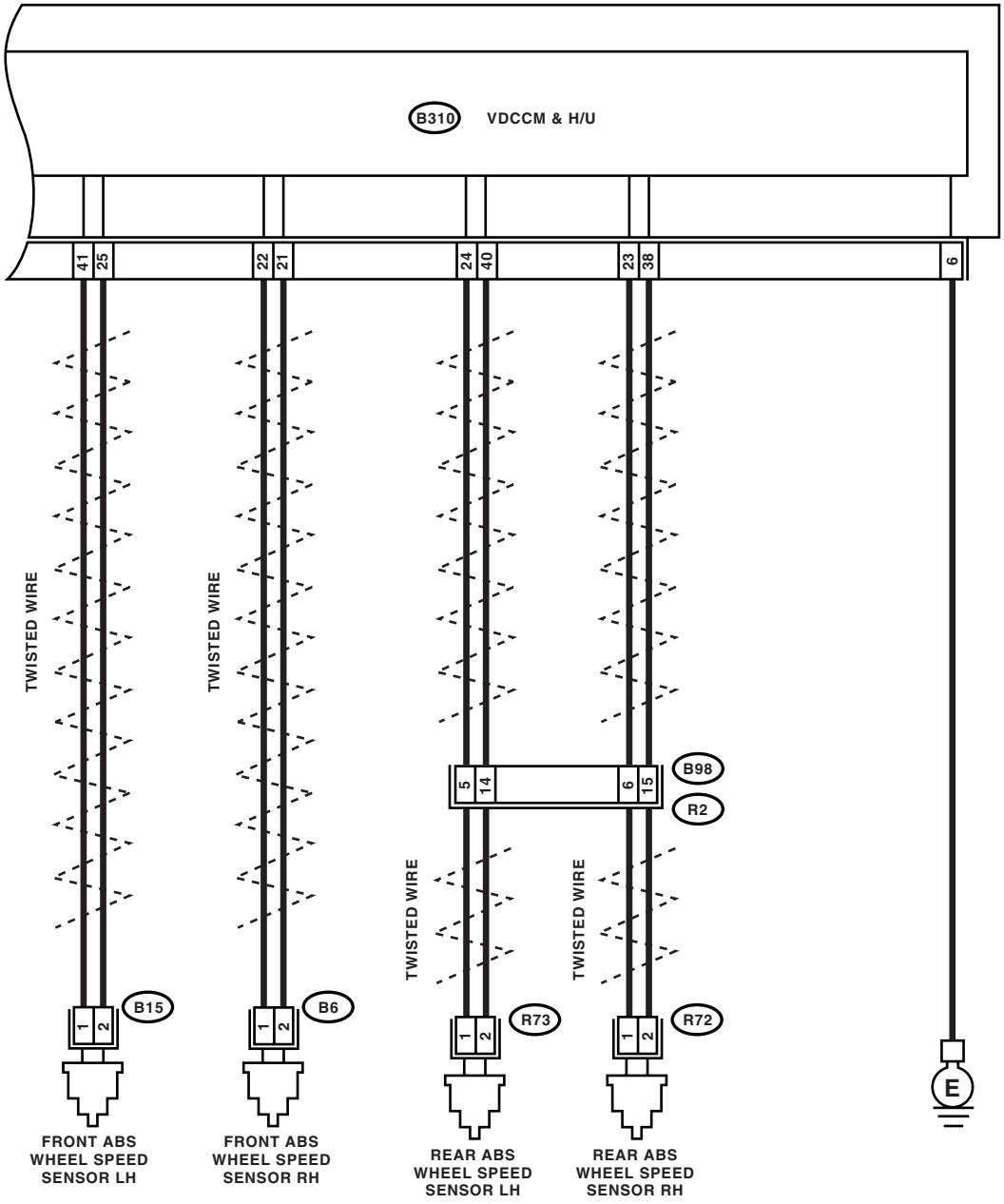
TROUBLE SYMPTOM:

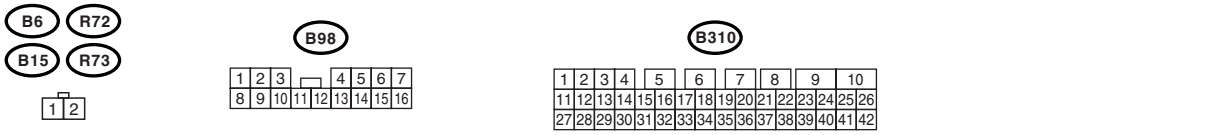
- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

NOTE:
Brake warning light comes on as well as ABS warning light when EBD does not operate.

WIRING DIAGRAM:

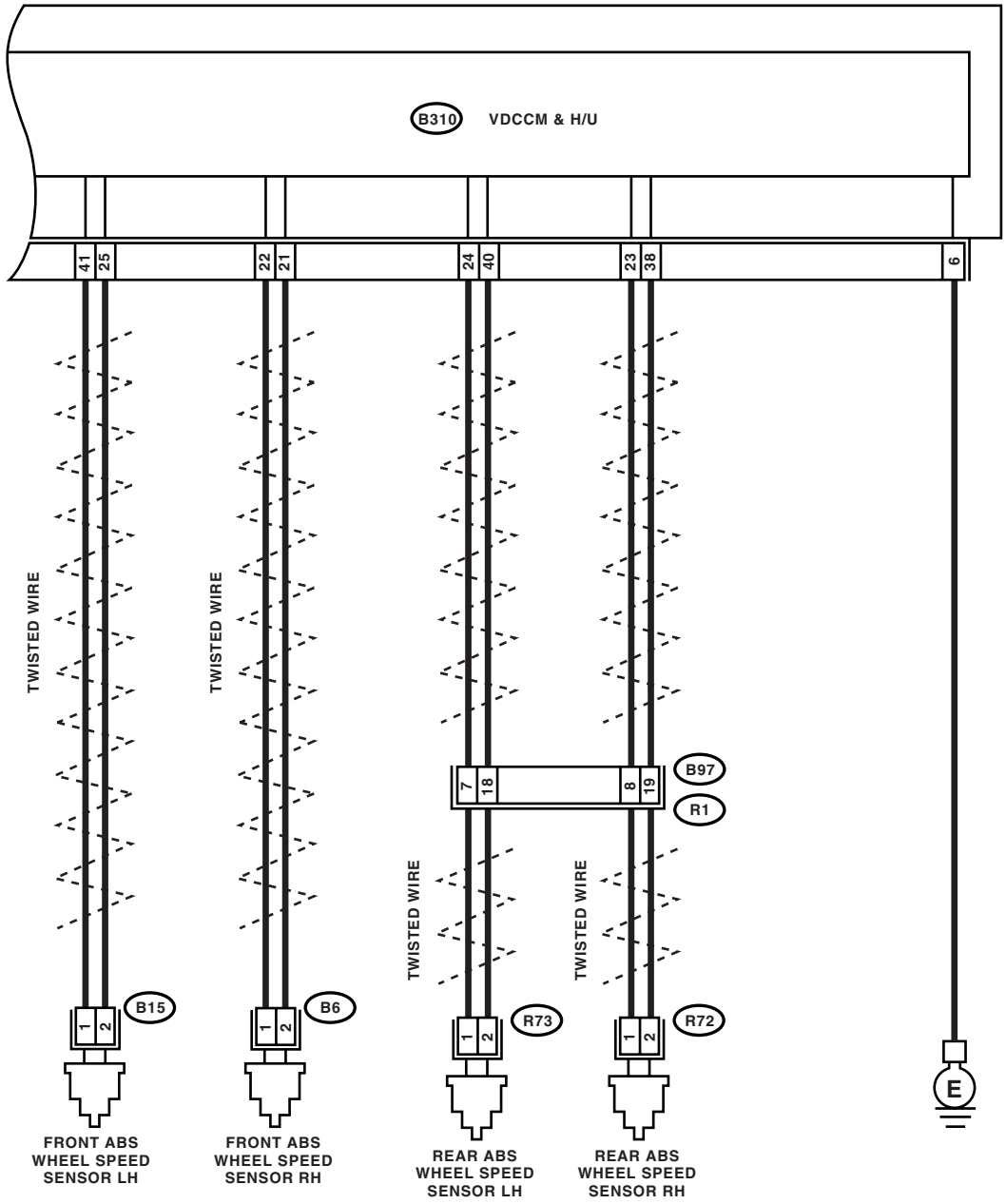
- LHD model

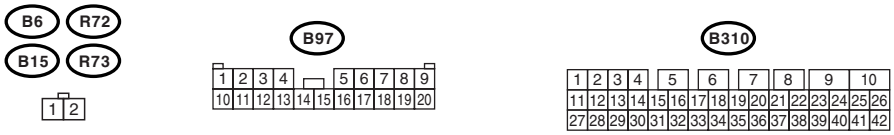




VDC00246

• RHD model





VDC00215

	Step	Check	Yes	No
1	**WHETHER A WHEEL TURNED FREELY OR NOT.** Check if the wheels have been turned freely for more than one minute, such as when the vehicle is jacked-up, under full-lock cornering or when the wheels are not in contact with road surface.	Did the wheels turn freely?	VDC is normal. Erase the memory. NOTE: When the wheels turn freely for a long time, such as when the vehicle is towed or jacked-up, or when steering wheel is continuously turned all the way, this diagnostic trouble code may sometimes occur.	Go to step **2.**
2	**CHECK TIRE SPECIFICATIONS.** Turn the ignition switch to OFF.	Are the tire specifications correct?	Go to step **3.**	Replace the tire.
3	**CHECK WEAR OF TIRE.**	Is the tire worn excessively?	Replace the tire.	Go to step **4.**
4	**CHECK TIRE INFLATION PRESSURE.**	Is the tire pressure correct?	Go to step **5.**	Adjust the tire pressure.
5	**CHECK INSTALLATION OF ABS WHEEL SPEED SENSOR.**	Are the ABS wheel speed sensor installation bolts tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)? (For four wheels)	Go to step **6.**	Tighten the ABS wheel speed sensor installation bolts.
6	**CHECK ABS WHEEL SPEED SENSOR SIGNAL.** 1) Install the ABS wheel speed sensor. 2) Prepare an oscilloscope. 3) Check the ABS wheel speed sensor. <Ref. to ABS-13, ABS WHEEL SPEED SENSOR, INSPECTION, Front ABS Wheel Speed Sensor.>	Is the oscilloscope pattern the same waveform as shown in the figure when the tire is rotated? Is the pattern as shown in the figure displayed regularly in the oscilloscope when the tire is slowly rotated more than one revolution with even speed?	Go to step **8.**	Go to step **7.**
7	**CHECK ABS WHEEL SPEED SENSOR OR MAGNETIC ENCODER.**	Are there foreign materials, breakage or damage in the protrusion of ABS wheel speed sensor or magnetic encoder?	Remove dirt thoroughly. Replace the ABS wheel speed sensor or magnetic encoder as a unit with hub unit bearing if there is breakage or damage.	Go to step **8.**
8	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. <Ref. to VDC(diag)-23, PROCEDURE, Inspection Mode.> 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **9.**

Step		Check	Yes	No
9	CHECK OTHER DTC DETECTION.	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference. NOTE: Though the ABS warning light remains on at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to turn off the ABS warning light. Be sure to drive the vehicle and check the warning light goes off.

N: DTC C0031 FRONT INLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

O: DTC C0032 FRONT OUTLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

P: DTC C0033 FRONT INLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Q: DTC C0034 FRONT OUTLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

R: DTC C0035 REAR INLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

S: DTC C0036 REAR OUTLET SOLENOID VALVE RH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

T: DTC C0037 REAR INLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

U: DTC C0038 REAR OUTLET SOLENOID VALVE LH MALFUNCTION IN VDC-CM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

V: DTC C0061 SECONDARY CUT VALVE MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

W: DTC C0062 PRIMARY CUT VALVE MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

X: DTC C0063 SECONDARY SUCTION VALVE MALFUNCTION IN VDCCM&H/U

NOTE:
For the diagnostic procedure, refer to DTC C0064 “PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U”. <Ref. to VDC(diag)-63, DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDC-CM&H/U, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

Y: DTC C0064 PRIMARY SUCTION VALVE MALFUNCTION IN VDCCM&H/U

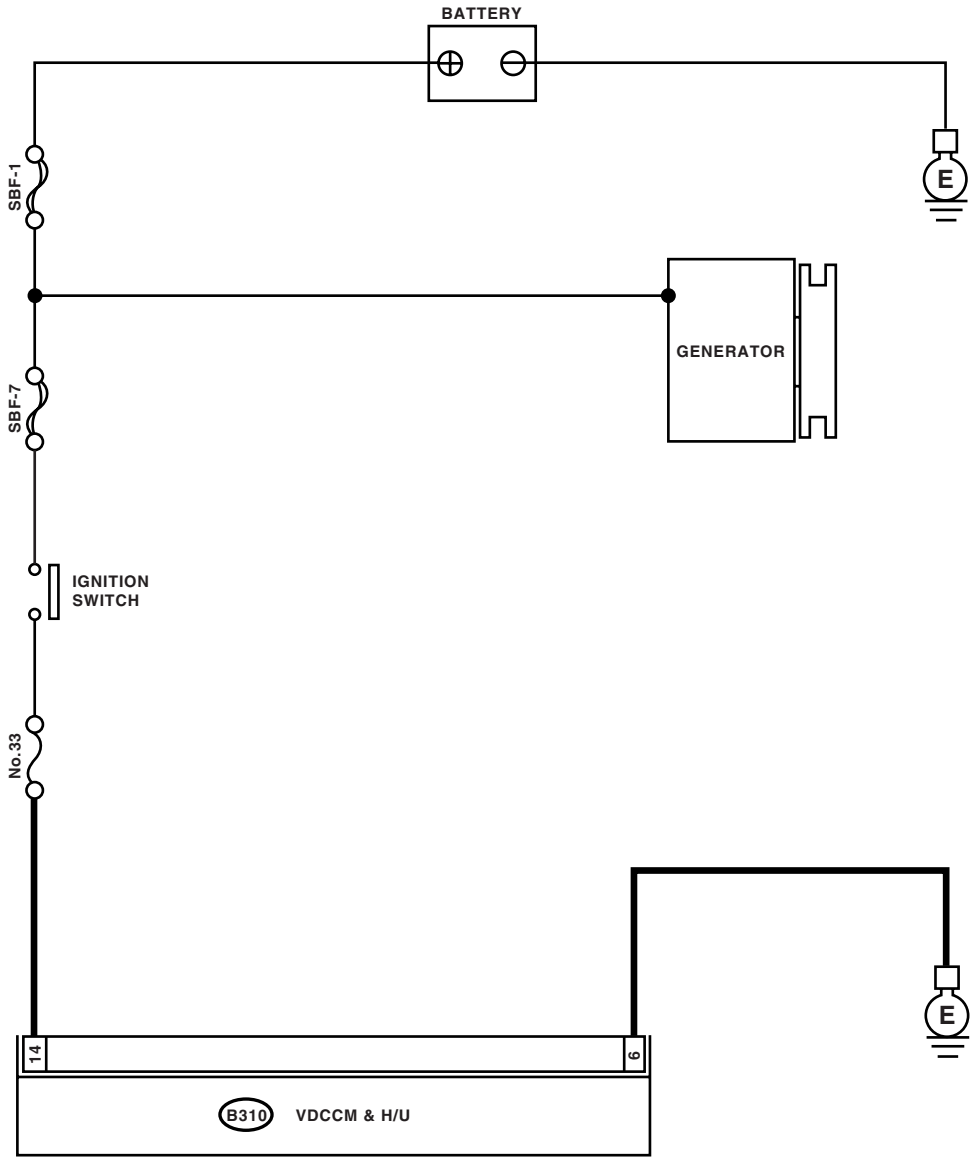
DTC DETECTING CONDITION:

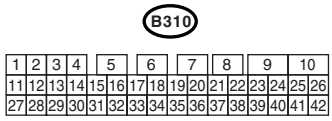
- Defective harness connector
- Defective VDCH/U solenoid valve

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00216

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the power supply circuit.
2	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the VDCCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5.**
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

Z: DTC C0041 VDC CONTROL MODULE MALFUNCTION

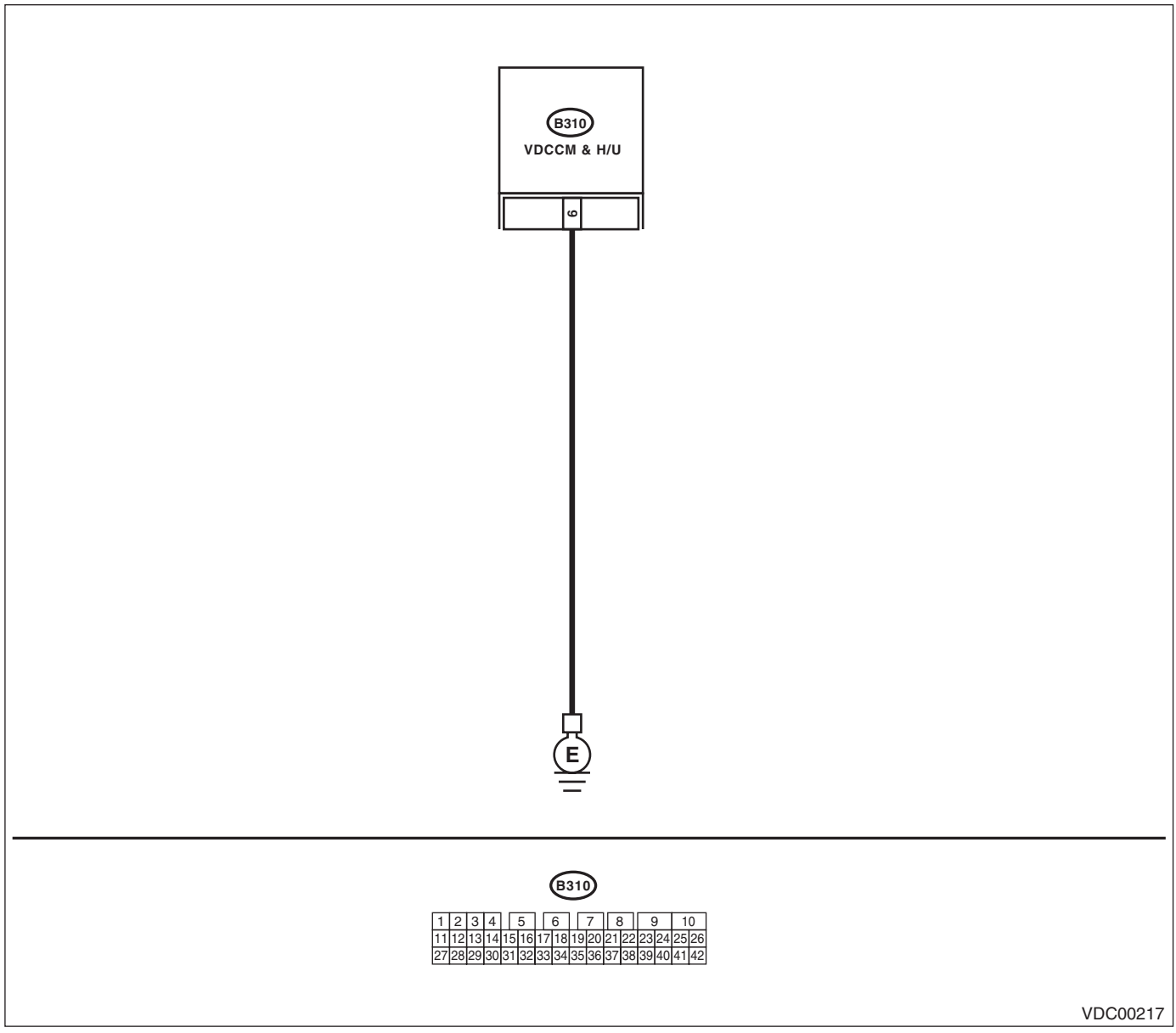
DTC DETECTING CONDITION:

Defective VDCCM&H/U

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **2.**	Repair the VDCCM&H/U ground harness.
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connectors between battery, ignition switch and VDCCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK SOURCES OF SIGNAL NOISE.**	Is the car phone or radio properly installed?	Go to step **4.**	Install the car phone or radio properly.
4	**CHECK SOURCES OF SIGNAL NOISE.**	Are noise sources (such as an antenna) installed near the sensor harness?	Install the noise sources apart from the sensor harness.	Go to step **5.**
5	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AA:DTC C0042 POWER VOLTAGE MALFUNCTION

DTC DETECTING CONDITION:

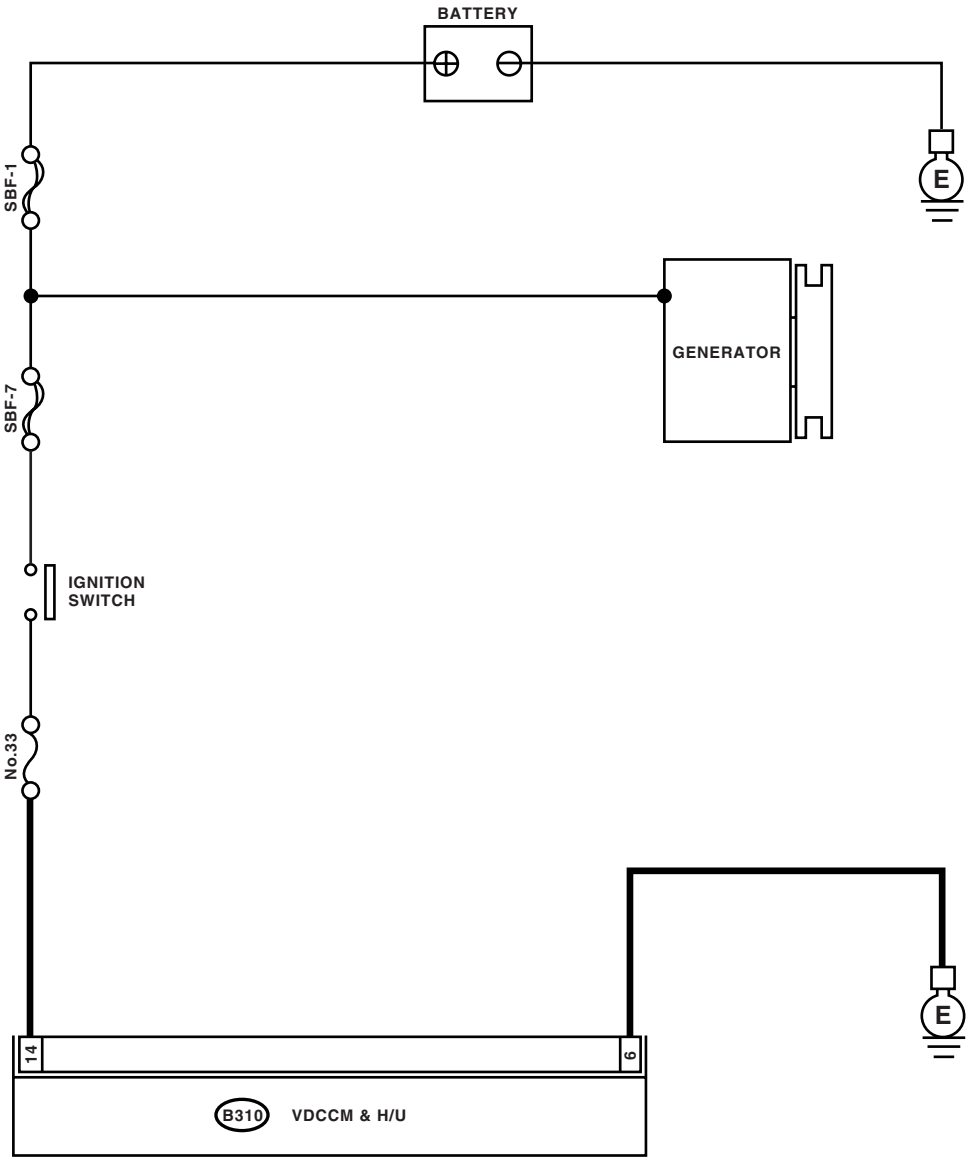
Defective VDCCM&H/U power voltage

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD may not operate.
- VDC does not operate.

NOTE:
Warning lights go off if voltage returns.

WIRING DIAGRAM:



B310

1	2	3	4	5	6	7	8	9	10					
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42

VDC00216

	Step	Check	Yes	No
1	**CHECK GENERATOR.** 1) Start the engine. 2) Run the engine at idle after warming up. 3) Measure the voltage between generator B terminal and chassis ground. ***Terminals*** ***Generator B terminal (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the generator. <Ref. to SC(H4SO 2.0)-14, Generator.>
2	**CHECK BATTERY TERMINAL.** Turn the ignition switch to OFF.	Are the positive and negative battery terminals clamped tightly?	Go to step **3.**	Tighten the terminal.
3	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Disconnect the connector from VDCCM&H/U. 2) Run the engine at idle. 3) Operate the devices such as headlights, air conditioner, defogger, etc. which produce much electrical loading. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **4.**	Repair the power supply circuit.
4	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **5.**	Repair the VDCCM&H/U ground harness.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AB:DTC C0042 ABS WHEEL SPEED SENSOR POWER MALFUNCTION

NOTE:
For the diagnostic procedure, refer to DTC C0042 “POWER VOLTAGE MALFUNCTION”. <Ref. to VDC(diag)-67, DTC C0042 POWER VOLTAGE MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AC:DTC C0044 AT COMMUNICATION

DTC DETECTING CONDITION:
No CAN signal from TCM.
TROUBLE SYMPTOM:
- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2.**
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in TCM connector?	Repair the connector.	Go to step **3.**
3	**CHECK TCM.**	Is the TCM normal?	Go to step **4.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).> <Ref. to 5AT-61, Transmission Control Module (TCM).>
4	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **5.**
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

AD:DTC C0045 DIFFERENT VDC CONTROL MODULE SPECIFICATION

DTC DETECTING CONDITION:

Different control module specification

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK VDCCM&H/U SPECIFICATION.** Check the identification mark of VDCCM&H/U. ***Identification mark of VDCCM&H/U*** ***OUTBACK 3.0 R: G2*** ***Wagon model 2.5 i: G3*** ***Wagon model 3.0 R: G4*** ***Sedan model 2.5 i: G9*** ***Sedan model 3.0 R: GA***	Is the identification mark of VDCCM&H/U the same as vehicle specification?	Go to step **2.**	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK TCM SPECIFICATION.** Check the TCM specification.	Is the specification of TCM same as vehicle specification?	Go to step **3.**	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).> <Ref. to 5AT-61, Transmission Control Module (TCM).>
3	**CHECK AT SYSTEM.** 1) Start the engine. 2) Check the DTC in AT system.	Is DTC of AT system displayed?	Repair the AT system.	Go to step **4.**
4	**CHECK ECM SPECIFICATION.** Check the ECM specification.	Is the specification of ECM same as vehicle specification?	Go to step **5.**	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
5	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

AE:DTC C0045 AT CONTROL MODULE MALFUNCTION

DTC DETECTING CONDITION:

Defective TCM

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK AT SYSTEM.** 1) Start the engine. 2) Check the DTC in AT system.	Is DTC of AT system displayed?	Repair the AT system.	Go to step **2.**
2	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Go to step **3.**
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

AF:DTC C0047 IMPROPER CAN COMMUNICATION

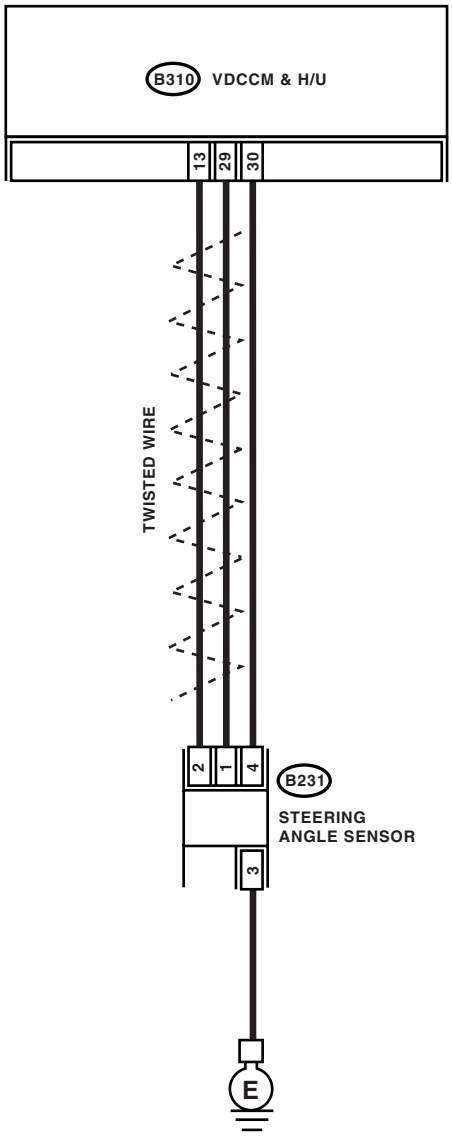
DTC DETECTING CONDITION:

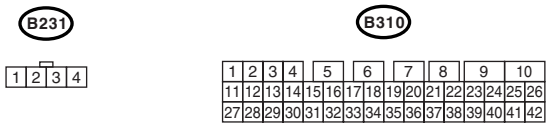
CAN communication line circuit is open or shorted.

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00247

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2.**
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in VDCCM&H/U connector?	Repair the connector.	Go to step **3.**
3	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Temporary poor contact occurs.

AG:DTC C0051 VALVE RELAY OFF MALFUNCTION

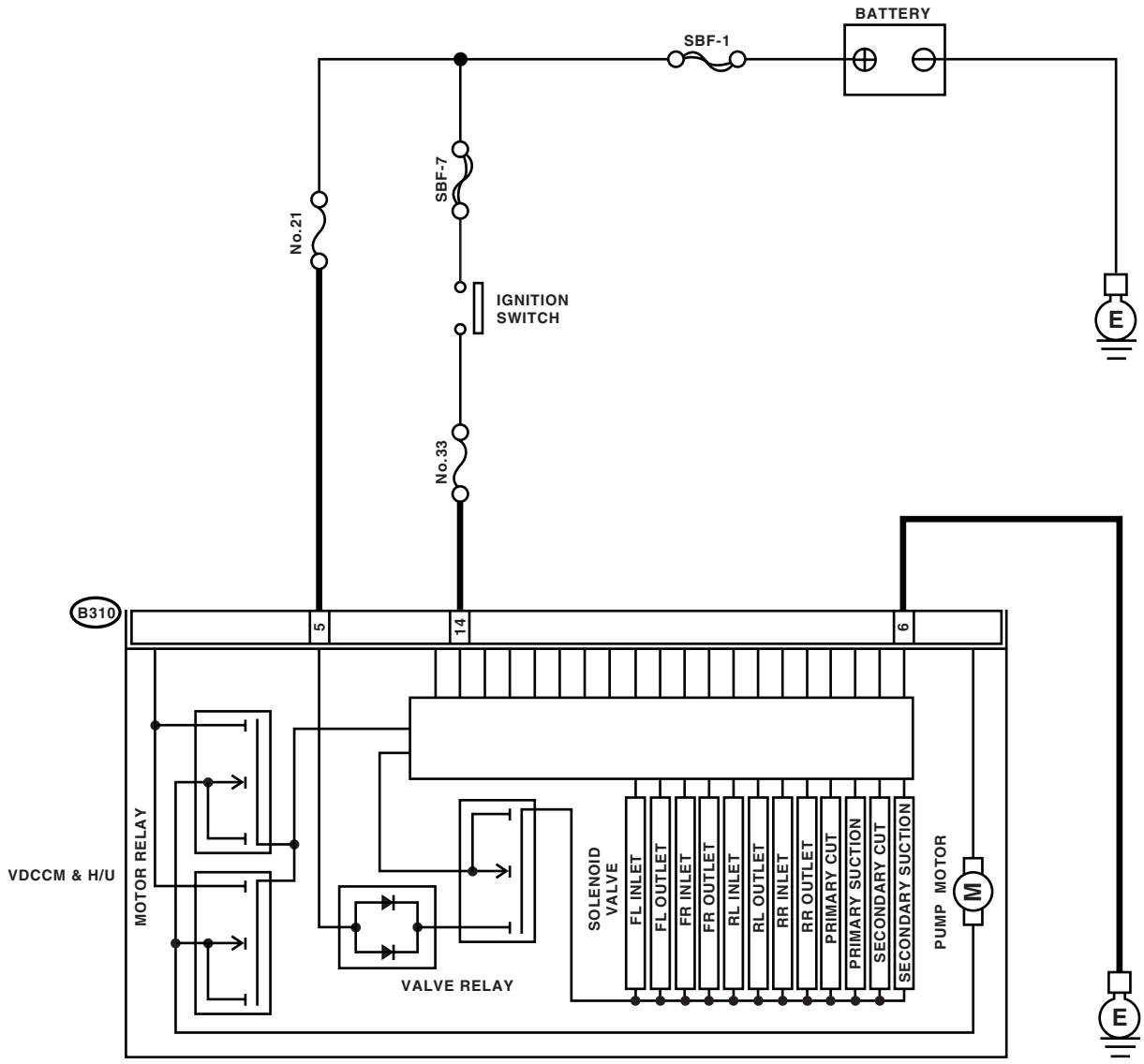
DTC DETECTING CONDITION:

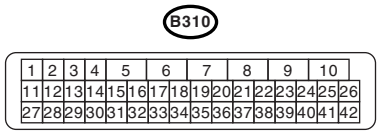
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00219

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 5 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the harness connector between battery and VDCCM&H/U.
2	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the VDCCM&H/U ground harness.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **4.**
4	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5.**
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AH:DTC C0051 VALVE RELAY MALFUNCTION

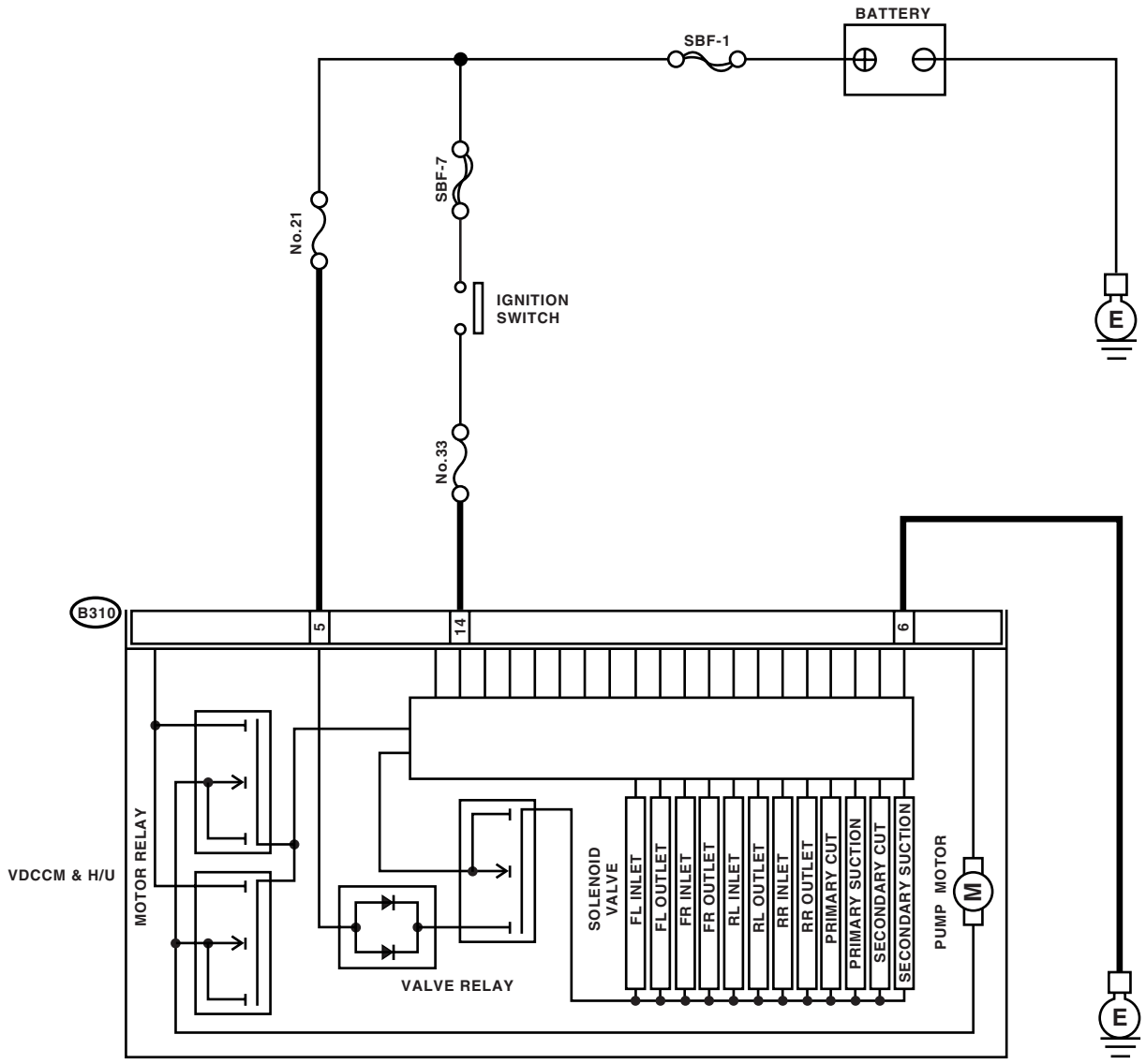
DTC DETECTING CONDITION:

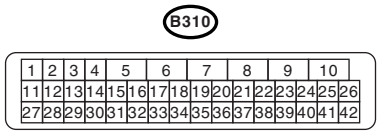
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00219

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 14 (+) —Chassis ground (–):*** ***(B310) No. 5 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the power supply circuit.
2	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** Calculate the voltage difference measured in step 1. A:(B310) No. 14 (+) — Chassis ground (–): B:(B310) No. 5 (+) — Chassis ground (–):	Is the voltage difference between A and B more than 2 V?	Repair the power supply circuit.	Go to step **3.**
3	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **4.**	Repair the VDCCM&H/U ground harness.
4	**CHECK VALVE RELAY FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 5 — (B310) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the VDCCM&H/U.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AI: DTC C0051 VALVE RELAY TEST MALFUNCTION

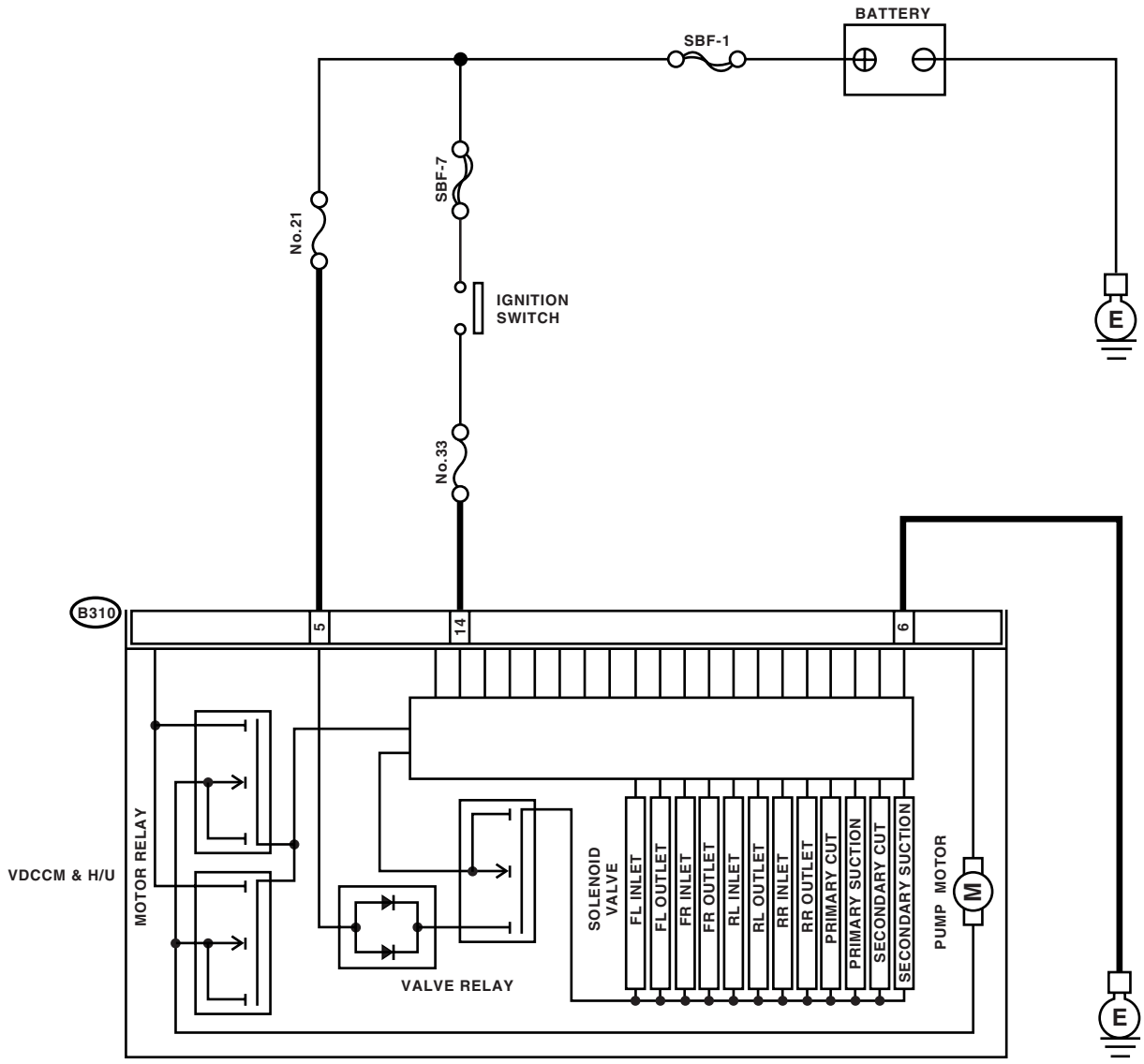
DTC DETECTING CONDITION:

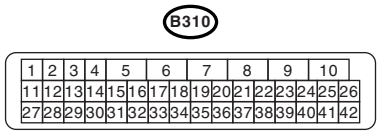
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- EBD does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00219

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Run the engine at idle. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 5 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the power supply circuit in VDCCM&H/U.
2	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the ground circuit in VDCCM&H/U.
3	**CHECK VALVE RELAY FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 5 — (B310) No. 6:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the H/U.
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **5.**
5	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **6.**
6	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AJ:DTC C0051 VALVE RELAY ON MALFUNCTION

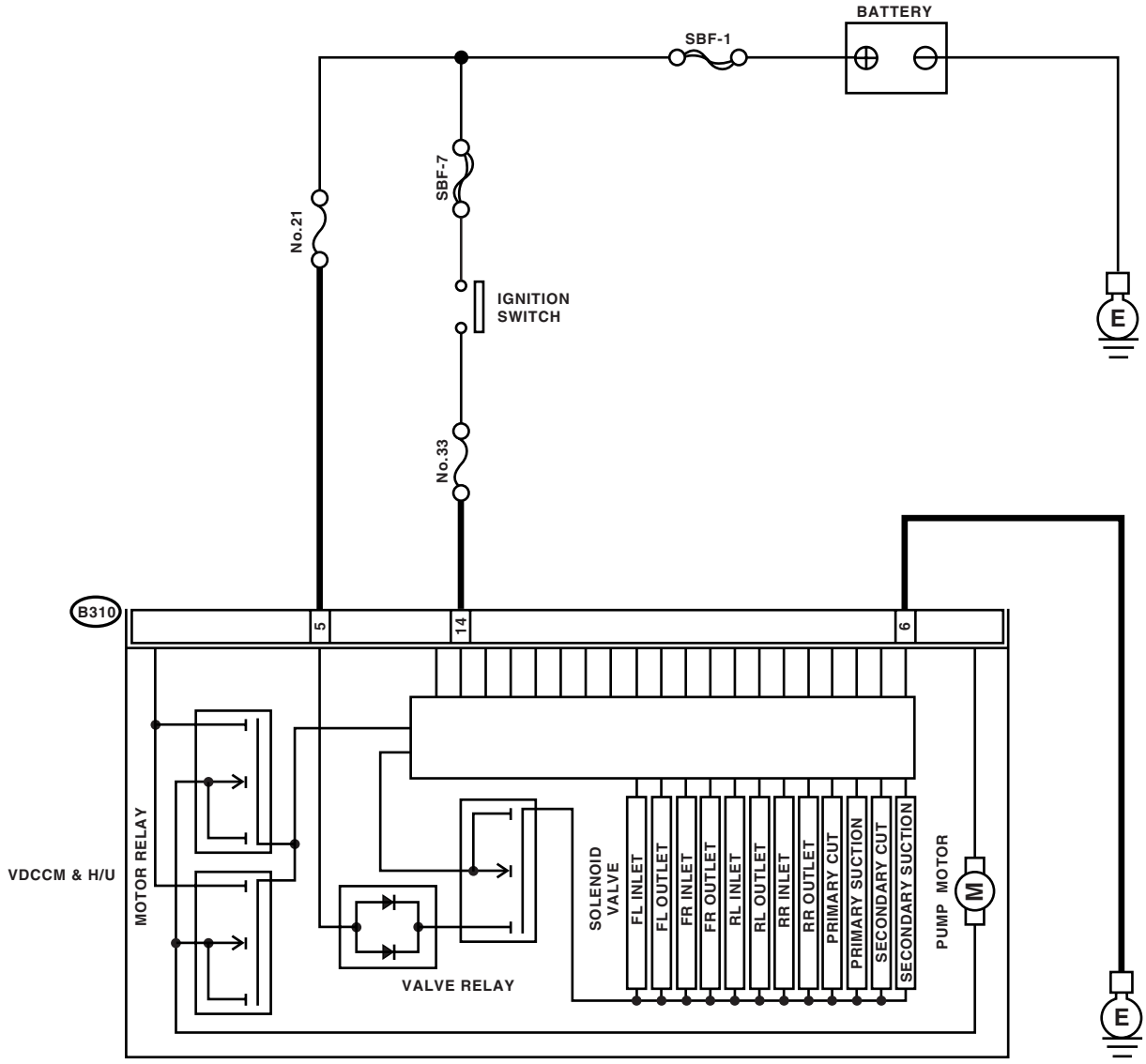
DTC DETECTING CONDITION:

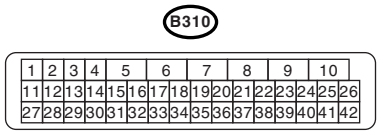
Defective valve relay

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00219

	Step	Check	Yes	No
1	**CHECK VALVE RELAY FOR VDCCM&H/U.** 1) Disconnect the connector from VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U connector terminals. ***Terminals*** ***No. 5 — No. 6:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **3.**
3	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AK:DTC C0052 MOTOR/MOTOR RELAY MALFUNCTION

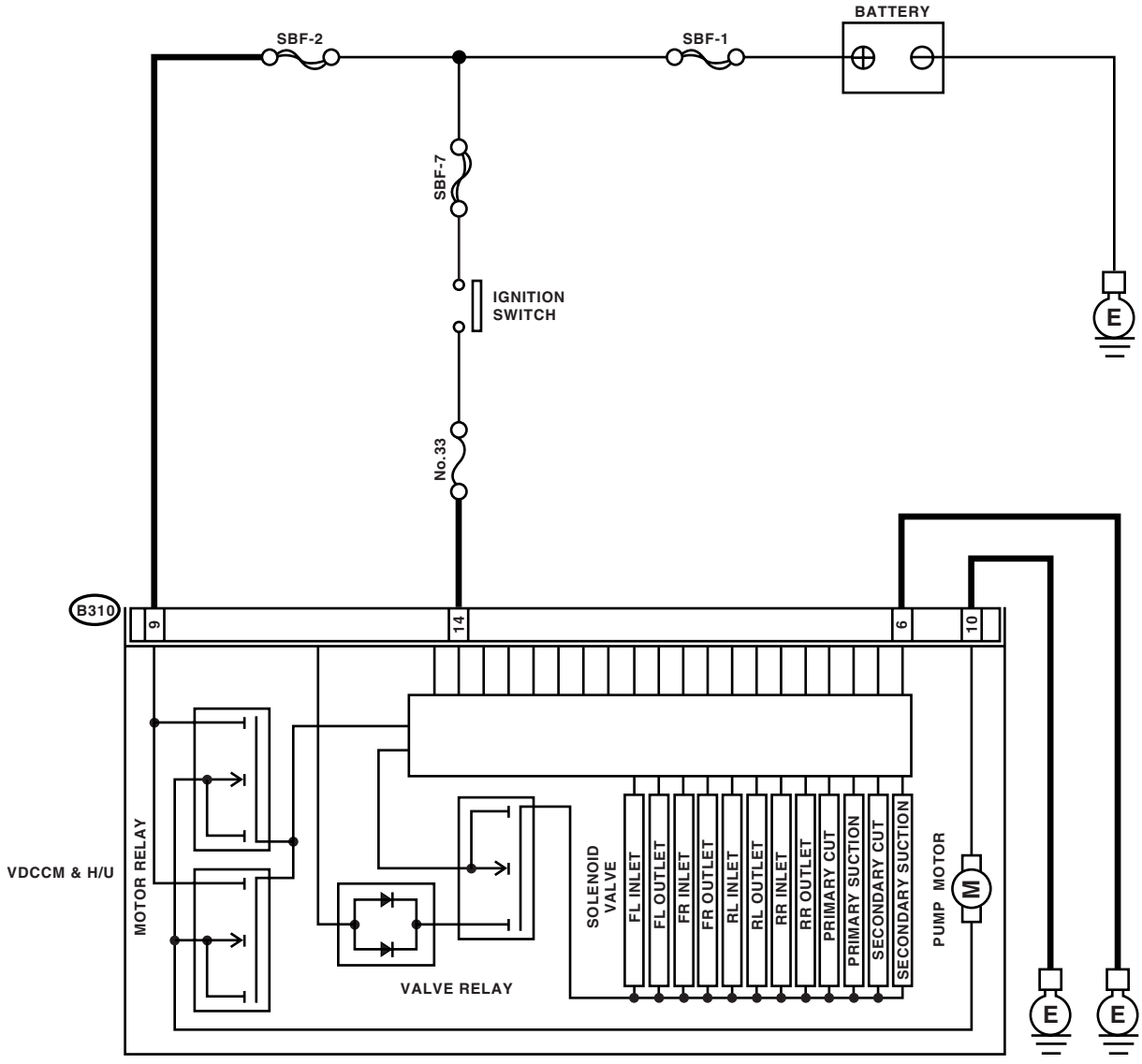
DTC DETECTING CONDITION:

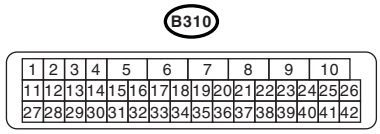
- Defective motor and motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:





VDC00220

	Step	Check	Yes	No
1	**CHECK INPUT VOLTAGE FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 9 (+) — Chassis ground (−):*** ***(B310) No. 14 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **2.**	Repair the power supply circuit in VDCCM&H/U.
2	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 6 — Chassis ground:*** ***(B310) No. 10 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **3.**	Repair the VDCCM&H/U ground harness.
3	**CHECK MOTOR RELAY FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U connector terminals. ***Terminals*** ***No. 9 — No. 10:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the VDCCM&H/U.
4	**CHECK MOTOR OPERATION.** Operate the sequence control.	Is the motor revolution noise (buzz) heard when carrying out the sequence control?	Go to step **5.**	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between generator, battery and VDCCM&H/U?	Repair the connector.	Go to step **6.**
6	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs. NOTE: Though the ABS warning light remains on at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to turn ABS warning light off. Be sure to drive the vehicle and check the warning light goes off.

AL:DTC C0052 MOTOR/MOTOR RELAY OFF MALFUNCTION

DTC DETECTING CONDITION:

- Defective motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

NOTE:
For the diagnostic procedure, refer to DTC C0052 “MOTOR/MOTOR RELAY MALFUNCTION” <Ref. to VDC(diag)-83, DTC C0052 MOTOR/MOTOR RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AM:DTC C0052 MOTOR/MOTOR RELAY ON MALFUNCTION

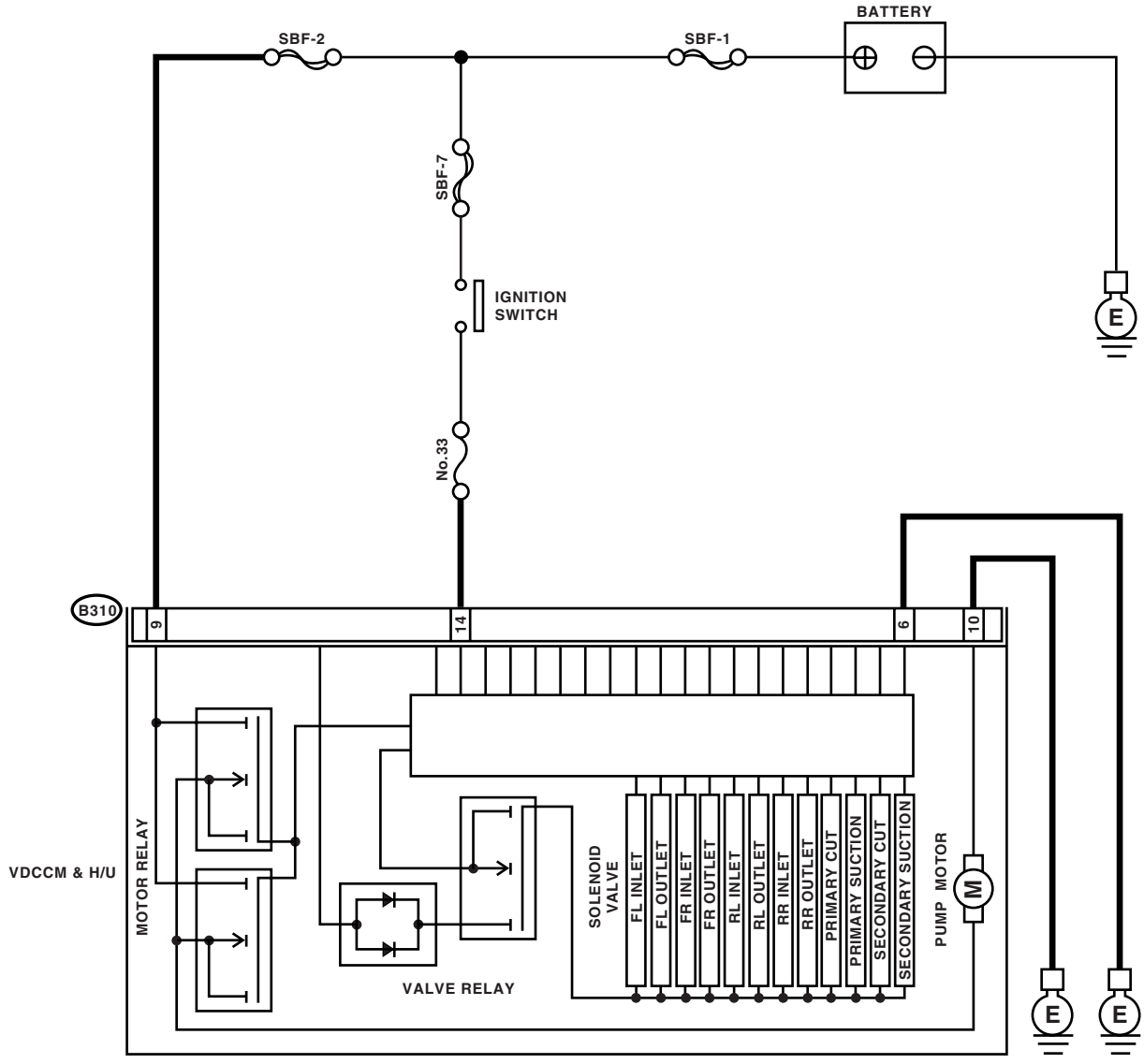
DTC DETECTING CONDITION:

- Defective motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

WIRING DIAGRAM:



B310

1	2	3	4	5			6			7			8			9			10							
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26											
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42											

VDC00220

	Step	Check	Yes	No
1	**CHECK MOTOR RELAY FOR VDCCM&H/U.** 1) Disconnect the connector from VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U connector terminals. ***Terminals*** ***No. 9 — No. 10:***	Is the resistance more than 1 MΩ?	Go to step **2.**	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
2	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **3.**
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs. NOTE: Though the ABS warning light remains on at this time, it is normal. Drive the vehicle at more than 12 km/h (7 MPH) in order to turn ABS warning light off. Be sure to drive the vehicle and check the warning light goes off.

AN:DTC C0052 MOTOR

DTC DETECTING CONDITION:

- Defective motor
- Defective motor relay
- Defective harness connector

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.
- EBD may not operate.

NOTE:
For the diagnostic procedure, refer to DTC C0052 “MOTOR/MOTOR RELAY MALFUNCTION” <Ref. to VDC(diag)-83, DTC C0052 MOTOR/MOTOR RELAY MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

AO:DTC C0054 BLS OPEN CIRCUIT

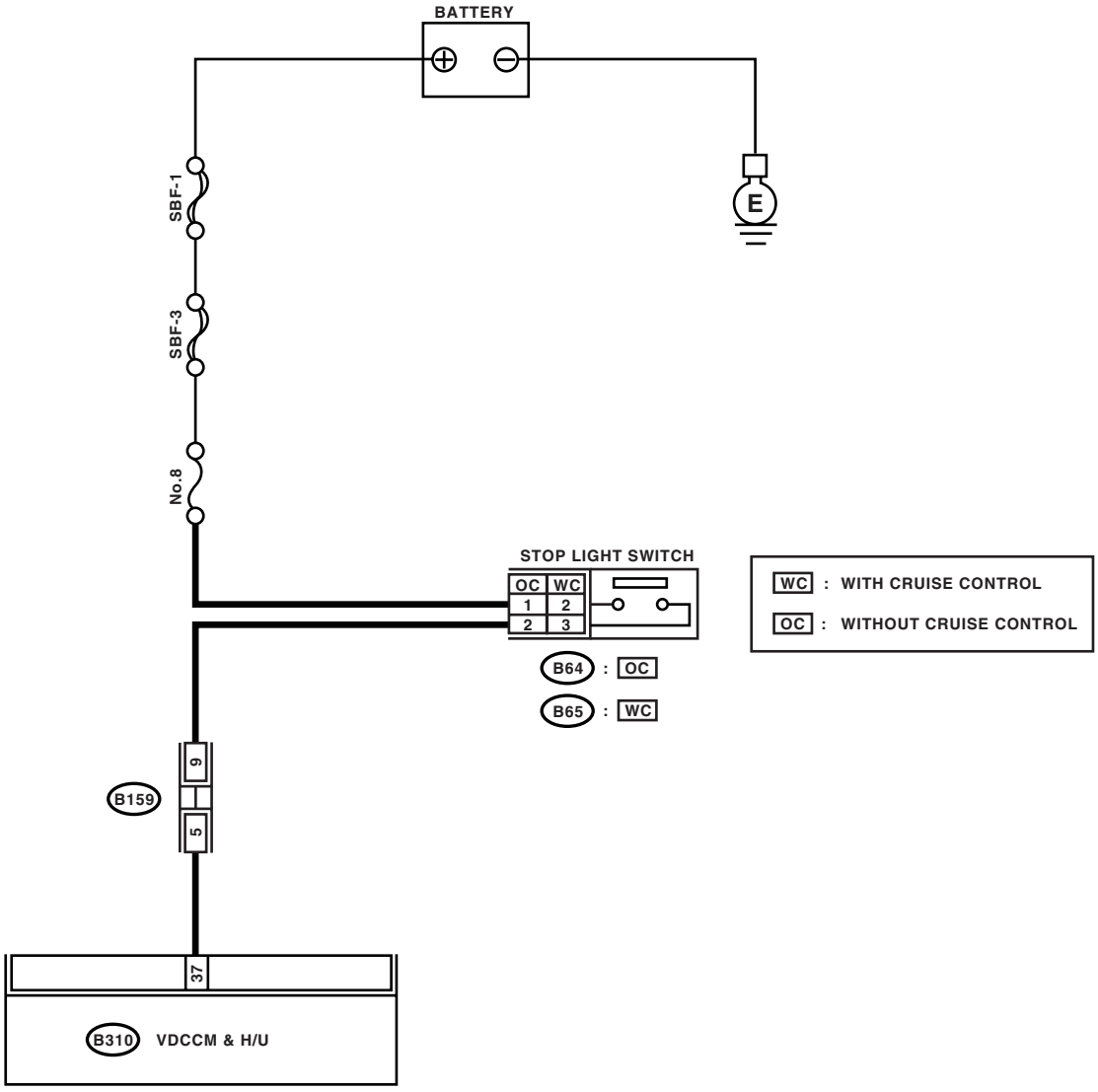
DTC DETECTING CONDITION:

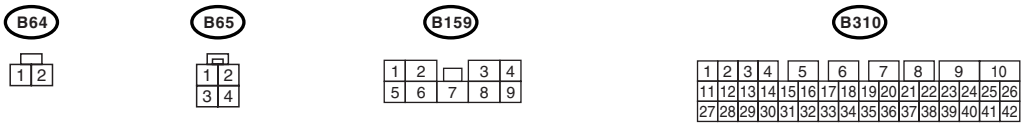
Defective stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00221

	Step	Check	Yes	No
1	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Release the brake pedal. 3) Read the stop light switch output in Subaru Select Monitor.	Is OFF displayed on the display?	Go to step **2.**	Go to step **3.**
2	**CHECK OUTPUT OF STOP LIGHT SWITCH WITH SUBARU SELECT MONITOR.** 1) Depress the brake pedal. 2) Read the stop light switch output in Subaru Select Monitor.	Is ON displayed on the display?	Go to step **5.**	Go to step **3.**
3	**CHECK IF STOP LIGHTS COME ON.** Depress the brake pedal.	Does the stop light illuminate?	Go to step **4.**	Repair the stop lights circuit.
4	**CHECK OPEN CIRCUIT OF HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Depress the brake pedal. 4) Measure the voltage between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 37 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **5.**	Repair the harness between stop light switch and VDCCM&H/U connector.
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between stop light switch and VDCCM&H/U?	Go to step **6.**	Repair the connector.
6	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AP:DTC C0054 BLS ON MALFUNCTION

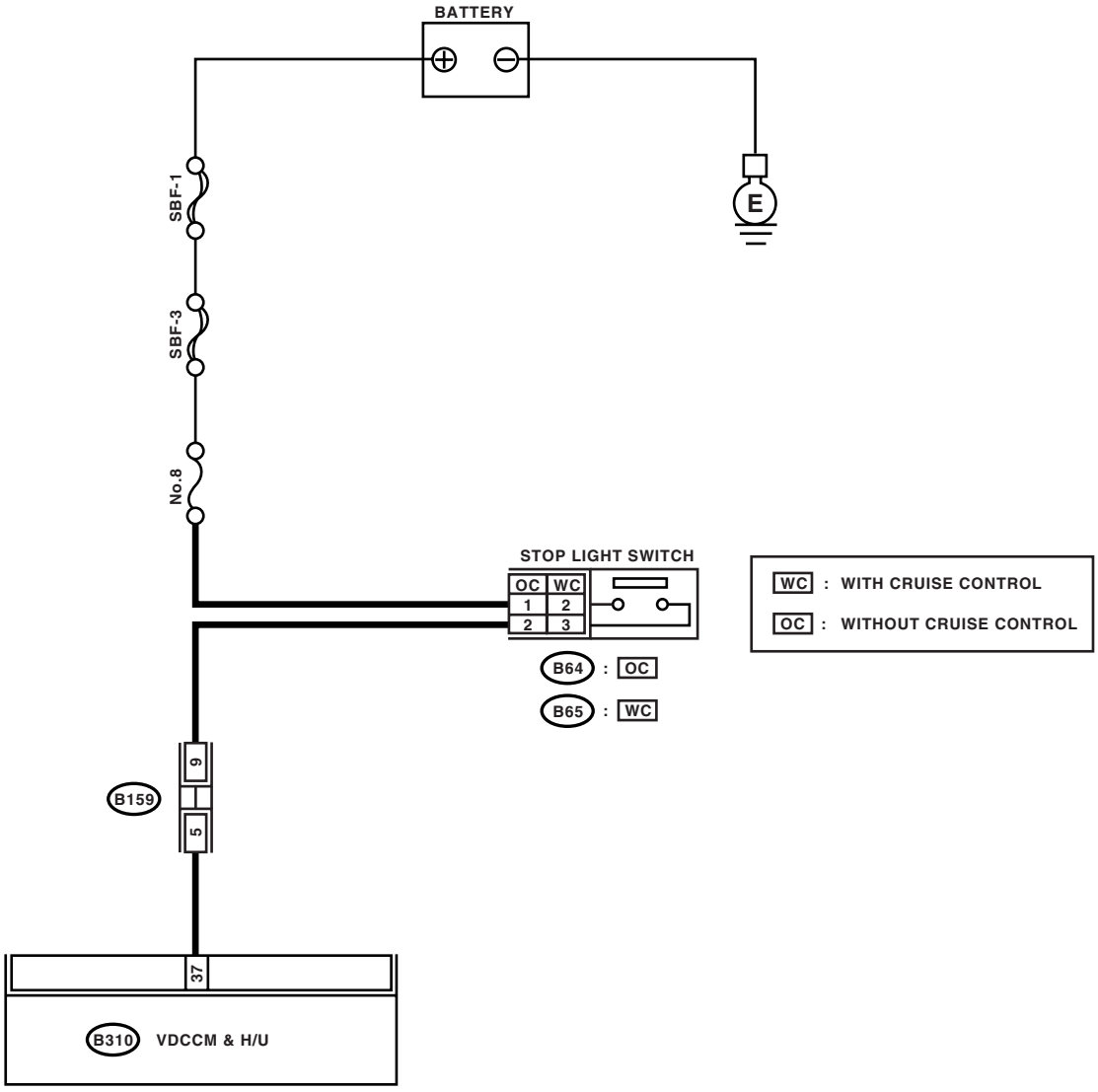
DTC DETECTING CONDITION:

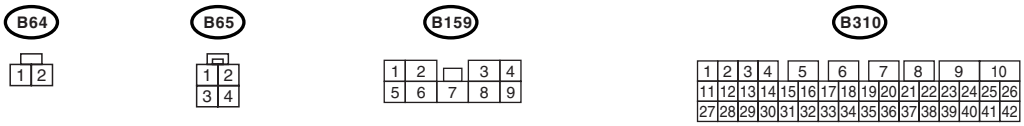
Defective stop light switch

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00221

	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch connector. 3) Measure the resistance of stop light switch terminals.	Is the resistance more than 1 MΩ when switch is OFF (when pedal is not depressed)?	Go to step **2.**	Replace the stop light switch.
2	**INTERVIEWING CUSTOMERS.** Make sure that the operation was performed in which accelerator pedal and brake pedal were depressed simultaneously (with depressing brake pedal with left foot).	Were the acceleration pedal and brake pedal depressed simultaneously during driving?	System is in good order. (DTC may be recorded while brake is applied during driving.)	Go to step **3.**
3	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AQ:DTC C0057 EGI COMMUNICATION

DTC DETECTING CONDITION:

No CAN signal from ECM.

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK LAN SYSTEM.** Perform the diagnosis for LAN system. <Ref. to LAN(diag)-24, OPERATION, Read Diagnostic Trouble Code (DTC).>	Is there any fault in LAN system?	Perform the diagnosis according to DTC for LAN system.	Go to step **2.**
2	**CHECK POOR CONTACT IN CONNECTORS.**	Is the poor contact in ECM connector?	Repair the connector.	Go to step **3.**
3	**CHECK ECM.**	Is ECM normal?	Go to step **4.**	Replace the ECM.
4	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	It results from a temporary noise interference.
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AR:DTC C0071 EXCESSIVE STEERING ANGLE SENSOR OUTPUT OFFSET

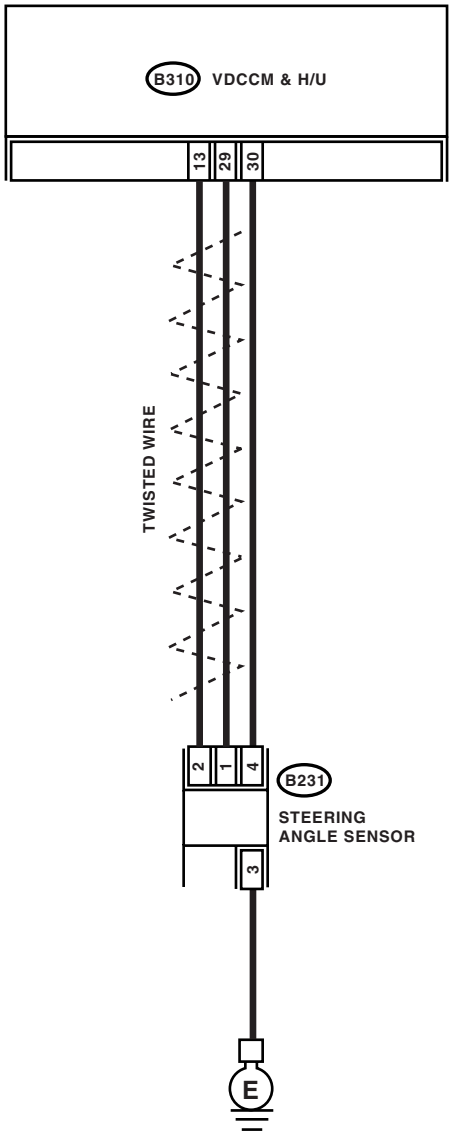
DTC DETECTING CONDITION:

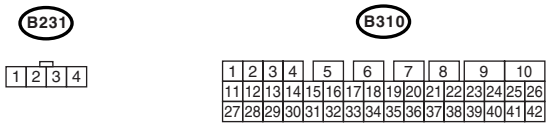
Defective steering angle sensor

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:



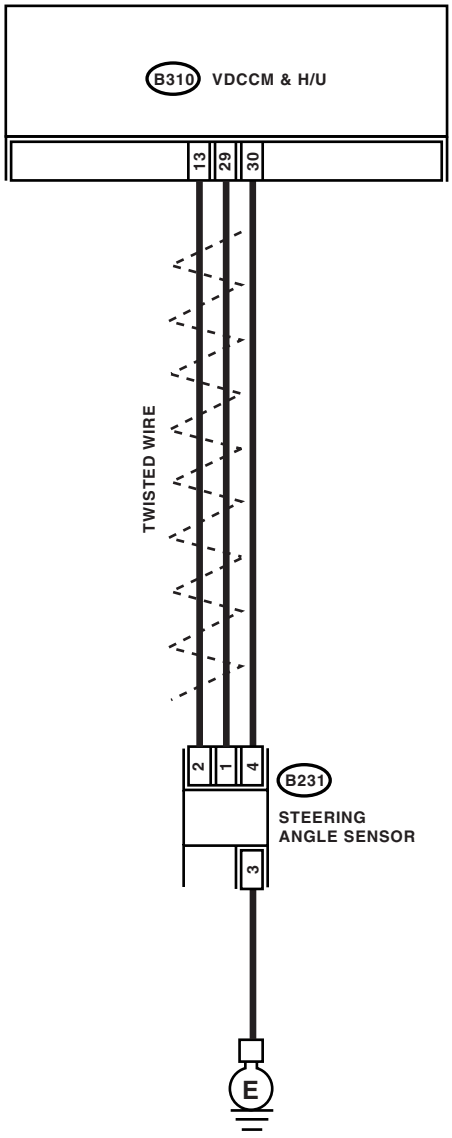


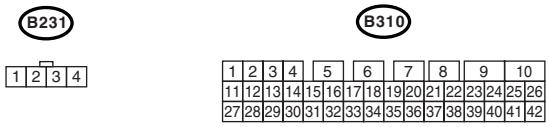
VDC00247

	Step	Check	Yes	No
1	**CHECK STEERING WHEEL.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step **2.**	Perform the centering adjustment of steering wheel.
2	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **3.**
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AS:DTC C0071 EXCESSIVE VARIATION AMOUNT OF STEERING ANGLE SENSOR OUTPUT

DTC DETECTING CONDITION:
Defective steering angle sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:





VDC00247

	Step	Check	Yes	No
1	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **2.**
2	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

AT:DTC C0071 STEERING ANGLE SENSOR OUTPUT

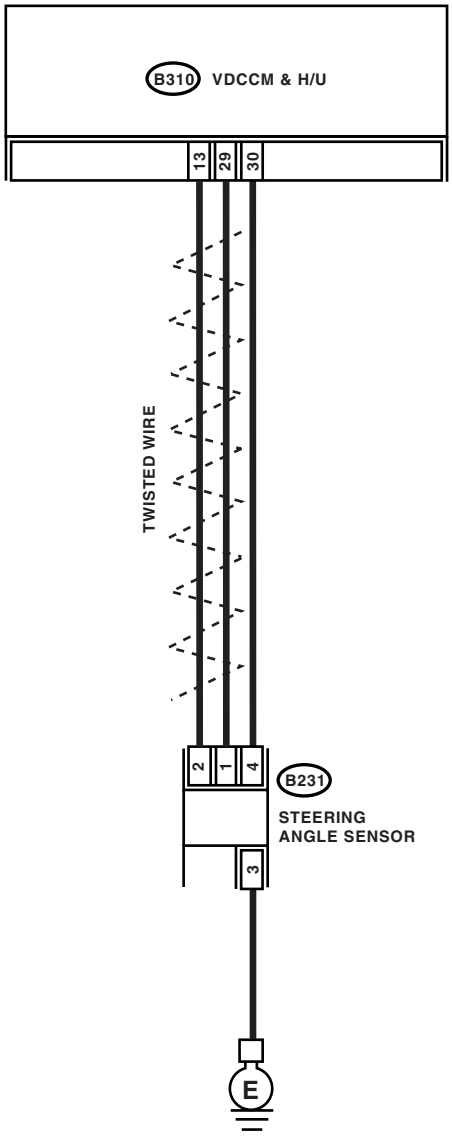
DTC DETECTING CONDITION:

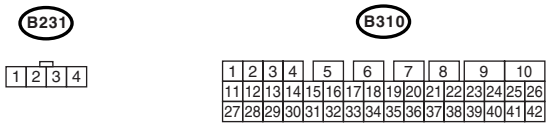
Defective steering angle sensor

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:





VDC00247

	Step	Check	Yes	No
1	**CHECK STEERING WHEEL.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Check the steering wheel for deviation from center.	Is the deviation from the center of steering wheel less than 5°?	Go to step **2.**	Perform the centering adjustment of steering wheel.
2	**CHECK DRIVING PLACE.** Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step **3.**
3	**CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.** 1) Select {Current Data Display & Save} in Subaru Select Monitor. 2) Read the steering angle sensor output displayed on display.	Does the steering angle sensor output value on the display vary in accordance with steering operation when turning the steering wheel to the right or left?	Go to step **4.**	Replace the steering angle sensor.
4	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **5.**
5	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AU:DTC C0071 STEERING ANGLE SENSOR COMMUNICATION

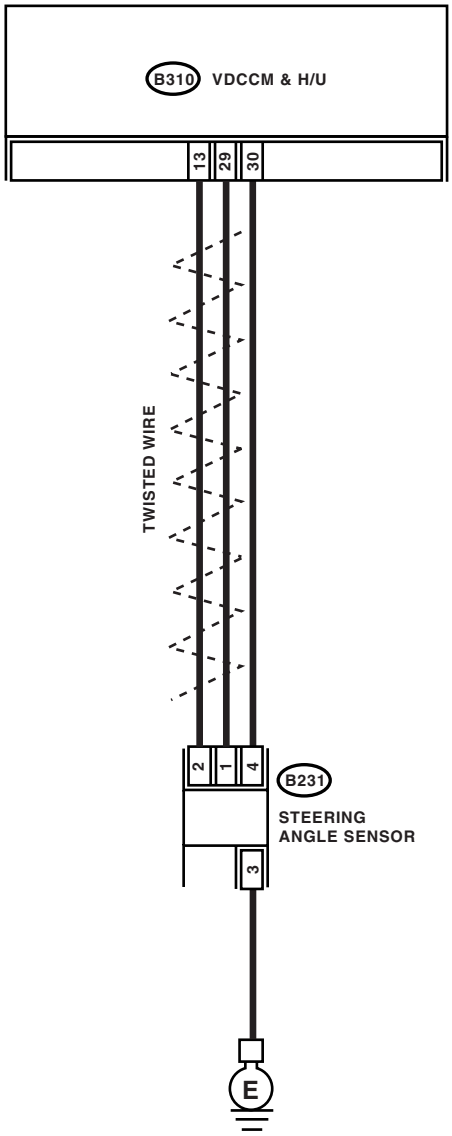
DTC DETECTING CONDITION:

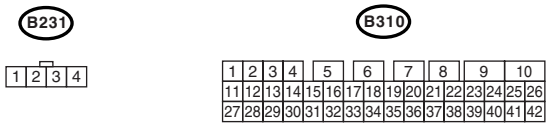
Signal does not come from the steering angle sensor.

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:





VDC00247

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering angle sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 4 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **4.**	Go to step **2.**
2	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Repair the harness between steering angle sensor and VDCCM&H/U.	Go to step **3.**
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **9.**
4	**CHECK GROUND CIRCUIT FOR STEERING ANGLE SENSOR.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 3 — Chassis ground:***	Is the resistance 0.5 Ω?	Go to step **5.**	Repair ground circuit in the steering angle sensor.
5	**CHECK STEERING ANGLE SENSOR HARNESS.** 1) Disconnect the connector from VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and steering angle sensor. ***Connector & terminal*** ***(B231) No. 1 — (B310) No. 29:*** ***(B231) No. 2 — (B310) No. 13:***	Is the resistance 0.5 Ω?	Go to step **6.**	Repair the harness between steering angle sensor and VDCCM&H/U.
6	**CHECK GROUND SHORT CIRCUIT OF STEERING ANGLE SENSOR HARNESS.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 1 — Chassis ground:*** ***(B231 No. 2 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness between steering angle sensor and VDCCM&H/U.
7	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **8.**	Go to step **10.**
8	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the steering angle sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **11.**

	Step	Check	Yes	No
9	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **10.**
10	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Original steering angle sensor malfunction

AV:DTC C0071 STEERING ANGLE SENSOR POWER SUPPLY MALFUNCTION

DTC DETECTING CONDITION:

Defective steering angle sensor

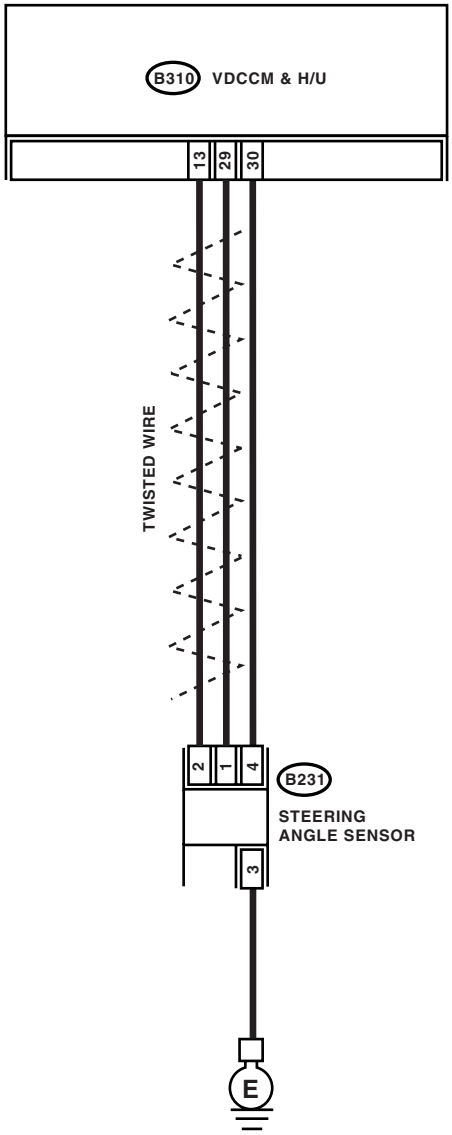
TROUBLE SYMPTOM:

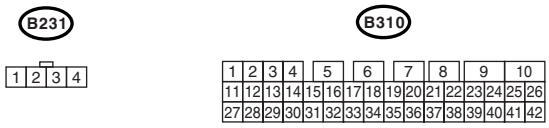
- ABS does not operate.
- VDC does not operate.

NOTE:

- Warning light does not illuminate though problem is detected.
- The ABS and VDC operate normally if voltage returns.

WIRING DIAGRAM:



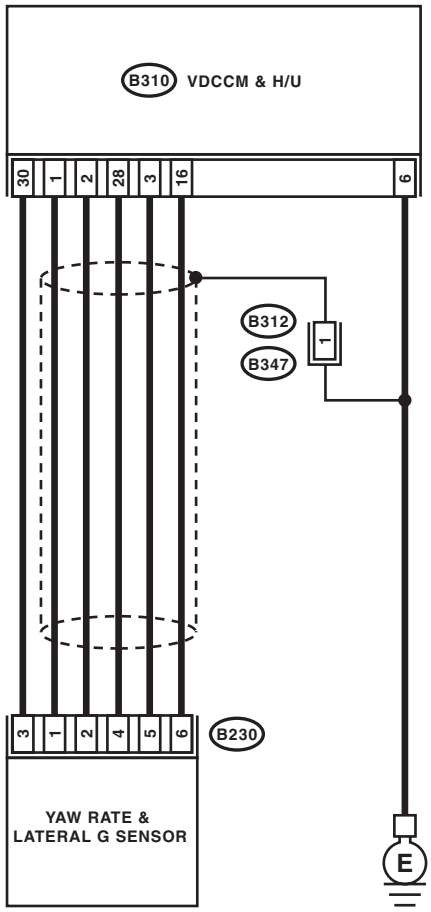


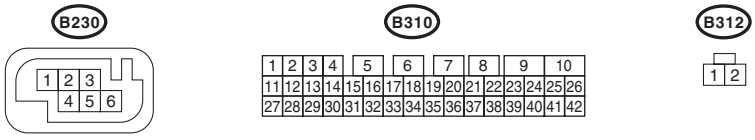
VDC00247

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from steering angle sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 4 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **4.**	Go to step **2.**
2	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Repair the harness between steering angle sensor and VDCCM&H/U.	Go to step **3.**
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **7.**
4	**CHECK GROUND CIRCUIT FOR STEERING ANGLE SENSOR.** Measure the resistance between steering angle sensor and chassis ground. ***Connector & terminal*** ***(B231) No. 3 — Chassis ground:***	Is the resistance 0.5 Ω?	Go to step **5.**	Repair ground circuit in the steering angle sensor.
5	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **6.**	Go to step **8.**
6	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the steering angle sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **9.**
7	**CHECK STEERING ANGLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8.**
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
9	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Original steering angle sensor malfunction

AW:DTC C0072 YAW RATE SENSOR OUTPUT

DTC DETECTING CONDITION:
Defective yaw rate sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:





VDC00222

	Step	Check	Yes	No
1	**CHECK DRIVING PLACE.** Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step **2.**
2	**CHECK YAW RATE & LATERAL G SENSOR INSTALLATION.**	Is the yaw rate & lateral G sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **3.**	Tighten the yaw rate & lateral G sensor installation bolt.
3	**CHECK OUTPUT OF YAW RATE & LATERAL G SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in Subaru Select Monitor. 4) Read the yaw rate output displayed on display.	Is the reading indicated on monitor display −4 — 4 deg/s?	Go to step **4.**	Replace the yaw rate & lateral G sensor.
4	**CHECK OUTPUT OF STEERING ANGLE SENSOR WITH SUBARU SELECT MONITOR.** 1) Drive the vehicle on a flat road. 2) Park the vehicle straight. 3) Select {Current Data Display & Save} in Subaru Select Monitor. 4) Read the steering angle sensor output displayed on display.	Is the reading indicated on monitor display −5 — 5°?	Go to step **5.**	Perform the centering adjustment of steering wheel.
5	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **6.**	Go to step **7.**
6	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the yaw rate & lateral G sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **8.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
8	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Malfunction is found in original yaw rate & lateral G sensor.

AX:DTC C0072 YAW RATE SENSOR POWER/OUTPUT

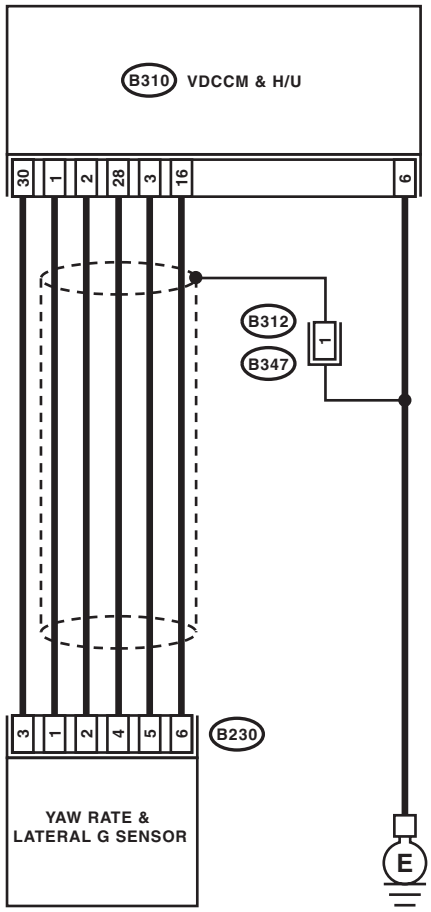
DTC DETECTING CONDITION:

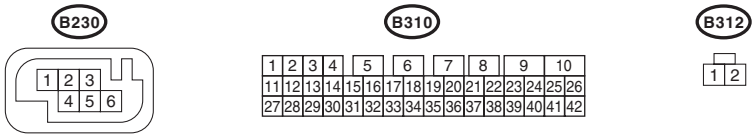
Defective yaw rate sensor

TROUBLE SYMPTOM:

VDC does not operate.

WIRING DIAGRAM:





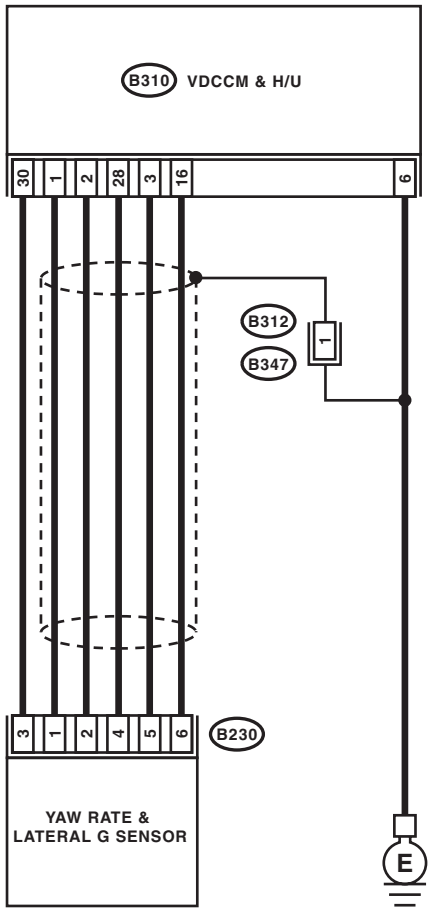
VDC00222

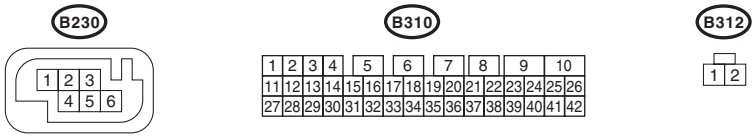
	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from the yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **4.**	Go to step **2.**
2	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **3.**
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **10.**
4	**CHECK GROUND CIRCUIT OF YAW RATE & LATERAL G SENSOR.** Measure the resistance between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **7.**	Go to step **5.**
5	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 16 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **6.**
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **10.**
7	**CHECK YAW RATE & LATERAL G SENSOR HARNESS.** 1) Disconnect the connector from VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B310) No. 28 — (B230) No. 4:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
8	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
9	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Check the signal pattern of oscilloscope between VDCCM&H/U connector terminals. <Ref. to VDC(diag)-15, WAVEFORM, MEASUREMENT, Control Module I/O Signal.> ***Connector & terminal*** ***(B310) No. 2 — No. 16:*** ***(B310) No. 28 — No. 16:***	Is the oscilloscope pattern the same waveform as shown in the figure?	Go to step **10.**	Replace the yaw rate & lateral G sensor.

	Step	Check	Yes	No
10	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AY:DTC C0072 YAW RATE SENSOR REFERENCE

DTC DETECTING CONDITION:
Defective yaw rate sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:





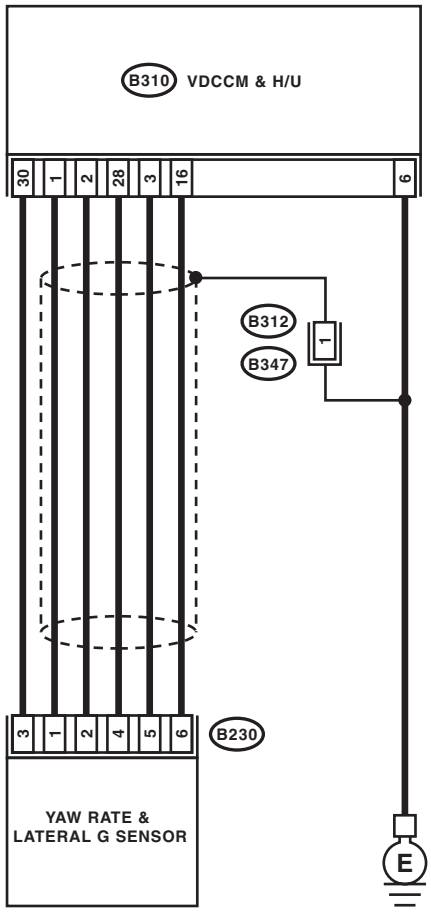
VDC00222

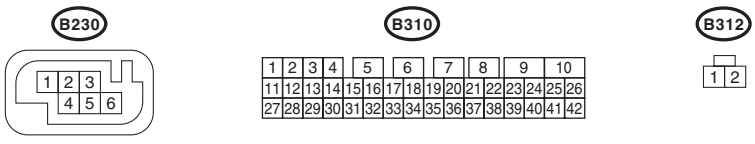
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Go to step **3.**	Go to step **2.**
2	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (–):***	Is the voltage 10 — 15 V?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **5.**
3	**CHECK GROUND CIRCUIT OF YAW RATE & LATERAL G SENSOR.** Measure the resistance between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **6.**	Go to step **4.**
4	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 16 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **5.**
5	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **9.**
6	**CHECK HARNESS OF YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B310) No. 1 — (B230) No. 1:***	Is the resistance less than 0.5 Ω?	Go to step **7.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
7	**CHECK GROUND SHORT CIRCUIT OF HARNESS.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 1 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
8	**CHECK THE YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Install the yaw rate & lateral G sensor to body. 3) Connect all the connectors. 4) Turn the ignition switch to ON. 5) Measure the voltage between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 1 (+) — No. 16 (–):***	Is the voltage 2.1 — 2.9 V?	Go to step **9.**	Replace the yaw rate & lateral G sensor. <Ref. to VDC-14, Yaw Rate & Lateral G Sensor.>

	Step	Check	Yes	No
9	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **10.**
10	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

AZ:DTC C0072 EXCESSIVE VARIATION AMOUNT OF YAW RATE SENSOR OUTPUT

DTC DETECTING CONDITION:
Defective yaw rate sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:





VDC00222

	Step	Check	Yes	No
1	**CHECK DRIVING PLACE.** Check if the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Did the vehicle run the road with banks or sandy surface (which does not mean a dirt road)?	VDCCM&H/U may record DTC when the vehicle ran the road with banks or sandy surface (which does not mean a dirt road).	Go to step **2.**
2	**CHECK YAW RATE & LATERAL G SENSOR INSTALLATION.**	Is the yaw rate & lateral G sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **3.**	Tighten the yaw rate & lateral G sensor installation bolt.
3	**CHECK YAW RATE & LATERAL G SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **5.**	Go to step **4.**
4	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **7.**
5	**CHECK GROUND CIRCUIT OF YAW RATE & LATERAL G SENSOR.** Measure the resistance between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 6 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Go to step **6.**
6	**CHECK GROUND CIRCUIT FOR VDCCM&H/U.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 16 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **7.**
7	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **14.**
8	**CHECK HARNESS OF YAW RATE & LATERAL G SENSOR.** 1) Disconnect the connector from VDCCM&H/U. 2) Measure the resistance between VDCCM&H/U and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B310) No. 1 — (B230) No. 1:*** ***(B310) No. 2 — (B230) No. 2:*** ***(B310) No. 28 — (B230) No. 4:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
9	**CHECK GROUND SHORT CIRCUIT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 1 — Chassis ground:*** ***(B310) No. 2 — Chassis ground:*** ***(B310) No. 28 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.

	Step	Check	Yes	No
10	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 1 (+) — No. 16 (–):***	Is the voltage 2.1 — 2.9 V?	Go to step **11.**	Replace the yaw rate & lateral G sensor.
11	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to ON. 2) Check the signal pattern of oscilloscope between VDCCM&H/U connector terminals. <Ref. to VDC(diag)-15, WAVEFORM, MEASUREMENT, Control Module I/O Signal.> ***Connector & terminal*** ***(B310) No. 2 — No. 16:*** ***(B310) No. 28 — No. 16:***	Is the oscilloscope pattern the same waveform as shown in the figure?	Go to step **12.**	Replace the yaw rate & lateral G sensor.
12	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Go to step **13.**	Go to step **15.**
13	**CHECK VDCCM&H/U.** 1) Turn the ignition switch to OFF. 2) Replace the yaw rate & lateral G sensor. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **16.**
14	**CHECK YAW RATE & LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **15.**
15	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.
16	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Malfunction is found in original yaw rate & lateral G sensor.

BA:DTC C0073 EXCESSIVE AMOUNT OF LATERAL G SENSOR OUTPUT OFFSET

NOTE:
For the diagnostic procedure, refer to DTC C0073. <Ref. to VDC(diag)-118, DTC C0073 EXCESSIVE LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BB:DTC C0073 LATERAL G SENSOR OUTPUT

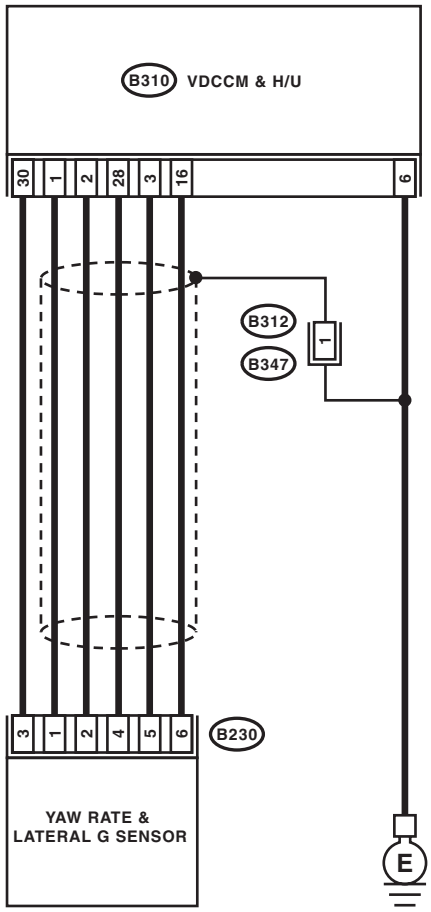
NOTE:
For the diagnostic procedure, refer to DTC C0073. <Ref. to VDC(diag)-118, DTC C0073 EXCESSIVE LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

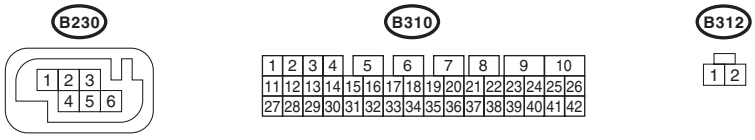
BC:DTC C0073 EXCESSIVE VARIATION AMOUNT OF LATERAL G SENSOR OUTPUT

NOTE:
For the diagnostic procedure, refer to DTC C0073. <Ref. to VDC(diag)-118, DTC C0073 EXCESSIVE LATERAL G SENSOR OUTPUT, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BD:DTC C0073 EXCESSIVE LATERAL G SENSOR OUTPUT

DTC DETECTING CONDITION:
Defective lateral G sensor
TROUBLE SYMPTOM:
VDC does not operate.
WIRING DIAGRAM:



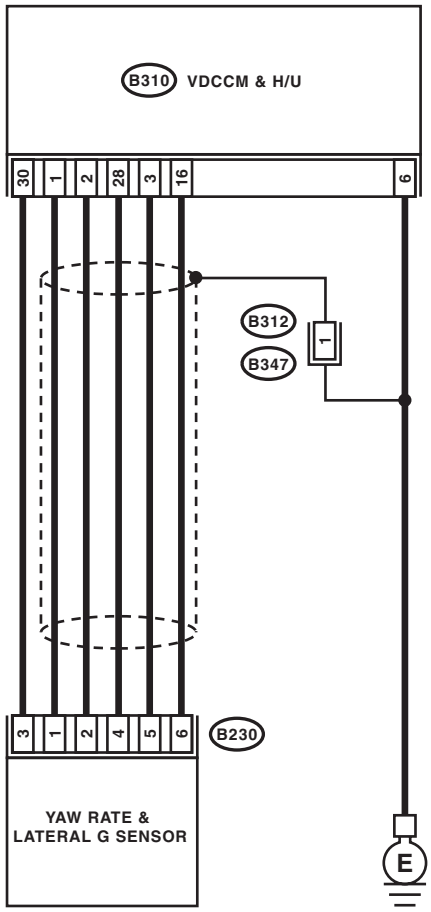


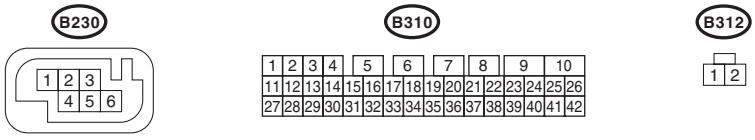
VDC00222

	Step	Check	Yes	No
1	**CHECK YAW RATE & LATERAL G SENSOR INSTALLATION.**	Is the yaw rate & lateral G sensor installation bolt tightened to 7.5 N·m (0.76 kgf-m, 5.5 ft-lb)?	Go to step **2.**	Tighten the yaw rate & lateral G sensor installation bolt.
2	**CHECK LATERAL G SENSOR OUTPUT.** 1) Park the vehicle on a level surface. 2) Select {Current Data Display & Save} in Subaru Select Monitor. 3) Read the lateral G sensor output displayed on display.	Is the indicated reading on the monitor display −1.5 — 1.5 m/s^2?	Go to step **3.**	Replace the yaw rate & lateral G sensor.
3	**CHECK LATERAL G SENSOR OUTPUT.** 1) Turn the ignition switch to OFF. 2) Remove the yaw rate & lateral G sensor from vehicle. 3) Turn the ignition switch to ON, and select {Current Data Display & Save} in Subaru Select Monitor. 4) Read the lateral G sensor output displayed on display.	When the yaw rate & lateral G sensor is inclined 90° to the right, is the indicated value 6.8 — 12.8 m/s^2?	Go to step **4.**	Replace the yaw rate & lateral G sensor.
4	**CHECK LATERAL G SENSOR.** Read the lateral G sensor output displayed on screen.	When the yaw rate & lateral G sensor is inclined 90° to the left, is the indicated value −6.8 — −12.8 m/s^2?	Go to step **5.**	Replace the yaw rate & lateral G sensor.
5	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between VDCCM&H/U and yaw rate & lateral G sensor?	Repair the connector.	Go to step **6.**
6	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **7.**
7	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BE:DTC C0073 LATERAL G SENSOR POWER/OUTPUT

DTC DETECTING CONDITION:
Defective lateral G sensor
DTC DETECTING CONDITION:
VDC does not operate.
WIRING DIAGRAM:





VDC00222

	Step	Check	Yes	No
1	**CHECK LATERAL G SENSOR OUTPUT.** 1) Park the vehicle on a level surface. 2) Select {Current Data Display & Save} in Subaru Select Monitor. 3) Read the lateral G sensor output displayed on display.	Is the indicated reading on the monitor display −1.5 — 1.5 m/s^2?	Go to step **2.**	Go to step **3.**
2	**CHECK POOR CONTACT IN CONNECTORS.** Turn the ignition switch to OFF.	Is there poor contact in connector between VDCCM&H/U and yaw rate & lateral G sensor?	Repair the connector.	Go to step **10.**
3	**CHECK YAW RATE & LATERAL G SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from yaw rate & lateral G sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between yaw rate & lateral G sensor and chassis ground. ***Connector & terminal*** ***(B230) No. 3 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Go to step **6.**	Go to step **4.**
4	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 30 (+) — Chassis ground (−):***	Is the voltage 10 — 15 V?	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.	Go to step **5.**
5	**CHECK POOR CONTACT IN CONNECTORS**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **10.**
6	**CHECK OPEN CIRCUIT IN LATERAL G SENSOR OUTPUT HARNESS.** 1) Disconnect the connector from yaw rate & lateral G sensor. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and yaw rate & lateral G sensor. ***Connector & terminal*** ***(B310) No. 3 — (B230) No. 5:***	Is the resistance less than 0.5 Ω?	Go to step **7.**	Repair the harness connector between yaw rate & lateral G sensor and VDCCM&H/U.
7	**CHECK GROUND SHORT CIRCUIT FOR YAW RATE & LATERAL G SENSOR HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **8.**	Repair the harness connector between yaw rate & lateral G sensor and VDCCM&H/U.
8	**CHECK LATERAL G SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the yaw rate & lateral G sensor from vehicle. 3) Connect the connector to the yaw rate & lateral G sensor. 4) Connect the connector to VDCCM&H/U. 5) Turn the ignition switch to ON. 6) Measure the voltage between yaw rate & lateral G sensor connector terminals. ***Connector & terminal*** ***(B230) No. 5 (+) — No. 6 (−):***	Is the voltage 2.35 — 2.65 V when yaw rate & lateral G sensor is on level?	Go to step **9.**	Replace the yaw rate & lateral G sensor.

	Step	Check	Yes	No
9	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector between VDCCM&H/U and yaw rate & lateral G sensor?	Repair the connector.	Go to step **10.**
10	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **11.**
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BF:DTC C0074 PRESSURE SENSOR TEST MALFUNCTION

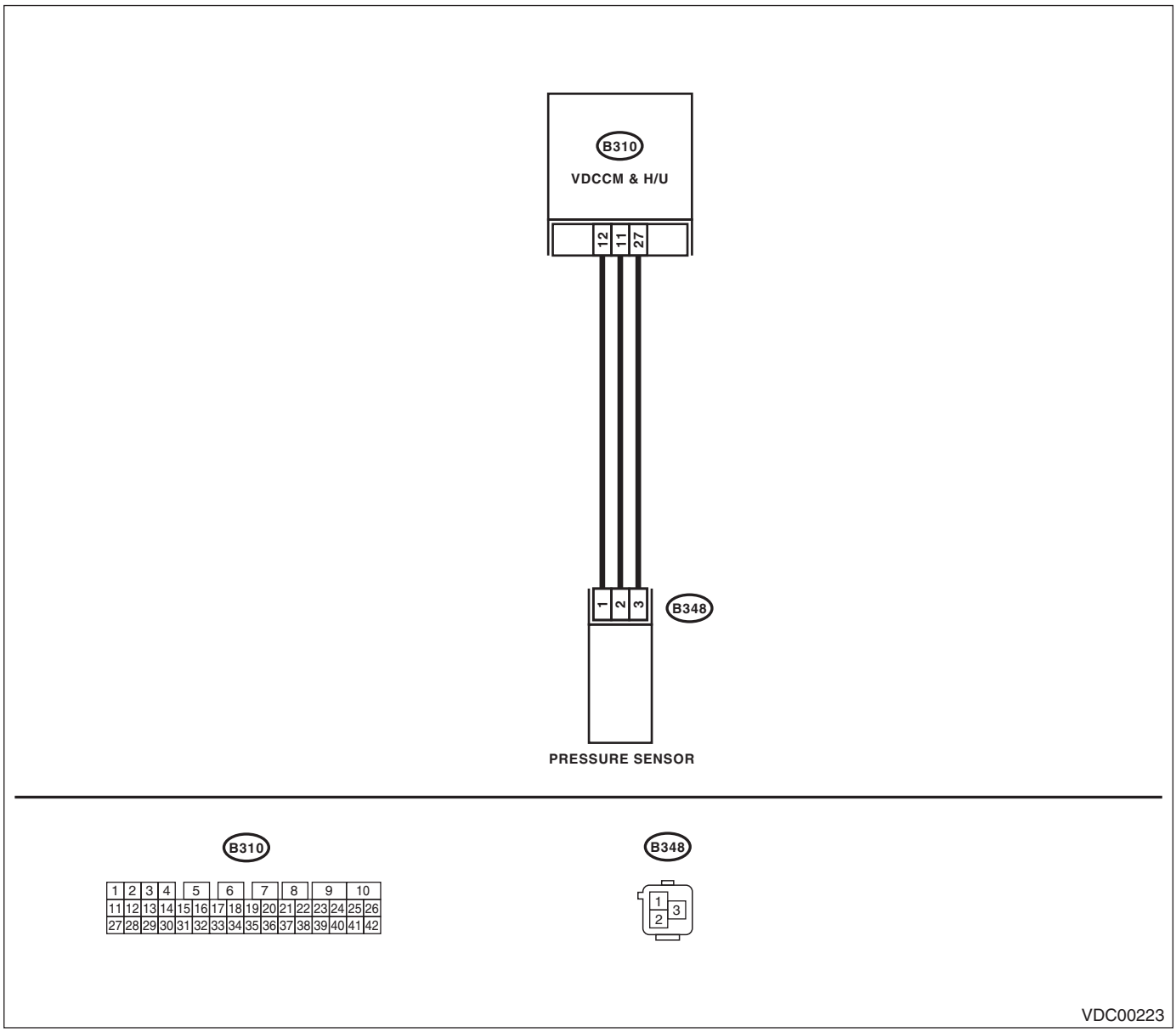
DTC DETECTING CONDITION:

Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PRESSURE SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between pressure sensor connector and chassis ground. ***Connector & terminal*** ***(B348) No. 3 (+) — Chassis ground (−):***	Is the voltage 4.75 — 5.25 V?	Go to step **4.**	Go to step **2.**
2	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 27 (+) — Chassis ground (−):***	Is the voltage 4.75 — 5.25 V?	Repair the harness between pressure sensor and VDCCM&H/U.	Go to step **3.**
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **9.**
4	**CHECK GROUND CIRCUIT OF PRESSURE SENSOR.** Measure the resistance between pressure sensor and chassis ground. ***Connector & terminal*** ***(B348) No. 1 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **7.**	Go to step **5.**
5	**CHECK GROUND CIRCUIT OF VDCCM&H/U.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 12 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Repair the harness between pressure sensor and VDCCM&H/U.	Go to step **6.**
6	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **9.**
7	**CHECK PRESSURE SENSOR HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and pressure sensor. ***Connector & terminal*** ***(B310) No. 11 — (B348) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
8	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **9.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
9	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **10.**
10	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BG:DTC C0074 EXCESSIVE PRESSURE SENSOR OUTPUT OFFSET

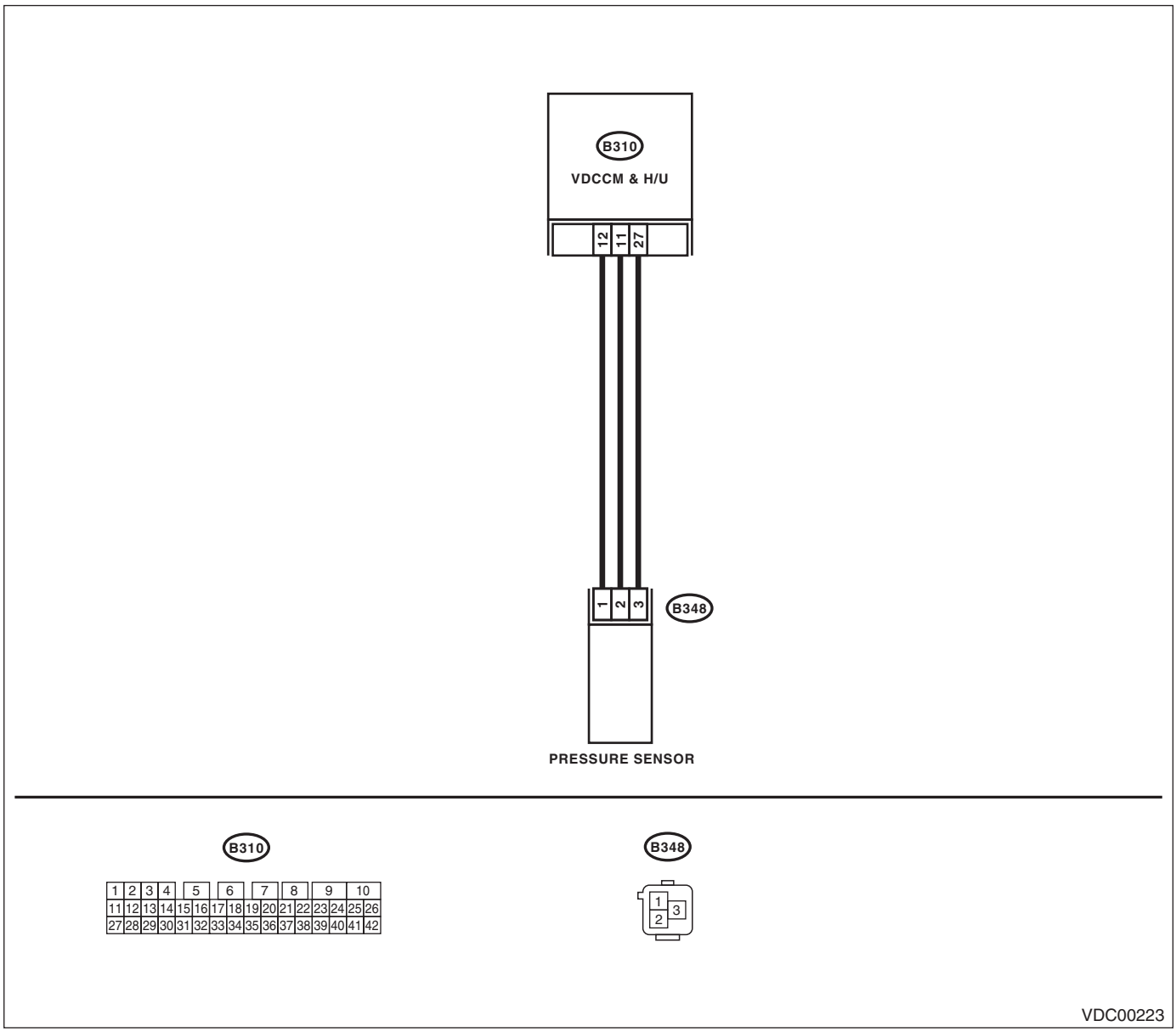
DTC DETECTING CONDITION:

Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH CIRCUIT.** Check stop light switch open circuit.	Is the stop light switch circuit OK?	Go to step **2.**	Repair the stop light switch circuit.
2	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **3.**
3	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC. <Ref. to VDC(diag)-37, List of Diagnostic Trouble Code (DTC).>	Temporary poor contact occurs.

BH:DTC C0074 PRESSURE SENSOR POWER/OUTPUT

DTC DETECTING CONDITION:

Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

NOTE:

For the diagnostic procedure, refer to DTC C0074 “PRESSURE SENSOR TEST MALFUNCTION”. <Ref. to VDC(diag)-123, DTC C0074 PRESSURE SENSOR TEST MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

BI: DTC C0074 PRESSURE SENSOR OUTPUT

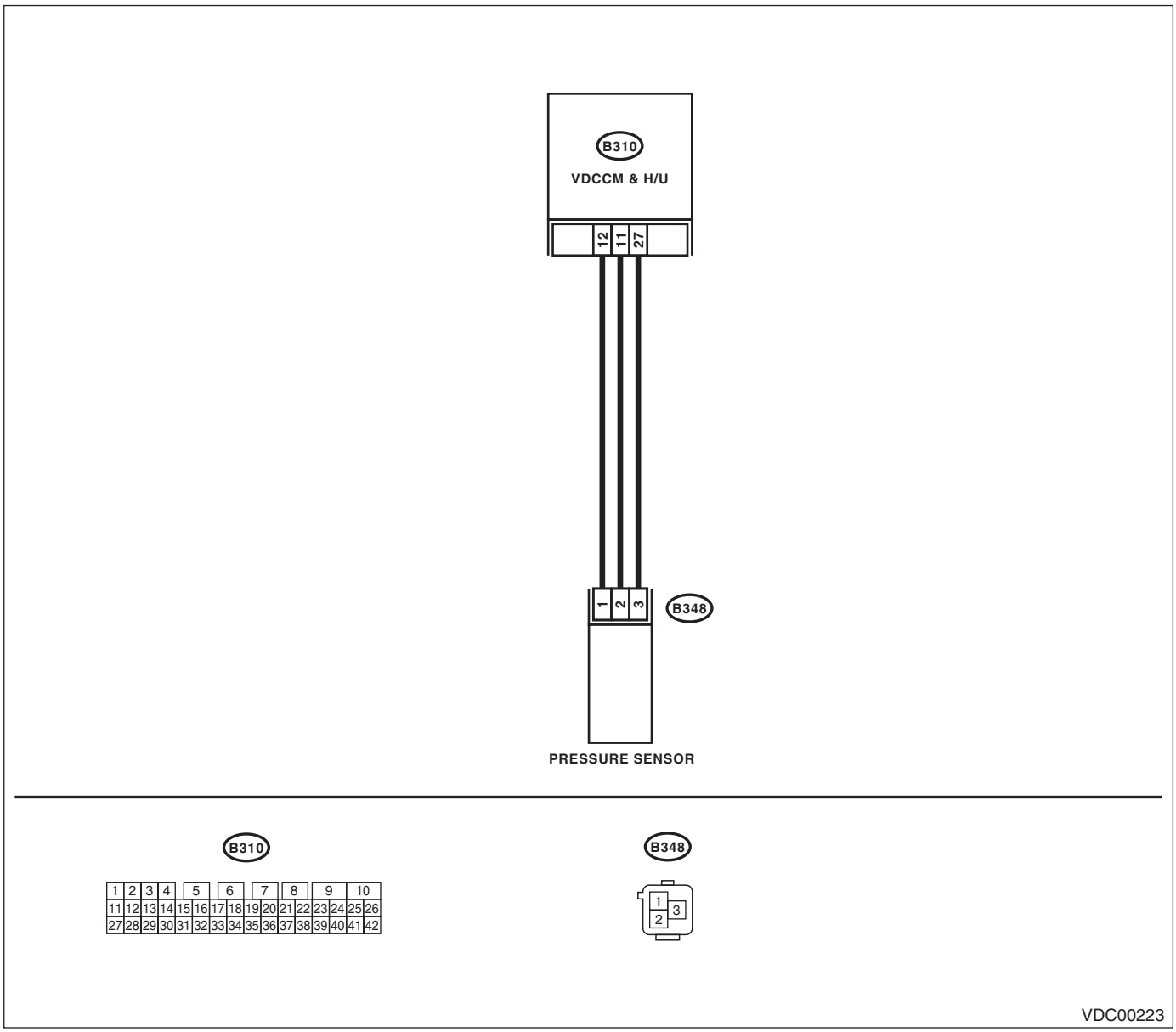
DTC DETECTING CONDITION:

Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH CIRCUIT.** Check stop light switch open circuit.	Is the stop light switch circuit OK?	Go to step **2.**	If there is malfunction in the stop light switch circuit, DTC may be recorded in the memory.
2	**CHECK PRESSURE SENSOR POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from pressure sensor. 3) Turn the ignition switch to ON. 4) Measure the voltage between pressure sensor connector and chassis ground. ***Connector & terminal*** ***(B348) No. 3 (+) — Chassis ground (–):***	Is the voltage 4.75 — 5.25 V?	Go to step **5.**	Go to step **3.**
3	**CHECK OUTPUT VOLTAGE OF VDCCM&H/U.** Measure the voltage between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 27 (+) — Chassis ground (–):***	Is the voltage 4.75 — 5.25 V?	Repair the harness between pressure sensor and VDCCM&H/U.	Go to step **4.**
4	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **10.**
5	**CHECK GROUND CIRCUIT OF PRESSURE SENSOR.** Measure the resistance between pressure sensor and chassis ground. ***Connector & terminal*** ***(B348) No. 1 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Go to step **8.**	Go to step **6.**
6	**CHECK GROUND CIRCUIT OF VDCCM&H/U.** Measure the resistance between VDCCM&H/U and chassis ground. ***Connector & terminal*** ***(B310) No. 12 — Chassis ground:***	Is the resistance less than 0.5 Ω?	Repair the harness between pressure sensor and VDCCM&H/U.	Go to step **7.**
7	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in connector?	Correct or replace the connector.	Go to step **10.**
8	**CHECK PRESSURE SENSOR HARNESS.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from VDCCM&H/U. 3) Measure the resistance between VDCCM&H/U and pressure sensor. ***Connector & terminal*** ***(B310) No. 11 — (B348) No. 2:***	Is the resistance less than 0.5 Ω?	Go to step **9.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
9	**CHECK GROUND SHORT OF HARNESS.** Measure the resistance between VDCCM&H/U connector and chassis ground. ***Connector & terminal*** ***(B310) No. 11 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **10.**	Repair the harness between yaw rate & lateral G sensor and VDCCM&H/U.
10	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **11.**

Step		Check	Yes	No
11	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	Temporary poor contact occurs.

BJ:DTC C0074 PRESSURE SENSOR POWER MALFUNCTION

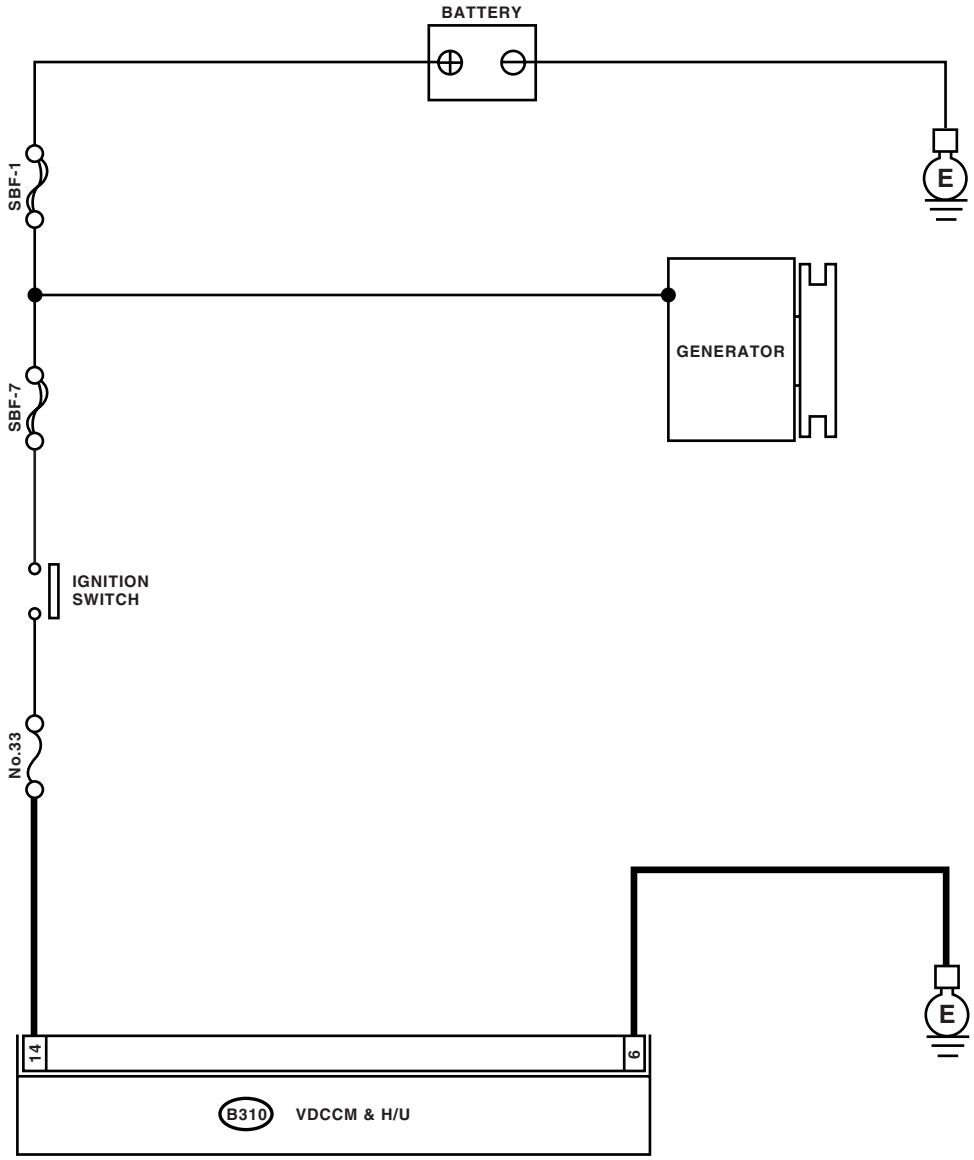
DTC DETECTING CONDITION:

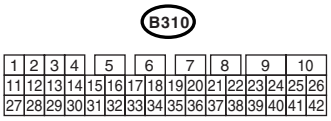
Defective pressure sensor

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

WIRING DIAGRAM:





VDC00216

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS.** Check if there is poor contact in VDCCM&H/U power supply circuit.	Is there poor contact?	Repair the connector.	Go to step **2.**
2	**CHECK VDCCM&H/U POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the VDCCM&H/U connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between VDCCM&H/U connector terminals. ***Connector & terminal*** ***(B310) No. 14 (+) — (B310) No. 6 (–):***	Is the voltage 10 — 15 V?	Go to step **3.**	Check the power supply circuit in VDCCM&H/U.
3	**CHECK VDCCM&H/U.** 1) Connect all the connectors. 2) Erase the memory. 3) Perform the inspection mode. 4) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U. <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>	Go to step **4.**
4	**CHECK OTHER DTC DETECTION.**	Is any other DTC displayed?	Perform the diagnosis according to DTC.	It results from a temporary noise interference.

BK:DTC C0081 SYSTEM MALFUNCTION

DTC DETECTING CONDITION:

VDC long time sequential control

TROUBLE SYMPTOM:

- ABS does not operate.
- VDC does not operate.

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in the VDCCM&H/U and yaw rate & lateral G sensor connector?	Repair the connector.	Go to step **2.**
2	**CHECK VDCCM&H/U.** 1) Replace the yaw rate & lateral G sensor. 2) Connect all the connectors. 3) Erase the memory. 4) Perform the inspection mode. 5) Read the DTC.	Is the same DTC displayed?	Replace the VDCCM&H/U.	Malfunction is found in original yaw rate & lateral G sensor.

13.General Diagnostic Table

A: INSPECTION

Symptom		Main probable cause	Other probable cause
Poor brake performance	Long braking/ stopping distance	• VDCCM&H/U • Brake pad • Aeration to brake line • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Master cylinder • Brake caliper • Disc rotor • Brake pipe • Brake booster
	Wheel lock	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Incorrect wiring or piping connections	• Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Brake caliper • Brake pipe
	Brake drag	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Axle and wheels • Brake pedal play	• Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Brake pad • Brake pipe
	Long brake pedal stroke	• Aeration to brake line • Brake pedal play	• VDCCM&H/U • Master cylinder • Brake caliper • Brake pad • Brake pipe • Brake booster
	Vehicle vertical pitching	• VDCCM&H/U • Road surface (uneven) • Suspension play or fatigue (reduced damping) • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation
Poor brake performance	Unstable or uneven braking	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Road surface (uneven) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Master cylinder • Disc rotor • Brake pipe • Axle and wheels • Road with crowns or banks • Suspension play or fatigue (poor damping)

Symptom		Main probable cause	Other probable cause
Vibration or noise • When braking suddenly • When accelerating suddenly • While driving on a slippery road	Excessive brake pedal vibration	• Road surface (uneven) • Incorrect wiring or piping connections	• VDCCM&H/U • Brake booster • Suspension play or fatigue (poor damping)
	Strange noise from VDCH/U	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Brake pipe	• VDCCM&H/U • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation
	Noise from the front side of vehicle	• VDCCM&H/U (mount bushing) • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Brake pad • Disc rotor • Brake pipe • Brake booster • Suspension play or fatigue (poor damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
	Noise inside passenger seat		• VDCCM&H/U • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation
	Noise from the rear side of vehicle	• Defective ABS wheel speed sensor or sensor gap • Brake caliper • Brake pad • Disc rotor • Parking brake • Brake pipe • Suspension play or fatigue (poor damping)	• Axle and wheels • Tire specifications, tire wear and air pressures
Engine does not accelerate or goes into a stall when accelerating suddenly or driving on a slippery surface.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Master cylinder • Brake caliper • Parking brake • Incorrect wiring or piping	• Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Brake pad • Brake pipe

General Diagnostic Table

Symptom		Main probable cause	Other probable cause
Poor change-direction-operation stability of TCS	Deviation to right or left direction	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Brake caliper • Brake pad • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Disc rotor • Brake pipe • Axle and wheels • Suspension play or fatigue (poor damping)
	Vehicle spin	• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Brake pad • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections	• Brake caliper • Brake pipe
Steering wheel drag while driving		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Incorrect wiring or piping connections • Power steering system	• Brake caliper • Brake pad • Disc rotor • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (poor damping) • Tire specifications, tire wear and air pressures
VDC operates while driving normally.		• VDCCM&H/U • Defective ABS wheel speed sensor or sensor gap • Defective steering angle sensor or improper neutral position • Defective yaw rate & lateral G sensor or improper installation • Wheel alignment • Road surface (uneven) • Road with crowns or banks • Suspension play or fatigue (poor damping) • Tire specifications, tire wear and air pressures • Incorrect wiring or piping connections • Power steering system	

Symptom	Main probable cause	Other probable cause
VDC OFF indicator light does not come on when the VDC OFF switch is depressed. NOTE: When pressing VDC OFF switch for more than 10 seconds, VDC OFF indicator light goes off and cannot operate any more. When turning the ignition switch from OFF to ON, the previous status is restored.	• Harness • Indicator light bulb • VDC OFF switch	

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

BRAKE

BR

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3.	Front Disc Rotor	19
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1. General Description

A: SPECIFICATION

Model			2.0 i, 2.5 i	OUTBACK 2.5 i, OUTBACK 3.0 R	2.0 GT, 3.0 R
Front disc brake	Size		15-inch type	16-inch type	17-inch type
	Type		Disc (Floating type, ventilated)		
	Effective disc diameter	mm (in)	228 (8.98)	244 (4.61)	261 (10.28)
	Disc thickness × Outer diameter	mm (in)	24 × 277 (0.94 × 10.91)	24 × 294 (0.94 × 11.57)	30 × 316 (1.18 × 12.44)
	Effective cylinder diameter		42.8 (1.685) × 2		
	Pad dimensions (length × width × thickness)	mm (in)	117.8 × 50.5 × 11.0 (4.638 × 1.988 × 0.433)		130.0 × 53.5 × 11.0 (5.118 × 2.106 × 0.433)
	Clearance adjustment		Automatic adjustment		
Rear disc brake	Size		15-inch type		
	Type		Disc (Floating type, solid)		Disc (Floating type, ventilated)
	Effective disc diameter	mm (in)	238 (9.37)		254 (10.0)
	Disc thickness × Outer diameter	mm (in)	10 × 274 (0.39 × 10.79)		18 × 290 (0.71 × 11.42)
	Effective cylinder diameter	mm (in)	38.1 (1.500)		
	Pad dimensions (length × width × thickness)	mm (in)	92.0 × 33.0 × 9.0 (3.622 × 1.299 × 0.354)		82.4 × 33.7 × 9.0 (3.244 × 1.327 × 0.354)
	Clearance adjustment		Automatic adjustment		
Master cylinder	Type		Tandem		
	Effective diameter	mm (in)	23.8 (15/16)		
	Reservoir type		Sealed type		
	Brake fluid reservoir capacity	cm^3 (cu in)	205 (12.51)		
Brake booster	Type		Vacuum suspended		
	Effective diameter	mm (in)	208 + 229 (8.19 + 9.02)		
Brake line			Dual circuit system		
Brake fluid **CAUTION:** **• Avoid mixing brake fluid of different brands to prevent fluid performance from degrading.** **• When brake fluid is supplemented, be careful not to allow any dust into the reservoir.** **• Use fresh SUBARU genuine brake fluid when replacing or refilling the fluid.**			FMVSS No. 116, DOT3		

NOTE:
Refer to “PB” section for parking brake specifications. <Ref. to PB-2, SPECIFICATION, General Description.>

Item			Standard value	Limit
Front brake	Pad thickness mm (in)	Except 17-inch type	11 (0.43)	1.5 (0.059)
		17-inch type	11 (0.43)	1.5 (0.059)
	Disc thickness mm (in)	Except 17-inch type	24 (0.94)	22 (0.87)
		17-inch type	30 (1.18)	28 (1.10)
	Disc runout mm (in)		—	0.05 (0.0020)
Rear brake (Disc type)	Pad thickness mm (in)	Solid disc	9.0 (0.354)	1.5 (0.059)
		Ventilated disc	9.0 (0.354)	1.5 (0.059)
	Disc thickness mm (in)	Solid disc	10 (0.39)	8.5 (0.335)
		Ventilated disc	18 (0.71)	16 (0.63)
	Disc runout mm (in)		—	0.05 (0.0020)
Parking brake	Inside diameter mm (in)		170 (6.69)	171 (6.73)
	Lining thickness mm (in)		3.2 (0.126)	1.5 (0.059)
	Lever stroke		5 — 6 notches/200 N (20 kgf, 45 lb)	

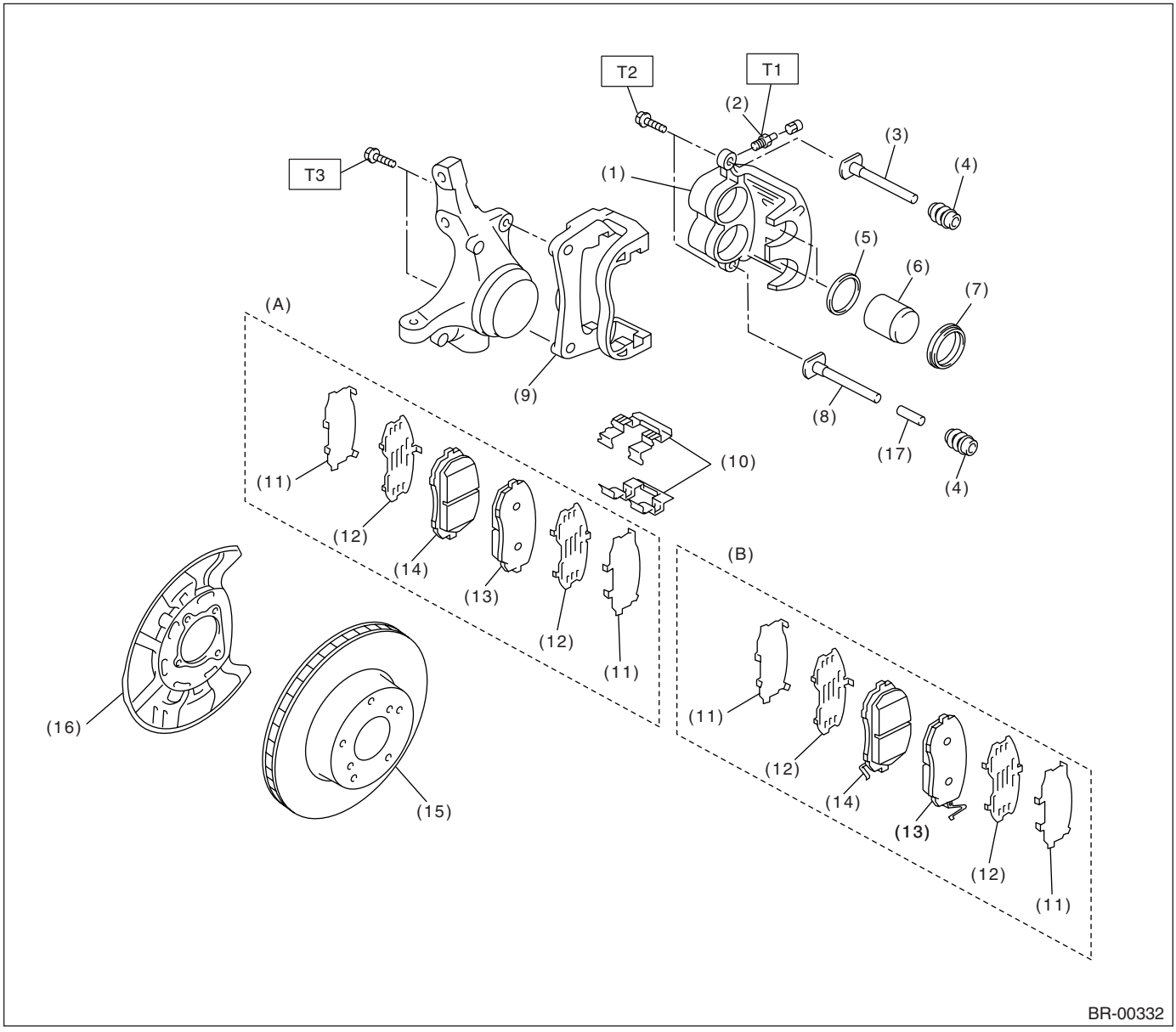
		Brake pedal force N (kgf, lb)	Fluid pressure kPa (kg/cm^2, psi)		
			15-inch type	16-inch type	17-inch type
Brake Booster	Brake fluid pressure without engine running	147 (15, 33)	545 (6, 79)		
		294 (30, 66)	1,564 (16, 227)		
	Brake fluid pressure with engine running and vacuum at 66.7 kPa (500 mmHg, 19.69 inHg)	147 (15, 33)	6,003 (61, 871)	5,381 (55, 780)	4,963 (51, 720)
		294 (30, 66)	11,273 (115, 1,635)	10,982 (112, 1,593)	10,055 (103, 1,458)

Brake pedal	Free play mm (in)	0.5 — 2 (0.02 — 0.08) [When pulling the brake pedal upward with a force of less than 10 N (1 kgf, 2 lb).]

B: COMPONENT

1. FRONT DISK BRAKE

• Except for EC, EK, OUTBACK model

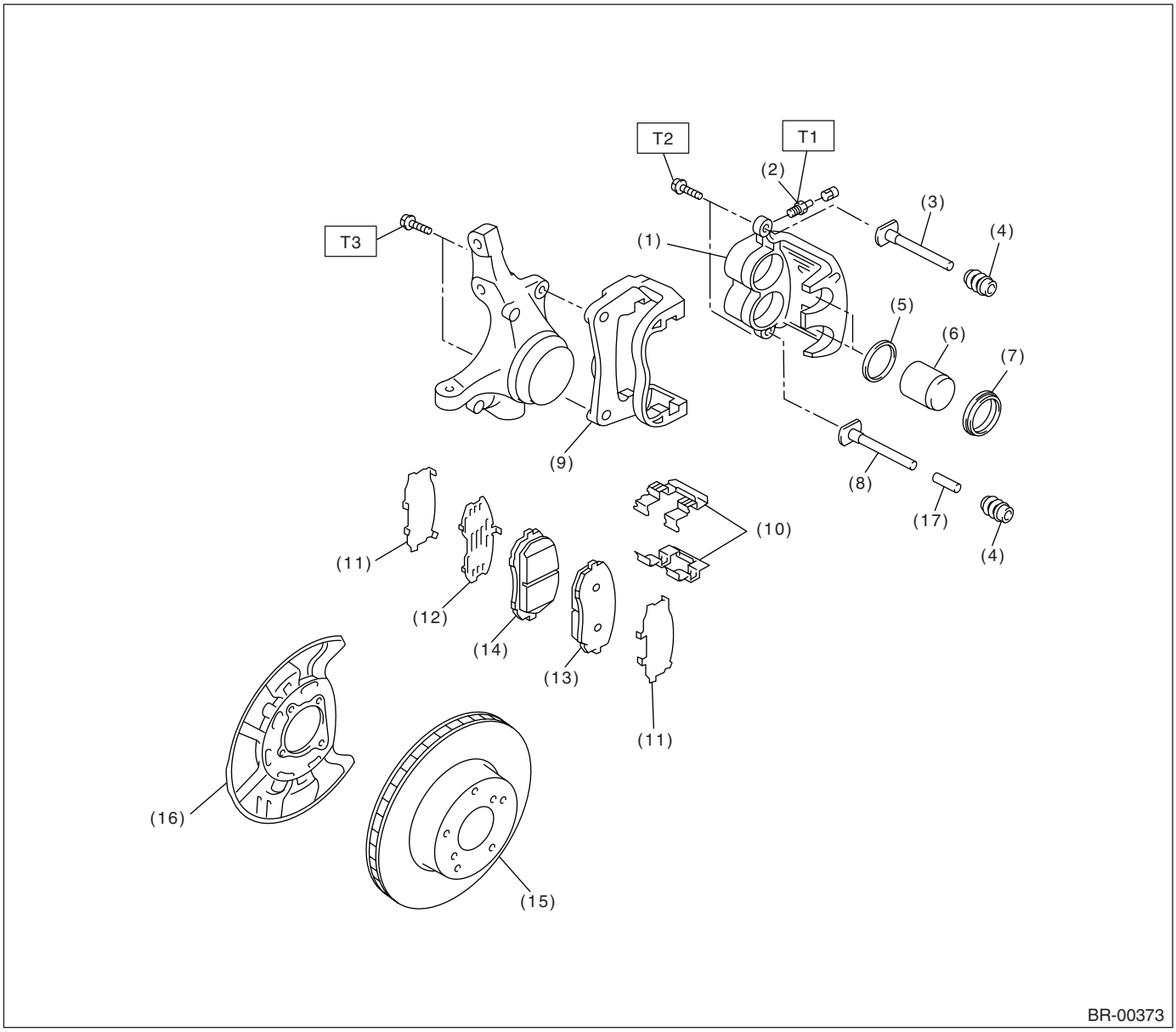


(A) 15, 16-inch type
(B) 17-inch type

(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 80 (8.2, 59)

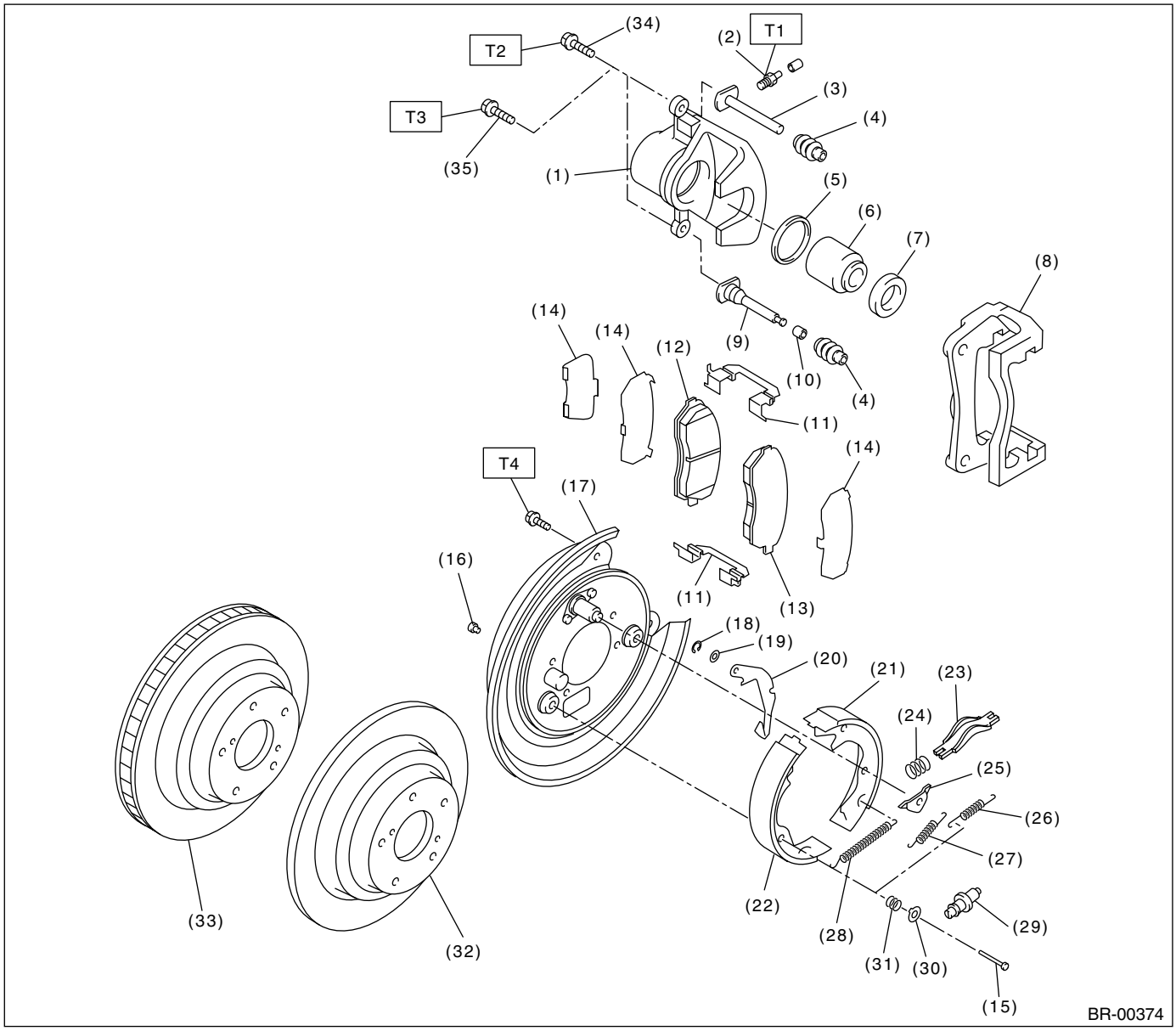
• EC, EK, OUTBACK model



(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Lock pin (Yellow)
(9) Support
(10) Pad clip
(11) Outer shim
(12) Inner shim
(13) Pad (Outside)
(14) Pad (Inside)
(15) Disc rotor
(16) Disc cover
(17) Bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 80 (8.2, 59)

2. REAR DISC BRAKE

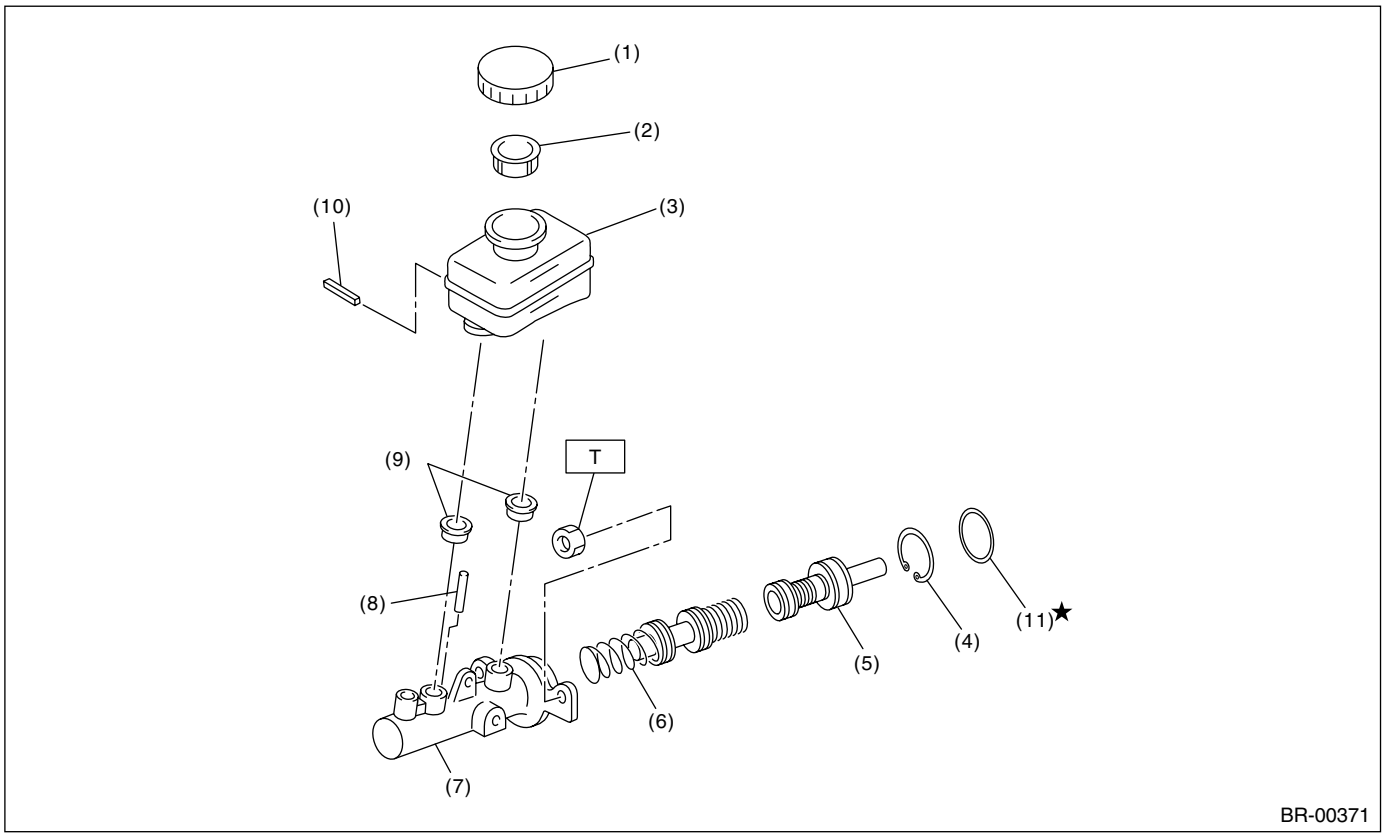


(1) Caliper body
(2) Air bleeder screw
(3) Guide pin (Green)
(4) Pin boot
(5) Piston seal
(6) Piston
(7) Piston boot
(8) Support
(9) Lock pin (Yellow)
(10) Bushing
(11) Pad clip
(12) Inner pad
(13) Outer pad
(14) Shim
(15) Shoe hold-down pin
(16) Cover
(17) Back plate
(18) Retainer
(19) Spring washer
(20) Parking brake lever
(21) Parking brake shoe (Secondary)
(22) Parking brake shoe (Primary)
(23) Strut
(24) Strut shoe spring
(25) Shoe guide plate
(26) Secondary shoe return spring
(27) Primary shoe return spring
(28) Adjusting spring
(29) Adjuster
(30) Shoe hold-down cup
(31) Shoe hold-down spring
(32) Disc rotor (Solid type)
(33) Disc rotor (Ventilated type)
(34) Bolt (For solid disc brake)
(35) Bolt (For ventilated disc brake)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 27 (2.8, 19.9)
T3: 37 (3.8, 27.5)
T4: 53 (5.4, 39.1)

3. MASTER CYLINDER

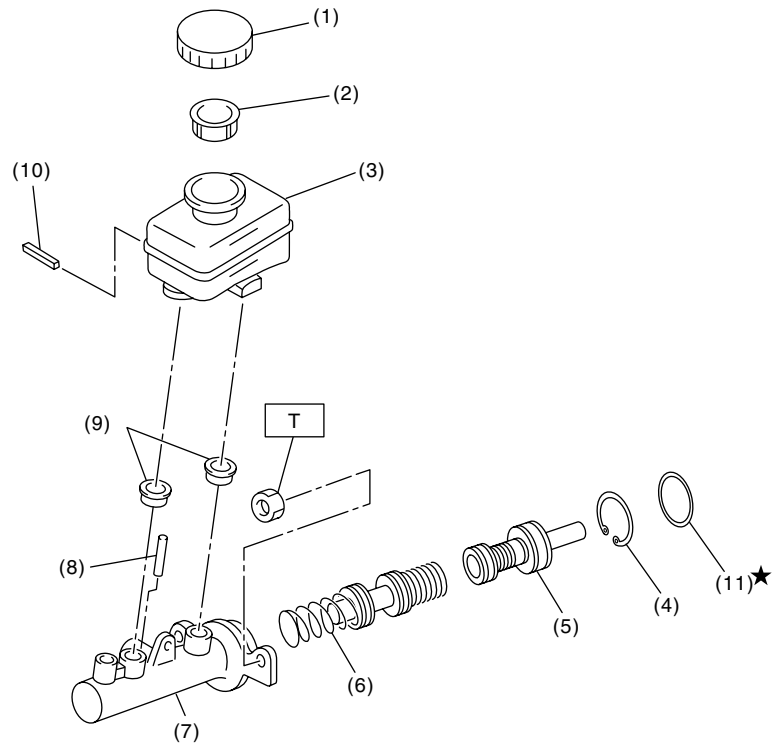
• LHD model



(1) Cap
(2) Filter
(3) Reservoir tank
(4) C-ring
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin
(9) Seal
(10) Pin
(11) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 13 (1.3, 9.6)

• RHD model

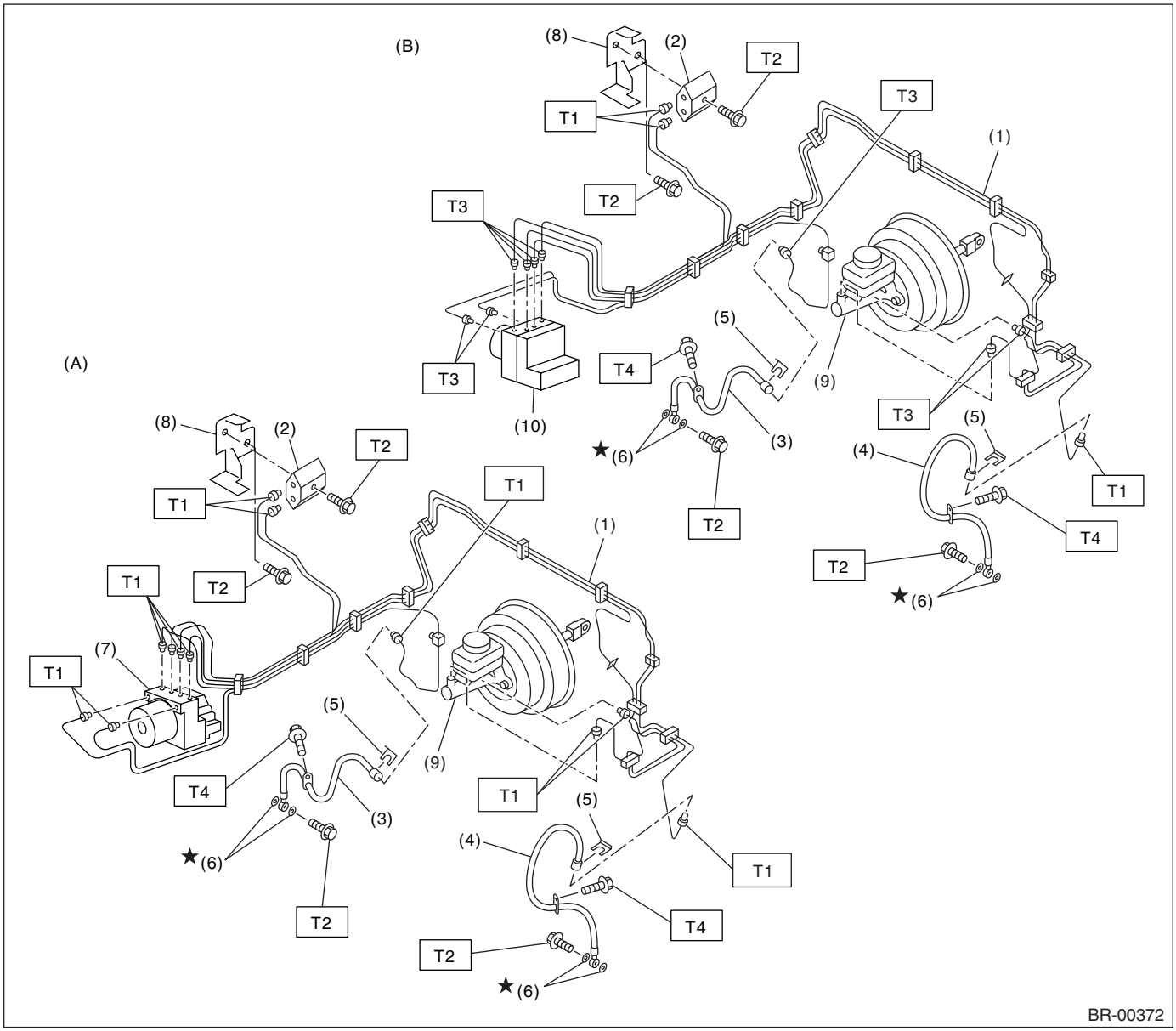


(1) Cap
(2) Filter
(3) Reservoir tank
(4) C-ring
(5) Primary piston
(6) Secondary piston
(7) Cylinder body
(8) Cylinder pin
(9) Seal
(10) Pin
(11) O-ring

Tightening torque: N·m (kgf-m, ft-lb)
T: 13 (1.3, 9.6)

4. FRONT BRAKE PIPES AND HOSE

• LHD model

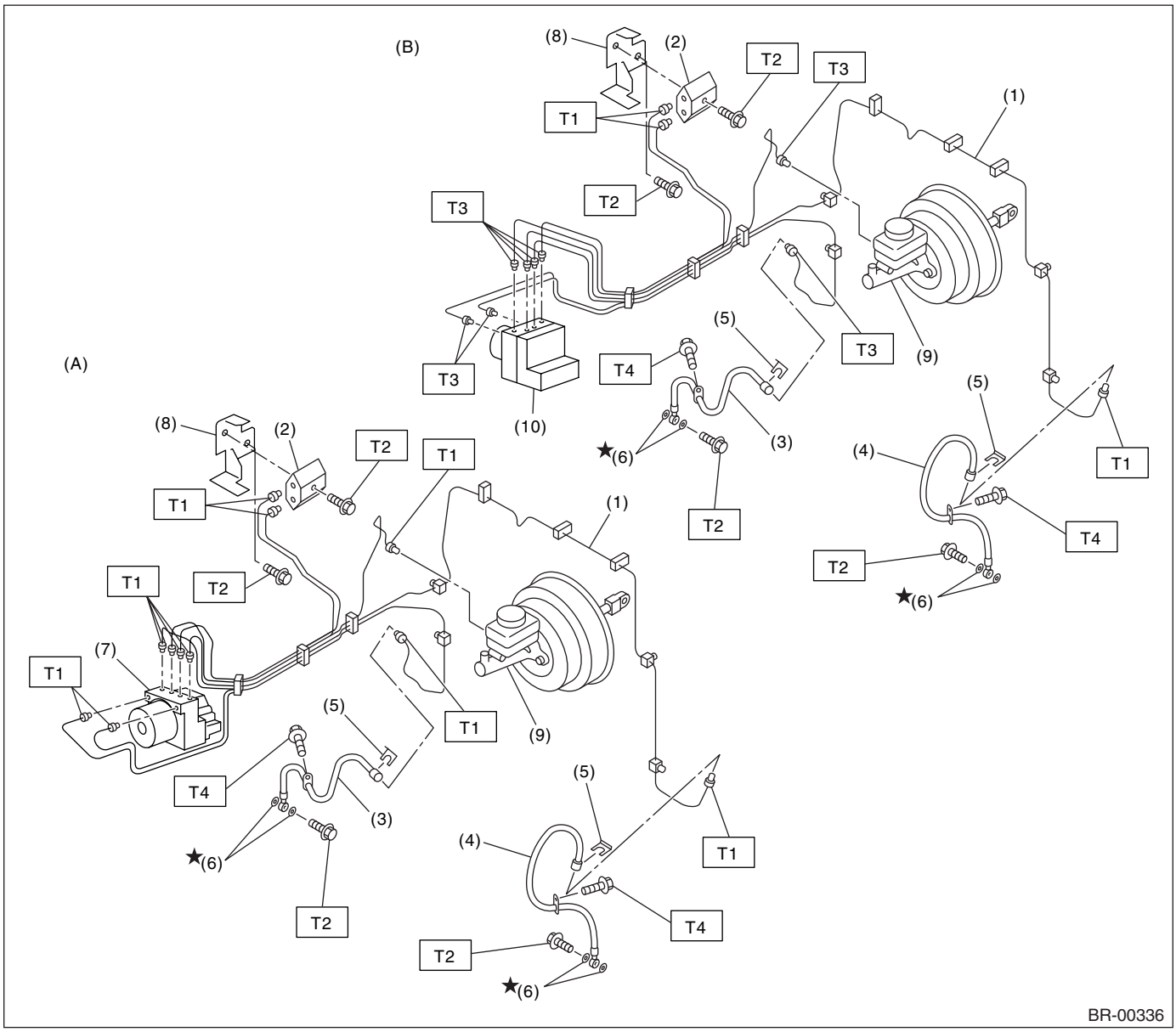


(A)	Model with ABS	(5)	Clamp
(B)	Model with Vehicle dynamics control (VDC)	(6)	Gasket
		(7)	ABS control module and hydraulic control unit (ABSCM&H/U)
(1)	Front brake pipe ASSY	(8)	Bracket
(2)	Two-way connector	(9)	Master cylinder
(3)	Front brake hose RH	(10)	VDC control module & hydraulic control unit (VDCCM&H/U)
(4)	Front brake hose LH		

Tightening torque: N·m (kgf-m, ft-lb)

T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 19 (1.9, 14.0)
T4: 33 (3.4, 24.3)

• RHD model

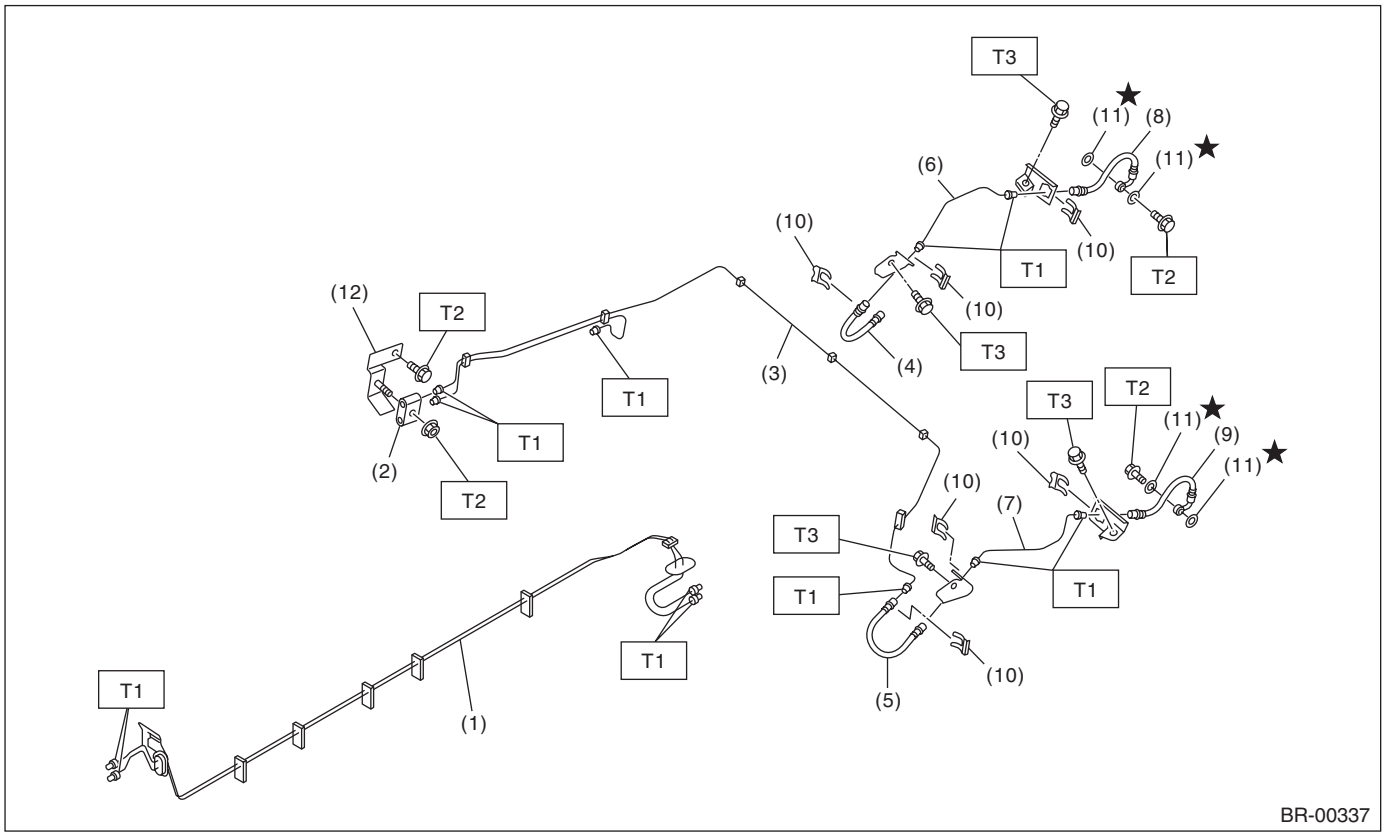


(A) Model with ABS
(B) Model with VDC

(1) Front brake pipe ASSY
(2) Two-way connector
(3) Front brake hose RH
(4) Front brake hose LH
(5) Clamp
(6) Gasket
(7) ABS control module and hydraulic control unit (ABSCM&H/U)
(8) Bracket
(9) Master cylinder
(10) VDC control module & hydraulic control unit (VDCCM&H/U)

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 19 (1.9, 14.0)
T4: 33 (3.4, 24.3)

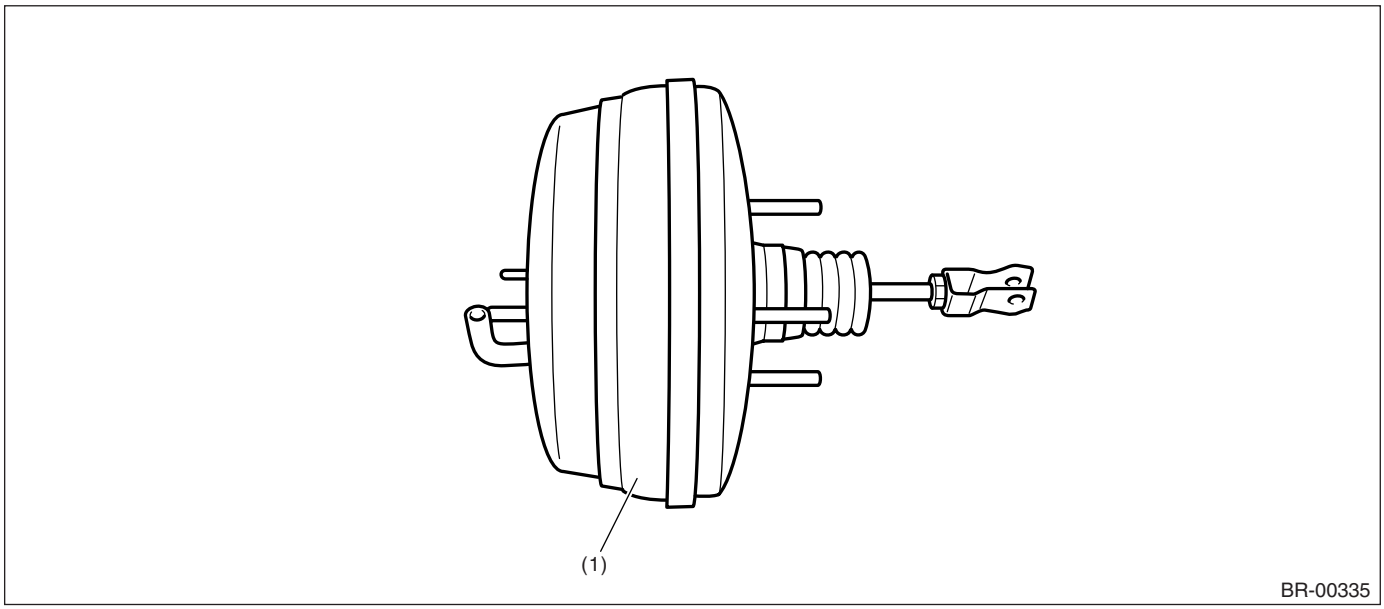
5. CENTER AND REAR BRAKE PIPES AND HOSE



(1)	Center brake pipe ASSY	(7)	Rear brake pipe LH
(2)	Two-way connector	(8)	Rear brake hose rear RH
(3)	Rear brake pipe ASSY	(9)	Rear brake hose rear LH
(4)	Rear brake hose RH	(10)	Clamp
(5)	Rear brake hose LH	(11)	Gasket
(6)	Rear brake pipe RH	(12)	Bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 15 (1.5, 10.8)
T2: 18 (1.8, 13.0)
T3: 33 (3.4, 24.3)

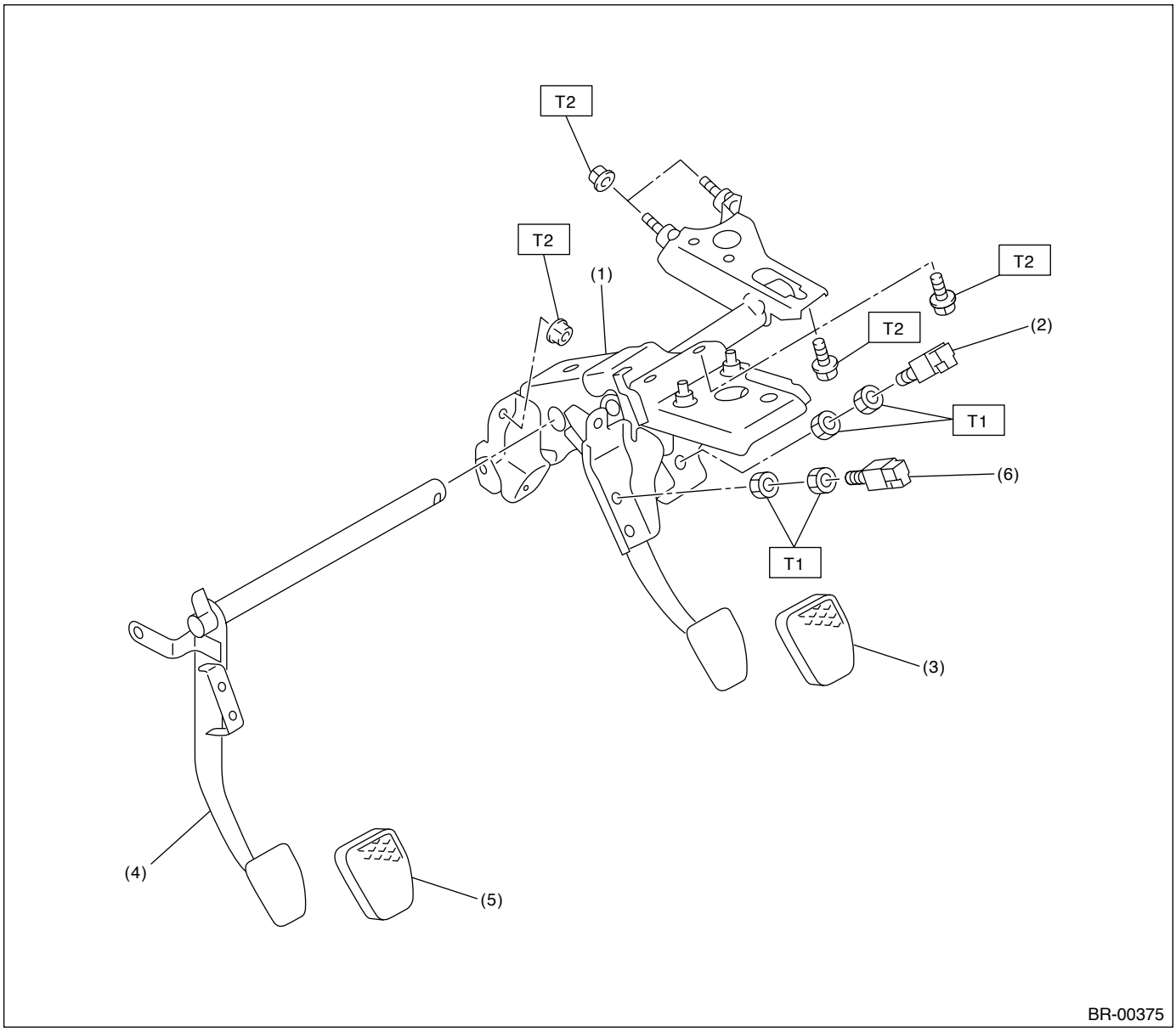
6. BRAKE BOOSTER



(1) Brake booster

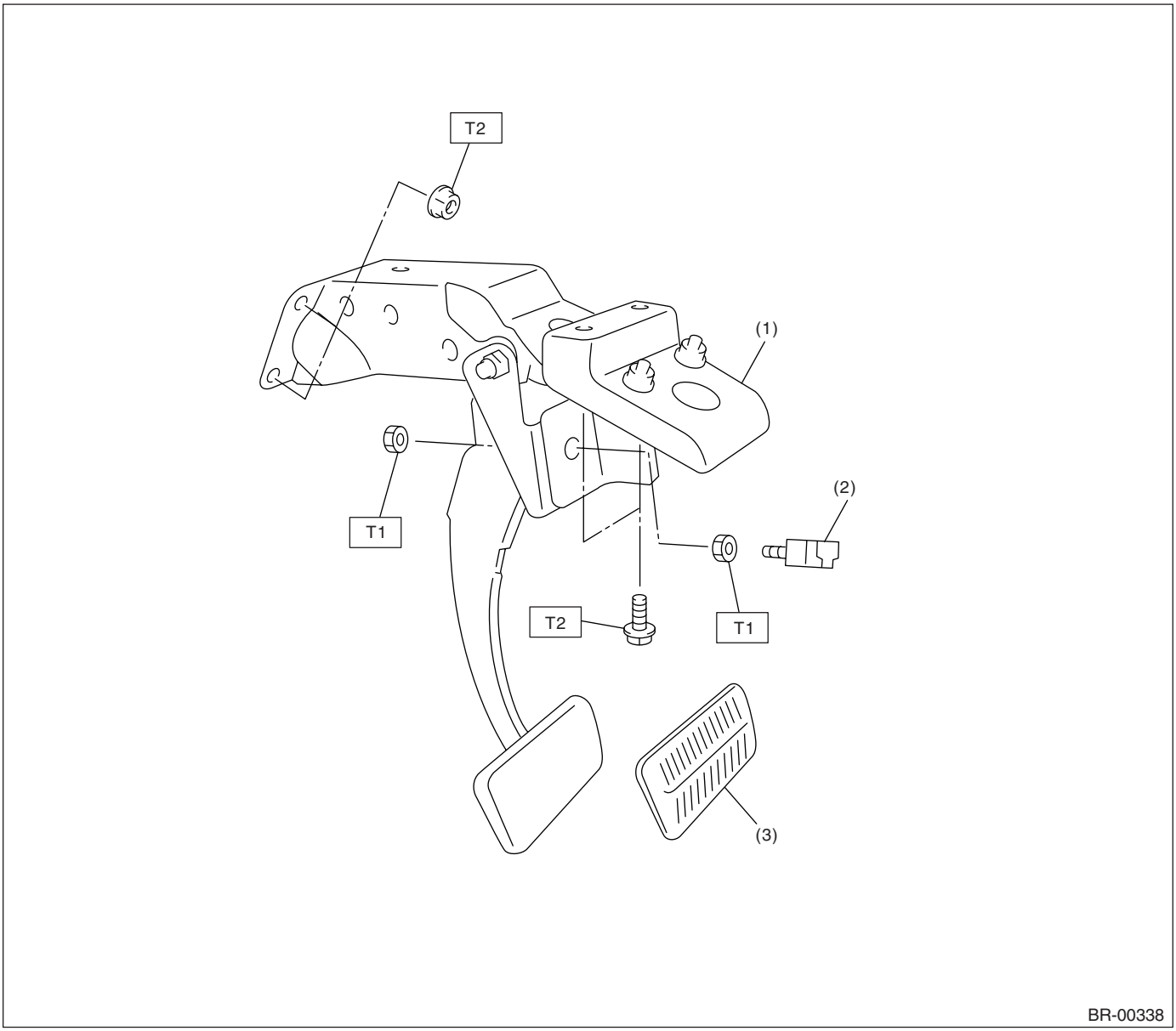
7. BRAKE PEDAL

• LHD MT model



(1)	Brake pedal ASSY	(4)	Clutch pedal	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Stop light switch	(5)	Clutch pedal pad	***T1: 8 (0.8, 5.8)***
(3)	Brake pedal pad	(6)	Clutch switch	***T2: 18 (1.8, 13.0)***

• LHD AT model, RHD model



(1) Brake pedal ASSY
(2) Stop light switch
(3) Brake pedal pad

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 18 (1.8, 13.0)

C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Use SUBARU genuine grease etc. or equivalent. Do not mix grease, etc. with that of another grade or from other manufacturers.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.

D: PREPARATION TOOL

1. GENERAL TOOL

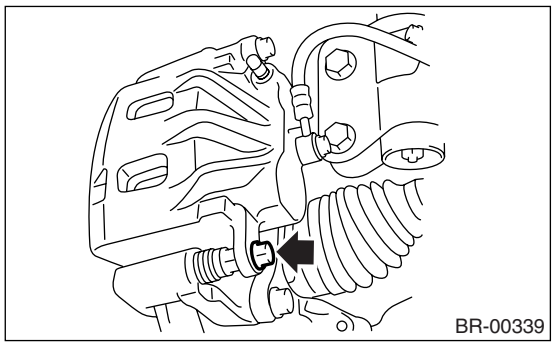
TOOL NAME	REMARKS
Snap ring pliers	Used for removing and installing snap ring.

2. Front Brake Pad

A: REMOVAL

1. 15-INCH TYPE

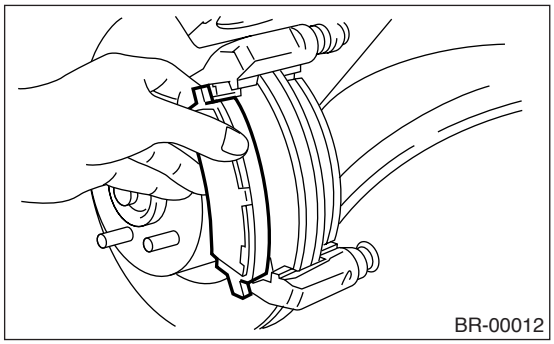
1) Lift-up the vehicle and remove the front wheels.
2) Remove the caliper bolt.



3) Raise the caliper body and support it.

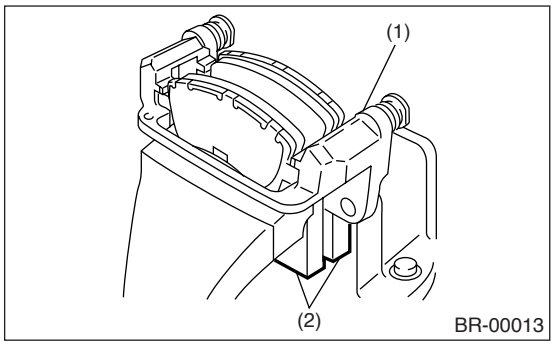
NOTE:
Do not disconnect the brake hose from caliper body.

4) Remove the pad.



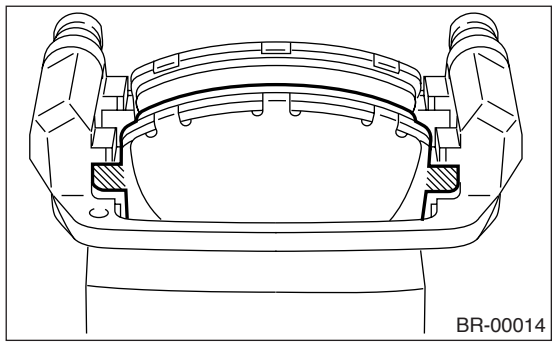
NOTE:
If the brake pad is difficult to remove, proceed as follows:

(1) Remove the caliper body from support.
(2) Remove the support.
(3) Place the support in a vise between wooden blocks.



(1) Support
(2) Wooden block

(4) Attach a rod of less than 12 mm (0.47 in) diameter to the shaded area of the brake pad, and strike the rod with a hammer to drive brake pad out of place.



2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, REMOVAL, Front Brake Pad.>

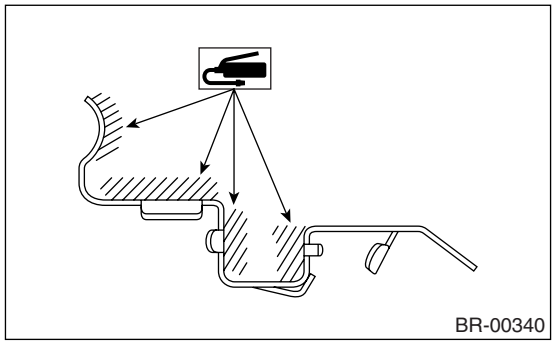
3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, REMOVAL, Front Brake Pad.>

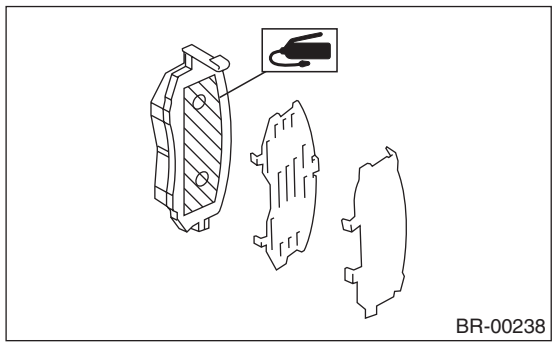
B: INSTALLATION

1. 15-INCH TYPE

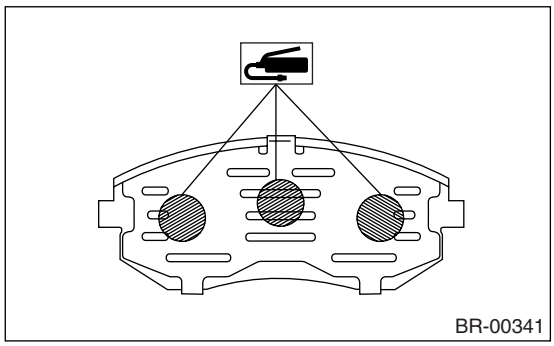
1) Apply a thin coat of Molykote M7439 to the pad clip.



2) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the frictional portion between pad and pad inner shim.



3) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



4) Install the pad on support.
5) Install the caliper body on support.

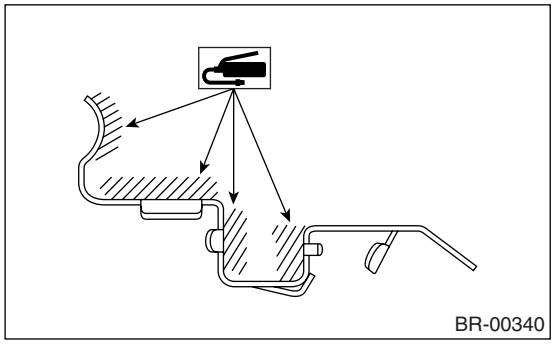
Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

2. 16-INCH TYPE

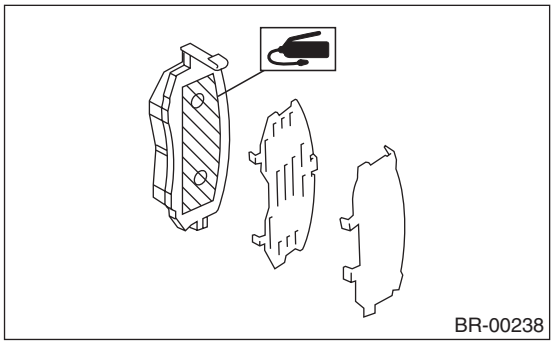
Refer to 15-inch type. <Ref. to BR-16, 15-INCH TYPE, INSTALLATION, Front Brake Pad.>

3. 17-INCH TYPE

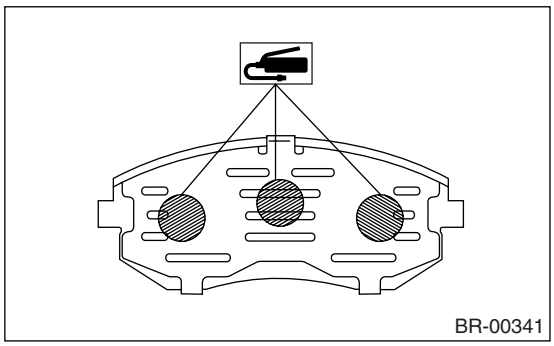
1) Apply a thin coat of Molykote M7439 to the pad clip.



2) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the frictional portion between pad and pad inner shim.

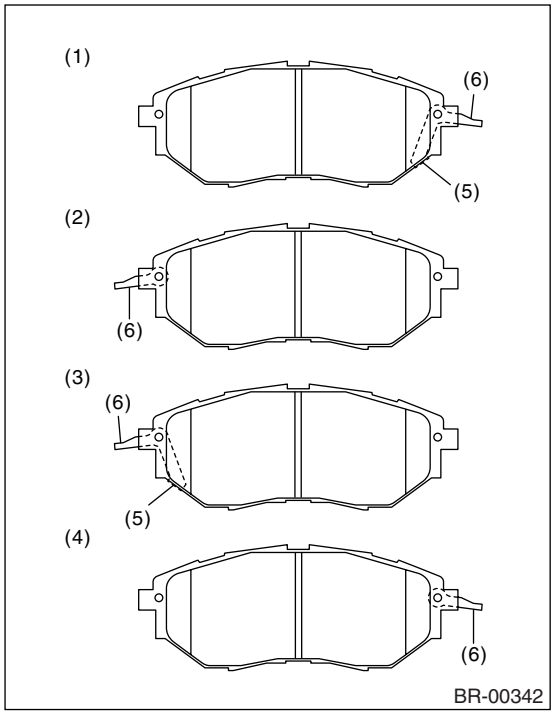


3) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



4) Install the pad on support.

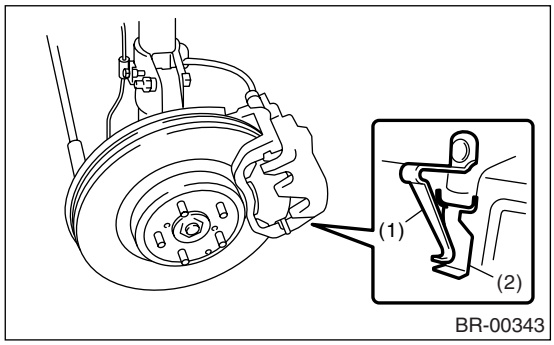
NOTE:
Install the pad indicator in proper direction.



(1) LH – IN
(2) LH – OUT
(3) RH – IN
(4) RH – OUT
(5) Pad indicator
(6) Pad return spring

CAUTION:
• Correctly install the pad return spring to supporting surface of pad clip as shown in the figure.

• When the pad return spring is deformed or damaged, replace the brake pad with new one.



(1) Pad return spring
(2) Supporting surface of pad clip

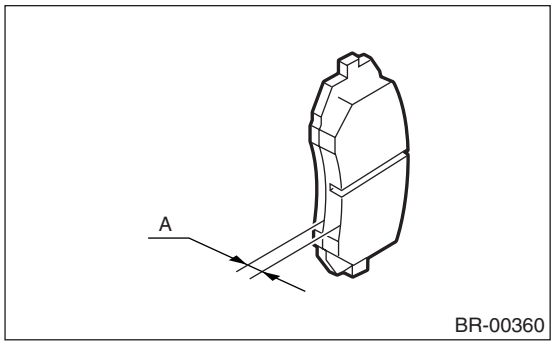
5) Install the caliper body on support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

C: INSPECTION

1. 15-INCH AND 16-INCH TYPE

Check the pad thickness A.



Pad thickness mm (in)	Standard value	11 (0.43)
	Wear limit	1.5 (0.059)

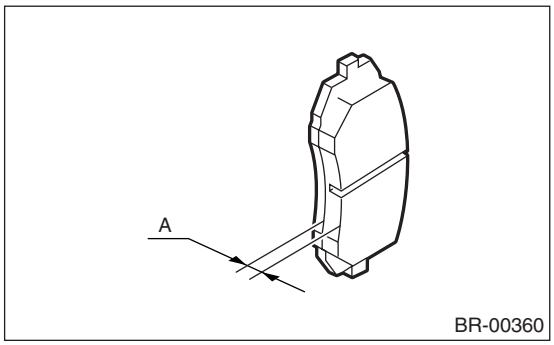
NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace the pad clips if they are twisted or worn.
• Replace the pad if there is oil or grease on it.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-18, 15-INCH AND 16-INCH TYPE, INSPECTION, Front Brake Pad.>

3. 17-INCH TYPE

Check the pad thickness A.



Pad thickness mm (in)	Standard value	11 (0.43)
	Wear limit	1.5 (0.059)

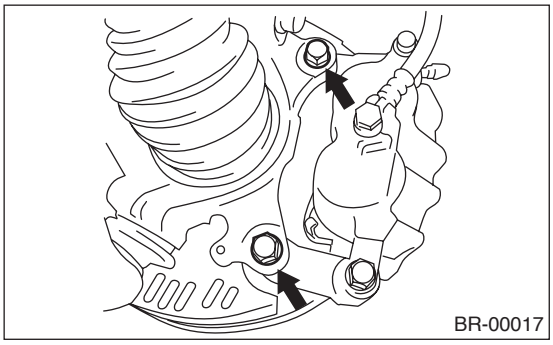
NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Replace the pad if there is oil or grease on it.

3. Front Disc Rotor

A: REMOVAL

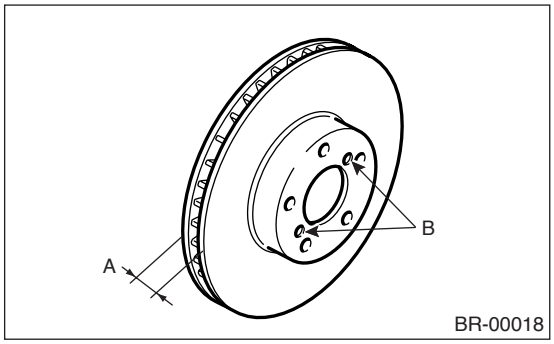
1. 15-INCH TYPE

1) Lift-up the vehicle, and remove the front wheels.
2) Remove the caliper body and the support from housing, and suspend it from strut using a wire.



3) Remove the disc rotor.

NOTE:
If the disc rotor seizes up within hub, drive the disc rotor out by pushing with an 8 mm bolt in holes B on the rotor.



4) Clean mud and foreign particles from the caliper body assembly and the support.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-19, 15-INCH TYPE, REMOVAL, Front Disc Rotor.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-19, 15-INCH TYPE, REMOVAL, Front Disc Rotor.>

B: INSTALLATION

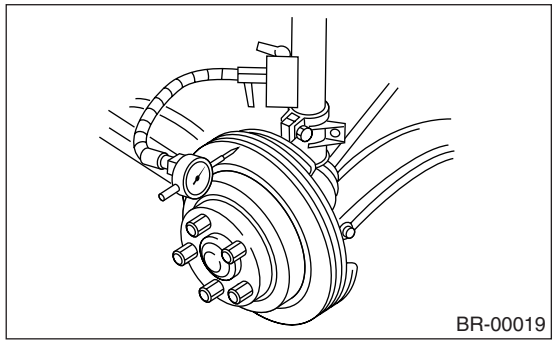
1) Install the disc rotor.
2) Install the caliper body and the support to housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

3) Install the front wheels.

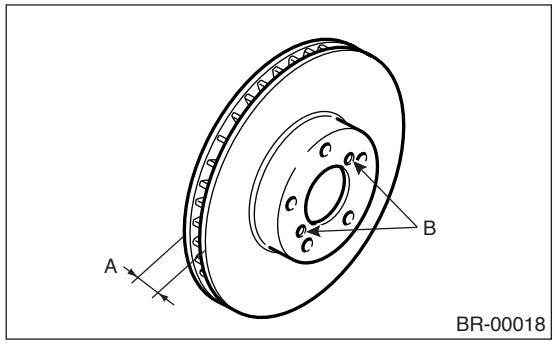
C: INSPECTION

1) Check front wheel bearing play and axial hub runout before disc rotor runout limit inspection. <Ref. to DS-15, INSPECTION, Front Axle.>
2) Secure the disc rotor by tightening five wheel nuts.
3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout exceeds specified value, replace with a new disc rotor.



Disc rotor runout limit:
0.05 mm (0.0020 in)

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor is outside the service limit, replace with a new disc rotor.



		Standard value	Limit	Disc rotor outer diameter
Disc rotor thickness A mm (in)	15″	24 (0.94)	22 (0.87)	277 (10.91)
	16″	24 (0.94)	22 (0.87)	294 (11.57)
	17″	30 (1.18)	28 (1.10)	316 (12.44)

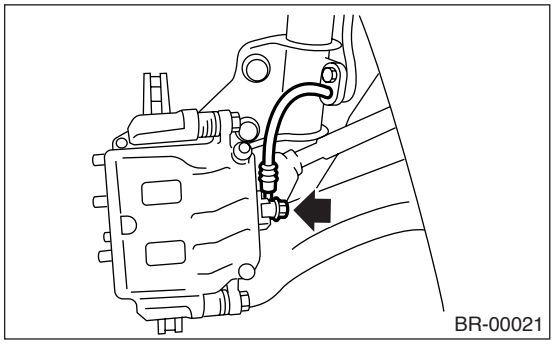
4. Front Disc Brake Assembly

A: REMOVAL

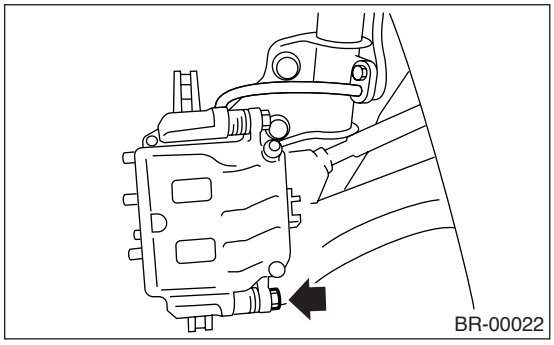
1. 15-INCH TYPE

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Lift-up the vehicle, and remove the front wheels.
2) Remove the union bolt, and disconnect the brake hose from caliper body assembly.

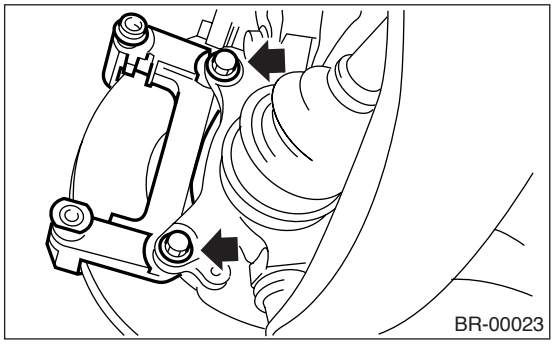


3) Remove the bolt securing lock pin to caliper body.



4) Raise the caliper body, and then move it toward vehicle center to separate it from support.
5) Remove the support from housing.

NOTE:
Remove the support only when replacing itself or rotor. It need not be removed when servicing the caliper body assembly.



6) Clean mud and foreign particles from the caliper body assembly and the support.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, REMOVAL, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, REMOVAL, Front Disc Brake Assembly.>

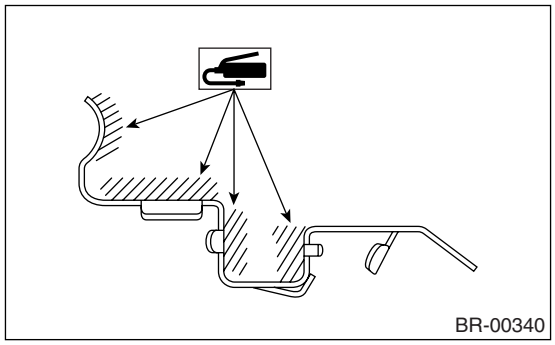
B: INSTALLATION

1. 15-INCH TYPE

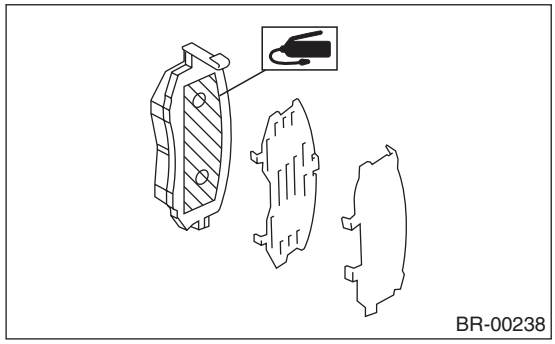
1) Install the support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

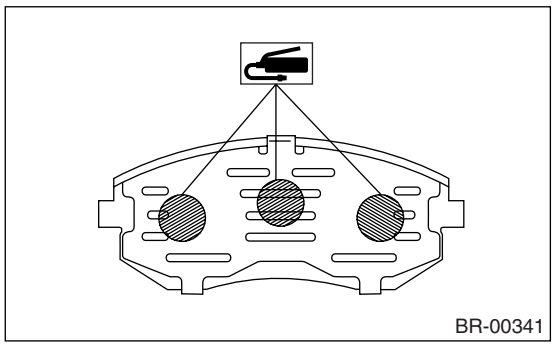
2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and inner shim.



4) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the three frictional portions between inner shim and outer shim of outer pads.



5) Install the pad on support.
6) Install the caliper body on support.

Tightening torque:
27 N·m (2.8 kgf-m, 19.9 ft-lb)

7) Using new brake hose gaskets, connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

8) Bleed air from brake system.

2. 16-INCH TYPE

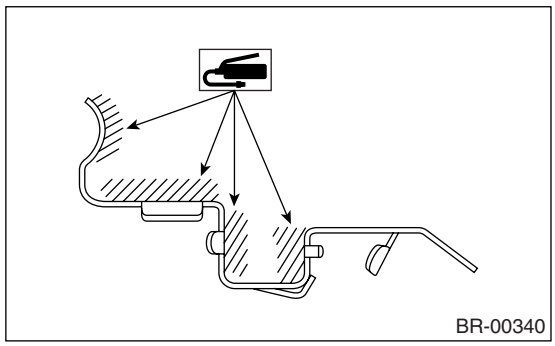
Refer to 15-inch type. <Ref. to BR-20, 15-INCH TYPE, INSTALLATION, Front Disc Brake Assembly.>

3. 17-INCH TYPE

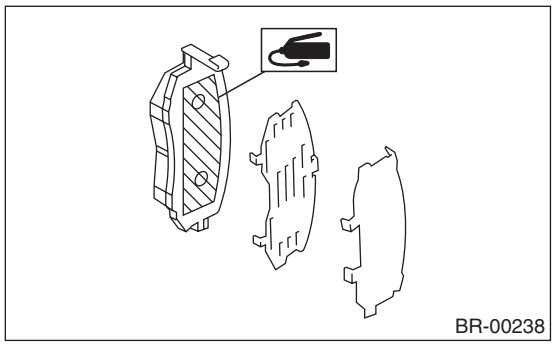
1) Install the support on housing.

Tightening torque:
80 N·m (8.2 kgf-m, 59 ft-lb)

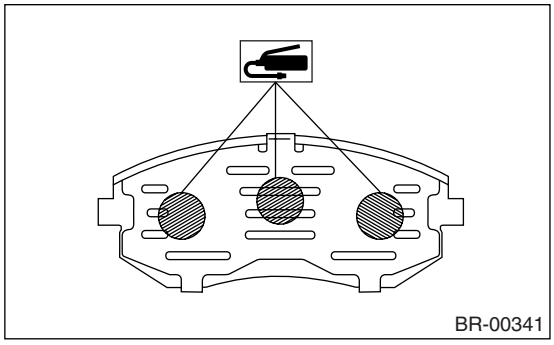
2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and inner shim.

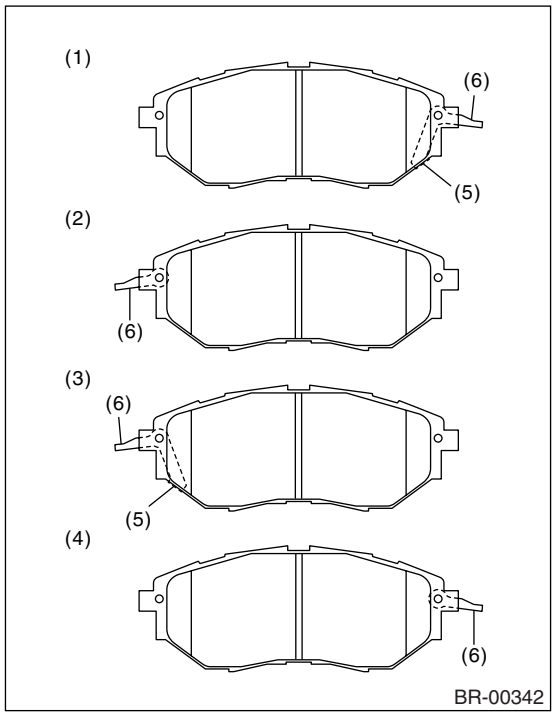


4) Apply a thin coat of Molykote AS880N (Part No. K0779YA010) to the three frictional portions between inner shim and outer shim of outer pads.



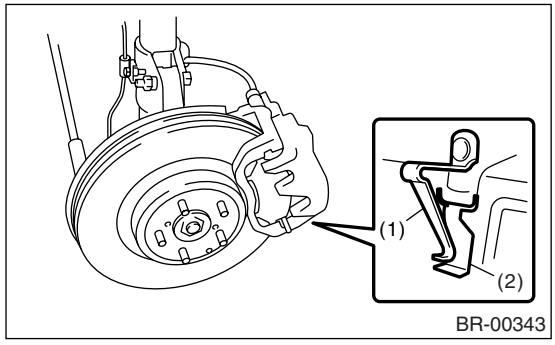
5) Install the pad on support.

NOTE:
Install the pad indicator in proper direction.



(1) LH – IN
(2) LH – OUT
(3) RH – IN
(4) RH – OUT
(5) Pad indicator
(6) Pad return spring

CAUTION:
• Correctly install the pad return spring to supporting surface of pad clip as shown in the figure.
• When the pad return spring is deformed or damaged, replace the brake pad with new one.



(1) Pad return spring
(2) Supporting surface of pad clip

6) Install the caliper body on support.

7) Using new brake hose gaskets, connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

8) Bleed air from brake system.

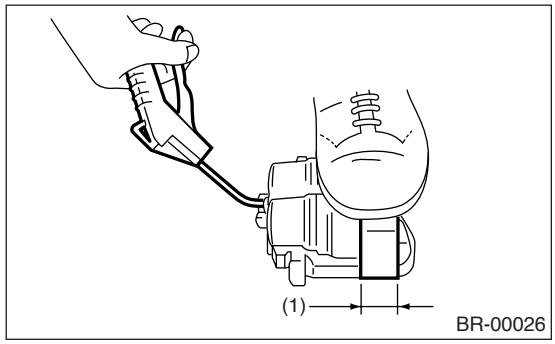
C: DISASSEMBLY

1. 15-INCH TYPE

1) Clean mud and foreign particles from the caliper body assembly and the support.

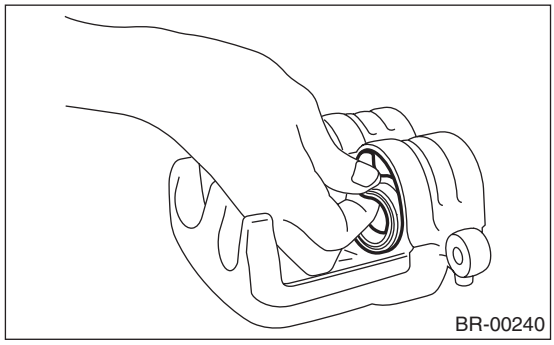
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

2) Place a wooden block in caliper body as shown in the figure to prevent piston from jumping out and avoid being damaged.
3) Gradually supply compressed air via installation hole of brake hose to force the piston out.



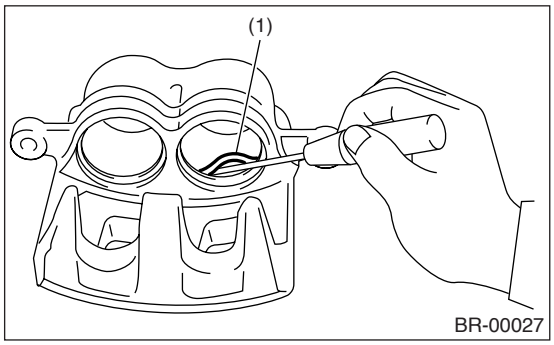
(1) Place a 30 mm (1.18 in) wide wood block here.

4) Remove the piston boot.



5) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



(1) Piston seal

6) Remove the guide pin and boot from caliper body.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-22, 15-INCH TYPE, DISASSEMBLY, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-22, 15-INCH TYPE, DISASSEMBLY, Front Disc Brake Assembly.>

D: ASSEMBLY

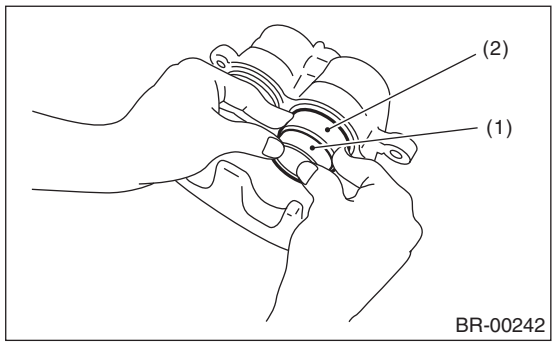
1. 15-INCH TYPE

1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and fit in to the groove on ends of cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

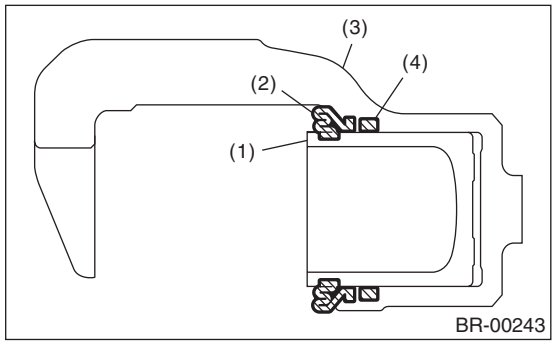
5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.



(1) Piston
(2) Piston boot

6) Position the boot in the grooves on cylinder and piston.

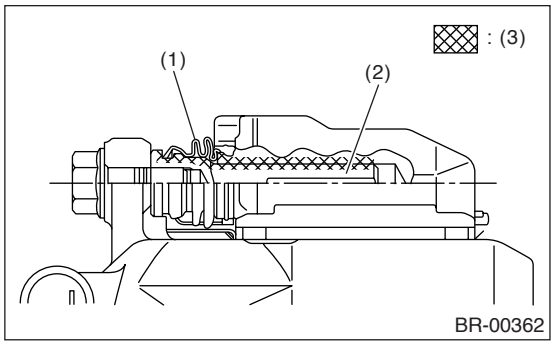


(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

7) Apply a coat of specified grease to the lock pin and guide pin outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

8) Install the lock pin and guide pin boot on support.



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

2. 16-INCH TYPE

Refer to 15-inch type. <Ref. to BR-23, 15-INCH TYPE, ASSEMBLY, Front Disc Brake Assembly.>

3. 17-INCH TYPE

Refer to 15-inch type. <Ref. to BR-23, 15-INCH TYPE, ASSEMBLY, Front Disc Brake Assembly.>

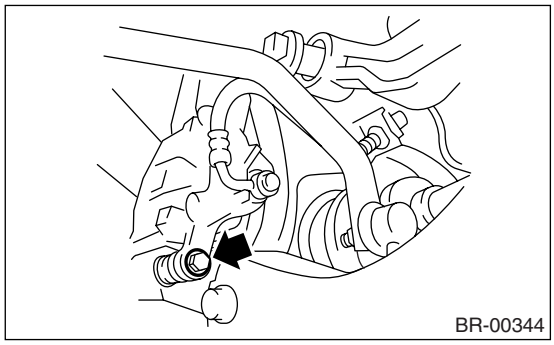
E: INSPECTION

1) Repair or replace the faulty parts.
2) Check the caliper body and piston for uneven wear, damage or rust.
3) Check the rubber parts for damage and deterioration.

5. Rear Brake Pad

A: REMOVAL

1) Lift-up the vehicle, and then remove the rear wheels.
2) Remove the caliper bolt.

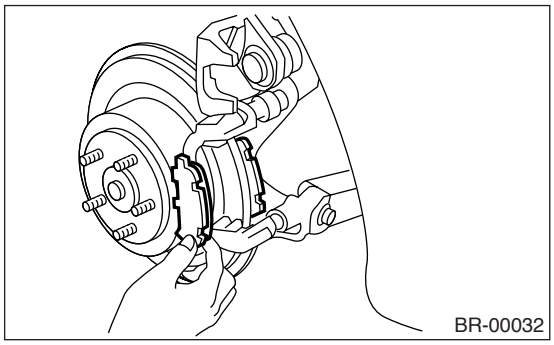


3) Raise the caliper body and support it.

NOTE:
Do not disconnect the brake hose from caliper body.

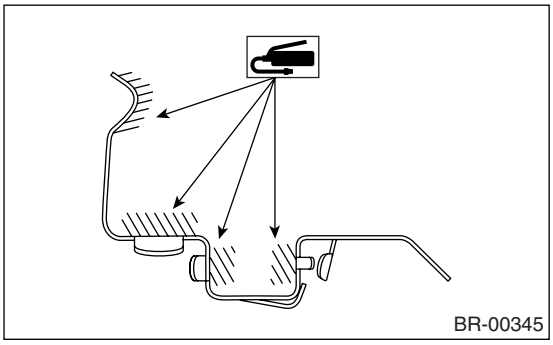
4) Remove the pad.

NOTE:
If the brake pad is difficult to remove, use the same procedure as for front disc brake pad.
<Ref. to BR-16, REMOVAL, Front Brake Pad.>



B: INSTALLATION

1) Apply a thin coat of Molykote M7439 to the pad clip.

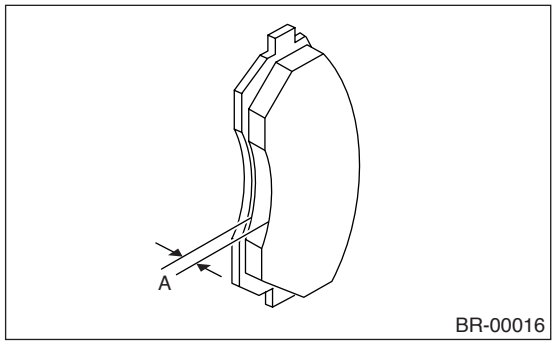


2) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and shim.
3) Install the pad on support.
4) Install the caliper body on support.

Tightening torque:
Solid disc brake model
27 N·m (2.8 kgf-m, 19.9 ft-lb)
Ventilated disc brake model
37 N·m (3.7 kgf-m, 27.2 ft-lb)

C: INSPECTION

Check the pad thickness A.



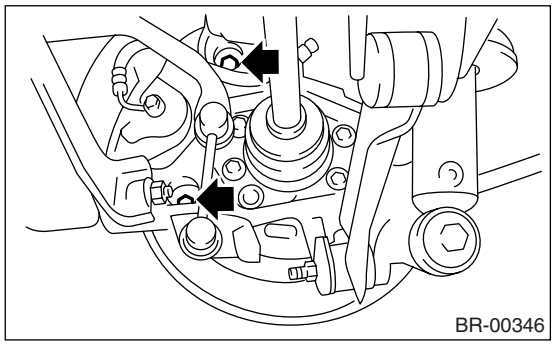
Type of disc rotor		Solid	Ventilated
Pad thickness mm (in)	Standard value	9.0 (0.35)	9.0 (0.35)
	Wear limit	1.5 (0.059)	1.5 (0.059)

NOTE:
• Always replace the pads for both right and left wheels at the same time.
• Also replace pad clips if they are twisted or worn.
• A wear indicator is provided on the inner disc brake pad. If the pad wears down to such an extent that the end of wear indicator contacts disc rotor, a squeaking sound is produced as the wheel rotates. If this sound is heard, replace the pad.
• Replace the pad if there is oil or grease on it.

6. Rear Disc Rotor

A: REMOVAL

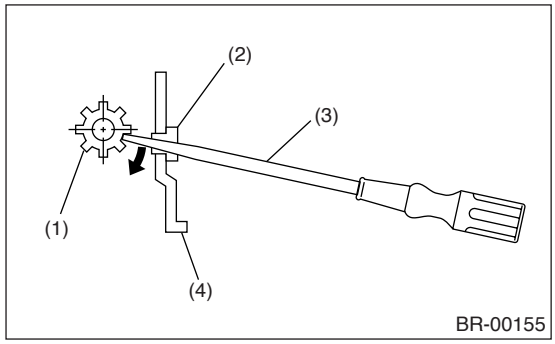
1) Lift-up the vehicle, and then remove the rear wheels.
2) Release the parking brake.
3) Remove the two mounting bolts, and remove the disc brake assembly.



4) Suspend the disc brake assembly so that the hose is not stretched.
5) Remove the disc rotor.

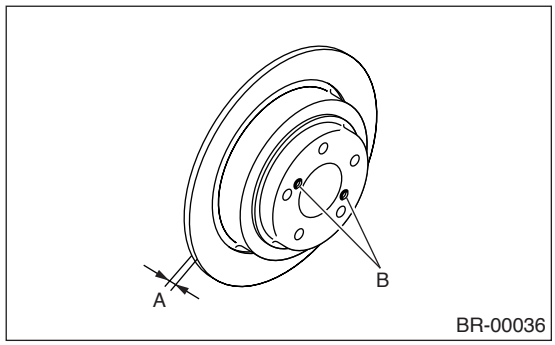
NOTE:
If the disc rotor is difficult to remove, try following two methods in order.

(1) Turn the adjusting screw using a flat tip screwdriver until the brake shoe gets away enough from the disc rotor.



(1) Adjusting screw
(2) Cover
(3) Flat tip screwdriver
(4) Back plate

(2) If the disc rotor seizes up within hub, drive the disc rotor out by pushing with an 8 mm bolt in holes B on the rotor.

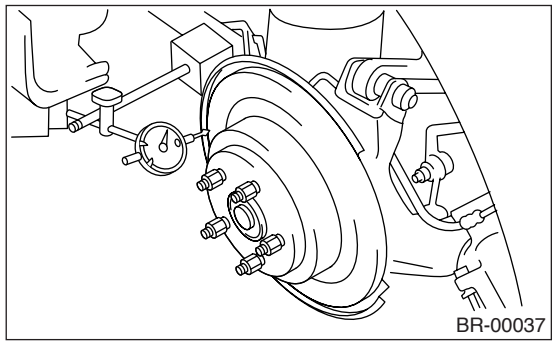


B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

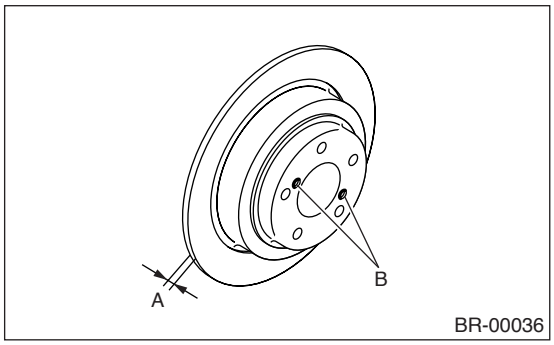
C: INSPECTION

1) Check rear wheel bearing play and axial hub runout before disc rotor runout limit inspection. <Ref. to DS-21, INSPECTION, Rear Hub Unit Bearing.>
2) Secure the disc rotor by tightening five wheel nuts.
3) Set a dial gauge 10 mm (0.39 in) inward of rotor outer perimeter. Turn the disc rotor to check runout. If the disc rotor runout exceeds specified value, replace with a new disc rotor.



Disc rotor runout limit:
0.05 mm (0.0020 in)

4) Set a micrometer 10 mm (0.39 in) inward of the rotor outer perimeter, and then measure the disc rotor thickness. If the thickness of disc rotor is outside the service limit, replace with a new disc rotor.



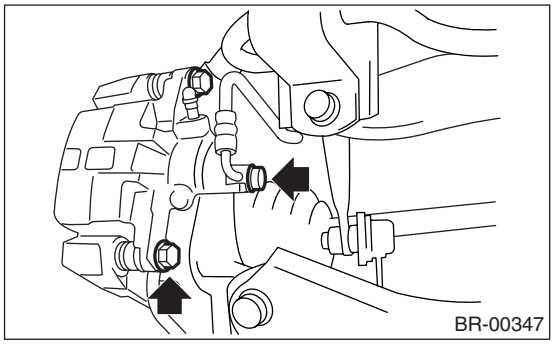
		Standard value	Limit	Disc outer dia.
Disc rotor thickness A mm (in)	Solid disc	10 (0.39)	8.5 (0.335)	274 (10.79)
	Ventilated disc	18 (0.71)	16 (0.63)	290 (11.42)

7. Rear Disc Brake Assembly

A: REMOVAL

CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Lift-up the vehicle, and then remove the rear wheels.
2) Disconnect the brake hose from caliper body assembly.
3) Remove the caliper lower bolts.



4) Raise the caliper body, and then move it toward vehicle center to separate it from the support.
5) Remove the support from housing.

NOTE:
Remove the support only when replacing itself or rotor. It need not be removed when servicing the caliper body assembly.

6) Clean mud and foreign particles from the caliper body assembly and the support.

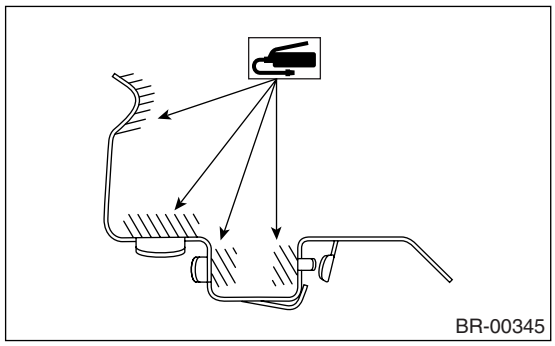
CAUTION:
Be careful not to allow foreign particles to enter inlet (at brake hose connector).

B: INSTALLATION

1) Install the support on housing.

Tightening torque:
53 N·m (5.4 kgf-m, 39.1 ft-lb)

2) Apply a thin coat of Molykote M7439 to the pad clip.



3) Apply a thin coat of Molykote AS880N (Part No. K0777YA010) to the frictional portion between pad and shim.
4) Install the pad on support.
5) Install the caliper body on support.

Tightening torque:
Solid disc brake model
27 N·m (2.8 kgf-m, 19.9 ft-lb)
Ventilated disc brake model
37 N·m (3.7 kgf-m, 27.2 ft-lb)

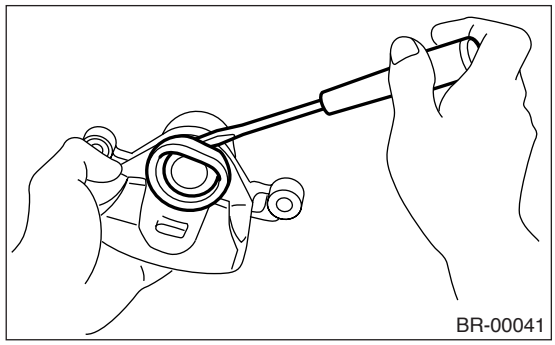
6) Replace the brake hose gaskets with new ones, and then connect the brake hose.

Tightening torque:
18 N·m (1.8 kgf-m, 13.0 ft-lb)

7) Bleed air from brake system.

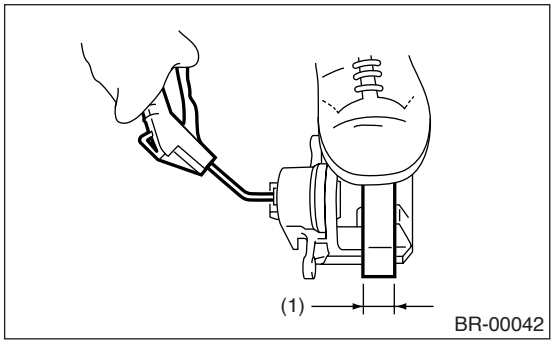
C: DISASSEMBLY

1) Remove the piston boot.



2) Place a wooden block in caliper body as shown in the figure to prevent the piston from jumping out and avoid being damaged.

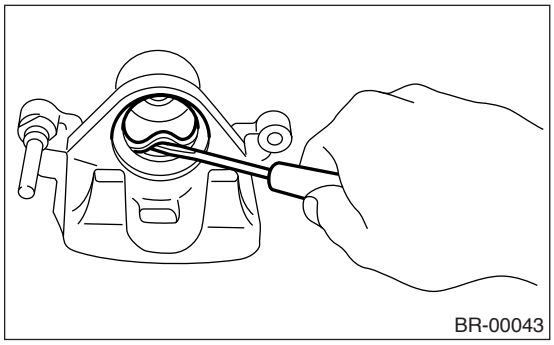
3) Gradually supply compressed air via installation hole of brake hose to force the piston out.



(1) Place a 30 mm (1.18 in) wide wooden block here.

4) Remove the piston seal from caliper body cylinder.

CAUTION:
Do not damage the cylinder and piston seal groove.



5) Remove the lock pin sleeve and boot from caliper body.
6) Remove the guide pin boot.

D: ASSEMBLY

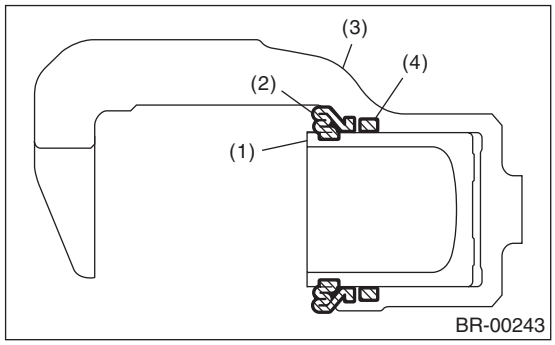
1) Clean the caliper body interior using brake fluid.
2) Apply a coat of brake fluid to the piston seal and fit piston seal in groove on caliper body.
3) Apply a coat of brake fluid to the entire inner surface of cylinder and outer surface of piston.
4) Apply a coat of specified grease to the boot and fit in to the groove on ends of cylinder.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)

5) Insert the piston into cylinder.

CAUTION:
Do not force the piston into cylinder.

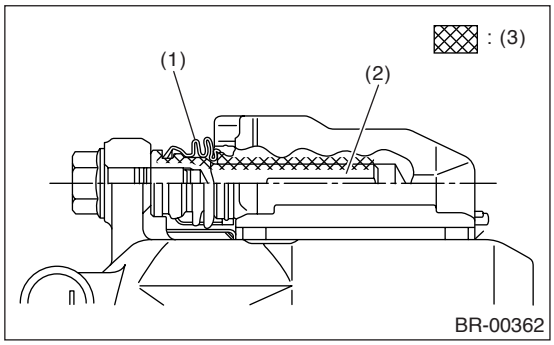
6) Position the boot in grooves on cylinder and piston.



(1) Piston
(2) Piston boot
(3) Caliper body
(4) Piston seal

7) Apply a coat of specified grease to the guide pin, outer surface, sleeve outer surface, cylinder inner surface, and boot grooves.

Grease:
NIGLUBE RX-2 (Part No. K0779GA102)



(1) Pin boot
(2) Lock pin or guide pin
(3) Apply grease.

8) Install the guide pin boot on support.
9) Install the lock pin boot on support, and then insert the lock pin sleeve into specified point.

E: INSPECTION

1) Repair or replace the faulty parts.
2) Check the caliper body and piston for uneven wear, damage or rust.
3) Check the rubber parts for damage or deterioration.

8. Master Cylinder

A: REMOVAL

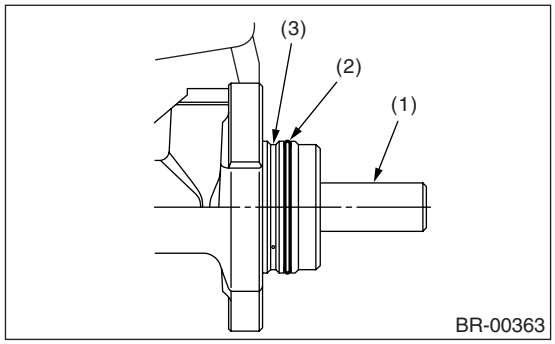
CAUTION:
Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.

1) Thoroughly drain the brake fluid from reservoir tank.
2) Disconnect the fluid level gauge harness connector.
3) Remove the brake pipes from master cylinder.
4) Remove the master cylinder mounting nuts, and take out the master cylinder from brake booster.

B: INSTALLATION

1) Replace the O-ring for the master cylinder with a new one.

CAUTION:
Do not install the O-ring in wrong place.



(1) Primary piston
(2) O-ring
(3) Do not install the O-ring on this groove.

2) Install in the reverse order of removal.

Tightening torque:
Master cylinder mounting nut
13 N·m (1.3 kgf-m, 9.6 ft-lb)
Piping flare nut
Model with ABS
15 N·m (1.5 kgf-m, 10.8 ft-lb)
Model with VDC
19 N·m (1.9 kgf-m, 14.0 ft-lb)

CAUTION:
Be sure to use recommended brake fluid.

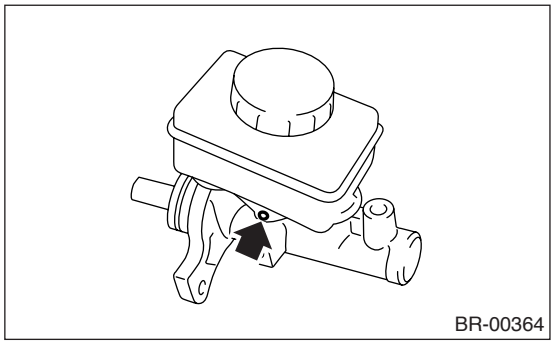
3) Bleed air from brake system. <Ref. to BR-38, PROCEDURE, Air Bleeding.>

C: REPLACEMENT

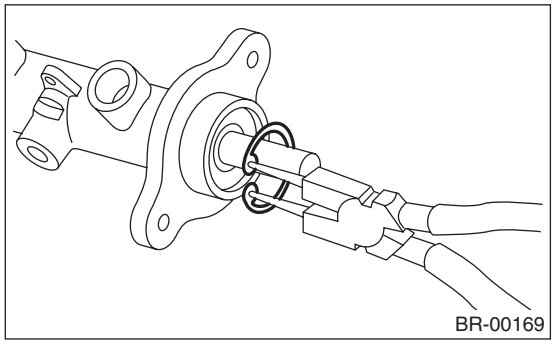
1) Remove mud and dirt from the surface of brake master cylinder.
2) Secure the master cylinder on a vise.

NOTE:
To avoid damaging master cylinder, use aluminum plate while holding with vise.

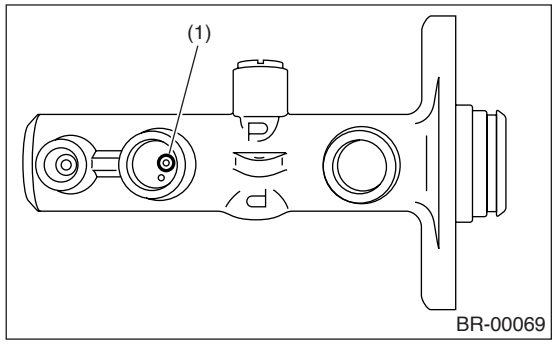
3) Remove the pin which secures the reservoir tank to master cylinder, and then remove the reservoir tank and seal.



4) With pushing-in the primary piston, remove the C-ring using pliers.



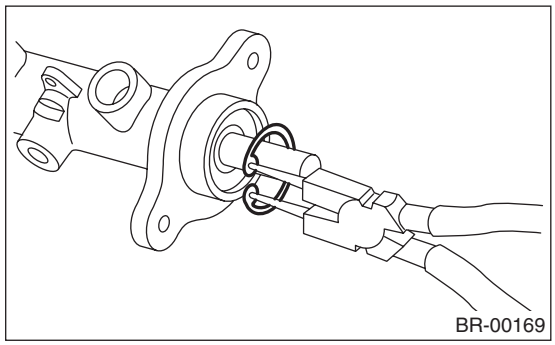
5) With pushing-in the primary piston, remove the straight pin from the port on installation part of reservoir tank using magnet pick-up tool.



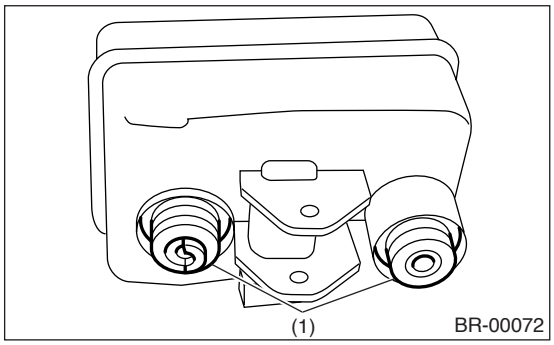
(1) Straight pin

6) Extract the primary piston assembly and secondary piston assembly straight out, while taking care not to scratch the inner surface of cylinder.
7) Clean the inside of master cylinder with brake fluid. Check the inside of cylinder for damage, deform and wear. Replace the master cylinder as assembly if faulty.
8) Apply recommended brake fluid to the inner wall of master cylinder, and outer surface of piston assembly.

9) Ensure that the inner wall of master cylinder, and piston assembly are free of dirt when assembling. Install the primary piston assembly and secondary piston assembly, while taking care not to damage the master cylinder inner wall.
10) With pushing-in the primary piston, install the cylinder pin.
11) With pushing-in the primary piston, install the C-ring to groove using pliers.

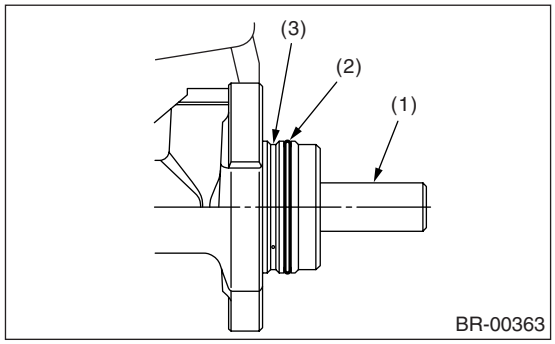


CAUTION:
Ensure the secure installation.
12) Install the seal to reservoir tank.



(1) Seal

13) Install the reservoir tank to master cylinder, and secure with pin.
14) Replace the O-ring for the master cylinder with a new one.



(1) Primary piston
(2) O-ring
(3) Do not install the O-ring on this groove.

D: INSPECTION

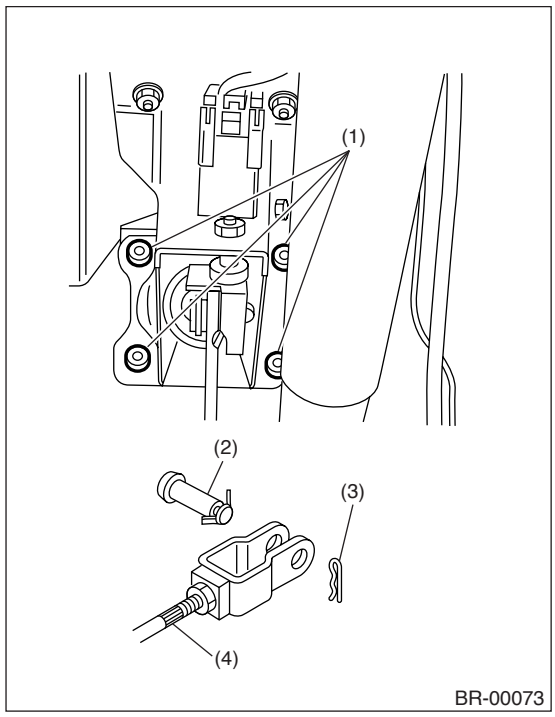
Inspect for oil leakage from the master cylinder.

NOTE:
After replacing piston kit; when the oil leakage is found without damaging or scratching the inside of cylinder, wear of master cylinder inner wall may be the cause. In this case, replace the master cylinder as assembly.

9. Brake Booster

A: REMOVAL

1) Remove or disconnect the following parts at engine compartment.
   (1) Disconnect the connector for brake fluid level gauge.
   (2) Remove the brake pipes from master cylinder.
   (3) Remove the master cylinder installing nuts.
   (4) Disconnect the vacuum hose from brake booster.
2) Remove the following parts from pedal bracket.
   (1) Snap pin and clevis pin
   (2) Four brake booster installing nuts

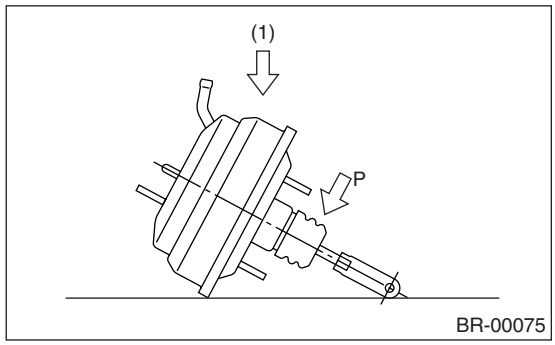


(1) Nut
(2) Clevis pin
(3) Snap pin
(4) Operating rod

3) Remove the brake booster while shunning brake pipes.

NOTE:
• Do not apply strong impact to booster shell and vacuum pipe.
• Be careful not to drop the brake booster. The brake booster should be replaced if it has been dropped.
• Use special care when handling the operating rod. If excessive force is applied to operating rod, sufficient to cause a change in the angle in excess of ±3°, it may result in damage to the power piston cylinder.
• Use care when placing the brake booster on the floor.
• Do not change the push rod length.

CAUTION:
• Do not disassemble the brake booster.
• If external force is applied from above when brake booster is placed in this position, the resin portion as indicated by "P", may be damaged.



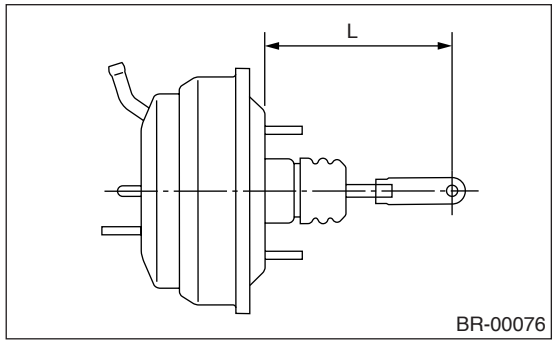
(1) Force

B: INSTALLATION

1) Check and adjust the operating rod of brake booster.

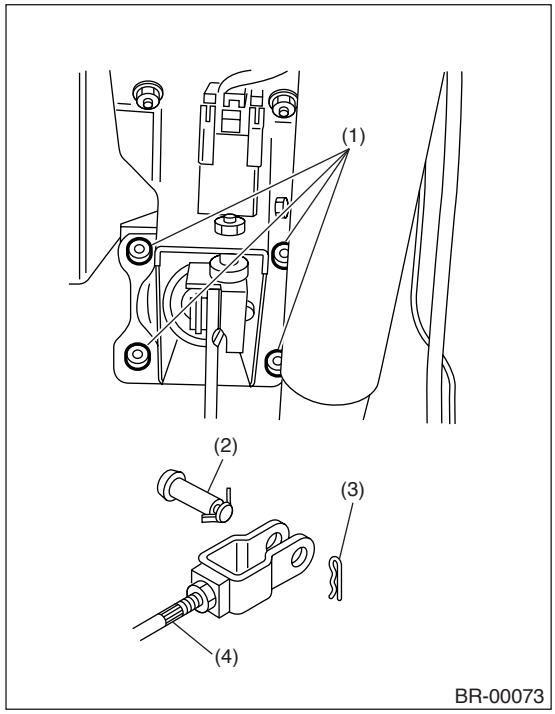
Standard L:
LHD: 136.3 mm (5.38 in)
RHD: 155.2 mm (6.11 in)

If it is not within the specified value, adjust it by adjusting the brake booster operating rod.



2) Mount the brake booster in position.

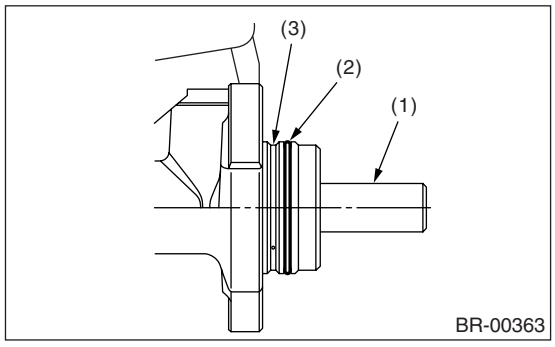
3) Connect the operating rod to brake pedal with clevis pin and snap pin.



(1) Nut
(2) Clevis pin
(3) Snap pin
(4) Operating rod

NOTE:
Apply a thin coat of grease [SUNLIGHT 2 (Part No. 003602010) or equivalent] to clevis pin.

4) Connect the vacuum hose to brake booster.
5) After replacing the O-ring with a new one, install the master cylinder to brake booster.

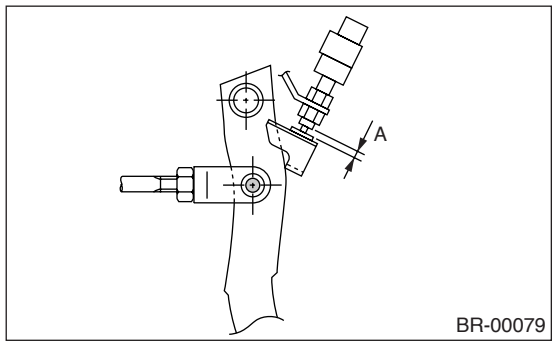


(1) Primary piston
(2) O-ring
(3) Do not install the O-ring on this groove.

6) Connect the brake pipes to master cylinder.
7) Connect the connector for brake fluid level gauge.
8) Measure the clearance between the threaded end of stop light switch and stopper.
If it is not within specified value, adjust it by adjusting the position of stop light switch. <Ref. to BR-45, ADJUSTMENT, Stop Light Switch.>

CAUTION:
Be careful not to rotate the stop light switch.

Stop light switch clearance A:
0.3 mm (0.012 in)



9) Apply grease to operating rod connecting pin to prevent it from wearing.
10) Bleed air from brake system.

Tightening torque (Air bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

11) Conduct road tests to ensure brakes do not drag.

C: INSPECTION

1. OPERATION CHECK (WITHOUT GAUGES)

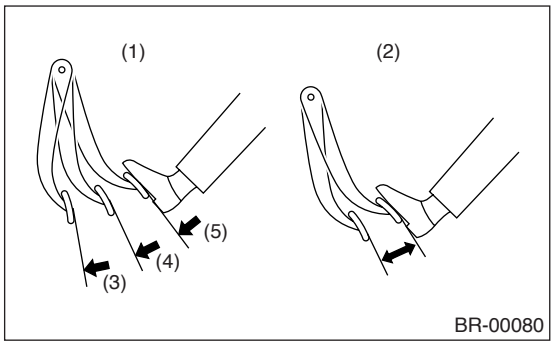
CAUTION:
When checking operation, be sure to securely apply the parking brake.

• CHECKING WITHOUT GAUGES

This method cannot determine the exact portion which has failed. But it can provide a rough understanding of the nature of failure if checking is conducted in accordance with the following procedures.

• AIR TIGHTNESS CHECK

Start the engine, and idle it for 1 to 2 minutes, then turn it OFF. Depress the brake pedal several times applying the same pedal force as that used in ordinary braking operations. The pedal stroke should be greatest on the 1st depression, and it should become smaller with each successive depression. If no change occurs in the pedal height while in a depressed state, the brake booster is faulty.

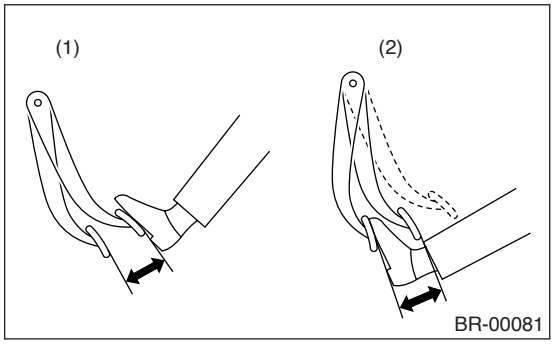


(1) Normal Operation
(2) Not OK
(3) 1st
(4) 2nd
(5) 3rd

NOTE:
• In the event of defective operation, also inspect the condition of the check valve and vacuum hose.
• Replace them if faulty and conduct the test again.
• If no improvement is observed, check precisely with gauges.

• OPERATION CHECK

1) With the engine OFF, depress the brake pedal several times applying the same pedal force and make sure that the pedal height does not vary with each depression of the pedal.



(1) When engine is stopped
(2) When engine is started

2) With the brake pedal depressed, start the engine.

3) As engine starts, the brake pedal should move slowly toward the floor. If no change occurs in the pedal height, the brake booster is faulty.

NOTE:
If faulty, check precisely with gauges.

• LOADED AIR TIGHTNESS CHECK

Depress the brake pedal while engine is running, and turn OFF the engine while the pedal is still depressed. Keep the pedal depressed for 30 seconds; if no change occurs in the pedal height, the brake booster is functioning normally; if the pedal height increases, it is faulty.

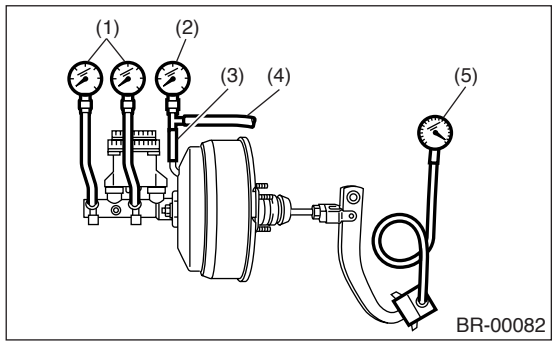
NOTE:
If faulty, check precisely with gauges.

2. OPERATION CHECK (WITH GAUGES)

CAUTION:
When checking operation, be sure to securely apply the parking brake.

• CHECKING WITH GAUGES

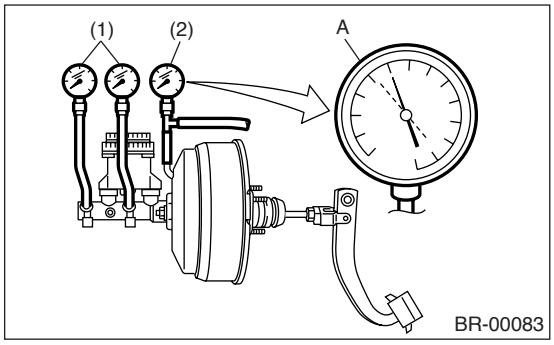
Connect gauges as shown in the figure. After bleeding air from pressure gauges, proceed to each check.



(1) Pressure gauge
(2) Vacuum gauge
(3) Adapter hose
(4) Vacuum hose
(5) Pedal force gauge

• AIR TIGHTNESS CHECK

1) Start the engine and keep it running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point A is indicated on vacuum gauge. Do not depress the brake pedal at this moment.

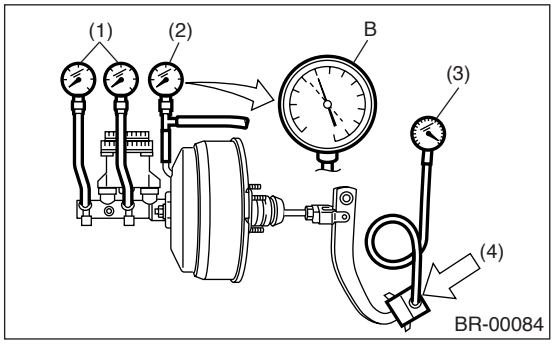


(1) Pressure gauge
(2) Vacuum gauge

2) Stop the engine and watch the gauge. If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping the engine, brake booster is functioning properly.
If defective, the cause may be one of those listed below.
- Check valve malfunction
- Leak from vacuum hose
- Leak from shell jointed portion or stud bolt welded portion
- Damaged diaphragm
- Leak from valve body seal and bearing portion
- Leak from plate and seal assembly portion
- Leak from poppet valve assembly portion

• LOADED AIR TIGHTNESS CHECK

1) Start the engine and depress the brake pedal with pedal force of 196 N (20 kgf, 44 lb). Keep the engine running until a vacuum of 66.7 kPa (500 mmHg, 19.69 inHg) = point B is indicated on vacuum gauge while the pedal is still depressed.



(1) Pressure gauge
(2) Vacuum gauge
(3) Pedal force gauge
(4) Depressed

2) Stop the engine and watch vacuum gauge.
If the vacuum drop range is less than 3.3 kPa (25 mmHg, 0.98 inHg) within 15 seconds after stopping the engine, brake booster is functioning properly.
If defective, refer to “AIR TIGHTNESS CHECK”.
<Ref. to BR-33, INSPECTION, Brake Booster.>
3) If any fault is found on brake booster, replace the brake booster with a new one.

• LACK OF BOOSTING ACTION CHECK

Turn OFF the engine, and set the vacuum gauge reading at “0”. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force N (kgf, lb)	147 (15, 33) / 294 (30, 66)
Fluid pressure kPa (kg/cm^2, psi)	545 (6, 79) / 1,564 (16, 227)

• BOOSTING ACTION CHECK

Set the vacuum gauge reading at 66.7 kPa (500 mmHg, 19.69 inHg) by running engine. Then, check the fluid pressure when brake pedal is depressed. The pressure must be greater than the standard value listed.

Brake pedal force N (kgf, lb)		147 (15, 33)	294 (30, 66)
Fluid pressure kPa (kg/cm^2, psi)	15″ 16″ OUTBACK	6,003 (61, 871)	11,273 (115, 1,635)
	16″ (Except for OUTBACK)	5,381 (55, 780)	10,982 (112, 1,593)
	17″	4,963 (51, 720)	10,055 (103, 1,458)

10.Brake Fluid

A: INSPECTION

1) Check that the brake fluid level remains between “MIN” and “MAX”. If out of the specified range, refill or drain fluid. If the fluid level becomes close to “MIN”, refill fluid.
2) Check the fluid for discoloration. If the fluid color has excessively changed, drain the fluid and refill with new fluid.

B: REPLACEMENT

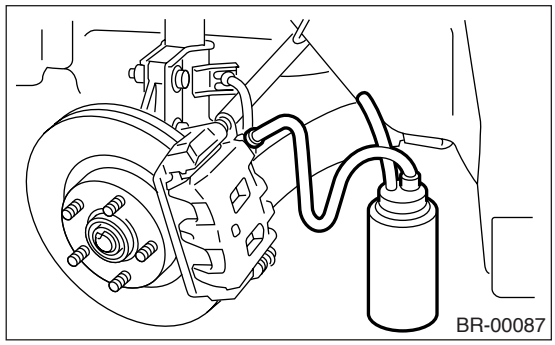
CAUTION:
• To always maintain the brake fluid characteristics, replace the brake fluid according to maintenance schedule or earlier than that when used in severe condition.
• Fresh Subaru genuine fluid must be used.
• Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
• Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

NOTE:
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.
• The amount of brake fluid required is approximately 500 mℓ (16.9 US fl oz, 17.6 Imp fl oz) for total brake system.

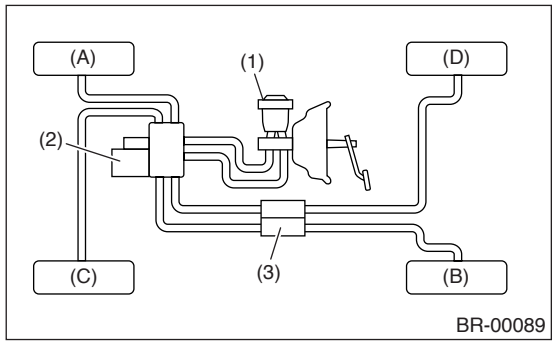
1) Either lift-up the vehicle to place a rigid rack under it, or lift-up the vehicle.
2) Remove both the front and rear wheels.
3) Draw out the brake fluid from master cylinder.
4) Refill the reservoir tank with recommended brake fluid.

Recommended brake fluid:
Refer to the specification. <Ref. to BR-2, SPECIFICATION, General Description.>

5) Install one end of a vinyl tube onto air bleeder and insert the other end of the tube into a container to collect brake fluid.



CAUTION:
Brake fluid replacement sequence; (A) Front RH → (B) Rear LH → (C) Front LH → (D) Rear RH



(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

6) Instruct your co-worker to depress the brake pedal slowly two or three times and then hold it depressed.
7) Loosen the bleeder screws to drain brake fluid. And then quickly tighten the screw.
8) Release the brake pedal slowly. Repeat steps 6) through 8) until there are no more air bubbles in the drained brake fluid.

NOTE:
Add brake fluid as necessary while performing air bleed operation, in order to prevent the tank from running short of brake fluid.

9) After completing the bleeding operation, hold the brake pedal depressed and tighten the screw and install bleeder cap.

Tightening torque (Bleeder screw):
8 N·m (0.8 kgf-m, 5.8 ft-lb)

10) Bleed air from each wheel cylinder using the same procedures as described in steps 6) through 8) above.

11) Depress the brake pedal with a force of approximately 294 N (30 kgf, 66 lb) and hold it there for approximately 20 seconds to check for no entry of air and if pedal height remain same.
Visually inspect the bleeder screws and brake pipe joints to make sure that there is no fluid leakage.
12) Install the wheels, and drive vehicle for a short distance between 2 to 3 km (1 to 2 miles) to make sure that brakes are operating properly.

11.Air Bleeding

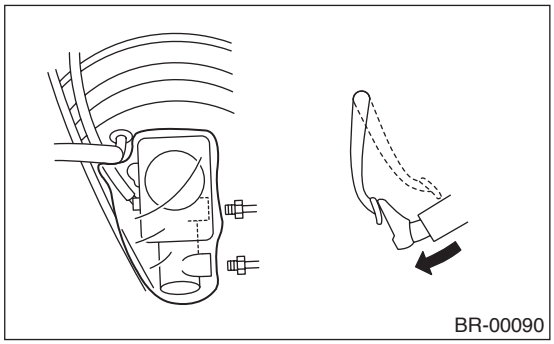
A: PROCEDURE

CAUTION:
• Fresh Subaru genuine fluid must be used.
• Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.
• Do not allow brake fluid to come in contact with vehicle body; wash away with water and wipe off completely if spilled.
• Avoid mixing different brands of brake fluid to prevent degrading the quality of fluid.
• Be careful not to allow dirt or dust to get into the reservoir tank.

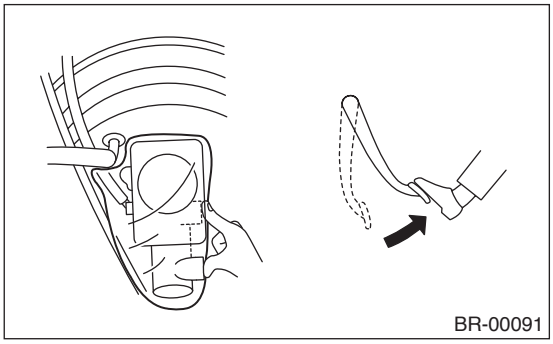
1. MASTER CYLINDER

NOTE:
• If the master cylinder is disassembled or reservoir tank is empty, bleed the master cylinder.
• During the bleeding operation, keep the brake reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.

1) Loosen the wheel nuts, jack-up the vehicle, support it with rigid racks, and remove the wheels.
2) Disconnect the brake line at primary and secondary sides.
3) Put a plastic bag cover on master cylinder.
4) Carefully depress and hold the brake pedal.


BR-00090

5) Close the outlet plug with your finger, and then release the brake pedal.


BR-00091

6) Repeat the step4) and 5) until brake fluid is completely drained from outlet plug.
7) Remove the plastic bag.
8) Install the brake pipes to master cylinder.

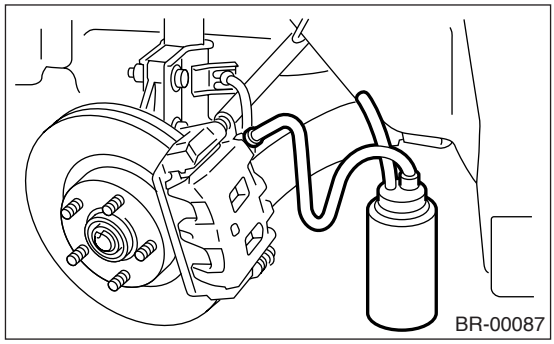
Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

9) Bleed air from the brake line. <Ref. to BR-38, BRAKE LINE, PROCEDURE, Air Bleeding.>

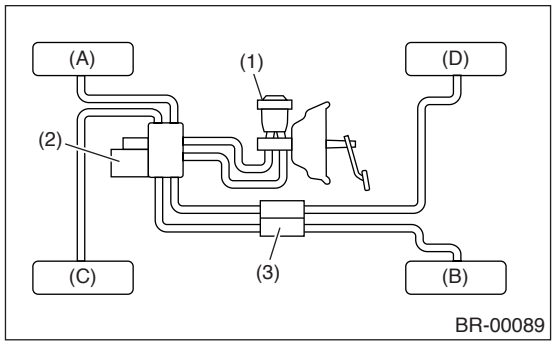
2. BRAKE LINE

NOTE:
• During the bleeding operation, keep the reservoir tank filled with brake fluid to eliminate entry of air.
• The brake pedal operating must be very slow.
• For convenience and safety, two people should do the work.

1) Make sure that there is no leak from joints and connections of the brake system.
2) Fit one end of vinyl tube into the air bleeder and put the other end into a brake fluid container.


BR-00087

CAUTION:
Brake fluid replacement sequence; (A) Front RH → (B) Rear LH → (C) Front LH → (D) Rear RH



BR-00089

(1) Master cylinder
(2) Hydraulic unit
(3) Proportioning valve

3) Slowly depress the brake pedal and keep it depressed. Then, open the air bleeder to discharge air together with the fluid.
Release the air bleeder for 1 to 2 seconds.
Next, with the bleeder closed, slowly release the brake pedal.
Repeat these steps until there are no more air bubbles in the vinyl tube.
Allow 3 to 4 seconds between two brake pedal operations.

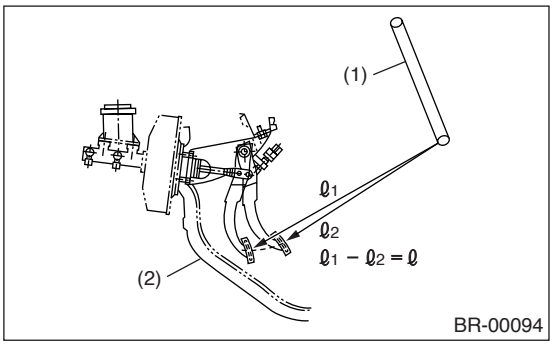
CAUTION:
Cover the bleeder with cloth, when loosening it, to prevent brake fluid from being splashed over surrounding parts.

NOTE:
The brake pedal operating must be very slow.

4) Tighten the air bleeder securely when no air bubbles are visible.

Air bleeder tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)

5) Perform these steps for the brakes connecting to secondary chamber of master cylinder first, and then for the ones connecting to primary chamber. With all procedures completed, fully depress the brake pedal and keep it in that position for approximately 20 seconds to make sure that there is no leak evident in the entire system.
6) Check the pedal stroke.
While the engine is idling after warming up, depress the brake pedal with a 500 N (51 kgf, 112 lb) load and measure the distance between brake pedal and steering wheel. With the brake pedal released, measure the distance between pedal and steering wheel again. The difference between the two measurements must not be more than specified value.



(1) Steering wheel
(2) Toe board

Specified pedal stroke:
95 mm (3.74 in) or less
When depressing brake pedal with a 500 N (51 kgf, 112 lb) load.

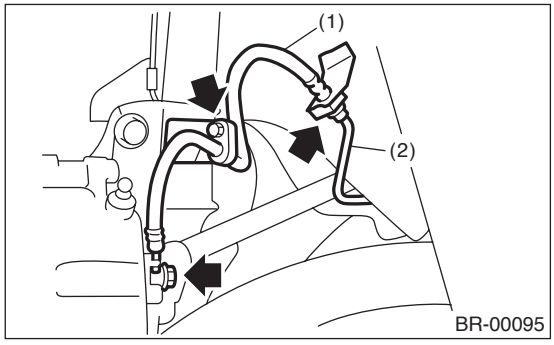
7) If the distance is more than specified, there is a possibility that air is in the brake line. Bleed the brake line until pedal stroke meets the specification.
8) Operate the hydraulic control unit in the sequence control mode. <Ref. to ABS-10, ABS Sequence Control.>
9) Recheck the pedal stroke.
10) If the distance is more than specified, there is a possibility that air is in the inside of the hydraulic unit. Repeat above steps 2) to 9) until pedal stroke meets the specification.
11) Add brake fluid to the required level (“MAX” level) of reservoir tank.
12) As a final step, test run the vehicle at low speed and ensure that brakes provide normal braking action.

12.Brake Hose

A: REMOVAL

1. FRONT BRAKE HOSE

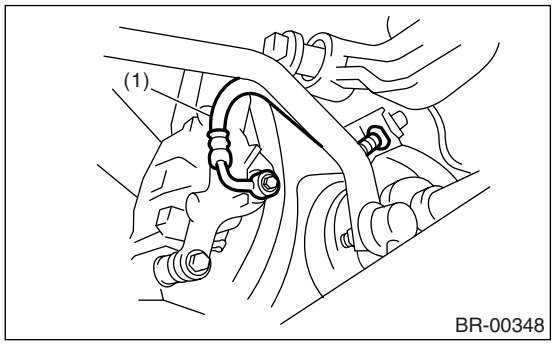
1) Separate the brake pipe from brake hose using a flare nut wrench.
2) Remove the clamp, bolt at strut mount, and union bolt.



(1) Brake hose
(2) Brake pipe

2. REAR BRAKE HOSE

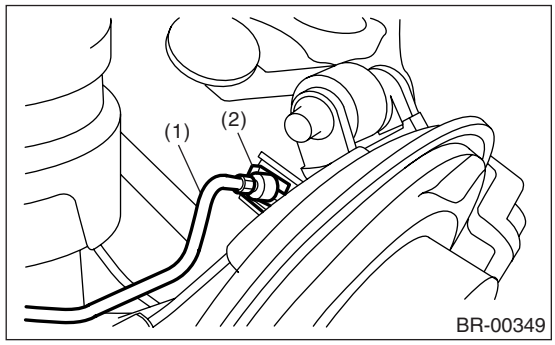
1) Remove the union bolt from rear brake caliper.



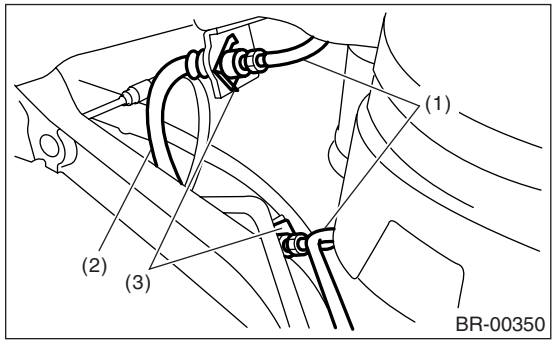
(1) Brake hose

2) Separate the brake pipe from brake hose using a flare nut wrench.

3) Remove the clamp and remove the brake hose.



(1) Brake pipe
(2) Brake hose clamp



(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp

B: INSTALLATION

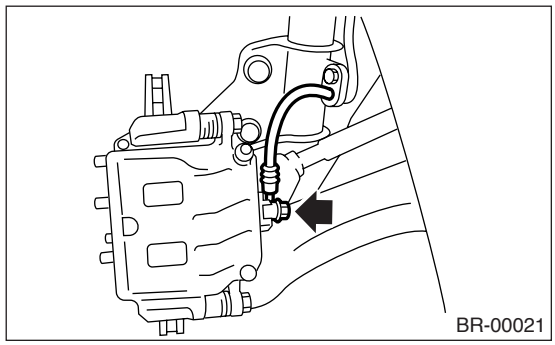
1. FRONT BRAKE HOSE

1) Secure the brake hose to strut mount.

Tightening torque:
33 N·m (3.4 kgf-m, 24.3 ft-lb)

2) Install the brake hose to caliper using a new gasket.

Tightening torque (Union bolt):
18 N·m (1.8 kgf-m, 13.0 ft-lb)



3) Position the disc in straight-forward direction and route the brake hose through the hole in bracket on wheel apron side.

CAUTION:
Be sure the brake hose is not twisted.

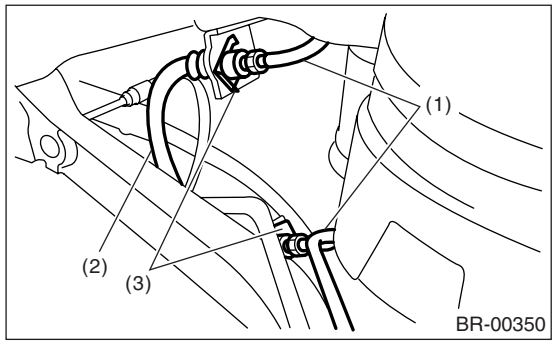
4) Temporarily tighten the flare nut to connect the brake pipe and hose.
5) Fix the brake hose with clamp at wheel apron bracket.
6) Tighten the flare nut to specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 10.8 ft-lb)

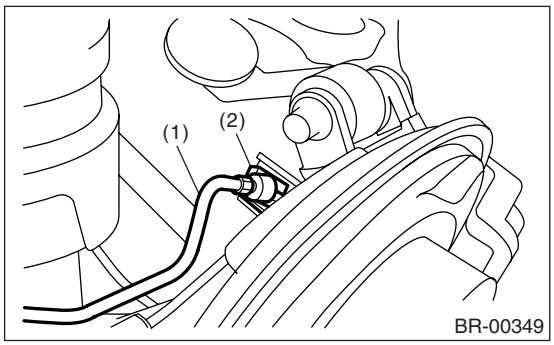
7) Bleed air from brake system.

2. REAR BRAKE HOSE

1) Pass the brake hose through the hole of bracket, and lightly tighten the flare nut to connect brake pipe.
2) Insert the clamp upward to fix brake hose.



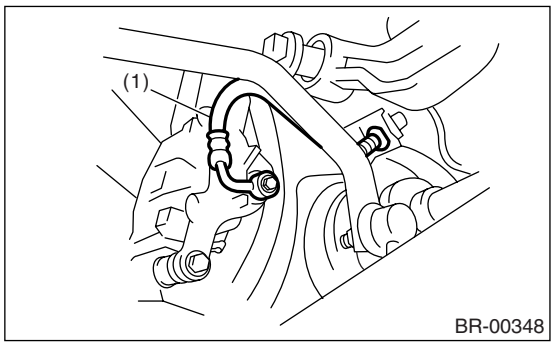
(1) Brake pipe
(2) Brake hose
(3) Brake hose clamp



(1) Brake pipe
(2) Brake hose clamp

3) Install the brake hose to rear brake caliper using a new gasket.

Tightening torque (Union bolt):
18 N·m (1.8 kgf-m, 13.0 ft-lb)



(1) Brake hose

4) Tighten the flare nut to specified torque.

Tightening torque (Brake pipe flare nut):
15 N·m (1.5 kgf-m, 10.8 ft-lb)

5) Bleed air from the brake system.

C: INSPECTION

Ensure there are no cracks, breakage or damage on hoses. Check joints for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the hose.

13.Brake Pipe

A: REMOVAL

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When removing the brake pipe, make sure that it is not bent.

B: INSTALLATION

NOTE:
Airbag system wiring harness is routed near the center brake pipe.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the center brake pipe.
• When installing the brake pipe, make sure that it is not bent.
• After installing the brake pipe and hose, bleed air.
• After installing the brake hose, make sure that it does not touch the tire or suspension assembly, etc.

Brake pipe tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

C: INSPECTION

Ensure there are no cracks, breakage or damage on pipes. Check joints for fluid leakage. If any cracks, breakage, damage or fluid leakage is found, repair or replace the pipes.

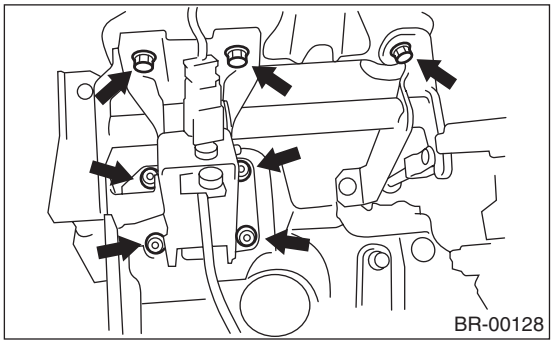
NOTE:
Use a mirror when inspecting the low-visible part or backside.

14.Brake Pedal

A: REMOVAL

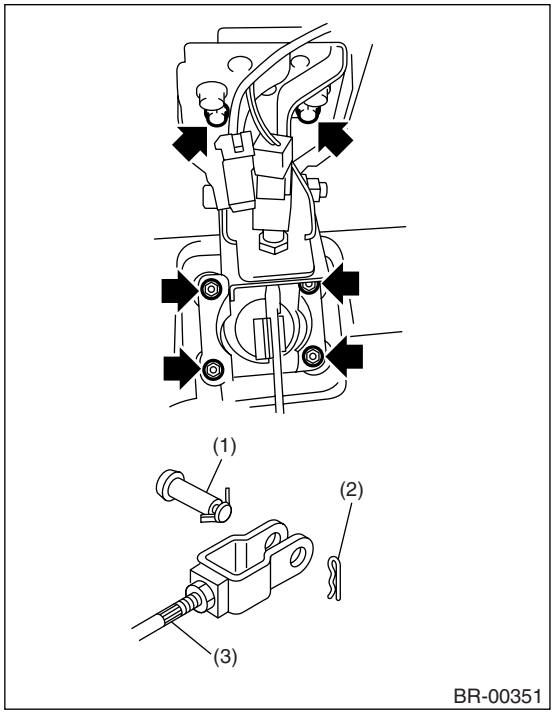
1. LHD MT MODEL

1) Remove the steering shaft.
2) Disconnect the connectors (stop light switch) from pedal bracket.
3) Remove the clevis pin which secures lever to push rod.
4) Remove the nuts which secure clutch master cylinder.
5) Remove the bolts and nuts which secure pedal bracket.



2. LHD AT MODEL

1) Remove the steering shaft.
2) Disconnect the connectors (stop light switch) from pedal bracket.
3) Remove the clevis pin which secures lever to push rod.
4) Remove the bolts and nuts which secure pedal bracket.



(1) Clevis pin
(2) Snap pin
(3) Operating rod

3. RHD MODEL

Refer to LHD AT model. <Ref. to BR-43, LHD AT MODEL, REMOVAL, Brake Pedal.>

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Always use new clevis pins.

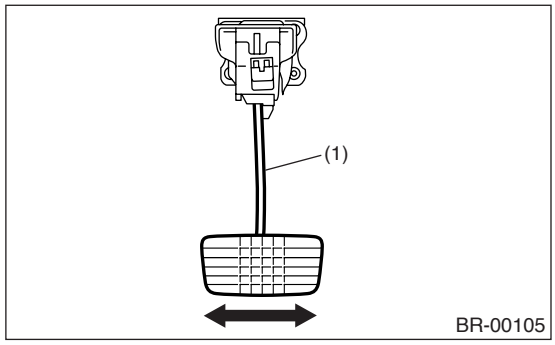
2) Inspect the brake pedal after installation. <Ref. to BR-43, INSPECTION, Brake Pedal.>

C: INSPECTION

1) Move the brake pedal pads in the lateral direction with a force of approx. 10 N (1 kgf, 2 lb) to ensure pedal deflection is in specified range.

CAUTION:
If excessive deflection is noted, replace the bushing with a new one.

Deflection of brake pedal:
Limit
5.0 mm (0.197 in) or less

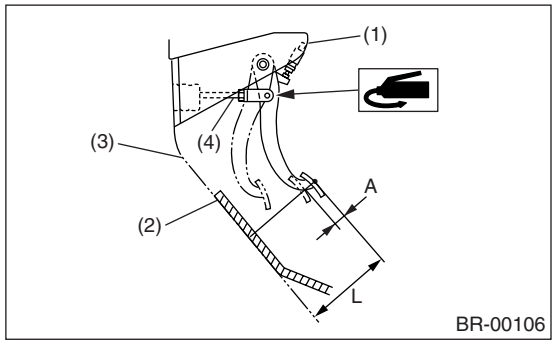


(1) Brake pedal

2) Check the position of pedal pad.

Pedal height L:
LHD: 150 — 160 mm (5.91 — 6.30 in)
RHD: 162 — 172 mm (6.38 — 6.77 in)

Brake pedal free play A:
0.5 — 2 mm (0.02 — 0.08 in) [When the brake pedal is pulled upward with force of less than 10 N (1 kgf, 2 lb).]



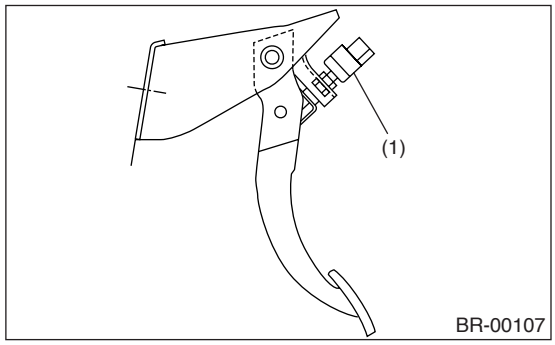
(1) Stop light switch
(2) Mat
(3) Toe board
(4) Brake booster operating rod

3) If it is not within the specified value, adjust it by adjusting the brake booster operating rod length.

15.Stop Light Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the stop light switch connector.
3) Loosen the nuts, and unscrew the stop light switch to remove.

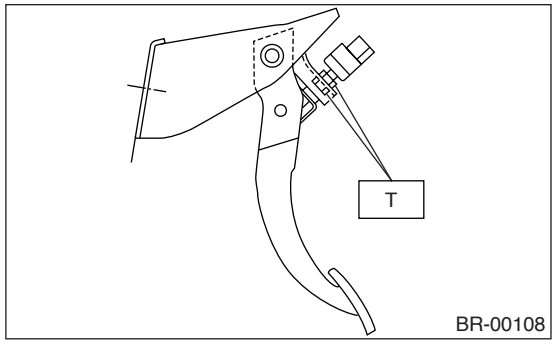


(1) Stop light switch

B: INSTALLATION

1) Screw the stop light switch onto a bracket and secure it temporarily with a nut.
2) Adjust the stop light switch position, and then tighten the nut.
<Ref. to BR-45, ADJUSTMENT, Stop Light Switch.>

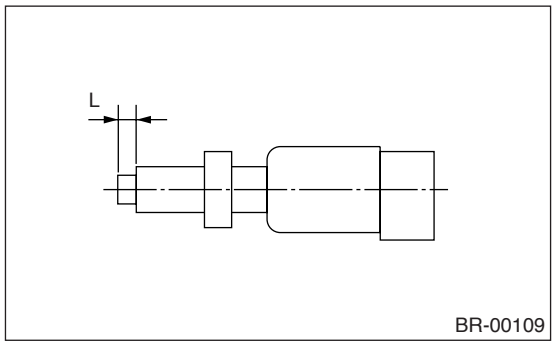
Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



C: INSPECTION

1) If the stop light switch does not operate properly (or if it does not fix at the specified position), replace with a new one.

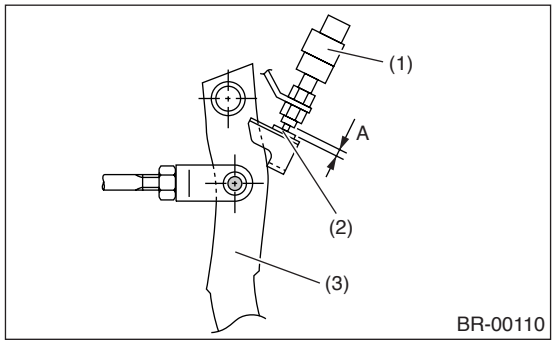
Specified position L:
2 mm (0.079 in)



2) Measure the clearance between the threaded end of stop light switch and stopper.

CAUTION:
Be careful not to rotate the stop light switch.

Stop light switch clearance A:
0.3 mm (0.012 in)



(1) Stop light switch
(2) Stopper
(3) Brake pedal

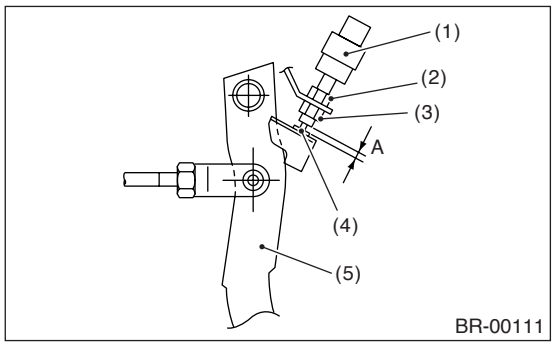
3) If it is not within the specified value, adjust it by adjusting the position of stop light switch.

CAUTION:
Be careful not to rotate the stop light switch.

D: ADJUSTMENT

Loosen the lock nut, and adjust the stop light switch position until the clearance between the threaded end of the stop light switch and stopper (A) becomes 0.3 mm (0.012 in). Then, tighten the lock nut.

Tightening torque:
8 N·m (0.8 kgf-m, 5.8 ft-lb)



(1) Stop light switch
(2) Lock nut A
(3) Lock nut B
(4) Stopper
(5) Brake pedal

NOTE:
Tighten the lock nut B until the clearance between the threaded end of stop light switch and stopper becomes 0 mm (0 inch). Hold the stop light switch to prevent turning, and then loosen the lock nut B approx. 60°. The clearance (A) becomes 0.3 mm (0.012 in).

16.Diagnosis

A: INSPECTION

	Trouble and possible cause	Corrective action
1. Insufficient braking	(1) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(2) Entry of air into the hydraulic mechanism	Bleed air.
	(3) Wear, deteriorated surface material, adhering water or fluid on the lining	Replace, grind or clean.
	(4) Improper operation of master cylinder, disc caliper, brake booster or check valve	Correct or replace.
2. Unstable or uneven braking	(1) Fluid on the lining or rotor	Eliminate cause of fluid leakage, and clean or replace.
	(2) Rotor eccentricity	Correct or replace the rotor.
	(3) Improper lining contact, deteriorated surface material, improper inferior material, or wear	Correct by grinding, or replace.
	(4) Deformed back plate	Rectify or replace.
	(5) Improper tire inflation	Adjust to correct pressure.
	(6) Disordered wheel alignment	Adjust alignment.
	(7) Loosened back plate or the support installing bolts	Retighten to specified torque.
	(8) Faulty wheel bearing	Replace.
	(9) Trouble in hydraulic system	Replace the cylinder, brake pipe or hose.
	(10) Uneven effect of the parking brake	Check, adjust, or replace the rear brake and cable system.
3. Excessive pedal stroke	(1) Entry of air into the hydraulic mechanism	Bleed air.
	(2) Excessive play in the master cylinder push rod	Adjust.
	(3) Fluid leakage from the hydraulic mechanism	Correct or replace. (cup, piston seal, piston boot, master cylinder piston kit, pipe or hose)
	(4) Improper lining contact or worn lining	Correct or replace.
4. Brake dragging or improper brake return	(1) Insufficient pedal play	Adjust play.
	(2) Improper master cylinder return	Clean or replace the cylinder.
	(3) Clogged hydraulic system	Replace.
	(4) Improper return or adjustment of parking brake	Correct or adjust.
	(5) Weakened spring tension or breakage of shoe return spring	Replace the spring.
	(6) Improper disc caliper operation	Correct or replace.
	(7) Faulty wheel bearing	Replace.
5. Brake noise (1) (creak sound)	(1) Hardened or deteriorated brake pad	Replace the pad.
	(2) Worn brake pad	Replace the pad.
	(3) Loosened back plate or the support installing bolts	Retighten to specified torque.
	(4) Loose wheel bearing	Retighten to specified torque.
	(5) Dirty rotor	Clean the rotor, or clean and replace brake assembly.
6. Brake noise (2) (hissing sound)	(1) Worn brake pad	Replace the pad.
	(2) Improper installed pad	Correct or replace the pad.
	(3) Loose or bent rotor	Retighten or replace.
7. Brake noise (3) (click sound)	Excessively worn pad or the support	Replace the pad or the support.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
BRAKE	BR
PARKING BRAKE	PB
POWER ASSISTED SYSTEM (POWER STEERING)	PS

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE6

PARKING BRAKE

PB

Page

1. General Description 2
2. Parking Brake Lever....5
3. Parking Brake Cable 6
4. Parking Brake Assembly (Rear Disc Brake) 7
5. General Diagnostic Table....10

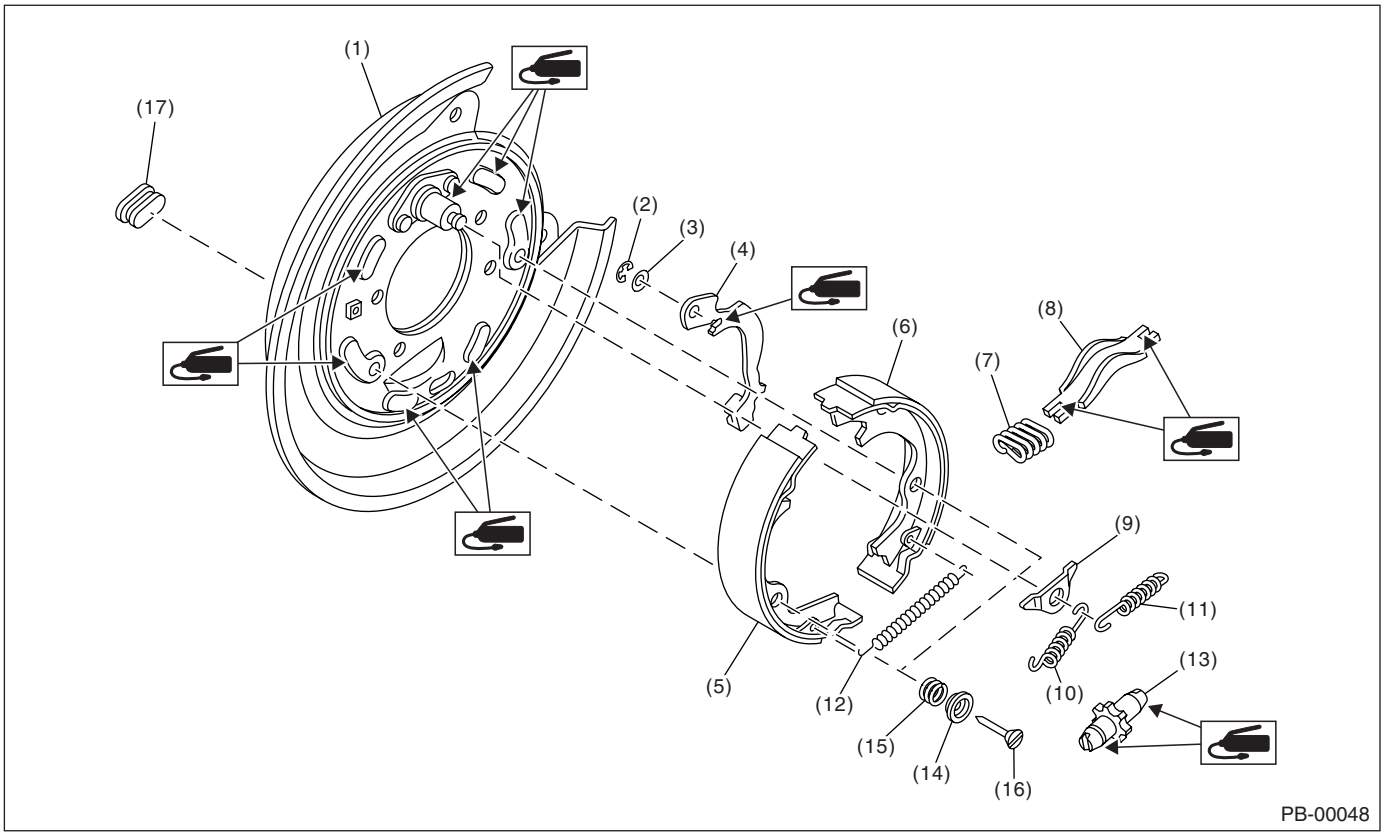
1. General Description

A: SPECIFICATION

Type	Mechanical on rear brakes, drum in disc
Effective drum diameter mm (in)	170 (6.69)
Lining dimensions (length × width × thickness) mm (in)	163.1 × 30.0 × 3.2 (6.421 × 1.181 × 0.126)
Clearance adjustment	Manual adjustment
Lever stroke notches/N (kgf, lb)	5 to 6/200 (20.4, 45)

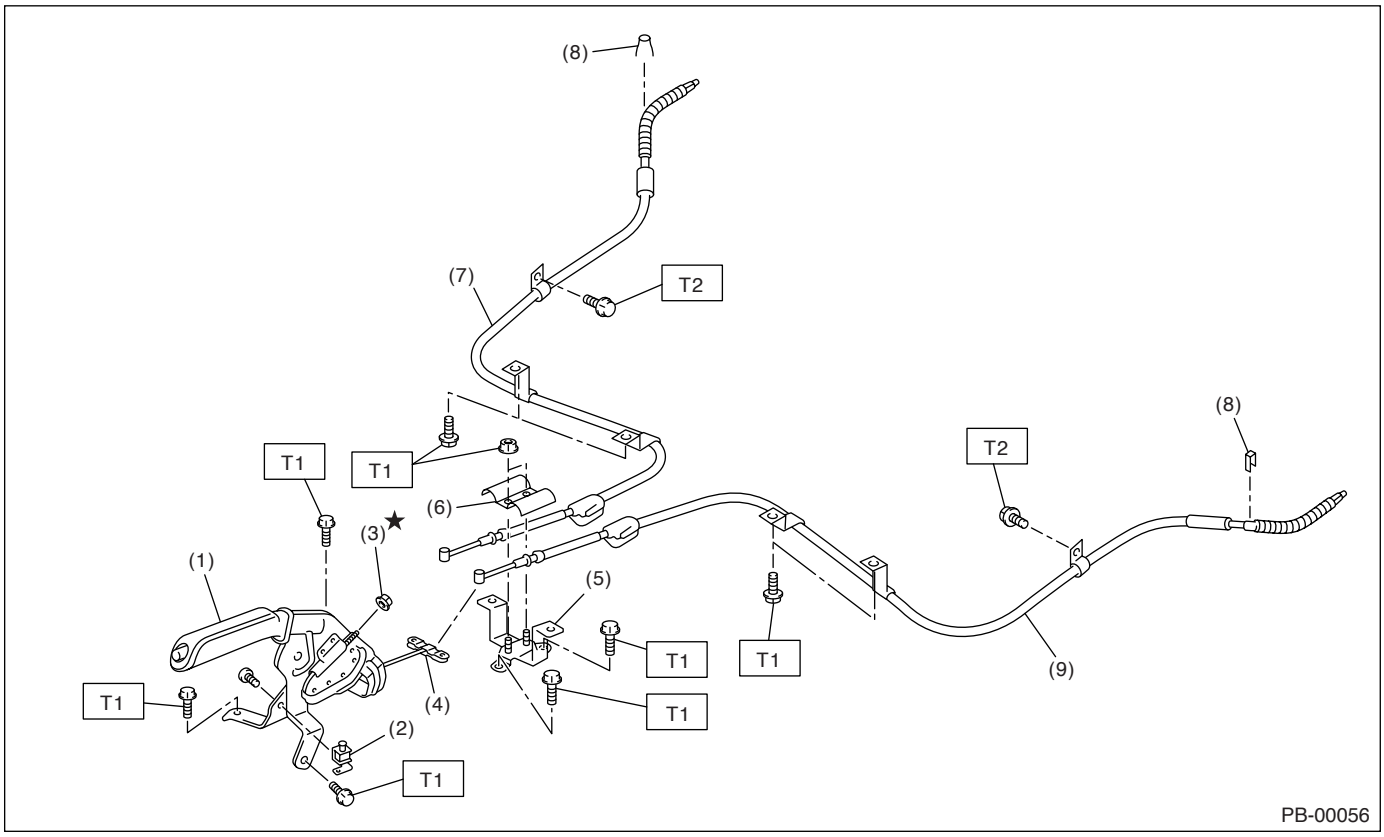
B: COMPONENT

1. PARKING BRAKE (REAR DISC BRAKE)



(1) Back plate
(2) Retainer
(3) Spring washer
(4) Lever
(5) Parking brake shoe (Primary)
(6) Parking brake shoe (Secondary)
(7) Strut spring
(8) Strut
(9) Shoe guide plate
(10) Primary return spring
(11) Secondary return spring
(12) Adjusting spring
(13) Adjuster
(14) Shoe hold-down cup
(15) Shoe hold-down spring
(16) Shoe hold-down pin
(17) Adjusting hole cover

2. PARKING BRAKE CABLE



(1) Parking brake lever
(2) Parking brake switch
(3) Adjusting nut (Self-locking nut)
(4) Equalizer
(5) Bracket
(6) Clamp
(7) Parking brake cable RH
(8) Clamp
(9) Parking brake cable LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 18 (1.8, 13.0)
T2: 33 (3.4, 24.3)

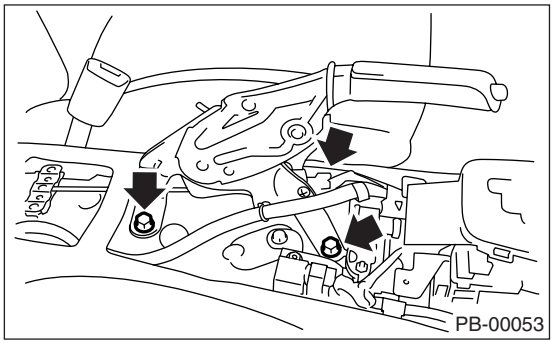
C: CAUTION

• Wear work clothing, including a cap, protective goggles, and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn your hands, because each part on the vehicle is hot after running.
• Use SUBARU genuine grease etc. or the equivalent. Do not mix grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vice, place cushioning material such as wood blocks, aluminum plate, or shop cloth between the part and the vice.
• Keep grease etc. away from parking brake shoes.

2. Parking Brake Lever

A: REMOVAL

1) Set the wheel stoppers to tires.
2) Remove the console box.
3) Disconnect the parking brake switch connector.
4) Remove the parking cable adjusting nut (self-locking nut).
5) Remove the parking brake lever.



B: INSTALLATION

1) Install in the reverse order of removal.

Tightening torque:
Parking brake lever
18 N·m (1.8 kgf-m, 13.0 ft-lb)

2) Install a new adjusting nut (self-locking nut).
3) Adjust the lever stroke. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

C: INSPECTION

1) Operate the parking brake lever 3 to 4 times and return the lever fully.
2) While pulling the parking brake lever upward, count the notches.

Lever stroke:
5 to 6 notches when pulled with a force of 200 N (20.4 kgf, 45 lb)

If it is not within the specified value, adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

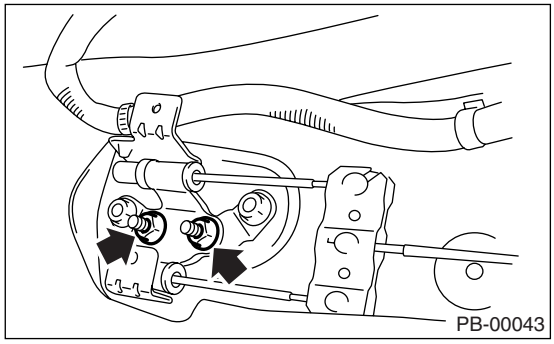
D: ADJUSTMENT

Adjust the parking lever stroke. <Ref. to PB-9, LEVER STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

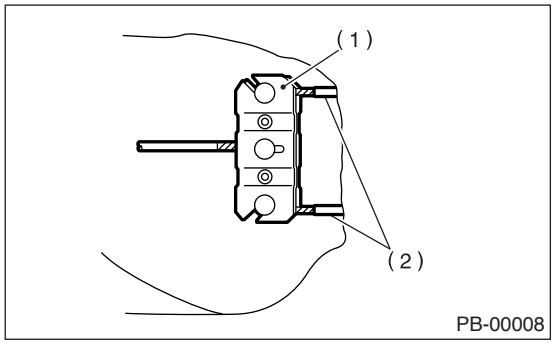
3. Parking Brake Cable

A: REMOVAL

1) Remove the rear seat cushion.
2) Remove the console box.
3) Remove the parking cable adjusting nut (self-locking nut).
4) Remove the parking brake lever. <Ref. to PB-5, REMOVAL, Parking Brake Lever.>
5) Roll up the floor mat and remove the clamps.

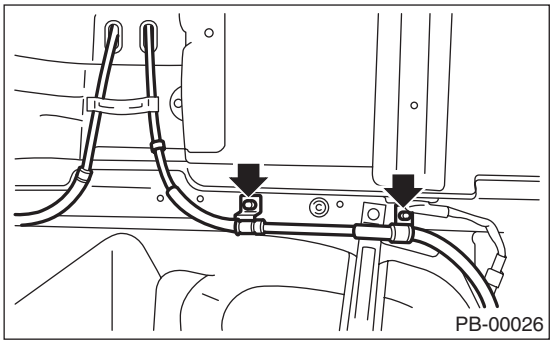


6) Remove the inner cable end from equalizer.



(1) Equalizer
(2) Inner cable end

7) Lift-up the vehicle, and then remove the rear wheels.
8) Remove the parking brake cable from rear brake. <Ref. to PB-7, REMOVAL, Parking Brake Assembly (Rear Disc Brake).>
9) Remove the clamp from rear brake.
10) Remove the cable clamp from rear arm bracket.
11) Remove the cable clamp from rear floor.



12) Remove the cable assembly.

B: INSTALLATION

1) Install in the reverse order of removal.

NOTE:
Be sure to pass the cable through the cable guide inside tunnel.

2) Adjust the lever stroke. <Ref. to PB-5, ADJUSTMENT, Parking Brake Lever.>

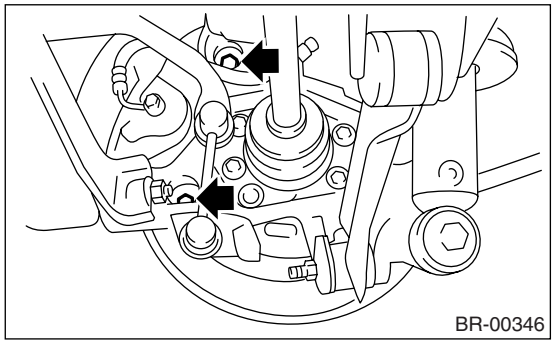
C: INSPECTION

Check and replace the removed cable if damaged, rusty or faulty.
1) Check the cable for smooth operation.
2) Check the inner cable for damage and rust.
3) Check the outer cable for damage, bends and cracks.
4) Check the boot for damage, cracks and corrosion.

4. Parking Brake Assembly (Rear Disc Brake)

A: REMOVAL

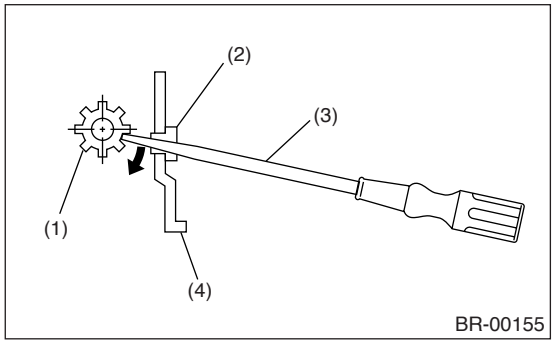
1) Release the parking brake.
2) Remove the two mounting bolts and remove the brake caliper assembly.



3) Suspend the brake caliper assembly so that the hose is not stretched.
4) Remove the disc rotor.

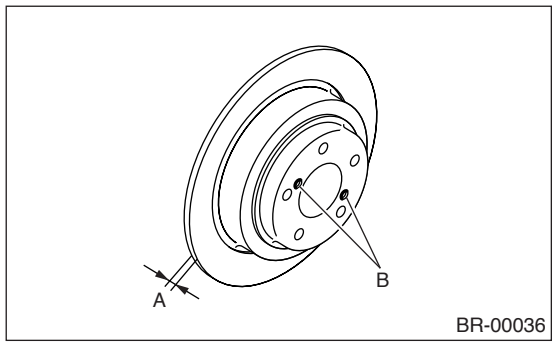
NOTE:
If the disc rotor is difficult to remove, try the following two methods in order.

(1) Turn the adjusting screw using a flat tip screwdriver until the brake shoe gets away enough from the disc rotor.

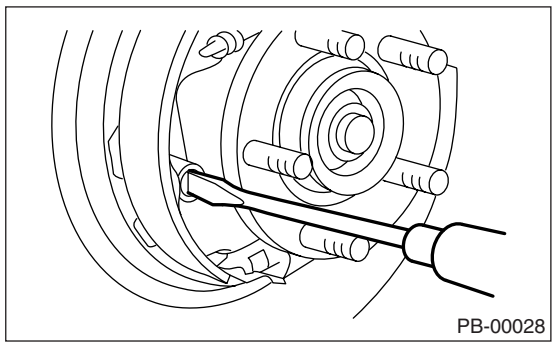


(1) Adjuster
(2) Adjusting hole cover (rubber)
(3) Flat tip screwdriver
(4) Back plate

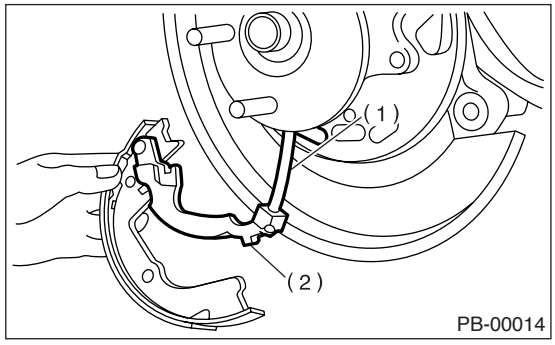
(2) If the disc rotor seizes up within hub, drive out the disc rotor by pushing two 8 mm bolts in holes B on rotor.



5) Remove the shoe return spring from parking brake assembly.
6) Remove the front shoe hold down spring and pin.



7) Remove the strut and strut spring.
8) Remove the adjuster assembly from parking brake assembly.
9) Remove the brake shoe.
10) Remove the rear shoe hold down spring and pin with pliers.
11) Remove the parking brake cable from lever.



(1) Parking brake cable
(2) Lever

12) Using a flat tip screwdriver, raise the retainer. Remove the parking lever and washer from brake shoe.

B: INSTALLATION

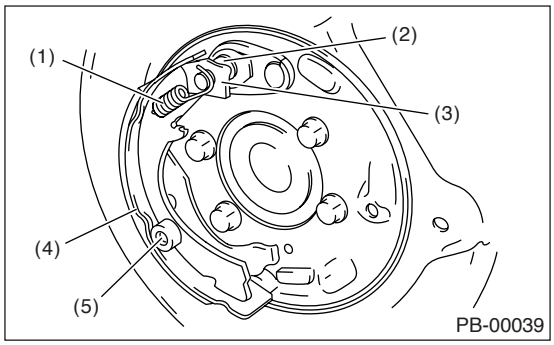
CAUTION:
Be sure the lining surface is free from oil and grease contamination.

1) Apply brake grease to the following places.

Brake grease:
Brake Grease (Part No. 003602002)

- Six contact surfaces of shoe rim and back plate packing
- Contact surface of shoe wave and anchor pin
- Contact surface of lever and strut
- Contact surface of shoe wave and adjuster assembly
- Contact surface of shoe wave and strut
- Contact surface of lever and shoe wave

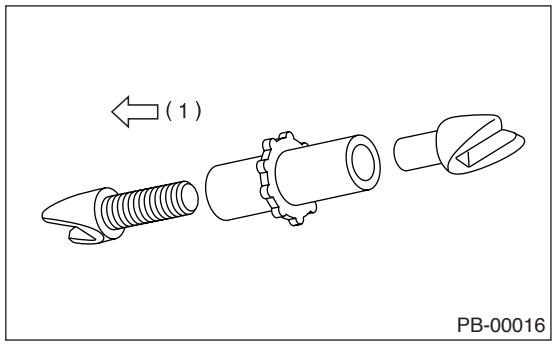
2) Insert the primary side brake shoe into anchor pin groove.
3) Secure the brake shoe with the shoe hold-down pin and cup.
4) Install the plate to anchor pin, and then assemble the primary return spring to anchor pin.



(1) Primary return spring
(2) Anchor pin
(3) Plate
(4) Primary shoe
(5) Shoe hold-down pin and shoe hold-down cup

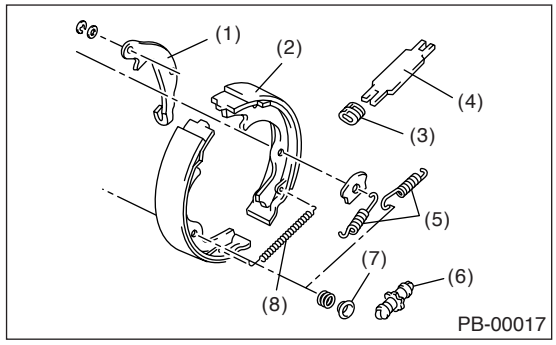
5) Install the parking brake cable to parking brake lever.
6) Assemble the strut and adjuster, and then secure the secondary side brake shoe with shoe hold-down pin and cup.

NOTE:
- Install the strut spring of both right and left wheel facing vehicle front.
- Install the adjuster assembly with screw on left side.



(1) LH

7) Install the secondary return spring and adjusting spring.



(1) Lever
(2) Secondary brake shoe
(3) Strut spring
(4) Strut
(5) Return spring
(6) Adjuster
(7) Shoe hold-down cup
(8) Adjusting spring

8) Adjust the parking brake. <Ref. to PB-9, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
9) Drive the vehicle for parking brake lining “break-in”.
(1) Drive the vehicle at about 35 km/h (22 MPH).
(2) With the parking brake release button pushed in, pull the parking brake lever gently.
(3) Drive the vehicle for about 200 m (0.12 mile) in this condition.
(4) Wait 5 to 10 minutes for the parking brake to cool down.
Repeat once more from step (1).
(5) After breaking-in, re-adjust the parking brakes.

C: INSPECTION

1) Measure the brake disc rotor inside diameter. If the disc is scored or worn, replace the brake disc rotor.

Disc rotor inside diameter:
Standard:
170 mm (6.69 in)
Service limit:
171 mm (6.73 in)

2) Measure the lining thickness. If it exceeds the limit, replace shoe assembly.

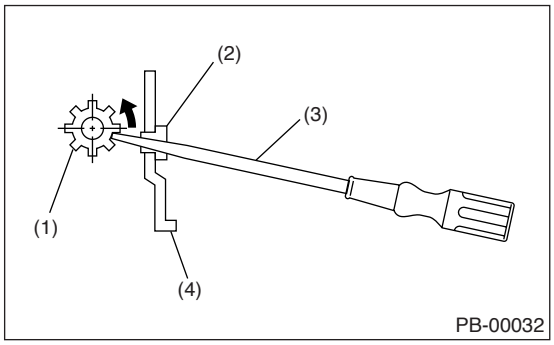
Lining thickness:
Standard:
3.2 mm (0.126 in)
Service limit:
1.5 mm (0.059 in)

NOTE:
Replace the right and left brake shoe as a set.

D: ADJUSTMENT

1. SHOE CLEARANCE

1) Return the parking brake lever fully.
2) Remove the adjusting hole cover from back plate.
3) Turn the adjusting screw using a flat tip screwdriver until the brake shoe is in close contact with disc rotor.



(1) Adjusting screw
(2) Adjusting hole cover (rubber)
(3) Flat tip screwdriver
(4) Back plate

4) Turn back (downward) the adjusting screw 3 to 4 notches.

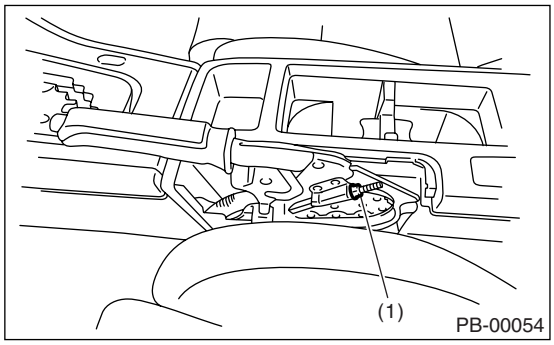
CAUTION:
Check there is no brake drag.

5) Install the adjusting hole cover to back plate.
6) Adjust the parking lever stroke. <Ref. to PB-9, LEVER STROKE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>

2. LEVER STROKE

1) Adjust the shoe clearance before lever stroke adjustment. <Ref. to PB-9, SHOE CLEARANCE, ADJUSTMENT, Parking Brake Assembly (Rear Disc Brake).>
2) Remove the parking lever cover.
3) Operate the parking brake lever 3 to 4 times.
4) Turn the adjusting nut until lever stroke is at the specification.

Lever stroke:
5 to 6 notches when pulled with a force of 200 N (20.4 kgf, 45 lb)



(1) Adjusting nut (Self-locking nut)

5) Check there is no brake drag.
6) Install the parking lever cover.

5. General Diagnostic Table

A: INSPECTION

Symptom	Possible cause	Remedy
Brake drag	Parking brake lever is maladjusted.	Adjustment.
	Parking brake cable does not move.	Repair or replace.
	Parking brake shoe clearance is maladjusted.	Adjustment.
	Return spring is faulty.	Replace.
Noise from brake	Return spring is faulty.	Replace.
	Shoe hold-down spring is faulty.	Replace.

CHASSIS SECTION

FRONT SUSPENSION	FS
REAR SUSPENSION	RS
WHEEL AND TIRE SYSTEM	WT
DIFFERENTIALS	DI
TRANSFER CASE	TC
DRIVE SHAFT SYSTEM	DS
ABS	ABS
ABS (DIAGNOSTICS)	ABS(diag)
VEHICLE DYNAMICS CONTROL (VDC)	VDC
VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)	VDC(diag)
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POWER ASSISTED SYSTEM (POWER STEERING)

PS

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1. General Description

A: SPECIFICATION

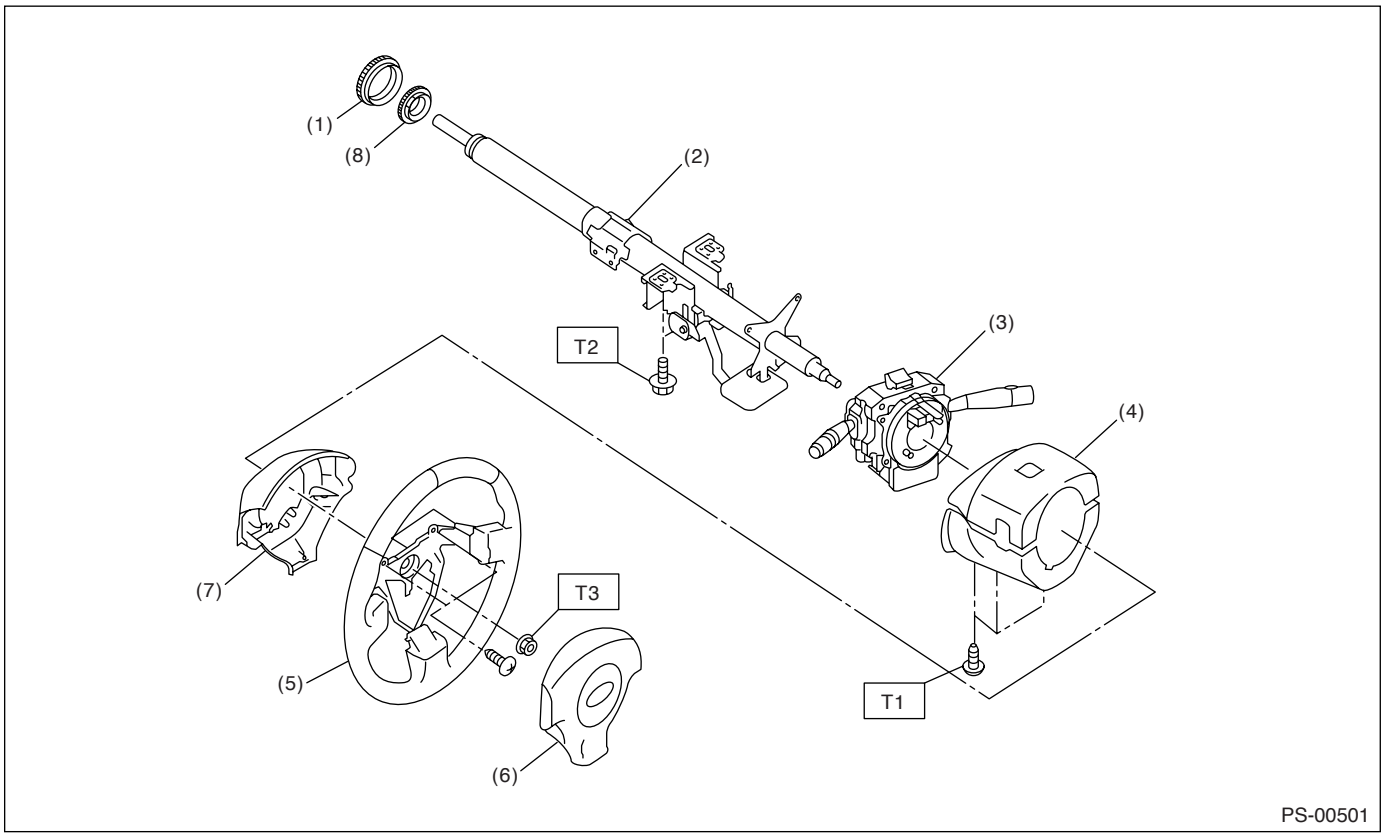
Model			Non-turbo (Except for 3.0 R)	Turbo	3.0 R
Whole system	Minimum turning radius m (ft)		5.4 (17.8)		
	Steering angle (Inside — outside)		2.0 i, 2.5 i: 37.3° — 33.0°, 2.0 GT, 3.0 R: 37.2° — 32.9°, OUTBACK: 37.8° — 33.5°		
	Steering wheel diameter mm (in)		375 (14.76)		
	Overall gear ratio (Turns, lock to lock Gearbox)		3.2	2.8	
Gearbox	Type		Rack and Pinion, Integral		
	Backlash		0 (Automatically adjustable)		
	Valve (Power steering system)		Rotary valve		
Pump (Power steering system)	Type		Vane pump		
	Oil tank		Installed on body		
	Specific output cm^3 (cu in)/rev.		7.2 (0.439)	8.5 (0.519)	9.6 (0.586)
	Relief pressure kPa (kg/cm^2, psi)		6,767 — 7,453 (69 — 76, 981 — 1,081)	7,350 — 8,036 (75 — 82, 1,067 — 1,165)	8,300 — 9,000 (85 — 92, 1,204 — 1,305)
	Hydraulic fluid control		Dropping in response to increased engine revolutions		
	Hydraulic fluid ℓ (US qt, Imp qt)		1,000 rpm: 6.5 (6.9, 5.7) 3,000 rpm: 5 (5.3, 4.4)	1,000 rpm: 6.15 (6.5, 5.4) 3,000 rpm: 5.5 (5.8, 4.8)	1,000 rpm: 6.5 (6.9, 5.7) 3,000 rpm: 5.5 (5.8, 4.8)
	Range of revolution rpm		680 — 9,800	680 — 9,600	
	Revolving direction		Clockwise		
Working fluid (Power steering system)	Fluid		ATF DEXRON III or equivalent		
	Capacity ℓ (US qt, Imp qt)	Oil tank	0.2 (0.2, 0.2)		
		Whole system	0.7 (0.7, 0.6)		

Steering wheel	Free play			mm (in)	17 (0.67)
Steering angle	Inner wheel				2.0 i, 2.5 i: 37.3°±1.5°, 2.0 GT, 3.0 R: 37.2°±1.5°, OUTBACK: 37.8°±1.5°
	Outer wheel				2.0 i, 2.5 i: 33.0°±1.5°, 2.0 GT, 3.0 R: 32.9°±1.5°, OUTBACK: 33.5°±1.5°
Steering shaft	Clearance between steering wheel and column cover			mm (in)	3.0 (0.12)
Steering gearbox (Power steering system)	Sliding resistance			N (kgf, lb)	314 (32, 71) or less Difference between right and left sliding resistance: Less than 20%
	Rack shaft play in radial direction	Right-turn steering mm (in)	LHD		0.3 (0.16) or less
			RHD		Horizontal movement: 0.6 (0.024) or less Vertical movement: 0.4 (0.016) or less
		Left-turn steering mm (in)	LHD		Horizontal movement: 0.6 (0.024) or less Vertical movement: 0.4 (0.016) or less
			RHD		0.3 (0.16) or less
	Input shaft play	In radial direction		mm (in)	0.18 (0.0071) or less
		In axial direction		mm (in)	0.27 (0.0106) or less
	Resistance to rotation			N (kgf, lb)	Maximum allowable value: 13 (1.3, 2.9) or less Difference between right and left sliding resistance: Less than 20%
Oil pump (Power steering system)	Pulley shaft	Radial play		mm (in)	0.4 (0.016) or less
		Axial play		mm (in)	0.9 (0.035) or less
	Pulley	Ditch deflection		mm (in)	1.0 (0.039) or less
		Resistance to rotation		N (kgf, lb)	9.22 (0.94, 2.07) or less
	Regular pressure (Unloaded)kPa (kg/cm^2, psi)				981 (10, 142) or less
Steering wheel effort (Power steering system)	At standstill with engine idling on a concrete road			N (kgf, lb)	29.4 (3.0, 6.6) or less
	At standstill with engine stalled on a concrete road			N (kgf, lb)	294.2 (30, 66.2) or less

Recommended power steering fluid	Manufacturer
ATF DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TAXACO

B: COMPONENT

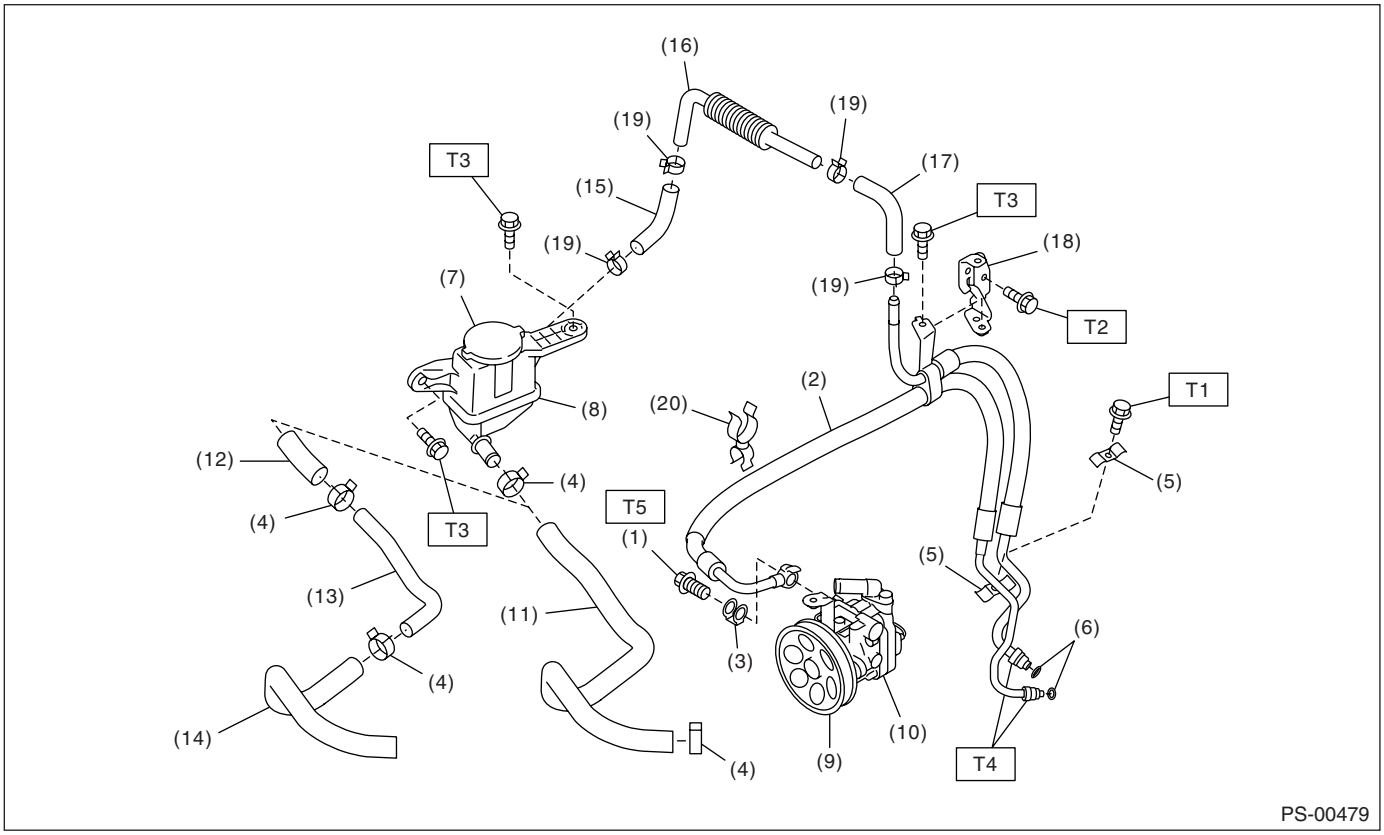
1. STEERING WHEEL AND COLUMN



(1)	Bushing	(5)	Steering wheel	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Steering shaft	(6)	Airbag module	***T1: 1.2 (0.12, 0.9)***
(3)	Steering roll connector	(7)	Steering wheel lower cover	***T2: 25 (2.5, 18.1)***
(4)	Column cover	(8)	Insulator	***T3: 45 (4.6, 33.2)***

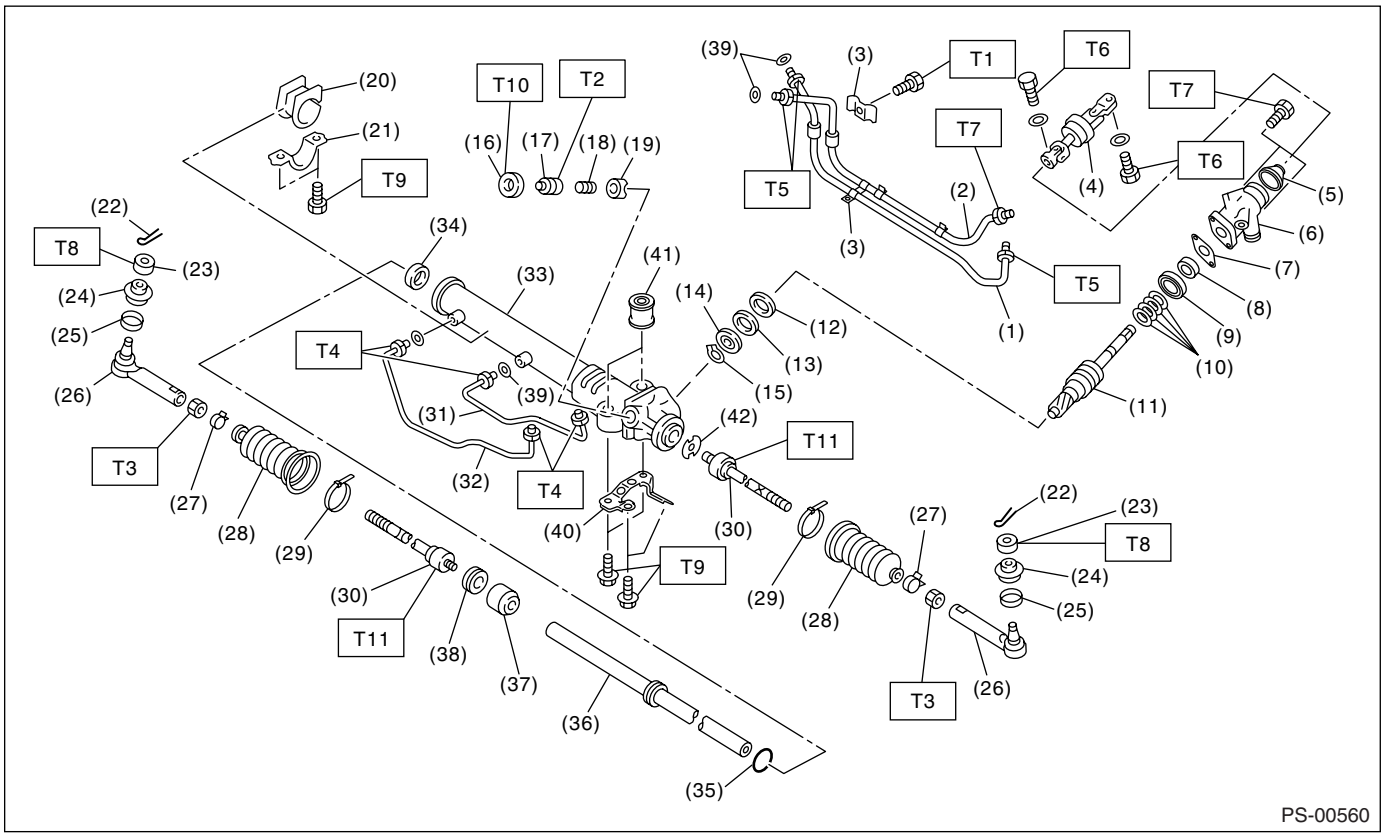
2. POWER ASSISTED SYSTEM

• Hose and tank



(1)	Eye bolt	(10)	Oil pump	(19)	Clip
(2)	Hose	(11)	Suction hose (Non-turbo model)	(20)	Clip
(3)	Eye bolt gasket	(12)	Suction hose (Turbo model)		
(4)	Clip	(13)	Suction hose (Turbo model)	***Tightening torque: N·m (kgf-m, ft-lb)***	
(5)	Clamp E	(14)	Suction hose (Turbo model)	***T1:***	***7.4 (0.75, 5.4)***
(6)	O-ring	(15)	Return hose	***T2:***	***17.6 (1.79, 13.0)***
(7)	Cap	(16)	Oil cooler	***T3:***	***12.7 (1.30, 9.4)***
(8)	Reservoir tank	(17)	Return hose	***T4:***	***15 (1.5, 10.8)***
(9)	Pulley	(18)	Hose bracket	***T5:***	***39.2 (4.0, 28.9)***

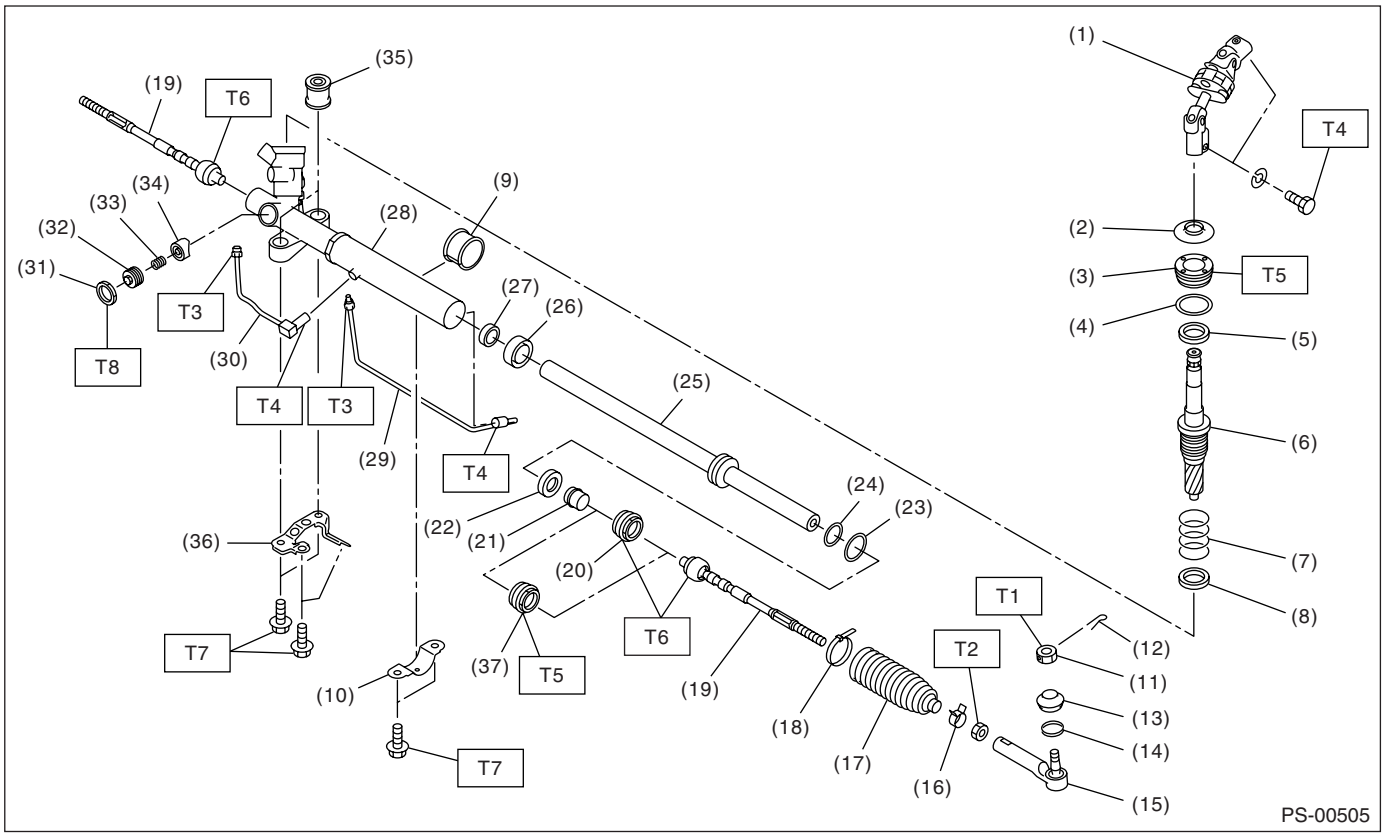
• Gearbox (LHD model)



(1) Pipe C
(2) Pipe D
(3) Clamp plate
(4) Universal joint
(5) Dust seal
(6) Valve housing
(7) Gasket
(8) Oil seal
(9) Bushing
(10) Seal ring
(11) Pinion & valve ASSY
(12) Oil seal
(13) Back-up washer
(14) Ball bearing
(15) Snap ring
(16) Lock nut
(17) Adjusting screw
(18) Spring
(19) Sleeve
(20) Adapter
(21) Clamp
(22) Cotter pin
(23) Castle nut
(24) Dust cover
(25) Clip
(26) Tie-rod end
(27) Clip
(28) Boot
(29) Band
(30) Tie-rod
(31) Pipe B
(32) Pipe A
(33) Steering body
(34) Oil seal
(35) Piston ring
(36) Rack
(37) Rack bushing
(38) Holder
(39) O-ring
(40) Bracket
(41) Bushing
(42) Lock washer

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.6, 4.3)
T2: 7.4 (0.75, 5.4)
T3: 85 (8.6, 62.2)
T4: 13 (1.3, 9.4)
T5: 15 (1.5, 10.8)
T6: 24 (2.4, 17.4)
T7: 25 (2.5, 18.1)
T8: 27 (2.75, 19.9)
T9: 60 (6.1, 44.1)
T10: 39 (4.0, 28.9)
T11: 78 (8.0, 57.9)

• Gearbox (RHD model)

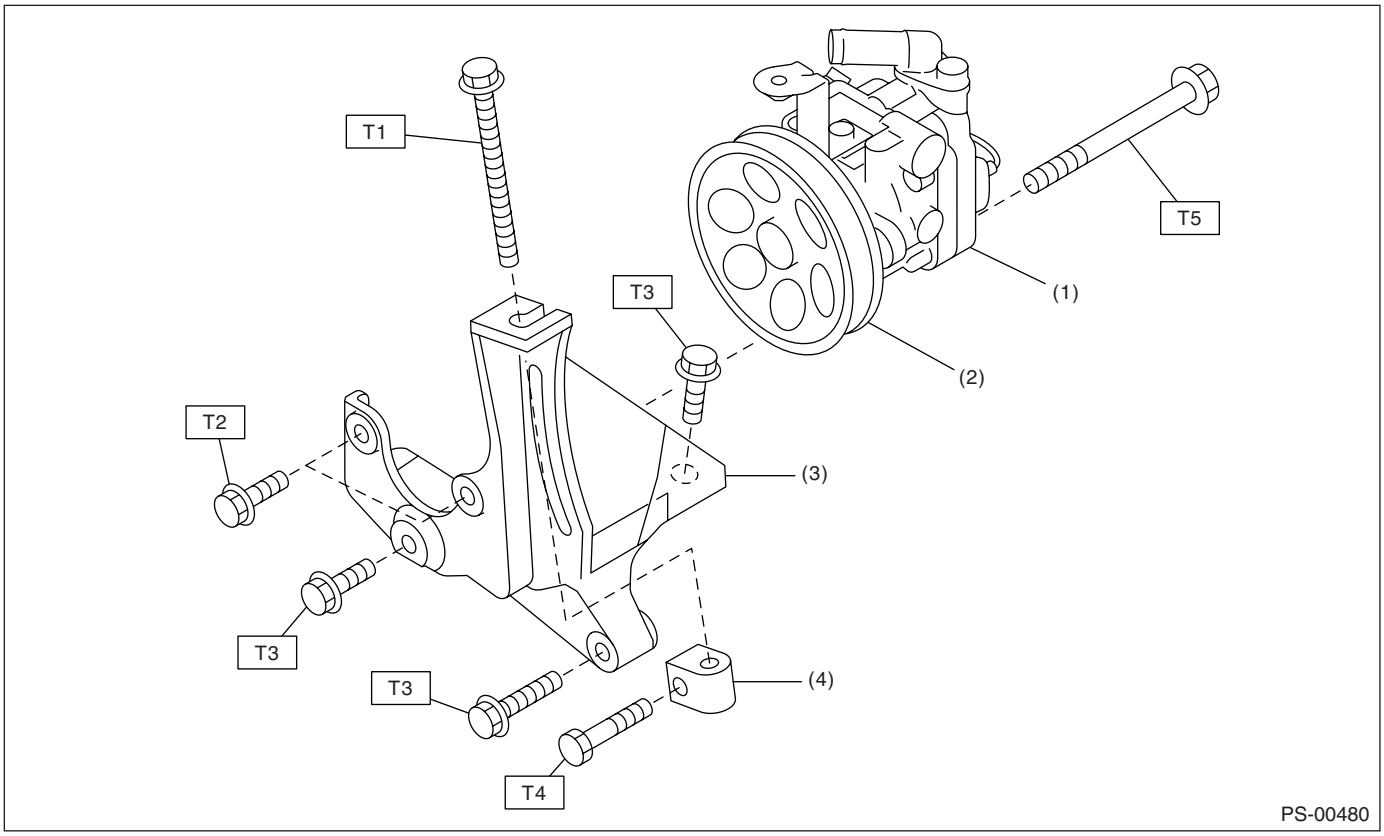


(1) Universal joint
(2) Dust cover
(3) Plug
(4) O-ring
(5) Oil seal
(6) Control valve
(7) Seal ring
(8) Oil seal
(9) Adapter
(10) Clamp
(11) Castle nut
(12) Cotter pin
(13) Dust seal
(14) Clip
(15) Tie-rod end
(16) Clip
(17) Boot
(18) Band
(19) Tie-rod
(20) Holder (Turbo, 3.0 R model)
(21) Bushing
(22) Oil seal
(23) Oil seal
(24) O-ring
(25) Rack
(26) Oil seal
(27) Back-up washer
(28) Steering body
(29) Pipe A
(30) Pipe B
(31) Lock nut
(32) Adjusting screw
(33) Spring
(34) Sleeve
(35) Bushing
(36) Bracket
(37) Holder (Except for turbo, 3.0 R model)

Tightening torque: N·m (kgf-m, ft-lb)

T1: 27 (2.75, 19.9)
T2: 85 (8.6, 62.2)
T3: 20 (2.0, 14.5)
T4: 24 (2.4, 17.4)
T5: 64 (6.5, 47.0)
T6: 90 (9.0, 65.1)
T7: 60 (6.1, 44.1)
T8: 39 (4.0, 28.9)

3. OIL PUMP



(1) Oil pump
(2) Pulley
(3) Bracket
(4) Belt tension nut

Tightening torque: N·m (kgf-m, ft-lb)
T1: 8 (0.8, 5.8)
T2: 15.7 (1.6, 11.6)
T3: 22 (2.2, 15.9)
T4: 25 (2.5, 18.1)
T5: 37.3 (3.8, 27.5)

C: CAUTION

• Wear work clothing, including a cap, protective goggles and protective shoes during operation.
• Before removal, installation or disassembly, be sure to clarify the failure. Avoid unnecessary removal, installation, disassembly and replacement.
• Be careful not to burn yourself, because each part on the vehicle is hot after running.
• Use SUBARU genuine power steering fluid, grease etc. or the equivalent. Do not mix fluid, grease etc. with that of another grade or from other manufacturers.
• Be sure to tighten fasteners including bolts and nuts to the specified torque.
• Place shop jacks or rigid racks at the specified points.
• Before securing a part on a vise, place cushioning material such as wooden blocks, aluminum plate or cloth between the part and the vise.

D: PREPARATION TOOL

1. SPECIAL TOOL

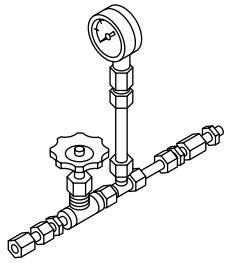
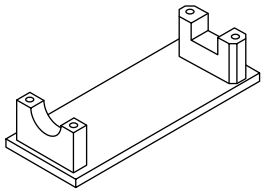
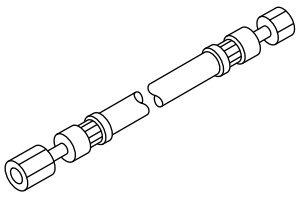
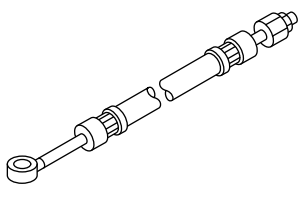
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925711000	925711000	PRESSURE GAUGE	Used for measuring oil pump pressure.
 ST-926200000	926200000	STAND	• Used when inspecting characteristic of gear-box assembly and disassembling it. • Used with BOSS D (34199AG000).
 ST34099AC010	34099AC010	ADAPTER HOSE A	Used with PRESSURE GAUGE (925711000).
 ST34099AC020	34099AC020	ADAPTER HOSE B	Used with PRESSURE GAUGE (925711000).

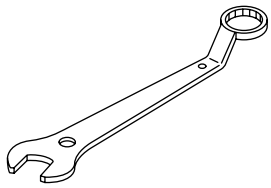
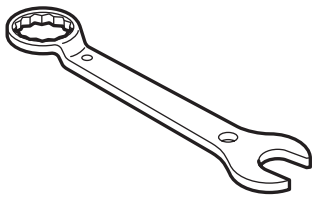
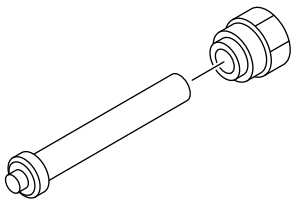
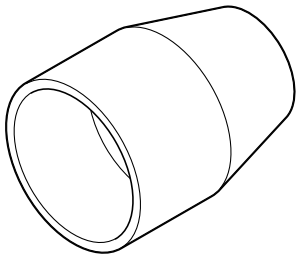
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-926230000	926230000	SPANNER	For the lock nut when adjusting backlash of gearbox.
 ST34099PA100	34099PA100	SPANNER	Used when measuring the rotating resistance of gearbox assembly.
 ST-926420000	926420000	PLUG	When fluid leaks from pinion side of gearbox assembly, remove pipe B from valve housing, attach this tool and check fluid leaking points.
 ST-926250000	926250000	GUIDE	• Used for installing holder assembly into rack housing. • Except for turbo and 3.0 R model.

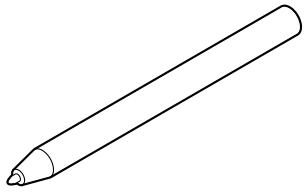
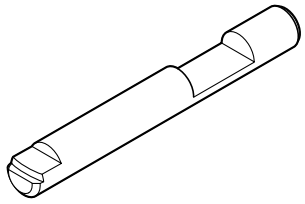
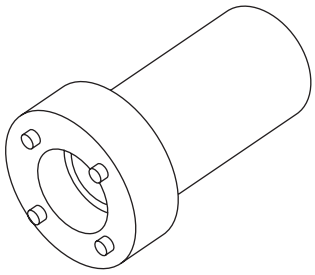
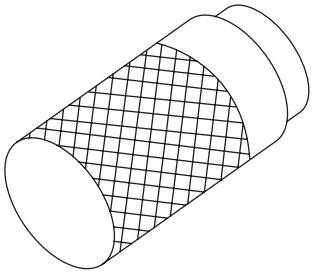
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34099FA060	34099FA060	PUNCH HOLDER	Used for caulking.
 ST34099FA080	34099FA080	PUNCH	• Used for removing caulking. • For RHD model.
 ST34199AE090	34199AE090	PLUG WRENCH	• Used for removing plug. • For RHD model.
 ST34199AE100	34199AE100	OIL SEAL PLUG REMOVER	• Used for removing oil seal plug. • For RHD model.

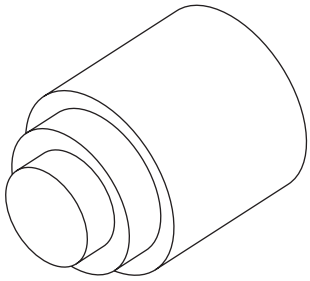
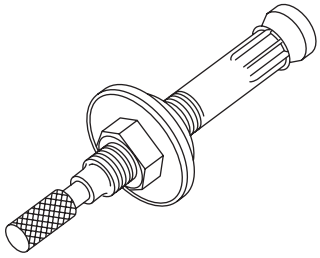
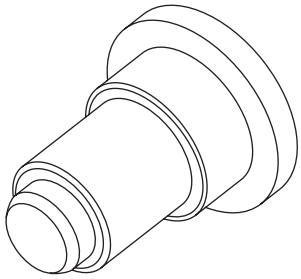
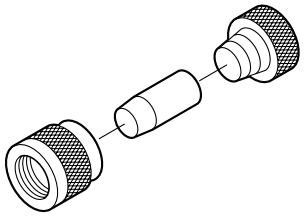
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE110	34199AE110	OIL SEAL PLUG INSTALLER	• Used for installing oil seal plug. • For RHD model.
 ST34199AE120	34199AE120	GEARBOX OIL SEAL REMOVER	• Used for removing gearbox oil seal. • For RHD model.
 ST34199AE130	34199AE130	GEARBOX OIL SEAL INSTALLER	• Used for installing gearbox oil seal. • For RHD model.
 ST34199FE040	34199FE040	INSTALLER A, B, C	• Used for installing oil seal to rack assembly. • For turbo and 3.0 R model.

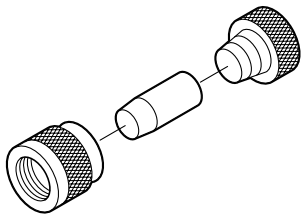
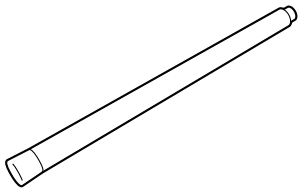
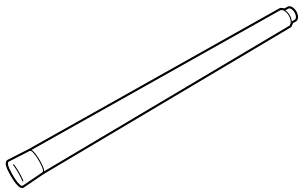
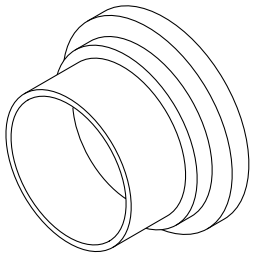
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-927490000	927490000	INSTALLER A, B, C	• Used for installing oil seal to rack assembly. • Except for turbo and 3.0 R model.
 ST34199FE010	34199FE010	REMOVER	• Used for removing backup ring and oil seal. • For turbo and 3.0 R model.
 ST-927580000	927580000	REMOVER	• Used for removing backup ring and oil seal. • Except for turbo and 3.0 R model.
 ST34199FE050	34199FE050	GUIDE	• Used for installing rack and seal into housing assembly. • For turbo and 3.0 R model.

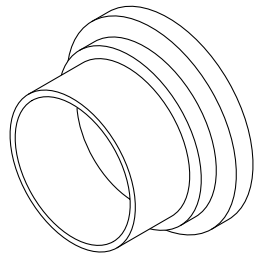
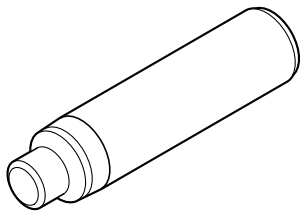
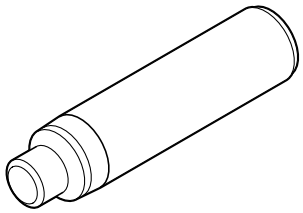
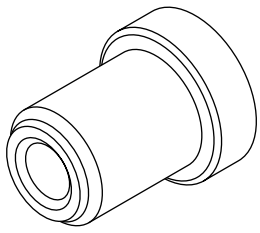
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE000	34199AE000	GUIDE	• Used for installing rack and seal into housing assembly. • Except for turbo and 3.0 R model.
 ST34199FE000	34199FE000	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • For turbo and 3.0 R model.
 ST34199FA030	34199FA030	INSTALLER & REMOVER	• Used for removing and installing rack oil seal (outer & inner). • Except for turbo and 3.0 R model.
 ST34199FE060	34199FE060	INSTALLER	• Used for installing rack oil seal (outer). • For turbo and 3.0 R model. • For RHD model.

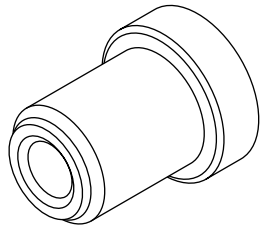
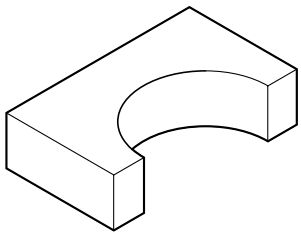
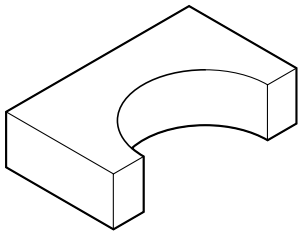
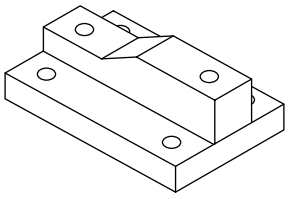
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AE010	34199AE010	INSTALLER	• Used for installing rack oil seal (outer). • Except for turbo and 3.0 R model. • For RHD model.
 ST34199FE020	34199FE020	BASE	• Used for support housing assembly. • For turbo and 3.0 R model. • For RHD model.
 ST34099FA070	34099FA070	BASE	• Used for support housing assembly. • Except for turbo and 3.0 R model. • For RHD model.
 ST34199AG000	34199AG000	BOSS D	• Used for inspecting characteristic of gearbox assembly and disassembling it. • Used with STAND (926200000).

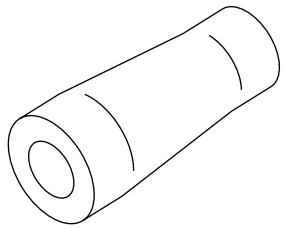
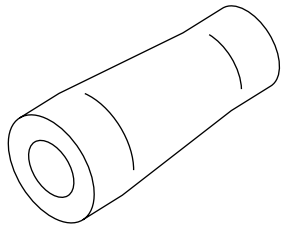
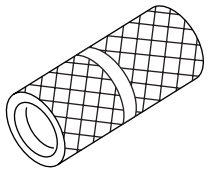
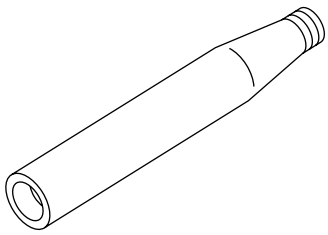
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AG040	34199AG040	GUIDE	• Used for installing sealing of rack. • For 3.0 R model. • For LHD model.
 ST34199AG030	34199AG030	GUIDE	• Used for installing seal ring of rack. • Except for 3.0 R model. • For LHD model.
 ST34199AG070	34199AG070	FORMER	• Used for forming seal ring of pinion. • For LHD model.
 ST34199AG020	34199AG020	GUIDE	• Used for installing seal ring of pinion. • For LHD model.

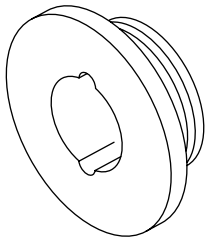
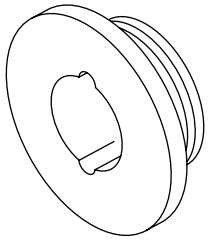
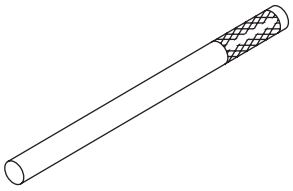
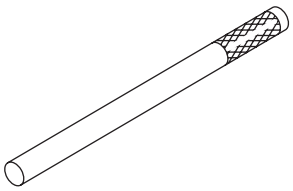
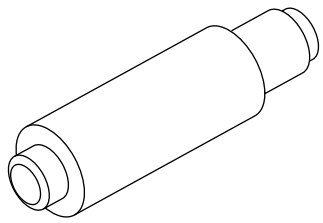
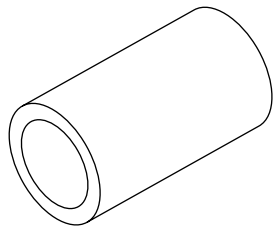
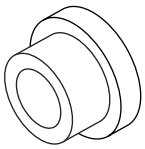
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AG060	34199AG060	GUIDE G (26)	• Used for forming seal ring of rack. • For 3.0 R model. • For LHD model. • Used with FORMER PISTON (34199AG080).
 ST34199AG050	34199AG050	GUIDE G (24)	• Used for forming seal ring of rack. • Except for 3.0 R model. • For LHD model. • Used with FORMER PISTON (34199AG080).
 ST34199AE050	34199AE050	OIL SEAL REMOVER	• Used for removing oil seal. • Except for 3.0 R model. • For LHD model.
 ST34099PA010	34099PA010	OIL SEAL REMOVER	• Used for removing oil seal. • For 3.0 R model. • For LHD model.

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST34199AG090	34199AG090	INSTALLER & REMOVER	• Used for installing oil seal of valve housing. • Used with SEAL INSTALLER (34099FA130). • Used for installing ball bearing of valve housing. • Used for removing oil seal and ball bearing from valve housing. • For LHD model.
 ST34199AG080	34199AG080	FORMER PISTON	• Used for forming seal of rack. • For LHD model. • Used with GUIDE G (26) (34199AG060) or GUIDE G (24) (34199AG050).
 ST34199AG010	34199AG010	INSTALLER	• Used for press-fit oil seal of gearbox cylinder. • For LHD model.

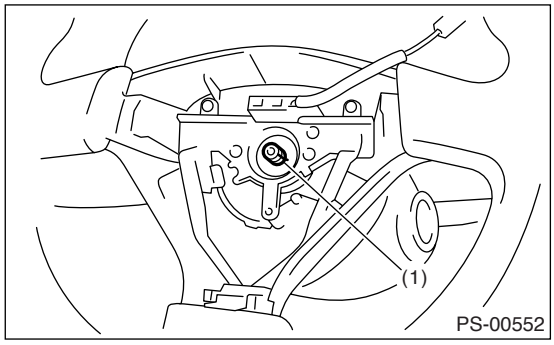
2. Steering Wheel

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tire to the straight-ahead position.
3) Remove the airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-4, CAUTION, General Description.>

4) Place alignment marks on the steering wheel and steering shaft.



(1) Alignment mark

5) Remove the steering wheel nut, and then draw out the steering wheel from shaft using steering puller.

B: INSTALLATION

WARNING:
Always refer to "Airbag System" before performing airbag module service. <Ref. to AB-4, CAUTION, General Description.>

1) Align the center of roll connector. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>
2) Install in the reverse order of removal.

NOTE:
Align the alignment marks on the steering wheel and steering shaft.

Tightening torque:
45 N·m (4.6 kgf-m, 33.2 ft-lb)

Column cover-to-steering wheel clearance:
2 — 4 mm (0.08 — 0.16 in)

CAUTION:
Insert roll connector guide pin into guide hole on lower end of surface of steering wheel to prevent damage.

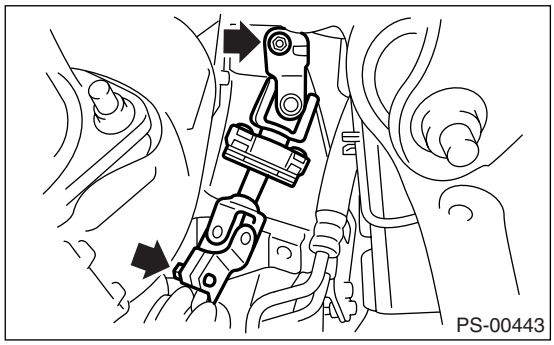
C: INSPECTION

1) Check the steering wheel for deformation. If the deformation is excessive, replace the steering wheel.
2) Check the splines on the steering wheel for damage. If the damage is excessive, replace the steering wheel.

3. Universal Joint

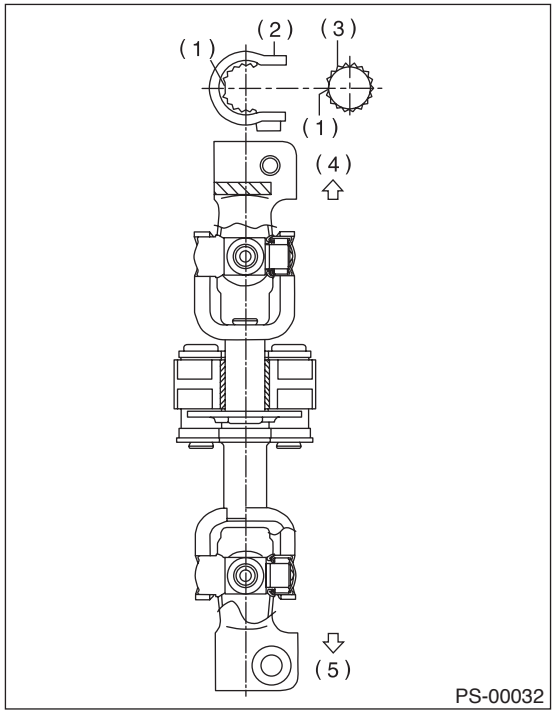
A: REMOVAL

1) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
2) Place alignment marks on universal joint.
3) Remove the universal joint bolts and then remove the universal joint.



B: INSTALLATION

1) Align the cutout at serrated section of the column shaft and yoke, then install the universal joint into column shaft.



(1) Cutout
(2) Yoke
(3) Column shaft
(4) Column shaft side
(5) Gearbox side

2) Install the universal joint to the serrations of gearbox assembly by matching alignment marks.
3) Tighten the bolt.

Tightening torque:
24 N·m (2.4 kgf-m, 17.4 ft-lb)

CAUTION:
Excessively large tightening torque of universal joint bolts may lead to heavy steering wheel operation.

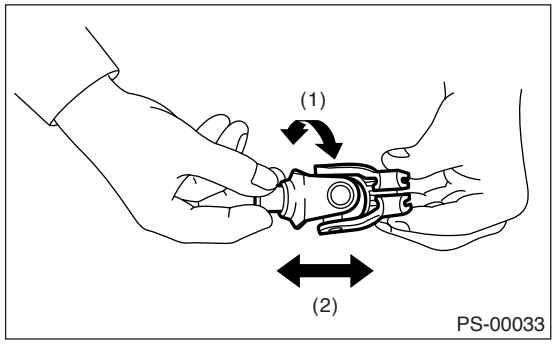
Clearance between coupling of universal joint to turbo cover:
15 mm (0.59 in) or more

4) Align the center of roll connector. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>
5) Install the steering wheel. <Ref. to PS-20, INSTALLATION, Steering Wheel.>

C: INSPECTION

Check for wear, damage or any other faults. If necessary, replace it.

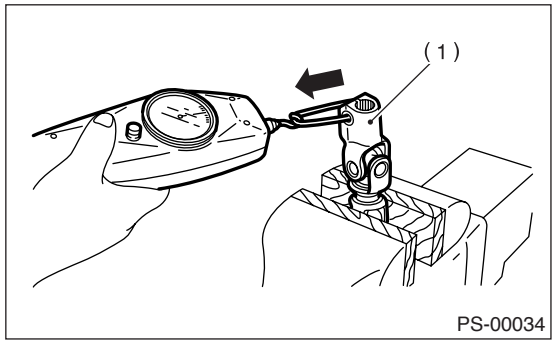
Service limit:
Universal joint play: 0 mm (0 in)
Maximum swing torque: 0.3 N (0.03 kgf, 0.07 lb)



(1) Swinging torque
(2) Play

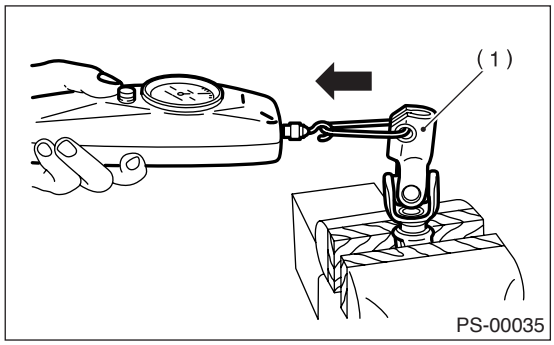
Measure the folding torque of universal joint.

Service limit:
Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less



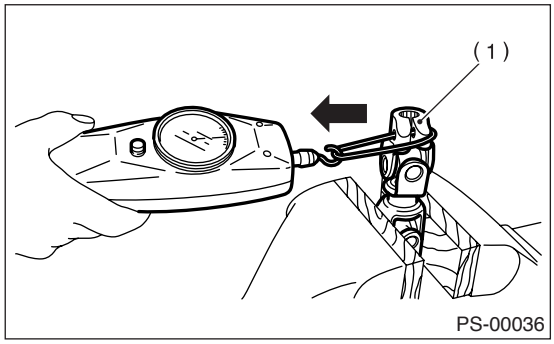
(1) Yoke (Gearbox side)

Service limit:
Maximum load: 3.8 N (0.39 kgf, 0.86 lb) or less



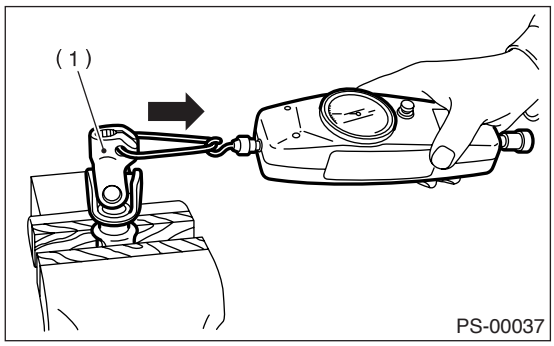
(1) Yoke (Gearbox side)

Service limit:
Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less



(1) Yoke (Steering column side)

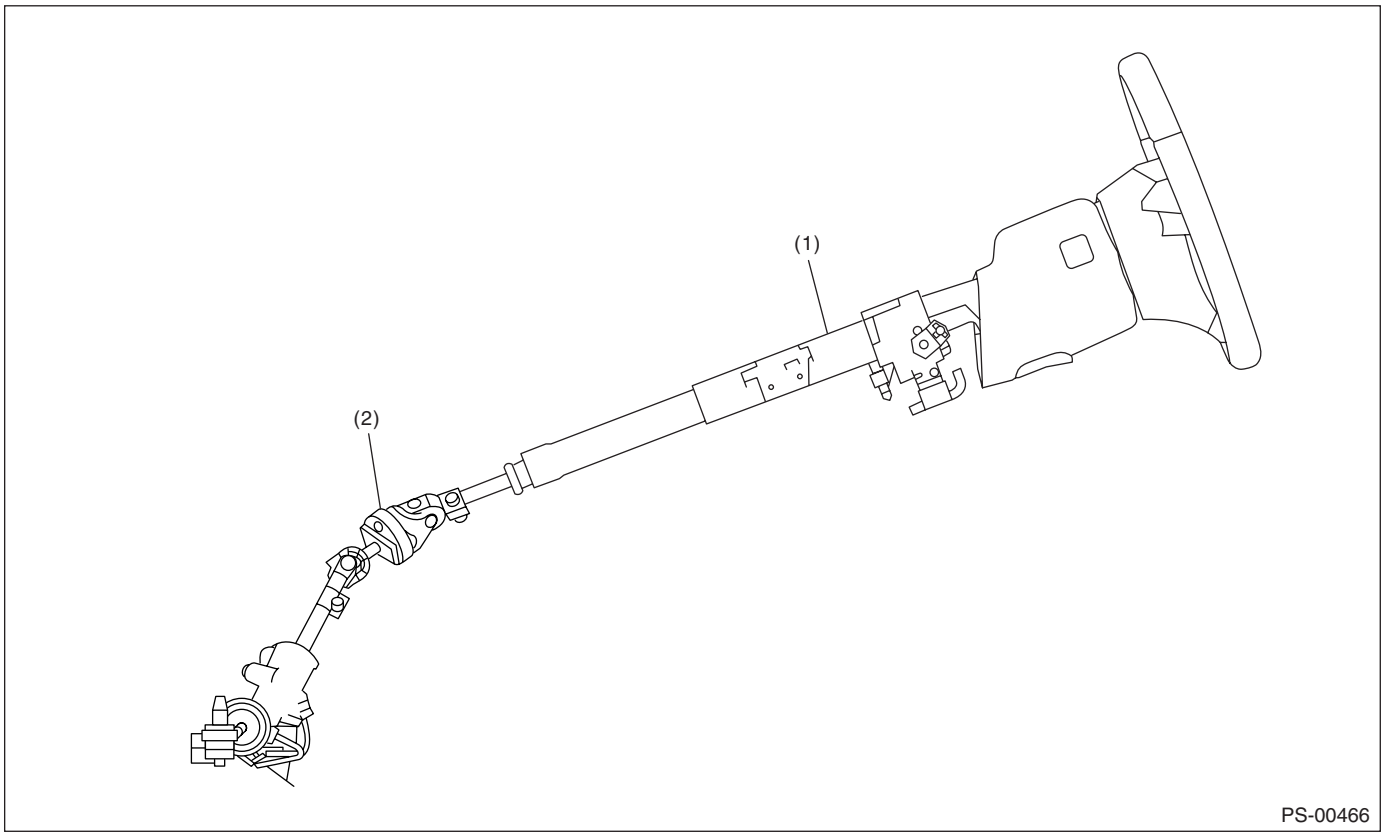
Service limit:
Maximum load: 7.3 N (0.74 kgf, 1.64 lb) or less



(1) Yoke (Steering column side)

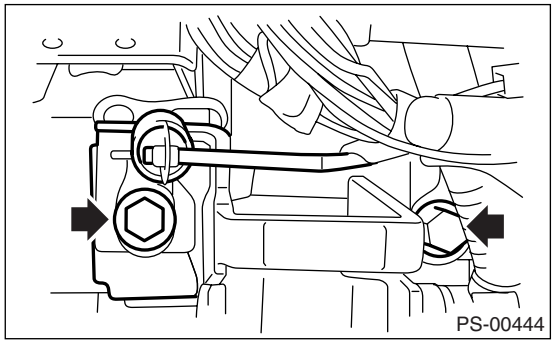
4. Tilt Steering Column

A: REMOVAL



(1) Tilt steering column (2) Universal joint

1) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
2) Remove the universal joint. <Ref. to PS-21, REMOVAL, Universal Joint.>
3) Remove the instrument panel lower cover under.
4) Remove the instrument panel lower cover upper.
5) Remove all connectors from the steering column.
6) Remove the two bolts under instrument panel securing steering column.

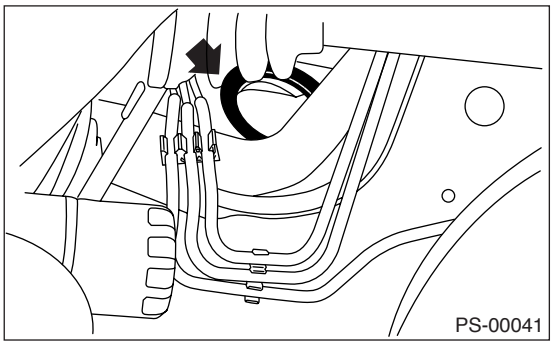


7) Pull out the steering shaft assembly from the hole on toe board.

CAUTION:
• Be sure to remove the universal joint before removing steering shaft assembly installing bolts when removing steering shaft assembly or when lowering it for servicing of other parts.
• Do not loosen the tilt lever when the steering column is not secured to the vehicle.

B: INSTALLATION

1) Install the grommet to toe board.



2) Insert the end of steering shaft into toe board grommet.
3) With the tilt lever secured, tighten the steering shaft mounting bolts under instrument panel.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

4) Connect all the connectors under instrument panel.
5) Connect the airbag system connector at the harness spool.

NOTE:
Make sure to apply double lock.

6) Install the instrument panel lower cover with tilt lever held in the lowered position.
7) Install the universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
8) Align the center of roll connector. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>
9) Install the steering wheel. <Ref. to PS-20, INSTALLATION, Steering Wheel.>

CAUTION:
Insert roll connector guide pin into guide hole on lower end of steering wheel surface to prevent damage.

C: DISASSEMBLY

Remove the two screws securing upper steering column covers, and the two screws securing combination switch, and then remove the related parts.

D: ASSEMBLY

Insert the combination switch to the upper column shaft, and install the upper column cover. Then route the ignition key harness and combination switch harness between column cover mounting bosses.

Tightening torque:
1.2 N·m (0.12 kgf-m, 0.9 ft-lb)

CAUTION:
Do not overtorque the screw.

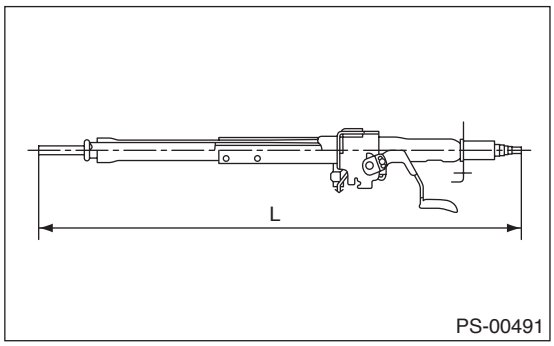
E: INSPECTION

1. BASIC INSPECTION

Measure the overall length of steering column. If not as specified, replace it.

Overall length L:

Standard value
Except for OUTBACK model
833.6±1.5mm (32.82±0.059 in)
OUTBACK model
825.4±1.5mm (32.50±0.059 in)



2. AIRBAG MODEL INSPECTION

WARNING:
For airbag inspection procedures, refer to "Airbag System". <Ref. to AB-4, CAUTION, General Description.>

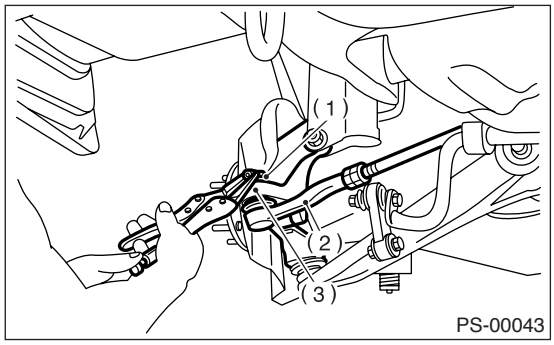
5. Steering Gearbox [LHD Model]

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Loosen the front wheel nuts.
4) Lift-up the vehicle and remove the front wheels.
5) Remove the under cover. <Ref. to EI-26, REMOVAL, Front Under Cover.>
6) Remove the front exhaust pipe assembly. (Non-turbo model) <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>

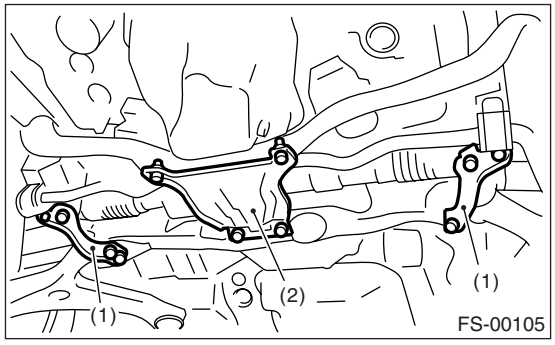
WARNING:
Be careful, not to burn your hand because the exhaust pipe is hot.

7) Using a puller, remove the tie-rod end from the knuckle arm after pulling off cotter pin and removing castle nut.



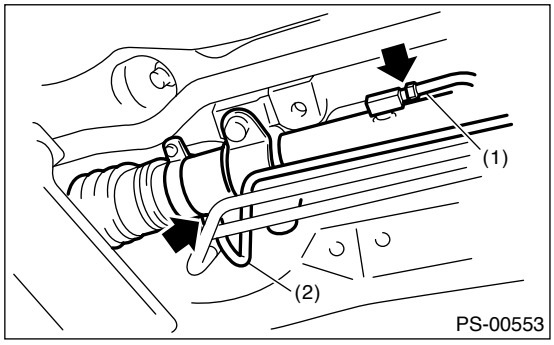
(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

8) Remove the front crossmember support plate, jack-up plate and front stabilizer. <Ref. to FS-16, REMOVAL, Front Stabilizer.>



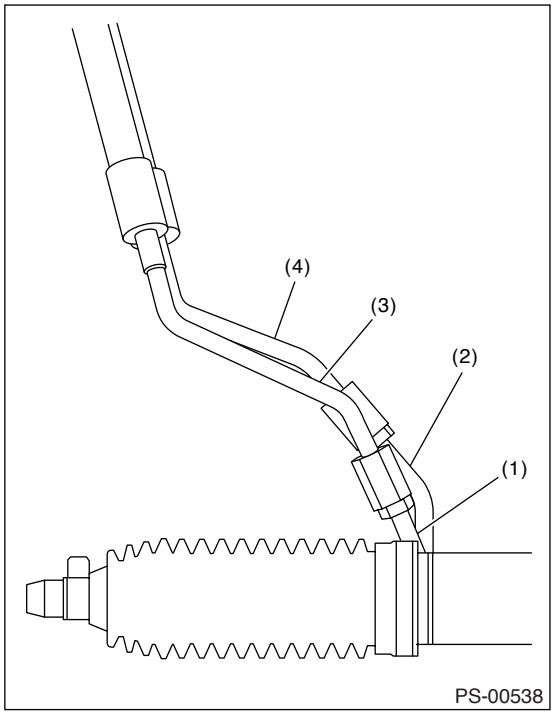
(1) Crossmember support plate
(2) Jack-up plate

9) Remove the one pipe joint at the center of gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



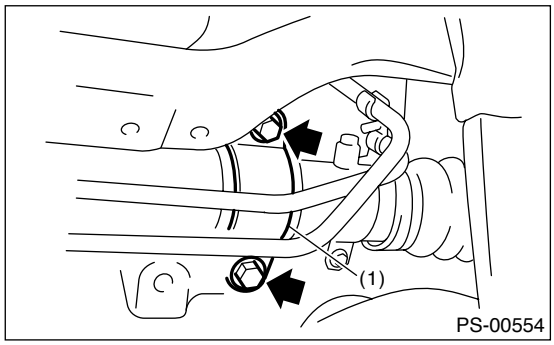
(1) Pipe A
(2) Pipe B

10) Remove the universal joint. <Ref. to PS-21, REMOVAL, Universal Joint.>
11) Disconnect the pipe C from pressure hose first, and pipe D from return hose second.



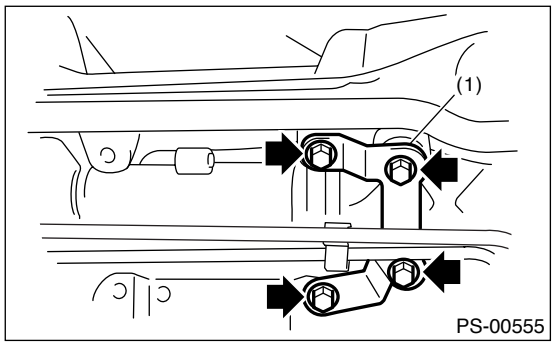
(1) Pipe C
(2) Pipe D
(3) Pressure hose
(4) Return hose

12) Remove the clamp bolts securing gearbox to crossmember, and remove the clamp.



(1) Clamp

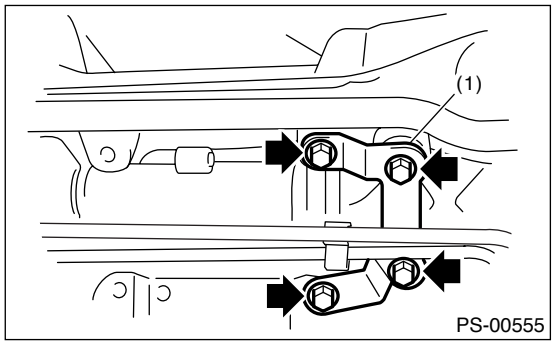
13) Remove the bolts which secure gearbox bracket, and remove the bracket and gearbox.



(1) Bracket

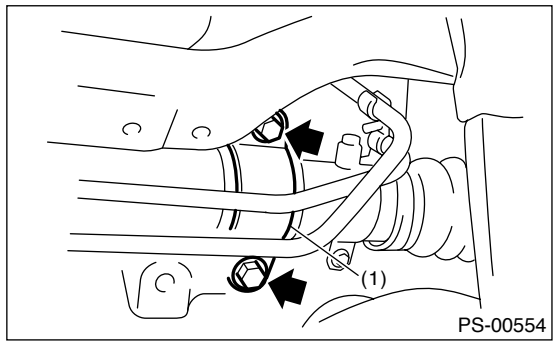
B: INSTALLATION

1) Insert the gearbox into crossmember, being careful not to damage gearbox boot.
2) Install the gearbox and bracket. Tighten the bolt temporarily.



(1) Bracket

3) Tighten the gearbox to the crossmember bracket via clamp with bolt temporarily.



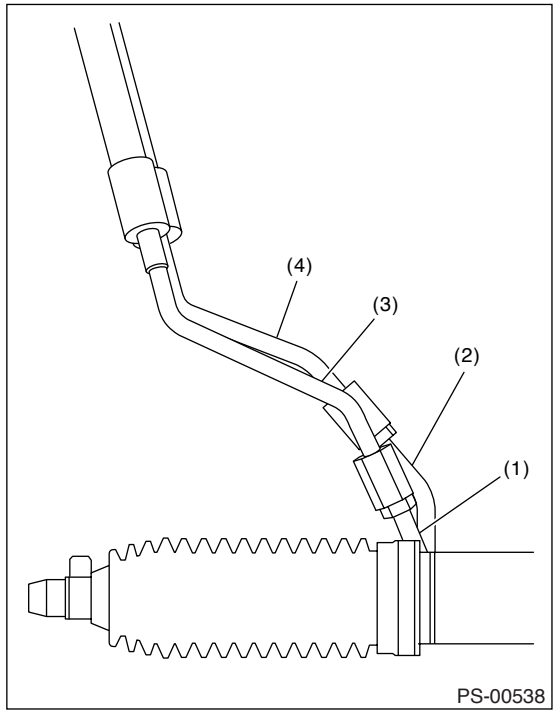
(1) Clamp

4) Tighten the bolts which temporary tightening the clamp and bracket of gearbox to specified torque.

Tightening torque:
60 N·m (6.1 kgf-m, 44.1 ft-lb)

5) Connect the pipe D to return hose first, and the pipe C to pressure hose second.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



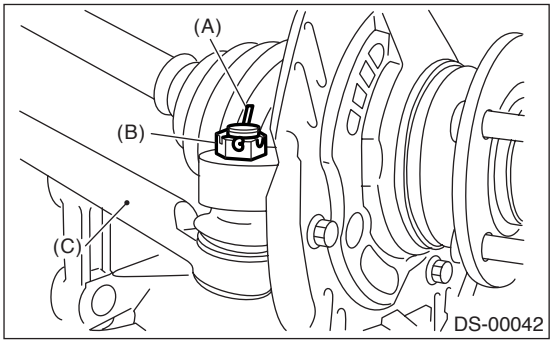
(1) Pipe C
(2) Pipe D
(3) Pressure hose
(4) Return hose

6) Install the universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
7) Connect the tie-rod end and knuckle arm, and tighten with castle nut.

Castle nut tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit cap at the bottom of tie-rod end with hammer.

8) After tightening the castle nut to specified tightening torque, tighten it further within 60° until cotter pin hole is aligned with slot in the nut. Fit the cotter pin into nut, and then bend the pin to lock.



(A) Cotter pin
(B) Castle nut
(C) Tie-rod end

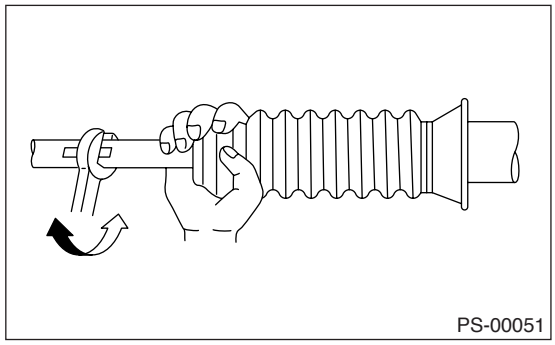
9) Install the front stabilizer. <Ref. to FS-16, INSTALLATION, Front Stabilizer.>
10) Install the front crossmember support plate and jack-up plate.
11) Install the front exhaust pipe assembly. (Non-turbo model) <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
12) Install the under cover. <Ref. to EI-26, INSTALLATION, Front Under Cover.>
13) Install the front wheels.
14) Tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.1 kgf-m, 65.8 ft-lb)

15) Lower the vehicle.
16) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
17) Align the center of roll connector. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>
18) Install the steering wheel. <Ref. to PS-20, INSTALLATION, Steering Wheel.>
19) Connect the battery ground cable to battery.
20) Pour fluid into the oil tank, and bleed air. <Ref. to PS-84, Power Steering Fluid.>
21) Check for fluid leaks.
22) Check the fluid level in oil tank.
23) After adjusting toe-in and steering angle, tighten the lock nut on tie-rod end.

Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

NOTE:
When adjusting toe-in, hold the boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



C: DISASSEMBLY

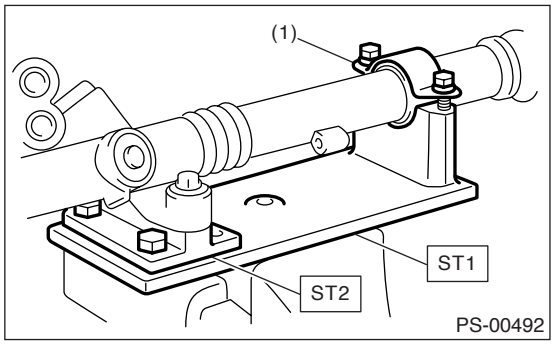
1. RACK HOUSING ASSEMBLY

1) Disconnect the four pipes from gearbox.

NOTE:
Remove the pipes C and D, which are fixed to clamp plate, as a single unit.

2) Secure the gearbox removed from vehicle in vice using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

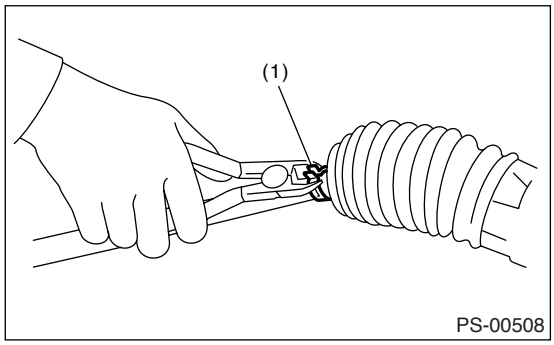
CAUTION:
Secure the gearbox in a vise using ST as shown. Do not attempt to secure it without this ST.



(1) Clamp

3) Remove the tie-rod end and lock nut from gearbox.

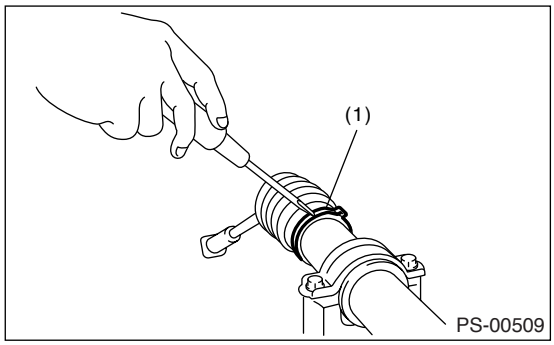
4) Remove the small clip from the boot using pliers, and then move the boot to tie-rod end side.



(1) Clip

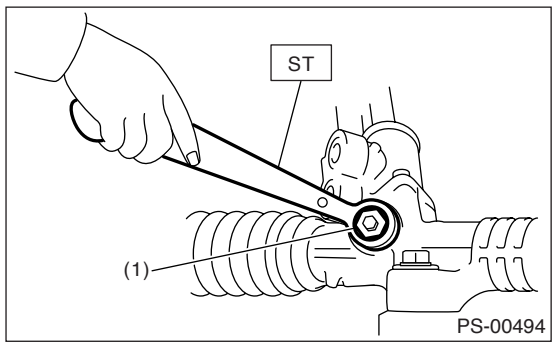
5) Using a flat-tip screwdriver, remove the band from boot.

NOTE:
Replace the boot it there is damage, cracks or deterioration.



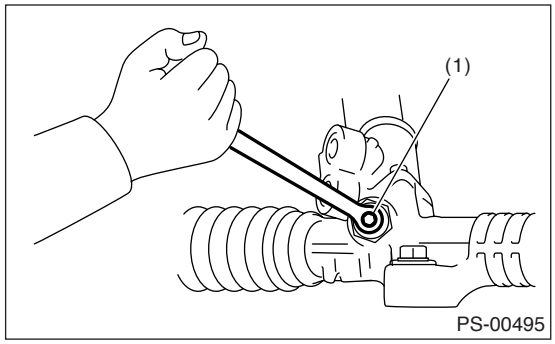
(1) Band

6) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



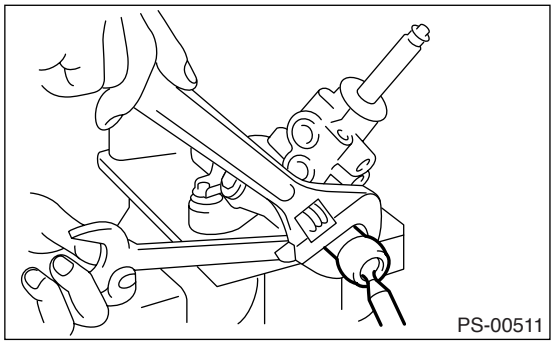
(1) Lock nut

7) Tighten the adjusting screw until it no longer tightens.

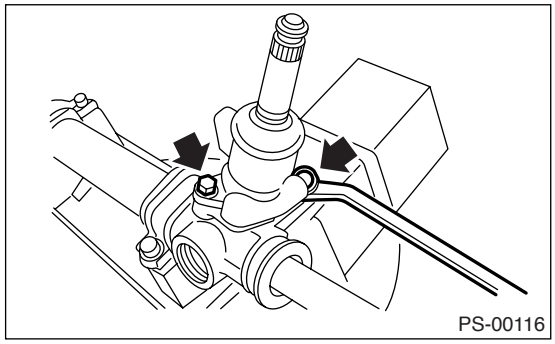


(1) Adjusting screw

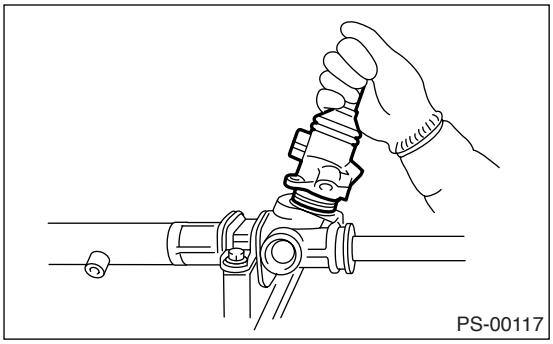
8) Hold the rack with a wrench [22 mm width across flats], and then remove the tie-rod using a wrench [32 mm width across flats] or adjustable wrench.



9) Loosen the adjusting screw, and then remove the spring and sleeve.
10) Remove the two bolts securing valve assembly.

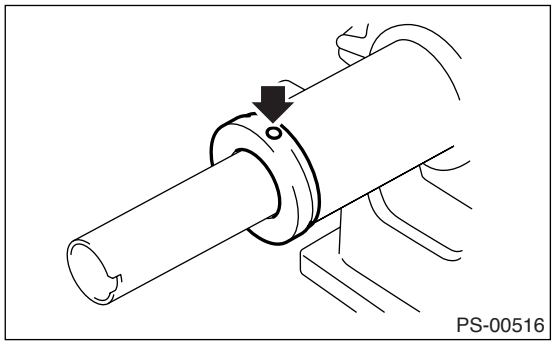


11) Carefully draw out the input shaft, and then remove the valve assembly.

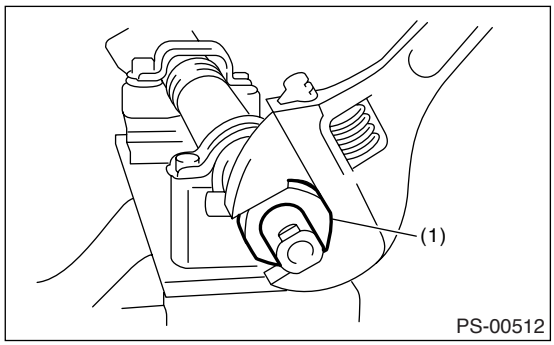


12) Using a drill, release the caulking of holder.

CAUTION:
Make a hole approx. 2 mm (0.08 in) depth using a drill bit of 3 mm (0.12 in) diameter.



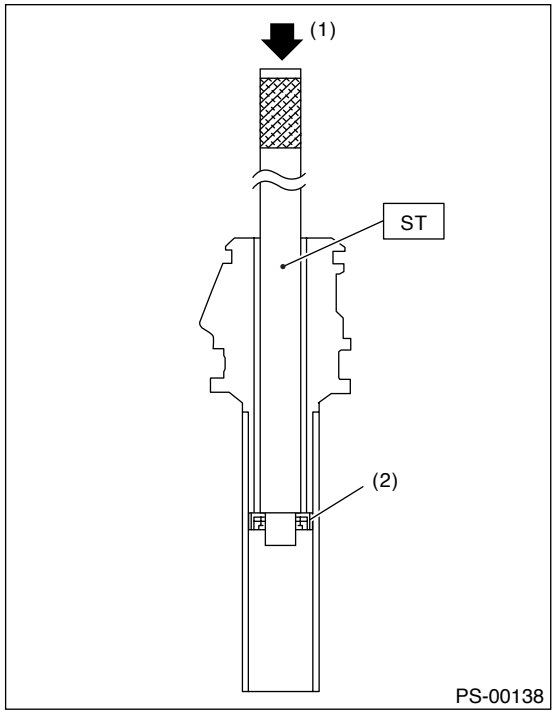
13) Using a spanner [36 mm width across flats] or adjustable wrench, remove the holder.



(1) Holder

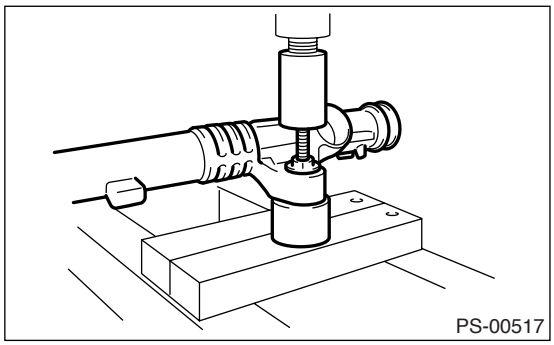
14) Remove the rack bushing and rack stopper from rack assembly.
15) Remove the oil seal from rack.

16) Insert the ST from pinion housing side, and then remove the oil seal using a press.
ST 34099PA010 OIL SEAL REMOVER (3.0 R model)
ST 34199AE050 OIL SEAL REMOVER (Except for 3.0 R model)



(1) Press
(2) Oil seal

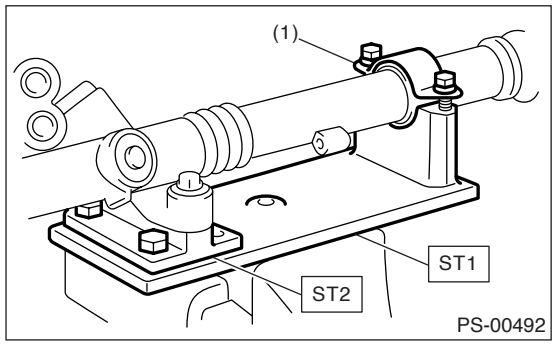
17) Using a press, remove the bushing at gearbox installation portion.



2. CONTROL VALVE

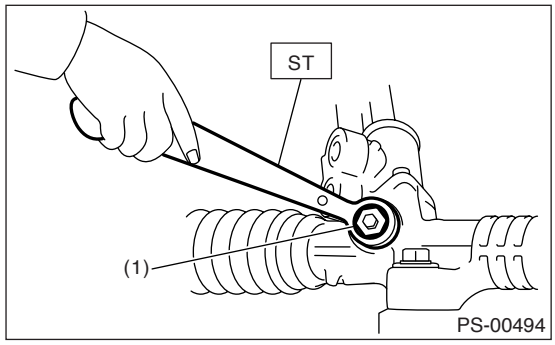
1) Disconnect the pipes A and B from gearbox.
2) Secure the gearbox removed from the vehicle in vise using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

CAUTION:
Secure the gearbox in a vise using ST as shown. Do not attempt to secure it without this ST.



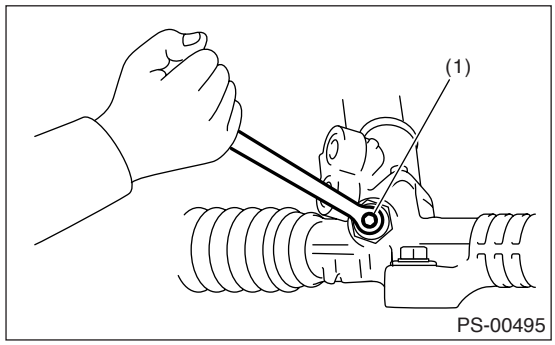
(1) Clamp

3) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



(1) Lock nut

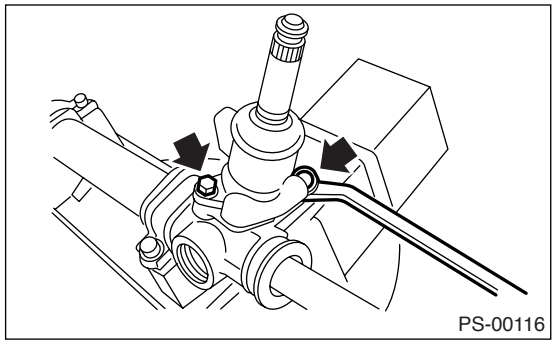
4) Tighten the adjusting screw until it no longer tightens.



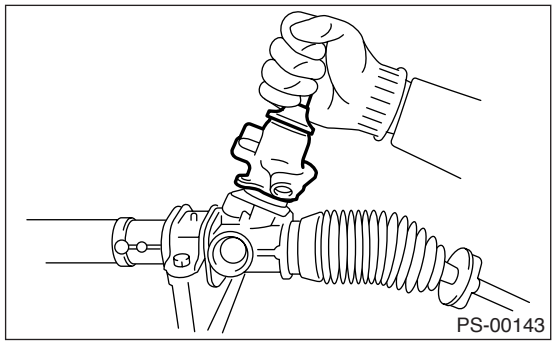
(1) Adjusting screw

5) Loosen the adjusting screw, and then remove the spring and sleeve.

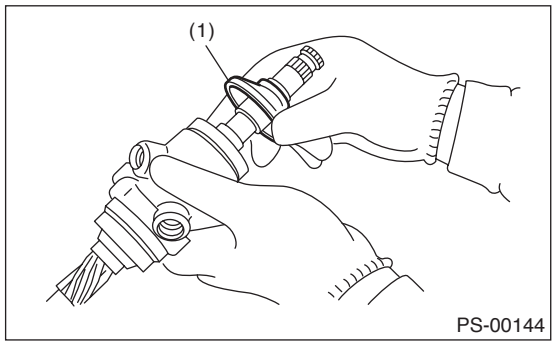
6) Remove the two bolts securing valve assembly.



7) Carefully draw out the input shaft, and then remove the valve assembly.

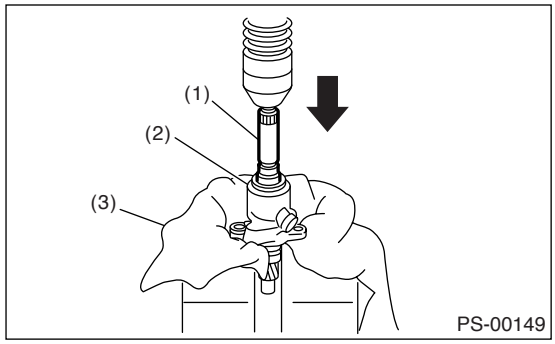


8) Wrap the tape to spline part, and slide the dust cover out.



(1) Dust cover

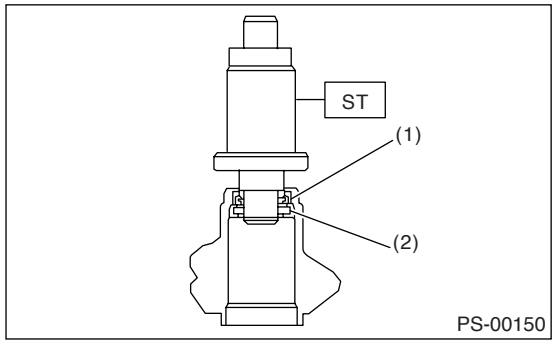
9) Using a press remove the pinion & valve assembly from valve housing.



(1) Pinion & valve ASSY
(2) Valve housing
(3) Cloth

10) Using the ST and press, remove the bushing and oil seal from valve housing.
ST 34199AG090 INSTALLER & REMOVER

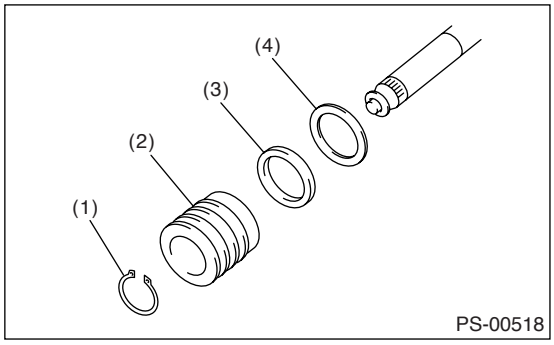
CAUTION:
• Do not apply force to the end surface of valve housing.
• Do not reuse the oil seal after removal.



(1) Oil seal
(2) Bushing

11) Using a snap ring pliers, remove the snap ring, valve, oil seal and backup washer.

CAUTION:
Be careful not to scratch the pinion & valve assembly.

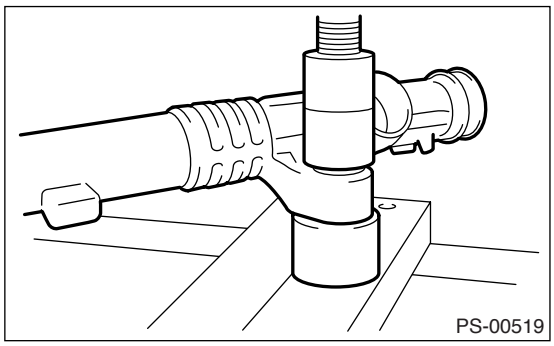


(1) Snap ring
(2) Valve
(3) Oil seal
(4) Backup ring

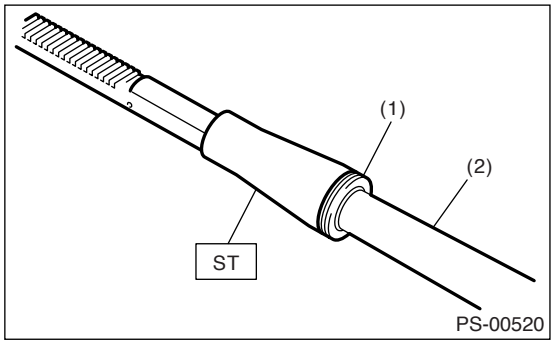
D: ASSEMBLY

1. RACK HOUSING ASSEMBLY

1) Using a press, install the bushing to the gearbox installation portion.



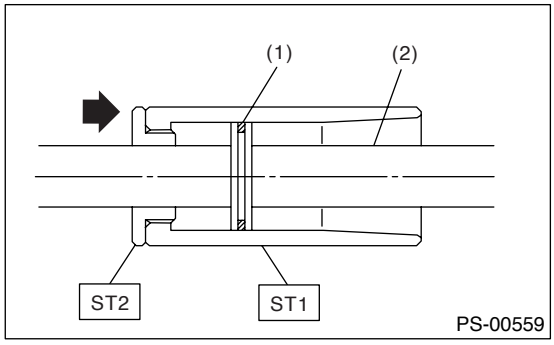
2) Insert the ST into rack.
ST 34199AG040 GUIDE (3.0 R model)
ST 34199AG030 GUIDE (Except for 3.0 R model)



(1) Seal ring
(2) Rack

3) Install the seal ring to piston portion of rack.
(1) Using the ST, form the seal ring properly

ST1 34199AG080 FORMER PISTON
ST2 34199AG060 GUIDE G (26) (3.0 R model)
ST2 34199AG050 GUIDE G (24) (Except for 3.0 R model)

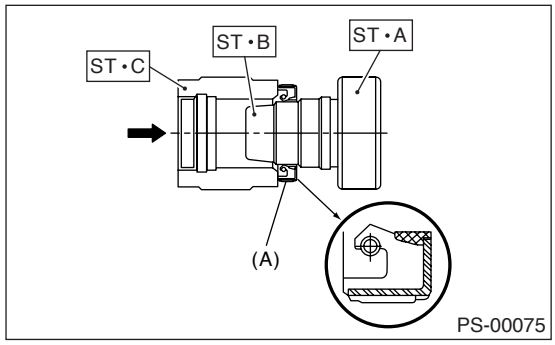


(1) Seal ring
(2) Rack

(2) Using ST-B and ST-C, install the oil seal to ST-A.

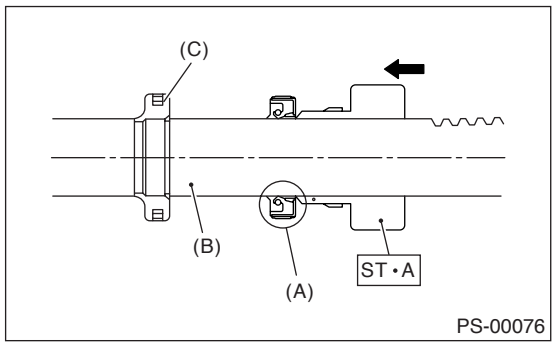
ST 34199FE040 INSTALLER A, B, C (3.0 R model)
ST 927490000 INSTALLER A, B, C (Except for 3.0 R model)

NOTE:
Face the oil seal in the direction as shown in the figure.



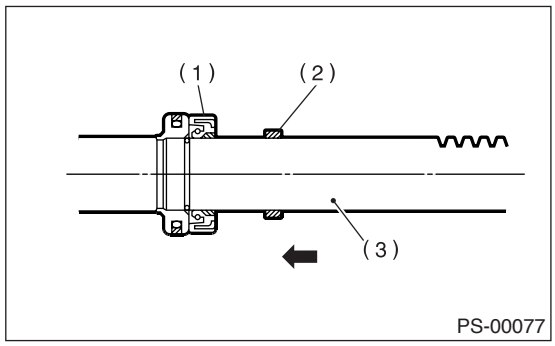
(A) Oil seal

(3) Insert the ST-A with oil seal assembled from the gear side of rack. Remove the oil seal from ST-A near piston, and then remove the ST-A from rack.



(A) Oil seal
(B) Rack
(C) Piston

4) Install the backup washer from gear side of rack.



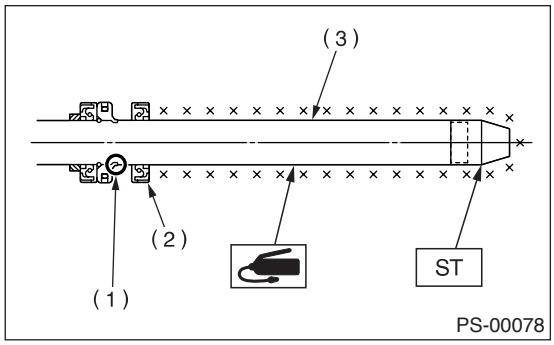
(1) Oil seal
(2) Backup washer
(3) Rack

5) Install the ST on rack, and equally apply a thin coat of grease to the rack and ST, then install the oil seal.

ST 926250000 GUIDE

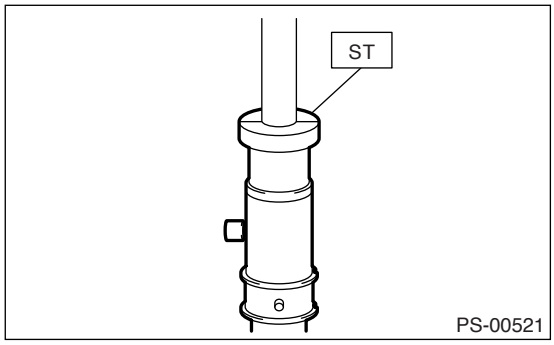
CAUTION:
Be careful not to scratch the oil seal lips with the inner ring section of piston.

NOTE:
Do not use this ST for turbo model.



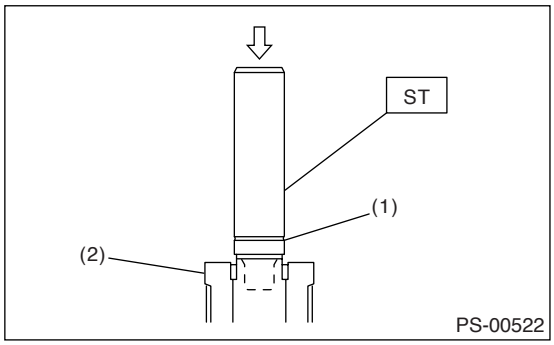
(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

6) Apply a coat of grease to the grooves in rack, sliding surface of sleeve and sealing surface of piston. Then insert the rack into steering body from cylinder side.
7) Check the thread part of holder and end of gearbox cylinder for burrs and scratches. Correct if necessary.
8) Insert the ST into gearbox cylinder, and then press-fit the oil seal.
ST 34199AG010 INSTALLER



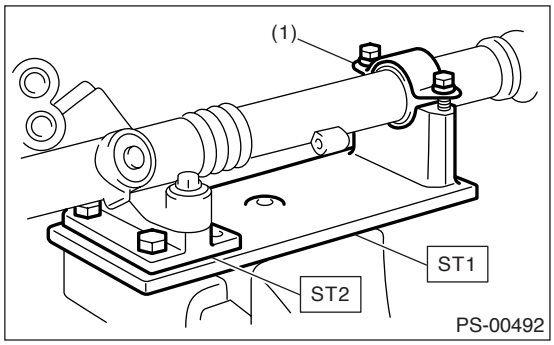
9) Temporarily install the holder to gearbox cylinder.
10) Set the ST to the end of rack.
ST 34199FE000 INSTALLER & REMOVER (3.0 R model)
ST 34099FA030 INSTALLER & REMOVER (Except for 3.0 R model)

11) Using a press, press-fit until the groove of ST reaches the end of holder.



(1) Groove
(2) Holder

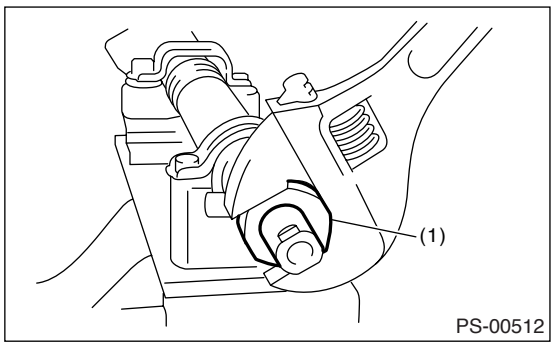
12) Secure the gearbox in a vice using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D



(1) Clamp

13) Tighten the holder.

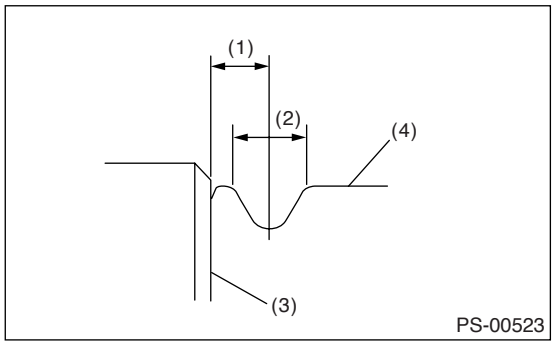
Tightening torque:
3.0 R model
90 N·m (9.18 kgf-m, 66.4 ft-lb)
Except for 3.0 R model
64 N·m (6.5 kgf-m, 47.0 ft-lb)



(1) Holder

14) Using ST, caulk the gearbox cylinder at 2 mm (0.08 in) from end to make punch hole 2 to 2.5 mm (0.08 to 0.10 in) in diameter.

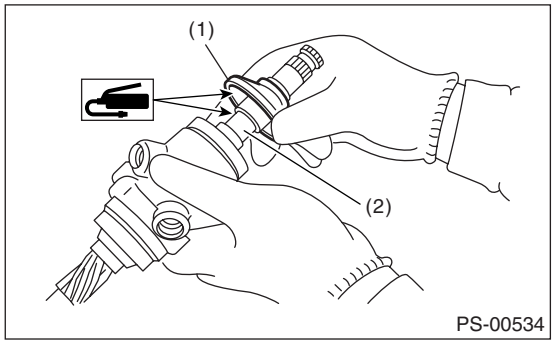
ST 34099FA060 PUNCH HOLDER



(1) 2 mm (0.08 in)
(2) Diameter: 2 — 2.5 mm (0.08 — 0.10 in)
(3) End of cylinder
(4) Holder

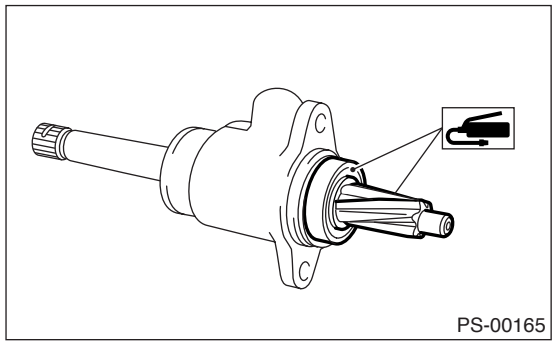
15) Apply vinyl tape to spline portion, and apply genuine grease to dust cover, and then install the dust cover to valve assembly.

CAUTION:
Be sure to install the dust cover to groove on shaft properly.

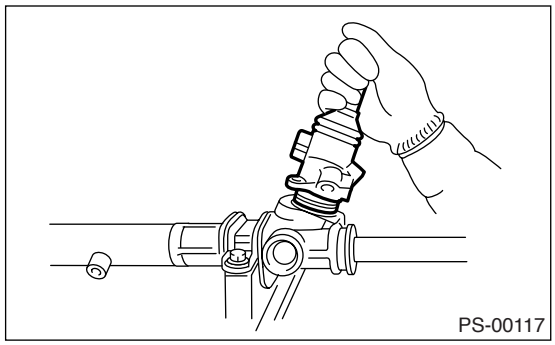


(1) Dust cover
(2) Groove

16) Apply genuine grease to the pinion gear and bearing of valve assembly.



17) Install a new gasket on valve assembly. Insert the valve assembly into place while facing the rack teeth toward pinion.



18) Tighten the bolts alternately to secure valve assembly.

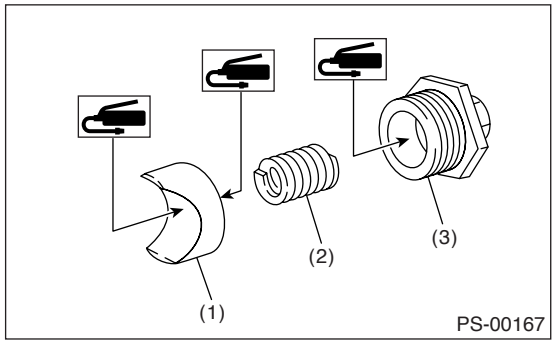
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten the bolts.

19) Temporarily install the rack, and then operate it from lock to lock two or three times to make it fit in. Remove the grease blocking air vent hole.

CAUTION:
If operating the rack from lock to lock without installing tie-rod, it may damage the oil seal. Always install the tie-rods LH and RH.

20) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



(1) Sleeve
(2) Spring
(3) Adjusting screw

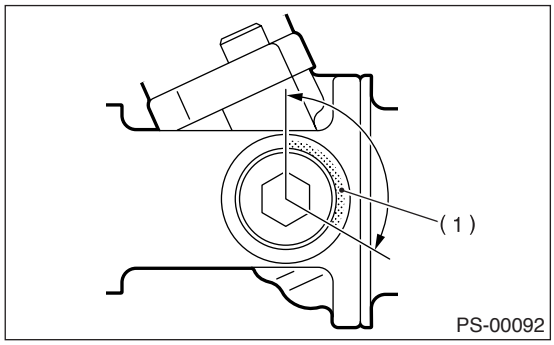
21) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

22) After tightening the adjusting screw with the specified tightening torque, loosen it by 25°.
23) Remove the tie-rod.

24) Verify that play is within specified value. **<Ref. to PS-43,** SERVICE LIMIT, INSPECTION**, Steering Gearbox [LHD Model].>**
25) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

26) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

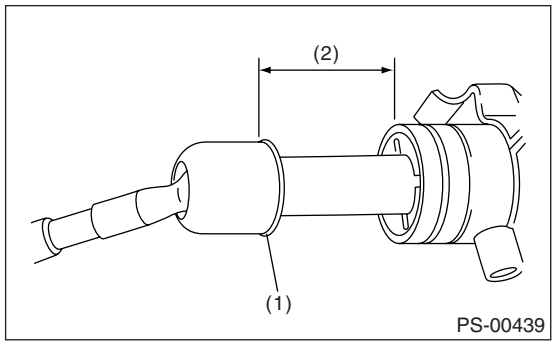
27) After tightening the adjusting screw with the specified tightening torque, loosen it by 25°.
28) Install the lock nut. While holding the adjusting screw with a wrench, tighten lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

29) Extend the rack approx. 40 mm (1.57 in) beyond side of steering body.
30) Install the tie-rod and a new lock washer into rack.

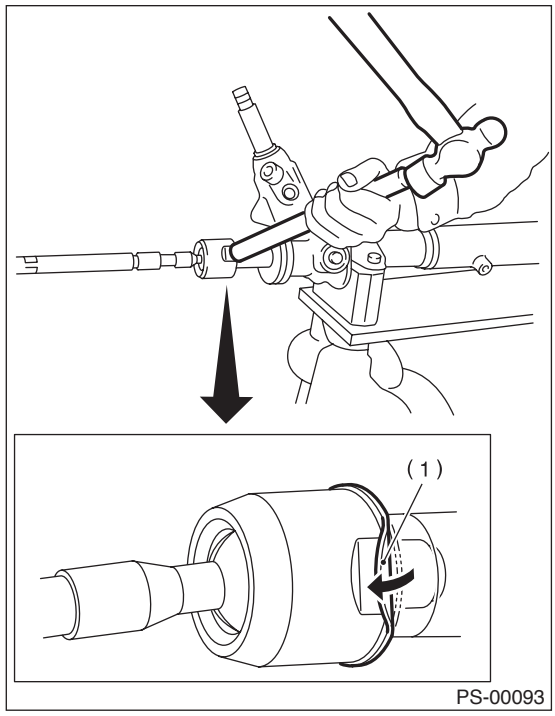
Tightening torque:
78 N·m (8.0 kgf-m, 57.9 ft-lb)



(1) Lock washer
(2) Approx. 40 mm (1.57 in)

31) Bend the lock washer.

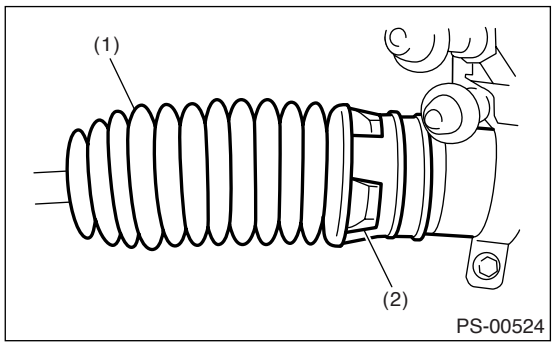
CAUTION:
Be careful not to scratch the rack when bending lock washer.



(1) Lock washer

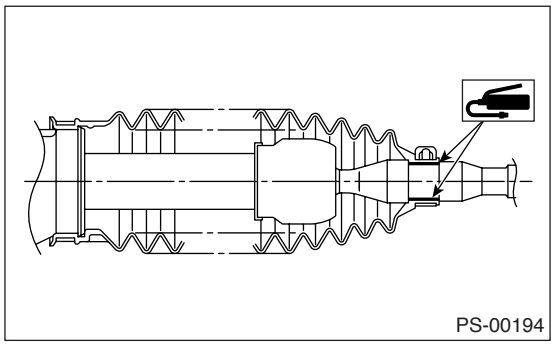
32) Apply a coat of grease to the tie-rod groove, and then install the boot to housing.

CAUTION:
Right side boot has groove for identification. Be sure to install the boots after identifying left and right boots.

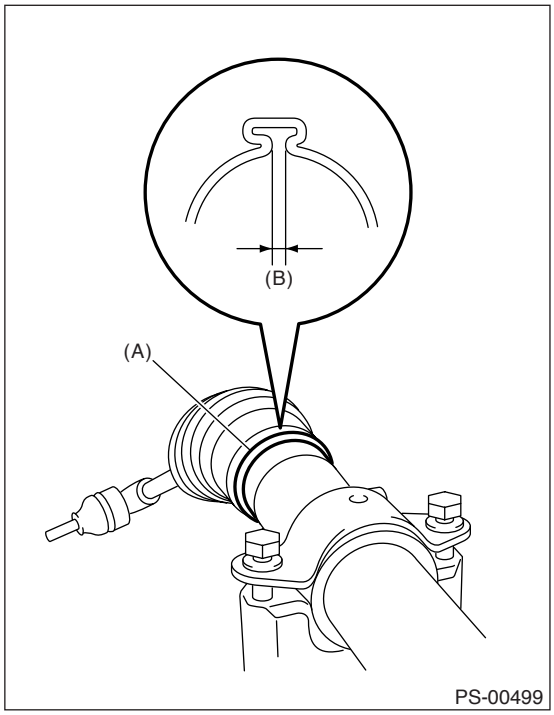


(1) Right side boot
(2) Groove for identification

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.

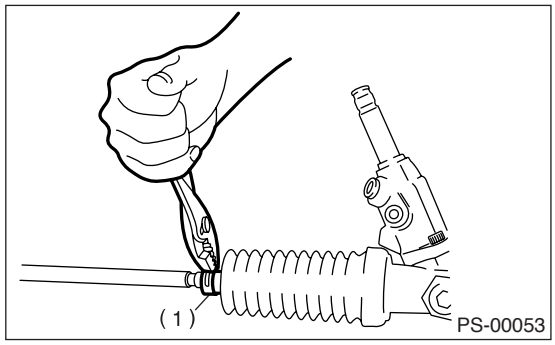


33) Install a new boot band. Using band clamp pliers, caulk the boot band until caulking part clearance is 2 mm (0.079 in) or less.



(A) Boot band
(B) 2 mm (0.079 in) or less

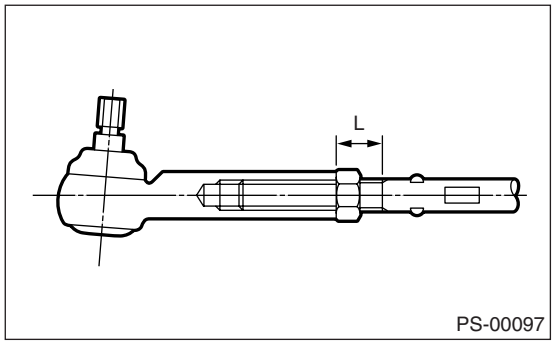
34) Fix the boot end with clip (small).



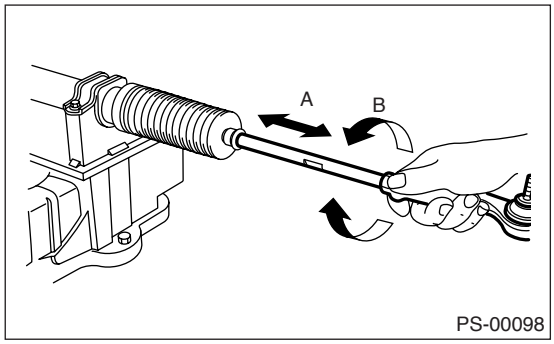
(1) Clip

35) After installing, check the boot end is positioned into groove on tie-rod.
36) If the tie-rod end has been removed, screw in the lock nut and tie-rod end to screwed portion of tie-rod, and then tighten the lock nut temporarily in a position as shown in the figure.

Installed tie-rod length L:
31 mm (1.22 in)



37) Inspect the gearbox as follows:
"A" Holding the tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding the tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that the boot is installed in specified position without deflation.

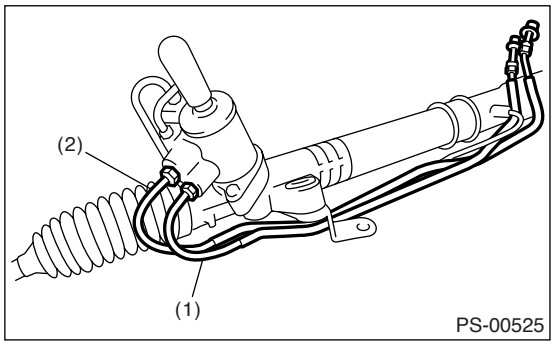


38) Remove the gearbox from ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D
39) Install the four pipes on gearbox.
(1) Connect the pipe A and B to four pipe joints of gearbox.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Connect the pipe C and D to gearbox.

Tightening torque:
Pipe C: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
Pipe D: 25 N·m (2.5 kgf-m, 18.1 ft-lb)

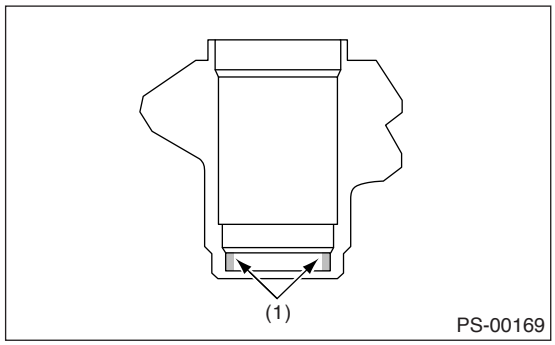


(1) Pipe C
(2) Pipe D

2. CONTROL VALVE ASSEMBLY

Specified steering grease:
VALIAM GREASE M2 (Part No. 003608001)

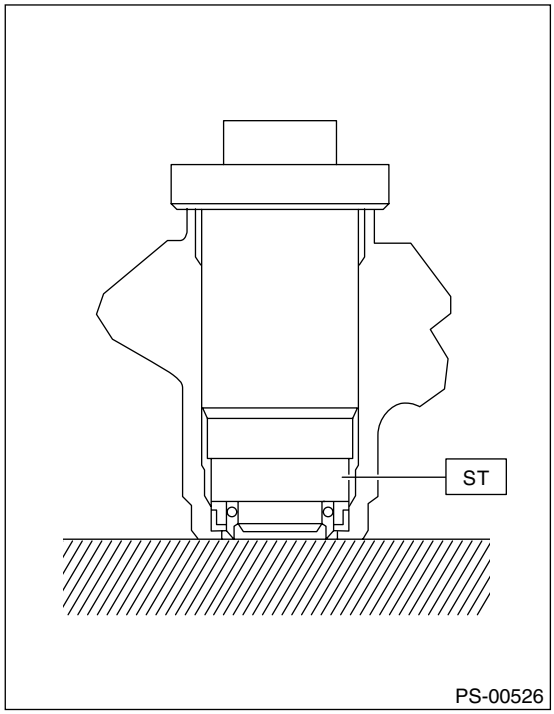
1) Clean all parts and tools before reassembling.
2) Apply a coat of specified power steering fluid to the inner wall of valve housing.



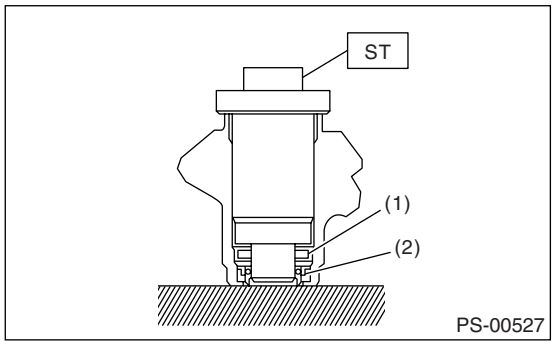
(1) Apply fluid.

3) To avoid scratching the oil seal, apply a coat of grease to the contact surface of installer and oil seal.
4) Verify the oil seal direction.
Attach the oil seal to installer and position in valve housing before pressing into place.

5) Press the oil seal into place using a press.
ST 34199AG090 INSTALLER & REMOVER



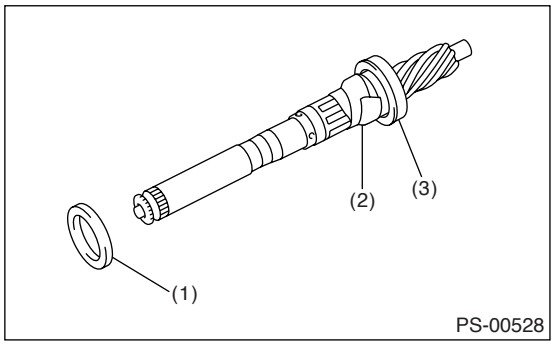
6) Attach the bearing to ST, and then position in value housing. Using the ST and press, install the special bearing in valve housing.
ST 34199AG090 INSTALLER & REMOVER



(1) Special bearing
(2) Oil seal

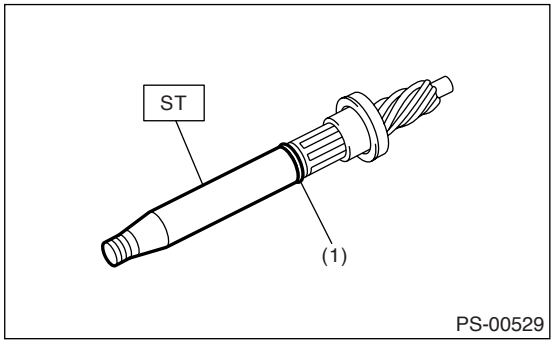
7) Apply vinyl tape to the groove portion of pinion.

8) Install the backup ring and oil seal to pinion, and then remove the vinyl tape.



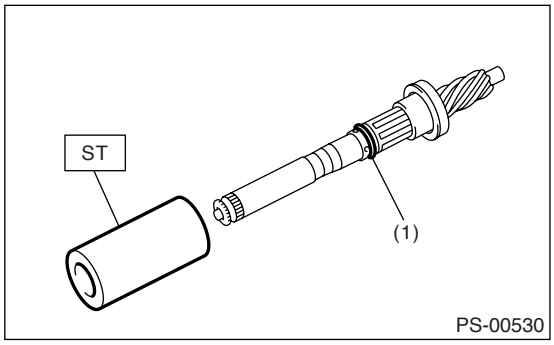
(1) Oil seal
(2) Vinyl tape
(3) Backup ring

9) Set the ST to pinion, and install the seal ring.
ST 34199AG020 GUIDE



(1) Seal ring

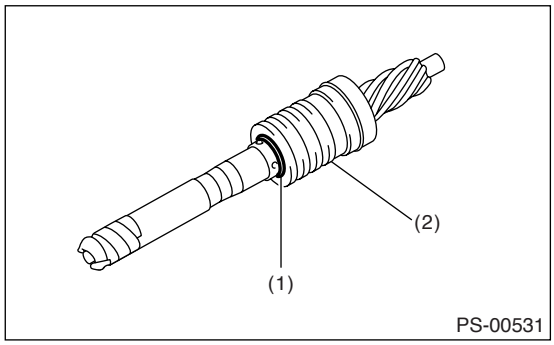
10) Remove the ST GUIDE, and form the seal ring properly using ST FORMER.
ST 34199AG070 FORMER



(1) Seal ring

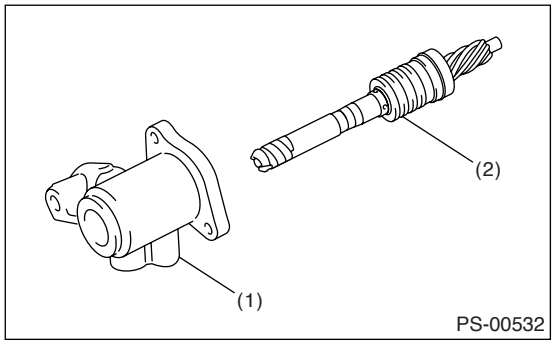
11) Put vinyl tape around the pinion shaft splines to protect oil seal from damage.

12) Install the valve to pinion, and install the snap ring.



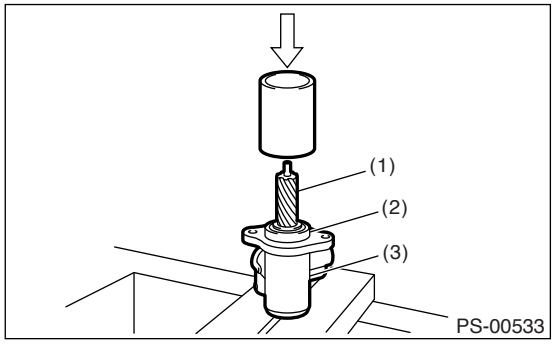
(1) Snap ring
(2) Valve

13) Fit the pinion & valve assembly into valve housing.



(1) Valve housing
(2) Pinion & valve ASSY

14) Using a press, press-fit the pinion & valve assembly into housing by pressing the bearing outer race.

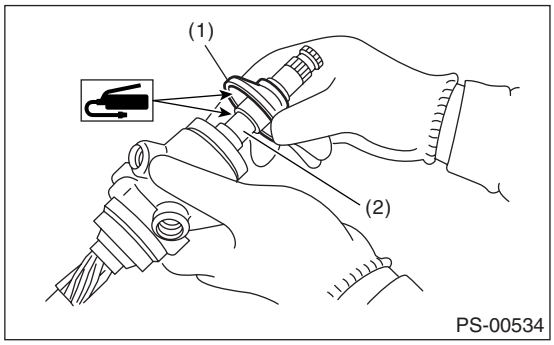


(1) Pinion & valve ASSY
(2) Bearing
(3) Housing

15) Apply the specified grease to dust cover.

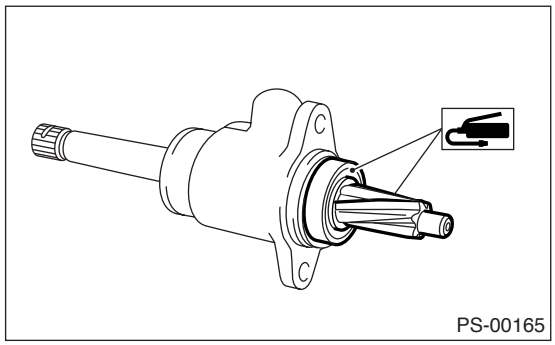
16) Install the dust cover on valve assembly.

CAUTION:
Be sure to install the dust cover to groove on shaft properly.

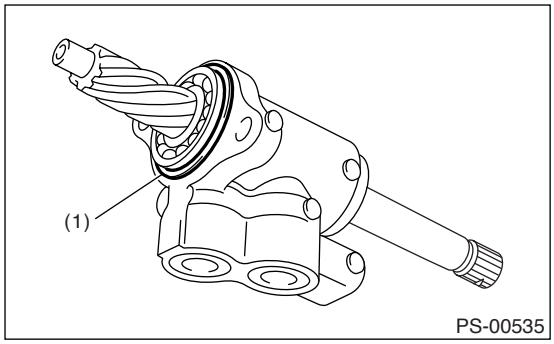


(1) Dust cover
(2) Groove

17) Apply genuine grease to the pinion gear and bearing of valve assembly.

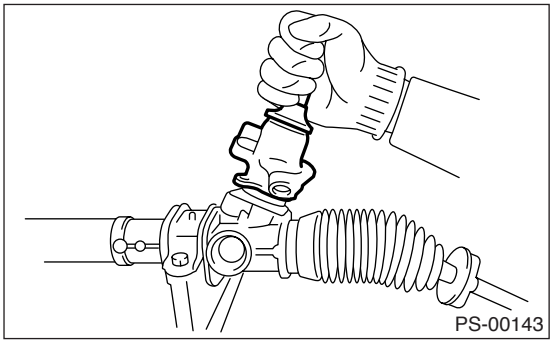


18) Install a new O-ring on valve assembly.



(1) O-ring

19) Insert the valve assembly into place while facing rack teeth toward pinion.

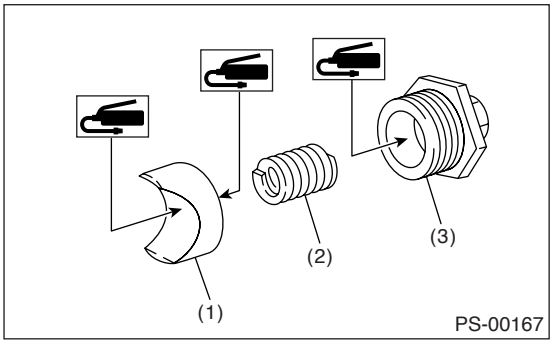


20) Tighten the bolts alternately to secure valve assembly.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

CAUTION:
Be sure to alternately tighten the bolts.

21) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert the sleeve into steering body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



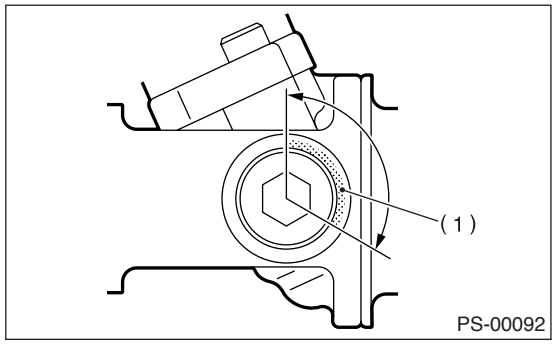
(1) Sleeve
(2) Spring
(3) Adjusting screw

22) Tighten the adjusting screw with specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

23) After tightening to the specified tightening torque, loosen it by 25°.
24) Verify that play is within specified value. **<Ref. to PS-43,** SERVICE LIMIT, INSPECTION**, Steering Gearbox [LHD Model].>**
25) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

26) Tighten the adjusting screw to specified torque.

Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

27) After tightening to the specified tightening torque, loosen it by 25°.
28) Install the lock nut. While holding the adjusting screw with a wrench, tighten the lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

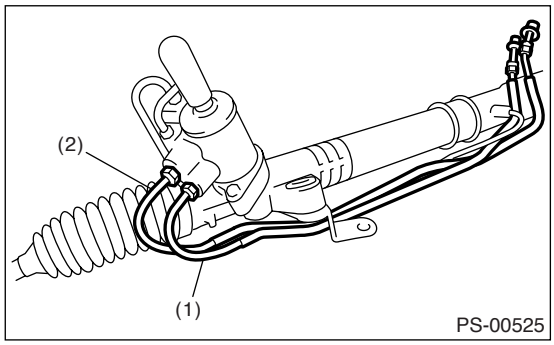
NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

29) Remove the gearbox from ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D
30) Install the four pipes on gearbox.
(1) Connect the pipe A and B to the gearbox.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

(2) Connect the pipe C and D to gearbox.

Tightening torque:
Pipe C: 15 N·m (1.5 kgf-m, 10.8 ft-lb)
Pipe D: 25 N·m (2.5 kgf-m, 18.1 ft-lb)



(1) Pipe C
(2) Pipe D

E: INSPECTION

1. BASIC INSPECTION

1) Clean all disassembled parts, and check for wear, damage or any other faults, then repair or replace as necessary.
2) When disassembling, check the inside of gearbox for water. If any water is found, carefully check the boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	Inspection	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, the lip is worn out or damage is found, replace it with a new one.
3	Rack & pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring the turning torque of gearbox and sliding resistance of rack, check if rack & pinion engage uniformly and smoothly with each other. (Refer to “Service limit”.) (2) Keeping the rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace the gearbox with a new one.
		(4) Wear or damage on rack bush	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox with a new one. (Refer to “Service limit”.)
		(5) Wear on input shaft bearing	If the free plays of input shaft in radial and axial directions are out of the specified ranges, replace the gearbox with a new one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

2. SERVICE LIMIT

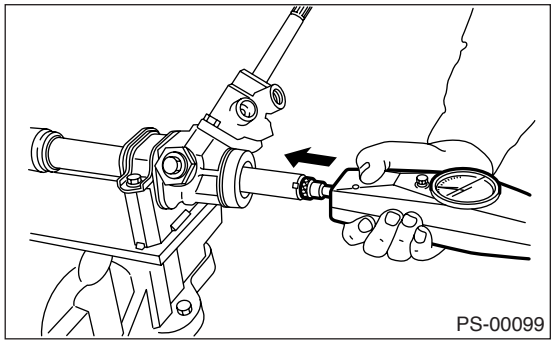
Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

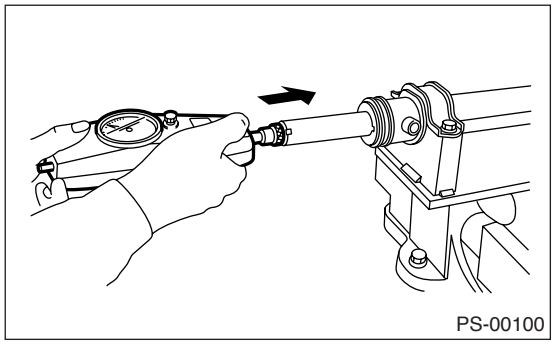
NOTE:
When making a measurement, vise the gearbox using ST. Never vise the gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST1 926200000 STAND
ST2 34199AG000 BOSS D

Sliding resistance of rack shaft:

Service limit
400 N (41 kgf, 90 lb) or less


PS-00099

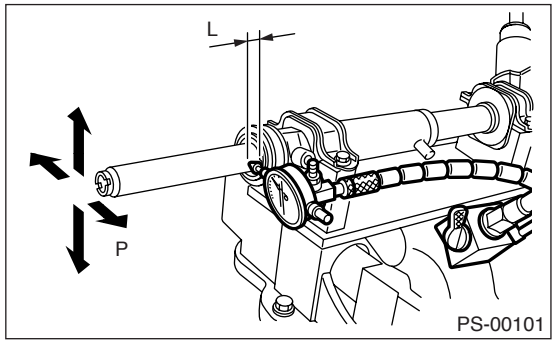

PS-00100

3. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

Service limit
0.19 mm (0.0075 in) or less

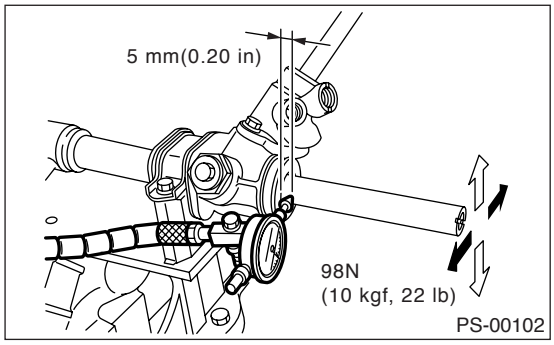
On condition
L: 5 mm (0.20 in)
P: 122.6 N (12.5 kgf, 27.6 lb)



PS-00101

Left-turn steering:

Service limit
Direction ⇦ ⇨
0.3 mm (0.012 in) or less
Direction ⬅ ➡
0.15 mm (0.0059 in) or less



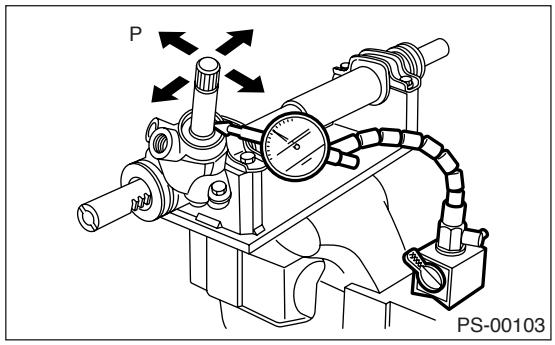
PS-00102

4. INPUT SHAFT PLAY

In radial direction:

Service limit
0.18 mm (0.0071 in) or less

On condition
P: 98 N (10 kgf, 22 lb)



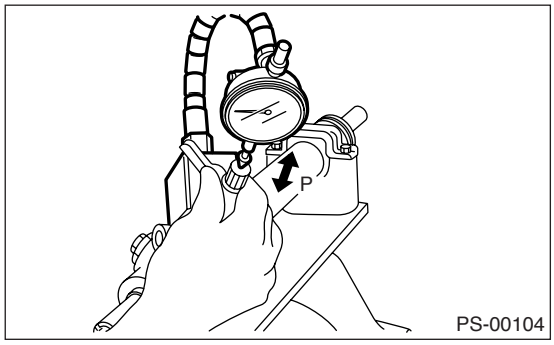
PS-00103

In axial direction:

Service limit
0.5 mm (0.020 in) or less

On condition

P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



5. TURNING RESISTANCE OF GEARBOX

Using the ST, measure the gearbox turning resistance.

ST 34099PA100 SPANNER

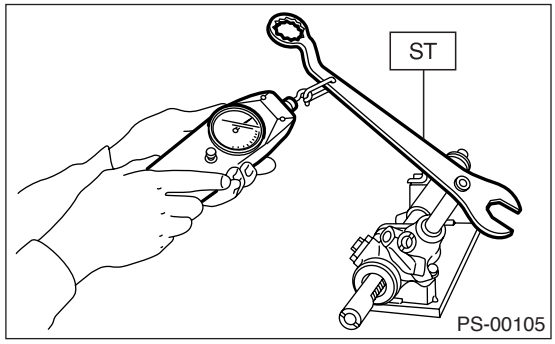
Service limit:

Maximum allowable resistance:

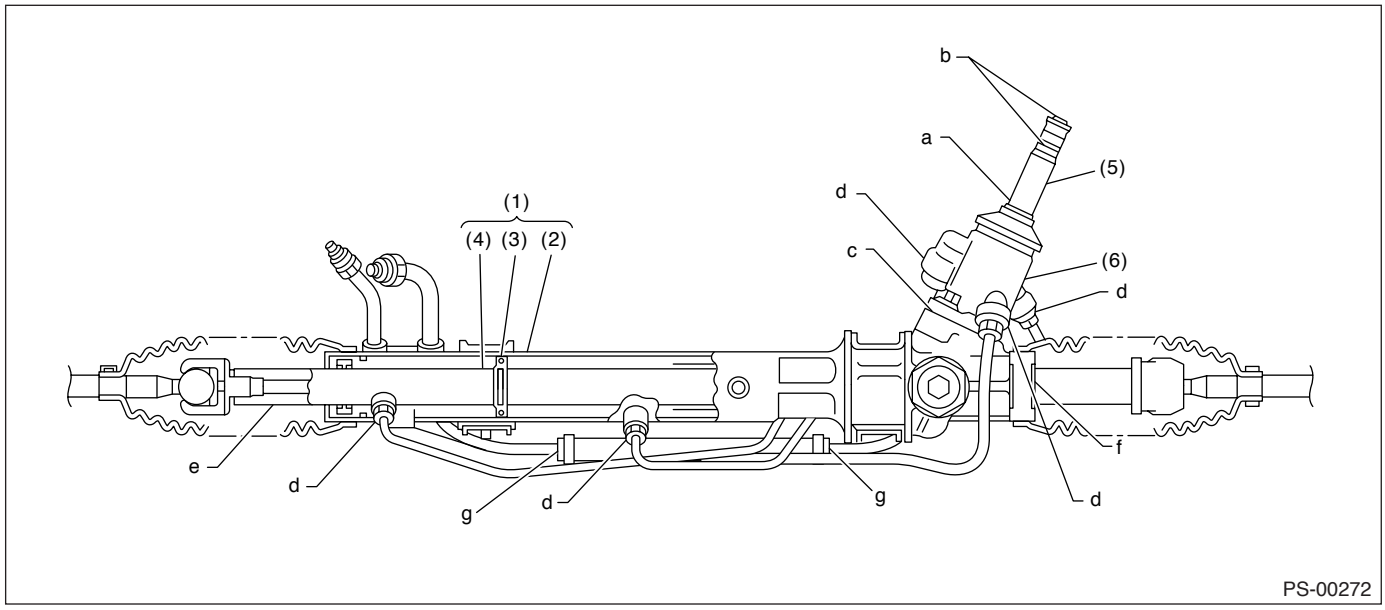
10.5 N (1.1 kgf, 2.4 lb) or less

Difference between right and left turning resistance:

20% or less



6. OIL LEAKING



(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(6) Valve housing

1) Lift up the vehicle.
2) Even if the location of leak can be easily found by observing the leaking condition, it is necessary to thoroughly remove the fluid from the suspected portion and turn the steering wheel from lock to lock about thirty to forty times with engine running, then make comparison of the suspected portion between immediately after and several hours after this operation.
3) Cause and measure for oil leakage from “a”
The oil seal is damaged. Replace the valve assembly with a new one.
4) Cause and measure for oil leakage from “b”
The torsion bar O-ring is damaged. Replace the valve assembly with a new one.
5) Cause and measure for oil leakage from “c”
The oil seal is damaged. Replace the valve assembly or oil seal with a new one.
6) Cause and measure for oil leakage from “d”
The pipe is damaged. Replace the faulty pipe or O-ring.
7) Cause and measure for oil leakage from “g”
The hose is damaged. Replace the hose with a new one.
8) If leak is other than a, b, c, d, or g, and if oil is leaking from the gearbox, move the right and left boots toward tie-rod end side, respectively, with the gearbox mounted to the vehicle, and remove fluid from the surrounding portions. Then, turn the steering wheel from lock to lock thirty to forty times with the engine running, and make comparison of the leaked portion immediately after and several hours after this operation.

(1) Leakage from “e”
The cylinder seal is damaged. Replace the rack bush with a new one.

(2) Leakage from “f”
There are two possible causes. Take the following step first. Remove the pipe assembly B from the valve housing, and close the circuit with ST.

ST 926420000 PLUG

Turn the steering wheel from lock to lock thirty to forty times with the engine running, then make comparison of the leaked portion between immediately after and several hours after this operation.

- If leakage from “f” is noted again:

The oil seal of pinion & valve assembly is damaged. Replace the pinion & valve assembly with a new one. Or replace the oil seal and parts that are damaged during disassembly with new ones.

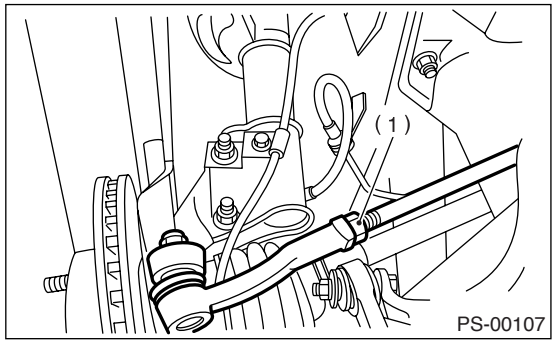
- If oil stops leaking from “f”:

The oil seal of rack housing is damaged. Replace the oil seal and the parts that are damaged during disassembly with new ones.

F: ADJUSTMENT

1) Adjust the front toe. <Ref. to FS-12, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



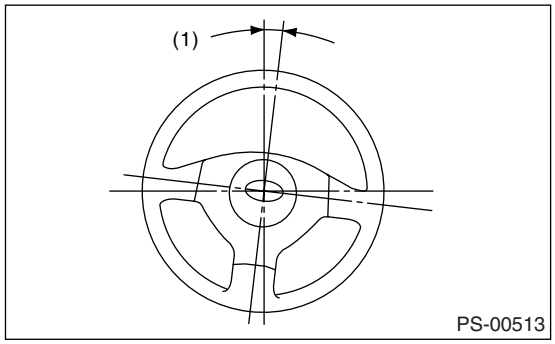
(1) Lock nut

2) Adjust the steering angle of wheels.

Standard of steering angle:

Model	2.0 i, 2.5 i	3.0 R	OUTBACK
Inner wheel	37.3°±1.5°	37.2°±1.5°	37.8°±1.5°
Outer wheel	33.0°±1.5°	32.9°±1.5°	33.5°±1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, and error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



(1) Within 5°

4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in opposite direction by same angle.

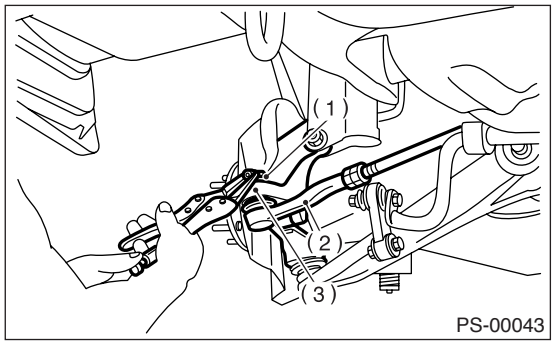
6. Steering Gearbox [RHD Model]

A: REMOVAL

1) Set the vehicle on a lift.
2) Disconnect the ground cable from battery.
3) Loosen the front wheel nuts.
4) Lift-up the vehicle and remove the front wheels.
5) Remove the under cover. <Ref. to EI-26, REMOVAL, Front Under Cover.>
6) Remove the front exhaust pipe assembly. (Non-turbo model) <Ref. to EX(H4SO 2.0)-7, REMOVAL, Front Exhaust Pipe.>

WARNING:
Be careful, not to burn your hand because the exhaust pipe is hot.

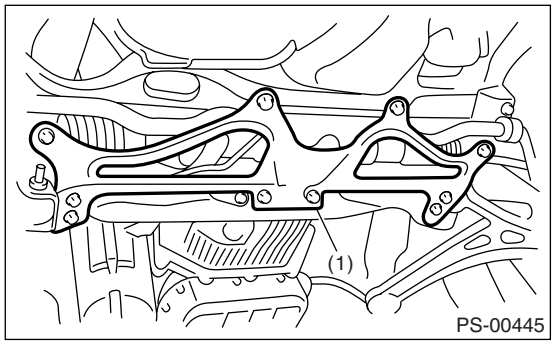
7) Using a puller, remove the tie-rod end from the knuckle arm after pulling off cotter pin and removing castle nut.



(1) Castle nut
(2) Tie-rod end
(3) Knuckle arm

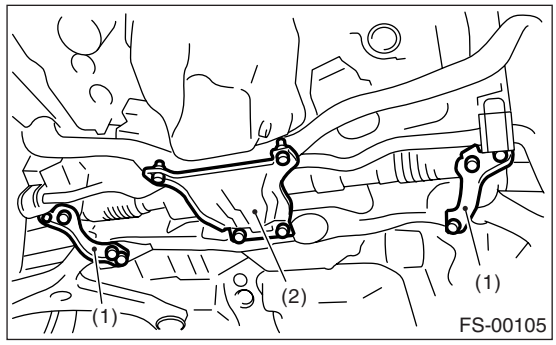
8) Remove the front crossmember support plate, jack-up plate and front stabilizer. <Ref. to FS-16, REMOVAL, Front Stabilizer.>

• Large type



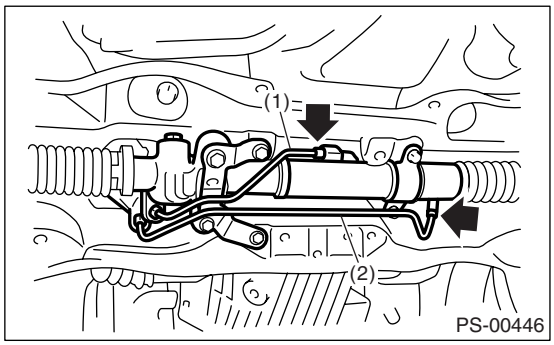
(1) Front crossmember support plate

• Small type



(1) Front crossmember support plate
(2) Jack-up plate

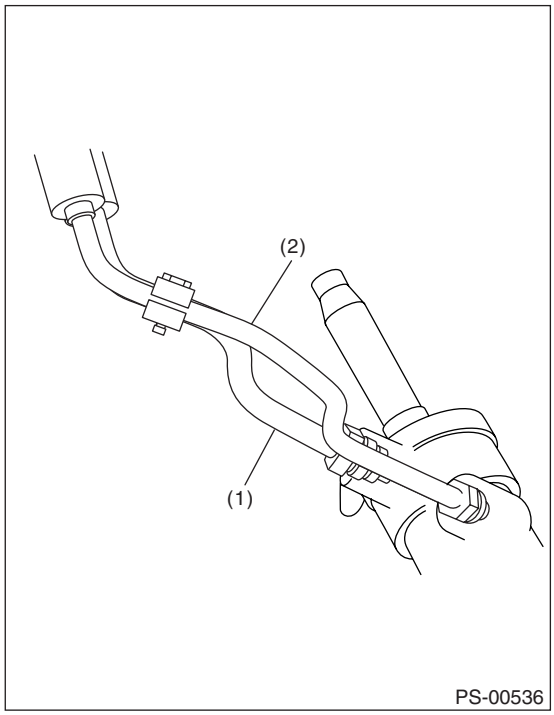
9) Remove the one pipe joint at the center of gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



(1) Pipe A
(2) Pipe B

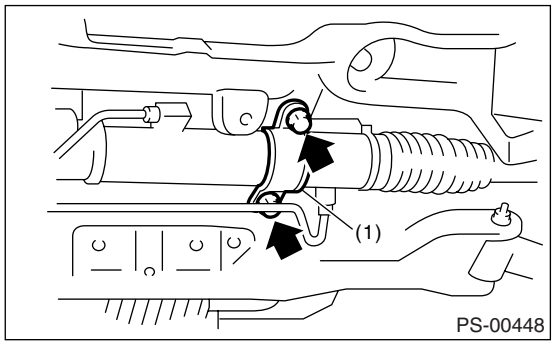
10) Remove the universal joint. <Ref. to PS-21, REMOVAL, Universal Joint.>

11) Disconnect the return hose and pressure hose from gearbox.



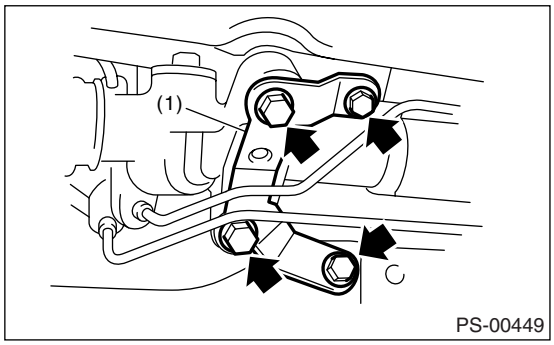
(1) Return hose
(2) Pressure hose

12) Remove the clamp bolts securing gearbox to crossmember, and remove the clamp.



(1) Clamp

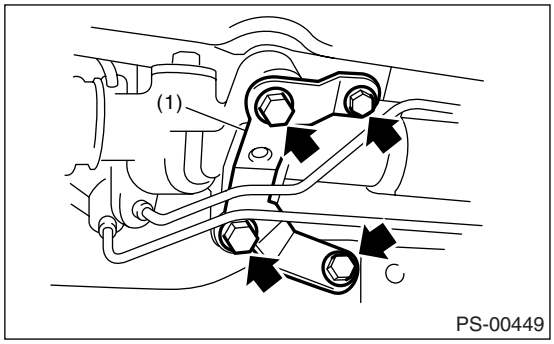
13) Remove the bolts which secure the gearbox bracket, and remove the bracket and gearbox.



(1) Bracket

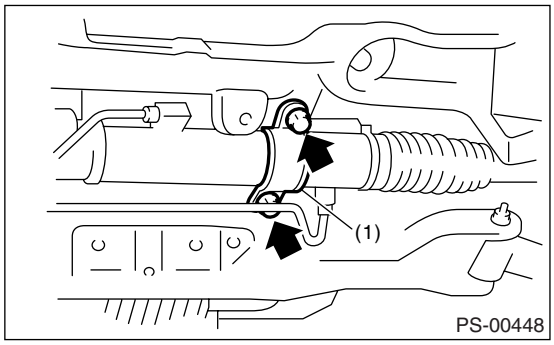
B: INSTALLATION

1) Insert the gearbox into the crossmember, being careful not to damage gearbox boot.
2) Install the gearbox and bracket. Tighten the bolt temporarily.



(1) Bracket

3) Tighten the gearbox to the crossmember bracket via clamp with bolt temporarily.



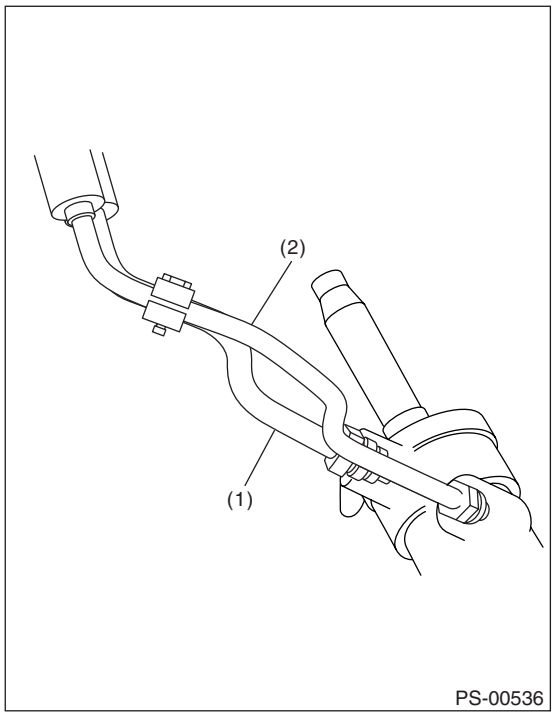
(1) Clamp

4) Tighten the bolts which temporary tightening the clamp and bracket of gearbox to specified torque.

Tightening torque:
60 N·m (6.1 kgf-m, 44.1 ft-lb)

5) Connect the return hose and pressure hose to gearbox.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)



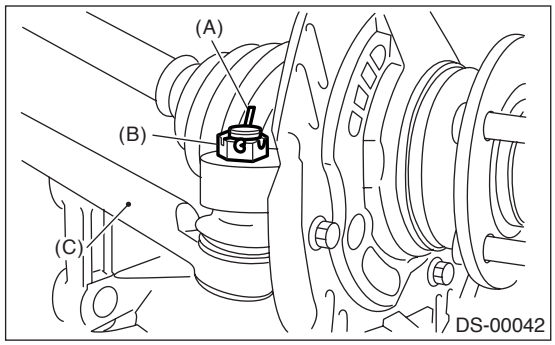
(1) Return hose
(2) Pressure hose

6) Install the universal joint. <Ref. to PS-21, INSTALLATION, Universal Joint.>
7) Connect the tie-rod end and knuckle arm, and tighten with castle nut.

Castle nut tightening torque:
27 N·m (2.75 kgf-m, 19.9 ft-lb)

CAUTION:
When connecting, do not hit cap at the bottom of tie-rod end with hammer.

8) After tightening the castle nut to specified tightening torque, tighten it further within 60° until cotter pin hole is aligned with slot in the nut. Fit the cotter pin into nut, and then bend the pin to lock.



(A) Cotter pin
(B) Castle nut
(C) Tie-rod end

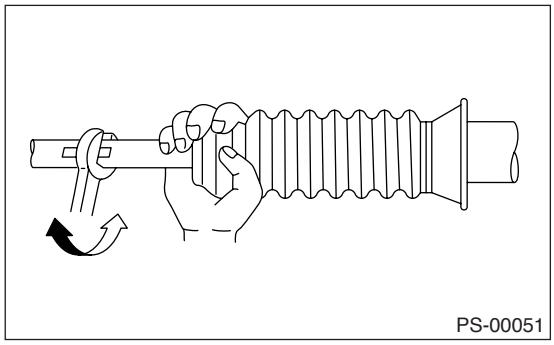
9) Install the front stabilizer. <Ref. to FS-16, INSTALLATION, Front Stabilizer.>
10) Install the front crossmember support plate and jack-up plate.
11) Install the front exhaust pipe assembly. (Non-turbo model) <Ref. to EX(H4SO 2.0)-8, INSTALLATION, Front Exhaust Pipe.>
12) Install the under cover. <Ref. to EI-26, INSTALLATION, Front Under Cover.>
13) Install the front wheels.
14) Tighten the wheel nuts to specified torque.

Tightening torque:
90 N·m (9.1 kgf-m, 65.8 ft-lb)

15) Lower the vehicle.
16) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
17) Align the center of roll connector. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>
18) Install the steering wheel. <Ref. to PS-20, INSTALLATION, Steering Wheel.>
19) Connect the battery ground cable to battery.
20) Pour fluid into the oil tank, and bleed air. <Ref. to PS-84, Power Steering Fluid.>
21) Check for fluid leaks.
22) Check the fluid level in oil tank.
23) After adjusting toe-in and steering angle, tighten the lock nut on tie-rod end.

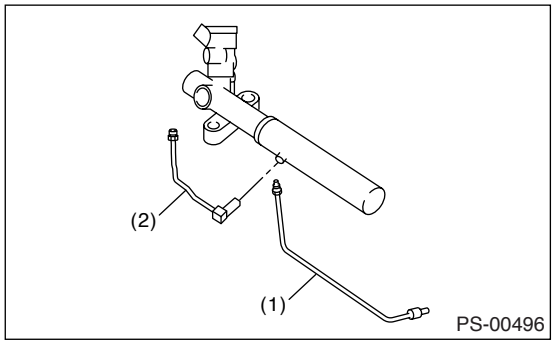
Tightening torque:
85 N·m (8.7 kgf-m, 62.7 ft-lb)

NOTE:
When adjusting toe-in, hold the boot as shown to prevent it from being rotated or twisted. If twisted, straighten it.



C: DISASSEMBLY

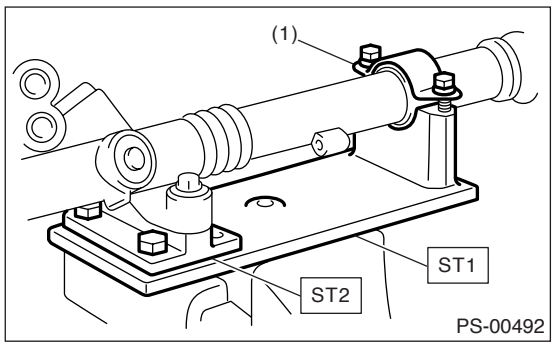
1) Disconnect the pipes A and B from steering body and control valve housing.



(1) Pipe A
(2) Pipe B

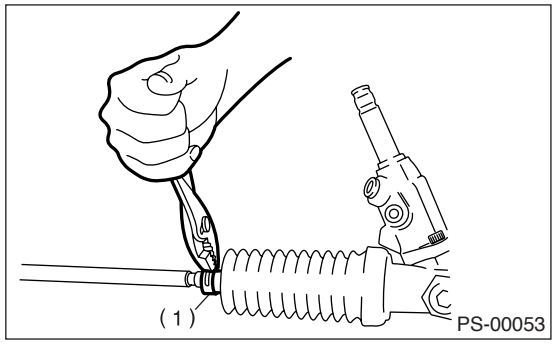
2) Secure the gearbox removed from vehicle in a vice using ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

CAUTION:
Secure the gearbox assembly in a vice using the ST as shown. Do not secure the gearbox without this ST.



(1) Clamp

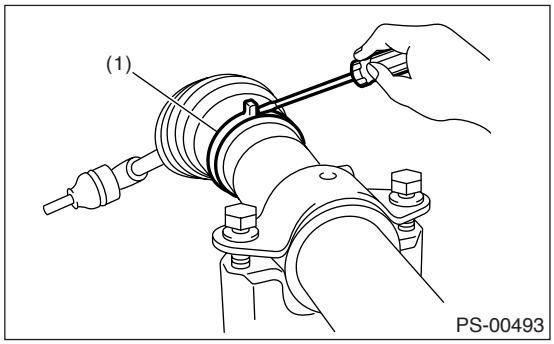
3) Remove the tie-rod end and lock nut from gearbox.
4) Remove the clip from outside boot using pliers, and then move the boot to tie-rod end side.



(1) Clip

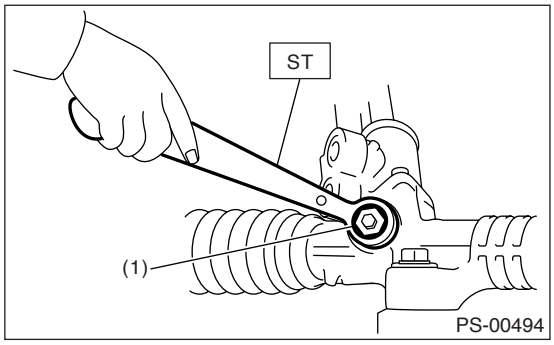
5) Using a flat tip screwdriver, remove the band from boot.

NOTE:
Replace the boot if there is damage, cracks or deterioration.



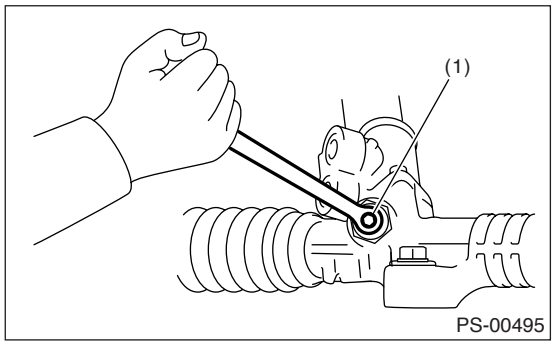
(1) Band

6) Using the ST, loosen the lock nut.
ST 926230000 SPANNER



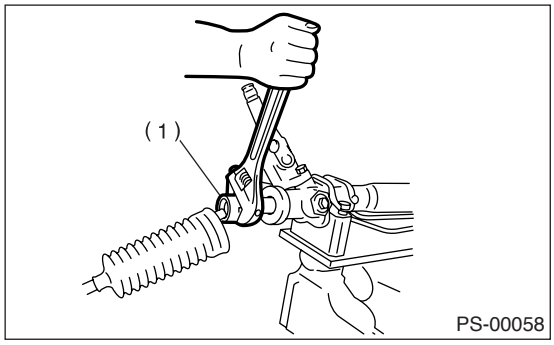
(1) Lock nuts

7) Tighten the adjusting screw until it no longer tightens.



(1) Adjusting screw

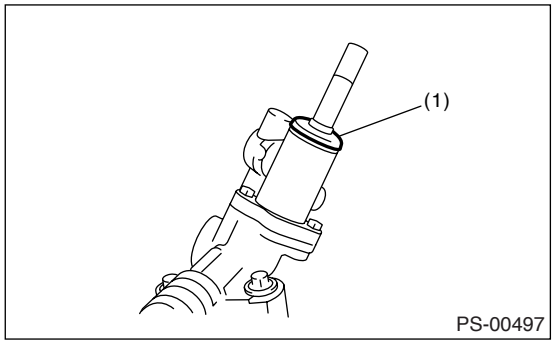
8) Using a 32 mm spanner or adjustable wrench with cinching boot, remove the tie-rod.



(1) Tie-rod

9) Loosen the adjusting screw and remove the spring and sleeve.
10) Clean the dirt adherent to the input shaft. Remove the dust cover paying attention not to scratch the housing or input shaft and not to allow foreign matter to enter the gear box interior.

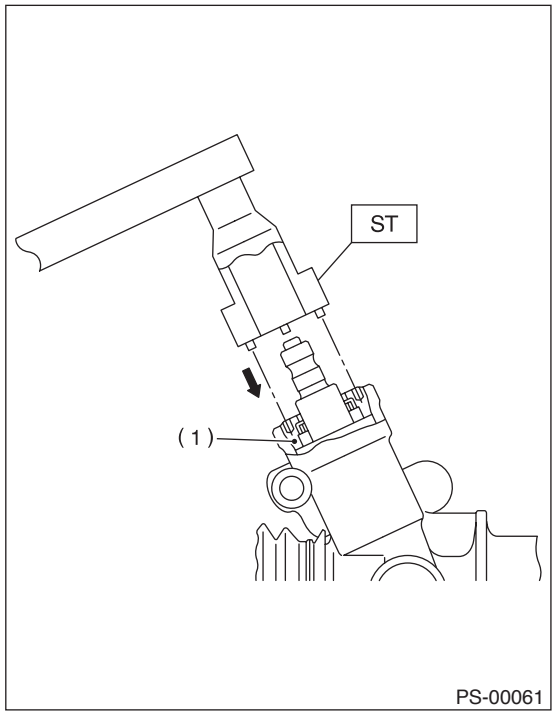
CAUTION:
Wrap the tape to the spline part of input shaft to avoid damaging dust cover.



(1) Dust cover

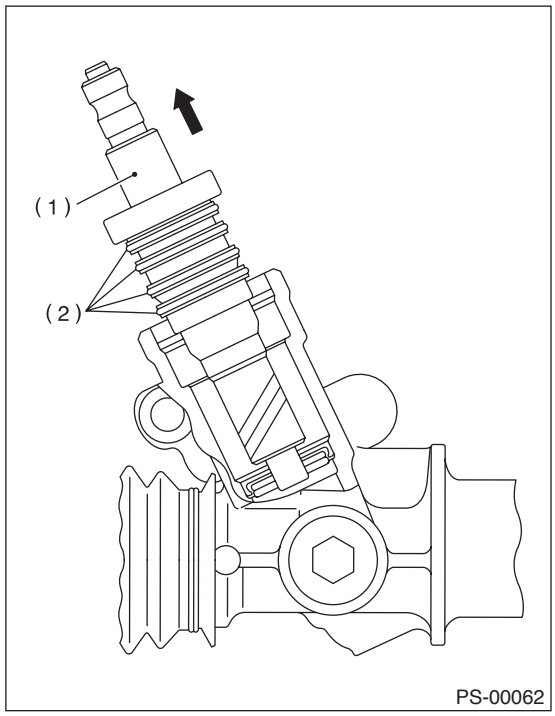
11) Align the ST pin with the plug hole to install. Rotate the ST counterclockwise to remove the plug.

ST 34199AE090 PLUG WRENCH



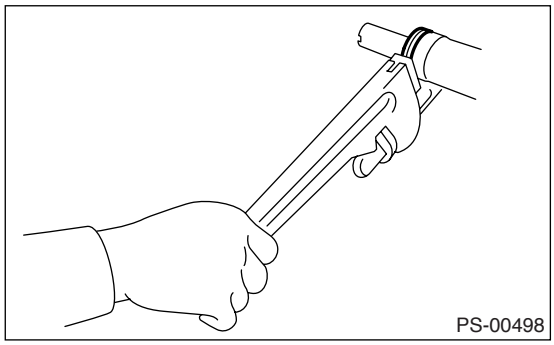
(1) Plug

12) Remove the valve assembly paying attention not to scratch seal ring or valve housing inner surface.



(1) Valve ASSY
(2) Seal ring

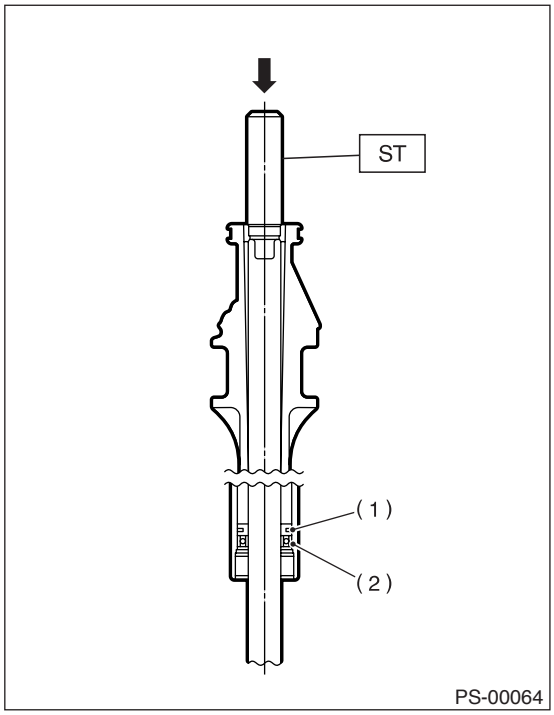
13) Remove the holder using a 36 mm spanner or adjustable wrench.



14) Install the ST on valve side of rack and press outer side oil seal out taking care not to contact rack with steering body inner surface.

ST	34199FE010	INSTALLER & REMOVER (Turbo and 3.0 R model)
ST	34199FA030	INSTALLER & REMOVER (Except for turbo and 3.0 R model)

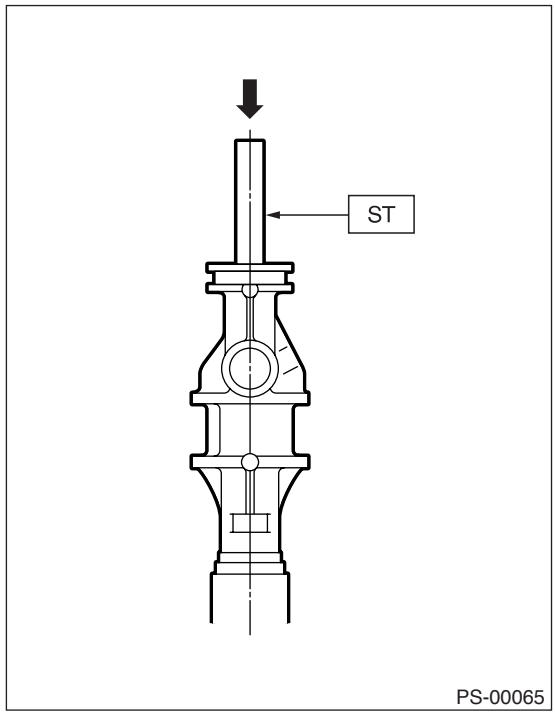
NOTE:
Block the pipe connection of steering body to prevent fluid from flowing out.



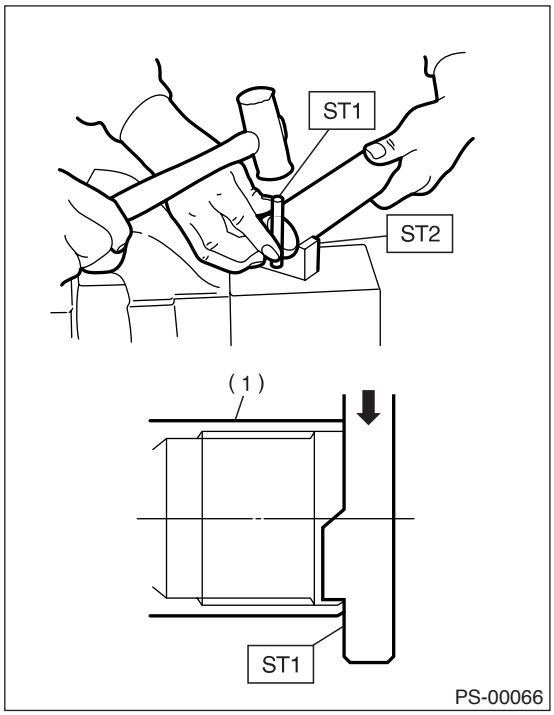
(1) Rack piston
(2) Outer side oil seal

15) Insert the ST from the valve side and press the back-up ring and oil seal out.

ST	34199FE010	REMOVER (Turbo and 3.0 R model)
ST	927580000	REMOVER (Except for turbo and 3.0 R model)

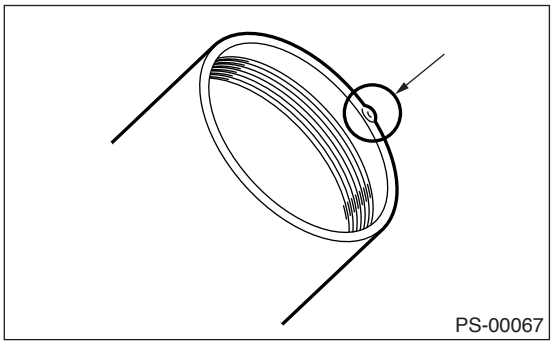


16) Using ST1 and ST2, repair the caulking portion of cylinder.
ST1 34099FA080 PUNCH
ST2 34199FE020 BASE (Turbo and 3.0 R model)
ST2 34099FA070 BASE (Except for turbo and 3.0 R model)



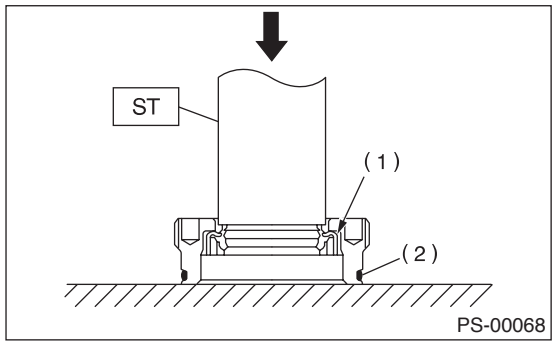
(1) Cylinder

17) If the cylinder edge is deformed in a convex shape, repair using an oil stone.



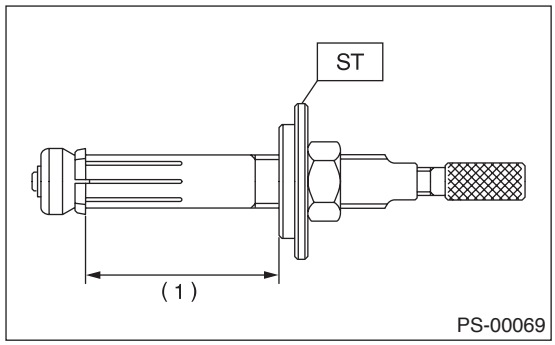
18) Remove the oil seal using ST and press from plug.
ST 34199AE100 OIL SEAL PLUG REMOVER

NOTE:
Do not apply force on the plug edge surface.



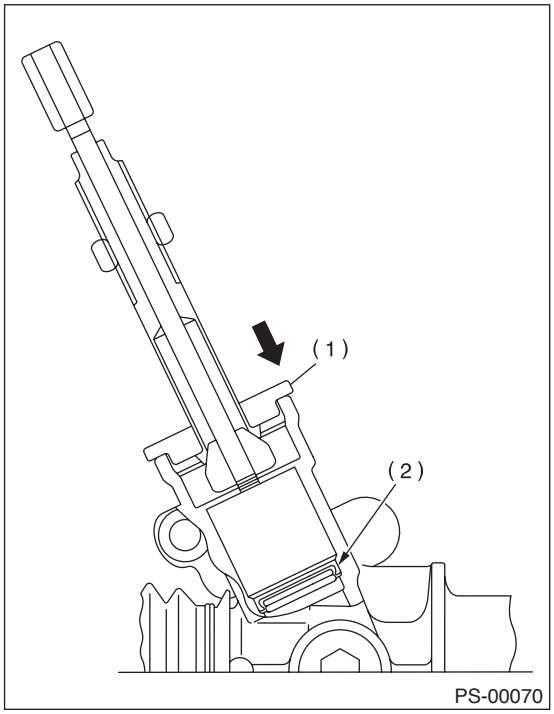
(1) Oil seal
(2) O-ring

19) Set the ST in the dimension as shown in the figure.
ST 34199AE120 GEARBOX OIL SEAL REMOVER



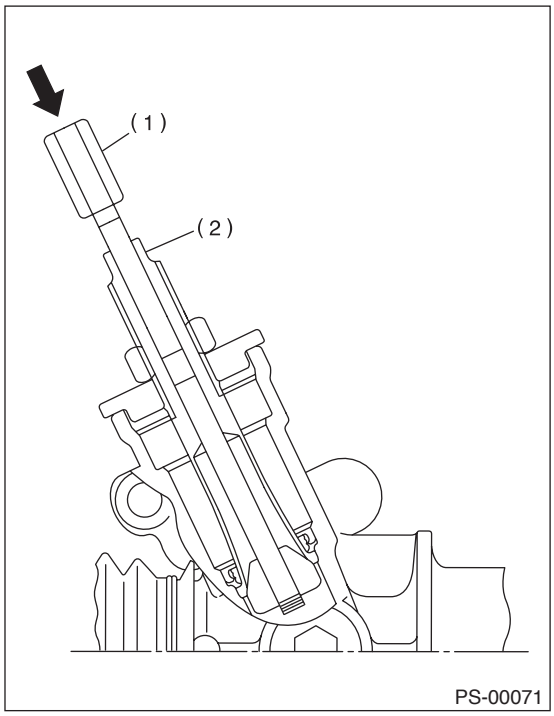
(1) 70 mm (2.76 in)

20) Set the stopper to gearbox, and then insert the tip of ST to gearbox.



(1) Stopper
(2) Oil seal

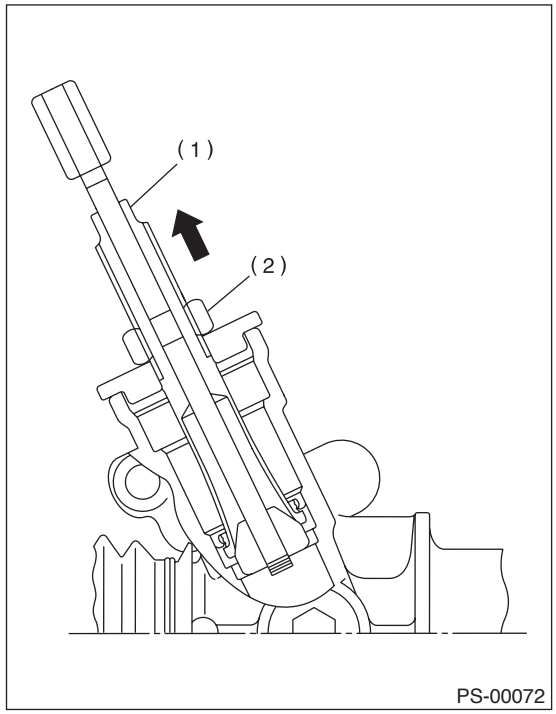
21) By fixing the 2-surface width, press-in by rotating the rod and attach to oil seal.



(1) Rod
(2) 2-surface width

22) While fixing the 2-surface width, pull out the oil seal by rotating nut.

CAUTION:
Take care not to scratch the gearbox inner surface.



(1) 2-surface width
(2) Nut

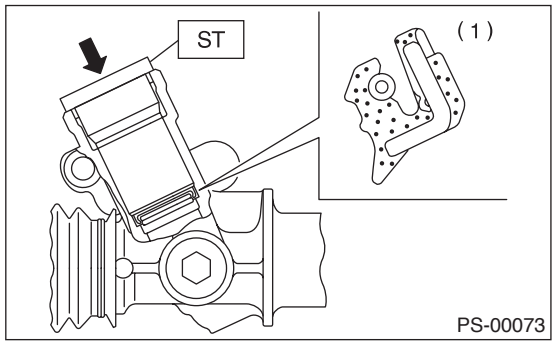
D: ASSEMBLY

1) Apply a coat of grease to the inside and outside of new oil seal.

Steering grease:
VALIANT GREASE M2 (Part No. 003608001)

2) Verify the oil seal direction and installation position. Using the ST and press, press-fit the oil seal to gearbox.

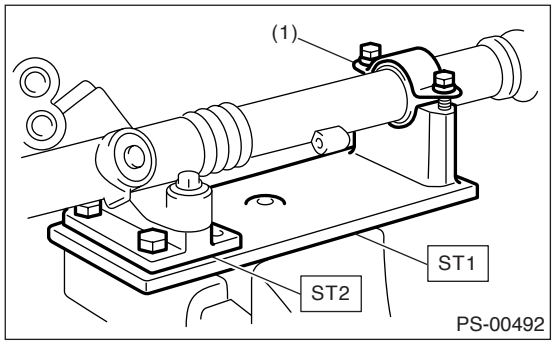
ST 34199AE130 GEARBOX OIL SEAL INSTALLER



(1) Oil seal

3) Attach the steering body to ST as shown in the figure. Apply a coat of grease to needle bearing.
ST1 926200000 STAND
ST2 34199AG000 BOSS D

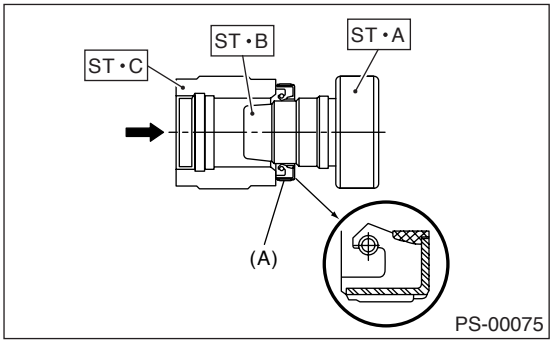
CAUTION:
Ensure the needle bearing is free from defects. If it is faulty, replace the steering body with a new one.



(1) Clamp

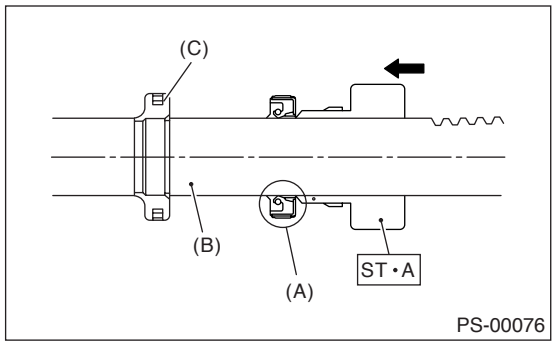
4) Using ST-B and ST-C, install the oil seal to ST-A.
ST 34199FE040 INSTALLER A, B, C (Turbo and 3.0 R model)
ST 927490000 INSTALLER A, B, C (Except for turbo and 3.0 R model)

NOTE:
Face the oil seal in the direction as shown in the figure.



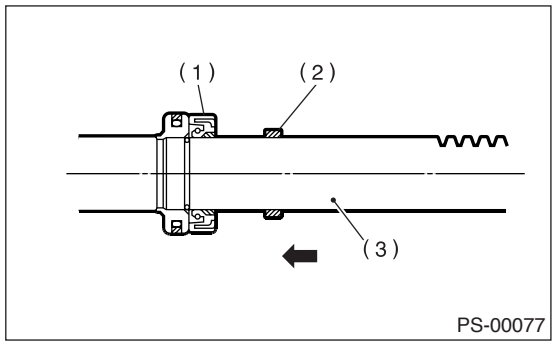
(A) Oil seal

5) Insert the ST-A with oil seal assembled from the gear side of rack. Remove the oil seal from ST-A near piston, and then remove the ST-A from rack.



(A) Oil seal
(B) Rack
(C) Piston

6) Install the back-up washer from gear side of rack.

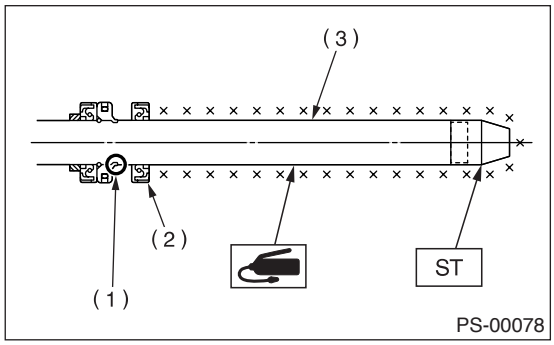


(1) Oil seal
(2) Back-up washer
(3) Rack

7) Install the ST on rack, and equally apply a thin coat of grease to the rack and ST, then install the oil seal.
ST 926250000 GUIDE

CAUTION:
Be careful not to scratch the oil seal lips with the inner ring section of piston.

NOTE:
Do not use this ST for turbo model.

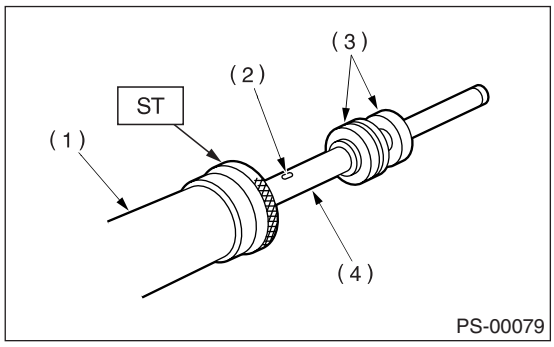


(1) Rack piston inner ring
(2) Outer side oil seal
(3) Rack

8) Apply a coat of grease to the grooves in rack, sliding surface of sleeve and sealing surface of piston. Install ST on the end of steering body cylinder. Then insert the rack into steering body from cylinder side.

ST 34199FE050 GUIDE (Turbo and 3.0 R model)
ST 34199AE000 GUIDE (Except for turbo and 3.0 R model)

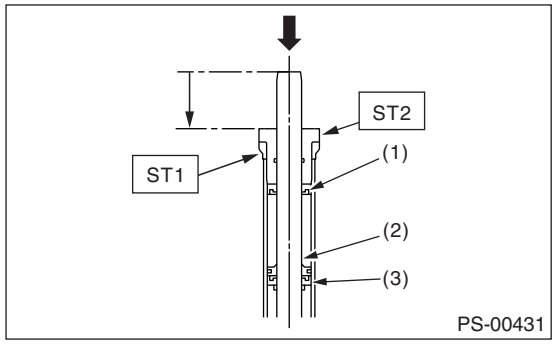
CAUTION:
Do not allow grease to block the air vent hole on rack.



(1) Cylinder side of steering body
(2) Air vent hole
(3) Oil seal
(4) Rack

9) Make the ST2 pass through rack, and then press-in the rack and ST2 using press.
Press-in the rack until ST1 comes in contact with ST2 and the edge surface of rack is aligned with that of ST2.

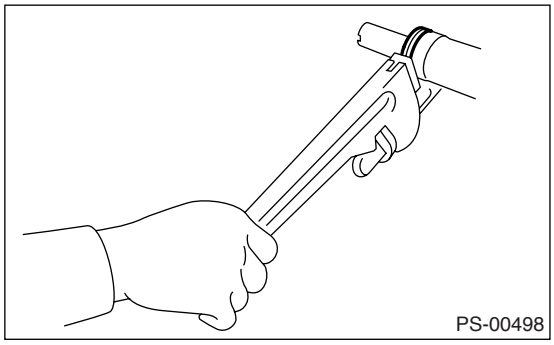
ST1 34199FE050 GUIDE (Turbo and 3.0 R model)
34199AE000 GUIDE (Except for turbo and 3.0 R model)
ST2 34199FE060 INSTALLER (Turbo and 3.0 R model)
34199AE010 INSTALLER (Except for turbo and 3.0 R model)



(1) Outer side oil seal
(2) Rack piston
(3) Inner side oil seal

10) Install a new holder to the cylinder side of steering body.

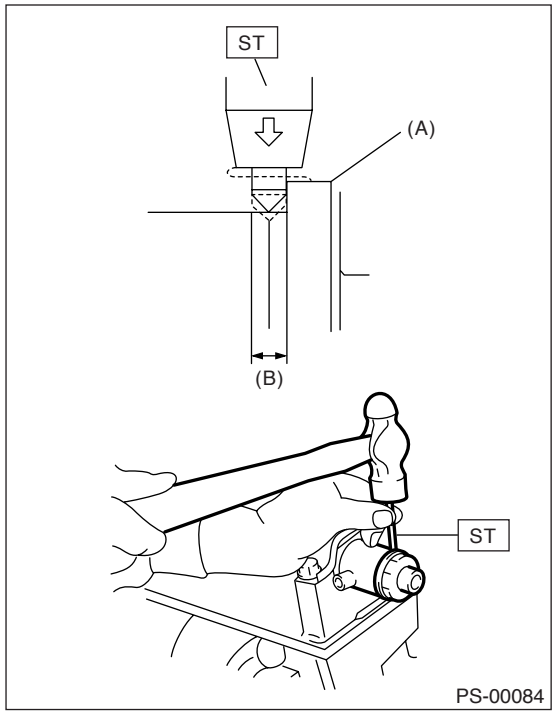
Tightening torque:
Turbo and 3.0 R model
90 N·m (9.18 kgf-m, 66.4 ft-lb)
Except for turbo and 3.0 R model
64 N·m (6.5 kgf-m, 47.0 ft-lb)



11) Using the ST, caulk the steering body at one point less than 3mm (0.12 in) from holder.

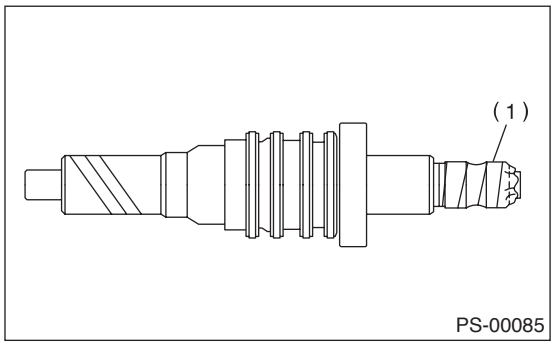
CAUTION:
Be careful not to deform the holder.

ST 34099FA060 PUNCH HOLDER



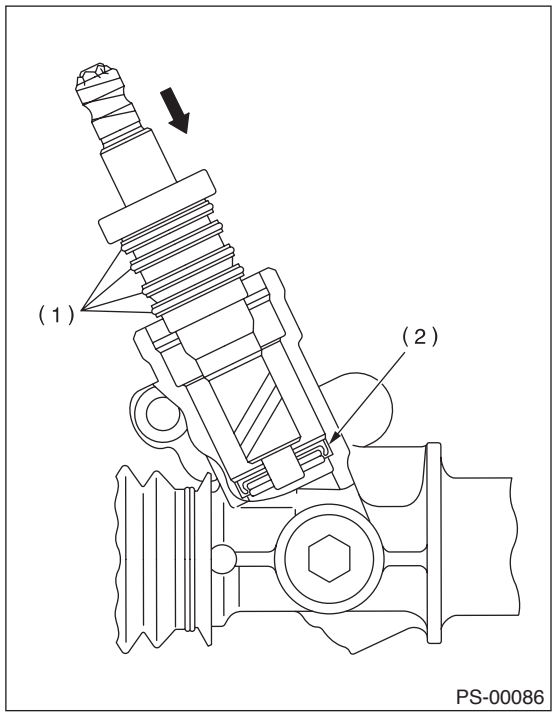
(A) Holder
(B) 3 mm (0.12 in)

12) Roll the vinyl tape on serration part of valve assembly, and then apply grease on the tape surface.



(1) Vinyl tape

13) Apply a coat of grease on the gear teeth of valve assembly, and then attach the valve assembly taking care not to scratch oil seal and seal ring.

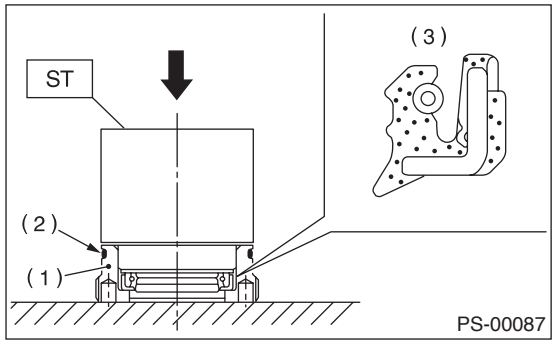


(1) Seal ring
(2) Oil seal

14) Apply grease on the oil seal circumference, and then press it into the plug using ST and press. Replace the O-rings of plug circumference with new ones.

ST 34199AE110 OIL SEAL PLUG INSTALLER

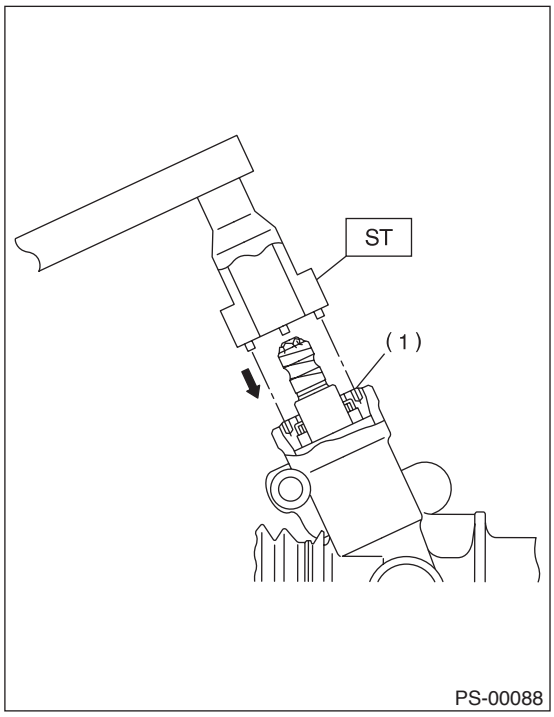
CAUTION:
Install the oil seal paying attention to its direction.



(1) Plug
(2) O-ring
(3) Oil seal

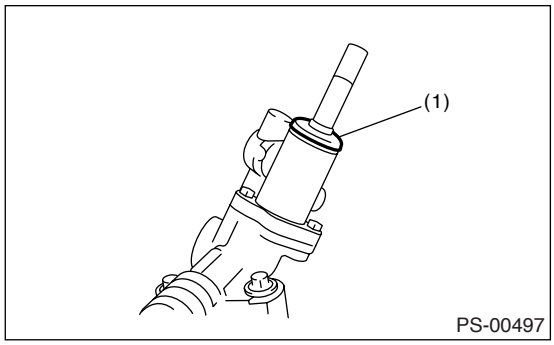
15) Using the ST, install plug.
ST 34199AE090 PLUG WRENCH

Tightening torque:
64 N·m (6.5 kgf-m, 47.0 ft-lb)



(1) Plug

16) Install the dust cover. Remove the vinyl tape.

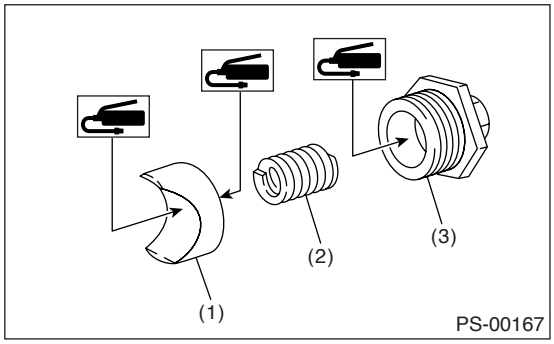


(1) Dust cover

17) Temporarily install the tie-rod to the rack, and then operate it from lock to lock two or three times to make it fit in. Remove the grease blocking air vent hole.

CAUTION:
If operating the rack from lock to lock without installing tie-rod, it may damage the oil seal. Always install the tie-rods LH and RH.

18) Apply a coat of grease to the sliding surface of sleeve and seating surface of spring, and then insert the sleeve into spring body.
Charge the adjusting screw with grease, and then insert the spring into adjusting screw and install on steering body.



(1) Sleeve
(2) Spring
(3) Adjusting screw

19) Tighten the adjusting screw to specified torque.

Tightening torque:
9.8 N·m (1.0 kgf-m, 7.2 ft-lb)

20) After tightening the adjusting screw with the specified tightening torque, loosen it.

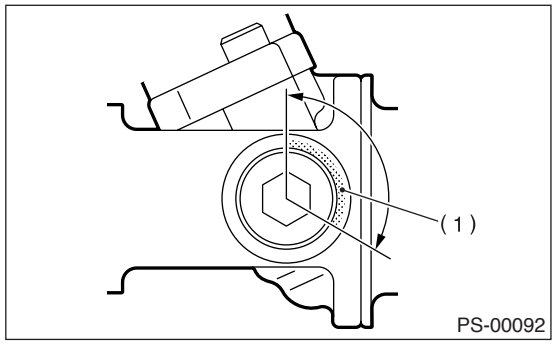
Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

21) After tightening the adjusting screw with the specified tightening torque, loosen 37° it.

Tightening torque:
4.9 N·m (0.50 kgf-m, 3.6 ft-lb)

22) Remove the tie-rod.
23) Verify that play is within specified value. <Ref. to PS-61, LIMIT, INSPECTION, Steering Gearbox [RHD Model].>
24) Loosen the adjusting screw, and then apply liquid gasket to at least 1/3 of the entire perimeter of adjusting screw thread.

Liquid gasket:
THREE BOND 1141 (Part No. 004403006)



(1) Apply liquid gasket to at least 1/3 of entire perimeter.

25) Install the lock nut. While holding adjusting screw with a wrench, tighten the lock nut using ST.
ST 926230000 SPANNER

Tightening torque (Lock nut):
39 N·m (4.0 kgf-m, 28.9 ft-lb)

NOTE:
Hold the adjusting screw with a wrench to prevent it from turning while tightening lock nut.

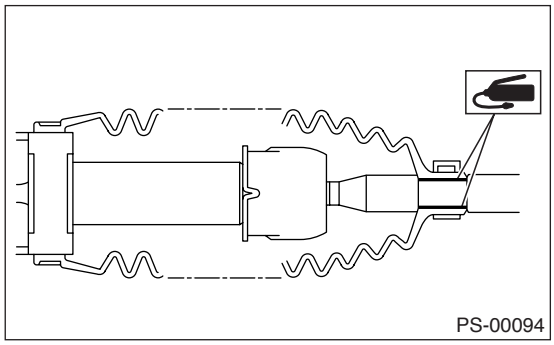
26) Install the tie-rod into rack.

Tightening torque:
90 N·m (9.0 kgf-m, 65.1 ft-lb)

NOTE:
Check the mating face of rack and tie-rod for foreign material, dirt and etc.

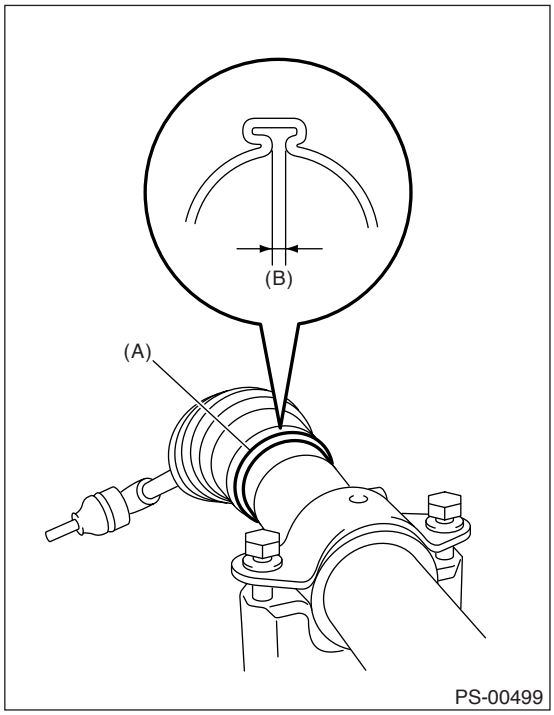
27) Apply a coat of grease to the tie-rod groove, and then install the boot to housing.

NOTE:
Make sure that the boot is installed without unusual inflation or deflation.



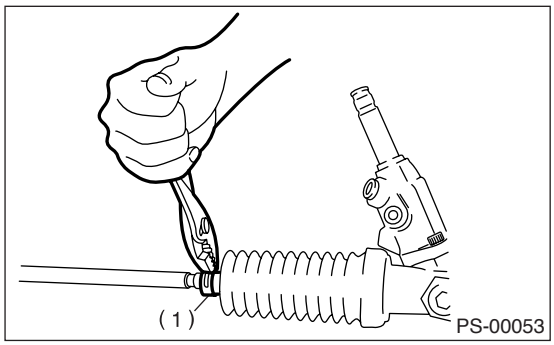
28) Caulk the boot so the space inside boot band caulking portion becomes 2 mm (0.08 in) or less.

NOTE:
Use a new boot band.



(A) Boot band
(B) 2 mm (0.08 in) or less

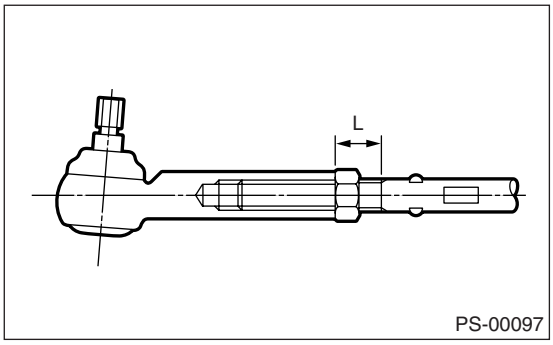
29) Fix the boot end with clip (small).



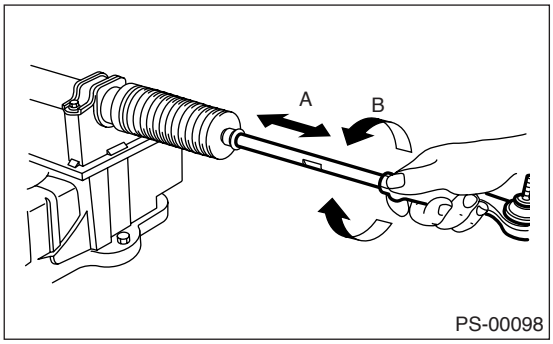
(1) Clip

30) After installing, check that the boot end is positioned into groove on tie-rod.
31) If the tie-rod end has been removed, screw in lock nut and tie-rod end to the screwed portion of tie-rod, and tighten the lock nut temporarily in a position as shown in figure.

Installed tie-rod length L:
31 mm (1.22 in)

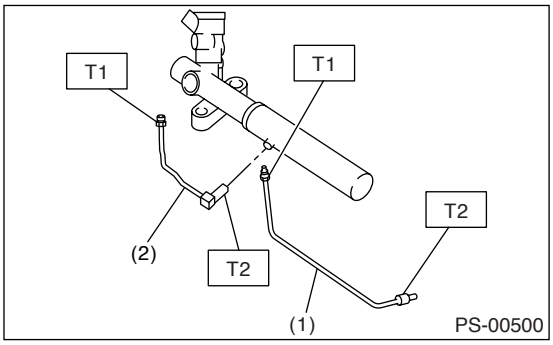


32) Inspect the gearbox as follows:
"A" Holding tie-rod end, repeat lock to lock two or three times as quickly as possible.
"B" Holding tie-rod end, turn it slowly at a radius one or two times as large as possible.
After all, make sure that the boot is installed in the specified position without deflation.



33) Take off the gearbox from ST.
ST1 926200000 STAND
ST2 34199AG000 BOSS D
34) Install the pipe A and B to steering body and control valve housing.

Tightening torque:
T1: 20 N·m (2.0 kgf-m, 14.5 ft-lb)
T2: 24 N·m (2.4 kgf-m, 17.4 ft-lb)



(1) Pipe A
(2) Pipe B

E: INSPECTION

1. BASIC INSPECTION

1) Clean all disassembled parts, and check for wear, damage or any other faults, then repair or replace as necessary.
2) When disassembling, check inside of gearbox for water. If any water is found, carefully check boot for damage, input shaft dust seal, adjusting screw and boot clips for poor sealing. If faulty, replace with new parts.

No.	Parts	INSPECTION	Corrective action
1	Input shaft	(1) Bend of input shaft (2) Damage on serration	If the bend or damage is excessive, replace the entire gearbox.
2	Dust seal	(1) Crack or damage (2) Wear	If the outer wall slips, the lip is worn out or damage is found, replace it with a new one.
3	Rack & Pinion	Poor mating of rack with pinion	(1) Adjust the backlash properly. By measuring turning torque of gearbox and sliding resistance of rack, check if rack & pinion engage uniformly and smoothly with each other. (Refer to “Service limit”.) (2) Keeping rack pulled out all the way so that all teeth emerge, check teeth for damage. Even if abnormality is found in either (1) or (2), replace the entire gearbox.
4	Gearbox unit	(1) Bend of rack shaft (2) Bend of cylinder portion (3) Crack or damage on cast iron portion	Replace the gearbox with a new one.
		(4) Wear or damage on rack bush	If the free play of rack shaft in radial direction is out of the specified range, replace the gearbox with new one. (Refer to “Service limit”.)
		(5) Wear on input shaft bearing	If the free play of rack shaft in radial and axial direction is out of the specified range, replace the gearbox with a new one. (Refer to “Service limit”.)
5	Boot	Crack, damage or deterioration	Replace.
6	Tie-rod	(1) Looseness of ball joint (2) Bend of tie-rod	Replace.
7	Tie-rod end	Damage or deterioration on dust seal	Replace.
8	Adjusting screw spring	Deterioration	Replace.
9	Boot clip	Deterioration	Replace.
10	Sleeve	Damage	Replace.
11	Pipes	(1) Damage to flared surface (2) Damage to flare nut (3) Damage to pipe	Replace.

2. LIMIT

Make a measurement as follows. If it exceeds the specified service limit, adjust or replace.

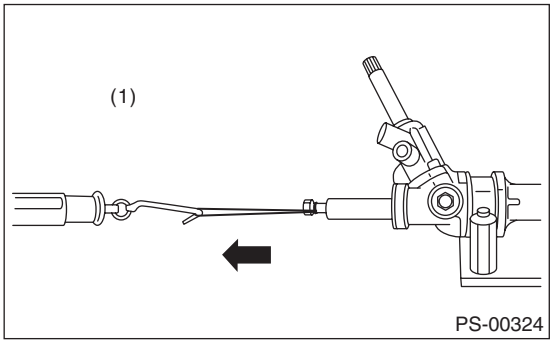
NOTE:
When making a measurement, vise the gearbox using ST. Never vise the gearbox by inserting aluminum plates, etc. between vise and gearbox.

ST1 926200000 STAND
ST2 34199AG000 BOSS D

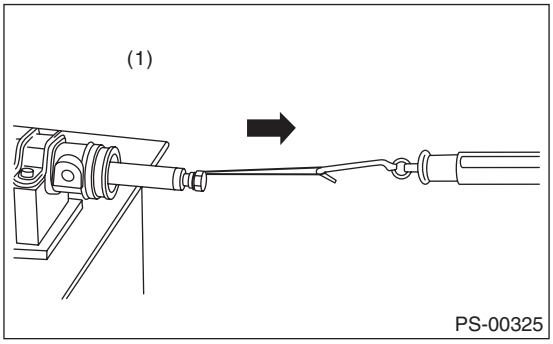
Sliding resistance of rack shaft:

Limit
314 N (32 kgf, 71 lb) or less

Difference between right and left sliding resistance:
20% or less



(1) Right-turn steering



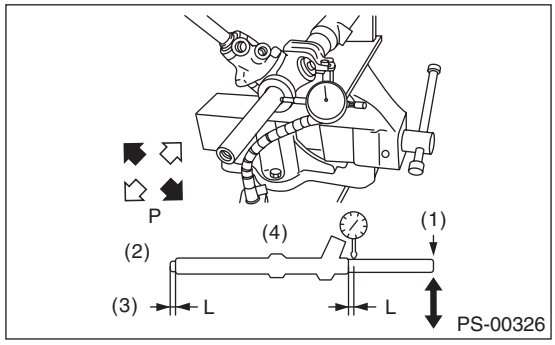
(1) Left-turn steering

3. RACK SHAFT PLAY IN RADIAL DIRECTION

Right-turn steering:

Limit
Direction ⇦ ⇨
0.4 mm (0.016 in) or less
Direction ⇦ ⇨
0.6 mm (0.024 in) or less

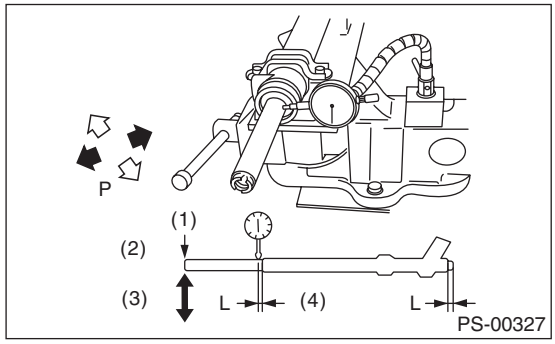
On condition
L: 5 mm (0.20 in)
P: 98 N (10 kgf, 22 lb)



(1) Under the step
(2) Right-turn steering
(3) Measure point
(4) Right

Left-turn steering:

Limit
Direction ⇦ ⇨
0.4 mm (0.016 in) or less



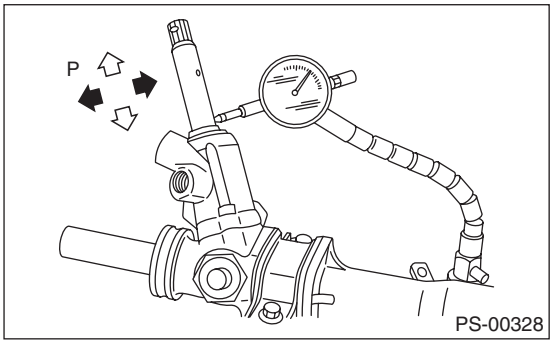
(1) Under the step
(2) Left-turn steering
(3) Measure point
(4) Left

4. INPUT SHAFT PLAY

In radial direction:

Limit
0.18 mm (0.0071 in) or less

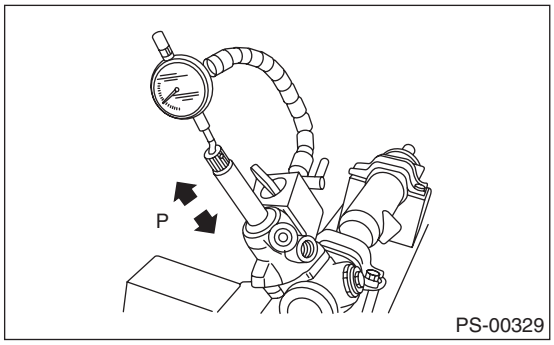
On condition
P: 98 N (10 kgf, 22 lb)



In axial direction:

Service limit
0.27 mm (0.0106 in) or less

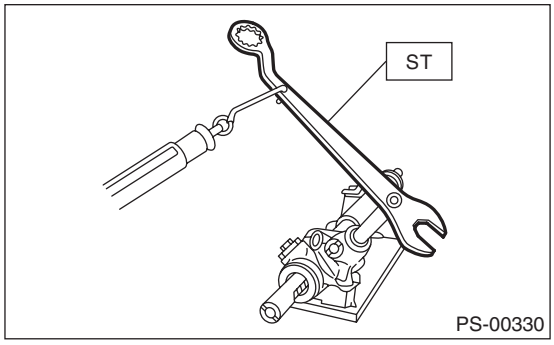
On condition
P: 20 — 49 N (2 — 5 kgf, 4 — 11 lb)



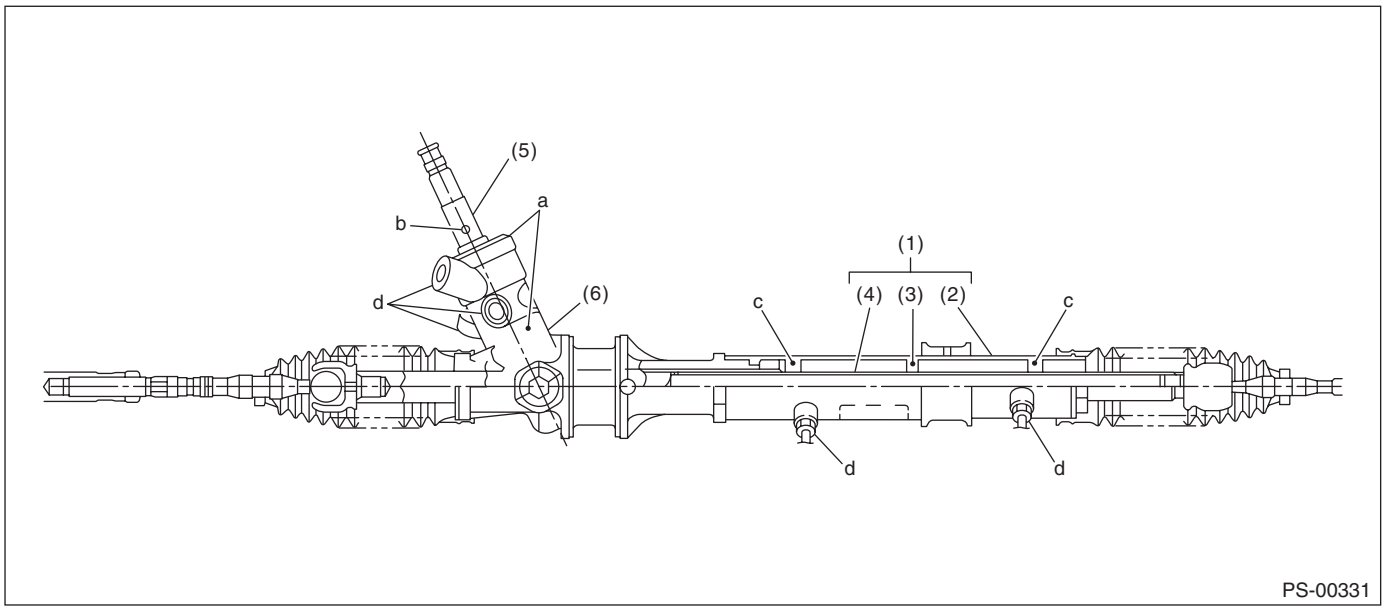
5. TURNING RESISTANCE OF GEARBOX

Using the ST, measure the gearbox turning resistance.
ST 34099PA100 SPANNER

Service limit:
Maximum allowable resistance:
13 N (1.3 kgf, 9.6 lb) or less
Difference between right and left turning resistance:
20% or less



6. OIL LEAKING



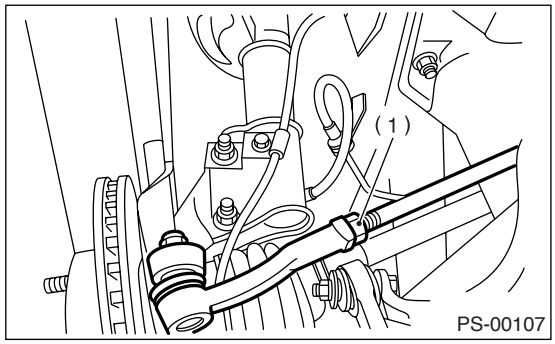
(1) Power cylinder
(2) Cylinder
(3) Rack piston
(4) Rack axle
(5) Input shaft
(6) Valve housing

1) Lift-up the vehicle.
2) Even if the location of leak can be easily found by observing leaking condition, it is necessary to thoroughly remove the oil from suspected portion and turn steering wheel from lock to lock about 30 to 40 times with engine running, then reinspect the suspected portion immediately after and several hours after this operation.
3) Cause and measure for oil leakage from “a”
The oil seal is damaged. Replace the valve assembly with a new one.
4) Cause and measure for oil leakage from “b”
The torsion bar O-ring is damaged. Replace the valve assembly with a new one.
5) Cause and measure for oil leakage from “c”
The oil seal is damaged. Replace the oil seal with a new one.
6) Cause and measure for oil leakage from “d”
The pipe is damaged. Replace the faulty pipe or O-ring.

F: ADJUSTMENT

1) Adjust the front toe.
<Ref. to FS-12, FRONT WHEEL TOE-IN, INSPECTION, Wheel Alignment.>

Standard of front toe:
IN 3 — OUT 3 mm (IN 0.12 — OUT 0.12 in)



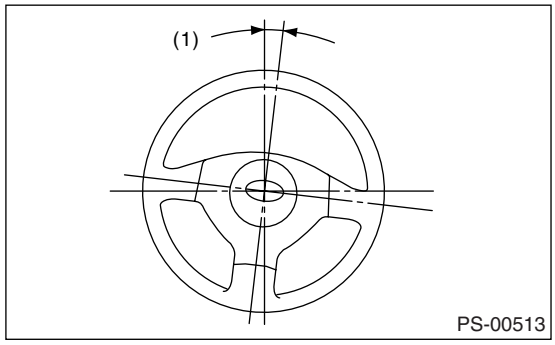
(1) Lock nut

2) Adjust the steering angle of wheels.

Standard of steering angle:

Model	2.0 i, 2.5 i	2.0 GT, 3.0 R	OUTBACK
Inner wheel	37.3°±1.5°	37.2°±1.5°	37.8°±1.5°
Outer wheel	33.0°±1.5°	32.9°±1.5°	33.5°±1.5°

3) If the steering wheel spokes are not horizontal when wheels are set in the straight ahead position, or error is more than 5° on the periphery of steering wheel, correctly re-install the steering wheel.



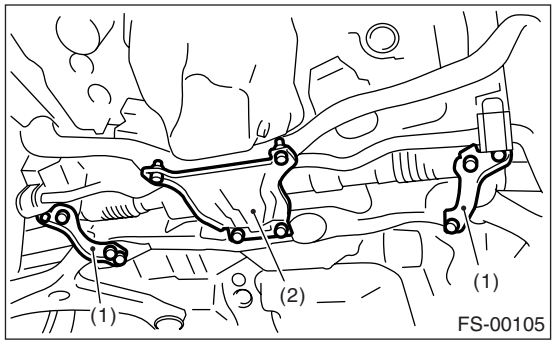
(1) Within 5°

4) If the steering wheel spokes are not horizontal with vehicle set in the straight ahead position after this adjustment, correct it by turning the right and left tie-rods in the opposite direction each other by the same angle.

7. Pipe Assembly [LHD Model]

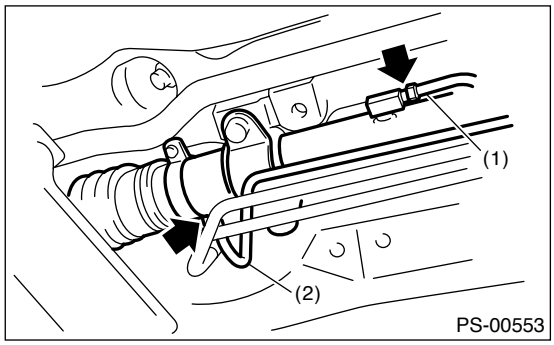
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the front crossmember support plate and jack-up plate.



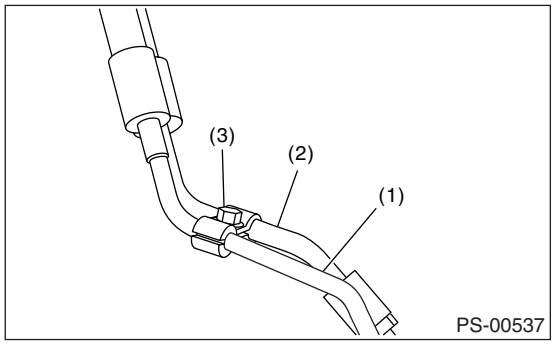
(1) Front crossmember support plate
(2) Jack-up plate

3) Remove one pipe joint at the center of gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



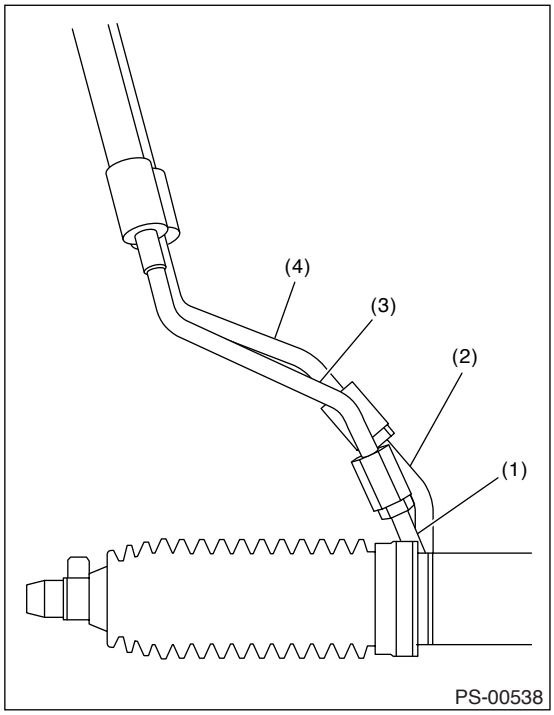
(1) Pipe A
(2) Pipe B

4) Remove the clamp E from return hose and pressure hose.



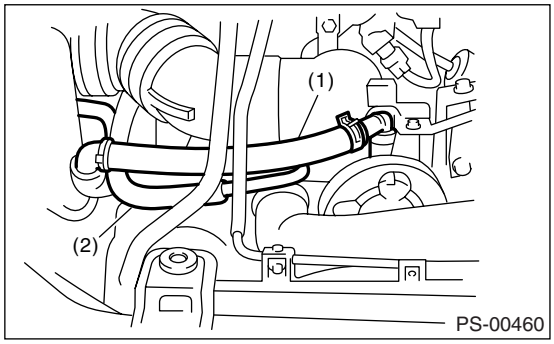
(1) Return hose
(2) Pressure hose
(3) Clamp E

5) Disconnect the return hose and pipe D, pressure hose and pipe C.



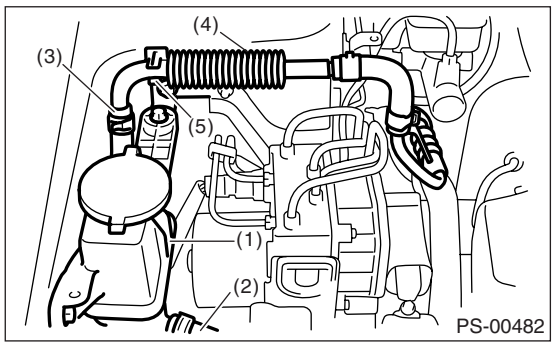
(1) Pipe C
(2) Pipe D
(3) Pressure hose
(4) Return hose

6) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
7) Disconnect the suction hose and pressure hose from oil pump.



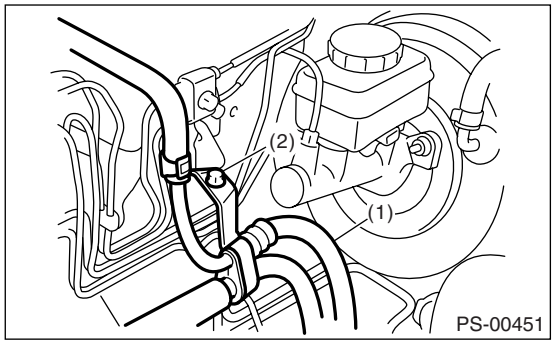
(1) Suction hose
(2) Pressure hose

8) Disconnect the suction hose and return hose from reservoir tank. Remove the oil cooler from oil cooler bracket.



(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

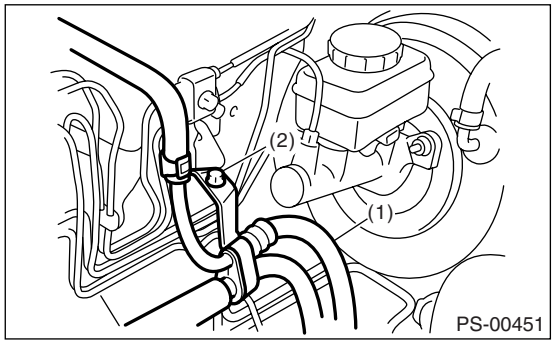
9) Remove the hose bracket and take out the hose assembly from vehicle.



(1) Hose ASSY
(2) Hose bracket

B: INSTALLATION

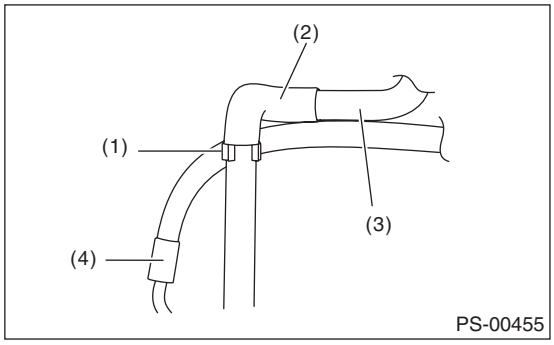
1) Temporarily tighten the bolt of hose bracket.



(1) Hose ASSY
(2) Hose bracket

2) Install the resin clip to the pressure hose and suction hose.

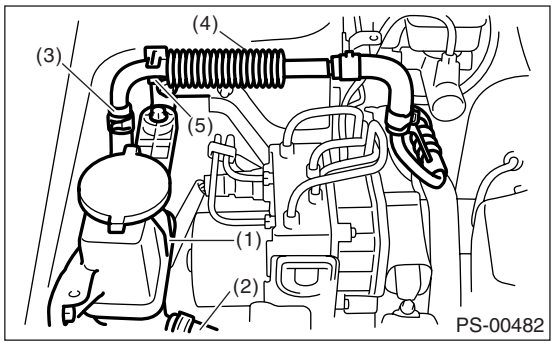
CAUTION:
Align the installation position of the resin clip with the protector edge of suction hose.



(1) Resin clip
(2) Protector
(3) Suction hose
(4) Pressure hose

3) Connect the suction hose and return hose to reservoir tank. Install the oil cooler to oil cooler bracket.

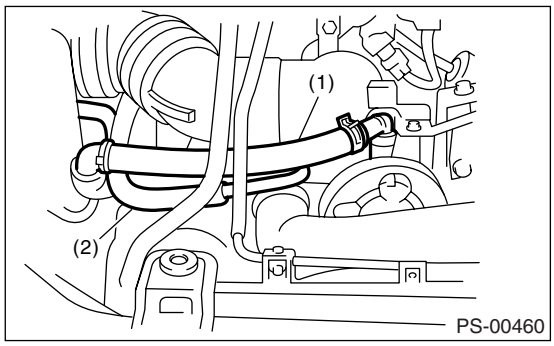
CAUTION:
Firmly insert the resin clip of return hose to the bracket.



(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

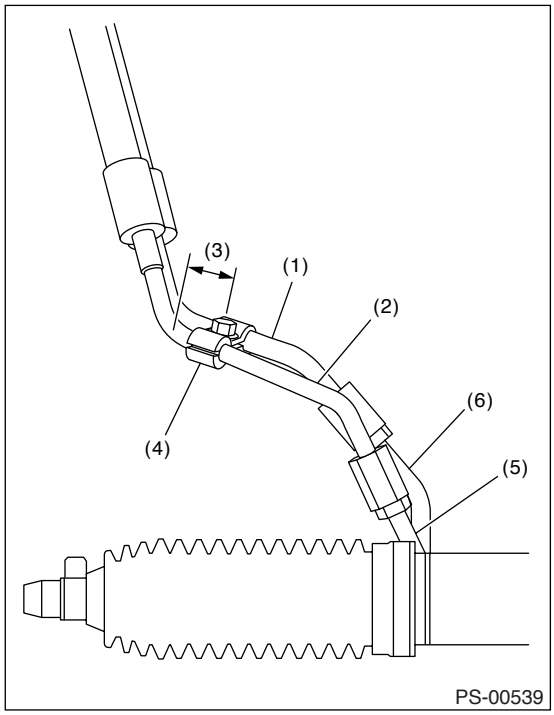
4) Connect the suction hose and pressure hose to the oil pump. Tighten the eye bolt of pressure hose.

Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)



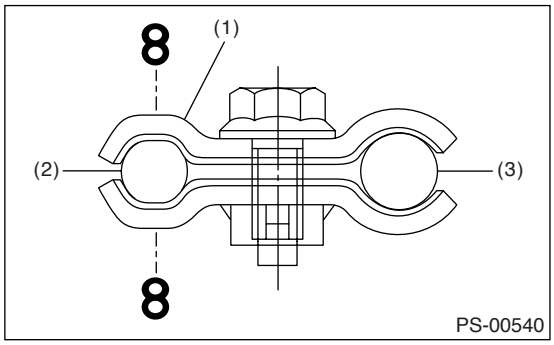
(1) Suction hose
(2) Pressure hose

5) Temporarily connect the pressure hose and pipe C, the return hose and D. Place the clamp E in the position shown in the figure, and tighten the bolt temporarily.



(1) Return hose
(2) Pressure hose
(3) Approx. 18 mm (0.71 in)
(4) Clamp E
(5) Pipe C
(6) Pipe D

NOTE:
Ensure that the letter “8” on each clamp are diagonally opposite each other as shown in the figure.



(1) Clamp E
(2) Pressure hose
(3) Return hose

6) Tighten the clamp E.

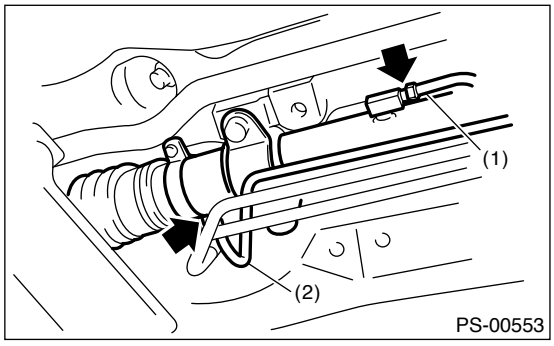
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

7) Tighten the pressure hose and pipe C, the return hose and pipe D.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

8) Connect the pipe A and B to the four pipe joints of gearbox.

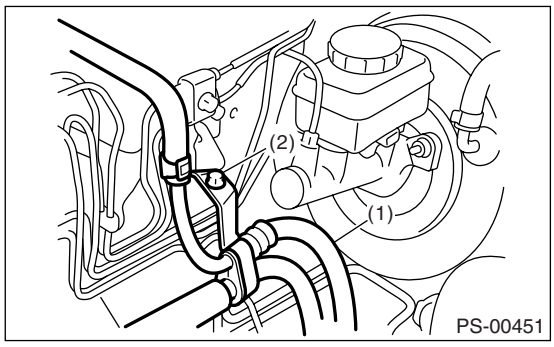
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Pipe A
(2) Pipe B

9) Install the front crossmember support plate and jack-up plate.
10) Lower the vehicle.
11) Tighten the bolts which hold the hose bracket.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Hose ASSY
(2) Hose bracket

12) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
13) Connect the battery ground cable to battery.
14) Feed the specified fluid.

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

15) Finally, check clearance between pipes or hoses as shown in the figure indicated in “General Diagnostic Table”. <Ref. to PS-89, INSPECTION OF CLEARANCE, INSPECTION, General Diagnostic Table.>

C: INSPECTION

Check all disassembled parts for wear, damage or other abnormalities. Repair or replace defective parts as necessary.

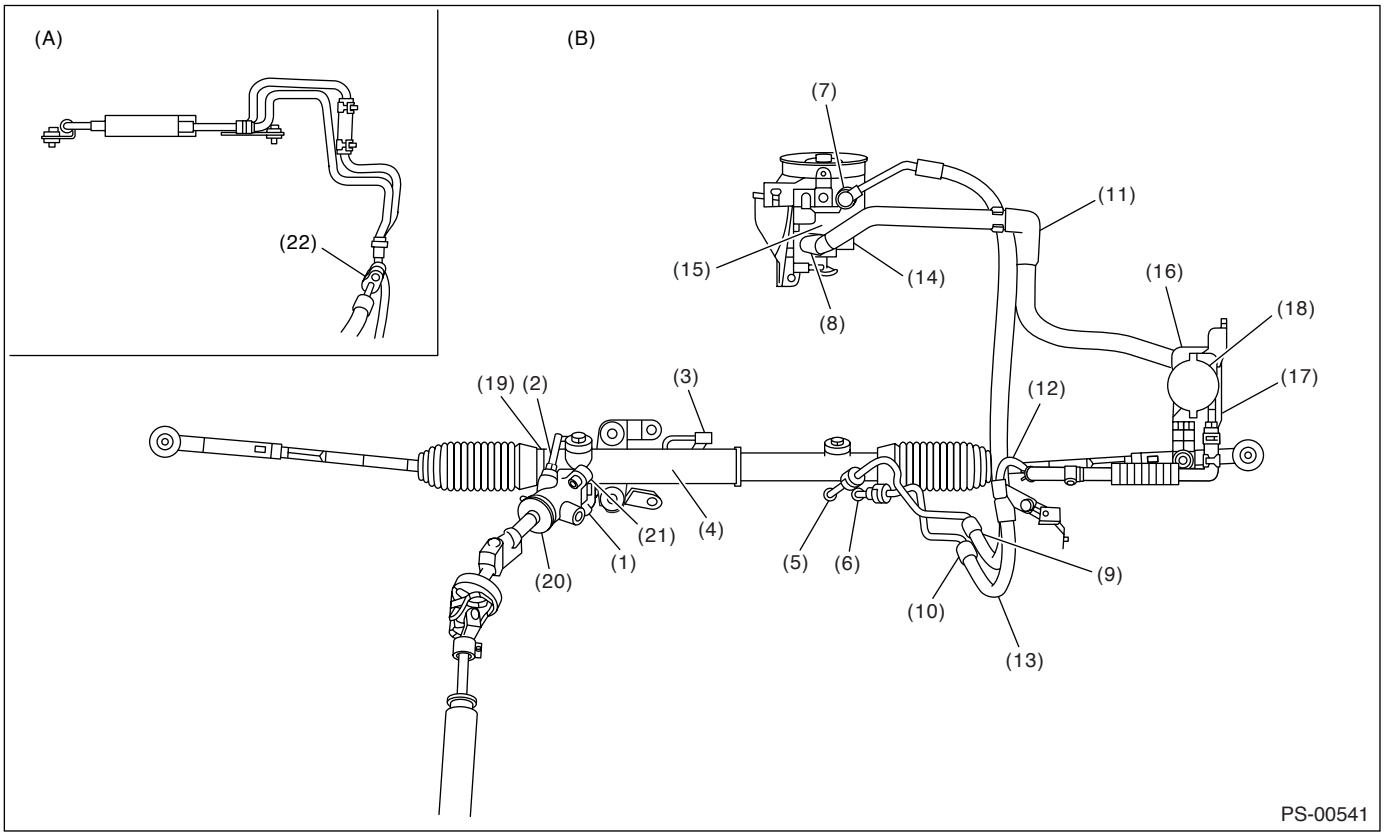
Parts	Maintenance Parts	Corrective action
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with a new one.
Clamp	• Clamps for weak clamping force	Replace with a new one.
Hose	• Flare surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for deformation	Replace with a new one.

CAUTION:
Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. Wipe out immediately when the hoses are adhered with the fluids.
Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather areas and a driving condition in which many steering operations are required in short time.
Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Repair.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace the parts if defective.
	Improper stop position of pitching stopper	Replace the parts if defective.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customers.
	Excessive tightening torque of return hose clip	Replace.
	Power steering fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

Pipe Assembly [LHD Model]

NOTE:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



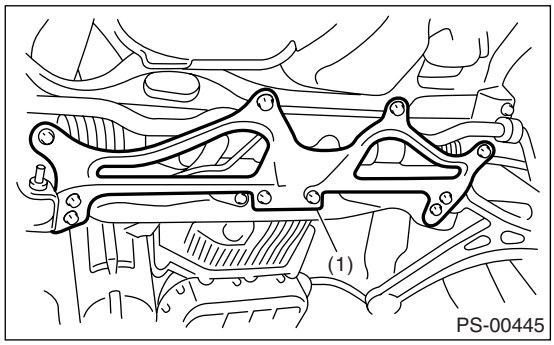
(A) 3.0 L model (B) Except for 3.0 L model

Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (8) in figure	Insufficient tightening of flare nut, adhesion of dirt, damage to flare or flare nut or eye bolt	Loosen and retighten. Replace if ineffective.
	Poor insertion of hose or clamping	Retighten or replace the clamp.
	Damaged O-ring or gasket	Replace O-ring or gasket pipe or hose with new one, if ineffective, replace the gearbox also.
Leakage from hose (9) through (13) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (14) and (15) in figure	Damaged O-ring	Replace the oil pump.
	Damaged gasket	Replace the oil pump.
Leakage from oil tank (16) and (17) in figure	Crack in oil tank	Replace the oil tank.
Leakage from filler neck (18)	Damaged cap packing	Replace the cap.
	Crack in root of filler neck	Replace the oil tank.
	High fluid level	Adjust the fluid level.
Leakage from surrounding of power cylinder of gearbox (19) in figure	Damaged oil seal	Replace the oil seal.
Leakage from control valve of gearbox (20) and (21) in figure	Damaged packing or oil seal	Replace the problem parts.
	Damage in control valve	Replace the control valve.
(22) Leakage from connecting portion of cooler pipe and hose.	Insufficient tightening of connecting portion.	Loosen and retighten.

8. Pipe Assembly [RHD Model]

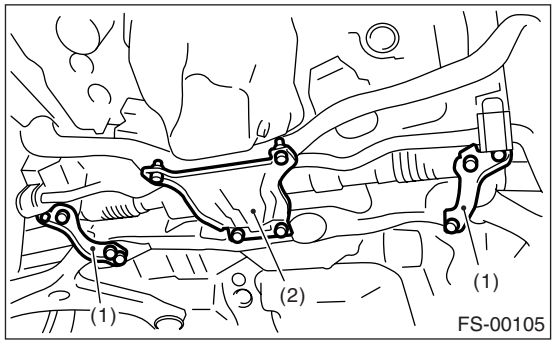
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Lift-up the vehicle, and then remove the front crossmember support plate and jack-up plate.
• Large type



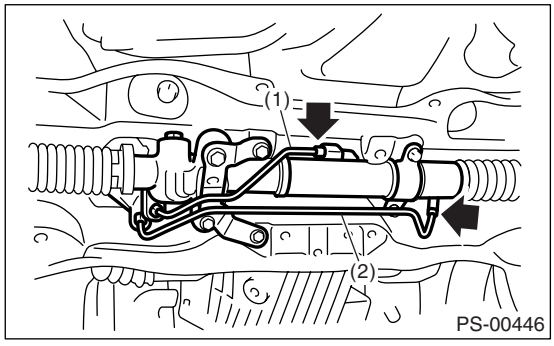
(1) Front crossmember support plate

• Small type



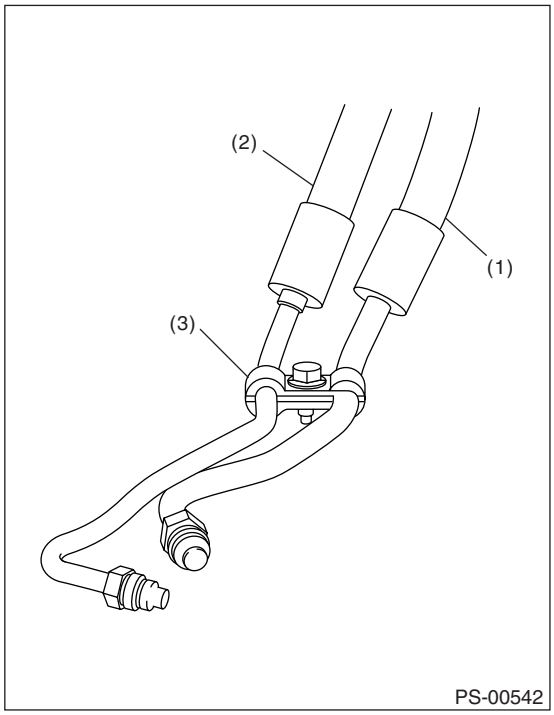
(1) Front crossmember support plate
(2) Jack-up plate

3) Remove one pipe joint at the center of gearbox, and connect the vinyl hose to the pipe and the joint. Discharge the fluid by turning steering wheel fully clockwise and counterclockwise. Discharge the fluid similarly from other pipes.



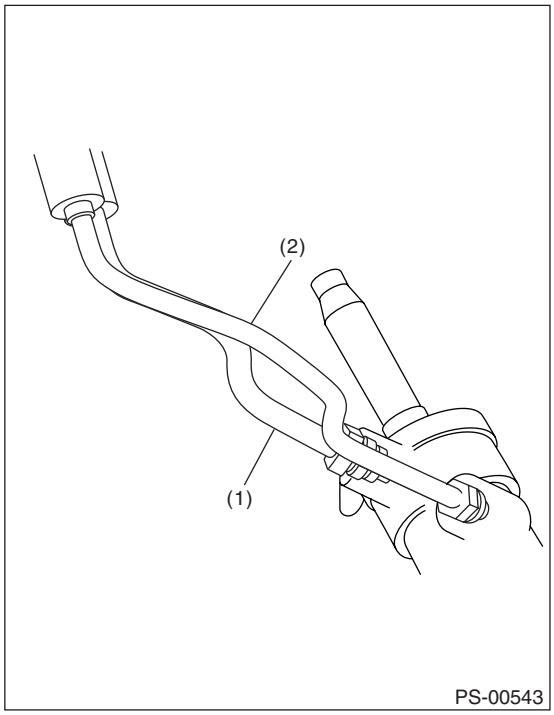
(1) Pipe A
(2) Pipe B

4) Remove the clamp E from the return hose and pressure hose.



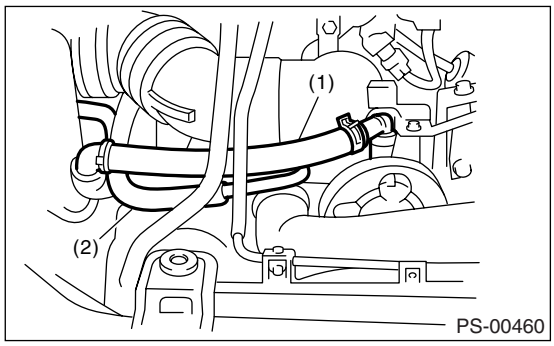
(1) Return hose
(2) Pressure hose
(3) Clamp E

5) Disconnect the return hose and pressure hose from gearbox.

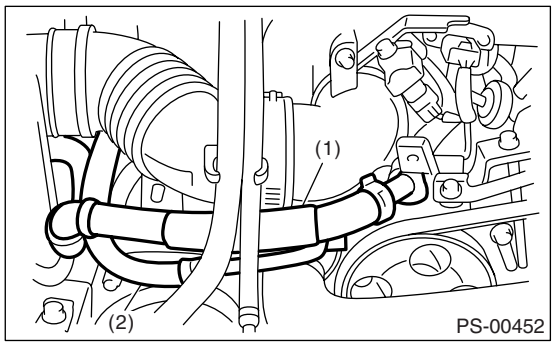


(1) Return hose
(2) Pressure hose

6) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
7) Disconnect the suction hose and pressure hose from the oil pump.
• Non-turbo model

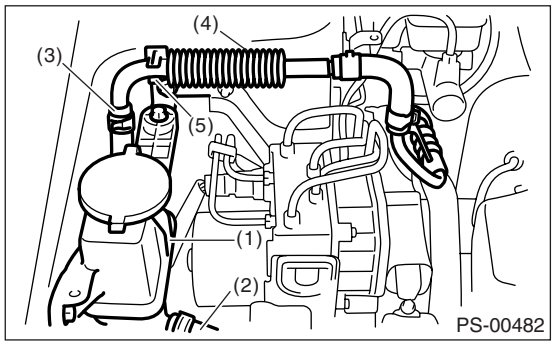


• Turbo model



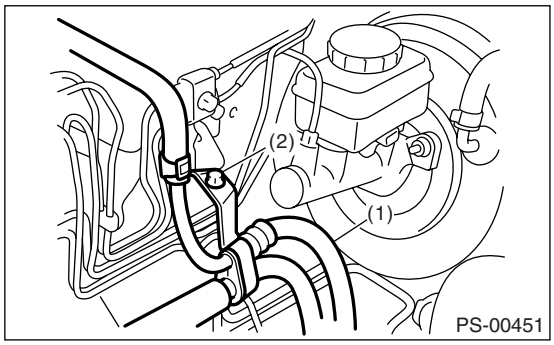
(1) Suction hose
(2) Pressure hose

8) Disconnect the suction hose and return hose from reservoir tank. Remove the oil cooler from oil cooler bracket.



(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

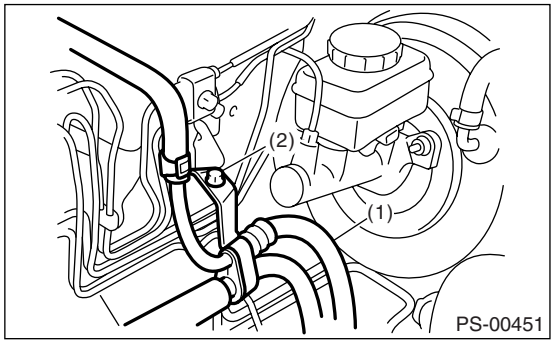
9) Remove the hose bracket and take out the hose assembly from vehicle.



(1) Hose ASSY
(2) Hose bracket

B: INSTALLATION

1) Temporarily tighten the bolt of hose bracket.

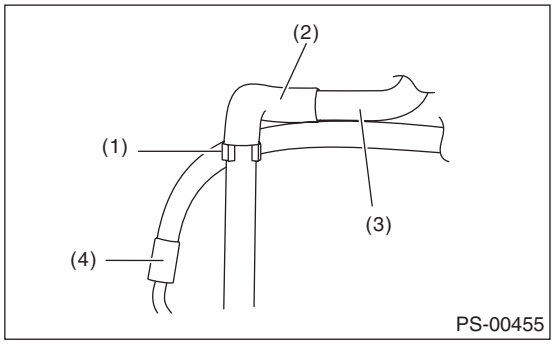


(1) Hose ASSY
(2) Hose bracket

2) Install the resin clip to the pressure hose and suction hose.

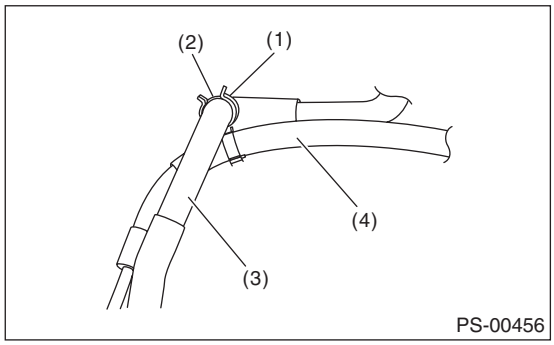
CAUTION:
Align the installation position of the resin clip with the protector edge of suction hose.

• Non-turbo model



(1) Resin clip
(2) Protector
(3) Suction hose
(4) Pressure hose

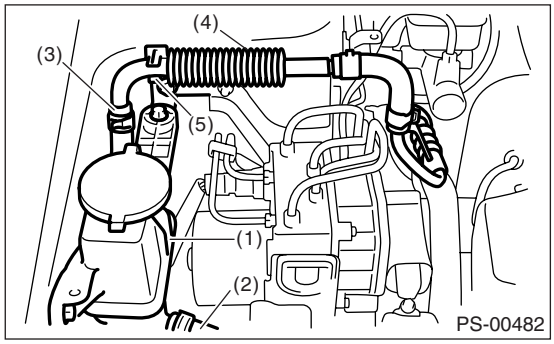
• Turbo model



(1) Resin clip
(2) Protector
(3) Suction hose
(4) Pressure hose

3) Connect the suction hose and return hose to reservoir tank. Install the oil cooler to oil cooler bracket.

CAUTION:
Firmly insert the resin clip of return hose to the bracket.

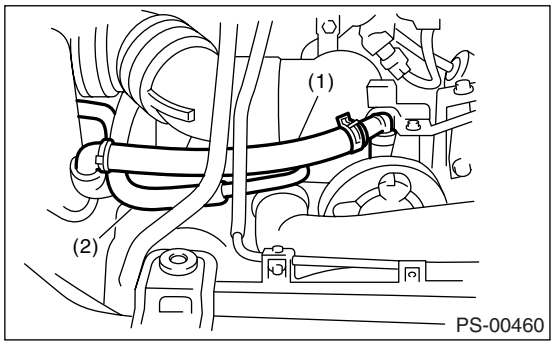


(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

4) Connect the suction hose and pressure hose to the oil pump. Tighten the eye bolt of pressure hose.

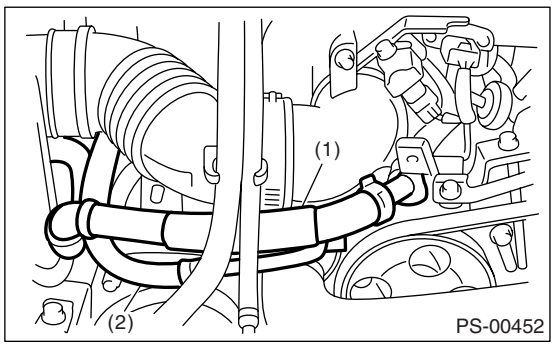
Tightening torque:
39 N·m (4.0 kgf-m, 28.9 ft-lb)

• Non-turbo model



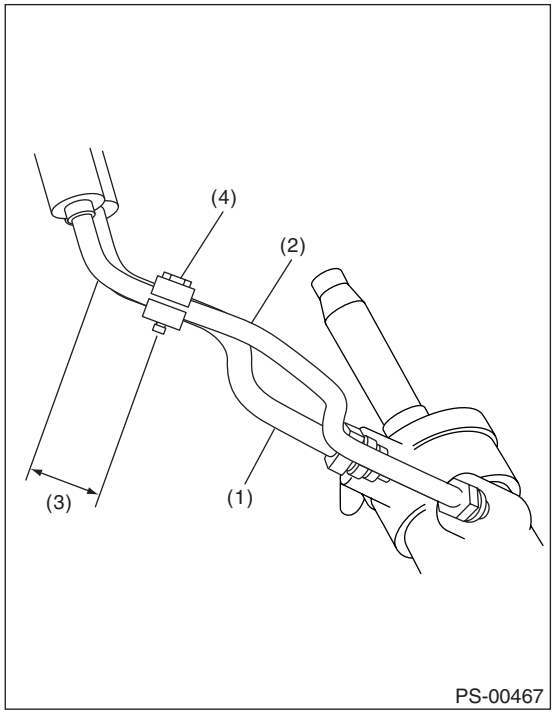
(1) Suction hose
(2) Pressure hose

• Turbo model



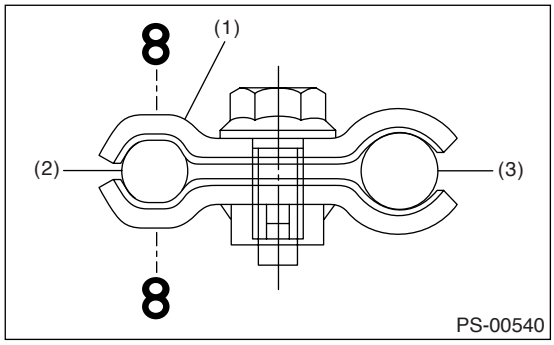
(1) Suction hose
(2) Pressure hose

5) Temporarily connect the return hose and pressure hose to gearbox. Place the clamp E in the position shown in the figure, and tighten the bolt temporarily.



(1) Return hose
(2) Pressure hose
(3) Approx. 27 mm (1.06 in)
(4) Clamp E

NOTE:
Ensure that the letter “8” on each clamp are diagonally opposite each other as shown in the figure.



(1) Clamp E
(2) Pipe C
(3) Return hose

6) Tighten the clamp E.

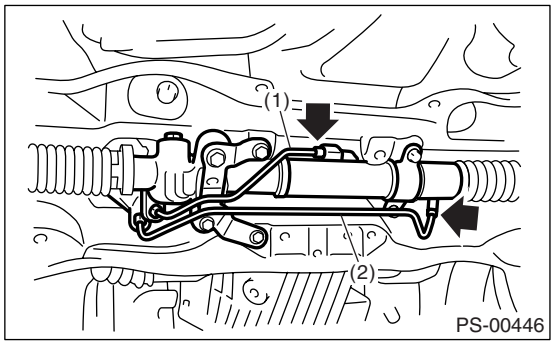
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.4 ft-lb)

7) Tighten the joint nut.

Tightening torque:
15 N·m (1.5 kgf-m, 10.8 ft-lb)

8) Connect the pipe A and B to the four pipe joints of gearbox.

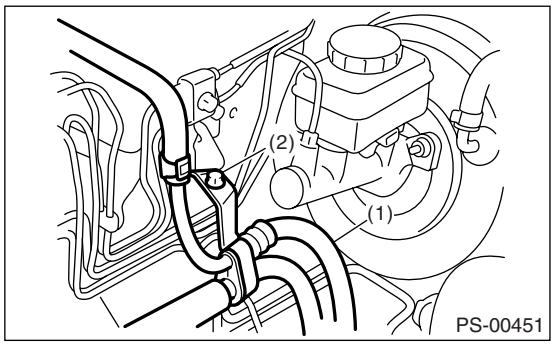
Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Pipe A
(2) Pipe B

9) Install the front crossmember support plate and jack-up plate.
10) Lower the vehicle.
11) Tighten the bolts which hold the hose bracket.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)



(1) Hose ASSY
(2) Hose bracket

12) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
13) Connect the battery ground cable to battery.
14) Feed the specified fluid.

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

15) Finally, check clearance between pipes or hoses as shown in the figure indicated in “General Diagnostic Table”. <Ref. to PS-89, INSPECTION OF CLEARANCE, INSPECTION, General Diagnostic Table.>

C: INSPECTION

Check all disassembled parts for wear, damage or other abnormalities. Repair or replace defective parts as necessary.

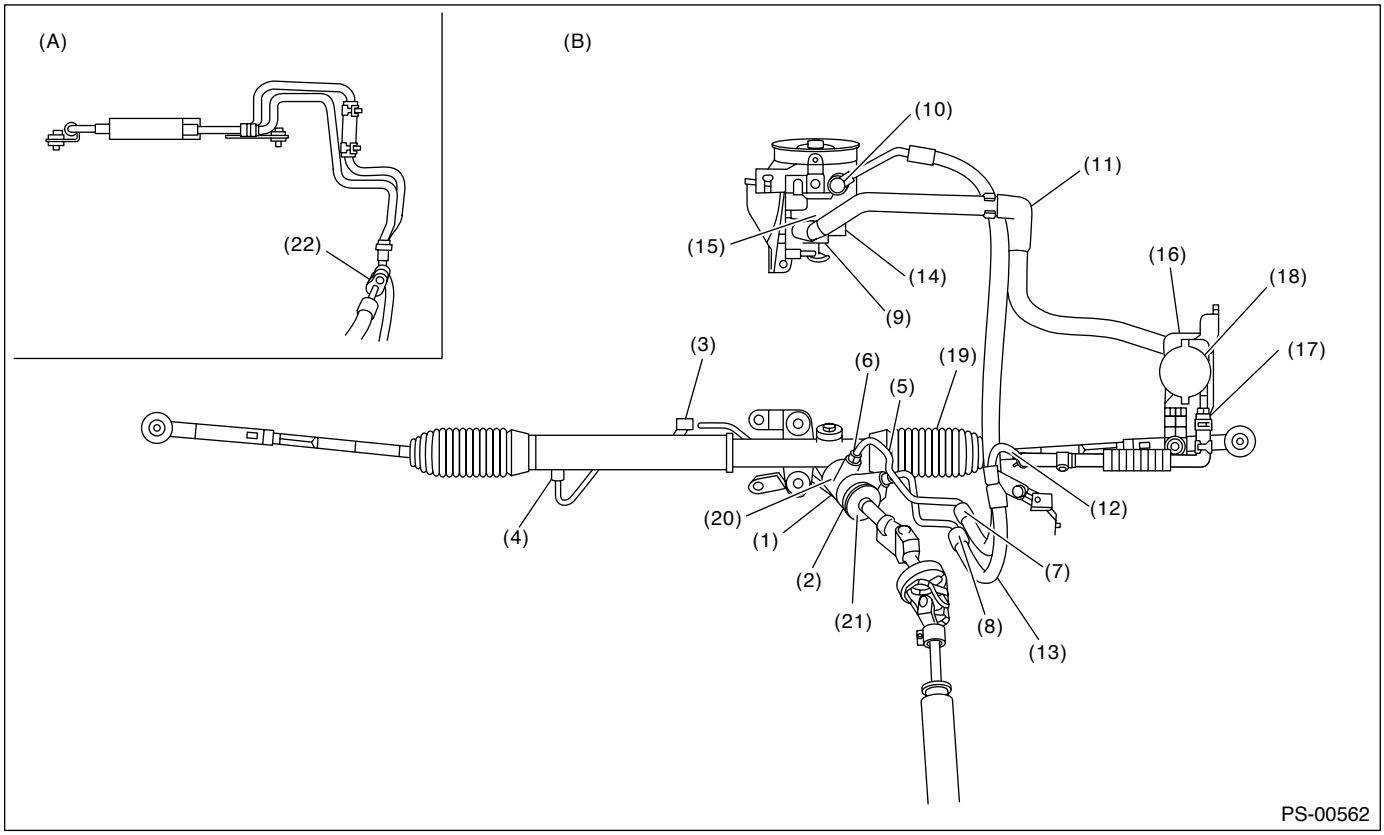
Parts	Maintenance Parts	Corrective action
Pipe	• O-ring fitting surface for damage • Nut for damage • Pipe for damage	Replace with a new one.
Clamp	• Clamps for weak clamping force	Replace with a new one.
Hose	• Flare surface for damage • Flare nut for damage • Outer surface for cracks • Outer surface for wear • Clip for damage • End coupling or adapter for deformation	Replace with a new one.

CAUTION:
Although surface layer materials of rubber hoses have excellent weathering resistance, heat resistance and resistance for low temperature brittleness, they are likely to be damaged chemically by brake fluid, battery electrolyte, engine oil and automatic transmission fluid and their service lives are to be very shortened. Wipe out immediately when the hoses are adhered with the fluids.
Since resistances for heat or low temperature brittleness are gradually declining according to time accumulation of hot or cold conditions for the hoses and their service lives are shortening accordingly, it is necessary to perform careful inspection frequently when the vehicle is used in hot weather areas, cold weather areas and a driving condition in which many steering operations are required in short time.
Particularly continuous work of relief valve over 5 seconds causes to reduce service lives of the hoses, the oil pump, the fluid, etc. due to over heat.

Trouble	Possible cause	Corrective action
Pressure hose burst	Excessive holding time of relief status	Instruct customers.
	Malfunction of relief valve	Replace oil pump.
	Poor cold characteristic of fluid	Replace fluid.
Forced out return hose	Poor connection	Repair.
	Poor holding of clip	Retighten.
	Poor cold characteristic of fluid	Replace fluid.
Fluid bleeding out of hose slightly	Wrong layout, tensioned	Replace hose.
	Excessive play of engine due to deterioration of engine mounting rubber	Replace the parts if defective.
	Improper stop position of pitching stopper	Replace the parts if defective.
Crack on hose	Excessive holding time of relief status	Replace. Instruct customers.
	Excessive tightening torque of return hose clip	Replace.
	Power steering fluid, engine oil, electrolyte adhere on the hose surface	Replace. Pay attention on service work.
	Too many times use in extremely cold weather	Replace. Instruct customers.

Pipe Assembly [RHD Model]

NOTE:
It is likely that although one judges fluid leakage, there is actually no leakage. This is because the fluid spilt during the last maintenance was not completely wiped off. Be sure to wipe off spilt fluid thoroughly after maintenance.



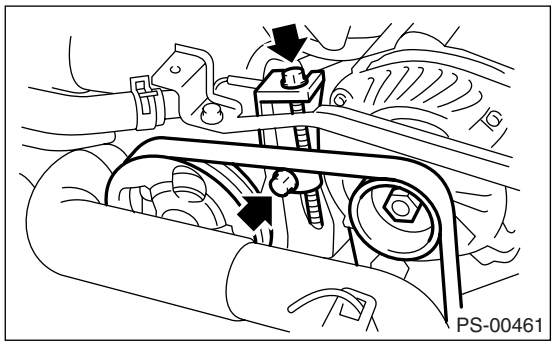
(A) 3.0 L model (B) Except for 3.0 L model

Fluid leaking area	Possible cause	Corrective action
Leakage from connecting portions of pipes and hoses, numbered with (1) through (10) in figure	Insufficient tightening of flare nut, adhesion of dirt, damage to flare or flare nut or eye bolt	Loosen and retighten. Replace if ineffective.
	Poor insertion of hose or clamping	Retighten or replace the clamp.
	Damaged O-ring or gasket	Replace O-ring or gasket pipe or hose with new one, if ineffective, replace the gearbox also.
Leakage from hose (11), (12) and (13) in figure	Crack or damage in hose	Replace with a new one.
	Crack or damage in hose hardware	Replace with a new one.
Leakage from surrounding of cast iron portion of oil pump (14) and (15) in figure	Damaged O-ring	Replace the oil pump.
	Damaged gasket	Replace the oil pump.
Leakage from oil tank (16) and (17) in figure	Crack in oil tank	Replace the oil tank.
Leakage from filler neck (18)	Damaged cap packing	Replace the cap.
	Crack in root of filler neck	Replace the oil tank.
	High fluid level	Adjust the fluid level.
Leakage from surrounding of power cylinder of gearbox (19) in figure	Damaged oil seal	Replace the oil seal.
Leakage from control valve of gearbox (20) and (21) in figure	Damaged packing or oil seal	Replace the problem parts.
	Damage in control valve	Replace the control valve.
(22) Leakage from connecting portion of cooler pipe and hose.	Insufficient tightening of connecting portion.	Loosen and retighten.

9. Oil Pump

A: REMOVAL

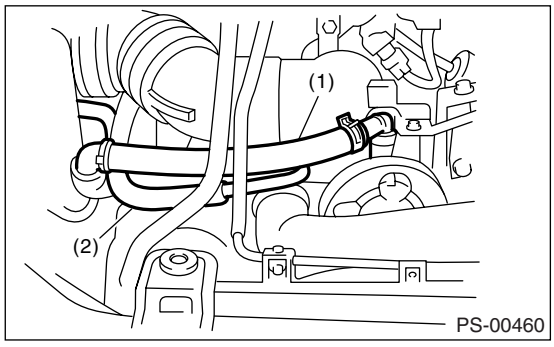
1) Disconnect the ground cable from battery.
2) Remove the air intake duct. <Ref. to IN(H4DOTC)-9, REMOVAL, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, REMOVAL, Air Intake Duct.>
3) Remove the pulley belt cover.
4) Loosen the belt tension securing bolt and generator securing bolt, and then remove the power steering pump V-belt.



5) Disconnect the connector from power steering pump switch.
6) Disconnect the pressure hose and suction hose from oil pump.

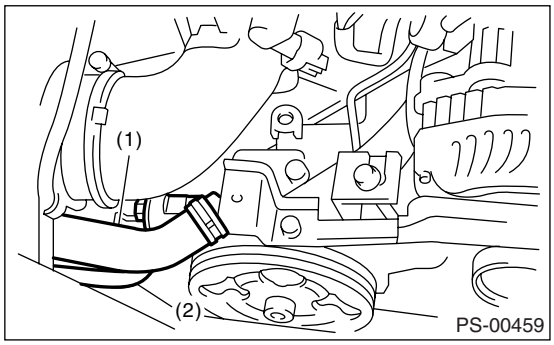
CAUTION:
• Do not allow fluid to come into contact with pulley belt.
• To prevent foreign matter from entering the hose and pipe, cover the open ends with a clean cloth.

• Non-turbo model



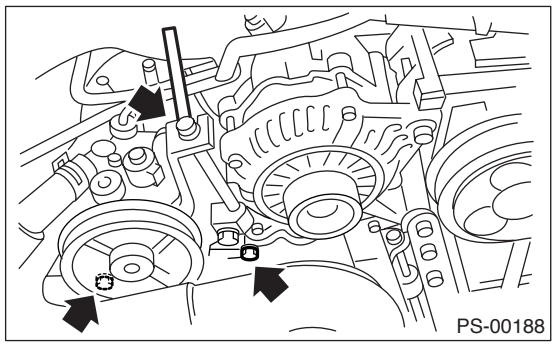
(1) Suction hose
(2) Pressure hose

• Turbo model



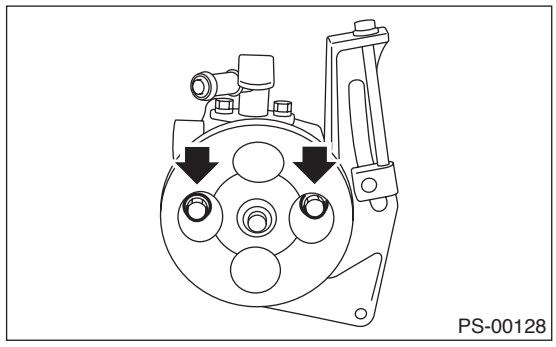
(1) Suction hose
(2) Pressure hose

7) Remove the bolts which hold the power steering pump bracket.



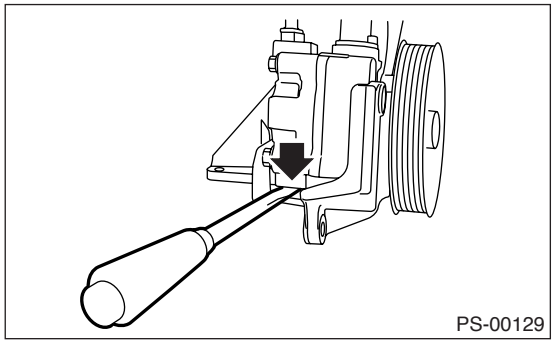
8) Place the oil pump bracket in a vise, and remove the two bolts from the front side of oil pump.

CAUTION:
When securing the oil pump bracket in a vice, hold the oil pump bracket with the least possible force between two wood pieces.



9) Remove the bolt from the rear side of oil pump.

10) Disassemble the oil pump and bracket by inserting a flat tip screwdriver as shown in the figure.

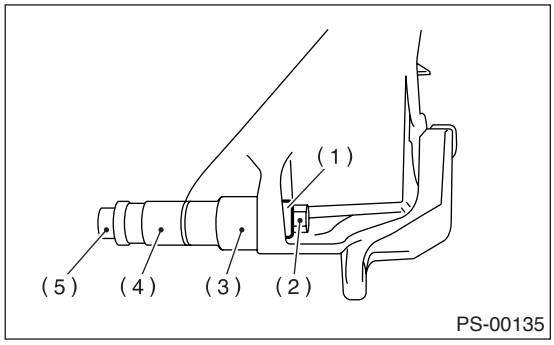


B: INSTALLATION

1) Install the oil pump to bracket.

(1) Place the oil pump bracket in a vise. Tighten the bushing using a 12.7 mm (1/2″) type 14- and 21-mm box wrench until it contact with oil pump mounting surface.

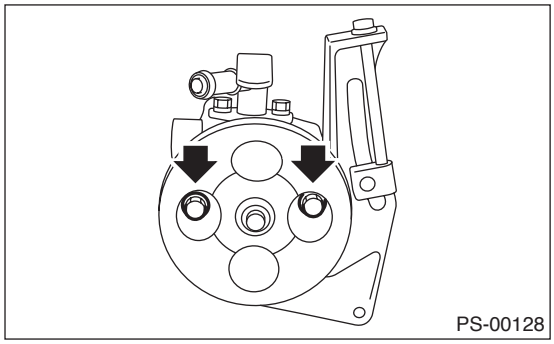
CAUTION:
When securing the oil pump bracket on a vice, hold the oil pump bracket with the least possible force between two wood pieces.



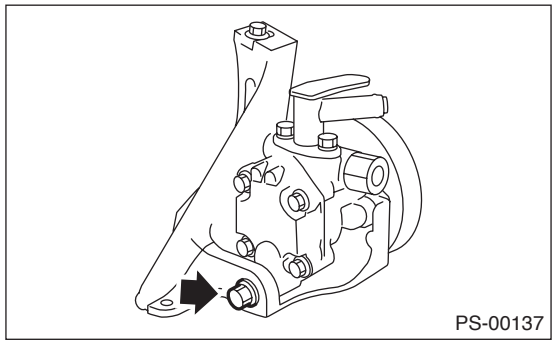
(1) Bushing
(2) Nut
(3) 21 mm
(4) 14 mm
(5) Bolt

(2) Tighten the bolt which holds the oil pump to bracket.

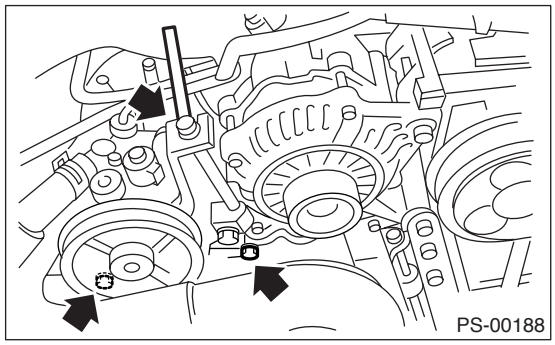
Tightening torque:
15.7 N·m (1.6 kgf-m, 11.6 ft-lb)



Tightening torque:
37.3 N·m (3.8 kgf-m, 27.5 ft-lb)



2) Tighten the bolts which hold the power steering pump bracket.

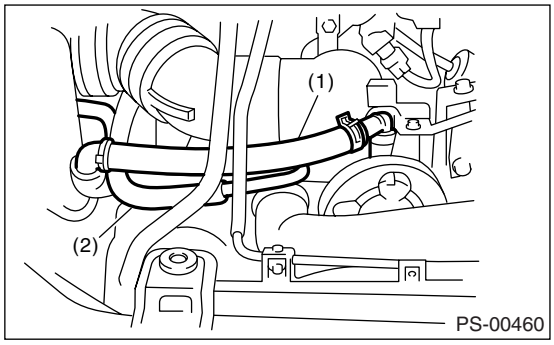


3) Interconnect the pressure hose and suction hose.

Tightening torque:
Eye bolt
39 N·m (4.0 kgf-m, 28.9 ft-lb)

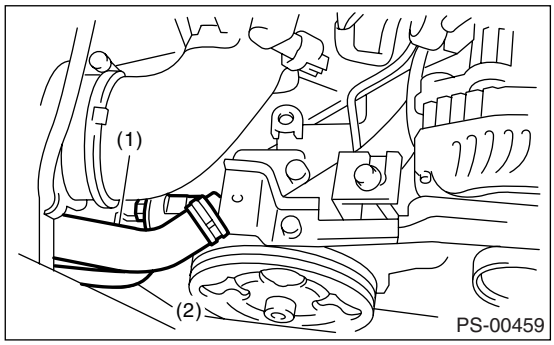
CAUTION:
If a hose is twisted at this step, take care the hose may come into contact with some other parts.

• Non-turbo model



(1) Suction hose
(2) Pressure hose

• Turbo model



(1) Suction hose
(2) Pressure hose

4) Connect the connector to power steering pump switch.
5) Install the V-belts to oil pump.
6) Check the tension of V-belt.
<Ref. to ME(H4SO 2.0)-39, INSPECTION, V-belt.>
7) Tighten the belt tension bolt.

Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

8) Install the pulley belt cover.
9) Install the air intake duct.
<Ref. to IN(H4DOTC)-9, INSTALLATION, Air Intake Duct.> <Ref. to IN(H4SO 2.0)-9, INSTALLATION, Air Intake Duct.>
10) Connect the battery ground cable to battery.
11) Feed the specified power steering fluid. <Ref. to PS-84, Power Steering Fluid.>

CAUTION:
Never start the engine before feeding the fluid; otherwise vane pump might be seized up.

C: INSPECTION

1. BASIC INSPECTION

Perform the following inspection procedures and replace defective parts.

No.	Parts	INSPECTION	Corrective action
1	Oil pump (Exterior)	(1) Crack, damage or oil leakage	Replace the oil pump with a new one.
		(2) Play of pulley shaft	Measure the radial play and axial play. If any of these exceeds the service limit, replace the oil pump with a new one.
2	Pulley	(1) Damage	Replace with a new one.
		(2) Bend	Measure the V ditch deflection. If it exceeds the service limit, replace the pulley with a new one.
3	Oil pump (Interior)	(1) Defect or burning of vane pump	Check the resistance to the rotation of pulley. If it exceeds the service limit, replace the oil pump with a new one.
		(2) Bend in the shaft or damage to bearing	Oil pump emits a noise that is markedly different in tone and loudness from a sound of a new oil pump when turning its pulley which is put around with a string, replace the oil pump with a new one.
4	O-ring	Crack or deterioration	Replace with a new one.
5	Bracket	Crack	Replace with a new one.

2. SERVICE LIMIT

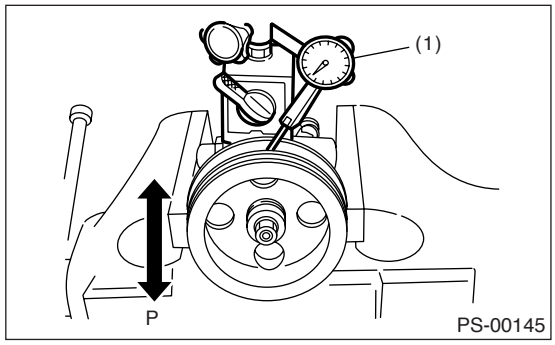
Make a measurement as follows. If it exceeds the service limit, replace with a new one.

CAUTION:
• When securing the oil pump on a vice, hold the oil pump with the least possible force between two wood pieces.
• Do not set outside of flow control valve or pulley on a vice; otherwise outside or pulley might be deformed. Select properly sized wood pieces.

1) Play of the pulley shaft

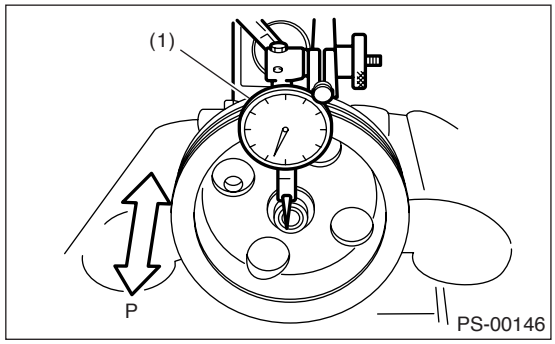
Condition:
P: When applying the force of 9.8 N (1.0 kgf, 2.2 lb)

Service limit:
Radial play (Direction ⟷)
0.4 mm (0.016 in) or less



(1) Dial gauge

Axial play (Direction ⟺)
0.9 mm (0.035 in) or less

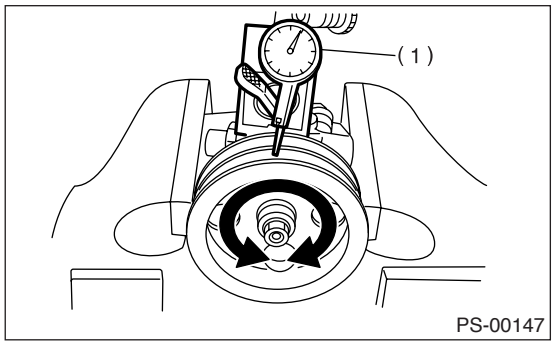


(1) Dial gauge

2) Ditch deflection of pulley

Service limit:
1.0 mm (0.039 in) or less

NOTE:
Read the value for one surface of V ditch, and then the value for another off the dial.

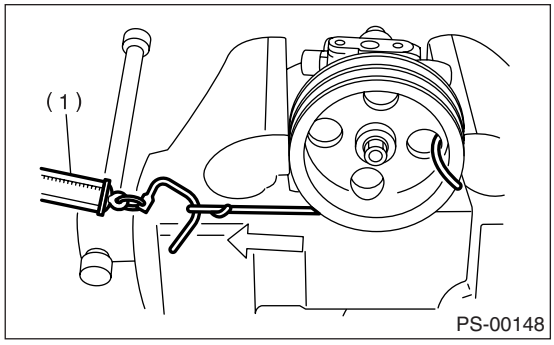


(1) Dial gauge

3) Resistance to rotation of pulley

Service limit:
Maximum load: 9.22 N (0.94 kgf, 2.07 lb) or less

NOTE:
• A rather higher value may be indicated when pulley starts turning.
• Measure the load during rotation to make a judgment.



(1) Spring balance

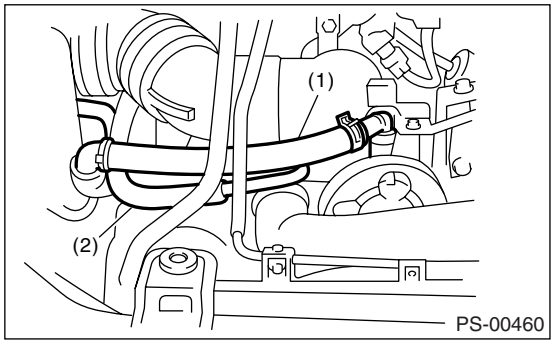
3. HYDRAULIC PRESSURE

NOTE:
• Be sure to complete all items aforementioned in "INSPECTION", prior to measuring hydraulic pressure. Otherwise, pressure cannot be measured correctly. <Ref. to PS-85, INSPECTION, General Diagnostic Table.>
• Do not leave the valve of pressure gauge closed or hold the steering wheel at stop end for 5 seconds or more in any case, as the oil pump may be damaged due to long keep of these conditions.
• Put cloth at a place where fluid drops before pressure gauge is installed. Wipe off spilt fluid thoroughly after the measurement.

1) Regular pressure measurement
(1) Connect ST1, ST2 and ST3.

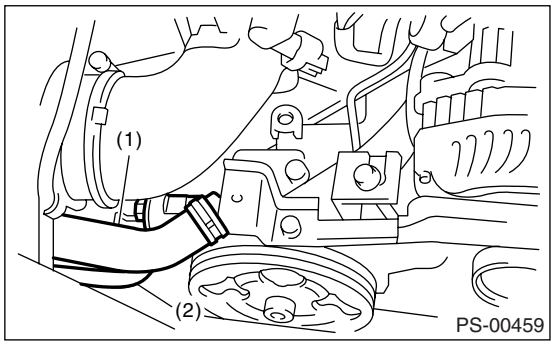
ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A

(2) Remove the air intake duct.
(3) Disconnect the pipe C from pump.
(4) Using the gasket (Part No. 34621AC021) and bolt (Part No. 34620AC010), install the ST2 to pump instead of pressure hose.
• Non-turbo model



(1) Suction hose
(2) Pressure hose

• Turbo model

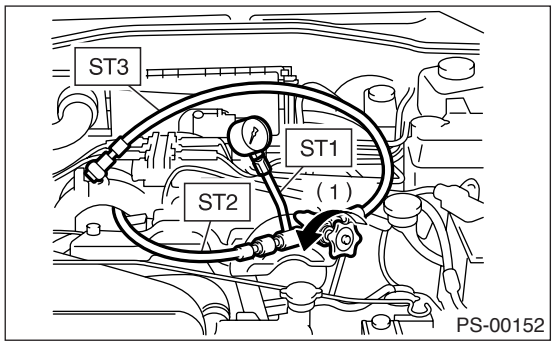


(1) Suction hose
(2) Pressure hose

(5) Install the ST3 to the end of pressure hose which is removed from pump.
(6) Replenish the power steering fluid up to specified level.
(7) Open the valve, and start the engine.

(8) Measure the regular pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



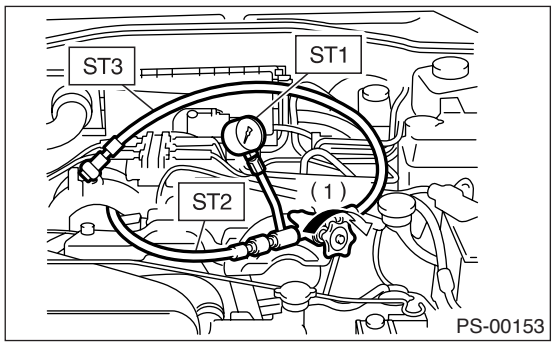
(1) Valve

Service limit:
981 kPa (10 kg/cm^2, 142 psi) or less

(9) If it is not within the specified value, replace the troubled part caused by following symptoms. (Pipe or hose clogged, leaks from fluid line, and mixture of foreign matters in fluid line)

2) Measure the relief pressure.
(1) Using the STs, measure the relief pressure.
(2) Close the valve.
(3) Measure the relief pressure.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



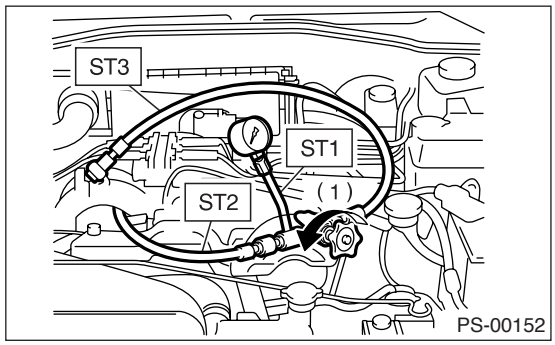
(1) Valve

Service limit:
Non-turbo model (Except for 3.0 R model):
6,767 — 7,453 kPa
(69 — 76 kg/cm^2, 981 — 1,081 psi)
Turbo model:
7,350 — 8,036 kPa
(75 — 82 kg/cm^2, 1,067 — 1,165 psi)
3.0 R model:
8,300 — 9,000 kPa
(85 — 92 kg/cm^2, 1,204 — 1,305 psi)

(4) If it is not within the specified value, replace the oil pump.

3) Measure working pressure.
(1) Using the STs, measure the working pressure.
(2) Open the valve.
(3) Measure the working pressure of control valve by turning steering wheel from stop to stop.

ST1 925711000 PRESSURE GAUGE
ST2 34099AC020 ADAPTER HOSE B
ST3 34099AC010 ADAPTER HOSE A



(1) Valve

Service limit:
7,650 — 8,330 kPa (78 — 85 kg/cm^2, 1,110 — 1,208 psi)

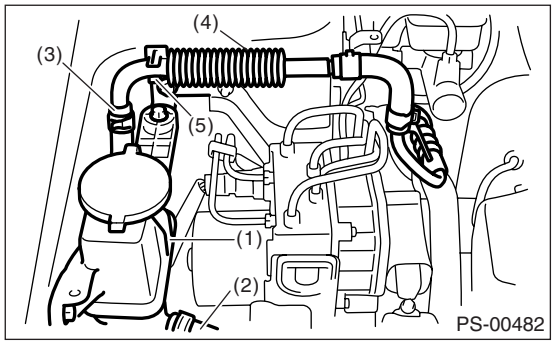
(4) If it is not within the specified value, measure the steering effort. <Ref. to PS-88, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.> If it is not within specified value, replace the control valve itself or control valve and pinion as a single unit with new ones.

10.Reservoir Tank

A: REMOVAL

1) Drain fluid from the reservoir tank.
2) Disconnect the hose from reservoir tank.

CAUTION:
To prevent foreign matter from entering the hose and pipe, cover the open ends of them with a clean cloth.



(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

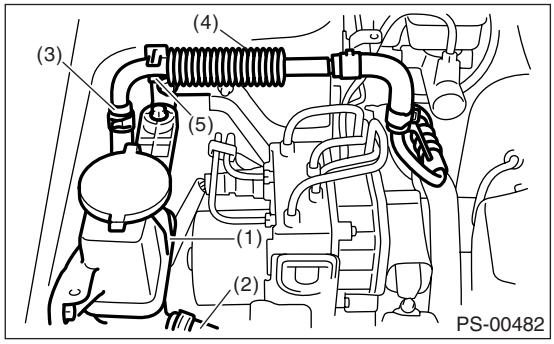
3) Remove the reservoir tank from body.

B: INSTALLATION

1) Install the reservoir tank to body.

Tightening torque:
13 N·m (1.3 kgf-m, 9.4 ft-lb)

2) Connect the hose to reservoir tank.



(1) Reservoir tank
(2) Suction hose
(3) Return hose
(4) Oil cooler
(5) Oil cooler bracket

3) Feed the power steering fluid to specified level.
<Ref. to PS-84, Power Steering Fluid.>

C: INSPECTION

Check the reservoir tank for cracks, breakage and damage. If a failure is found, replace the reservoir tank.

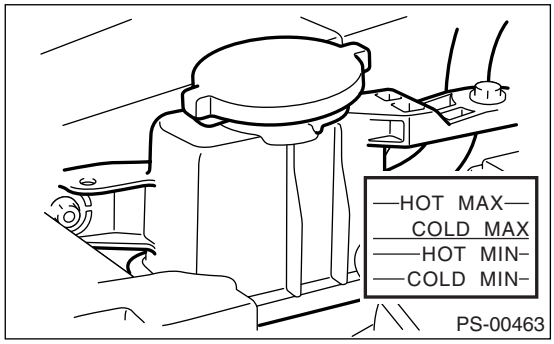
11.Power Steering Fluid

A: SPECIFICATION

Recommended power steering fluid	Manufacturer
ATF DEXRON III or equivalent	B.P.
	CALTEX
	CASTROL
	MOBIL
	SHELL
	TAXACO

B: INSPECTION

1) Check the power steering fluid for deterioration and contamination. If the fluid is highly deteriorated or contaminated, drain it and refill with new fluid.
2) Check the joints and units for oil leakage. If any oil leaks are found, repair or replace the applicable part.
3) Inspect the fluid level on flat and level surface with engine "OFF" by indicator of reservoir tank.
If the level is at "MIN." point or below, add fluid to keep the level in the specified range of the indicator. If at "MAX." point or above, drain fluid by using a syringe or the like.
(1) Check at power steering fluid temperature 20°C (68°F); read the fluid level on the "COLD" side.
(2) Check at power steering fluid temperature 80°C (176°F); read the fluid level on the "HOT" side.



C: REPLACEMENT

1) Lift-up the vehicle.
2) Remove the crossmember support.
3) Remove the pipe joint in the center of gearbox, and connect the vinyl hose to the pipe and joint. Wipe fluid off while turning the steering wheel.
4) Add the specified fluid to reservoir tank at MAX level.
5) Continue to turn the steering wheel slowly from lock to lock until the bubbles stop appearing on oil surface while keeping the fluid at the level in the Step 4).
6) If turning the steering wheel in low fluid level condition, air will be sucked in pipe. In this case, leave it about half an hour and then do the step 5) again.
7) Start the engine and let it idle.
8) Continue to turn the steering wheel slowly from lock to lock again until the bubbles stop appearing on oil surface while keeping the fluid at the level in Step 4).
Normally bubbles stop appearing after three times turning of steering wheel from lock to lock.
9) In case bubbles do not stop appearing in the tank, leave it about half an hour and then do the step 4) all over again.
10) Lower the vehicle, and then idle the engine.
11) Continue to turn the steering wheel from lock to lock until the bubbles stop appearing and change of the fluid level is within 3 mm (0.12 in).
12) In case the following happens, leave it about half an hour and then do step 8) to 11) again.
(1) The fluid level changes over 3 mm (0.12 in).
(2) Bubbles remain on the upper surface of the fluid.
(3) Grinding noise is generated from oil pump.
13) Check the fluid leakage after turning steering wheel from lock to lock with engine running.

12.General Diagnostic Table

A: INSPECTION

Trouble	Possible cause	Corrective action
• Heavy steering effort in all ranges • Heavy steering effort at stand still • Steering wheel surges when turning.	1. Pulley belt • Unequal length of pulley belts • Adhesion of oil and grease • Loose or damage of pulley belt • Poor uniformity of pulley belt cross section • Pulley belt touches to pulley bottom • Poor revolution of pulleys except oil pump pulley • Poor revolution of oil pump pulley	Adjust or replace.
	2. Tire and wheel • Improper tires out of specification*1 • Improper wheel out of specification*1 • Tires not properly inflated	Replace or reinflate.
	3. Fluid • Low fluid level • Aeration • Dust mix • Deterioration of fluid • Poor warming-up of fluid *2	Refill, bleed air, replace or instruct customer.
	4. Idle speed • Lower idle speed • Excessive drop of idle speed at start or at turning steering wheel *3	Adjust or instruct customer.
	5. Measure hydraulic pressure. <Ref. to PS-80, INSPECTION, Oil Pump.>	Replace the problem parts.
	6. Measure steering effort. <Ref. to PS-88, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust or replace.
• Vehicle leads to one side or the other • Poor return of steering wheel to center • Steering wheel surges when turning.	1. Fluid line • Folded hose • Flattened pipe	Correct or replace.
	2. Tire and wheel • Flat tire • Mix use of different tires • Mix use of different wheels • Abnormal wear of tire • Unbalance of remained grooves • Unbalance of tire pressure	Adjust, fix or replace.
	3. Front alignment • Improper or unbalance caster • Improper or unbalance toe-in • Loose connection of suspension	Adjust or retighten.
	4. Others • Damaged joint assembly • Unbalanced height • Unbalanced weight	Replace, adjust or instruct customer.
	5. Measure steering effort. <Ref. to PS-88, MEASUREMENT OF STEERING EFFORT, INSPECTION, General Diagnostic Table.>	Adjust or replace.

*1 If the tires or wheels are wider than specifications, the load to power steering system is increased. Accordingly, in a condition, for example before fluid warms-up, relief valve may work before maximum turning angle. In this case, steering effort may be heavy. When the measured hydraulic pressure is normal, there is no abnormal thing.
*2 In cold weather, steering effort may be heavy due to increased flow resistance of cold fluid. After warming-up engine, turn the steering wheel from stop to stop several times to warm-up fluid. Then if steering effort reduces normally, there is no abnormal thing.

*3 In cold weather or with insufficient warm-up of engine, steering effort may be heavy due to excessive drop of idling when turning steering wheel. In this case, it is recommended to start the vehicle with increasing engine speed than usual. Then if steering effort reduces normally, there is no abnormal thing.

1. NOISE AND VIBRATION

CAUTION:
Do not keep the relief valve operated over five seconds at any time or inner parts of the oil pump may be damaged due to rapid increase of fluid temperature.

NOTE:
• Grinding noise may be heard immediately after the engine start in extremely cold condition. In this case, if the noise goes off during warm-up there is no abnormal function in the system. This is due to the fluid characteristic in extremely cold condition.
• Oil pump makes whine or growl noise slightly due to its mechanism. Even if the noise can be heard when steering wheel is turned at stand still, there is no abnormal function in the system provided that the noise eliminates when the vehicle is running.
• When turning the steering wheel with service brake and/or parking brake applied, the noise is generated by creaking between disc and pads. However this does not indicate abnormal function in system.
• There may be a little vibration around the steering devices when turning steering wheel at standstill, even though the component parts are properly adjusted and have no defects.
Hydraulic systems are likely to generate this kind of vibration as well as working noise and fluid noise because of combined conditions, i.e., road surface and tire surface, engine speed and turning speed of steering wheel, fluid temperature and braking condition.
These phenomena do not indicate there are some abnormal functions in the system.
Confirm the vibration by turning the steering wheel repeatedly at various speeds from slow to rapid step by step with parking brake applied on concrete road and in “D” range for AT model.

Trouble	Possible cause	Corrective action
Hiss noise (continuous) While engine is running.	Relief valve emits operating sound when steering wheel is completely turned in either direction. (Do not keep this condition over five seconds.)	Normal Operation
	Relief valve emits operating sound when steering wheel is not turned. This means that the relief valve is defective.	Replace the oil pump.
Rattling noise (intermittent) While engine is running.	Interference with adjacent parts	Check the clearance. Correct if necessary. <Ref. to PS-69, INSPECTION, Pipe Assembly [LHD Model].>
	Loosened installation of oil pump, oil tank, pump bracket, gearbox or crossmember	Retighten.
	Loosened installation of oil pump pulley or other pulley(s)	Retighten.
	Loosened linkage or play of steering or suspension Loosened tightening of joint or steering column	Retighten or replace.
	Sound generates from the inside of gearbox or oil pump.	Replace the faulty parts of the gearbox or oil pump.
Knocking When turning steering wheel in both directions with small angle repeatedly at engine ON or OFF.	Excessive backlash Loosened lock nut for adjusting backlash	Adjust and retighten.
	Loosened tightening or play of tie-rod, tie-rod end	Retighten or replace.
Grinding noise (continuous) While engine is running.	Vane pump aeration	Inspect and retighten the fluid line connection. Refill the fluid and vent air.
	Vane pump seizing	Replace the oil pump.
	Pulley bearing seizing of oil pump	Replace the oil pump.
	Folded hose, flattened pipe	Replace.

Trouble	Possible cause	Corrective action
Squeal, squeak (intermittent or continuous) While engine is running.	Maladjustment of pulley belt Damaged or charged pulley belt Unequal length of pulley belts	Adjust or replace. (Replace two belts as a set.)
	Runout or defacement of V-groove surface of oil pump pulley	Clean or replace.
Sizzling noise (continuous) While engine is running.	Fluid aeration	Fix the wrong part causing aeration. Replace the fluid and vent air.
	Damaged pipe of gearbox	Replace the pipe.
	Abnormal inside of hose or pipe Flattened hose or pipe	Rectify or replace.
	Abnormal inside of oil tank	Replace.
	Removed oil tank cap	Install cap.
Whistle (continuous) While engine is running.	Abnormal pipe of gearbox or abnormal inside of hose	Replace the faulty parts of the gearbox or hose.
Whine or growl (intermittent or continuous) While engine is running with/ without steering turned.	Loosened installation of oil pump, oil pump bracket	Retighten.
	Abnormal inside of oil pump, hose	Replace the oil pump or hose, if the noise can be heard when running as well as stand still.
	Torque converter growl, air conditioner compression growl	Remove the power steering pulley belt and confirm.
Grinding noise (continuous) While engine is running with the steering turned.	Abnormal inside of gearbox	Replace the faulty parts of gearbox.
	Abnormal bearing for steering shaft	Apply grease or replace.
	Generates when turning steering wheel with brake (service or parking) applied.	If the noise goes off when brake is released, it is normal.
Vibration While engine is running with/ without steering turned.	Too low engine speed	Adjust and instruct customers.
	Vane pump aeration	Fix the wrong part. Vent air.
	Damaged valve in oil pump, gearbox	Replace the oil pump, faulty parts of gearbox.
	Looseness of play of steering, suspension parts	Retighten.

2. MEASUREMENT OF STEERING EFFORT

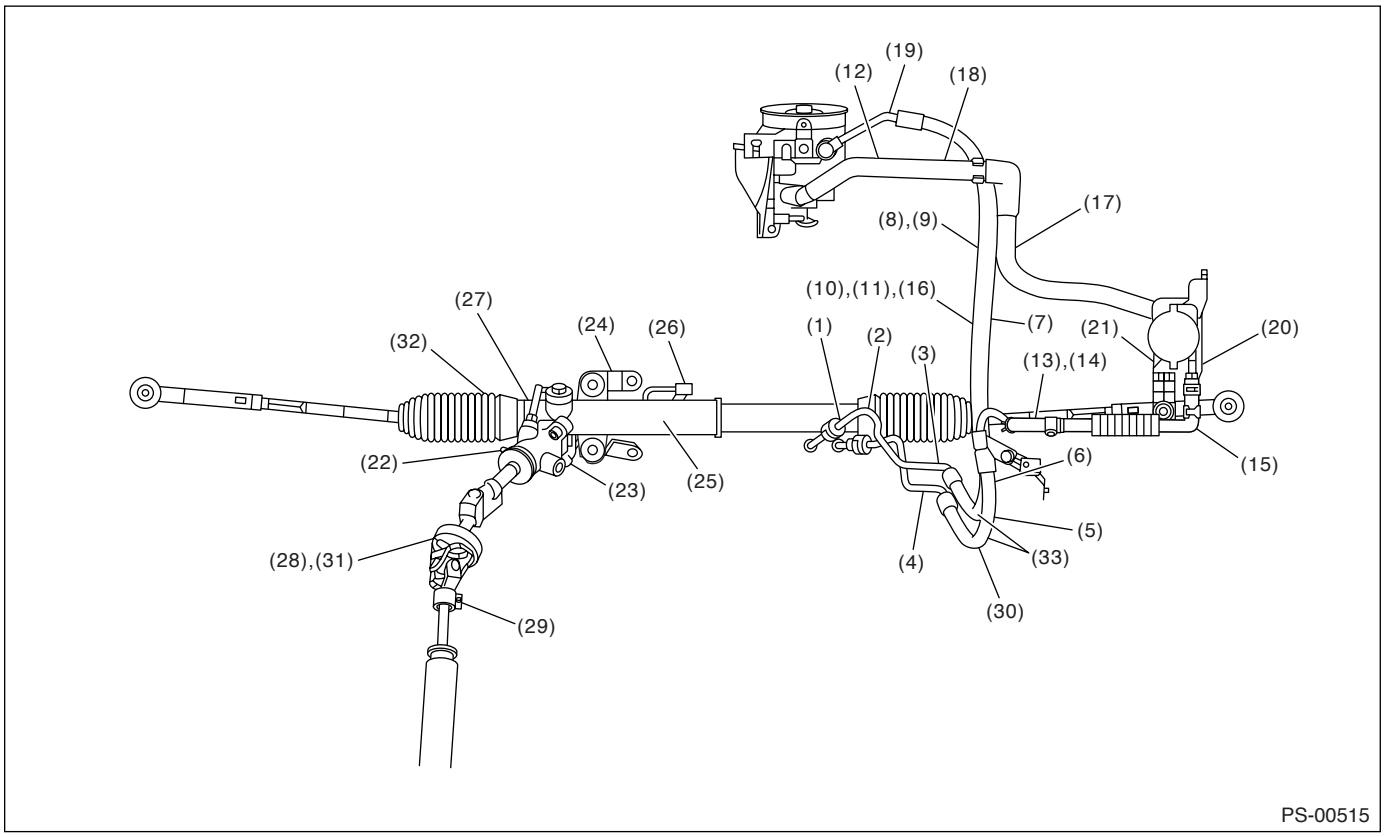
	Step	Check	Yes	No
1	**CHECK STEERING EFFORT.** 1) Stop the vehicle on a concrete road. 2) Start the engine. 3) Run the engine at idle. 4) Install a spring scale on the steering wheel. 5) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts. NOTE: When turning the steering more quickly than necessary from a direction to the other direction at an engine speed over 2,000 rpm, steering effort may be heavy. This is caused by flow characteristic of oil pump and is not defective.	Is the steering effort less than 29.4 N (3.0 kgf, 6.6 lb)?	Go to step **2.**	Adjust the backlash.
2	**CHECK STEERING EFFORT.** 1) Stop the engine. 2) Pull the spring scale at a right angle to the steering wheel, and measure both right and left steering wheel efforts.	Is the steering effort less than 294.2 N (30 kgf, 66.2 lb)?	Go to step **3.**	Perform adjustment.
3	**CHECK STEERING WHEEL EFFORT.** 1) Remove the universal joint. 2) Measure steering wheel effort.	Is steering effort less than 2.26 N (0.23 kgf, 0.51 lb)?	Go to step **4.**	Check, adjust and replace if necessary.
4	**CHECK STEERING WHEEL EFFORT.** Measure steering wheel effort.	Is the difference of steering effort between clockwise and counterclockwise less than 20%?	Go to step **5.**	Check, adjust and replace if necessary.
5	**CHECK UNIVERSAL JOINT.** Measure the folding torque of the joint (yoke of steering column side). <Ref. to PS-21, INSPECTION, Universal Joint.>	Is the folding torque less than 7.3 N (0.74 kgf, 1.64 lb)?	Go to step **6.**	Replace with a new one.
6	**CHECK UNIVERSAL JOINT.** Measure the folding torque of the joint (yoke of gearbox side). <Ref. to PS-21, INSPECTION, Universal Joint.>	Is the folding torque less than 3.8 N (0.39 kgf, 0.86 lb)?	Go to step **7.**	Replace with a new one.
7	**CHECK FRONT WHEEL.** Check the front wheel.	If the front wheels have unsteady revolution or rattling and brake for dragging?	Inspect, readjust and replace if necessary.	Go to step **8.**
8	**CHECK TIE-ROD ENDS.** Remove the tie-rod ends.	If the tie-rod ends of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **9.**
9	**CHECK BALL JOINT.** Remove the ball joint.	If the ball joints of suspension have unsteady revolution or rattling?	Inspect and replace if necessary.	Go to step **10.**
10	**CHECK GEARBOX.** Measure the rotating of gearbox. <Ref. to PS-44, TURNING RESISTANCE OF GEARBOX, INSPECTION, Steering Gearbox [LHD Model].>	Is the rotating resistance of steering gearbox less than 10.5 N (1.1 kgf, 2.4 lb)? Is the difference between clockwise and counterclockwise less than 20%?	Go to step **11.**	Readjust the backlash, and if ineffective, replace the faulty parts.
11	**CHECK GEARBOX.** Measure the sliding of gearbox. **<Ref. to PS-43,** SERVICE LIMIT, INSPECTION**, Steering Gearbox [LHD Model].>**	Is the sliding resistance of steering gearbox less than 314 N (32 kgf, 71 lb)? Is the difference between right and left sliding resistances less than 20%?	Steering effort is normal.	Readjust the backlash, and if ineffective, replace the faulty parts.

3. INSPECTION OF CLEARANCE

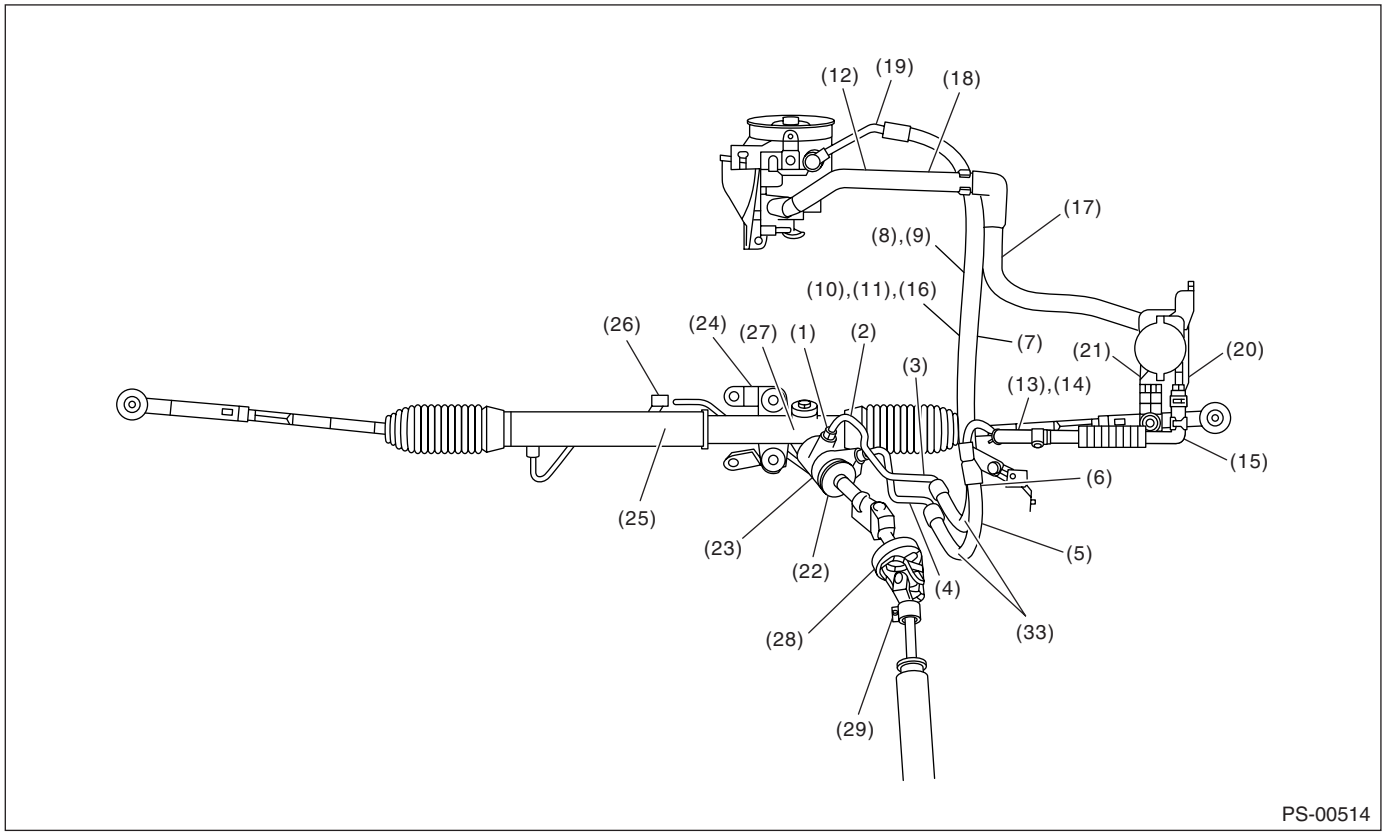
This table lists various clearances that must be correctly adjusted to ensure the normal vehicle driving without interfering noise, or any other faults.

LOCATION	Minimum allowance mm (in)
(1) Crossmember-to-Hose ASSY	3 (0.12)
(2) Front exhaust pipe-to-Hose ASSY (Turbo model)	15 (0.59)
(3) Front frame side-to-Hose ASSY	10 (0.39)
(4) Turbo cover-to-Hose ASSY (Turbo model)	10 (0.39)
(5) Master cylinder-to-Return hose (Turbo model)	10 (0.39)
(6) Master cylinder-to-Hose clip (Model with vehicle dynamics control (VDC))	10 (0.39)
(7) VDC H/U-to-Hose ASSY (Model with vehicle dynamics control (VDC))	5 (0.20)
(8) Air cleaner-to-Hose ASSY (Turbo model)	5 (0.20)
(9) Air boot-to-Hose ASSY	10 (0.39)
(10) Protector-to-Hose ASSY (Turbo model, DOHC non-turbo model)	10 (0.39)
(11) Blow-by-to-Hose ASSY (Turbo model)	8 (0.31)
(12) Over flow hose-to-Hose ASSY (Turbo model)	8 (0.31)
(13) Brake pipe-to-Return hose (Model with ABS)	10 (0.39)
(14) Front suspension bracket-to-Return hose	5 (0.20)
(15) Front wheel apron-to-Return hose	5 (0.20)
(16) VDC H/U bracket-to-Suction hose (Model with vehicle dynamics control (VDC))	5 (0.20)
(17) Air cleaner case-to-Suction hose	5 (0.20)
(18) Air intake duct-to-Suction hose (Turbo model)	10 (0.39)
(19) Air duct-to-Suction hose (Turbo model)	10 (0.39)
(20) Front wheel apron-to-Reservoir tank	5 (0.20)
(21) VDC H/U-to-Reservoir tank (Model with vehicle dynamics control (VDC))	5 (0.20)
(22) Valve housing-to-DOJ (MT model)	12 (0.47)
(23) Valve housing-to-Crossmember (Hole)	1 (0.04)
(24) Bracket-to-Crossmember	1 (0.04)
(25) Cylinder-to-Crossmember	5 (0.20)
(26) Elbow-to-Crossmember	1 (0.04)
(27) Cylinder-to-Exhaust pipe	18 (0.71)
(28) Universal joint coupling-to-Turbo cover (Turbo model)	15 (0.59)
(29) Universal joint column side yoke-to-Master cylinder (Closest approach point when universal joint turns by 360°) (OUTBACK model)	5 (0.20)
(30) Cruise control-to-Hose ASSY (Model with cruise control)	10 (0.39)
(31) Universal joint coupling-to-ATF level gauge (LHD model)	10 (0.39)
(32) Boot-to-Exhaust pipe (LHD model)	18 (0.71)
(33) Return hose-to-Pressure hose	No contact between hoses

• LHD model



• RHD model



BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)

AC

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1. General Description

A: SPECIFICATION

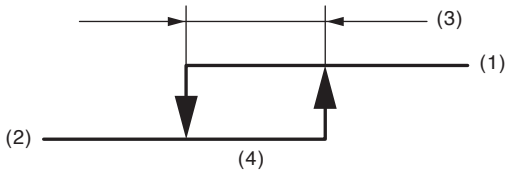
1. HEATER SYSTEM

Item		Specification	On condition
Heating capacity		5.2 kW (4,471 kcal/h, 17,743 BTU/h) or more	• Mode selector switch: HEAT • Temperature control switch: FULL HOT • Temperature difference between hot water and inlet air: 65°C (149°F) • Hot water flow rate: 360 ℓ (95.1 US gal, 79.2 Imp gal)/h
Air flow rate		370 m^3 (13,066 cu ft)/h	Heat mode (FRESH), FULL HOT at 12.5 V
Max air flow rate		460 m^3 (16,245 cu ft)/h	• Temperature control switch: FULL COLD • Blower fan speed: Auto A/C: 6th position Manual A/C: 4th position • Mode selector lever: RECIRC
Heater core size (height × length × width)		264 × 110 × 27 mm (10.4 × 4.33 × 1.06 in)	—
Blower motor	Type	Magnet motor 220 W or less	12 V
	Fan type and size (diameter × width)	Sirocco fan type 150 × 75 mm (5.91 × 2.95 in)	—

2. A/C SYSTEM

• Auto A/C model

Item		Specification
Type of air conditioner		Reheat air-mix type
Cooling capacity		5.3 kW (4,557 kcal/h, 18,084 BTU/h)
Refrigerant		HFC-134a (CH_2FCF_3) [0.4±0.03 kg (0.88±0.07 lb)]
Compressor	Type	Scroll, constant volume (SCSA 08C)
	Discharge	74.5 cc (4.55 cu in)/rev
	Max. permissible speed	9,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	35 W
	Type of belt	H4 model: V-belt 4 PK H6 model: V-belt 6 PK
	Pulley dia. (effective dia.)	93 mm (3.7 in)
	Pulley ratio	1.43
Condenser	Type	Corrugated fin (Sub cool type)
	Core face area	0.186 m^2 (2.002 sq ft)
	Core thickness	16 mm (0.63 in)
	Radiation area	5.49 m^2 (59.09 sq ft)
Receiver drier	Effective inner capacity	190 cm^3 (11.6 cu in)
Expansion valve	Type	Internal equalizing
Evaporator	Type	Single tank
	Dimensions (W × H × T)	298.6 × 151 × 38 mm (11.76 × 5.94 × 1.50 in)
Blower fan	Fan type	Sirocco fan
	Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
	Power consumption	220 W

Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	H4 model: 90 W H6 model: 160 W
		Fan outer diameter	H4 model: 300 mm (11.8 in) H6 model: 320 mm (12.6 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	H4 model: 90 W H6 model: 160 W
		Fan outer diameter	H4 model: 300 mm (11.8 in) H6 model: 320 mm (12.6 in)
Idling speed (A/C ON)		MPFI model	800±100 rpm
Triple switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	196±20 kPa (2.00±0.20 kg/cm^2, 28.4±2.9 psi)
		OFF → ON	225^{+25}_{-29} kPa ($2.29^{+0.25}_{-0.30}$ kg/cm^2, $32.6^{+3.6}_{-4.2}$ psi)
	High-pressure switch operating pressure	ON → OFF	$3{,}140^{+50}_{-200}$ kPa ($32.02^{+0.51}_{-2.04}$ kg/cm^2, $455.4^{+7.25}_{-29.0}$ psi)
		OFF → ON	2,550±200 kPa (26.00±2.04 kg/cm^2, 369.8±29.0 psi)
	Middle-pressure switch operating pressure	ON → OFF	1,370±120 kPa (13.97±1.22 kg/cm^2, 198.65±17.35 psi)
		OFF → ON	1,770±100 kPa (18.05±1.02 kg/cm^2, 256.81±14.50 psi)
Thermo-control amplifier working temperature (Evaporator outlet air)		 AC-00601 (1) ON (2) OFF (3) 1±0.5°C (33.8±0.9°F) (4) $4^{+1.5}_{0}$°C ($39.2^{+2.7}_{0}$°F)	

• Manual A/C model

Item		Specification
Type of air conditioner		Reheat air-mix type
Cooling capacity		5.3 kW (4,557 kcal/h, 18,084 BTU/h)
Refrigerant		HFC-134a (CH_2FCF_3) [0.4±0.03 kg (0.88±0.07 lb)]
Compressor	Type	Scroll, constant volume (SCSA 08C)
	Discharge	74.5 cc (4.55 cu in)/rev
	Max. permissible speed	9,000 rpm
Magnet clutch	Type	Dry, single-disc type
	Power consumption	35 W
	Type of belt	V-belt 4 PK
	Pulley dia. (effective dia.)	93 mm (3.7 in)
	Pulley ratio	1.43

Condenser		Type	Corrugated fin (Sub cool type)
		Core face area	0.186 m^2 (2.002 sq ft)
		Core thickness	16 mm (0.63 in)
		Radiation area	5.49 m^2 (59.09 sq ft)
Receiver drier		Effective inner capacity	250 cm^3 (15.26 cu in)
Expansion valve		Type	Externally equalizing
Evaporator		Type	Single tank
		Dimensions (W × H × T)	298.6 × 151 × 38 mm (11.7 × 5.94 × 1.50 in)
Blower fan		Fan type	Sirocco fan
		Outer diameter × width	150 × 75 mm (5.91 × 2.95 in)
		Power consumption	220 W
Condenser fan (Sub fan)		Motor type	Magnet
		Power consumption	90 W
		Fan outer diameter	300 mm (11.8 in)
Radiator fan (Main fan)		Motor type	Magnet
		Power consumption	90 W
		Fan outer diameter	300 mm (11.8 in)
Idling speed (A/C ON)		MPFI model	800±100 rpm
Triple switch (Pressure switch)	Low-pressure switch operating pressure	ON → OFF	196±20 kPa (2.00±0.20 kg/cm^2, 28.4±2.9 psi)
		OFF → ON	225^{+25}_{-29} kPa ($2.29^{+0.25}_{-0.30}$ kg/cm^2, $32.6^{+3.6}_{-4.2}$ psi)
	High-pressure switch operating pressure	ON → OFF	$3{,}140^{+50}_{-200}$ kPa ($32.02^{+0.51}_{-2.04}$ kg/cm^2, $455.4^{+7.25}_{-29.0}$ psi)
		OFF → ON	2,550±200 kPa (26.00±2.04 kg/cm^2, 369.8±29.0 psi)
	Middle-pressure switch operating pressure	ON → OFF	1,370±120 kPa (13.97±1.22 kg/cm^2, 198.65±17.35 psi)
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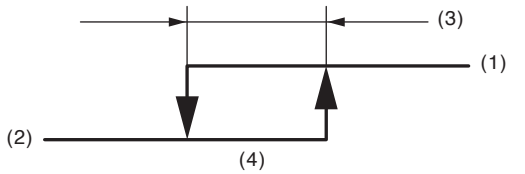
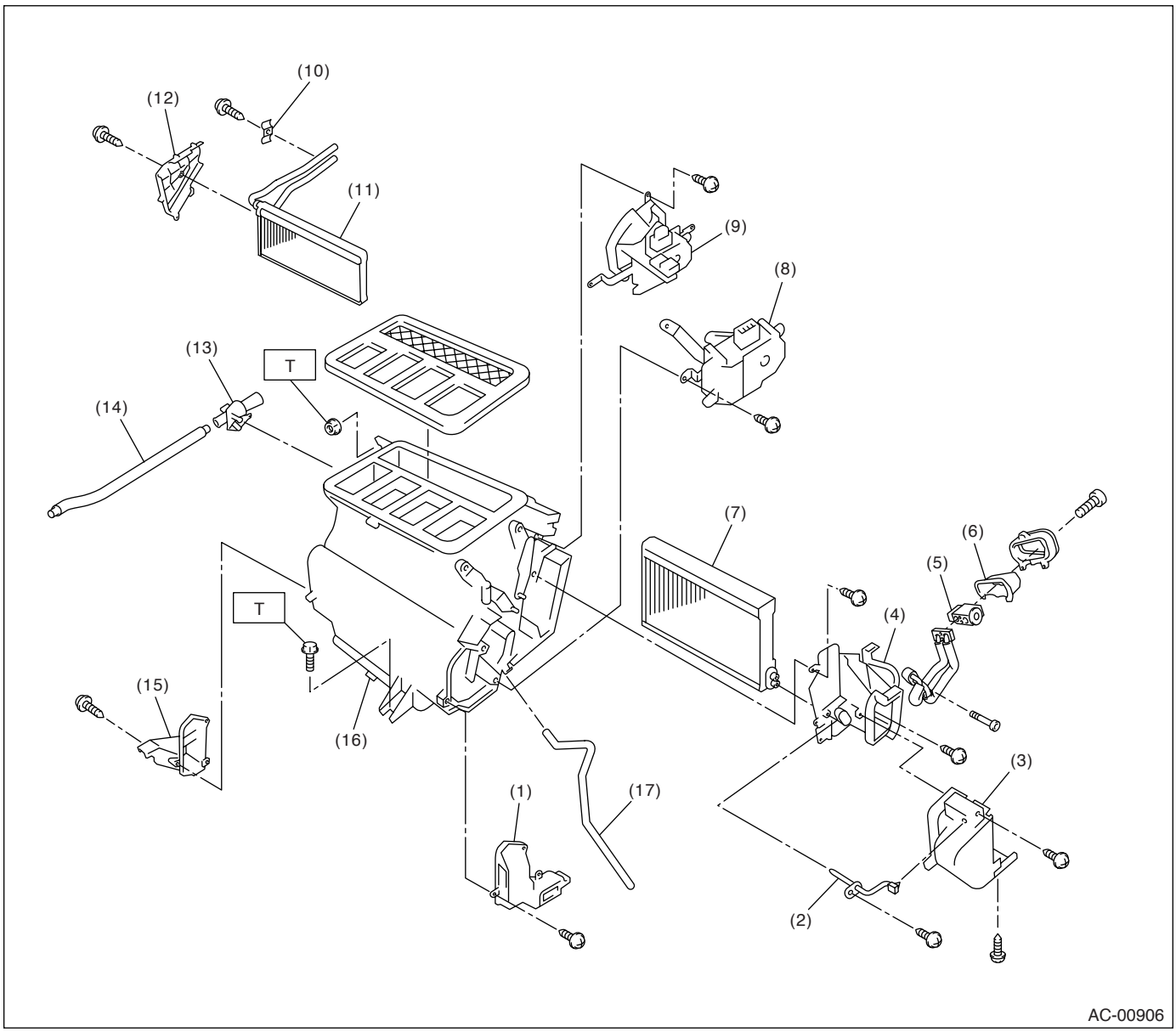
Thermo control amplifier working temperature (Evaporator outlet air)		 AC-00601 (1) ON (2) OFF (3) 1±0.5°C (33.8±0.9°F) (4) $4^{+1.5}_{0}$°C ($39.2^{+2.7}_{0}$°F)	

B: COMPONENT

1. HEATER COOLING UNIT

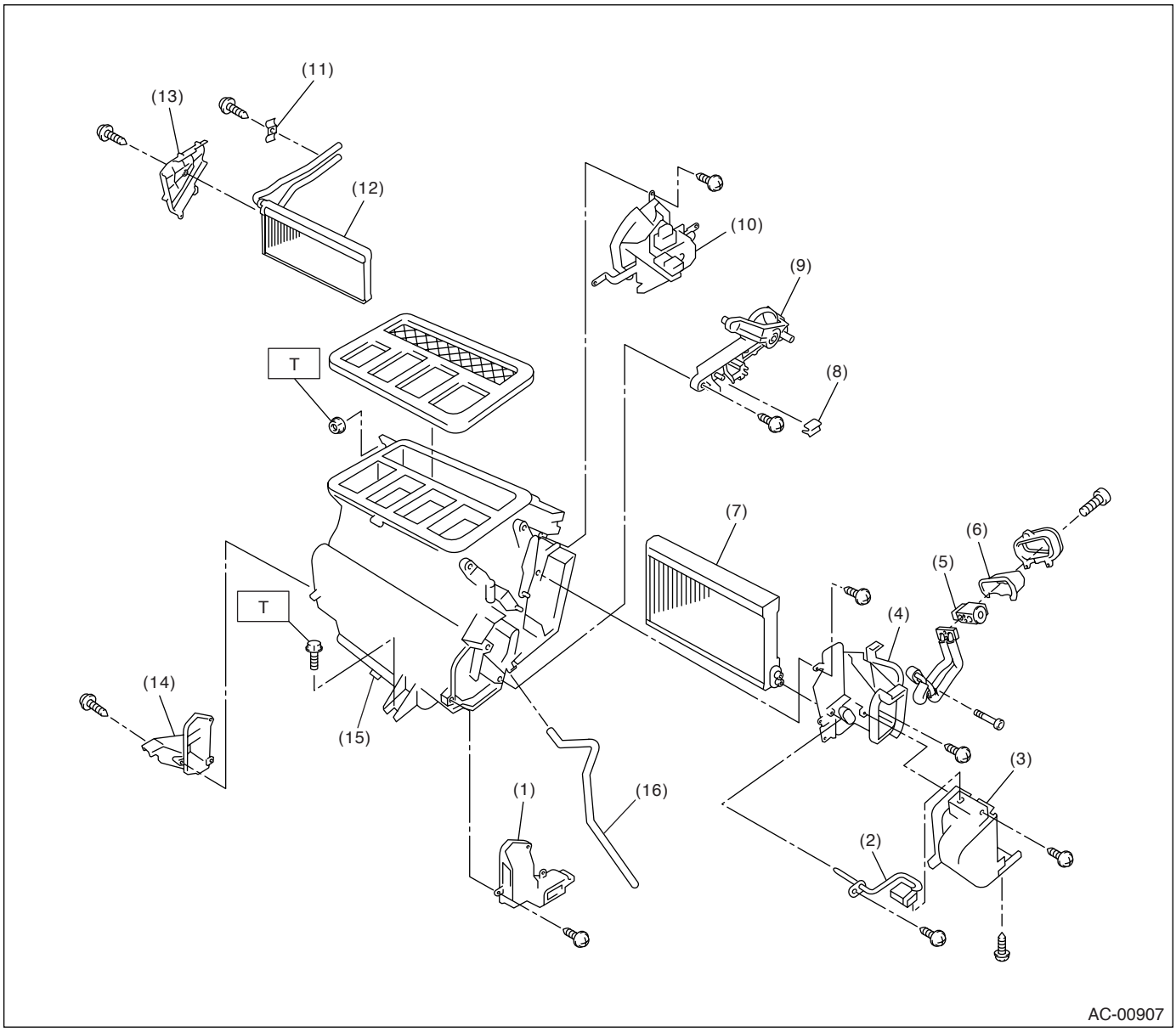
• Auto A/C model



(1) Foot duct (RH)
(2) Evaporator center
(3) Pipe cover
(4) Evaporator cover
(5) Expansion valve
(6) Packing
(7) Evaporator
(8) Mix actuator
(9) Mode actuator
(10) Heater pipe clamp
(11) Heater core
(12) Heater core cover
(13) Aspirator
(14) Aspirator hose
(15) Foot duct (LH)
(16) Unit ASSY
(17) Drain hose

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

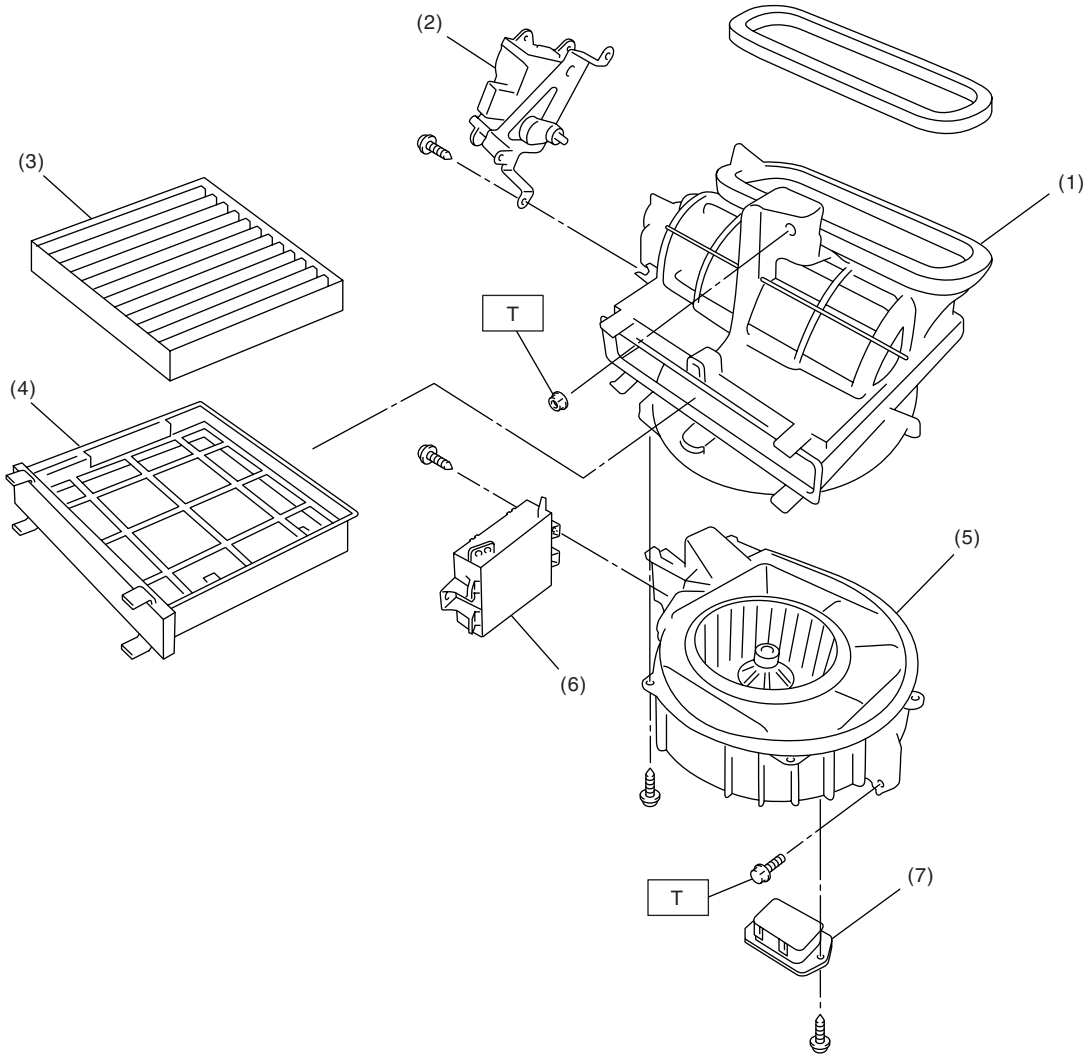
• Manual A/C model



(1) Foot duct (RH)
(2) Thermo amplifier
(3) Pipe cover
(4) Evaporator cover
(5) Expansion valve
(6) Packing
(7) Evaporator
(8) Clip
(9) Air mix door linkage
(10) Mode actuator
(11) Heater pipe clamp
(12) Heater core
(13) Heater core cover
(14) Foot duct (LH)
(15) Unit ASSY
(16) Drain hose

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

2. BLOWER MOTOR UNIT

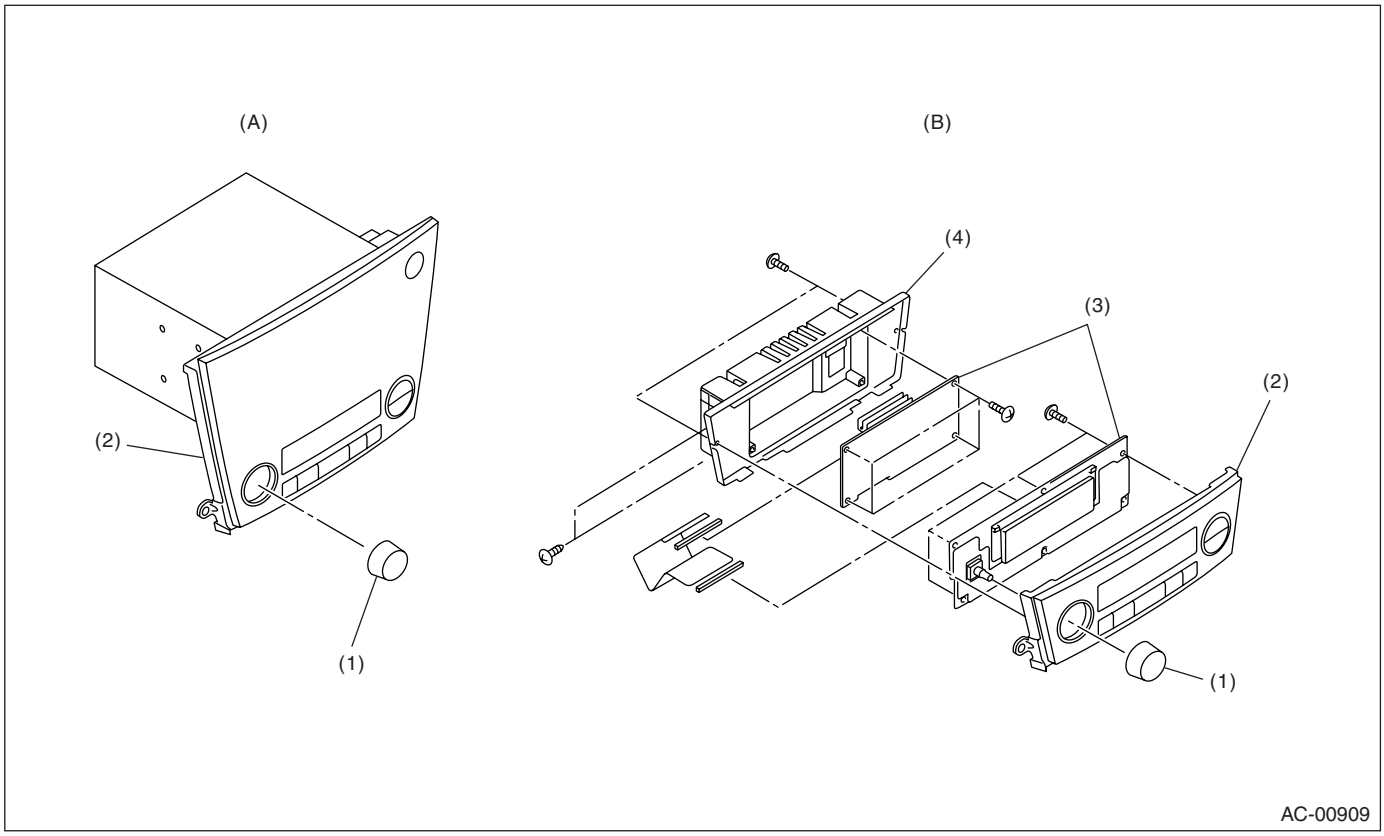


(1) Upper case
(2) Intake door actuator
(3) Filter (Auto A/C model)
(4) Filter cover
(5) Blower motor ASSY
(6) Control unit (Auto A/C model)
(7) Power transistor (Auto A/C model)
Blower resistor (Manual A/C model)

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.5 (0.76, 5.5)

3. CONTROL PANEL

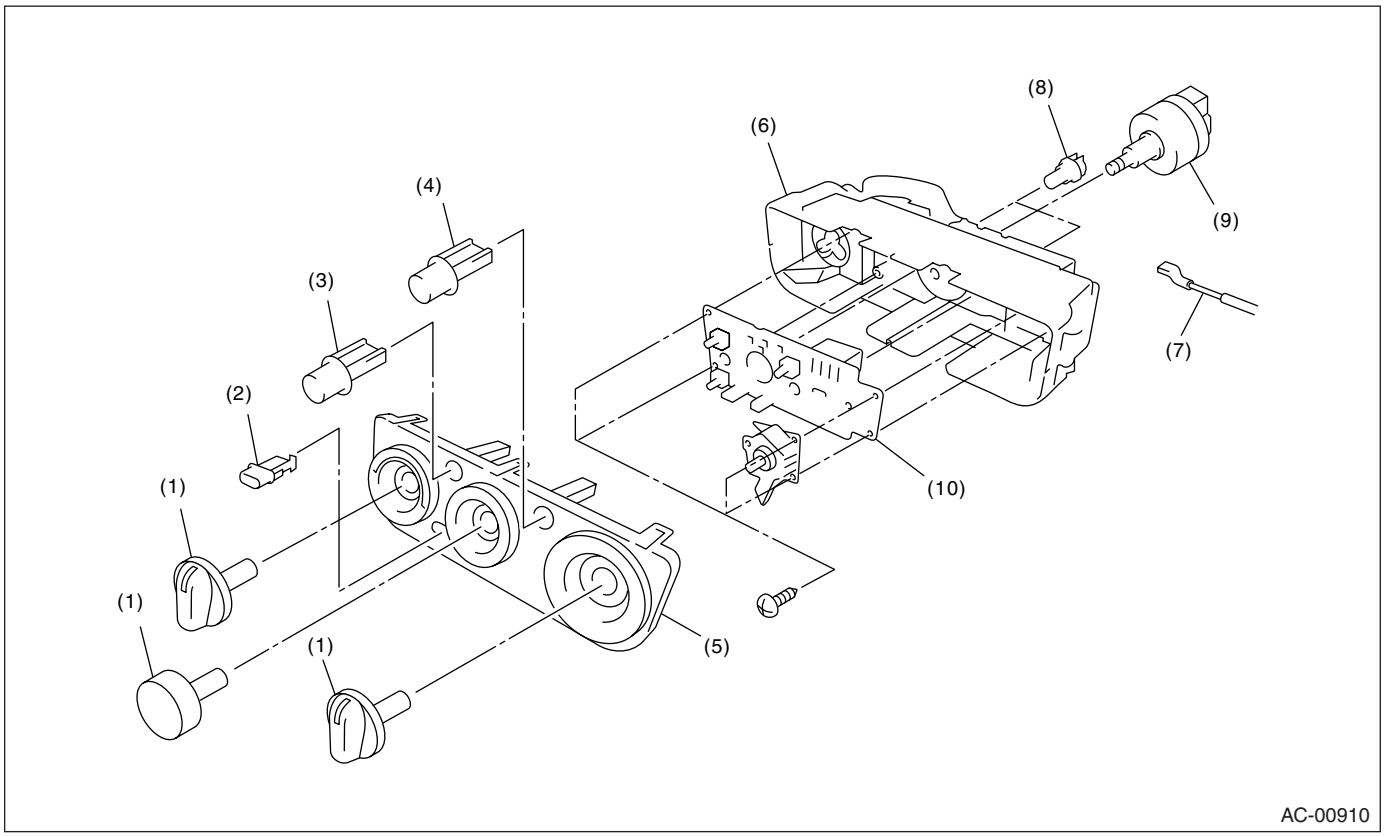
• Auto A/C model



(A) For integrated audio
(B) For Mclntosh audio

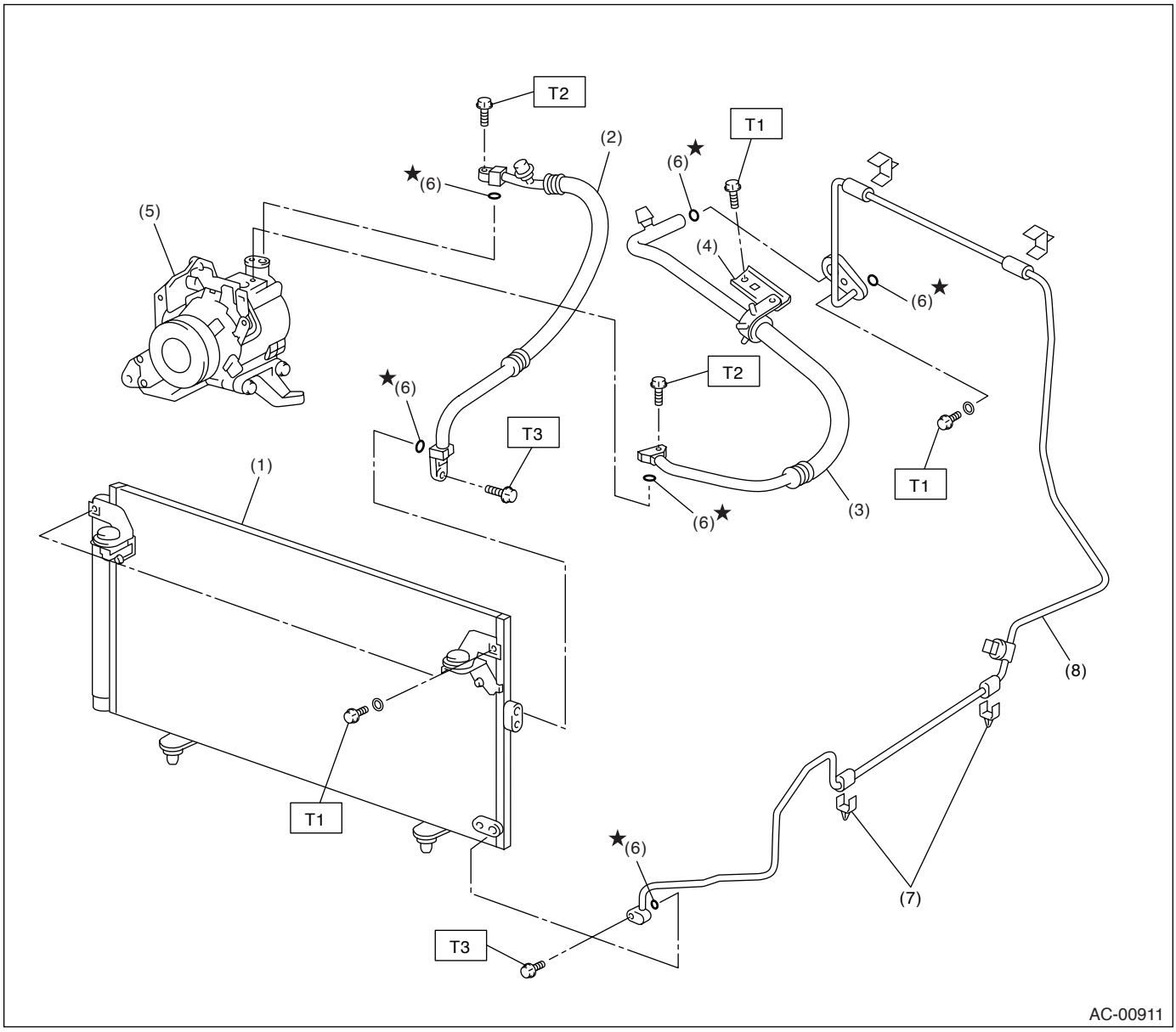
(1) Temperature control dial
(2) Control panel assembly
(3) Board
(4) Heater control base

• Manual A/C model



(1) Dial
(2) A/C switch
(3) FRESH/RECIRC switch
(4) Rear window defogger switch
(5) Heater control panel
(6) Heater control base
(7) Temperature control cable
(8) Valve
(9) Fan switch ASSY
(10) Switch base

4. AIR CONDITIONING UNIT

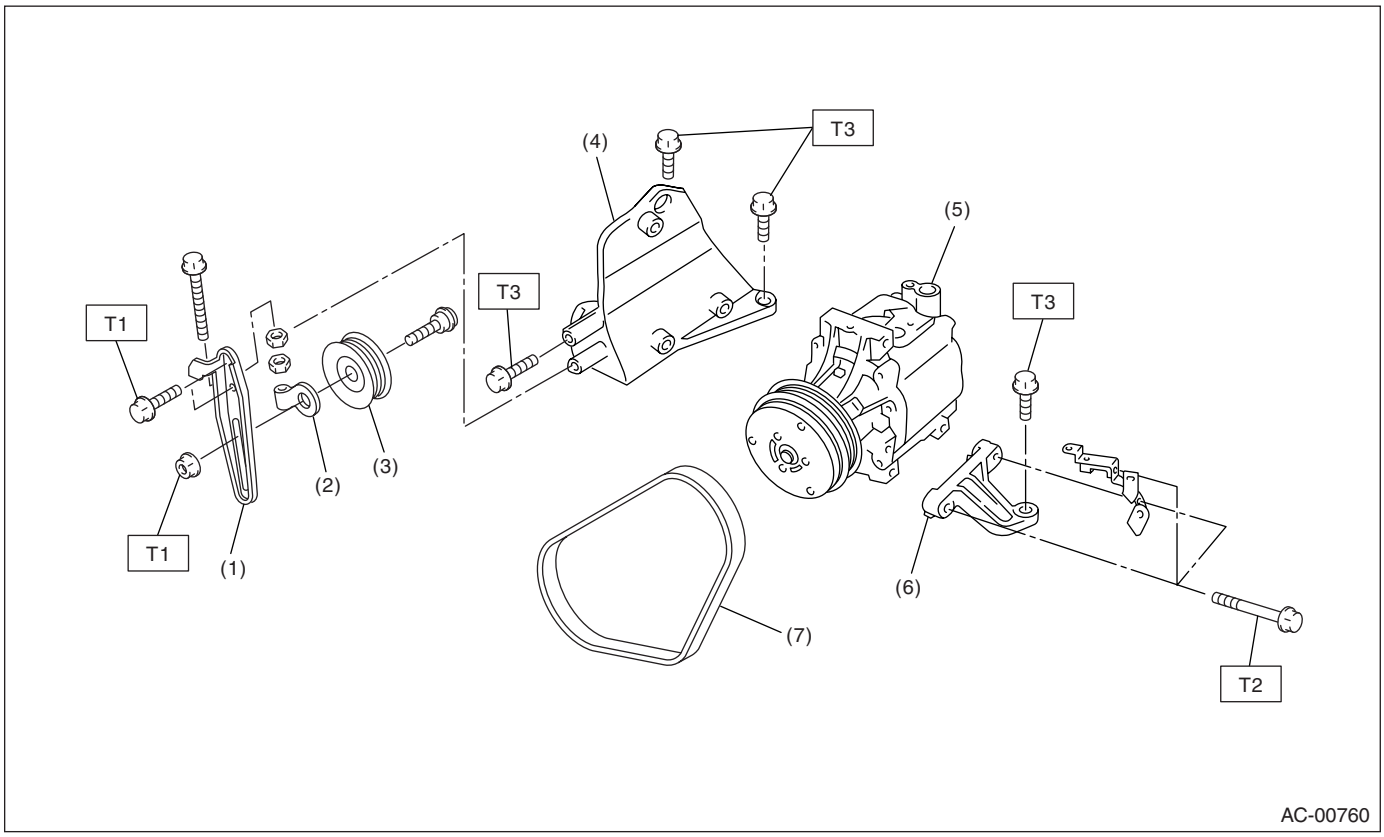


(1)	Condenser	(5)	Compressor
(2)	Hose (High-pressure)	(6)	O-ring
(3)	Hose (Low-pressure)	(7)	Clamp
(4)	Bracket	(8)	Tube

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 10 (1.0, 7.4)
T3: 5 (0.5, 3.7)

5. COMPRESSOR

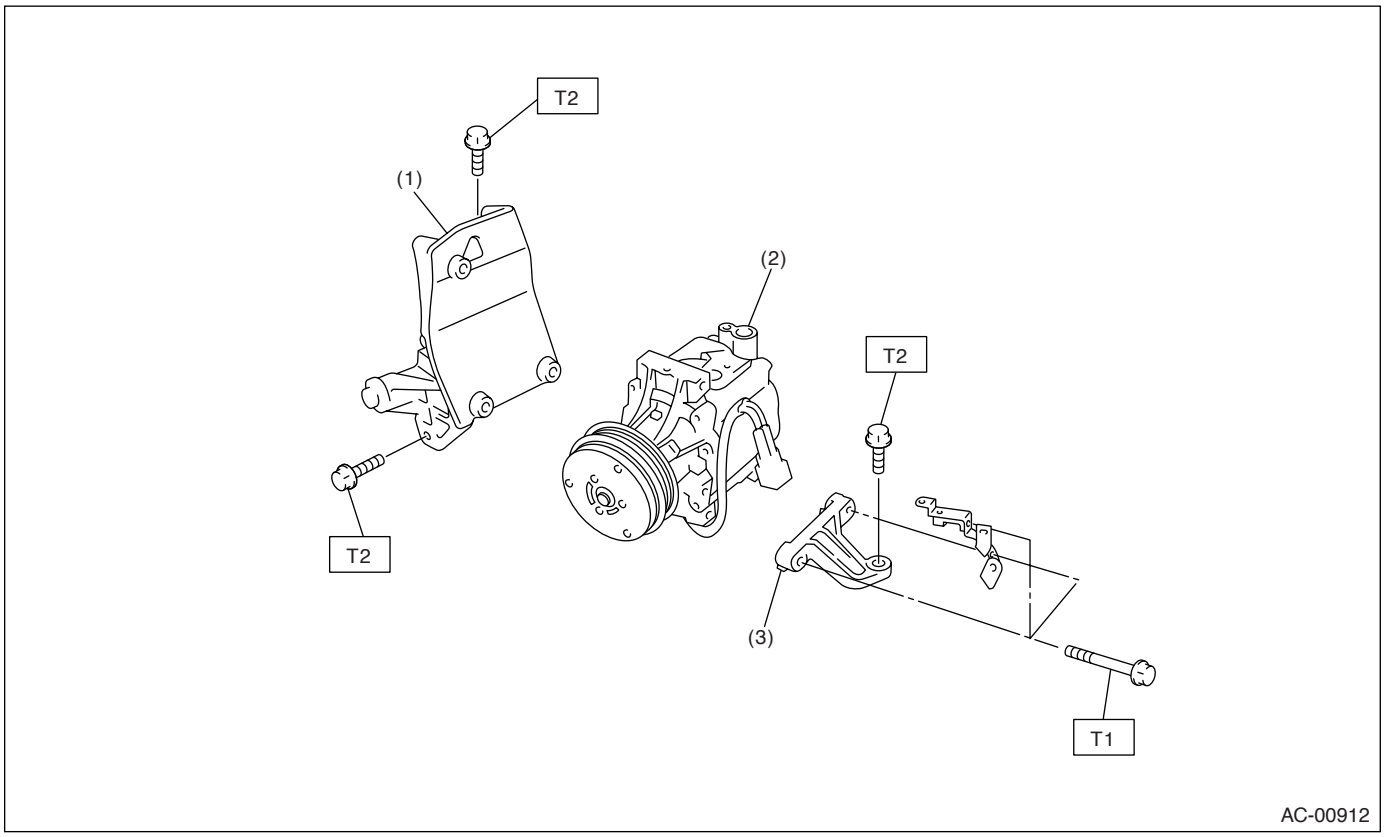
• H4 model



(1)	Idler pulley bracket	(5)	Compressor
(2)	Idler pulley adjuster	(6)	Compressor lower bracket
(3)	Idler pulley	(7)	V-Belt
(4)	Compressor upper bracket		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 23.0 (2.35, 17.0)
T2: 28.9 (2.95, 21.3)
T3: 36 (3.7, 26.6)

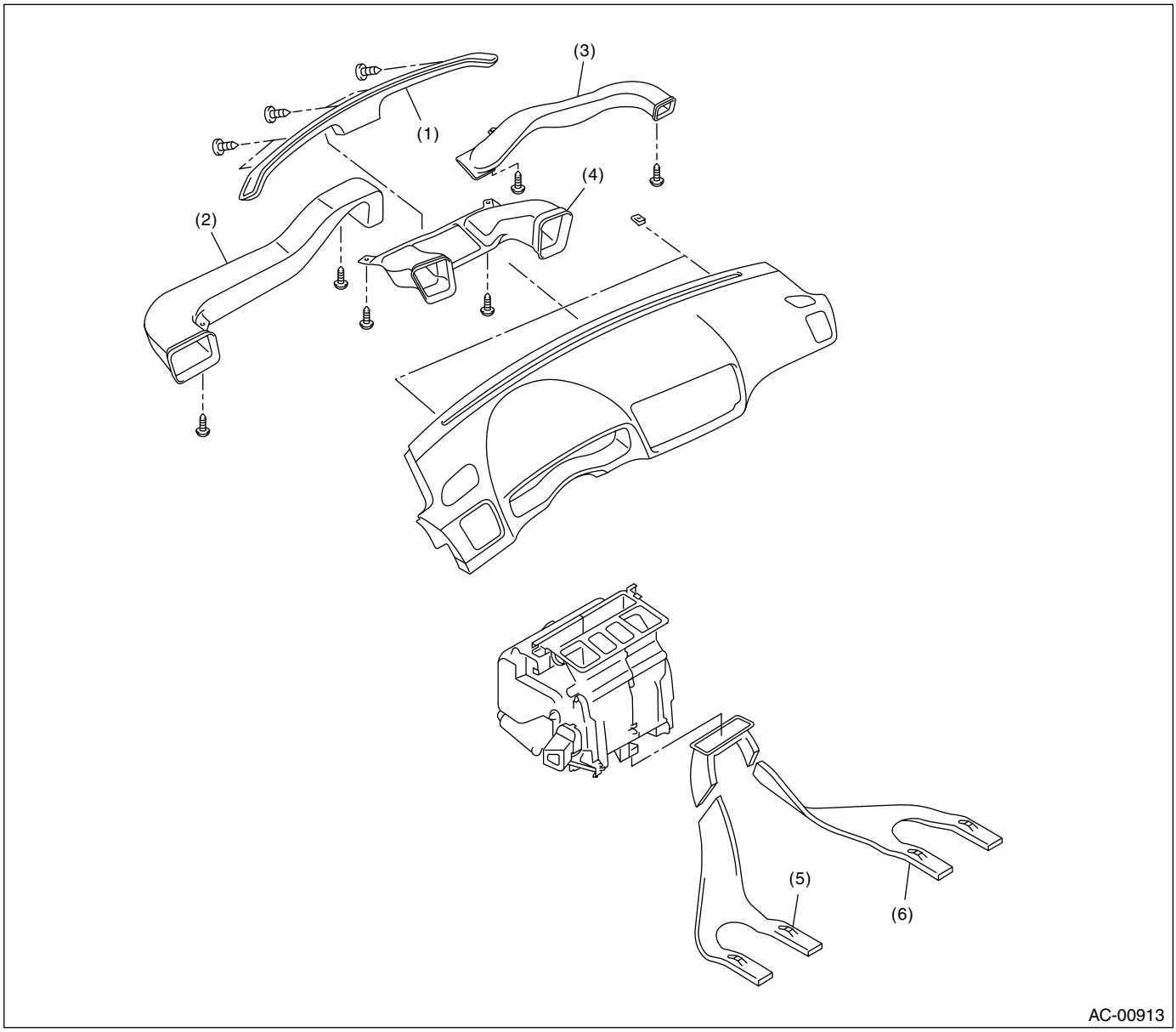
• H6 model



(1) Compressor upper bracket
(2) Compressor
(3) Compressor lower bracket

Tightening torque: N·m (kgf-m, ft-lb)
T1: 28.9 (2.95, 21.3)
T2: 36 (3.7, 26.6)

6. HEATER DUCT

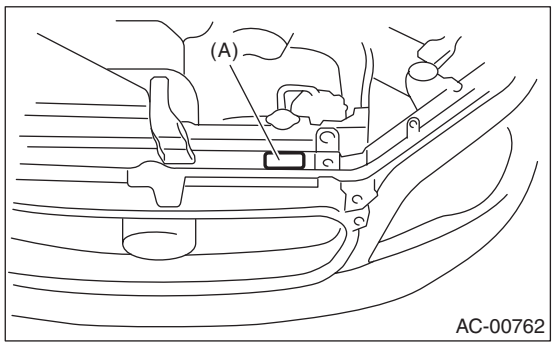


(1) Front defroster nozzle
(2) Side ventilation duct (LH)
(3) Side ventilation duct (RH)
(4) Center ventilation duct
(5) Rear heater duct (LH)
(6) Rear heater duct (RH)

C: CAUTION

1. HFC-134a A/C SYSTEM

• The cooling system components for the HFC-134a system such as the refrigerant and compressor oil are different from the conventional CFC-12 system components and they are incompatible with each other.
• Vehicles with the HFC-134a system can be identified by the label (A) attached to the vehicle.
Before maintenance, check which A/C system is installed to the vehicle.



2. COMPRESSOR OIL

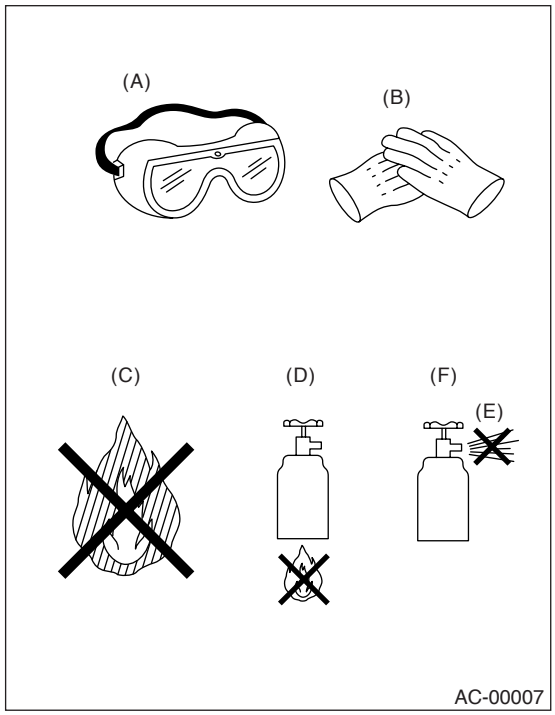
• HFC-134a compressor oil has no compatibility with that of CFC-12 system.
• Use only Denso Oil 8 which is a manufacturer-authorized compressor oil for HFC-134a system.
• Do not mix multiple compressor oils.
If CFC-12 compressor oil is used in the HFC-134a A/C system, the compressor may become stuck due to poor lubrication, or the refrigerant may leak due to swelling of rubber parts.
On the other hand, if HFC-134a compressor oil is used in a CFC-12 A/C system, the durability of the A/C system will be lowered.
• HFC-134a compressor oil is very hygroscopic. When replacing or installing/removing A/C parts, immediately isolate the oil from atmosphere using a plug or tape. In order to avoid moisture, store the oil in a container with its cap tightly closed.

3. REFRIGERANT

• The CFC-12 refrigerant cannot be used in the HFC-134a A/C system. The HFC-134a refrigerant, also, cannot be used in the CFC-12 A/C system.
• If an incorrect or no refrigerant is used, it will result in poor lubrication and the compressor itself may be damaged.

4. HANDLING OF REFRIGERANT

• The refrigerant boils at approx. –30°C (–22°F). When handling it, be sure to wear protective goggles and protective gloves. Direct contact of the refrigerant with skin may cause frostbite.
If the refrigerant gets into your eye, avoid rubbing your eyes with your hands. Wash your eye with plenty of water, and receive medical treatment from an eye doctor.
• Do not heat a service can. If a service can is directly heated, or put into boiling water, the inside pressure will become extremely high. This may cause the can to explode. If a service can must be warmed up, use hot water in 40°C (104°F) max.
• Do not drop or impact a service can. (Observe the precautions and operation procedure described on the refrigerant can.)
• When the engine is running, do not open the high-pressure valve of manifold gauge. The high-pressure gas will back-flow resulting in an explosion of the can.
• Provide good ventilation and do not work in a closed area.
• In order to prevent global warming, avoid releasing HFC-134a into the atmosphere. Using a refrigerant recovery system, discharge and reuse it.

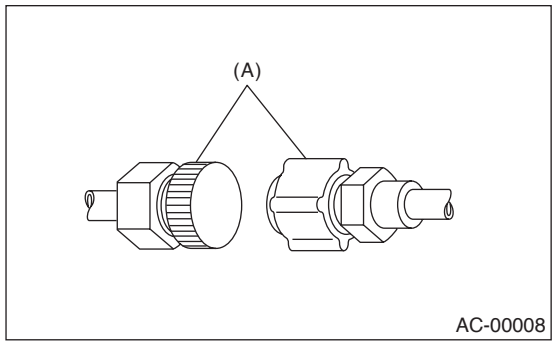


(A) Goggles
(B) Gloves
(C) Avoid open flame
(D) No direct heat on container
(E) Do not discharge
(F) Loosen

5. O-RING CONNECTIONS

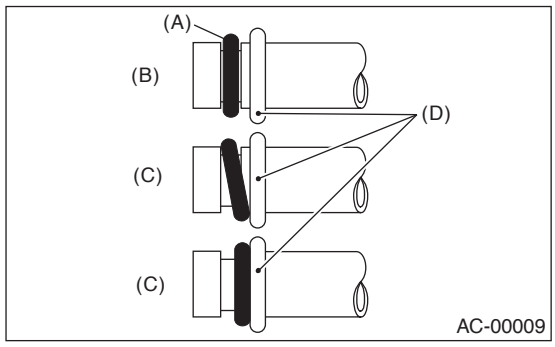
• Always use a new O-ring.
• In order to keep the O-rings free of lint which will cause a refrigerant gas leak, perform operations without gloves and cloth.

• Apply compressor oil to O-rings to avoid sticking, before installation.
• Use a torque wrench to tighten the O-ring fittings. Over-tightening will result in damage of O-ring and tube end distortion.
• If the operation is interrupted before completing a pipe connection; recap the tubes, components and fittings with a plug or tape to prevent foreign matter from entering.



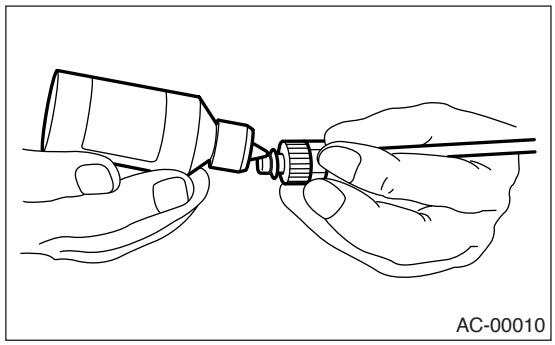
(A) Seal

• Visually check the surfaces and mating surfaces of O-rings, threads and connecting points. If a failure is found, replace the applicable parts.
• Install the O-rings at right angle to tube beads.



(A) O-ring
(B) OK
(C) NG
(D) Bead

• Use compressor oil specified in the service manual to lubricate the O-rings.
Apply oil to the top and sides of O-rings before installation.
Apply compressor oil to the bead of tube.



• After tightening, use a clean cloth to remove excess compressor oil from the connections and any oil which may have run on the vehicle body or other parts.
• If any leakage is suspected after tightening, do not further tighten the connections, but disconnect the connections, remove the O-rings, and check the O-rings, threads, and connections.

D: PREPARATION TOOL

CAUTION:
When working on vehicles with HFC-134a system, only use HFC-134a specified tools and parts. Do not mix with those of CFC-12. If HFC-134a and CFC-12 refrigerant or compressor oil is mixed, it will result in poor lubrication and the compressor itself may be destroyed.
In order to prevent the mixture of HFC-134a and CFC-12 parts and liquid, the tool and screw type and the type of service valves used are different. The gas leak detectors for the HFC-134a and CFC-12 systems must also not be interchanged.

	HFC-134a	CFC-12
Tool & screw type	Millimeter size	Inch size
Valve type	Quick joint type	Screw-in type

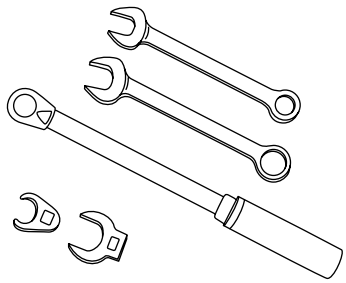
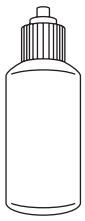
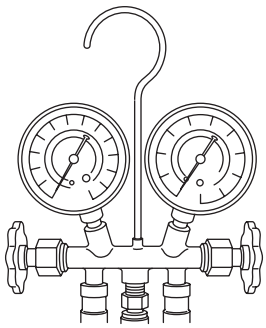
ILLUSTRATION	Tools and Equipment
 AC-00213	Wrench Various **WRENCHES** will be required to service any A/C system. 7 to 40 N·m (0.7 to 4.1 kgf-m, 5 to 30 ft-lb) torque wrench and various crow-foot wrenches will be needed. Open end or flare nut wrenches will be needed to hold the tube and hose fittings.
 AC-00012	Applicator bottle A small **APPLICATOR BOTTLE** is recommended to apply compressor oil to the various parts. It can be available at a hardware or drug store.
 AC-00013	Manifold gauge set A **MANIFOLD GAUGE SET** (with hoses) can be available at either a refrigerant supplier or an automotive equipment supplier.

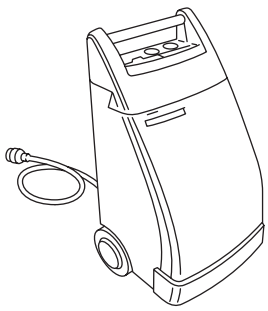
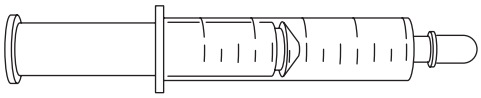
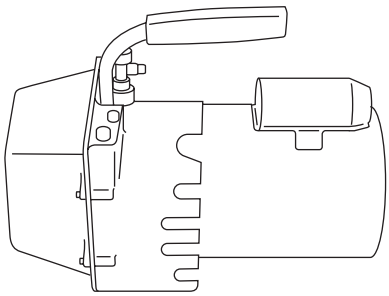
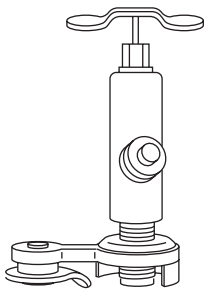
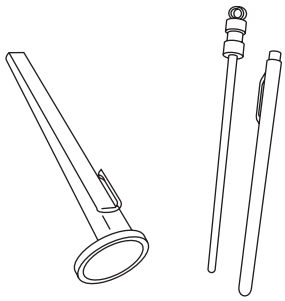
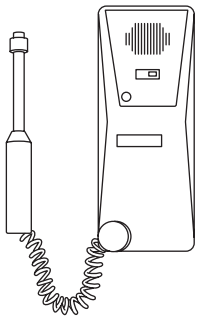
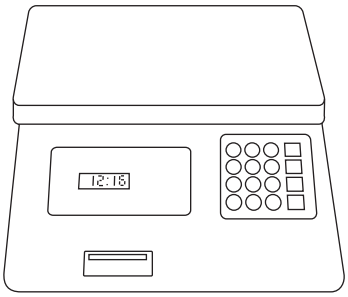
ILLUSTRATION	Tools and Equipment
 AC-00014	Refrigerant recovery system A **REFRIGERANT RECOVERY SYSTEM** is used for the recovery and reuse of A/C system refrigerant after contaminants and moisture have been removed from the refrigerant.
 AC-00015	Syringe A graduated plastic **SYRINGE** will be needed to add oil back into the system. A syringe can be available at a pharmacy or drug store.
 AC-00016	Vacuum pump A **VACUUM PUMP** is necessary (for a good working condition), and may be available at either a refrigerant supplier or an automotive equipment supplier.
 AC-00017	Can tap A **CAN TAP** for the 397 g (14 oz.) can is available at an automotive equipment supplier.

ILLUSTRATION	Tools and Equipment
 AC-00018	Temperature gauge A Pocket **THERMOMETER** is available at either a industrial hardware store or a refrigerant suppliers.
 AC-00019	Electronic leak detector An **ELECTRONIC LEAK DETECTOR** can be available at either a specialty tool supplier or an A/C equipment supplier.
 AC-00020	Weight scale A **WEIGHT SCALE** such as an electronic charging scale or a bathroom scale with digital display will be needed, if a 13.6 kg (30 lb) refrigerant container is used.

2. Refrigerant Pressure with Manifold Gauge Set

A: PROCEDURE

1) Place the vehicle in the shade and windless condition.
2) Connect the manifold gauge set.
3) Open the front windows and close all doors.
4) Open the front hood.
5) Increase the engine to 1,500 rpm.
6) Turn on the A/C switch.
7) Turn the temperature control switch to MAX COOL.
8) Put in RECIRC position.
9) Turn the blower control switch to HI.
10) Read the gauge.

Standard:
Low pressure: 127 — 196 kPa (1.3 — 2.0 kg/cm^2, 18 — 28 psi)
High pressure: 1,471 — 1,667 kPa (15 — 17 kg/cm^2, 213 — 242 psi)
Ambient temperature: 30 — 35°C (86 — 95°F)

B: INSPECTION

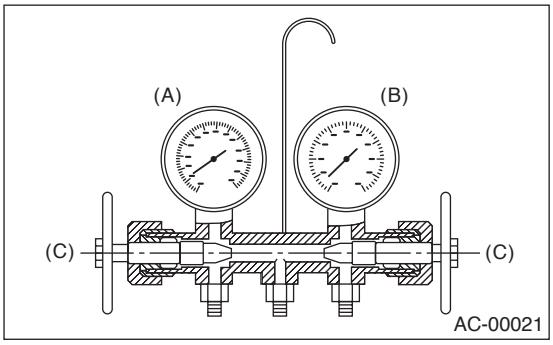
Symptom	Probable cause	Repair order
High-pressure side is unusually high.	• Defective condenser fan motor • Clogged condenser fin • Too much refrigerant • Air inside the system • Defective receiver dryer	• Replace the fan motor. • Clean the condenser fin. • Discharge refrigerant. • Replace the receiver dryer. • After evacuating again, charge an appropriate amount of refrigerant.
High-pressure side is unusually low.	• Defective compressor • Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture.	• Replace the compressor. • Check for leaks. • Replace the expansion valve. • Fully evacuate the expansion valve.
Low-pressure side is unusually high.	• Defective compressor • Defective expansion valve • Too much refrigerant	• Replace the compressor. • Replace the expansion valve. • Discharge refrigerant.
Low-pressure side is unusually low.	• Not enough refrigerant • Clogged expansion valve • Expansion valve frozen temporarily by moisture. • Saturated receiver dryer	• Check for leaks. • Replace the expansion valve. • Replace the receiver dryer.

3. Refrigerant Recovery Procedure

A: PROCEDURE

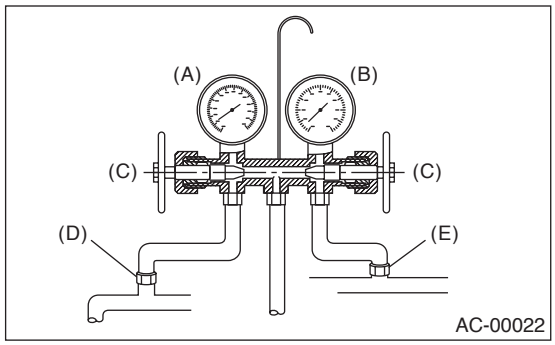
CAUTION:
• During operation, be sure to wear protective goggles and protective gloves.
• Connect the refrigerant recovery system with the manifold gauge set to discharge the refrigerant from the A/C system and reuse it.
• When reusing the discharged refrigerant, keep service cans on hand. Because the discharge rate with the recovery system is approx. 90%, service cans are necessary to charge the refrigerant.
• Follow the detailed operation procedure described in the operation manual attached to the refrigerant recovery system.

1) Perform the compressor oil return operation. <Ref. to AC-25, PROCEDURE, Compressor Oil.>
2) Stop the engine.
3) Make sure the valves on low-/high-pressure sides of manifold gauge set are fully closed.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

4) Install the low-/high-pressure hoses to the service ports on the low-/high-pressure sides of the vehicle respectively.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Low-pressure side service port
(E) High-pressure side service port

5) Connect the center hose to the refrigerant recovery system.
6) Follow the operation manual to activate the refrigerant recovery system.

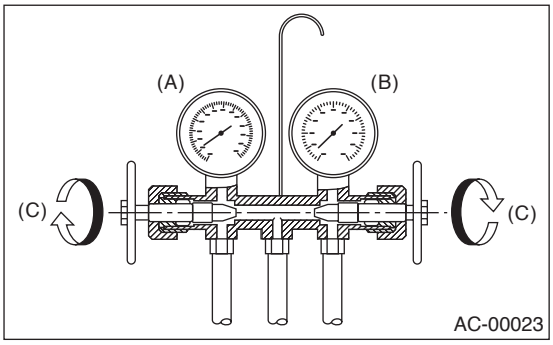
4. Refrigerant Charging Procedure

A: PROCEDURE

CAUTION:
• During operation, be sure to wear protective goggles and protective gloves.
• Before charging the refrigerant, evacuate the system to remove small amounts of moisture remaining in the system.
The moisture in the system can be completely evacuated only under the minimum vacuum level. The minimum vacuum level affects the temperature in the system.
• The list below shows the vacuum values necessary to boil water in various temperature. In addition, the vacuum levels indicated on the gauge are approx. 3.3 kPa (25 mmHg, 0.98 inHg) lower than those measured at 304.8 m (1,000 ft) above sea level.

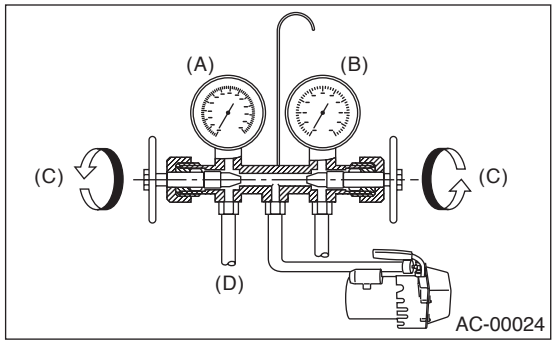
Vacuum level required to boil water (at sea level)	
Temperature	Vacuum
1.7°C (35°F)	100.9 kPa (757 mmHg, 29.8 inHg)
7.2°C (45°F)	100.5 kPa (754 mmHg, 29.7 inHg)
12.8°C (55°F)	99.8 kPa (749 mmHg, 29.5 inHg)
18.3°C (65°F)	99.2 kPa (744 mmHg, 29.3 inHg)
23.9°C (75°F)	98.5 kPa (739 mmHg, 29.1 inHg)
29.4°C (85°F)	97.2 kPa (729 mmHg, 28.7 inHg)
35°C (95°F)	95.8 kPa (719 mmHg, 28.3 inHg)

1) Close the valves on low-/high-pressure sides of the manifold gauge.



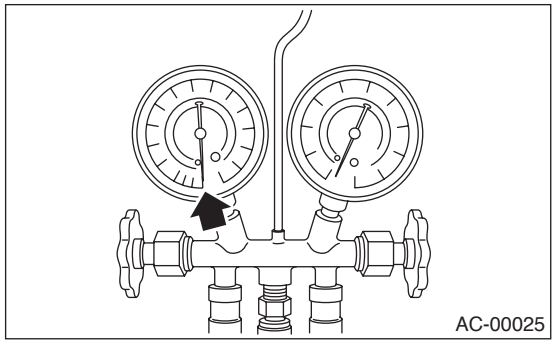
(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

2) Install the low-/high-pressure hoses to the corresponding service ports on the vehicle respectively.
3) Connect the center hose of the manifold gauge set with the vacuum pump.
4) Carefully open the valves on the low-/high-pressure sides to activate the vacuum pump.

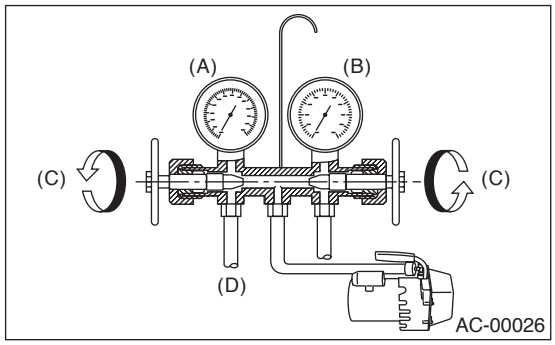


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Slowly open
(D) Vacuum pump turn on

5) After the low-pressure gauge reaches 100.0 kPa (750 mmHg, 29.5 inHg) or higher, evacuate the system for approx. 15 minutes. (Continue evacuation).

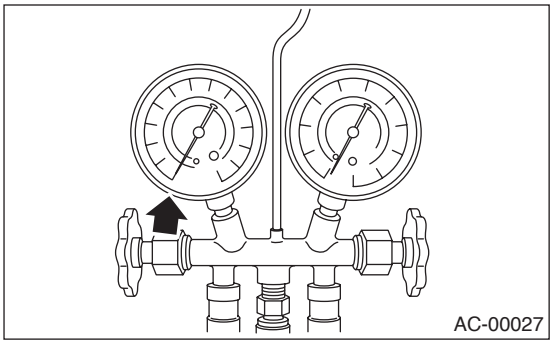


6) After 15 minutes of evacuation, if the reading shows 100.0 kPa (750 mmHg, 29.5 inHg) or higher, close the valves on the both sides to stop the vacuum pump.

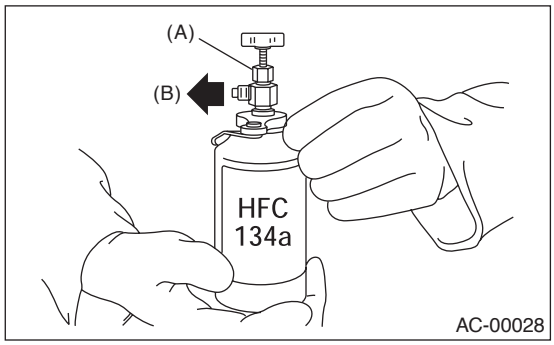


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Vacuum pump turn off

7) Note the low-pressure gauge reading.

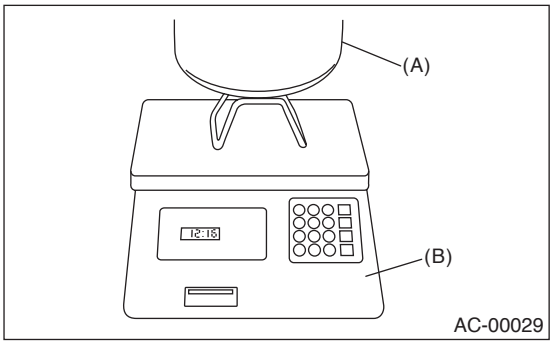


8) Leave it at least 5 minutes, and then check the low-pressure gauge reading for any changes.
When a gauge indicator shows near to zero point, it is a sign of leakage. Check pipe connector points, repair them, make sure there is no leakage by air bleeding.
9) Following the can tap operation manual instructions, install it to the refrigerant can.



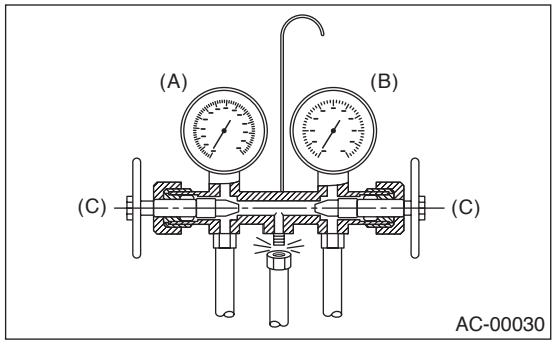
(A) Tap valve
(B) Center manifold hose

10) Disconnect the center manifold hose from the vacuum pump, and connect the hose to the tap valve.
11) When a 13.6 kg (30 lb) refrigerant container is used, measure the refrigerant amount in use using a weight scale.



(A) Refrigerant container (HFC-134a)
(B) Weight scale

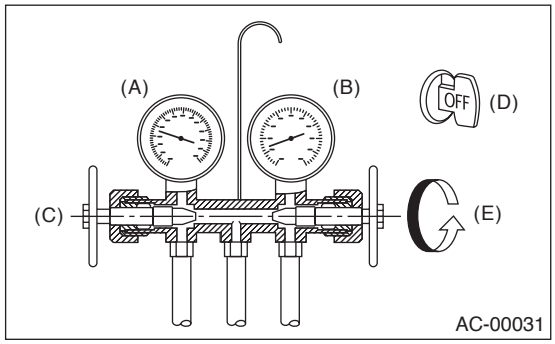
12) Confirm that all the 3 hoses are tightly connected to the manifold gauge set.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

13) Open the valve on the HFC-134a source.
14) Loosen the center hose connection on the manifold gauge set (if applicable, press a purge valve on the manifold gauge set) only for a couple of seconds to allow the air in the center hose to escape by the refrigerant.
15) Carefully open the high-pressure valve with the engine stopping.

CAUTION:
Do not open the low-pressure valve.



(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close
(D) Ignition switch OFF
(E) Slowly open

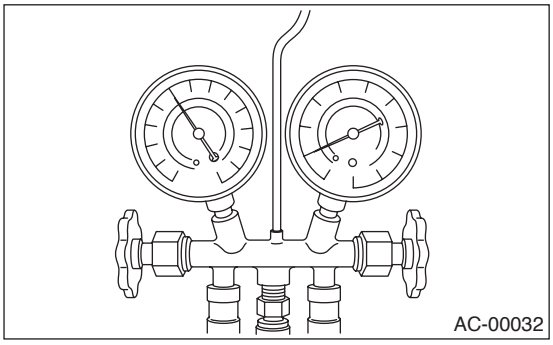
CAUTION:
Never run the engine during charging from the high-pressure side.

16) Close the high-pressure valve when the low-pressure gauge reaches 98 kPa (1 kg/cm^2, 14 psi).
Using a leak tester, check the system for leaks.
If any leakage is found after the refrigerant recovery is completed, repair the applicable area.

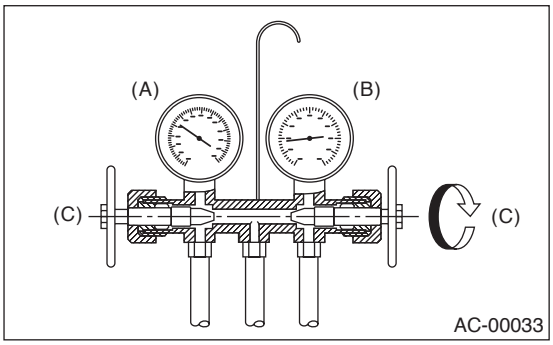
17) After confirming that there are no leaks with the leak test, charge the required amount of refrigerant.

CAUTION:
Never run the engine during charging from the high-pressure side.

18) Close the high-pressure valve when;
• the readings of low- / high-pressure gauges become almost equal, after the charging speed is reduced,
• the HFC-134a source becomes empty, or the system is filled with the gas.



19) If the HFC-134a source is empty, close the high-pressure valve, close the valve on the can tap, and replace the HFC-134a source with a new one to restart the operation.

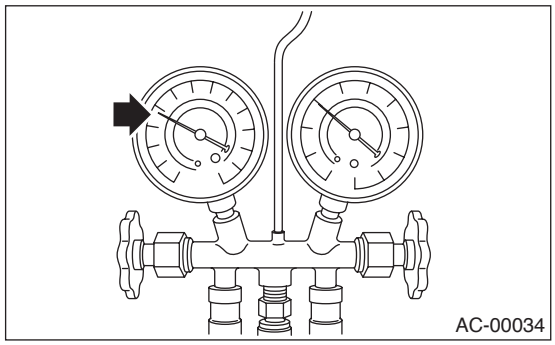


(A) Low-pressure gauge (Compound pressure gauge)
(B) High-pressure gauge
(C) Close

20) Confirm that both the low-/high-pressure valves can be closed. Start the engine with the A/C switch OFF.
21) Quickly repeat ON-OFF cycles a few times to prevent initial compressor damage.
22) Set up the vehicle to the following status:
• A/C switch ON
• Engine running at 1,500 rpm
• Blower speed setting to “HI”
• Temperature setting to “MAX COOL”
• Air inlet setting to “RECIRC”
• Window open

23) While reading the low-pressure gauge, carefully open the low-pressure valve with the refrigerant source connected and the service hose purged.

CAUTION:
Never open the high-pressure valve with the engine running. The high-pressure gas will backflow resulting in an explosion of the can.



24) Adjust the refrigerant flow to maintain the pressure on the low-pressure side at 276 kPa (2.81 kg/cm^2, 40 psi) max.
25) After the system is fully charged, close the low-pressure valve.
26) Close the valve on the refrigerant source.

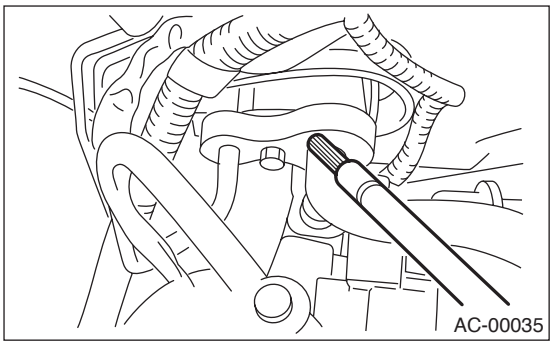
Refrigerant amount		
Refrigerant	Minimum	Maximum
HFC-134a	370 g (0.82 lb)	430 g (0.95 lb)

27) Disconnect the hose from the service port, and install the service port cap.

5. Refrigerant Leak Check

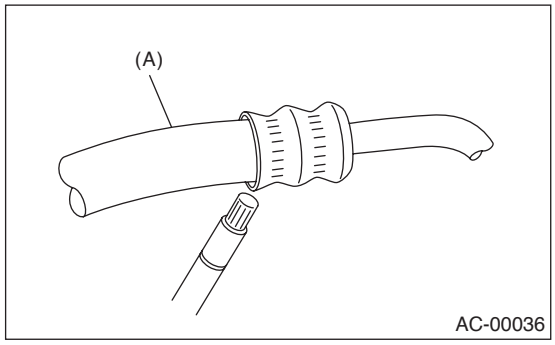
A: INSPECTION

1) Operate the A/C system for approx. 10 minutes, and confirm that the high-side pressure shows at least 690 kPa (7.03 kg/cm^2, 100 psi). Then stop the engine to start the leak test.
2) Starting from the connection between high-pressure pipe and evaporator, check the system for leaks along the high-pressure side through the compressor. The following items must be checked thoroughly.
3) Check the joint and seam between pressure switch (dual switch) and high-pressure pipe.
4) Check the connections between condenser and pipes, and welded joints on the condenser.
The leak tester may detect the oil on the condenser fins as a leak.
5) Check the joint between compressor and hoses.
6) Check the machined area of compressor and other joints on the compressor.
7) Check the compressor shaft seal at the area near the center of compressor clutch pulley.
Some shaft seals show a slight amount of leakage about 3 g (0.1 oz.) per year. This is not a problem.
8) Starting from the connection between low-pressure pipe and evaporator, check the system for leakage along the low-pressure side through the compressor. The following items must be checked thoroughly.
- Connection between 2 parts
- Connection between pipe and plate



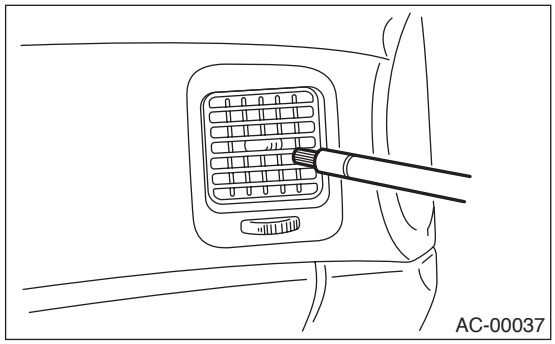
9) Visually check the rubber area of the flexible hose for cracks.
Check the entire length of the flexible hose, especially the connection with the metal hose end.

CAUTION:
Carefully check the external surface of hoses and tubes at approx. 25 mm (0.98 in) per second.

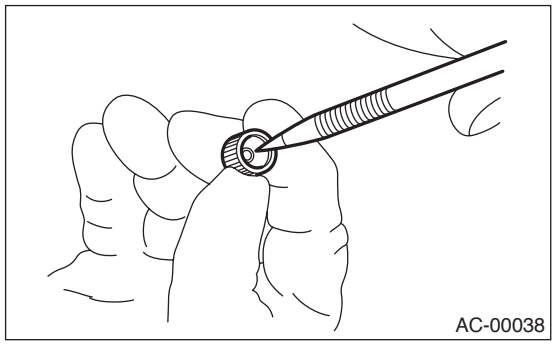


(A) Flexible hose

10) Disconnect the drain hose from heater case, and check the hose end for at least 10 seconds.
After the test is finished, reconnect the drain hose.
11) Turn the ignition key to ON position, and run the blower at high speed for approx. 1 minute. Stop the blower to check the ventilation grille on the instrument panel. While moving the tester closer to the grille, run the blower for 1 or 2 seconds, then stop it. Check the grille at that point for at least 10 seconds.



12) Check the valve in the service port.
13) Visually check the rubber seal in the service port cap.



6. Compressor Oil

A: PROCEDURE

NOTE:
Before making repairs, perform the oil return operation to return the compressor oil in circulation with the refrigerant to the compressor.

1) Increase the engine to 1,500 rpm.
2) Turn ON the A/C switch.
3) Turn the temperature control switch to MAX COOL.
4) Put in RECIRC position.
5) Turn the blower control switch to HI.
6) Leave in this condition for 10 minutes.

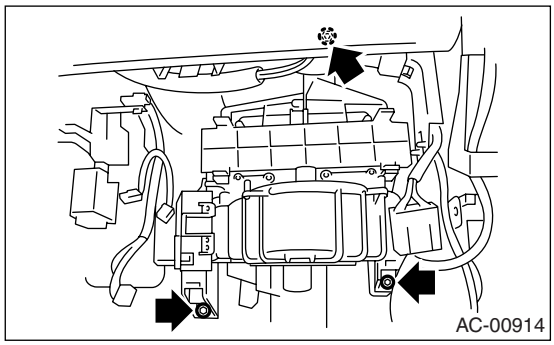
B: REPLACEMENT

NOTE:
• If a component has been replaced, add an appropriate amount of compressor oil (same as the amount of remaining oil in removed component).
• When replacing the compressor, the new compressor will already have the specified amount of oil in it. Install the new compressor after removing the same amount of oil that is remaining in the compressor removed.

7. Blower Motor Unit Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Disconnect the connectors of A/C control module, intake door actuator, blower motor, power transistor and blower resistor.
4) Loosen the bolt and nut to remove blower motor unit assembly.



B: INSTALLATION

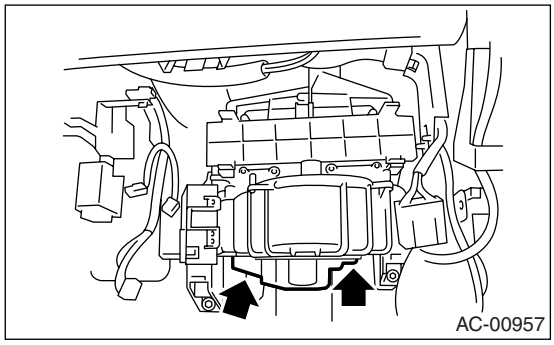
Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-5, HEATER COOLING UNIT, COMPONENT, General Description.> <Ref. to AC-7, BLOWER MOTOR UNIT, COMPONENT, General Description.>

8. Blower Motor

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box lower cover. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Disconnect the connector of blower motor.
4) Loosen the screw to remove blower motor.

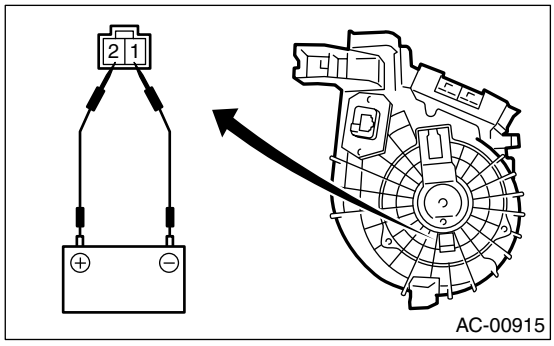


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

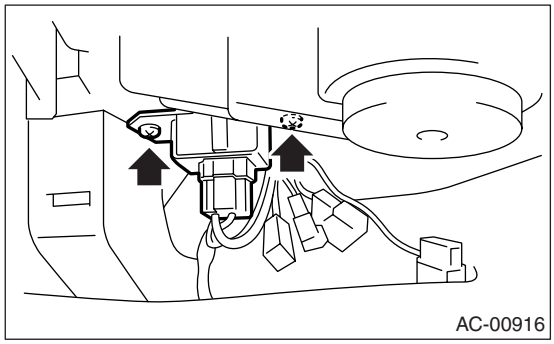
Connect the battery positive (+) terminal to terminal No. 2 of blower motor, and negative (−) terminal to terminal No. 1. Check the blower motor for smooth rotation.



9. Power Transistor (Auto A/C Model)

A: REMOVAL

1) Remove the glove box lower cover on passenger side. <Ref. to EI-51, REMOVAL, Glove Box.>
2) Disconnect the power transistor connector.
3) Remove two screws, and then remove the power transistor.



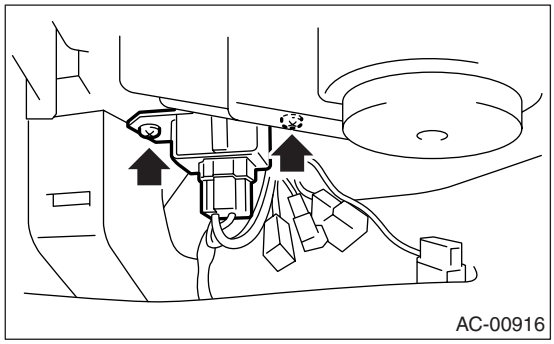
B: INSTALLATION

Install in the reverse order of removal.

10. Blower Resistor (Manual A/C Model)

A: REMOVAL

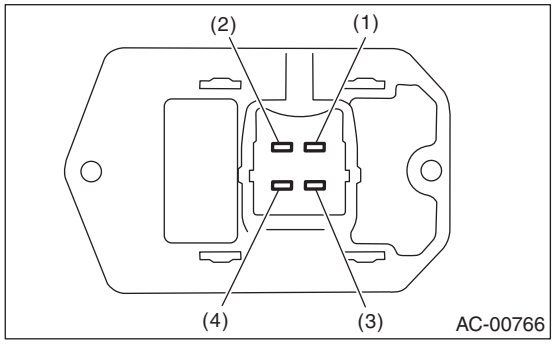
1) Remove the glove box lower cover on passenger side. <Ref. to EI-51, REMOVAL, Glove Box.>
2) Disconnect the blower resistor connector.
3) Remove two screws, and then remove the blower resistor.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



Measure the blower resistor resistance.

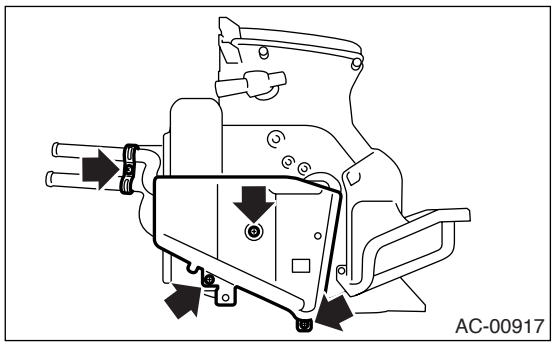
Terminal No.	Standard
4 and 2	Approx. 0.44 Ω
4 and 3	Approx. 1.12 Ω
4 and 1	Approx. 2.92 Ω

If NG, replace the blower resistor.

11.Heater Core

A: REMOVAL

1) Remove the heater and cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
2) Remove the screws and remove the heater core cover and pipe clamp.



3) Remove the heater core.

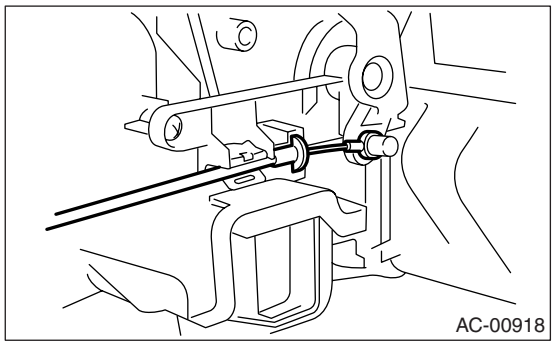
B: INSTALLATION

Install in the reverse order of removal.

12.Control Unit (Manual A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the control wires.



4) Remove the integrated panel. <Ref. to ET-5, REMOVAL, Audio.>
5) Loosen the screw to remove the control unit from bracket.

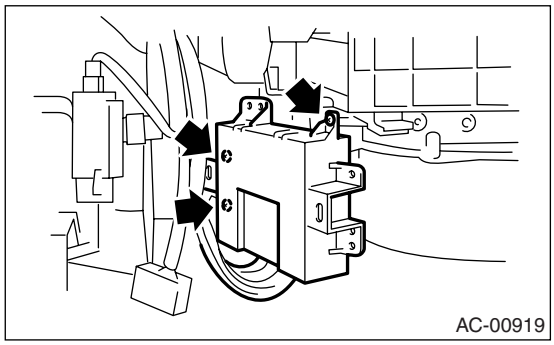
B: INSTALLATION

Install in the reverse order of removal.

13.Control Unit (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the screw, disconnect the connector and remove the control unit.



B: INSTALLATION

Install in the reverse order of removal.

14.Compressor

A: INSPECTION

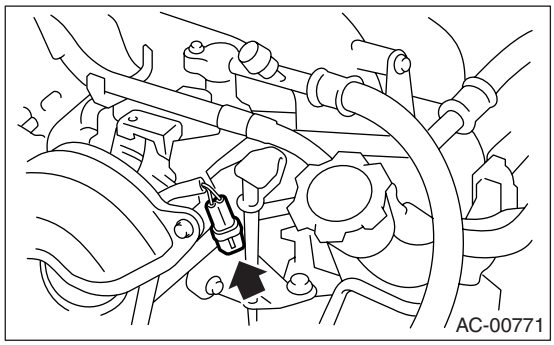
1. MAGNETIC CLUTCH CLEARANCE

Check the clearance of entire circumference around the drive plate and pulley.

Standard:
0.45±0.15 mm (0.0177±0.0059 in)

2. MAGNETIC CLUTCH OPERATION

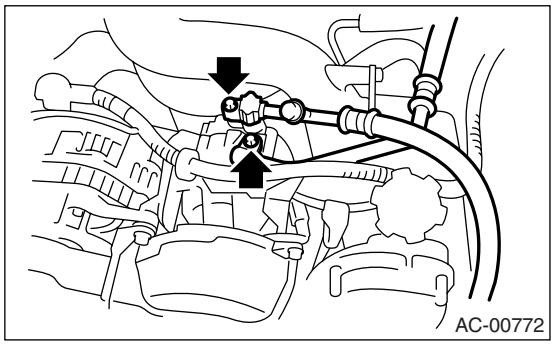
1) Disconnect the compressor connector.
2) Connect the battery positive (+) terminal to terminal No. 1 of compressor connector, and negative (−) terminal to terminal No. 2.



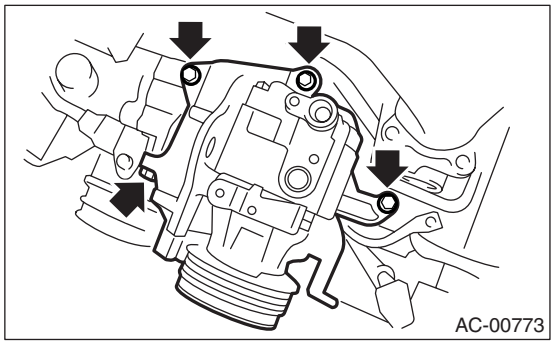
3) Check the magnet clutch engagement.
If NG, replace the compressor.

B: REMOVAL

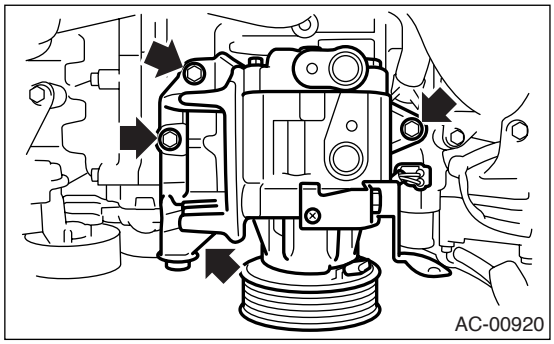
1) Perform the compressor oil return operation. <Ref. to AC-25, PROCEDURE, Compressor Oil.>
2) Turn the A/C switch to OFF and stop the engine.
3) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
4) Disconnect the ground cable from battery.
5) Remove the V-belts. <Ref. to ME(H4SO 2.0)-38, REMOVAL, V-belt.> <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.> <Ref. to ME(H6DO)-33, REMOVAL, V-belt.>
6) Remove the generator. <Ref. to SC(H4SO 2.0)-14, REMOVAL, Generator.> <Ref. to SC(H6DO)-14, REMOVAL, Generator.>
7) Remove the bolt and remove the low-pressure hose and high-pressure hose.



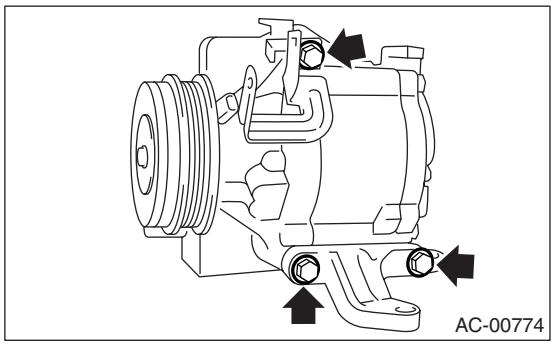
8) Disconnect the compressor harness from body harness.
9) Remove the bolts and remove compressor bracket.
• H4 model



• H6 model



10) Remove the bolts, and then remove the bracket from compressor.



C: INSTALLATION

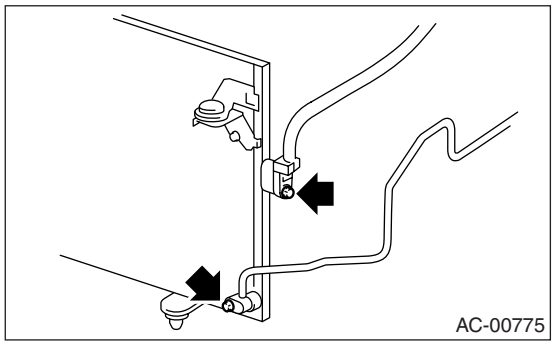
1) Install in the reverse order of removal.
2) Replace the O-rings on low-/high-pressure hoses with new ones, then apply compressor oil.
3) When replacing the compressor, adjust amount of compressor oil. <Ref. to AC-25, PROCEDURE, Compressor Oil.>
4) Charge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-10, AIR CONDITIONING UNIT, COMPONENT, General Description.> <Ref. to AC-11, COMPRESSOR, COMPONENT, General Description.>

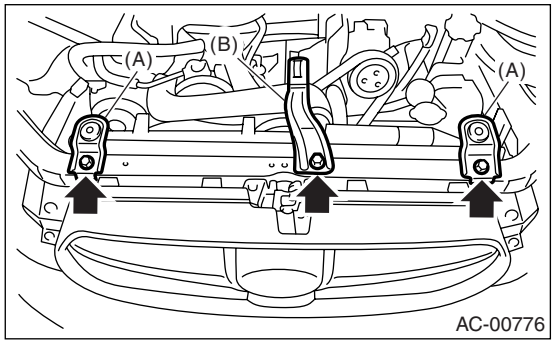
15.Condenser

A: REMOVAL

1) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
2) Disconnect the ground cable from battery.
3) Disconnect the pressure hose and pipe from condenser.

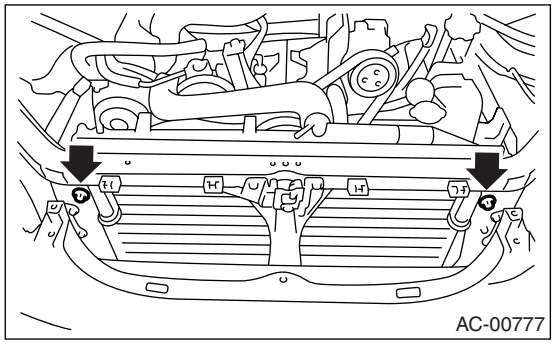

AC-00775

4) Remove the radiator bracket (A) and hood stay (B).



AC-00776

5) Remove the front grille. <Ref. to EI-24, REMOVAL, Front Grille.>
6) Remove two bolts. While lifting condenser, pull it out through the space between radiator and radiator panel.

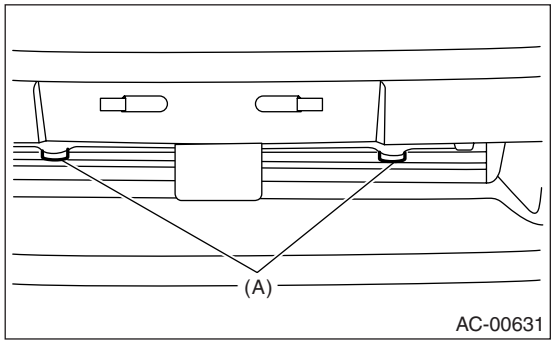

AC-00777

CAUTION:
• Be careful not to damage the condenser fins. If a damaged fin is found, repair it using a thin screwdriver.
• If the condenser is replaced, add an appropriate amount of compressor oil to the compressor. <Ref. to AC-25, REPLACEMENT, Compressor Oil.>

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Replace the O-rings on hoses or pipes with new ones, and then apply compressor oil. Confirm that lower guide of condenser (A) has been fitted into holes on radiator panel.



AC-00631

2) Charge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-10, AIR CONDITIONING UNIT, COMPONENT, General Description.> <Ref. to CO(H4SO 2.0)-5, RADIATOR AND RADIATOR FAN, COMPONENT, General Description.>

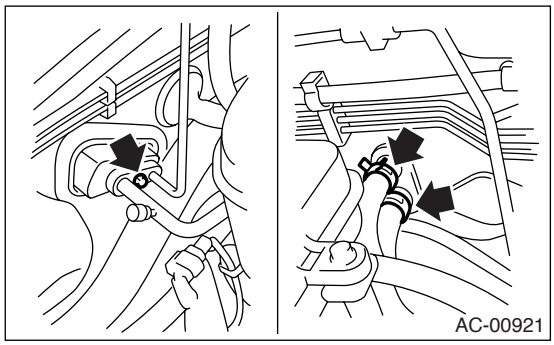
C: INSPECTION

1) Check no dust or insects are found on the condenser fins. Air-blow or flush fins with water as needed.
2) Inspect for oil leakage from condenser. If a failure is found, replace the condenser with a new one.

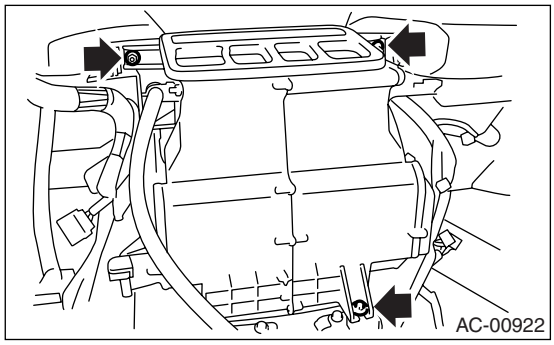
16.Heater and Cooling Unit

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
3) Drain coolant from the radiator.
4) Remove the bolts securing expansion valve and pipe in engine compartment. Release the heater hose clamps in engine compartment to remove the hoses.



5) Remove the instrument panel. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
6) Remove the support beam.
7) Remove the blower motor unit assembly. <Ref. to AC-26, REMOVAL, Blower Motor Unit Assembly.>
8) Disconnect the actuator connector.
9) Remove the bolt and nuts to remove the heater and cooling unit.



B: INSTALLATION

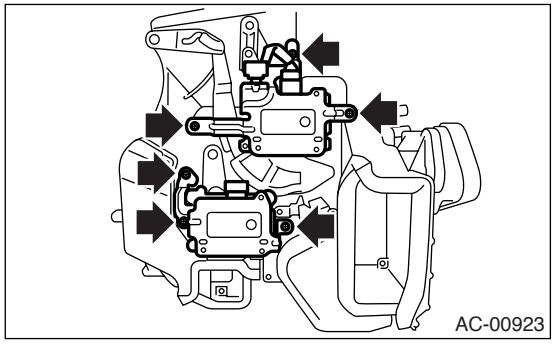
1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-5, HEATER COOLING UNIT, COMPONENT, General Description.>

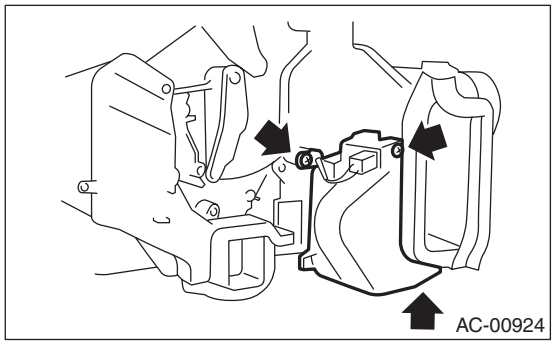
17.Evaporator

A: REMOVAL

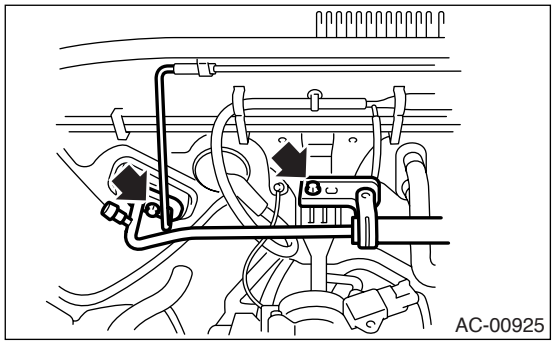
1) Remove the blower motor unit assembly. <Ref. to AC-26, REMOVAL, Blower Motor Unit Assembly.>
2) Disconnect the connector, remove the screw and then remove the air-mix door actuator and mode door actuator.



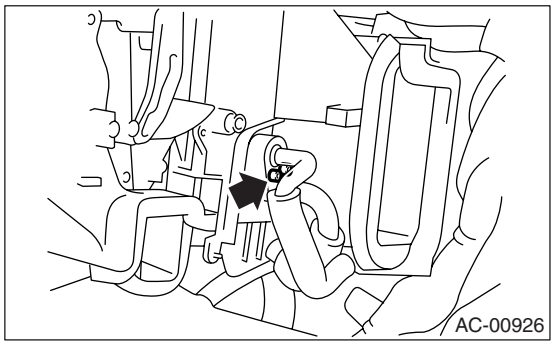
3) Disconnect the connector, remove the screw and remove the pipe cover and evaporator sensor.



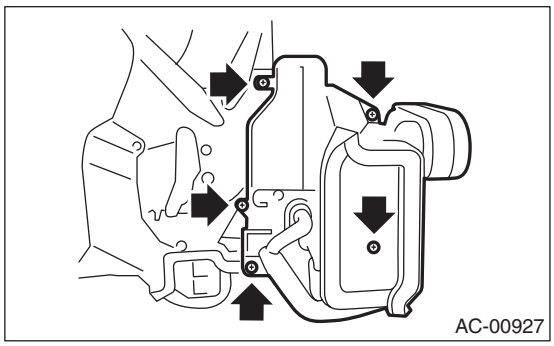
4) Remove the bolts securing expansion valve and pipe in engine compartment.



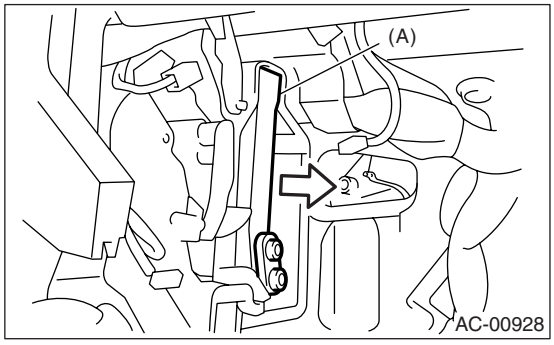
5) Remove the bolt which holds the pipe to evaporator.



6) Remove the screws and clip to remove the evaporator cover.



7) Pull out the evaporator (A) in the direction of arrow.



CAUTION:
If the evaporator is replaced, add an appropriate amount of compressor oil to evaporator. <Ref. to AC-25, REPLACEMENT, Compressor Oil.>

B: INSTALLATION

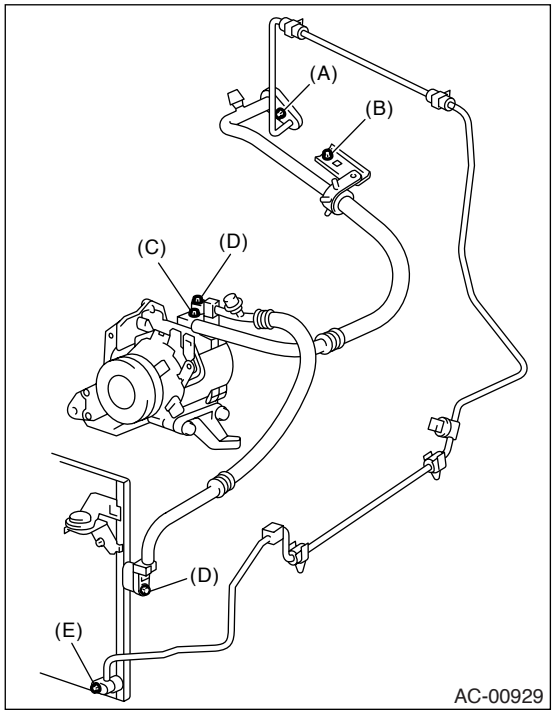
Install in the reverse order of removal.

18.Hose and Tube

A: REMOVAL

CAUTION:
• When disconnecting/connecting hoses, do not apply an excessive force to them. Confirm that no torsion and excessive tension is charged after installing.
• Seal the disconnected hose with a plug or vinyl tape to prevent foreign matter from entering.

1) Disconnect the ground cable from battery.
2) Using the refrigerant recovery system, discharge refrigerant. <Ref. to AC-20, PROCEDURE, Refrigerant Recovery Procedure.>
3) Remove the evaporator unit mounting bolt (A) and low-pressure hose bracket bolt (B).
4) Remove the low-pressure hose attaching bolts (C).
5) Disconnect the low-pressure hose from evaporator unit.
6) Disconnect the low-pressure hose from compressor.
7) Remove the low-pressure hose from vehicle.
8) Remove the high-pressure hose attaching bolt (D).
9) Disconnect the high-pressure hose from compressor.
10) Disconnect the high-pressure hose from condenser.
11) Remove the high-pressure hose from vehicle.
12) Remove the high-pressure attaching bolt (E).
13) Remove the high-pressure tube from vehicle.



B: INSTALLATION

CAUTION:
• When disconnecting or connecting the hoses, do not apply excessive force to them. Confirm that no torsion and excessive tension is charged after installing.
• Seal the disconnected hose with a plug or vinyl tape to prevent foreign matter from entering.

1) Install in the reverse order of removal.
2) Charge refrigerant. <Ref. to AC-21, PROCEDURE, Refrigerant Charging Procedure.>

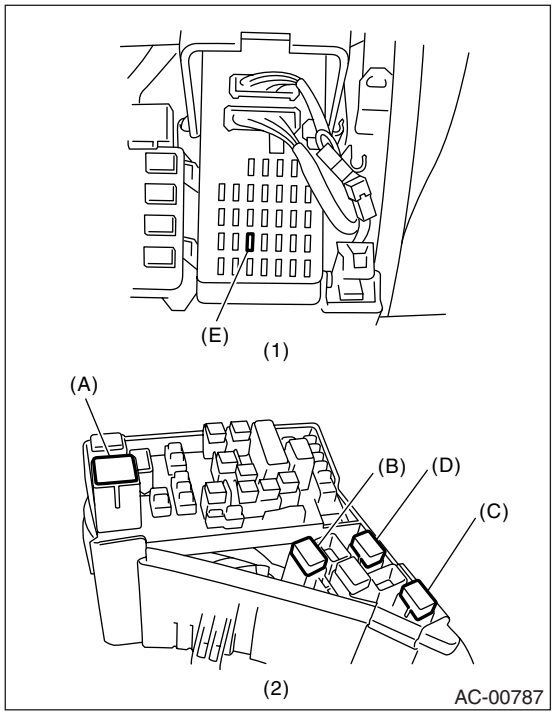
Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AC-10, AIR CONDITIONING UNIT, COMPONENT, General Description.>

C: INSPECTION

Check the hoses for cracks, damage and expansion. If any fault is found, replace them with new ones.

19.Relay and Fuse

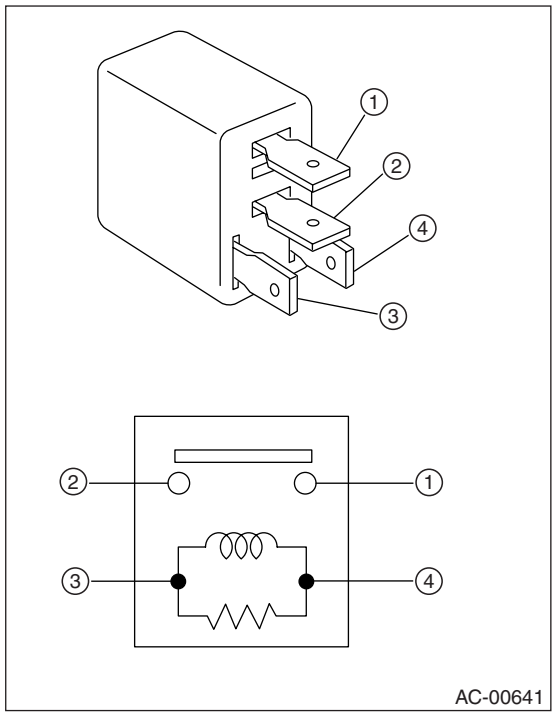
A: LOCATION



(1) Joint box
(2) Main fuse box

Main Fan Relay 1	(A)
Main Fan Relay 2	(B)
Sub Fan Relay	(C)
A/C Relay	(D)
A/C Fuse	(E)

B: INSPECTION



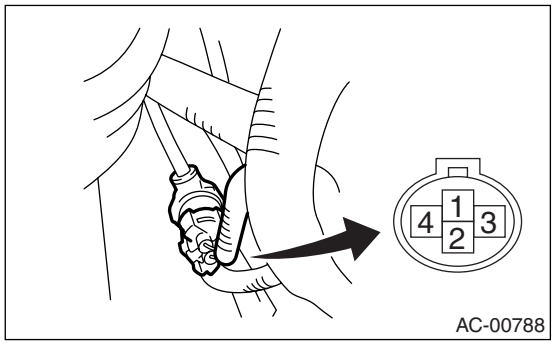
(3) — (4): Continuity exists
(1) — (2): Continuity does not exist

While applying battery voltage to the terminal between (3) and (4), check continuity between (1) and (2).
If no continuity exists, replace the relay with a new one.

20.Pressure Switch (Triple Pressure Switch)

A: INSPECTION

1) Connect the manifold gauge to the service valve on the high-pressure side.
2) Remove the pressure switch harness connector. Using a circuit tester, inspect the ON-OFF operation of pressure switch.

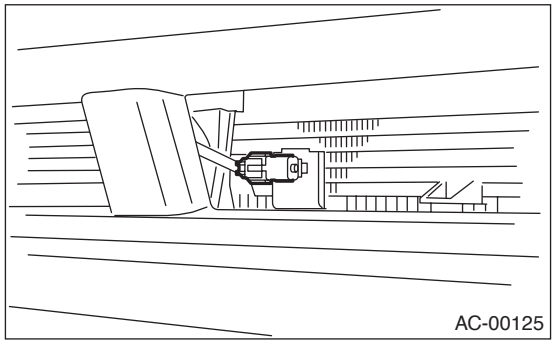


	Terminal No.	Operation	Standard kPa (kg/cm^2, psi)
High and low pressure switch	1 and 2	Turns OFF.	Increasing to $3{,}140^{+50}_{-200}$ ($32.02^{+0.51}_{-2.04}$, $455.4^{+7.25}_{-29.0}$)
			Decreasing to 196±20 (2.00±0.20, 28.4±2.9)
		Turns ON.	Increasing to 225^{+25}_{-29} ($2.29^{+0.25}_{-0.30}$, $32.6^{+3.6}_{-4.2}$)
			Decreasing to 2,550±200 (26.00±2.04, 369.8±29.0)
Middle pressure switch	3 and 4	Turns OFF.	Decreasing to 1,370±120 (14±1, 199±14)
		Turns ON.	Increasing to 1,770±100 (18±1, 256±14)

21. Ambient Sensor (Auto A/C Model)

A: REMOVAL

1) Open the front hood.
2) Disconnect the ground cable from battery.
3) Disconnect the ambient sensor connector.
4) Remove the ambient sensor from the radiator lower panel.



B: INSTALLATION

Install in the reverse order of removal.

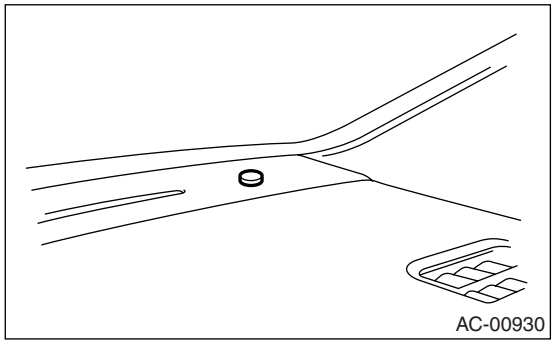
C: INSPECTION

<Ref. to AC(diag)-30, AMBIENT SENSOR, Diagnostic Procedure for Sensors.>

22.Sunload Sensor (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disconnect the connector and remove the sunload sensor.



CAUTION:
Be careful not to damage the interior trims when removing the sensor.

B: INSTALLATION

Install in the reverse order of removal.

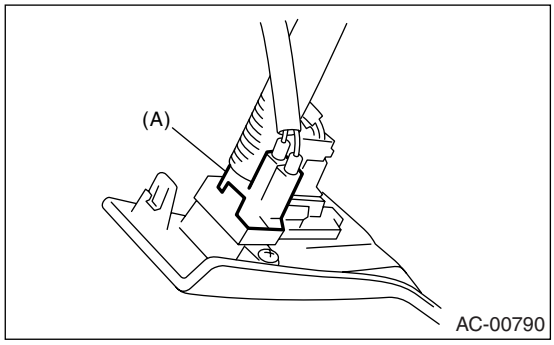
C: INSPECTION

<Ref. to AC(diag)-36, SUNLOAD SENSOR, Diagnostic Procedure for Sensors.>

23.In-Vehicle Sensor (Auto A/C Model)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
3) Disconnect the connector and aspirator hose, remove the pawl and remove the in-vehicle sensor (A) from instrument lower cover.



CAUTION:
Be careful not to damage the sensors and interior trims when removing.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

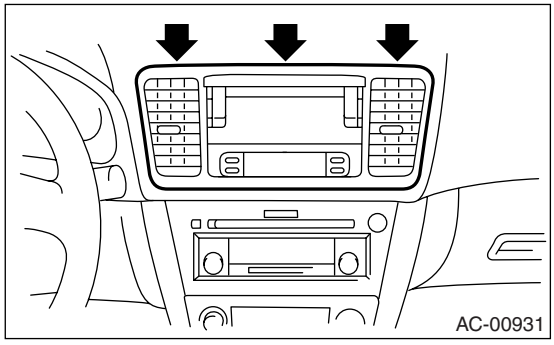
<Ref. to AC(diag)-32, IN-VEHICLE SENSOR, Diagnostic Procedure for Sensors.>

24. Air Vent Grille

A: REMOVAL

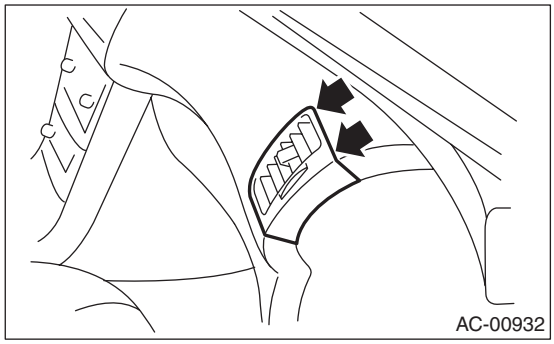
1. CENTER GRILLE

1) Disconnect the ground cable from battery.
2) Remove the three pawls and connector to remove center air vent grill.



2. SIDE GRILLE

Remove the two pawls to remove side air vent grill.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

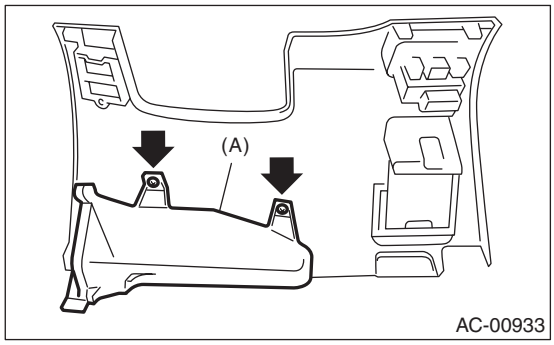
1) Check the direction and amount of air can be adjusted smoothly.
2) Check the adjustment can be kept in each position.

25.Heater Duct

A: REMOVAL

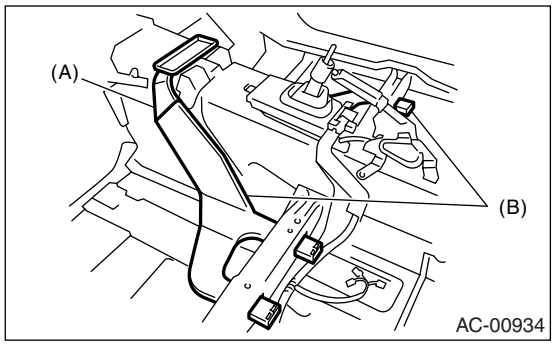
1. FRONT HEATER DUCT

1) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Remove the screws and detach the front heater duct (A).



2. REAR HEATER DUCT

1) Remove the heater cooling unit. <Ref. to AC-36, REMOVAL, Heater and Cooling Unit.>
2) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
3) Remove the front side sill cover.
4) Pull off the floor mat to remove the rear center heater duct (A) and rear heater duct LH, RH (B).



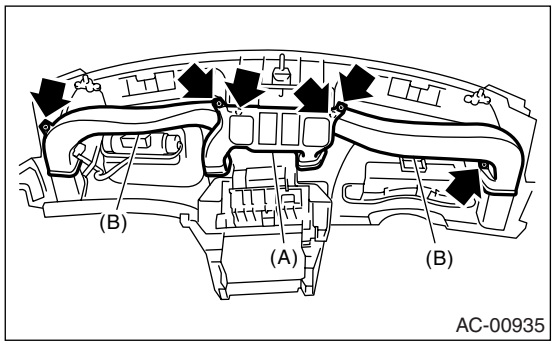
B: INSTALLATION

Install in the reverse order of removal.

26.Heater Vent Duct

A: REMOVAL

1) Remove the instrument panel. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Remove the screws and detach the center vent duct (A).
3) Remove the screws and detach the center vent duct (B).
4) Remove the insulator, remove the screws and detach the defroster duct.



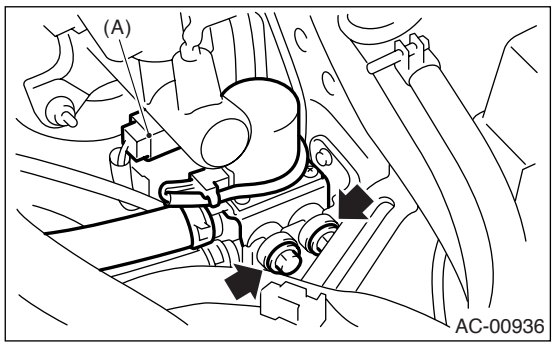
B: INSTALLATION

Install in the reverse order of removal.

27.Heater Cock Solenoid Valve

A: REMOVAL

1) Drain the engine coolant. <Ref. to CO(H4SO 2.0)-13, DRAINING OF ENGINE COOLANT, REPLACEMENT, Engine Coolant.>
2) Disconnect the harness connector (A) of the heater cock solenoid valve.
3) Remove the two bolts to remove the heater cock solenoid from the bracket.



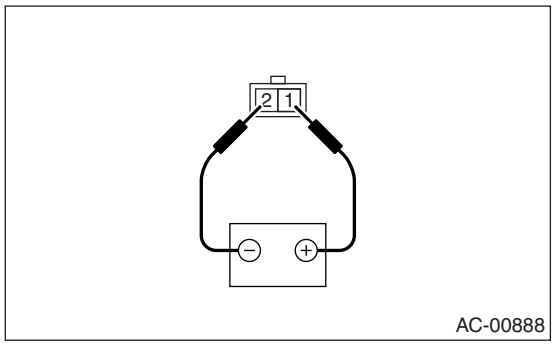
4) Pull out the heater cock solenoid. Loosen the hose clamp and disconnect the two heater hoses.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Remove the heater cock solenoid valve. <Ref. to AC-47, REMOVAL, Heater Cock Solenoid Valve.>
2) Connect the positive terminal of battery to No. 1 terminal of heater cock solenoid valve, and the ground terminal to No. 2 terminal. Check that the heater cock solenoid valve opens and closes normally.



If any failure is found, replace the heater cock solenoid valve.

28.General Diagnostic Table

A: INSPECTION

Symptom		Repair order
Blower motor	Doesn't operate.	Fuse
		Blower motor relay
		Blower motor
		Blower motor resistor
		Blower switch
		Wire harness
	Noise	Blower motor
Compressor	Doesn't operate.	Refrigerant
		Fuse
		Air conditioning relay
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
	Noise	V-Belt
		Magnet clutch
		Compressor
Cold air not emitted.		Refrigerant
		V-Belt
		Magnet clutch
		Compressor
		Pressure switch
		A/C switch
		Blower switch
		Wire harness
		Heater duct
		Heater vent duct
Warm air not emitted.		Engine coolant
		Blower switch
		Heater core
		Heater cock solenoid valve
Temperature of air from vents does not change.		Engine coolant
		Air mix actuator (Auto A/C)
		Wire harness (Auto A/C)
		Temperature control cable (Manual A/C)
Unable to switch blow vents.		Mode actuator (Auto A/C)
		Air flow switch (Auto A/C)
		Wire harness (Auto A/C)
		Mode cable (Manual A/C)
Unable to switch suction vents.		Air inlet select switch (Auto A/C)
		FRESH/RECIRC actuator (Auto A/C)
		Wire harness (Auto A/C)
		Intake cable (Manual A/C)

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)

AC(diag)

		Page
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2.	General Description	3
3.	Electrical Component Location	5
4.	Auto A/C Control Module I/O Signal	8
5.	Diagnostic Chart for Self-Diagnosis	10
6.	Diagnostics for A/C System Malfunction	15
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1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**START INSPECTIONS.** 1) Perform the pre-inspection. <Ref. to AC(diag)-3, INSPECTION, General Description.> 2) Perform the self-diagnosis. <Ref. to AC(diag)-10, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Does the self-diagnosis operate?	Go to step **2.**	<Ref. to AC(diag)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**IDENTIFY MALFUNCTION PART.** Identify the malfunction part with self-diagnosis.	Can the malfunction part be identified?	Repair the malfunction part in accordance with each diagnostic chart.	Go to step **3.**
3	**CHECK COMPARTMENT TEMPERATURE.** 1) Turn ON the A/C switch. 2) Turn the temperature control dial at maximum cool position. 3) Check the compartment temperature change.	Does the compartment temperature change?	Go to step **4.**	<Ref. to AC(diag)-20, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>
4	**CHECK A/C SYSTEM RESPONSE.** Change the temperature setting, and check the response of A/C system.	Does the A/C system respond quickly?	A/C system is normal.	<Ref. to AC(diag)-20, COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY., Diagnostics for A/C System Malfunction.>

2. General Description

A: CAUTION

1) Never connect the battery in reverse polarity.
• Auto A/C control module may be destroyed instantly.
2) Do not disconnect the battery terminals while the engine is running.
• A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as auto A/C control module, etc.
3) Before disconnecting the connectors of each sensor and the auto A/C control module, be sure to turn off the ignition switch.
• Auto A/C control module may be damaged.
4) Every A/C-related part is a precision part. Do not drop them.
5) Airbag system wiring harness is routed near the A/C control panel and junction box.

CAUTION:
• For airbag system, yellow-colored wiring harness and connectors are all used. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the A/C control panel and junction box.

B: INSPECTION

Before performing the diagnosis, check the following items which might affect A/C system problems.

1. BATTERY

1) Measure the battery voltage and specific gravity of electrolyte.

Standard voltage: 12 V

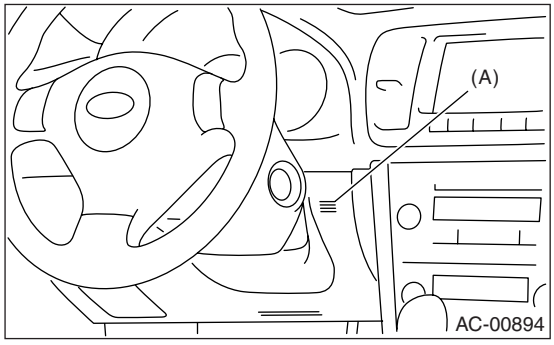
Specific gravity: More than 1.260

2) Check the condition of the fuses for A/C system power supply and other fuses.
3) Check the condition of harness and harness connector connections.

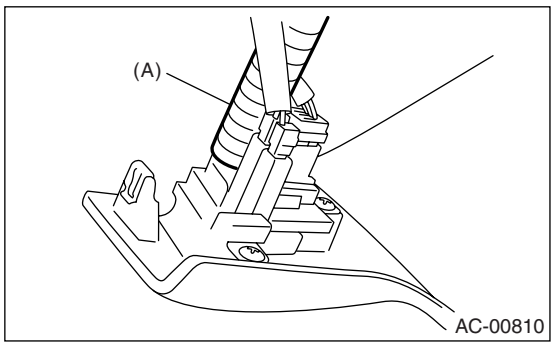
2. ASPIRATOR HOSE

1) Turn the ignition switch to ON, and press the A/C switch.
2) Turn the temperature control dial at maximum hot position.
3) Turn the air flow control dial to “DEF” position.
4) Turn the fan speed control dial to 4th position.
5) Approach a strip of paper in front of the in-vehicle sensor suction port (A) located in the instrument lower cover, and check that air is being sucked into the port by seeing the paper moving towards the port.

NOTE:
Be careful not to let the paper get sucked into the port.

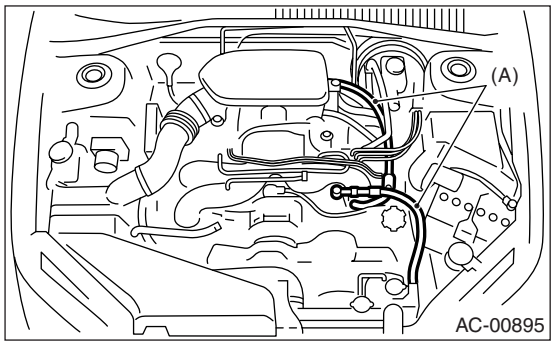


6) If the paper does not move at all, remove the instrument panel lower cover <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.> and check for improper connection of the aspirator hose (A), in-vehicle sensor and heater unit, and repair them if necessary.



3. A/C LINE

Check the connection for A/C line (A) and lower side high-pressure pipe.



4. CONTROL LINKAGE

1) Check the state of mode door linkage.
2) Check the state of air mix door linkage.
3) Check the state of intake door linkage.

5. CONTROL SWITCHES

Start and warm-up the engine completely.
1) Inspection using switches

No.	Point to check	Switch operation	Judgment standard
1	OFF switch	Press the OFF switch.	Setting temperature display goes out. • Blower fan: OFF • Inlet opening: External air • Compressor: OFF
2	AUTO switch	1) Press the AUTO switch. 2) Turn the temperature control dial to the left fully, and set to 18°C (maximum cool position).	AUTO display illuminates. • Outlet air temperature: COOL • Blower fan: HI (AUTO) • Outlet opening: FACE • Inlet opening: AUTO • Compressor: AUTO
		3) Turn the temperature control dial to the right slowly, and change the setting from 18°C (maximum cool position) to 32°C.	• Outlet air temperature: COOL → HOT • Blower fan: AUTO • Outlet opening: FACE → B/L → FOOT • Inlet opening: AUTO • Compressor: AUTO
		4) Turn the temperature control dial to the right fully, and set to 32°C (maximum hot position).	• Outlet air temperature: HOT • Blower fan: HI (AUTO) • Outlet opening: FOOT • Inlet opening: Ambient (AUTO) • Compressor: AUTO
3	Defroster switch	Press the defroster switch.	Defroster switch indicator illuminates. • Outlet air temperature: AUTO • Blower fan: AUTO • Outlet opening: DEF • Inlet opening: External air • Compressor: ON
4	FRESH/RECIRC switch	Press the FRESH/RECIRC switch.	Inlet opening switches RECIRC → FRESH or FRESH → RECIRC each time pressing the switch.
5	MODE switch	Press the MODE switch.	Outlet opening switches FACE → B/L → FOOT → F/D each time pressing the switch
6	FAN switch	Press the FAN (+) switch.	Inlet opening switches LO → M1 → M2 → M3 → M4 → HI each time pressing the switch

2) Compressor operation inspection

No.	Point to check	Switch operation	Judgment standard
1	Compressor	1) Turn the A/C switch to ON. 2) Set the FAN switch between LO and HI.	Compressor: ON

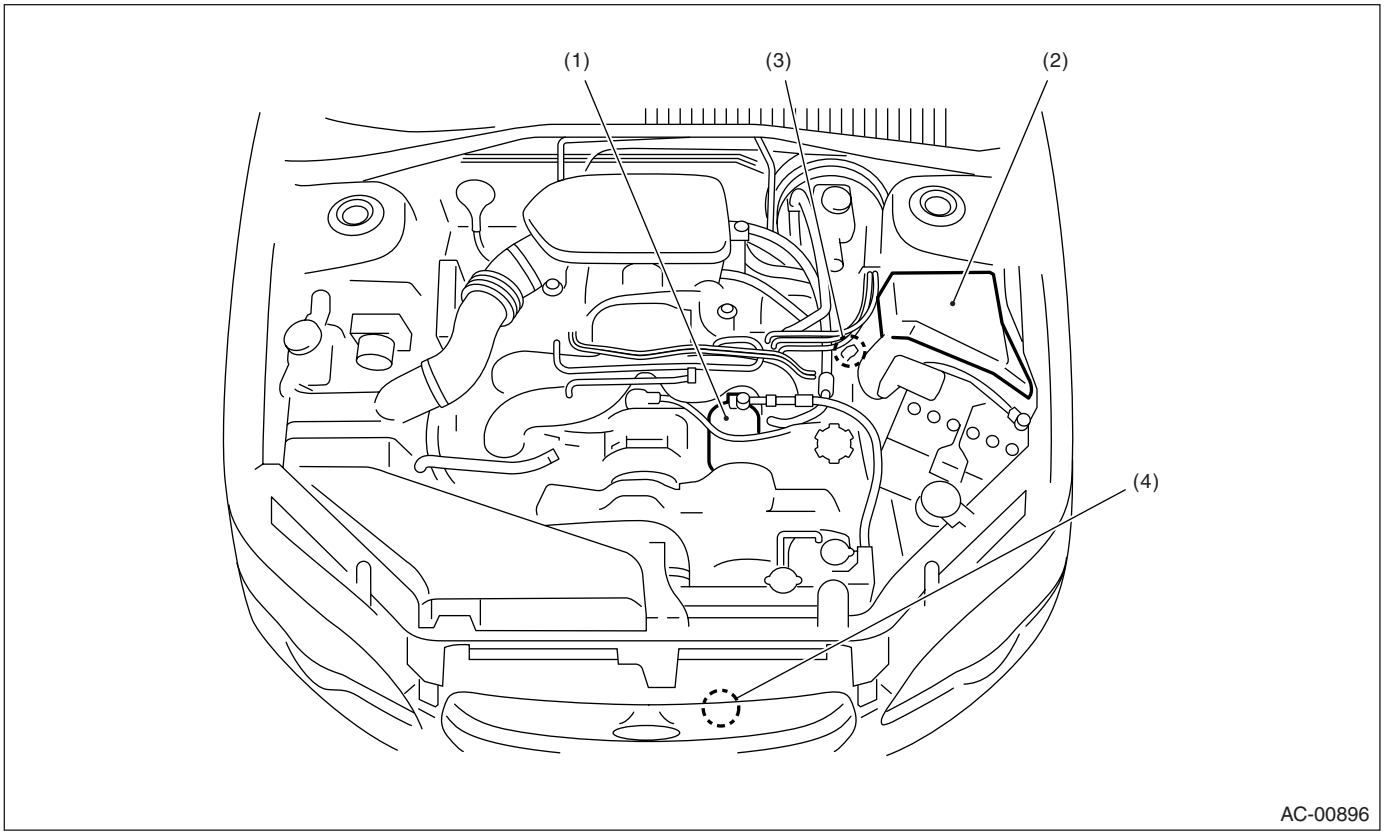
3) Inspection of illumination control

No.	Point to check	Switch operation	Judgment standard
1	Illumination	Turn the lighting switch to ON.	Illumination comes on.

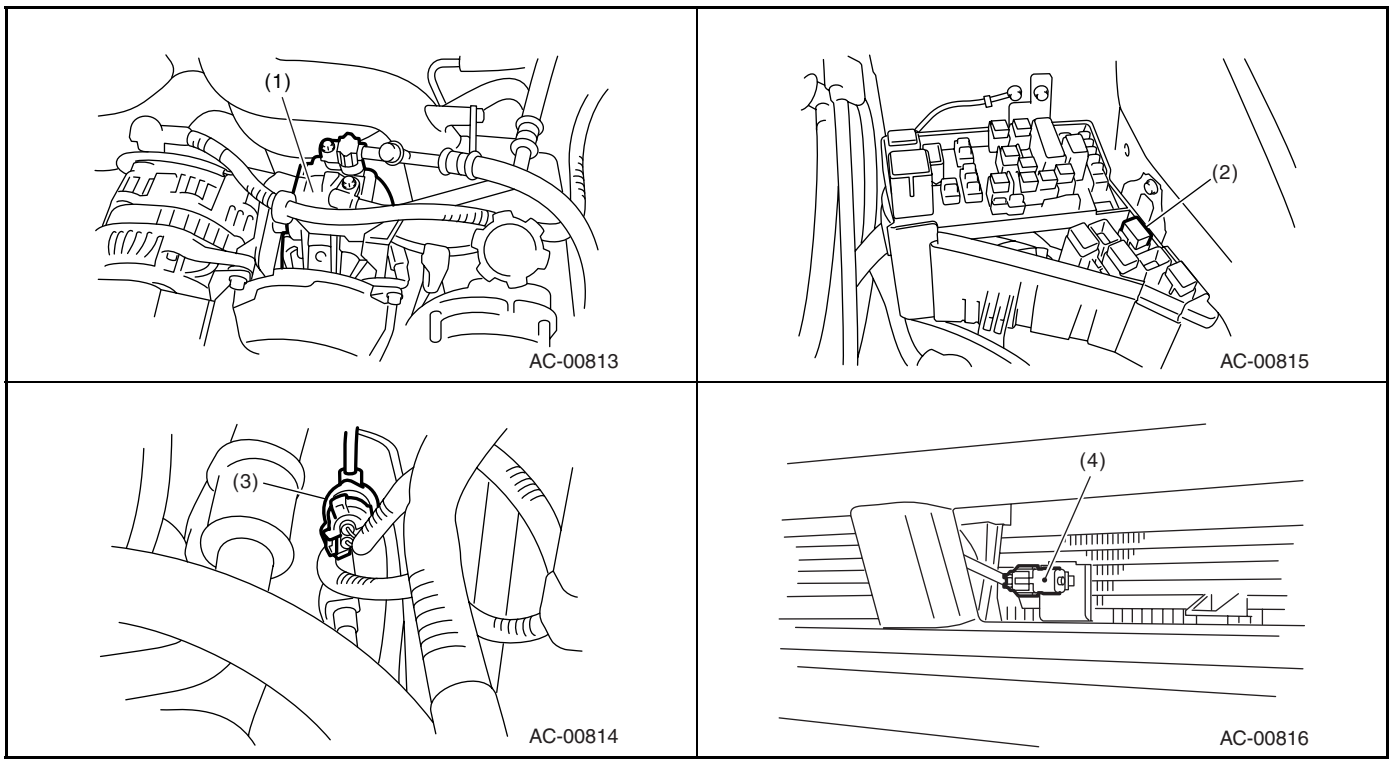
3. Electrical Component Location

A: LOCATION

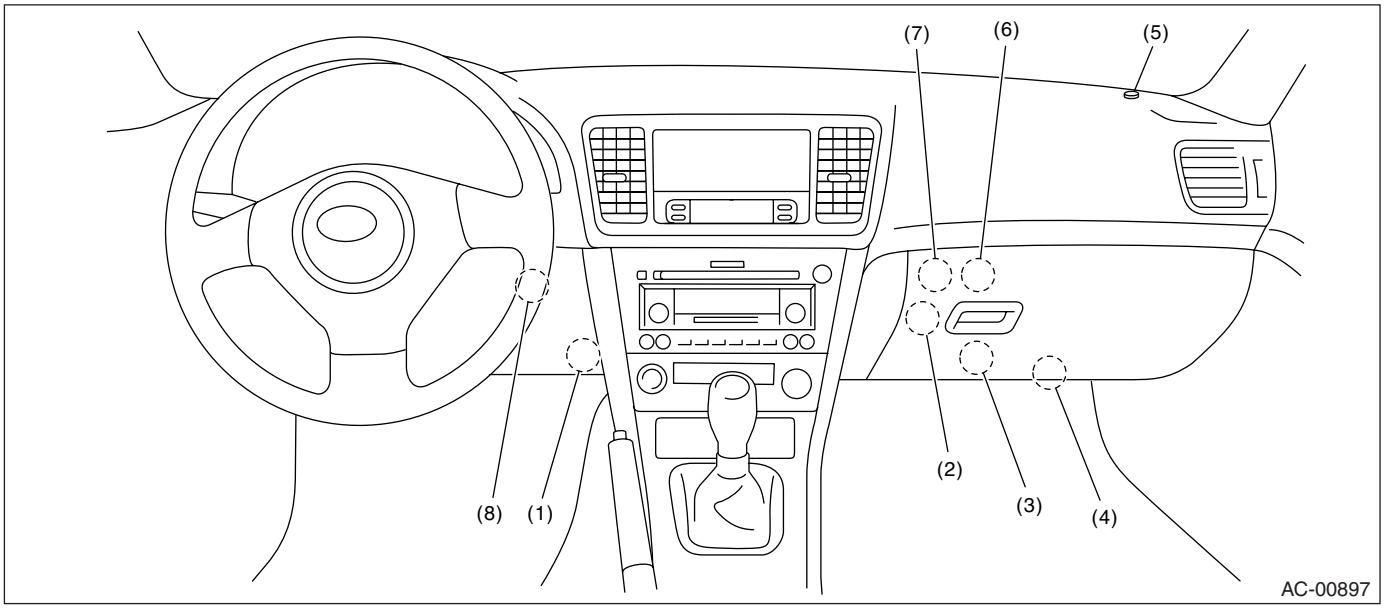
1. ENGINE COMPARTMENT



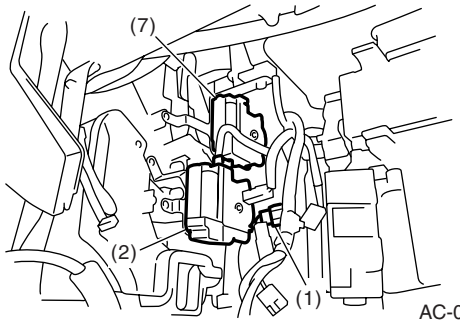
(1) A/C compressor
(2) A/C relay
(3) Pressure switch
(4) Ambient sensor



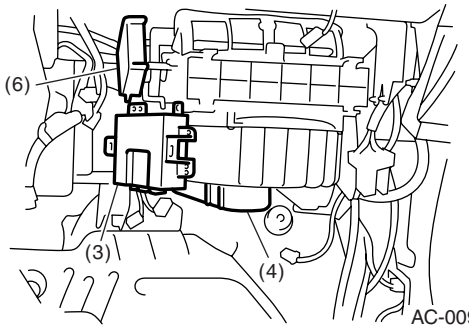
2. PASSENGER COMPARTMENT



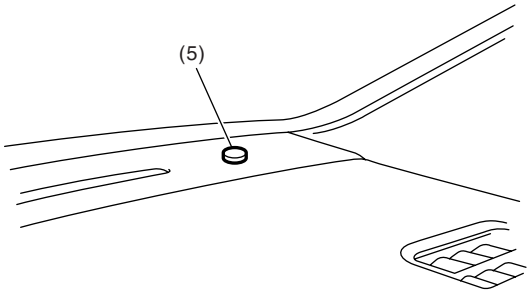
(1) Evaporator sensor
(2) Air mix door actuator
(3) Auto A/C control module
(4) Blower motor
(5) Sunload sensor
(6) Intake door actuator
(7) Mode door actuator
(8) In-vehicle sensor



AC-00898



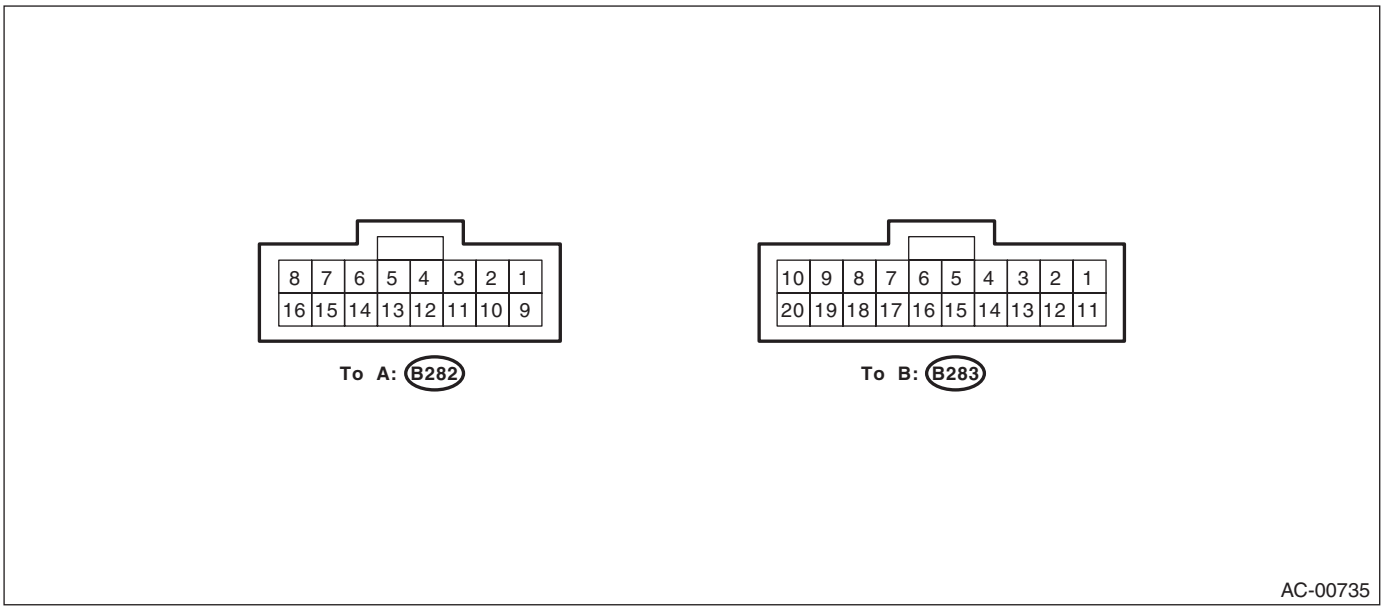
AC-00900



AC-00899

4. Auto A/C Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



Terminal No.	Remarks	Measuring conditions	Standard value
A1	Battery power supply	Ignition switch: OFF	Battery voltage
A2	ACC power supply	Ignition switch: ACC	Battery voltage
A3	Mode door actuator position signal	Mode door: FACE position	4 V
		Mode door: DEF position	1 V
A4	Air mix door actuator position signal	Air mix door: Maximum cool position	4 V
		Air mix door: Maximum hot position	1 V
A5	In-vehicle sensor	Ignition switch: ON	Less than 5 V
A6	Sunload sensor	Ignition switch: ON, With sunload (No sunload: 0 V)	3 V
A8	Sensor power supply	Ignition switch: ON	5 V
A9	Ignition power supply	Ignition switch: ON	Battery voltage
A10	A/C cut signal	Ignition switch: ON	Battery voltage
		When operating pressure SW	0 V
A13	Evaporator center	Ignition switch: ON	Less than 5 V
A14, A16	Ground	Continuity to chassis ground	0 Ω
A15	Sensor ground	Continuity to chassis ground	0 Ω
B1, B11	Ambient sensor, engine coolant temperature sensor	—	*1
B2	Blower motor control	Ignition switch : ON, Blower switch : ON	0.45 V
B3	Blower motor control	Ignition switch : ON, Blower switch : ON	9.05 V
B4	RAM monitor	—	*1
B5	RAM monitor	—	*1
B6	A/C ON signal	A/C ON (A/C OFF: 0 V)	7 — 14 V
B7	Mode door actuator power supply	When switching mode door from DEF → FACE	Battery voltage
B17		When switching mode door from FACE → DEF	Battery voltage
B8	Air mix door actuator power supply	When switching air mix door from HOT → COOL	Battery voltage
B18		When switching air mix door from COOL → HOT	Battery voltage
B10	Intake door actuator	FRESH (RECIRC: Battery voltage)	0 V
B20		RECIRC (FRESH: Battery voltage)	0 V
B13	Blower fan ON signal	When blower fan is rotating (Not rotating: Battery voltage)	0 V
B14	RAM monitor	—	*1
B15, B16	Control panel	—	*1

*1: Unable to measure the voltage for digital signal.

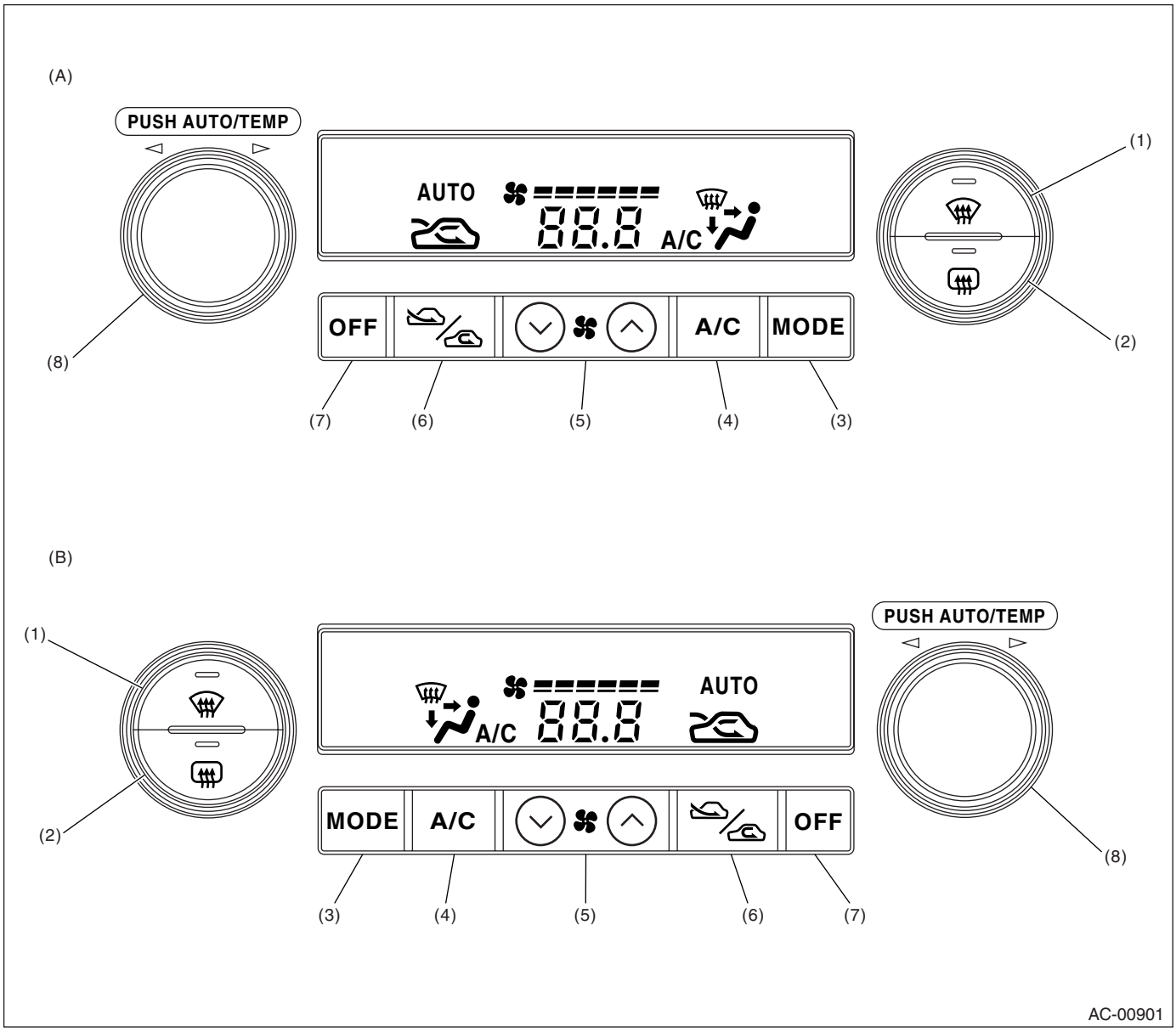
B: WIRING DIAGRAM

1. AIR CONDITIONER AUTO A/C MODEL

<Ref. to WI-59, WIRING DIAGRAM, Air Conditioning System.>

5. Diagnostic Chart for Self-Diagnosis

A: OPERATION



(A) LHD model
(B) RHD model

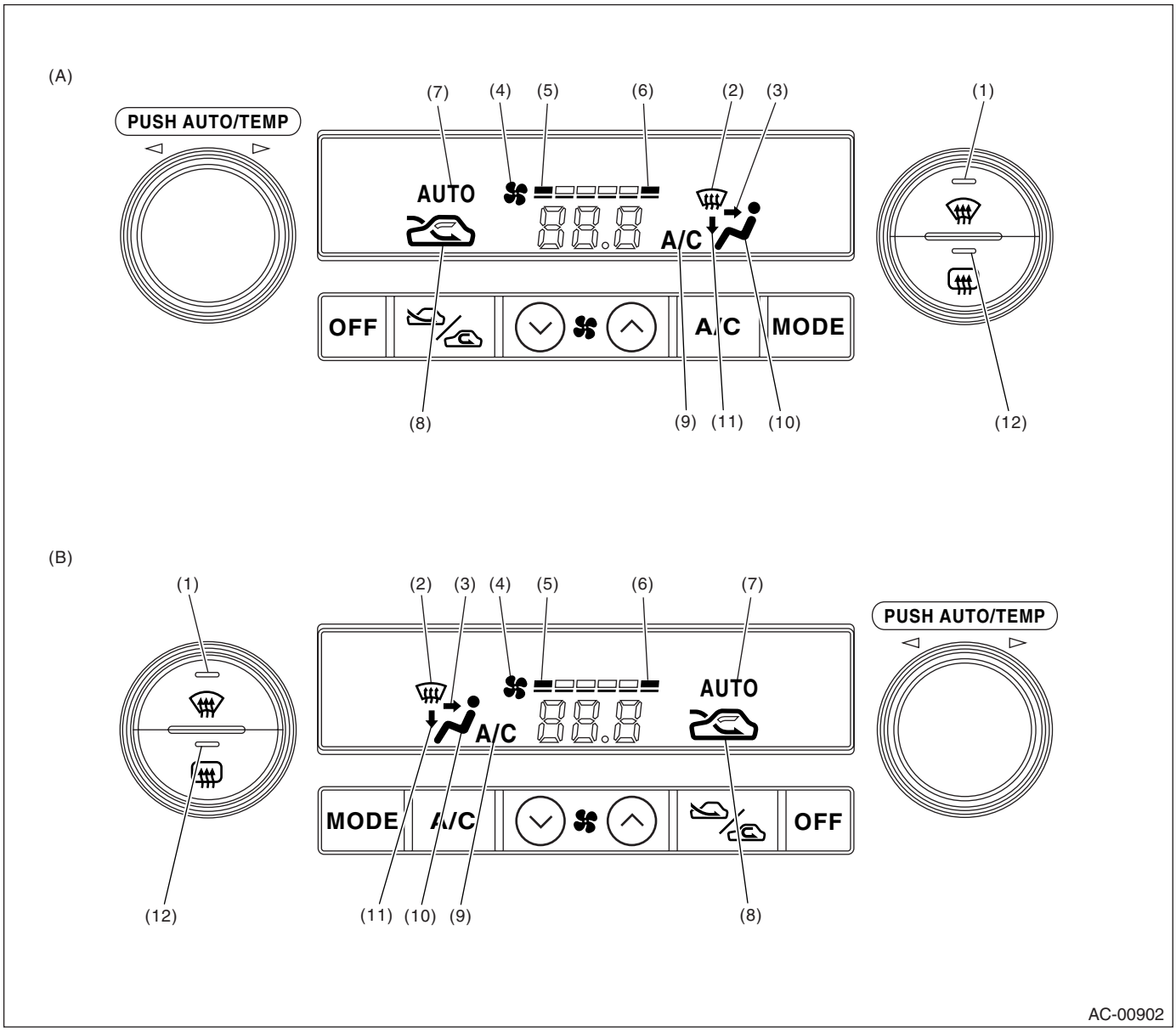
(1) Defroster switch
(2) Rear window defogger switch
(3) Air flow control switch
(4) A/C switch
(5) Fan switch
(6) FRESH/RECIRC switch
(7) OFF switch
(8) Temperature control dial (AUTO switch)

NOTE:
For A/C system self-diagnosis, there is one that checks the control panel, and the other that checks the whole control system (sensor, actuator, blower motor, etc.). Perform the self-diagnosis for control panel first, and then perform the self-diagnosis for control system.

1. A/C CONTROL PANEL SELF-DIAGNOSIS

	Step	Check	Yes	No
1	**SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.** 1) Turn the ignition switch to OFF. 2) Turn the ignition switch to ON with the defroster switch and A/C switch pressed. 3) The screen display and indicator illuminate.	Does the self-diagnosis mode operate?	Go to step **2.**	<Ref. to AC(diag)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CHECK DISPLAY AND INDICATOR.** Check the display and all indicators illuminate.	Do the display and all indicators illuminate?	Go to step **3.**	Replace the A/C control panel.
3	**CHECK SWITCH AND TEMPERATURE CONTROL DIAL INPUT.** According to the switch check table, press each switch or turn the temperature control dial, and check the relative screen display and indicators illuminate. <Ref. to AC(diag)-12, SWITCH CHECK TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Does the screen display related to each switch and dial input illuminate?	Go to step **4.**	Replace the A/C control panel.
4	**CHECK A/C CONTROL PANEL COMMUNICATION.** 1) Turn the ignition switch to OFF. 2) Disconnect the auto A/C control module harness connector. 3) Using a suitable lead wire, short the terminal No. 15 and No. 16 of auto A/C control module harness connector (B283). 4) Turn the ignition switch to ON with the rear defogger switch and A/C switch pressed. 5) When no malfunction occurs in the control panel communication, “CL” is displayed in the screen; and when malfunction occurs, “OP” is displayed.	Is “CL” displayed in the screen?	A/C control panel is normal. Turn the ignition switch to OFF, and connect the auto A/C control module harness connector.	Replace the A/C control panel.

2. SWITCH CHECK TABLE



(A) LHD model (B) RHD model

Switch	Display screen	Switch	Display screen
A/C switch	(9)	FAN switch (+)	(6)
AUTO switch	(7)	FAN switch (–)	(5)
Air flow control switch	(10)	Temperature control dial (Right turn)	(3)
FRESH/RECIRC	(8)	Temperature control dial (Left turn)	(11)
Defroster switch	(1) (2)	OFF switch	(4)
Rear defogger switch	(12)		

3. A/C CONTROL SYSTEM SELF-DIAGNOSIS

	Step	Check	Yes	No
1	**SET SELF-DIAGNOSIS MODE BY OPERATING A/C CONTROL PANEL.** 1) Turn the ignition switch to OFF. 2) Start the engine with the auto switch and FRESH/RECIRC switch pressed. NOTE: Self-diagnosis can also be performed with ignition switch ON, but start the engine because telling the magnet clutch operation is difficult. 3) All the indicator blinks four times.	Does the self-diagnosis mode operate?	Go to step **2.**	<Ref. to AC(diag)-15, A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE, Diagnostics for A/C System Malfunction.>
2	**CHECK EACH SENSOR AND POTENTIOMETER** 1) After the indicators are completed to blink, automatically change to the inspection mode of sensor and potentiometer. NOTE: Display items can be changed each time the A/C switch is pressed. (Step Operation) 2) When malfunction occurs in each sensor and potentiometer, codes are displayed on the screen. When no malfunction occurs in each sensor and potentiometer, code “20” is displayed on the screen. 3) Identify the defective sensor according to the sensor check table. <Ref. to AC(diag)-14, SENSOR CHECK TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Are other codes except “20” displayed?	Repair the defective sensor. <Ref. to AC(diag)-30, Diagnostic Procedure for Sensors.>	Go to step **3.**
3	**CHECK EACH ACTUATOR, BLOWER FAN AND MAGNET CLUTCH.** 1) After completing each sensor and potentiometer inspection, change to the inspection mode of actuator, blower fan and magnet clutch by pressing the defroster switch. 2) Each mode will change and operate automatically every four seconds. NOTE: Operation mode items can be changed each time the A/C switch is pressed. (Step Operation) 3) Check the operation of actuator, blower fan and magnet clutch in each mode according to the operating mode table. <Ref. to AC(diag)-14, OPERATING MODE TABLE, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Do the actuator, blower fan and magnet clutch operate along the operating mode table?	A/C control system is normal. Press the OFF switch and complete the self-diagnosis mode.	Repair the malfunction part in accordance with each diagnostic chart. <Ref. to AC(diag)-15, Diagnostics for A/C System Malfunction.> or <Ref. to AC(diag)-24, Diagnostic Procedure for Actuators.>

4. SENSOR CHECK TABLE

NOTE:
When the sunload sensor check is conducted indoors or in the shade, open circuit might be indicated. Always check the sunload sensor at the place where the sun shines directly on it.

Display screen (Malfunction at present) *1	SENSOR	Trouble contents
21/AUTO Blink	In-vehicle sensor	Broken
−21/AUTO Blink		Short
22/AUTO Blink	Ambient sensor	Sensor trouble or communication malfunction
23/AUTO Blink	Evaporator sensor	Broken
−23/AUTO Blink		Short
24/AUTO Blink	Engine coolant temperature sensor	Sensor trouble or communication malfunction
25 Blink	Sunload sensor	Open *2
−25/AUTO Blink		Short
26/AUTO Blink	Air mix door actuator potentiometer	COOL
27/AUTO Blink		HOT
28/AUTO Blink	Mode door actuator potentiometer	FACE
29/AUTO Blink		DEF
20 Blink	When all conditions are normal	

*1: “AUTO” display does not blink when past malfunction occurred. Past malfunction means that abnormal signal had input for a certain time continuously in the past.
*2: Present malfunction only is displayed for sunload sensor open circuit.

5. OPERATING MODE TABLE

Display screen	FRESH/RECIRC door	Mode door	Air mix door	Blower fan	A/C compressor (Magnet clutch)
31	FRESH	FACE	Maximum cool	LO	OFF
32	RECIRC	FACE	Maximum cool	LO	ON
33	RECIRC	FACE	Maximum cool	M1	ON
34	FRESH	B/L	50%	M1	ON
35	FRESH	FOOT	50%	M1	ON
36	FRESH	FOOT	Maximum hot	M3	ON
37	FRESH	F/D	Maximum hot	M3	ON
38	FRESH	DEF	Maximum hot	HI	ON

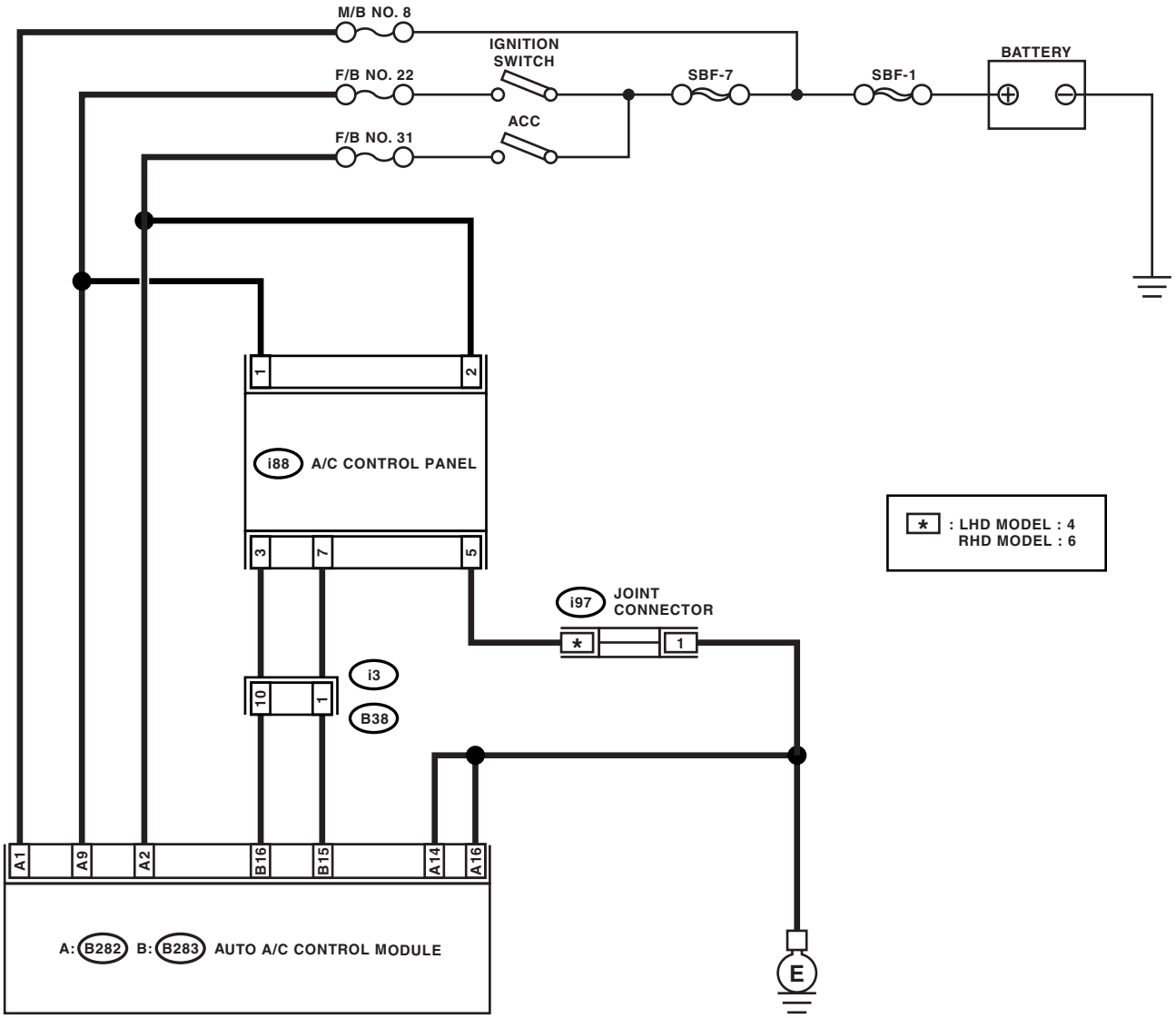
6. Diagnostics for A/C System Malfunction

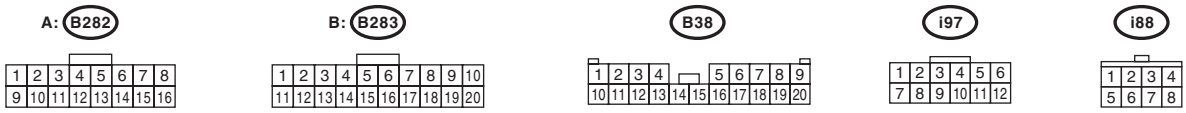
A: A/C OR SELF-DIAGNOSIS SYSTEMS DO NOT OPERATE

TROUBLE SYMPTOM:

- "Set" temperature is not indicated on the display, switch LEDs are faulty and switches do not operate.
- Self-diagnosis system does not operate.

WIRING DIAGRAM:





AC-00903

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 8 from main fuse box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22 and 31 from fuse & relay box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **3.**
3	**CHECK A/C CONTROL PANEL POWER CIRCUIT.** 1) Replace the A/C control panel. 2) Disconnect the A/C control panel harness connector. 3) Measure the voltage between A/C control panel harness connector terminal and chassis ground after turning the ignition switch to ACC position. ***Connector & terminal*** ***(i88) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **4.**	Check the harness for open or short circuit between A/C control panel and fuse.
4	**CHECK A/C CONTROL PANEL POWER CIRCUIT.** Measure the voltage between A/C control panel harness connector terminal and chassis ground after turning the ignition switch to ON position. ***Connector & terminal*** ***(i88) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **5.**	Check the harness for open or short circuit between A/C control panel and fuse.
5	**CHECK A/C CONTROL PANEL GROUND POWER CIRCUIT.** Measure the resistance in harness between A/C control panel and chassis ground after turning the ignition switch to OFF position. ***Connector & terminal*** ***(i88) No. 5 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **6.**	Repair the harness for ground line.
6	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to OFF position. ***Connector & terminal*** ***(B282) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **7.**	Check the harness for open or short circuit between auto A/C control module and fuse.
7	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to ACC position. ***Connector & terminal*** ***(B282) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **8.**	Check the harness for open or short circuit between auto A/C control module and fuse.
8	**CHECK AUTO A/C CONTROL MODULE POWER CIRCUIT.** Measure the voltage between auto A/C control module connector terminal and chassis ground after turning the ignition switch to ON position. ***Connector & terminal*** ***(B282) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **9.**	Check the harness for open or short circuit between auto A/C control module and fuse.

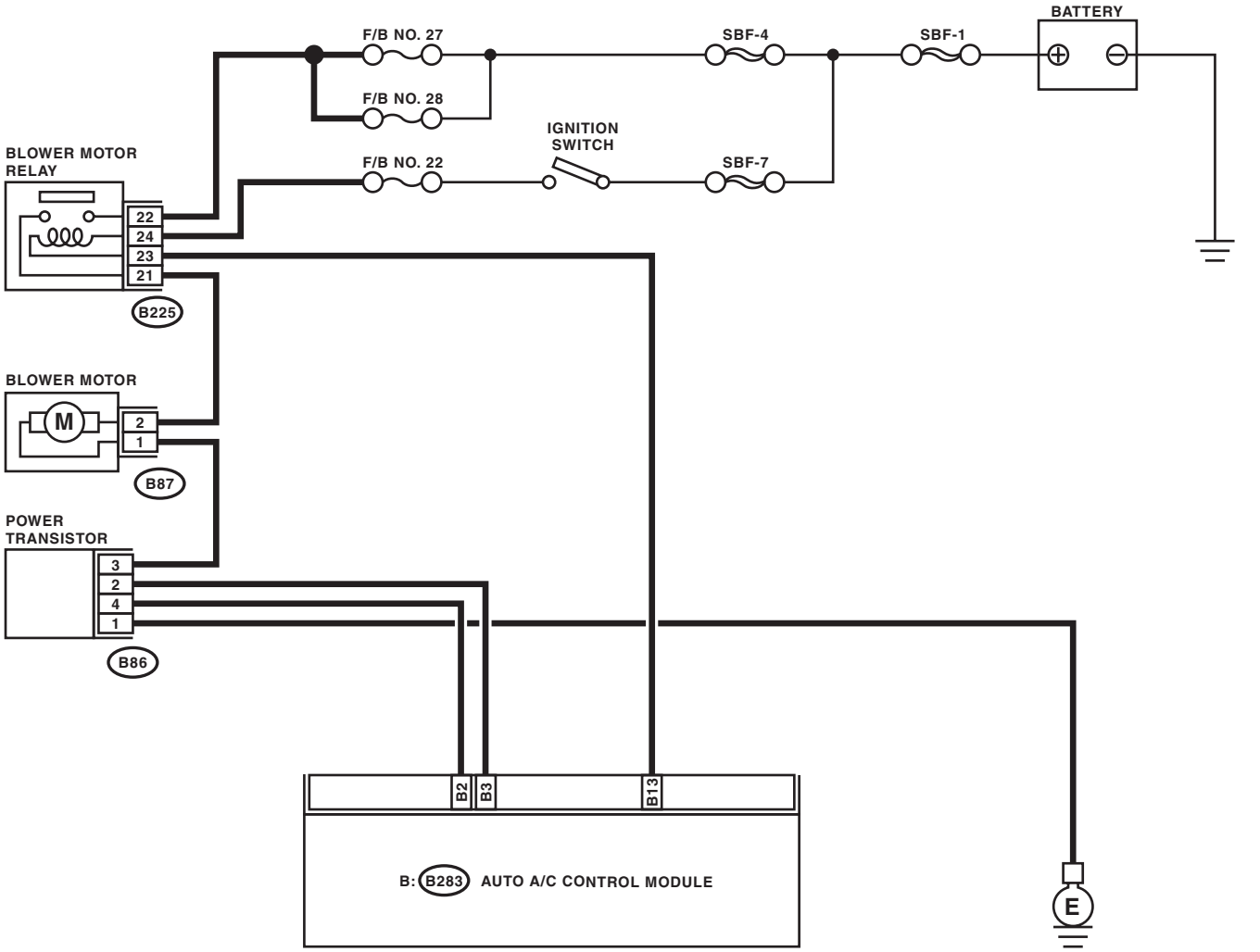
	Step	Check	Yes	No
9	**CHECK AUTO A/C CONTROL MODULE GROUND CIRCUIT.** Measure the resistance in harness between auto A/C control module and chassis ground. ***Connector & terminal*** ***(B282) No. 14, No. 16 — Chassis ground:***	Is the resistance less than 5 Ω?	Go to step **10.**	Repair the harness for ground line.
10	**CHECK COMMUNICATION CIRCUIT.** Measure the resistance in harness between A/C control panel and auto A/C control module. ***Connector & terminal*** ***(i88) No. 3 — (B283) No. 16:*** ***(i88) No. 7 — (B283) No. 15:***	Is the resistance less than1 Ω?	Go to step **11.**	Repair the harness.
11	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

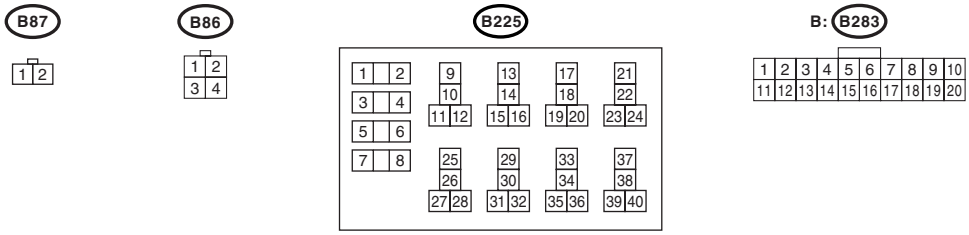
B: BLOWER FAN DOES NOT ROTATE.

TROUBLE SYMPTOM:

- Blower motor does not rotate.
- Blower motor does not rotate in “HI”.

WIRING DIAGRAM:



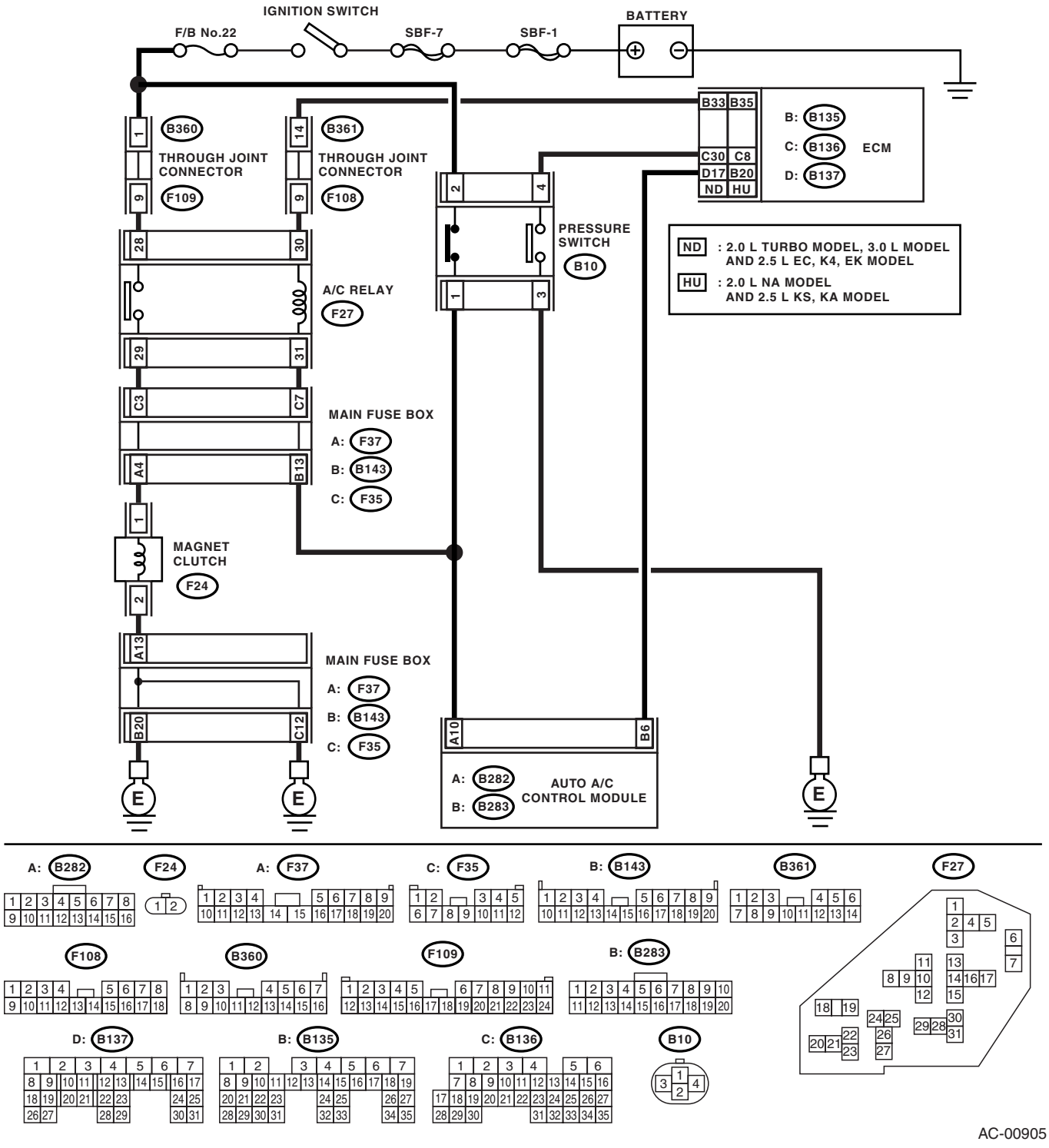


AC-00824

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Remove the fuse No. 22, 27 and 28 from fuse & relay box. 2) Check the condition of fuse.	Is any fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK POWER SUPPLY FOR BLOWER MOTOR.** 1) Turn the ignition switch to ON. 2) Turn the blower switch to ON. 3) Measure the voltage between blower motor and chassis ground. ***Connector & terminal*** ***(B87) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the open circuit of blower motor power supply line harness.
3	**CHECK BLOWER MOTOR RELAY.** 1) Turn the ignition switch to OFF. 2) Remove the blower motor relay. 3) Connect the battery positive (+) terminal to terminal No. 24 of blower motor relay, and negative (–) terminal to terminal No. 23. 4) Measure the resistance between terminals No. 21 and 22. ***Terminals*** ***No. 21 — No. 22:***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the blower motor relay.
4	**CHECK BLOWER MOTOR.** 1) Disconnect the connector from blower motor. 2) Connect the battery positive (+) terminal to terminal No. 2 of blower motor connector, and negative (–) terminal to terminal No. 1. 3) Make sure the blower motor runs.	Does the blower motor run?	Go to step **5.**	Replace the blower motor.
5	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

C: COMPARTMENT TEMPERATURE DOES NOT CHANGE, OR A/C SYSTEM DOES NOT RESPOND PROMPTLY.

WIRING DIAGRAM:



AC-00905

	Step	Check	Yes	No
1	**CHECK FUSE.** 1) Turn the ignition switch to OFF. 2) Remove the fuse No. 22 from fuse & relay box. 3) Check the condition of fuse.	Is the fuse blown-out?	Replace the fuse.	Go to step **2.**
2	**CHECK SIGNAL TO A/C RELAY AND A/C CONTROL MODULE.** 1) Disconnect the A/C relay and auto A/C control module harness connector. 2) Turn the ignition switch to ON. 3) Measure the voltage between A/C relay connector terminal and chassis ground. 4) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 31 (+) — Chassis ground (−):*** ***(B282) No. 10 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Go to step **3.**
3	**CHECK POWER SUPPLY FOR PRESSURE SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the pressure switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between pressure switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B10) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Check the harness for open or short circuit between fuse and pressure switch.
4	**CHECK HARNESS BETWEEN PRESSURE SWITCH AND A/C RELAY, AUTO A/C CONTROL MODULE.** 1) Turn the ignition switch to OFF. 2) Measure the resistance in harness between pressure switch connector and A/C relay connector. 3) Measure the resistance in harness between pressure switch connector and auto A/C control module connector. ***Connector & terminal*** ***(B10) No. 1 — (F27) No. 31:*** ***(B10) No. 1 — (B282) No. 10:***	Is the resistance less than 1 Ω?	Check the pressure switch. <Ref. to AC-40, INSPECTION, Pressure Switch (Triple Pressure Switch).>	Repair the harness.
5	**CHECK POWER SUPPLY FOR A/C RELAY.** Measure the voltage between A/C relay connector terminal and chassis ground. ***Connector & terminal*** ***(F27) No. 28 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Check the harness for open or short circuit between fuse and A/C relay.
6	**CHECK A/C RELAY.** Check the A/C relay. <Ref. to AC-39, INSPECTION, Relay and Fuse.>	Is malfunction found in A/C relay?	Go to step **7.**	Replace the A/C relay.

	Step	Check	Yes	No
7	**CHECK A/C ON SIGNAL.** 1) Turn the ignition switch to OFF. 2) Connect the A/C relay and all disconnected connectors. 3) Start the engine and turn the A/C switch to ON. 4) Turn the temperature control dial at maximum cool position. 5) Measure the voltage between auto A/C control module harness connector terminal and chassis ground. ***Connector & terminal*** ***(B283) No. 6 (+) — Chassis ground (–):***	Is the voltage more than 5.5 V?	Go to step **9.**	Go to step **8.**
8	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of auto A/C control module and ECM. 3) Measure the resistance in harness between auto A/C control module connector and ECM connector. ***Connector & terminal*** ***2.0 L turbo model, 3.0 L model and 2.5 L EC, K4, EK model*** ***(B283) No. 6 — (B137) No. 17:*** ***2.0 L non-turbo model and 2.5 L KS, KA model*** ***(B283) No. 6 — (B135) No. 20:***	Is the resistance less than 1 Ω?	Replace the auto A/C control module.	Repair the harness.
9	**CHECK MAGNET CLUTCH ON SIGNAL.** 1) Stop the engine and turn the A/C switch to OFF. 2) Turn the ignition switch to ON. 3) Measure the voltage between ECM connector terminal and chassis ground. ***Connector & terminal*** ***2.0 L turbo model, 3.0 L model and 2.5 L EC, K4, EK model*** ***(B135) No. 33 (+) — Chassis ground (–):*** ***2.0 L non-turbo model and 2.5 L KS, KA model*** ***(B135) No. 35 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **10.**	Check the harness for open or short circuit between A/C relay and ECM.
10	**CHECK MAGNET CLUTCH ON SIGNAL.** 1) Start the engine and turn the A/C switch to ON. 2) Turn the temperature control dial at maximum cool position. 3) Measure the voltage between ECM connector terminal and chassis ground. ***Connector & terminal*** ***2.0 L turbo model, 3.0 L model and 2.5 L EC, K4, EK model*** ***(B135) No. 33 (+) — Chassis ground (–):*** ***2.0 L non-turbo model and 2.5 L KS, KA model*** ***(B135) No. 35 (+) — Chassis ground (–):***	Is the voltage 0 V?	Go to step **11.**	Replace the ECM.

	Step	Check	Yes	No
11	**CHECK POWER SUPPLY FOR MAGNET CLUTCH.** 1) Stop the engine and turn the A/C switch to OFF. 2) Disconnect the harness connector of magnet clutch. 3) Start the engine and turn the A/C switch to ON. 4) Turn the temperature control dial at maximum cool position. 5) Measure the voltage between magnet clutch harness connector terminal and chassis ground. ***Connector & terminal*** ***(F24) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **12.**	Check the harness for open or short circuit between A/C relay and magnet clutch.
12	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND ECM.** 1) Stop the engine and turn the A/C switch to OFF. 2) Measure the resistance between magnet clutch harness connector terminal and chassis ground. ***Connector & terminal*** ***(F24) No. 2 — Chassis ground:***	Is the resistance less than 1 Ω?	Check the compressor. <Ref. to AC-33, INSPECTION, Compressor.>	Repair the harness.

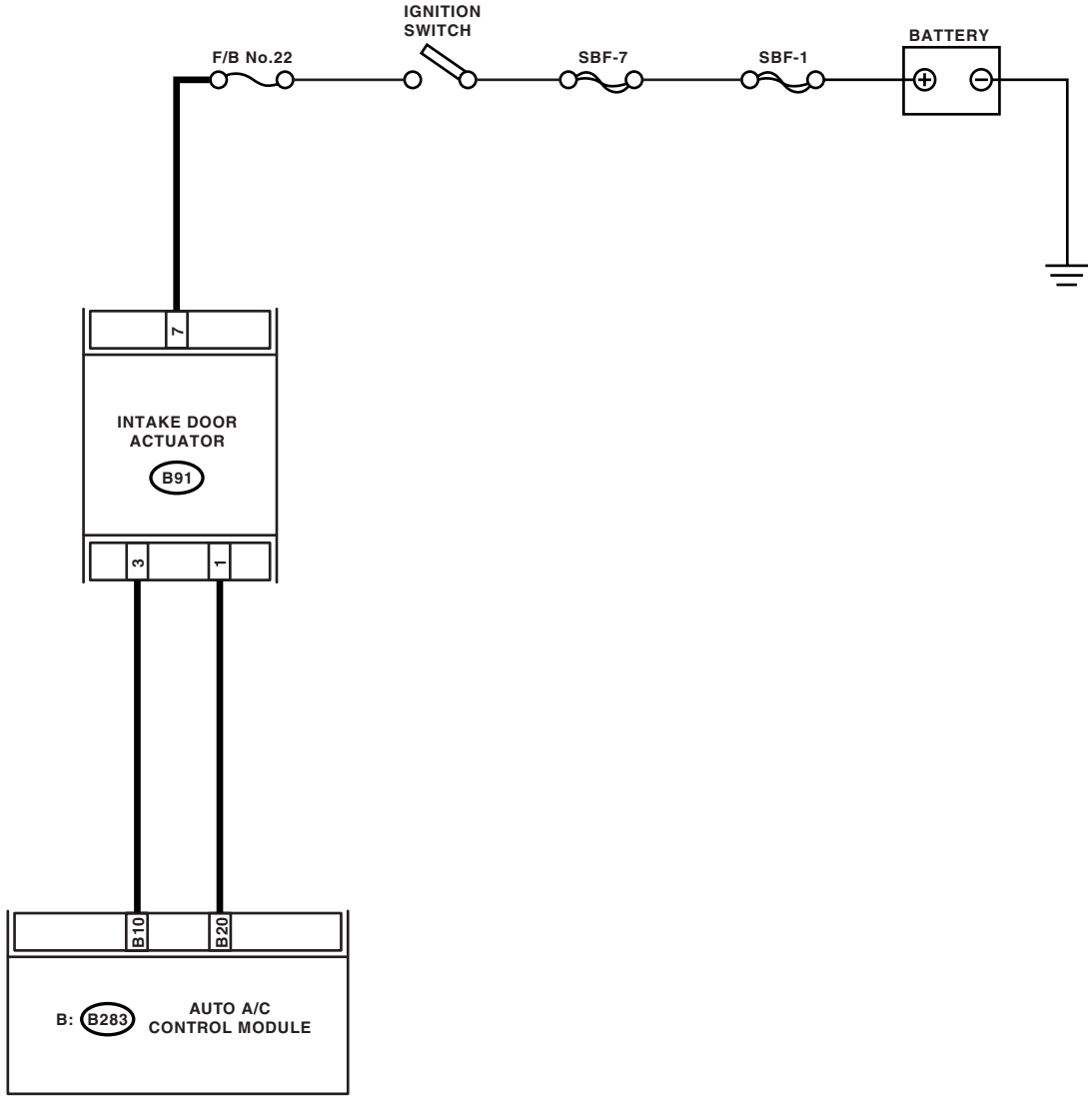
7. Diagnostic Procedure for Actuators

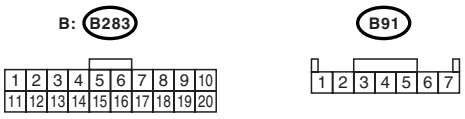
A: INTAKE DOOR ACTUATOR

TROUBLE SYMPTOM:

FRESH/RECIRC mode is not changed.

WIRING DIAGRAM:





AC-00826

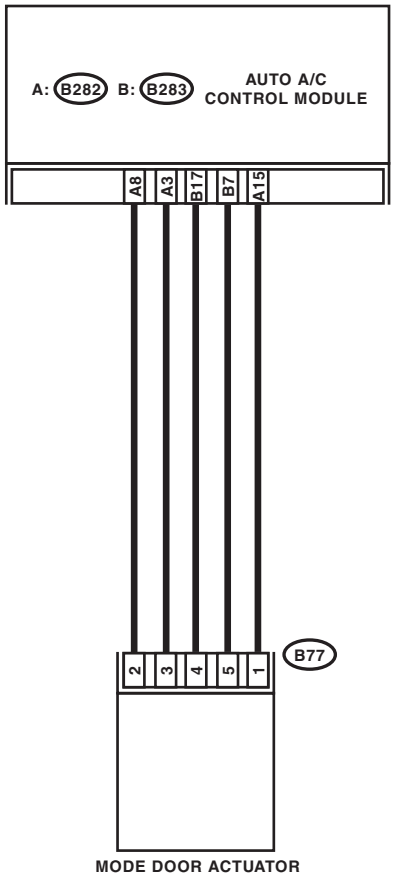
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the intake door actuator connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between intake door actuator connector and chassis ground. ***Connector & terminal*** ***(B91) No. 7 (+) — Chassis ground (–):***	Is the voltage 7 V (at normal temperature)?	Go to step **2.**	Check the harness for open or short circuit between intake door actuator and fuse.
2	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the auto A/C control module connector. 3) Measure the resistance between intake door actuator connector and auto A/C control module connector. ***Connector & terminal*** ***(B283) No. 10 — (B91) No. 3:*** ***(B283) No. 20 — (B91) No. 1:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness between auto A/C control module and intake door actuator.
3	**CHECK OPERATION OF INTAKE DOOR ACTUATOR.** 1) Connect the intake door actuator connector. 2) Ground the auto A/C control module connector with a suitable wire. 3) Turn the ignition switch to ON, and check the operation of intake door actuator. ***Connector & terminal*** ***(B283) No. 10 — Chassis ground:***	Does the actuator move to the FRESH side?	Go to step **4.**	Replace the intake door actuator.
4	**CHECK OPERATION OF INTAKE DOOR ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Ground the auto A/C control module connector with a suitable wire. 3) Turn the ignition switch to ON, and check the operation of intake door actuator. ***Connector & terminal:*** ***(B283) No. 20 — Chassis ground:***	Does the actuator move to the RECIRC side?	Replace the auto A/C control module.	Replace the intake door actuator.

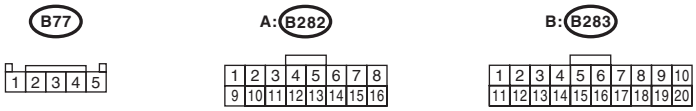
B: MODE DOOR ACTUATOR

TROUBLE SYMPTOM:

Air flow outlet is not changed.

WIRING DIAGRAM:





AC-00827

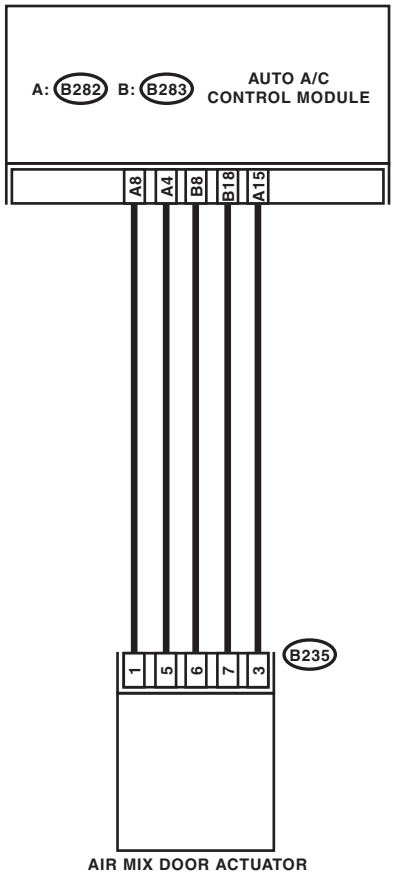
	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR POSITION SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the mode door actuator connector. 3) Turn the ignition switch and AUTO switch to ON. 4) Measure the voltage between auto A/C control module connector terminals. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **2.**	Replace the auto A/C control module.
2	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to FACE position. ***Connector & terminal*** ***(B283) No. 7 (+) — Chassis ground (–):***	Is the voltage 7 V (at normal temperature)?	Go to step **3.**	Replace the auto A/C control module.
3	**CHECK POWER SUPPLY FOR MODE DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the air flow control switch to DEF position. ***Connector & terminal*** ***(B283) No. 17 (+) — Chassis ground (–):***	Is the voltage 7 V (at normal temperature)?	Go to step **4.**	Replace the auto A/C control module.
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND MODE DOOR ACTUATOR.** 1) Turn the A/C and ignition switch to OFF. 2) Disconnect the auto A/C control module connector. 3) Measure the resistance between auto A/C control module and mode door actuator connector. ***Connector & terminal*** ***(B77) No. 1 — (B282) No. 15:*** ***(B77) No. 2 — (B282) No. 8:*** ***(B77) No. 3 — (B282) No. 3:*** ***(B77) No. 4 — (B283) No. 17:*** ***(B77) No. 5 — (B283) No. 7:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness between auto A/C control module and mode door actuator.
5	**CHECK MODE DOOR ACTUATOR POSITION SWITCH SIGNAL.** 1) Connect the connector of auto A/C control module and mode door actuator. 2) Turn the ignition switch and AUTO switch to ON. 3) Check the voltage between auto A/C control module connector terminals while changing the mode between DEF and FACE. ***Connector & terminal*** ***(B282) No. 3 (+) — (B282) No. 15 (–):***	Does the voltage change between 1 (DEF) — 4 (FACE) V?	Go to step **6.**	Replace the mode door actuator.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module and connector.	Is there poor contact in connector?	Repair connector.	Replace the auto A/C control module.

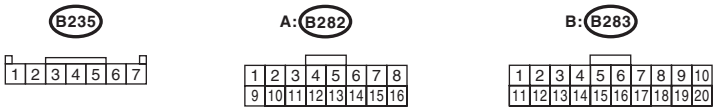
C: AIR MIX DOOR ACTUATOR

TROUBLE SYMPTOM:

Outlet air temperature does not change.

WIRING DIAGRAM:





AC-00828

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR POSITION SWITCH.** 1) Turn the ignition switch to OFF. 2) Disconnect the air mix door actuator connector. 3) Turn the ignition switch and AUTO switch to ON. 4) Measure the voltage between auto A/C control module connector terminals. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **2.**	Replace the auto A/C control module.
2	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum COOL position. ***Connector & terminal*** ***(B283) No. 8 (+) — Chassis ground (–):***	Is the voltage 7 V (at normal temperature)?	Go to step **3.**	Replace the auto A/C control module.
3	**CHECK POWER SUPPLY FOR AIR MIX DOOR ACTUATOR.** Measure the voltage between auto A/C control module connector and chassis ground after turning the temperature control dial to maximum HOT position. ***Connector & terminal*** ***(B283) No. 18 (+) — Chassis ground (–):***	Is the voltage 7 V (at normal temperature)?	Go to step **4.**	Replace the auto A/C control module.
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND AIR MIX DOOR ACTUATOR.** 1) Turn the A/C and ignition switch to OFF. 2) Disconnect the auto A/C control module connector. 3) Measure the resistance between auto A/C control module and air mix door actuator connector. ***Connector & terminal*** ***(B235) No. 1 — (B282) No. 8:*** ***(B235) No. 3 — (B282) No. 15:*** ***(B235) No. 5 — (B282) No. 4:*** ***(B235) No. 6 — (B283) No. 8:*** ***(B235) No. 7 — (B283) No. 18:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness between auto A/C control module and air mix door actuator.
5	**CHECK AIR MIX DOOR ACTUATOR POSITION SWITCH SIGNAL.** 1) Connect the connector of auto A/C control module and air mix door actuator. 2) Turn the ignition switch and AUTO switch to ON. 3) Check the voltage between auto A/C control module connector terminals while changing the setting temperature between maximum COOL and maximum HOT. ***Connector & terminal*** ***(B282) No. 4 (+) — (B282) No. 15 (–):***	Does the voltage change between 1 (Max. HOT) — 4 (Max. COOL) V?	Go to step **6.**	Replace the air mix door actuator.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module and connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

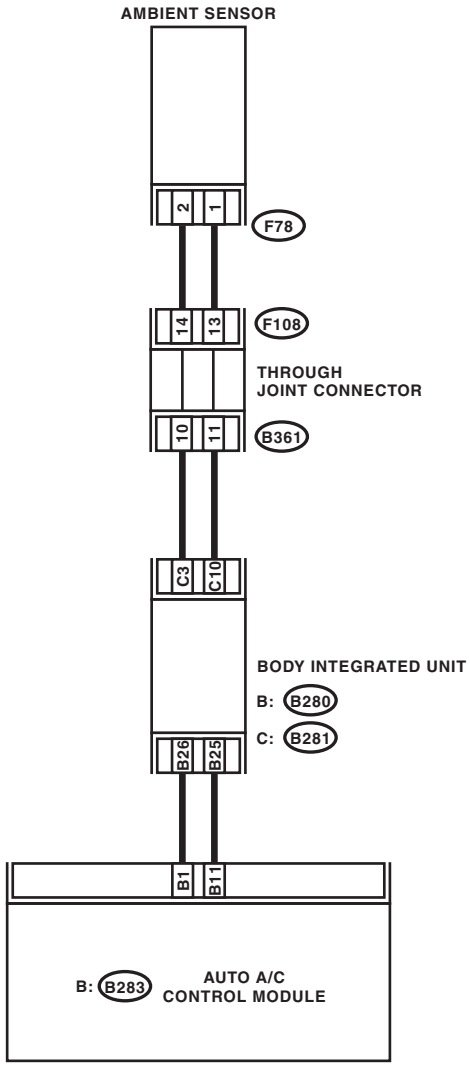
8. Diagnostic Procedure for Sensors

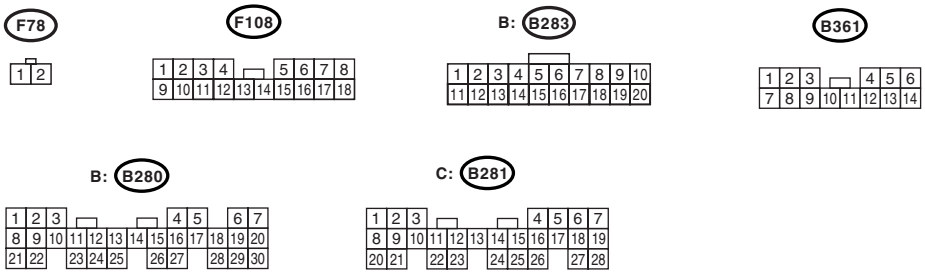
A: AMBIENT SENSOR

TROUBLE SYMPTOM:

Fan speed is not switched when the fan speed control dial is in AUTO position.

WIRING DIAGRAM:





AC-00829

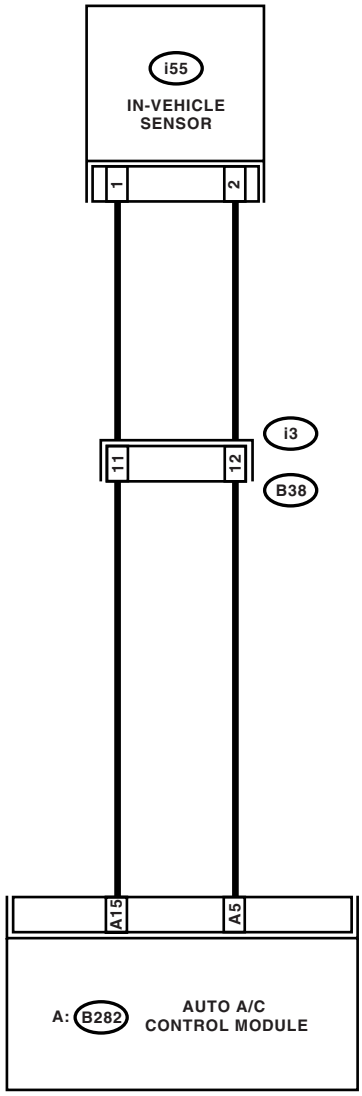
	Step	Check	Yes	No
1	**CHECK AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ambient sensor. 3) Measure the resistance between connector terminals of ambient sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 2.2 kΩ at 25°C (77°F)?	Go to step **2.**	Replace the ambient sensor.
2	**CHECK INPUT SIGNAL FOR AMBIENT SENSOR.** 1) Turn the ignition to ON. 2) Measure the voltage between connector (F78) terminals. ***Connector & terminal*** ***(F78) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **6.**	Go to step **3.**
3	**CHECK OUTPUT SIGNAL OF BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Draw out the body integrated unit. 3) Disconnect the connector from ambient sensor. 4) Turn the ignition switch to ON. 5) Measure the voltage between connector terminals of body integrated unit. ***Connector & terminal*** ***(B281) No. 3 (+) — No. 10 (–):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **6.**
4	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Measure the resistance in harness between body integrated unit and ambient sensor. ***Connector & terminal*** ***(F78) No. 1 — (B281) No. 10:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between body integrated unit and ambient sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND AMBIENT SENSOR.** Measure the resistance in harness between body integrated unit and ambient sensor. ***Connector & terminal*** ***(F78) No. 2 — (B281) No. 3:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between body integrated unit and ambient sensor.
6	**CHECK COMMUNICATION ERROR DISPLAY.** 1) Connect the connectors of body integrated unit and ambient sensor to original position. 2) Check “Er xx” is indicated on the Odo/Trip meter in combination meter after turning the ignition switch to ON.	Is the error display “Er xx” indicated?	Check the communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Go to step **7.**
7	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the A/C control module.

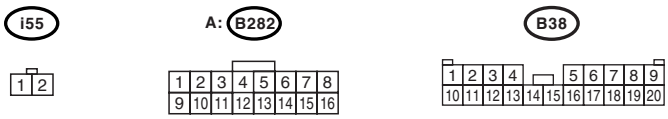
B: IN-VEHICLE SENSOR

TROUBLE SYMPTOM:

Blower fan speed, outlet port and inlet port do not change after turning the AUTO switch to ON.

WIRING DIAGRAM:



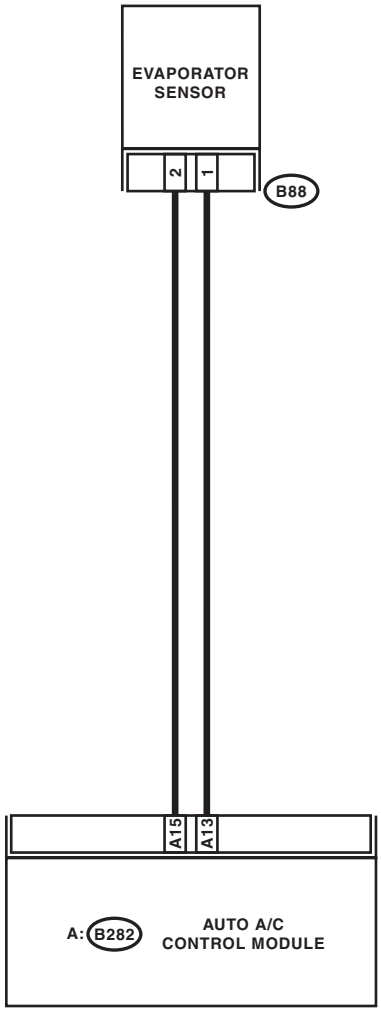


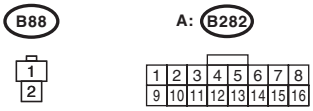
AC-00830

	Step	Check	Yes	No
1	**CHECK IN-VEHICLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Remove the driver's side lower cover. 3) Disconnect the connector from in-vehicle sensor. 4) Measure the resistance between connector terminals of in-vehicle sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 2.7 kΩ at 20°C (68°F)?	Go to step **2.**	Replace the in-vehicle sensor.
2	**CHECK INPUT SIGNAL FOR IN-VEHICLE SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between in-vehicle sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(i55) No. 2 (+) — No. 1 (−):***	Is the voltage approx. 5 V?	Go to step **6.**	Go to step **3.**
3	**CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.** 1) Turn the ignition switch to OFF. 2) Remove the auto A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between connector terminals of auto A/C control module. ***Connector & terminal*** ***(B282) No. 5 (+) — (B282) No. 15 (−):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **6.**
4	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance in harness between auto A/C control module and in-vehicle sensor. ***Connector & terminal*** ***(i55) No. 2 — (B282) No. 5:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the harness between auto A/C control module and in-vehicle sensor.
5	**CHECK HARNESS BETWEEN AUTO A/C CONTROL MODULE AND IN-VEHICLE SENSOR.** Measure the resistance in harness between auto A/C control module and in-vehicle sensor. ***Connector & terminal*** ***(i55) No. 1 — (B282) No. 15:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the harness between auto A/C control module and in-vehicle sensor.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

C: EVAPORATOR SENSOR

WIRING DIAGRAM:





AC-00831

	Step	Check	Yes	No
1	**CHECK EVAPORATOR SENSOR** 1) Turn the ignition switch to OFF. 2) Remove the glove box. 3) Disconnect the connector from evaporator sensor. 4) Measure the resistance between connector terminals of evaporator sensor. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance approx. 3.3 kΩ at 20°C (68°F)?	Go to step **2.**	Replace the evaporator sensor.
2	**CHECK INPUT SIGNAL FOR EVAPORATOR SENSOR.** 1) Turn the ignition switch to ON. 2) Measure the voltage between connector (B88) terminal and chassis ground. ***Connector & terminal*** ***(B88) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **6.**	Go to step **3.**
3	**CHECK AUTO A/C CONTROL MODULE OUTPUT SIGNAL.** 1) Turn the ignition switch to OFF. 2) Remove the auto A/C control module. 3) Turn the ignition switch to ON. 4) Measure the voltage between connector terminals of auto A/C control module. ***Connector & terminal*** ***(B282) No. 13 (+) —No. 15 (–):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **6.**
4	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance in harness between auto A/C control module and evaporator sensor. ***Connector & terminal*** ***(B88) No. 2 — (B282) No. 15:***	Is the resistance less than 1 Ω?	Go to step **5.**	Repair the open circuit in harness between auto A/C control module and evaporator sensor.
5	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND EVAPORATOR SENSOR.** Measure the resistance in harness between auto A/C control module and evaporator sensor. ***Connector & terminal*** ***(B88) No. 1 — (B282) No. 13:***	Is the resistance less than 1 Ω?	Go to step **6.**	Repair the open circuit in harness between auto A/C control module and evaporator sensor.
6	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

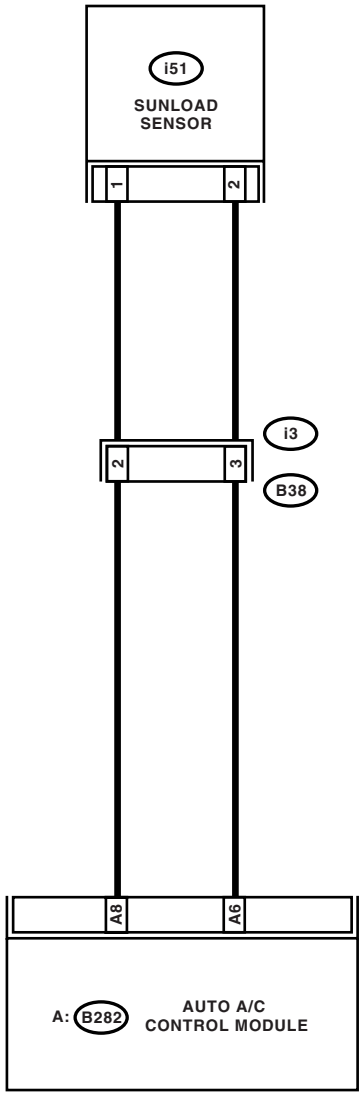
D: SUNLOAD SENSOR

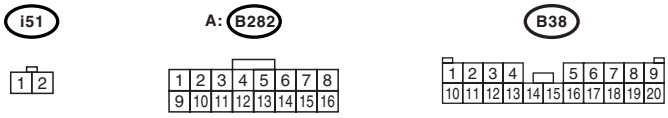
TROUBLE SYMPTOM:

- Sensor identifies that sunlight is at maximum. Then, A/C system is controlled to COOL side.
- Sensor identifies that sunlight is at minimum. Then, A/C system is controlled to HOT side.

NOTE:
When the sunload sensor check is conducted indoors or in the shade, open circuit might be indicated. Always check the sunload sensor at the place where the sun shines directly on it.

WIRING DIAGRAM:





AC-00832

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY VOLTAGE FOR SUNLOAD SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from sunload sensor. 3) Turn the ignition switch to ON. 4) Measure the power supply voltage for sunload sensor. ***Connector & terminal*** ***(i51) No. 1 (+) — No. 2 (–):***	Is the voltage approx. 5 V?	Go to step **4.**	Go to step **2.**
2	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from auto A/C control module. 3) Measure the resistance in harness between auto A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 2 — (B282) No. 6:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the harness between auto A/C control module and sunload sensor.
3	**CHECK HARNESS CONNECTOR BETWEEN AUTO A/C CONTROL MODULE AND SUNLOAD SENSOR.** Measure the resistance in harness between auto A/C control module and sunload sensor. ***Connector & terminal*** ***(i51) No. 1 — (B282) No. 8:***	Is the resistance less than 1 Ω?	Go to step **4.**	Repair the harness between auto A/C control module and sunload sensor.
4	**CHECK INPUT VOLTAGE FOR AUTO A/C CONTROL MODULE.** 1) Connect the connectors of sunload sensor and auto A/C control module. 2) Turn the ignition switch to ON. 3) Measure the voltage between connector terminals of auto A/C control module. ***Connector & terminal*** ***(B282) No. 8 (+) — (B282) No. 6 (–):***	Is the voltage approx. 2.5 V?	Go to step **5.**	Replace the sunload sensor.
5	**CHECK POOR CONTACT.** Check poor contact in auto A/C control module connector.	Is there poor contact in connector?	Repair the connector.	Replace the auto A/C control module.

9. Diagnostics with Phenomenon

A: INSPECTION

Symptom	Problem parts
A/C system fails to operate.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay • A/C Relay • Compressor (Magnet clutch) • Evaporator sensor
Fuse is blown out.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact)
Illumination cannot dim.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact) • Auto A/C control module
Blower fan does not rotate or fan speed cannot be controlled.	• Fuse (M/B No. 8, F/B No. 22, 31) • Connector (Poor contact) • Ground • Auto A/C control module • Blower fan motor • Blower fan relay
Unable to switch suction vents.	• Connector (Poor contact) • Auto A/C control module • Intake door actuator
Unable to switch blow vents.	• Connector (Poor contact) • Auto A/C control module • Mode door actuator
Compartment temperature does not increase. (No hot air is discharged.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature does not decrease. (No cool air is discharged.)	• Connector (Poor contact) • Auto A/C control module • Air mix door actuator • A/C Relay • Compressor (Magnet clutch) • Radiator fan motor • Radiator fan relay • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature is higher or lower than setting temperature.	• Auto A/C control module • Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Compartment temperature does not quickly respond to setting temperature.	• Air mix door actuator • In-vehicle sensor, ambient sensor, evaporator sensor and sunload sensor • In-vehicle sensor aspirator hose
Radiator fan does not rotate during A/C operation.	• Radiator fan motor • Radiator fan relay

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

AIRBAG SYSTEM

AB

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2. Airbag Connector 9
3. Inspection Locations After a Collision 12
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5. Passenger's Airbag Module 15
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7. Curtain Airbag Module 18
8. Airbag Control Module 20
9. Side Airbag Sensor 21
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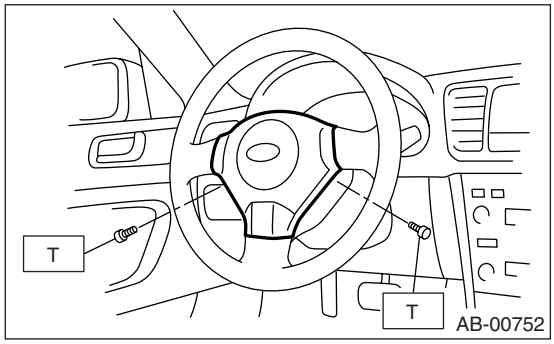
12. Front Sub Sensor 24
13. Disposal of Airbag Module (Deployment Processing On Vehicle) 25
14. Disposal of Airbag Module (Deployment Processing After Removal from Vehicle) 30

1. General Description

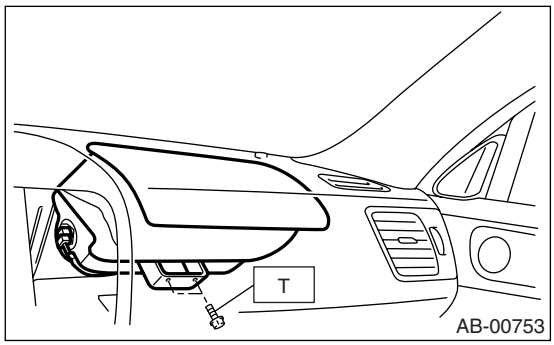
A: COMPONENT

1. DRIVER'S AIRBAG MODULE



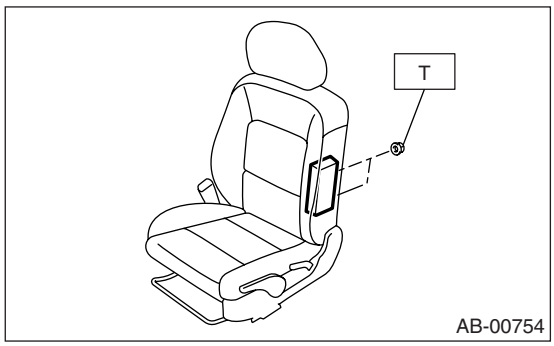
Tightening torque:
10 N·m (1.0 kgf-m, 7.2 ft-lb)

2. PASSENGER'S AIRBAG MODULE



Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

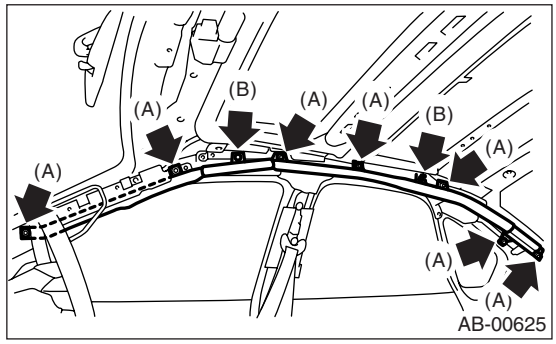
3. SIDE AIRBAG MODULE



Tightening torque:
6 N·m (0.61 kgf-m, 4.4 ft-lb)

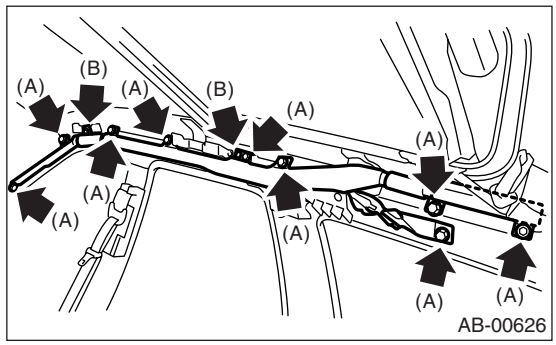
4. CURTAIN AIRBAG MODULE

• Sedan model



(A) Bolt
(B) Clip

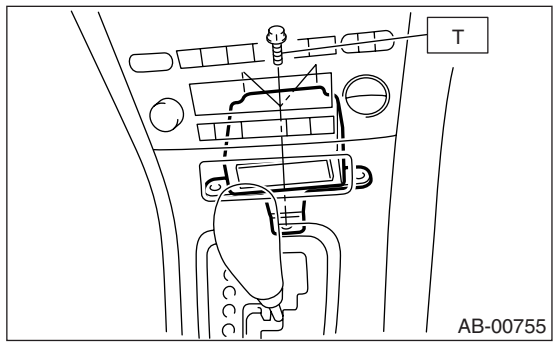
• Wagon model



(A) Bolt
(B) Clip

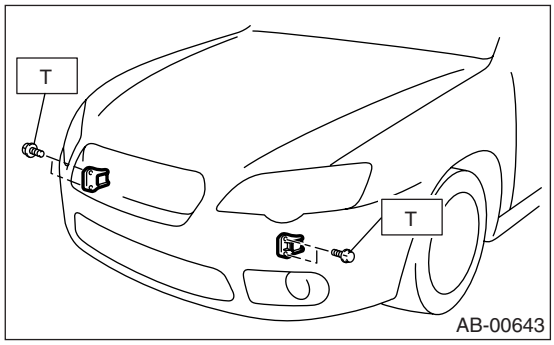
Tightening torque:
7.5 N·m (0.77 kgf-m, 5.5 ft-lb)

5. AIRBAG CONTROL MODULE



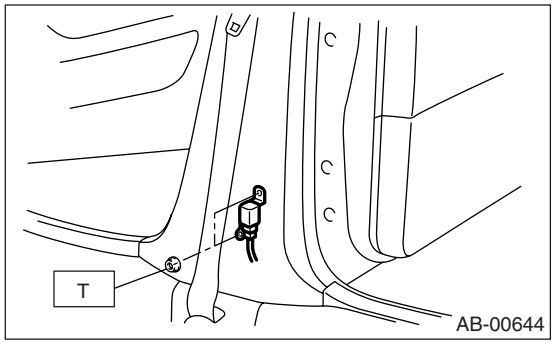
Tightening torque:
25 N·m (2.5 kgf-m, 18.1 ft-lb)

6. FRONT SUB SENSOR



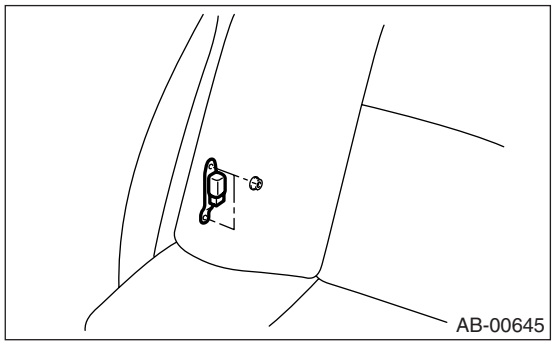
Tightening torque:
13 N·m (1.32 kgf-m, 9.6 ft-lb)

7. SIDE AIRBAG SENSOR



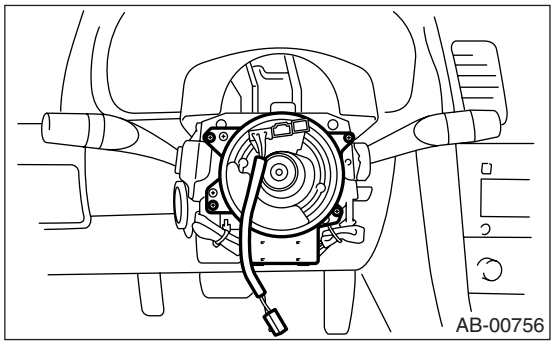
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

8. CURTAIN AIRBAG SENSOR

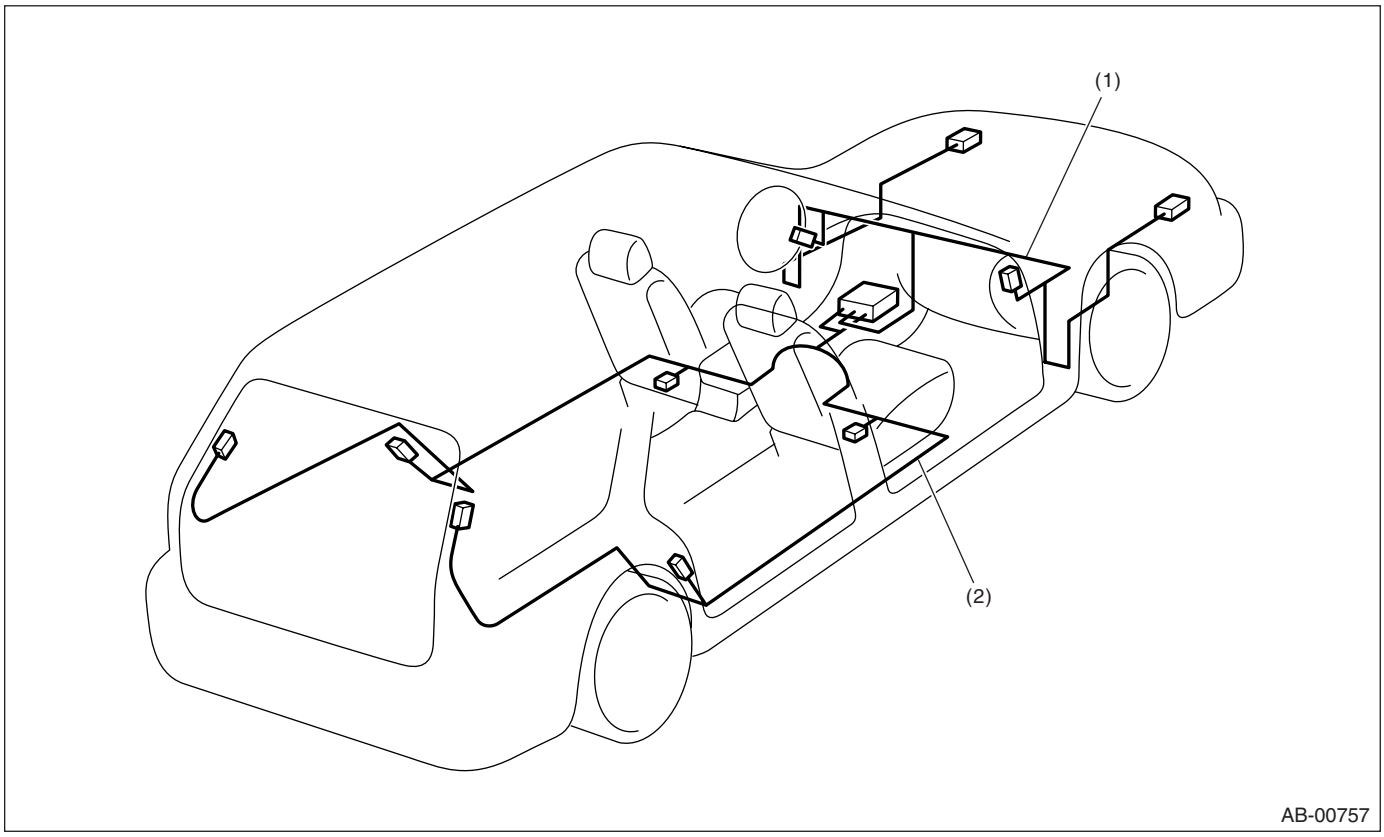


Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

9. STEERING ROLL CONNECTOR



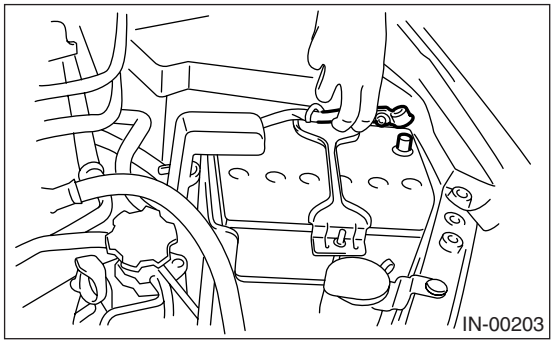
10.AIRBAG HARNESS



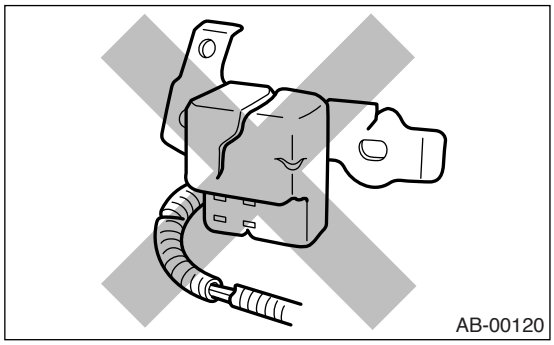
(1) Airbag main harness (2) Airbag rear harness

B: CAUTION

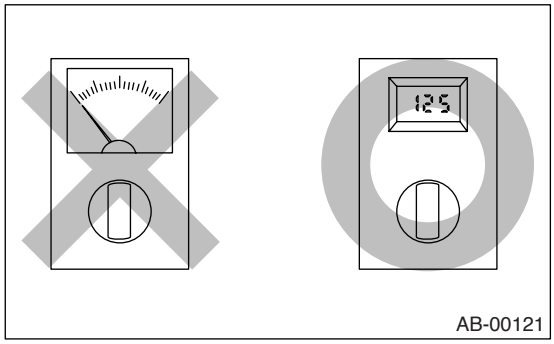
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is fitted with a backup power source. If the airbag system is serviced within 20 seconds after the ground cable is disconnected, it may inflate.



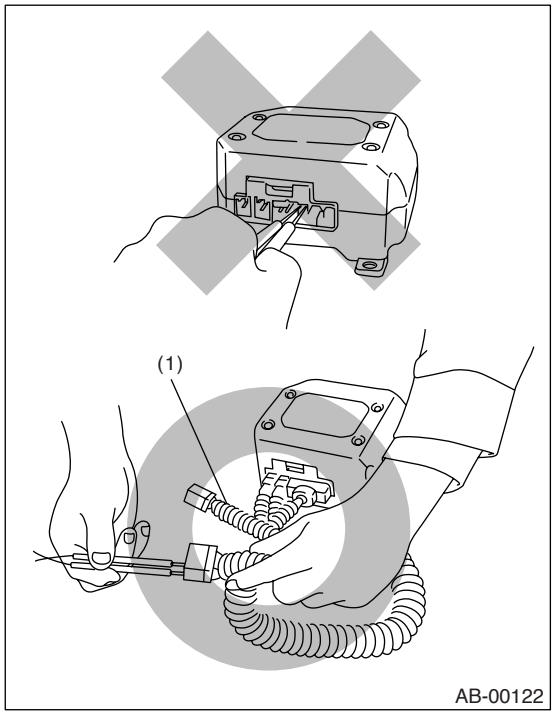
• If the airbag warning light illuminates, repair the vehicle immediately. Airbag or pretensioner may inflate incorrectly, or not inflate in collision.
• If sensors, airbag module, airbag control module, pretensioner and harness are deformed or damaged, replace them with new parts.



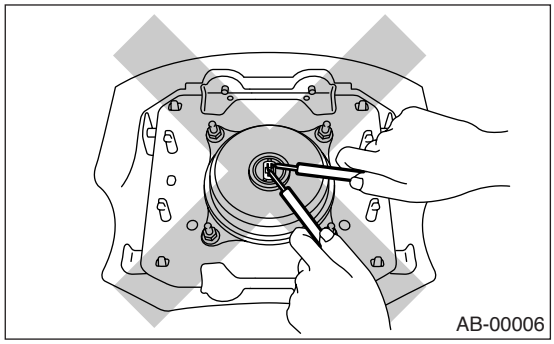
• When checking the airbag system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously.



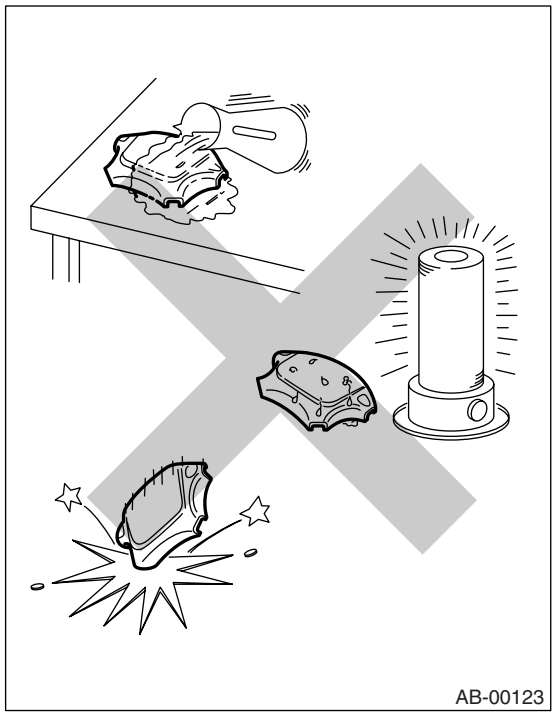
• When checking, use a test harness (1). Since damage to the connector terminal may cause the airbag to activate erroneously, do not directly apply the tester probe to any connector terminal of the airbag.



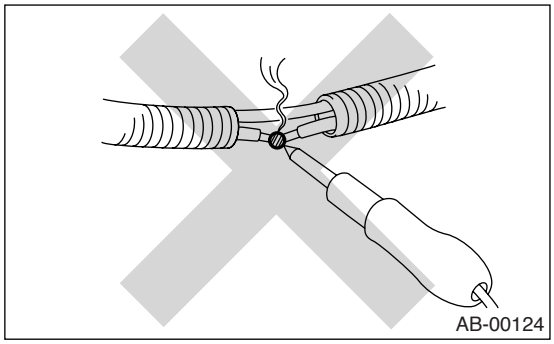
• Do not check continuity of the airbag modules for driver, passenger, side or curtain, or pretensioner.



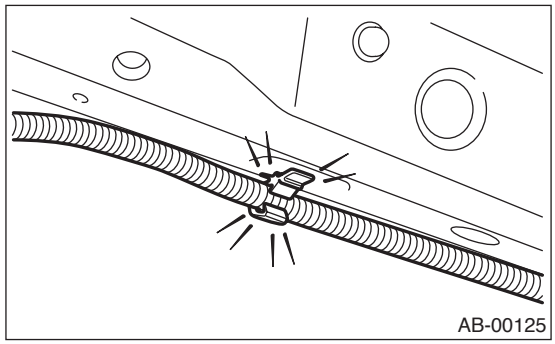
• Do not drop the airbag modules, subject them to high temperature over 93°C (199°F), or let water, oil or grease get on them; the internal parts may be damaged and reliability greatly lowered.



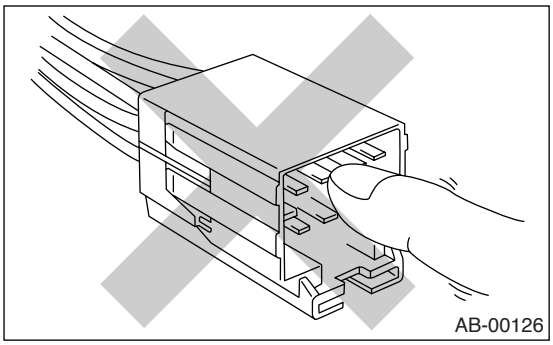
• If any damage, opening or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



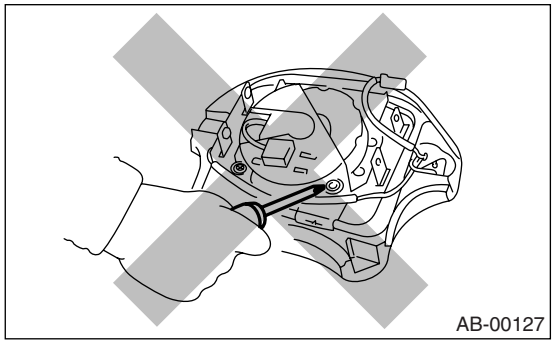
• Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.



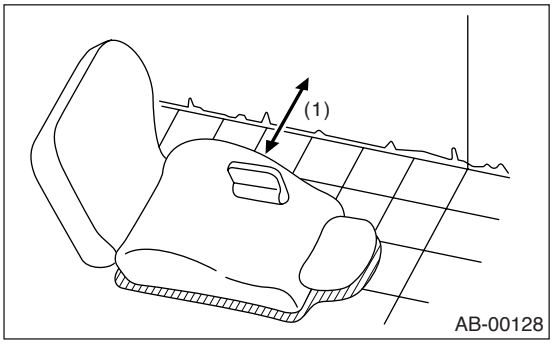
• Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.



• Either of the airbag modules for driver, passenger, side or curtain, or pretensioner must not be disassembled.

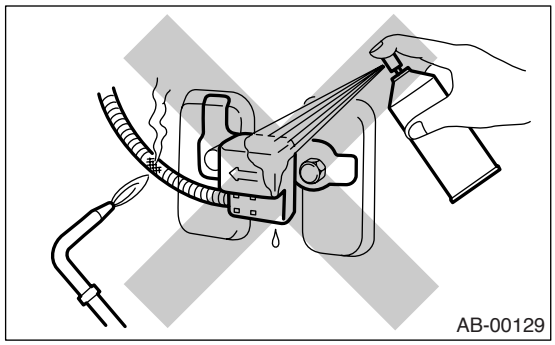


• The removed front seat with airbag module must be kept at least 200 mm (8 in) away from walls and other objects.

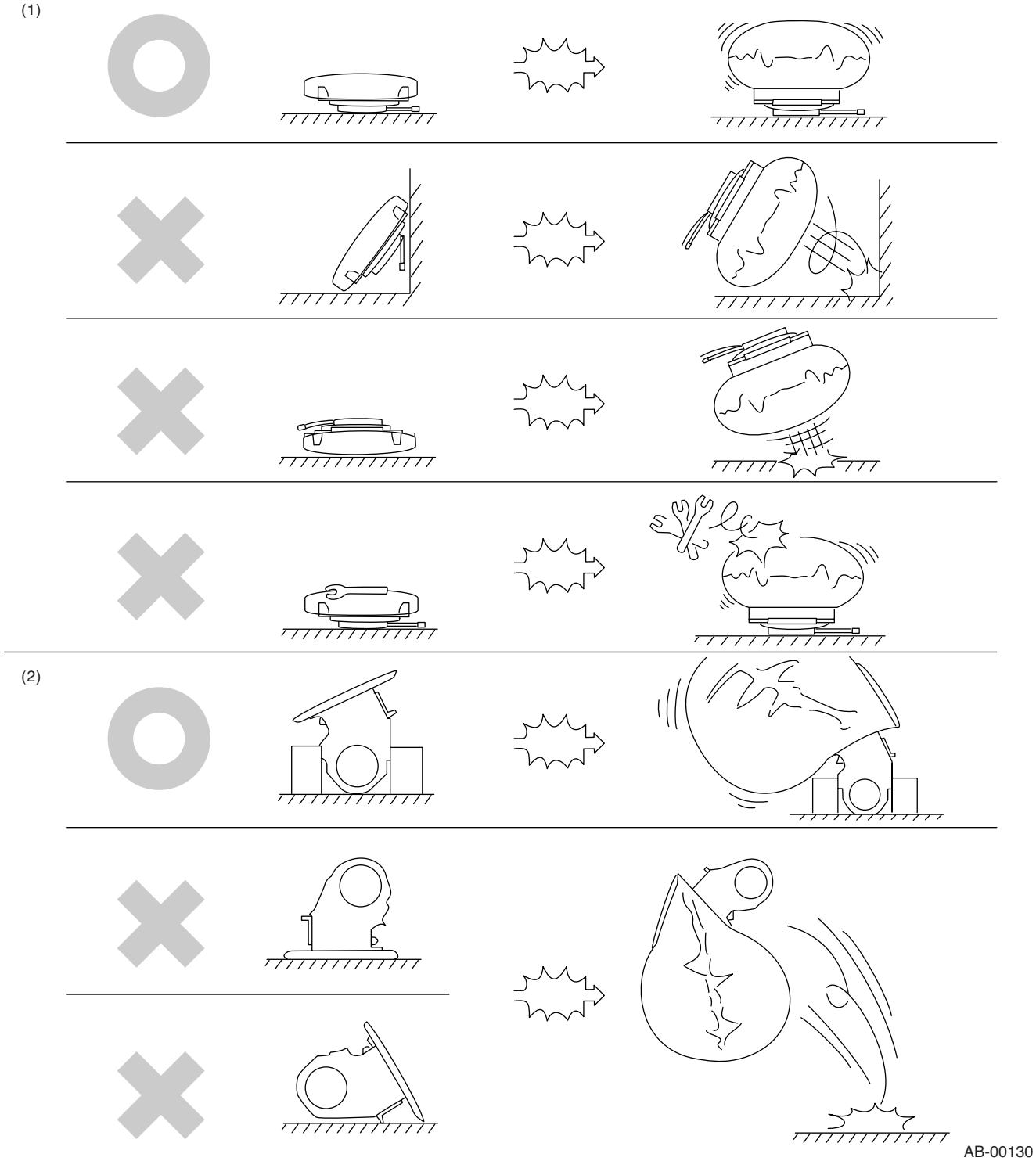


(1) 200 mm (8 in) or more

• Do not use the airbag or pretensioner parts from other vehicles. Always replace the defective parts with new parts.
• Never reuse a deployed airbag and pretensioner.
• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron front fender, and front side frame, remove the front sub sensors and wire harness of airbag system.
• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar, and front and rear doors, remove the side airbag sensors and wire harness of airbag system.



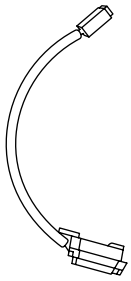
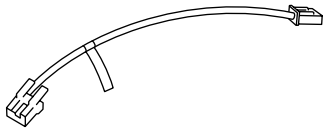
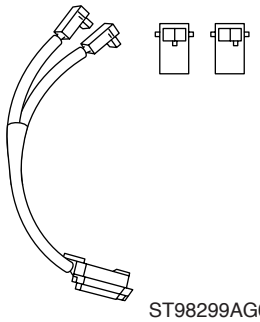
• When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver's airbag module (2) Passenger's airbag module

C: PREPARATION TOOL

1. SPECIAL TOOL

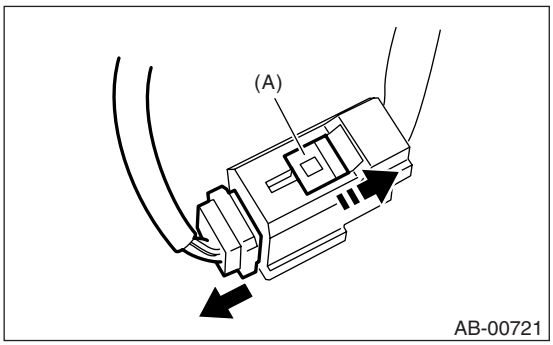
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FC030	98299FC030	DEPLOYMENT ADAPTER A	• Used for deploying side airbag module. • Used for deploying curtain airbag module. • Used with DEPLOYMENT TOOL (98299PA030).
 ST98299SA030	98299SA030	DEPLOYMENT ADAPTER E	• Used for deploying driver's airbag module. • Used for deploying passenger's airbag module. • Used with DEPLOYMENT TOOL (98299PA030).
 ST98299AG030	98299AG030	DEPLOYMENT ADAPTER X	• Used for deploying driver's airbag module. • Used with DEPLOYMENT TOOL (98299PA030). • Can not reuse.
ST98299PA030	98299PA030	DEPLOYMENT TOOL	• Used for deploying airbag module. • Used with each deployment adapter.

2. Airbag Connector

A: PROCEDURE

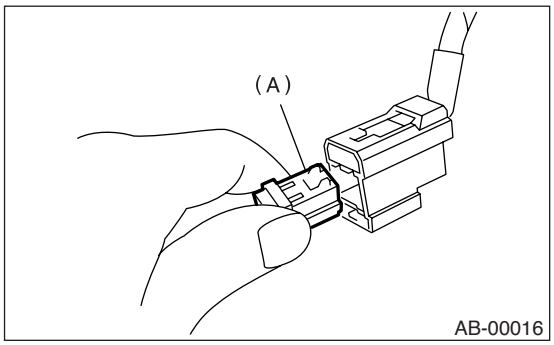
1. POWER SUPPLY

1) How to disconnect:
(1) Move the slide lock (A) in the direction of arrow.
(2) With the slide lock (A) moved, separate the connector.



CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.

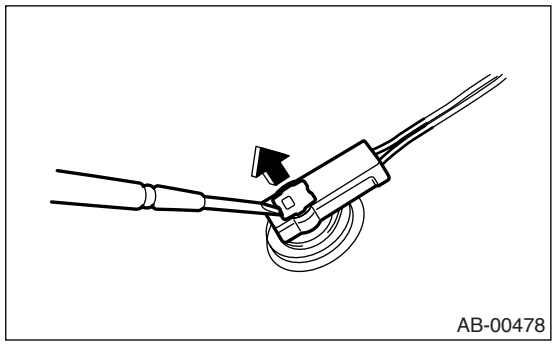
2) How to connect:
Holding the connector (A), and push it in carefully until a connecting sound is heard.



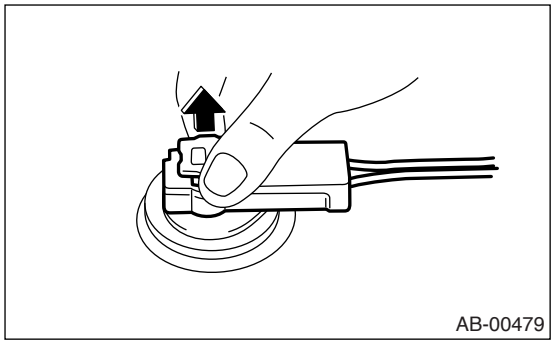
CAUTION:
Be sure to insert the connector in until it is locked. Then pull on it gently to make sure that it is locked.

2. DRIVER'S AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

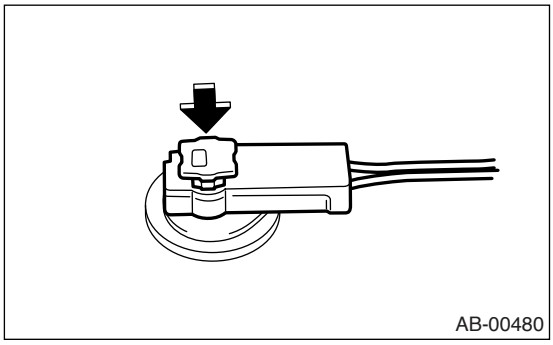


(2) Pull the connector to disconnect from the driver's airbag module assembly or retractor assembly.



2) How to connect:
Connect the connector in the reverse order of disconnecting. At this time, be sure to insert the push lock until a connecting sound is heard.

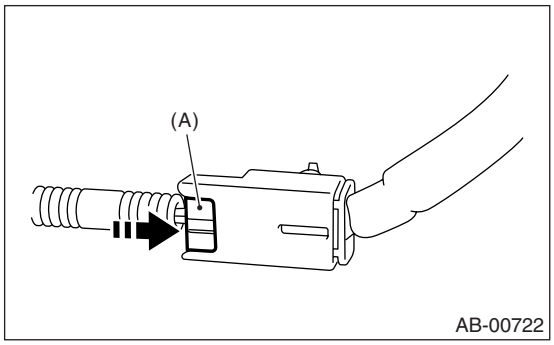
CAUTION:
• Be sure to insert the connector in until it is locked. Then pull on it gently to make sure that it is locked.
• Be sure to push the push lock in securely.



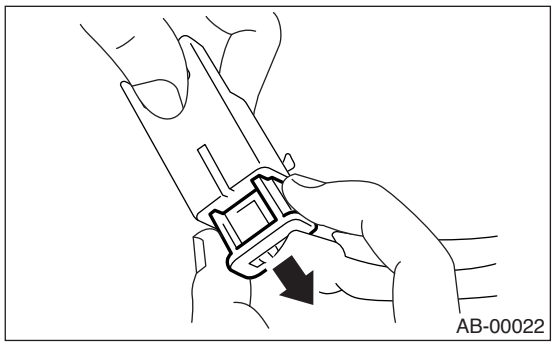
NOTE:
Connector can not be connected when the push lock is in lock position. To connect the connector, set the push lock to unlock position.

3. DRIVER'S AIRBAG (BETWEEN AIRBAG MAIN HARNESS AND ROLL CONNECTOR), PASSENGER'S AIRBAG

1) How to disconnect:
(1) Push the slide lock (A) into the direction of arrow.



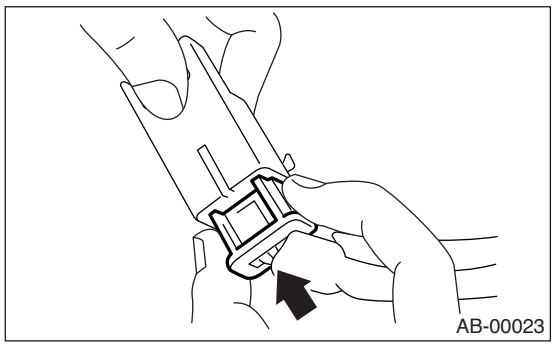
(2) With the slide lock pushed, disconnect the connector.



CAUTION:
When pulling the side lock or disconnecting the connector, be sure to hold onto the connector and not the wire.

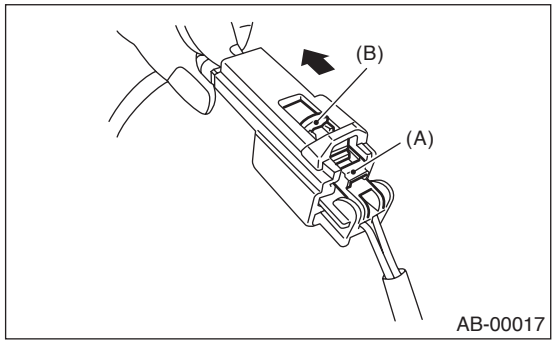
2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it is locked. Then pull on it gently to make sure that it is locked.



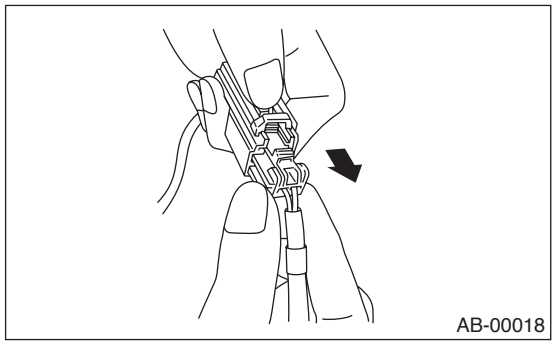
4. SIDE AIRBAG AND CURTAIN AIRBAG

1) How to disconnect:
(1) Push the lock arm (A).
(2) With the lock arm (A) pushed in, move the slide lock (B) in the direction of arrow.



(3) With the slide lock moved, release the lock arm (back to its original position), and disconnect the connector.

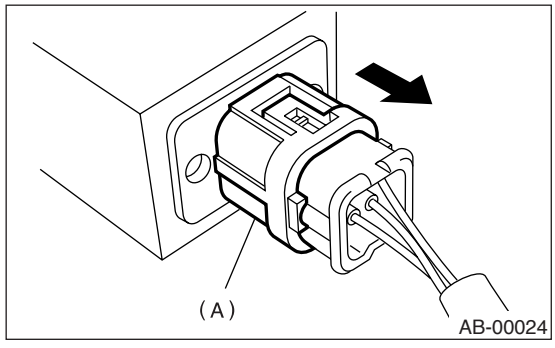
CAUTION:
When pulling the side lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



5. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR

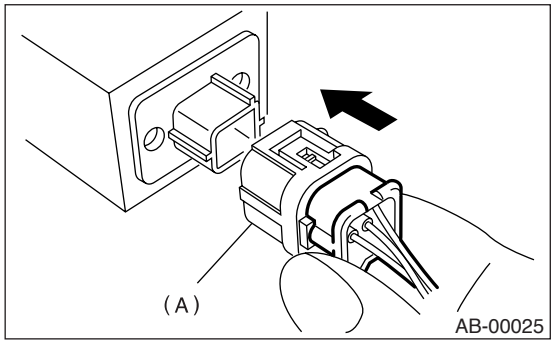
1) How to disconnect:
Holding the outer part (A), pull it in the direction of arrow.

CAUTION:
When pulling the side lock or disconnecting the connector, be sure to hold onto the connector and not the wire.



2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

CAUTION:
• The outer side (A) moves back, and so do not put your hand on the outer part.
• Be sure to insert the connector in until it is locked. Then pull on it gently to make sure that it is locked.



3. Inspection Locations After a Collision

A: REPLACEMENT

Replace the following parts when the airbag is deployed.

1. FRONT COLLISION

1) Driver's airbag module
2) Passenger's airbag module
3) Driver's seat belt (Pretensioner)
4) Passenger's seat belt (Pretensioner)
5) Airbag control module
6) Front sub sensor
7) Roll connector
8) Instrument panel (for integrating with passenger's airbag module)

2. SIDE COLLISION

1) Airbag control module
2) Side airbag module (operating side seat backrest)
3) Side airbag sensor (operating side)
4) Curtain airbag module (operating side)
5) Curtain airbag sensor (operating side)

3. INSPECTION OF OTHER PARTS

Check for the following, and replace the damaged parts with new parts.
1) Check the steering shaft for mounting conditions and deflection of front and rear, upward and downward directions, and deflection of front and rear direction with tilt lever released. (After collision, absorbing part of steering shaft may work.)
2) Check the direct type connector of driver's airbag module, pretensioner, etc. for damage, and also check each harness for pinch and connector damage. Replace the harness as a unit if damage is found.
3) Check the installing condition and play of the seat cushion, backrest, seat rail and headrest.

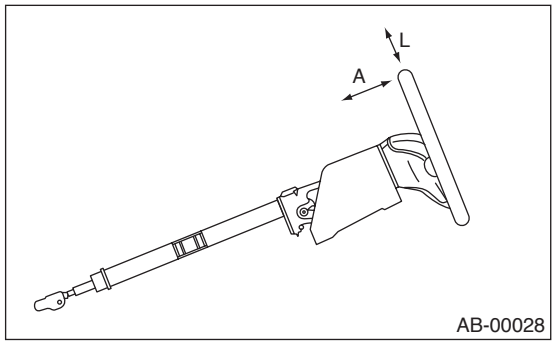
B: INSPECTION

If the vehicle is involved in a collision on any side, even if it is a slight collision, be sure to check the following systems.

1. DRIVER'S AIRBAG MODULE

1) Check for the following, and replace the damaged parts with new parts.
• Airbag module is cracked or deformed.
• Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
• The module surface is fouled with grease, oil, water or cleaning solvent.
2) When installing a new driver's airbag module, check for the following, and replace the damaged parts with new parts.
• The steering wheel is in the way, making it difficult to install the airbag module.
• The clearance between the driver's airbag module and steering wheel is not constant.
• When steering wheel deformation in axial, upward and downward directions exceed limits.

Standard value:
Height deflection A
Less than 6 mm (0.24 in)
O.D. deflection L
Less than 7 mm (0.28 in)



2. PASSENGER'S AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.
• Airbag module and instrument panel are cracked or deformed.
• Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
• Mounting bracket is cracked or deformed.

3. SIDE AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.
• Front seat, airbag module and mounting bracket are damaged or deformed.
• Harness and/or connector is cracked, deformed or open. Harness wire is exposed.

4. CURTAIN AIRBAG MODULE

Check for the following, and replace the damaged parts with new parts.
• Airbag cover is scratched or broken.
• Harness and/or connector is cracked, deformed or open. Harness wire is exposed.
• Mounting bracket and securing clip are cracked or deformed.

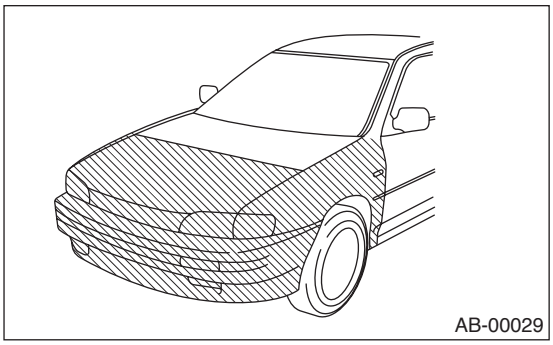
5. AIRBAG CONTROL MODULE

Check for the following, and replace the damaged parts with new parts.
• Control module is cracked or deformed.

- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Airbag is deployed.
- Side airbag is deployed.
- Curtain airbag is deployed.

6. FRONT SUB SENSOR

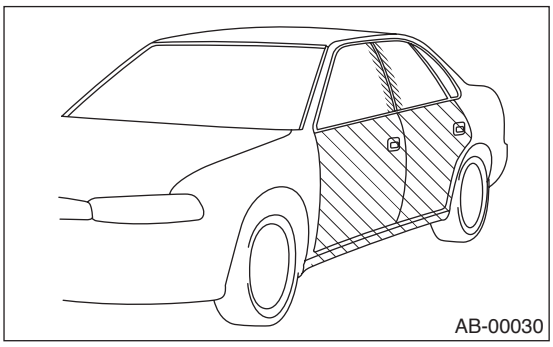
If the section of vehicle as shown in the figure is damaged, check for the following and replace the damaged parts with new parts.



- Front sub sensor is cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Airbag is deployed.

7. SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR

If the section of vehicle as shown in the figure is damaged, check for the following and replace the damaged parts with new parts.



- Side airbag sensor and curtain airbag sensor are cracked or deformed.
- Mounting bracket is cracked or deformed.
- Connector is scratched, cracked or deformed.
- Side airbag sensor or curtain airbag is deployed. (operating side)

8. ROLL CONNECTOR

Check for the following, and replace the damaged parts with new parts.

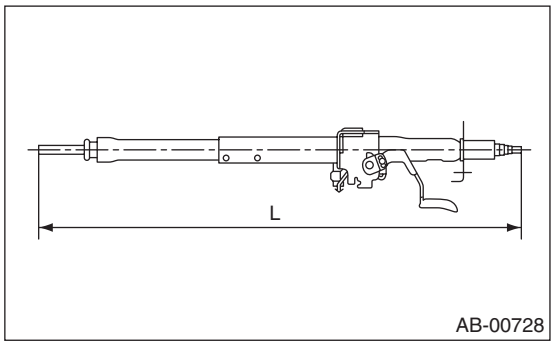
- Combination switch or steering roll connector is cracked or deformed.

9. STEERING SHAFT

Check for the following, and replace the damaged parts with new parts.

- Overall length of steering column should be within specifications.

Standard value:
Overall length L
Except for OUTBACK model
833.6 $^{+1.3}_{-0.3}$ mm (32.8 $^{+0.1}_{-0.01}$ in)
OUTBACK model
825.4 $^{+1.3}_{-0.3}$ mm (32.5 $^{+0.1}_{-0.01}$ in)

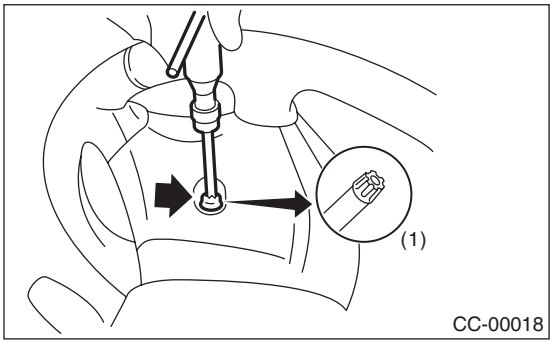


4. Driver's Airbag Module

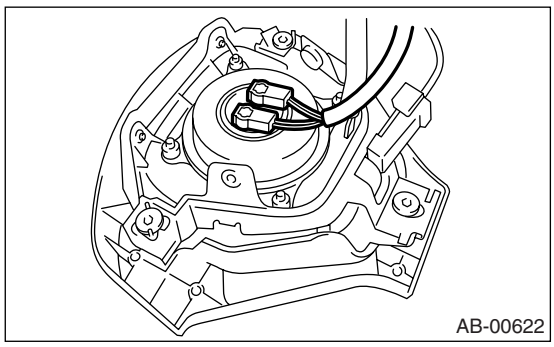
A: REMOVAL

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

1) Position the front wheels straight ahead. (After moving a vehicle more than 5 m (16 ft) with front wheels positioned straight ahead, make sure the vehicle moves straight ahead.)
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30 (1), remove the two TORX® bolts on the side of steering wheel.



5) Disconnect the horn harness.
6) Disconnect the airbag connector on the back of airbag module, and then remove the airbag module. <Ref. to AB-9, PROCEDURE, Airbag Connector.>



7) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-4, CAUTION, General Description.>

B: INSTALLATION

CAUTION:
• Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
• Do not allow harness and connectors to interfere or get tangled up with other parts.
• To prevent the misconnection, the connector is colored. Connect the harness side connector to the same color of module side connector.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-2, DRIVER'S AIRBAG MODULE, COMPONENT, General Description.>

C: INSPECTION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

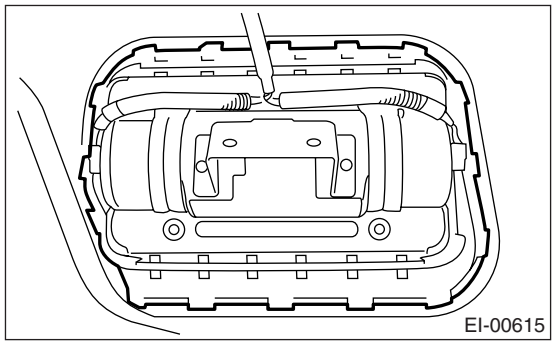
Check for the following, and replace damaged parts with new parts.
• Airbag module, harness, connector and mounting bracket are damaged. <Ref. to AB-12, DRIVER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

5. Passenger's Airbag Module

A: REMOVAL

CAUTION:
Refer to "CAUTION" of "General Description" before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the instrument panel. <Ref. to EI-56, INSTRUMENT PANEL (EXCLUDING STEERING SUPPORT BEAM), REMOVAL, Instrument Panel Assembly.>
4) Remove the pawl and remove the passenger's airbag module.



5) Refer to "CAUTION" for handling of a removed airbag module. <Ref. to AB-4, CAUTION, General Description.>

B: INSTALLATION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Install in the reverse order of removal.

CAUTION:
Do not allow harness and connectors to interfere or get tangled up with other parts.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-2, PASSENGER'S AIRBAG MODULE, COMPONENT, General Description.>

C: INSPECTION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Check for the following, and replace damaged parts with new parts.
• Airbag module, harness, connector, and mounting bracket are damaged. <Ref. to AB-12, PASSENGER'S AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

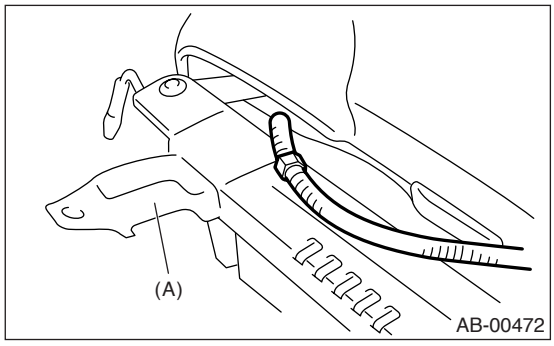
6. Side Airbag Module

A: REMOVAL

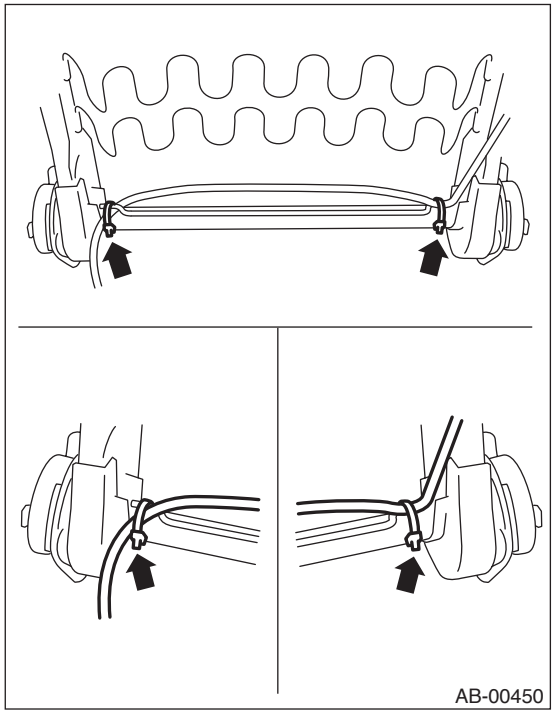
CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

NOTE:
Remove the passenger's side by referring to driver's side.

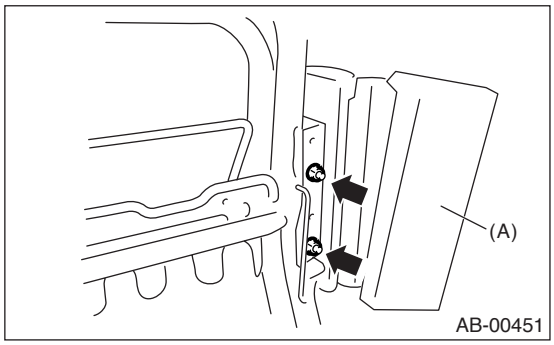
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
4) Remove the clip from reverse side of seat cushion assembly and slide rail IN (A), and then remove the side airbag harness.



5) Remove the backrest cover. <Ref. to SE-7, DISASSEMBLY, Front Seat.>
6) Remove the side airbag harness from backrest frame assembly.



7) Remove the side airbag module (A) from backrest frame assembly.

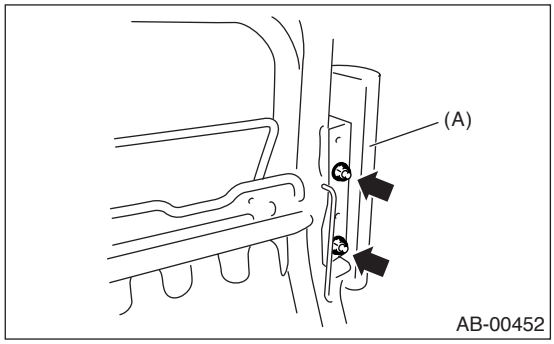


B: INSTALLATION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

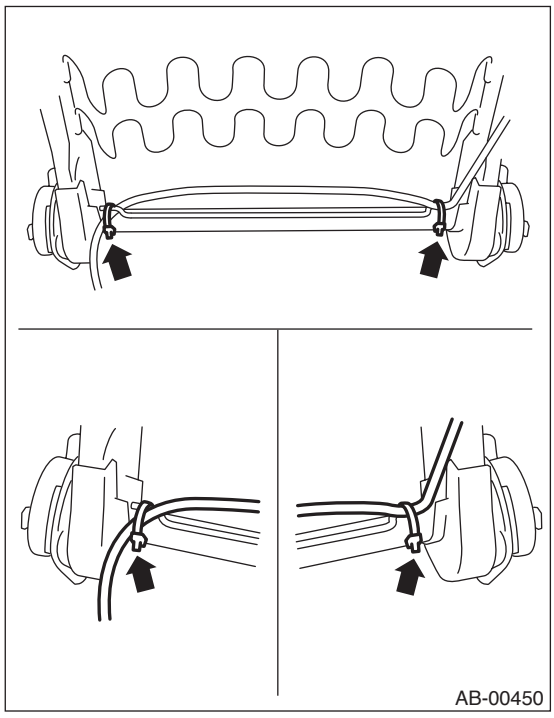
1) Ensure that there are no foreign articles on side airbag module.
2) Install the side airbag module (A) to backrest frame assembly.

Tightening torque:
6.0 N·m (0.61 kgf-m, 4.4 ft-lb)



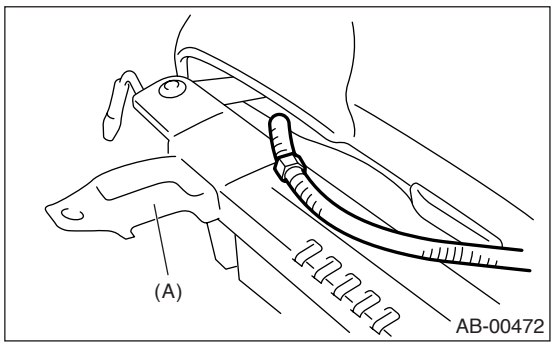
3) Install the side airbag harness to backrest frame assembly.

NOTE:
Secure the harness to its original position of seat.



4) Install the backrest cover. <Ref. to SE-12, ASSEMBLY, Front Seat.>

5) Install the side airbag harness to slide rail IN (A), and then secure the connector to the bracket on back side of seat cushion assembly.



6) Recline the seat or slide it backward and forward, and check there is no contact between the seat backrest assembly, cushion cover assembly and side airbag harness.

C: INSPECTION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

Perform the inspection of following items, and replace the damaged parts with new ones. <Ref. to AB-12, SIDE AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>

1) With side collision (when side airbag is deployed)
- Side airbag module assembly
- Backrest pad assembly
- Backrest frame assembly
- Backrest cover assembly

2) Other replacement parts, which found to be damaged by visual check
- Headrest assembly
- Bushing
- Slide rail OUT
- Slide rail IN
- Seat hinge cover
- Seat lifter lever
- Reclining lever
- Side airbag harness and connector on body side.

3) With side collision (when side airbag is not deployed)
Check the seat and airbag module visually, and then replace them with new ones if damaged or cracked.
Specially inspect the damage of airbag module body, mounting bracket, and harness connector.

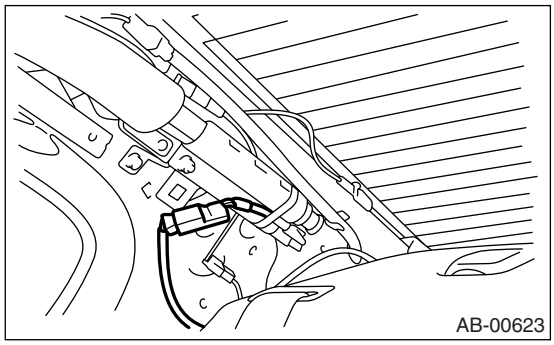
4) Without side collision (dirt and damage of cover)
Replace the corresponding part with a new one.

7. Curtain Airbag Module

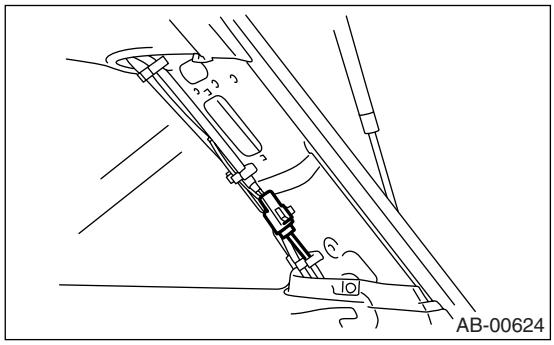
A: REMOVAL

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the rear quarter trim. (Sedan model) <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIRBAG), REMOVAL, Rear Quarter Trim.>
4) Remove the quarter rear pillar trim. (Wagon model) <Ref. to EI-63, WAGON MODEL, REMOVAL, Rear Quarter Trim.>
5) Disconnect the curtain airbag module connector.
• Sedan model


AB-00623

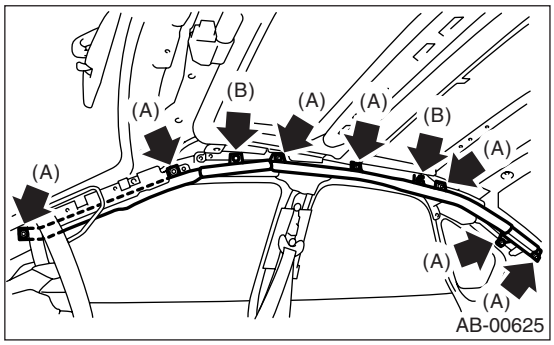
• Wagon model


AB-00624

6) Remove the roof trim. <Ref. to EI-67, REMOVAL, Roof Trim.>
7) Remove the bolts (A) and clips (B), and then remove the curtain airbag module.

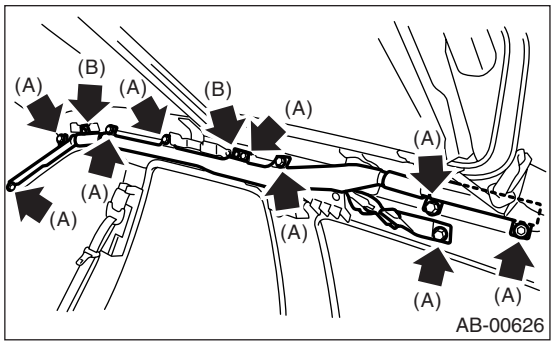
CAUTION:
• Be careful not to damage the curtain airbag module during removal.
• Never open the curtain airbag module before deploying it. Never reuse the opened curtain airbag module.

• Sedan model



AB-00625

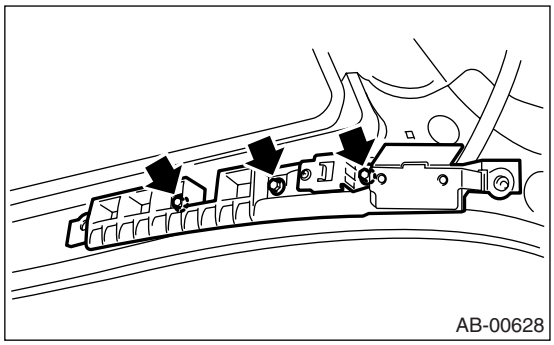
• Wagon model



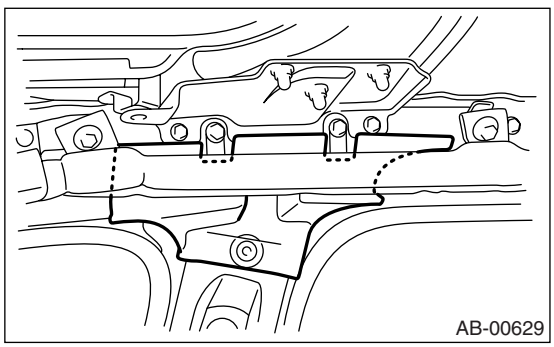
AB-00626

NOTE:
Remove the rear center seat belt retractor on the RH side before servicing.

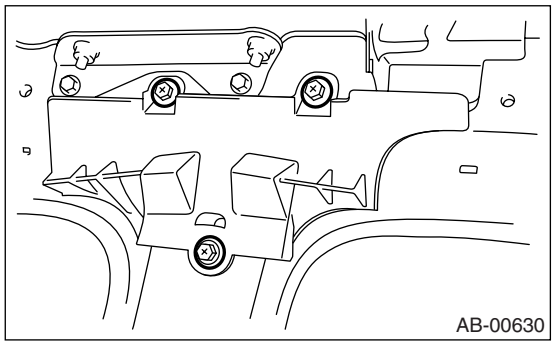
8) Remove the airbag guide A from front pillar.


AB-00628

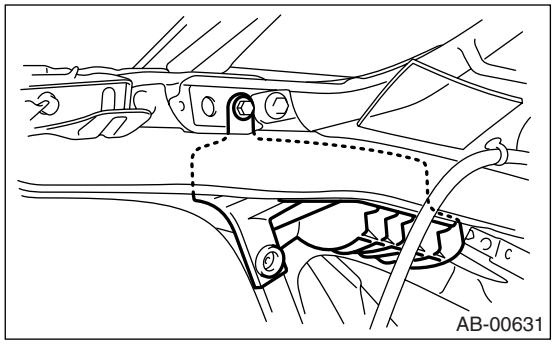
9) Remove the airbag guide B from center pillar.
• Sedan model


AB-00629

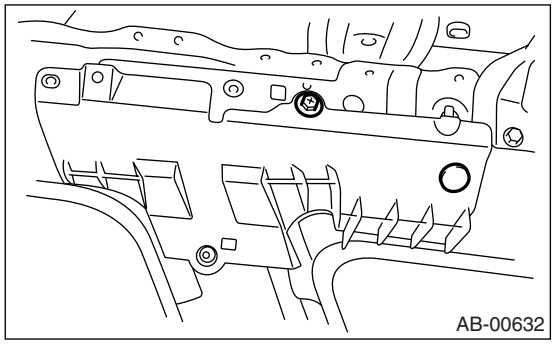
• Wagon model



10) Remove the airbag guide C from quarter pillar.
• Sedan model



• Wagon model



B: INSTALLATION

CAUTION:
• Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>
• When installing the curtain airbag module, install a specified part at specified place.
• Be careful not to damage the curtain airbag module during removal.
• Never open the curtain airbag module before deploying it. Never reuse the deployed curtain airbag module.
• Ensure that there are no foreign articles on airbag module.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-2, CURTAIN AIRBAG MODULE, COMPONENT, General Description.>

C: INSPECTION

CAUTION:
Refer to "CAUTION" of General Description before handling the airbag module. <Ref. to AB-4, CAUTION, General Description.>

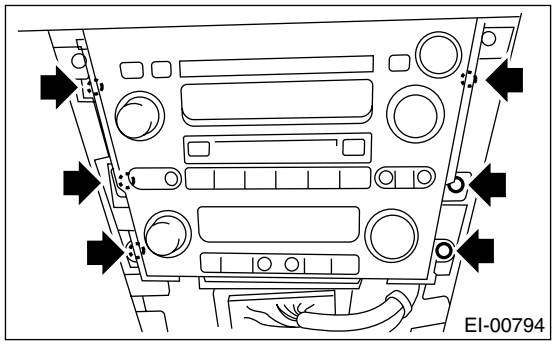
Perform the inspection of following items, and replace the damaged parts with new ones. <Ref. to AB-12, CURTAIN AIRBAG MODULE, INSPECTION, Inspection Locations After a Collision.>
1) With side collision (when curtain airbag is deployed)
• Curtain airbag module assembly
• Roof trim
• Front pillar upper trim
• Center pillar upper trim
• Rear quarter pillar trim
• Airbag guide A, B, C
2) Other replacement parts, which found to be damaged by visual check
• Assist grip
• Assist grip bracket
• Curtain airbag harness and connector on body side.
3) With side collision (when curtain airbag is not deployed)
Check the roof trim, pillar trim and airbag module visually, and then replace them with new ones if damaged or cracked.
Specially inspect the damage of airbag module body, mounting bracket, harness connector.
4) Without side collision (dirt and damage of cover)
Replace the corresponding part with a new one.

8. Airbag Control Module

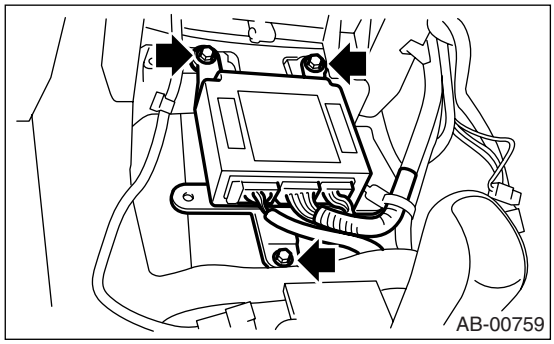
A: REMOVAL

CAUTION:
• Do not disassemble the airbag control module.
• If the airbag control module is deformed or if water damage is suspected, replace the airbag control module with a new one.
• Do not drop the airbag control module.
• After removal, keep the airbag control module on a dry, clean surface away from moisture, heat and dust.

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the console front panel and console side garnish. <Ref. to EI-54, REMOVAL, Center Console.>
4) Remove the screws and pull out the audio unit assembly to disconnect the connector for removal.



5) Disconnect the connector from airbag control module.
6) Remove the bolts and remove airbag control module.



B: INSTALLATION

CAUTION:
Use new hexagon head bolts (for airbag control module only) during installation.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-2, AIRBAG CONTROL MODULE, COMPONENT, General Description.>

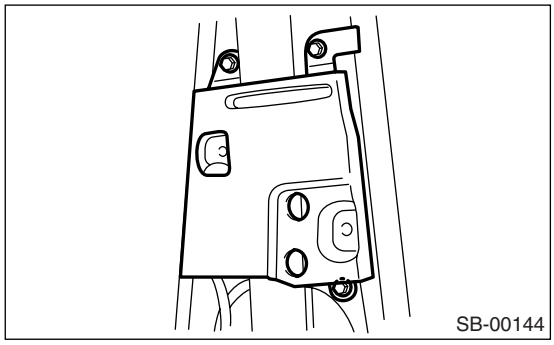
C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
• Control module, connector, and mounting bracket are damaged.
• Airbag is deployed.
• Side airbag is deployed.
• Curtain airbag is deployed.

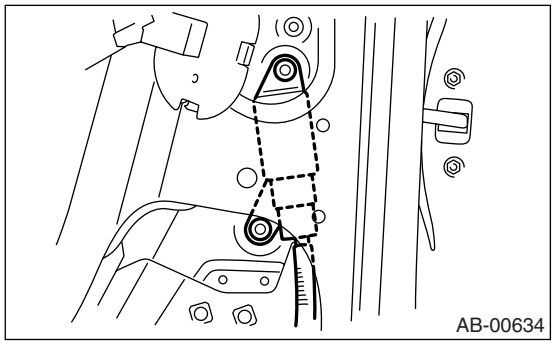
9. Side Airbag Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the center pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
4) Remove the center pillar inner protector lower.


SB-00144

5) Remove the front outer seat belt retractor. <Ref. to SB-12, OUTER SEAT BELT ASSEMBLY, REMOVAL, Front Seat Belt.>
6) Remove the nut and disconnect the airbag connector to remove side airbag sensor.


AB-00634

B: INSTALLATION

CAUTION:
Use new nuts (exclusive use for side airbag sensors) during installation.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-3, SIDE AIRBAG SENSOR, COMPONENT, General Description.>

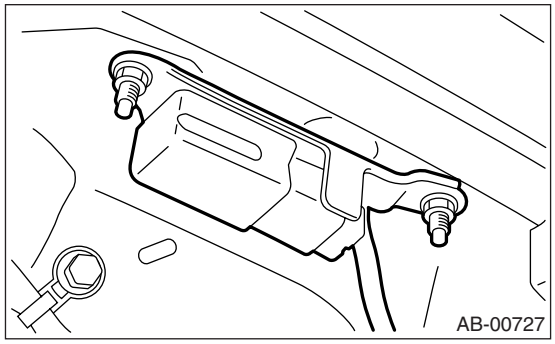
C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
• Mounting bracket of airbag sensor or connector is damaged.
• Side airbag is deployed.

10.Curtain Airbag Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the rear seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
4) Detach the nuts and disconnect the airbag connector to remove the curtain airbag sensor.



B: INSTALLATION

CAUTION:
Use new nuts (exclusive use for curtain airbag sensors) during installation.

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-3, CURTAIN AIRBAG SENSOR, COMPONENT, General Description.>

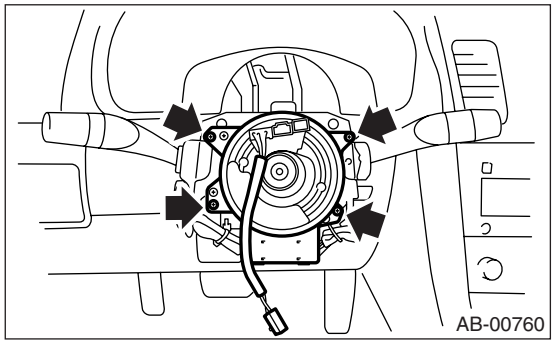
C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
• Mounting bracket of curtain airbag sensor or connector is damaged.
• Curtain airbag is deployed.

11.Roll Connector

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>
4) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
5) Remove the steering column cover.
6) Remove the screws, and then remove the roll connector.



B: INSTALLATION

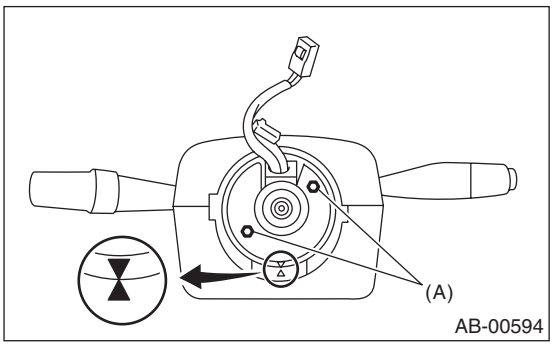
1) Install in the reverse order of removal.
2) Before installing steering wheel, be sure to adjust the direction of roll connector with steering. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>

C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
• Combination switch and roll connector are cracked or deformed.

D: ADJUSTMENT

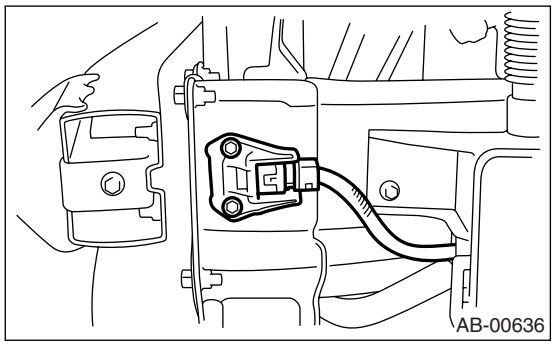
1) Check that front wheels are positioned in straight ahead direction.
2) Turn the roll connector pins (A) clockwise until it stops.
3) Turn the roll connector pins (A) approx. 3.25 turns until "▲" marks are aligned.



12.Front Sub Sensor

A: REMOVAL

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the front bumper face. <Ref. to EI-30, FRONT BUMPER FACE, REMOVAL, Front Bumper.>
4) Remove the bolts, and then detach the front sub sensor.



5) Disconnect the connector from front sub sensor.

B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to AB-3, FRONT SUB SENSOR, COMPONENT, General Description.>

C: INSPECTION

Check for the following, and replace the damaged parts with new parts.
• Front sub sensor, mounting bracket and connector are damaged.
• Airbag is deployed.

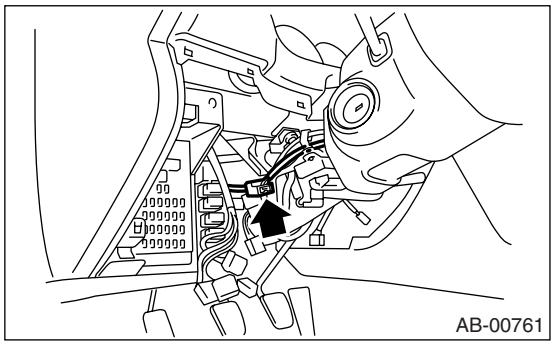
13. Disposal of Airbag Module (Deployment Processing On Vehicle)

A: PROCEDURE

CAUTION:
• Do not discard an undeployed airbag modules because it may cause a serious personal injury when accidentally deployed.
• As a rule, airbag modules should be deployed while still installed in the vehicle. Do not remove airbag modules unless necessary.
• Deployment of airbag modules should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Deploying an airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well-ventilated place with no smoke detector nearby.
• Wear protective gloves, safety goggles and earplugs during this operation. Wash your hands afterwards.
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.
• Wrap the deployed airbag module in an airtight vinyl bag, and discard it.
• If circumstances do not permit the airbag module deployment, contact the SUBARU dealer.

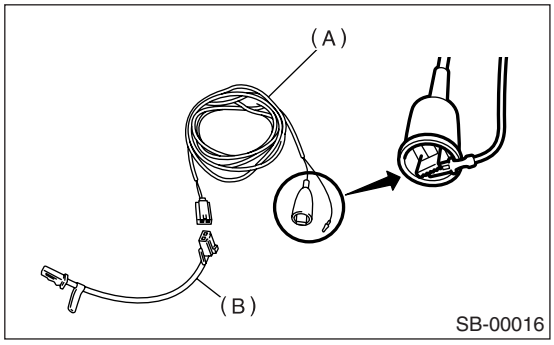
1. DRIVER'S AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the instrument panel lower cover upper. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
4) Disconnect the airbag connector.



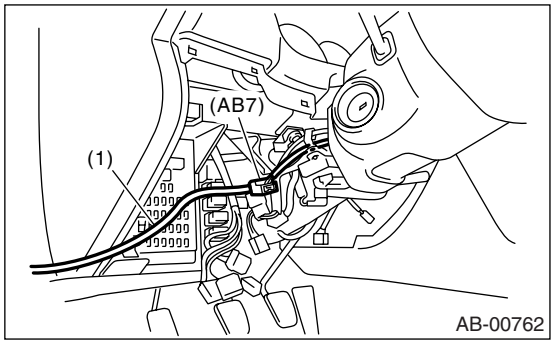
5) Short the terminal to the alligator clip furnished as deployment tool (A).
6) Connect the deployment tool and deployment adapter E (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.



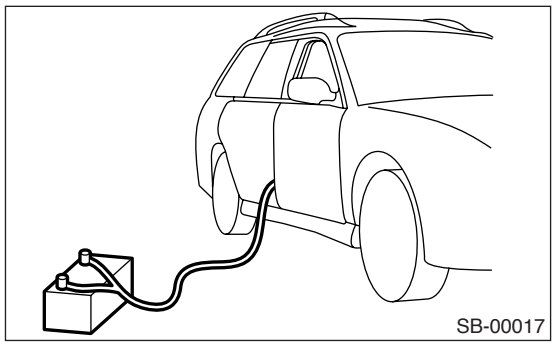
(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter E:
(Tool number 98299SA030)

7) Connect the deployment adapter E (1) to airbag connector (AB7).

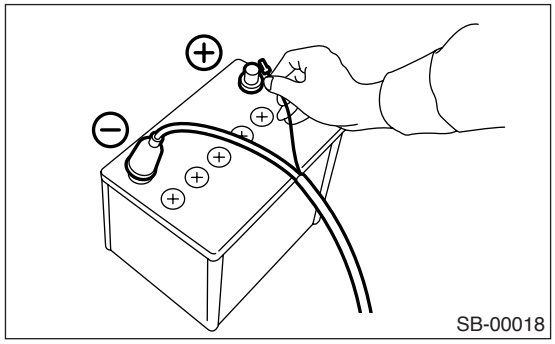


(1) Deployment adapter E:
(Tool number 98299SA030)

8) Extend the wiring of deployment tool to the limit, and make sure the vehicle is empty. Close all the windows, sunroof and rear gate completely.

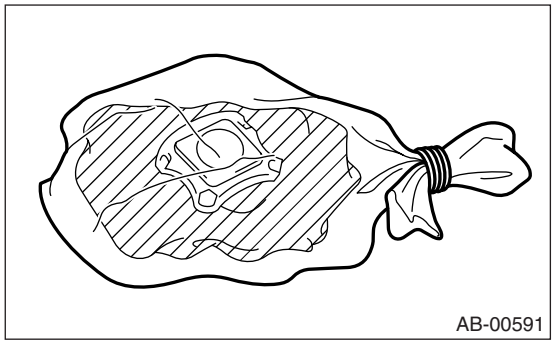

SB-00017

9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.
10) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.


SB-00018

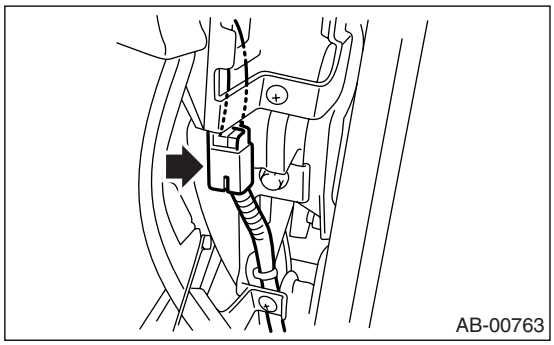
CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

11) Remove the airbag module. <Ref. to AB-14, Driver's Airbag Module.>
12) Wrap the deployed airbag module in airtight vinyl bag, and discard it.


AB-00591

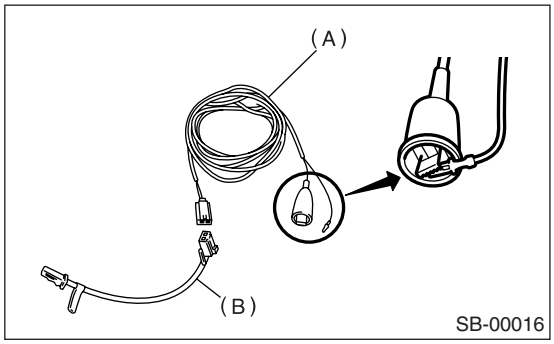
2. PASSENGER'S AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the instrument panel side cover of passenger's side and disconnect the airbag connector.


AB-00763

4) Short the terminal to the alligator clip furnished as deployment tool (A).
5) Connect the deployment tool (A) and deployment adapter E (B).

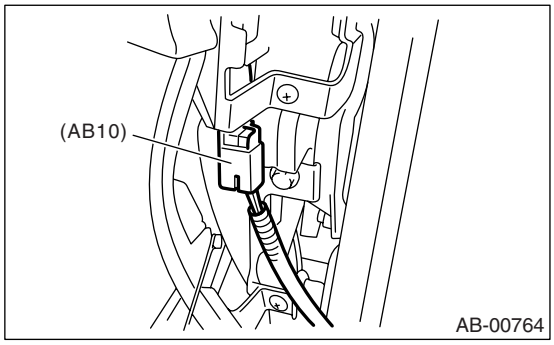
CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.



SB-00016

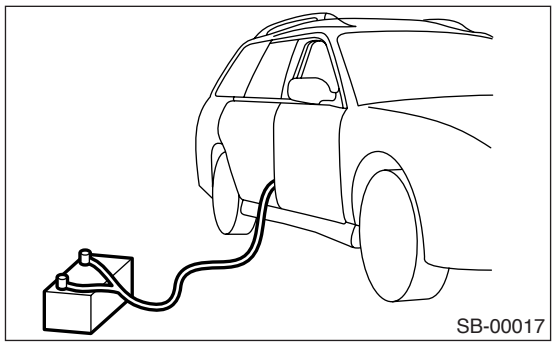
(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter E:
(Tool number 98299SA030)

6) Connect the deployment adapter E to airbag connector (AB10).

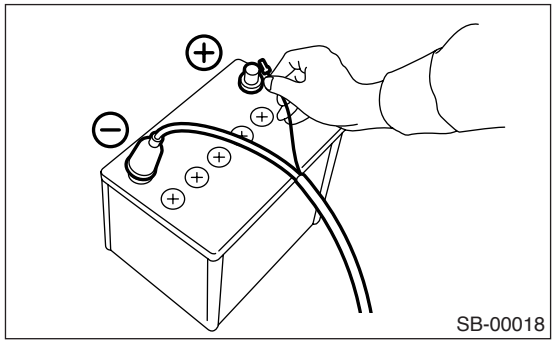


AB-00764

7) Extend the wiring of deployment tool to the limit, and make sure the vehicle is empty. Close all the windows, sunroof and rear gate completely.

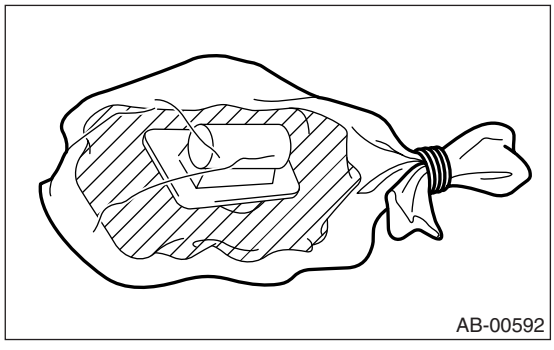

SB-00017

8) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.
9) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.


SB-00018

CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

10) Remove the instrument panel upper. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
11) Remove the passenger airbag module from instrument panel upper.
12) Wrap the airbag module, which were removed from instrument panel upper, in airtight vinyl bag, and discard it.


AB-00592

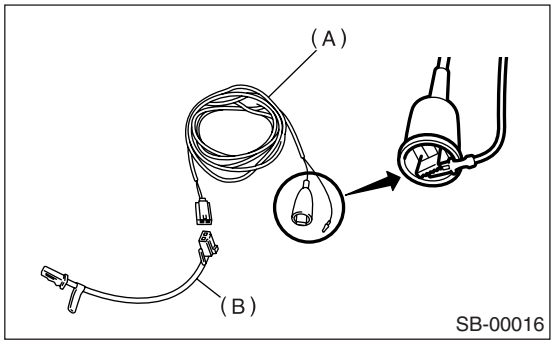
3. SIDE AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Disconnect the side airbag module connector (yellow) under the front seat cushion.

NOTE:
For power seat type, seat need to be removed. When deploying in vehicle, reinstall the seat after disconnecting the airbag connector. When deploying after removal from vehicle, refer to “Disposal of Airbag Module (Deploying After Removal from Vehicle)”. <Ref. to AB-33, SIDE AIRBAG MODULE, PROCEDURE, Disposal of Airbag Module (Deployment Processing After Removal from Vehicle).>

4) Set the backrest at most standing position, and then set the seat position at the center of slide rail.
5) Short the terminal to the alligator clip furnished as deployment tool (A).
6) Connect the deployment tool and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.



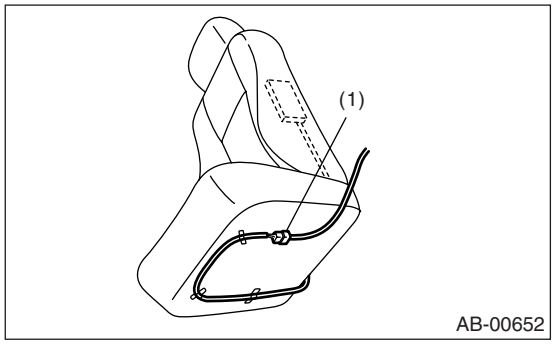
SB-00016

(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter A:
(Tool number 98299FC030)

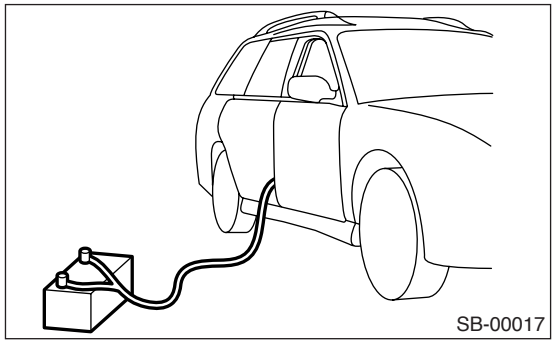
7) Connect the deployment adapter A (1) to the side airbag module connector (yellow).

CAUTION:
• Do not place any object on front seat.

• **Deploy the side airbag one by one to discard.**

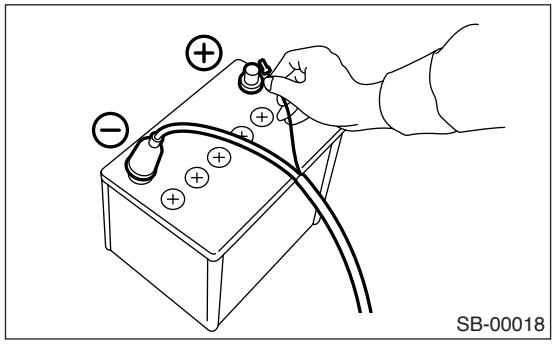


8) Extend the wiring of deployment tool to the limit, and make sure the vehicle is empty. Close all the windows, sunroof and rear gate completely.



9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.

10) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



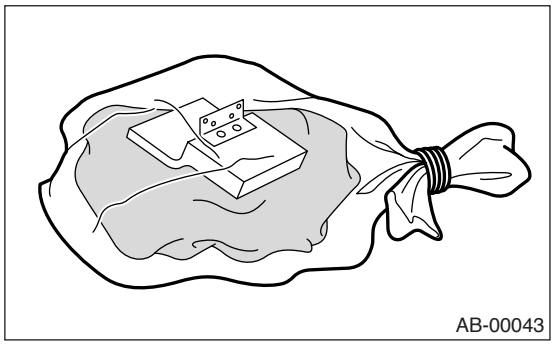
CAUTION:

• **After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.**

• **Do not let water get on the deployed airbag module.**

11) Remove the side airbag module. <Ref. to AB-16, REMOVAL, Side Airbag Module.>

12) Wrap the deployed airbag module in airtight vinyl bag, and discard it.



4. CURTAIN AIRBAG MODULE

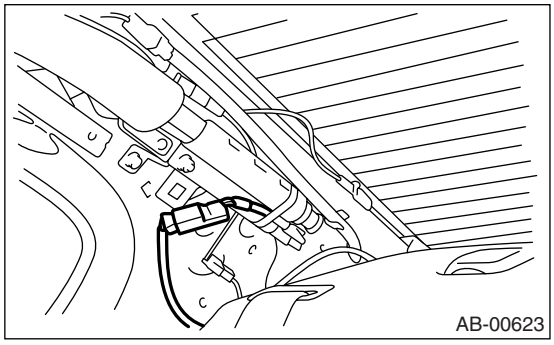
1) Turn the ignition switch to OFF.

2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.

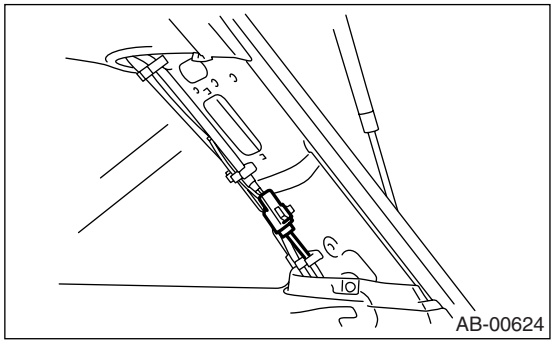
3) Remove the rear quarter trim. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>

4) Disconnect the curtain airbag harness.

• Sedan model



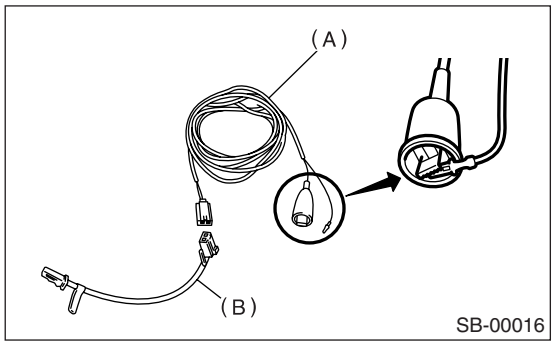
• Wagon model



5) Short the terminal to the alligator clip furnished as deployment tool (A).

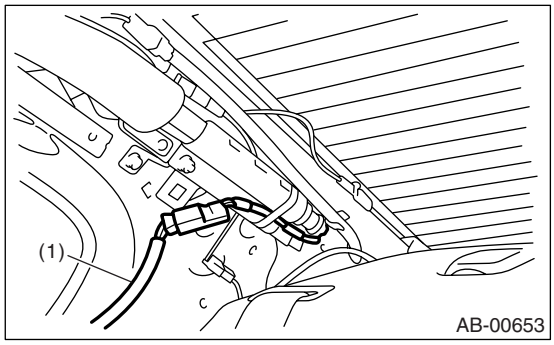
6) Connect the deployment tool and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.

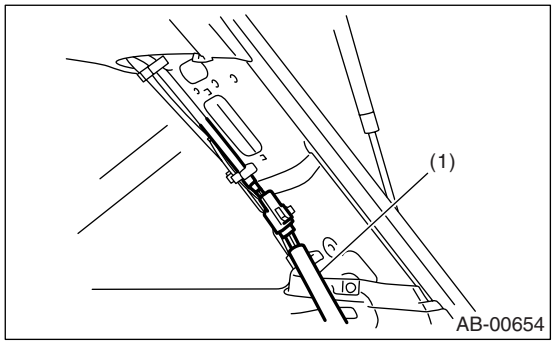


(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter A:
(Tool number 98299FC030)

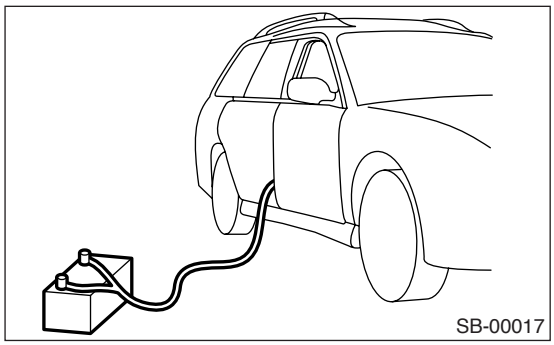
7) Connect the deployment adapter A (1) to the curtain airbag module connector (yellow).
• Sedan model



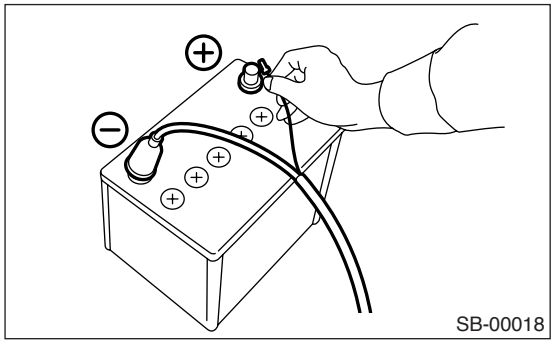
• Wagon model



8) Extend the wiring of deployment tool to the limit, and make sure the vehicle is empty. Close all the windows, sunroof and rear gate completely.

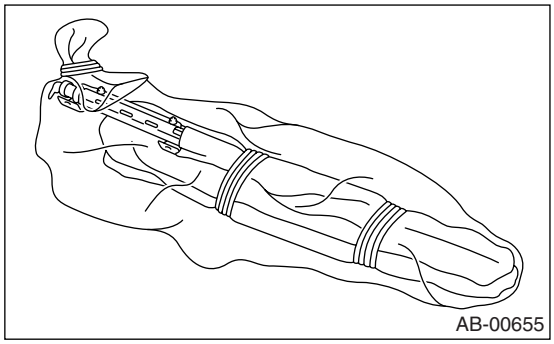


9) Move the battery at least 5 m (16 ft) from vehicle, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.
10) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

11) Remove the curtain airbag module. <Ref. to AB-18, REMOVAL, Curtain Airbag Module.>
12) Wrap the deployed airbag module in airtight vinyl bag, and discard it.



NOTE:
Fold the airbag cloth three or four times as required and fasten it with string and seal it with vinyl bag.

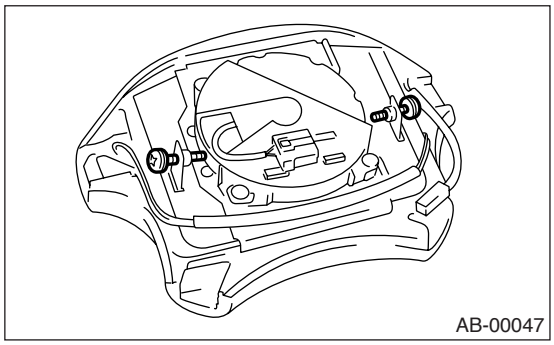
14. Disposal of Airbag Module (Deployment Processing After Removal from Vehicle)

A: PROCEDURE

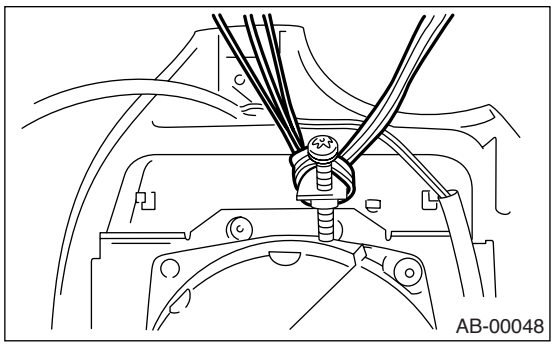
CAUTION:
• Do not discard an undeployed airbag module because it may cause serious personal injury when accidentally deployed.
• As a rule, airbag modules should be deployed while still installed in the vehicle. Do not remove the airbag modules unless necessary.
• Deployment of airbag modules should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Do not damage the airbag module or drop it.
• Deploying an airbag module causes a high explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted from deployment of the airbag module. Therefore, it must be deployed in a well ventilated place with no smoke detector nearby.
• Wear protective gloves, safety goggles and earplugs during this operation. Wash your hands afterwards.
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.
• Wrap the deployed airbag module in an airtight vinyl bag, and discard it.
• If circumstances do not permit the airbag module deployment, contact the SUBARU dealer.

1. DRIVER'S AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>
4) Install the removed bolts to airbag module.

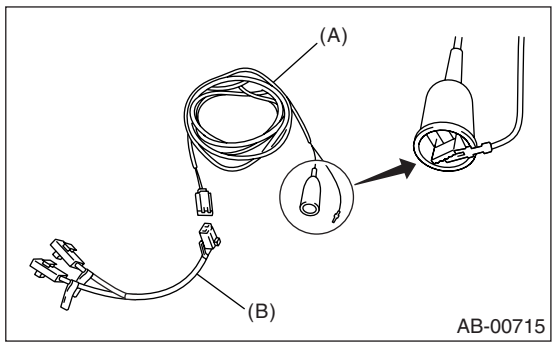

AB-00047

5) Bundle three automotive wire harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around airbag module stay.


AB-00048

6) Short the terminal to the alligator clip furnished as deployment tool (A).
7) Connect the deployment tool and deployment adapter X (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.

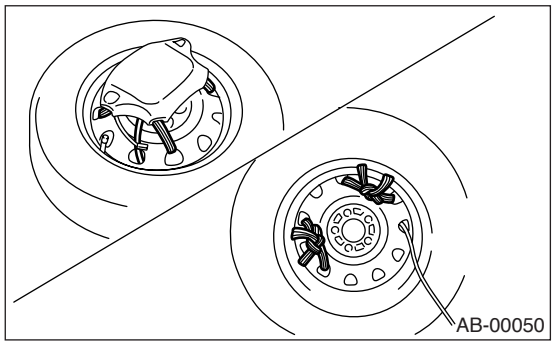


AB-00715

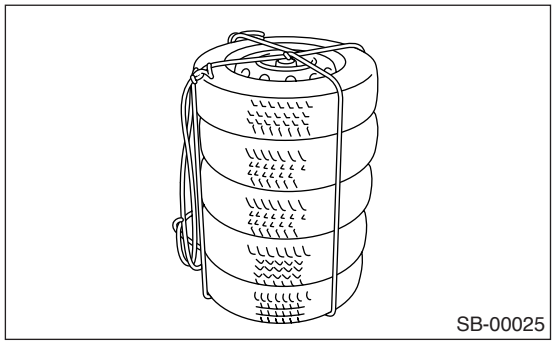
(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter X:
(Tool number 98299AG030)

8) Connect the deployment adapter X connector to airbag module.

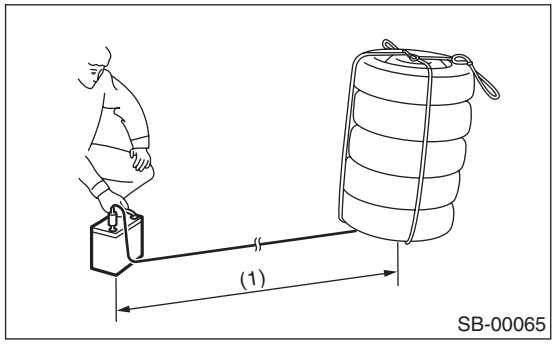
9) Install the airbag module with pad side facing upward on a wheel with tire.



10) Put three tires without wheels on the tire installed with the airbag module. Put on an additional tire with a wheel, and then fasten them tight with a rope.

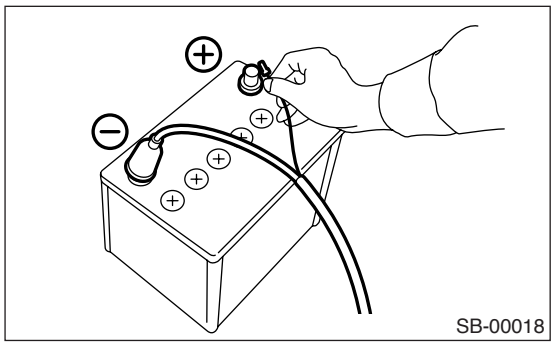


11) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



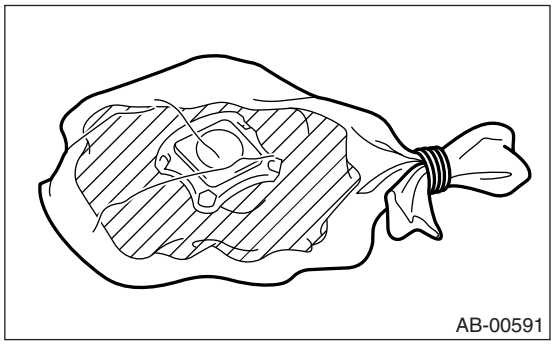
(1) 5 m (16 ft) or more

12) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

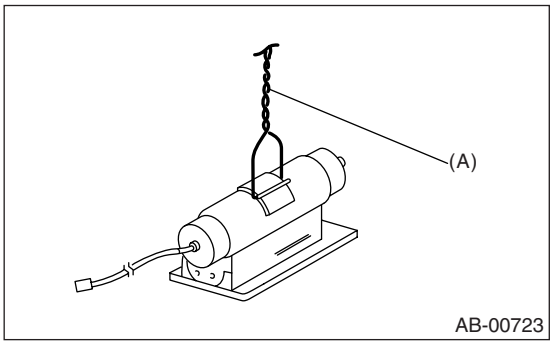
13) Wrap the deployed airbag module in airtight vinyl bag, and discard it.



2. PASSENGER'S AIRBAG MODULE

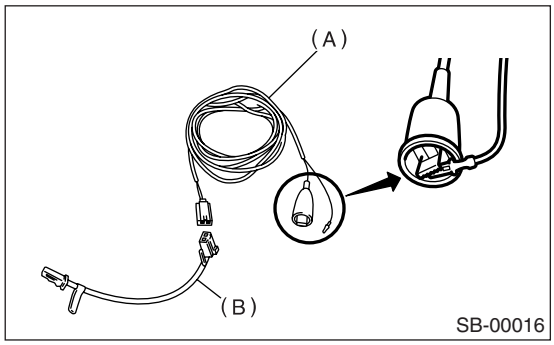
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the instrument panel assembly. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
4) Remove the passenger airbag module. <Ref. to AB-15, Passenger's Airbag Module.>

5) Bundle three automotive wire harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], route them through airbag module bracket (A). Then, twist them to add strength.



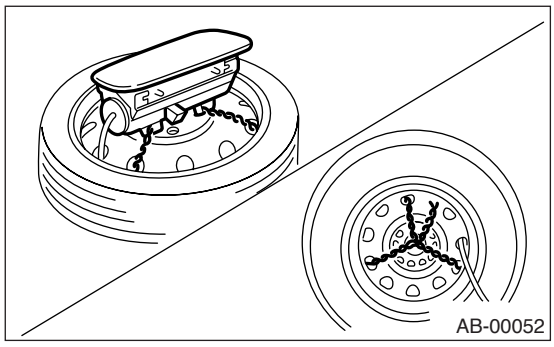
6) Short the terminal to the alligator clip furnished as deployment tool (A).
7) Connect the deployment tool and deployment adapter E (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.

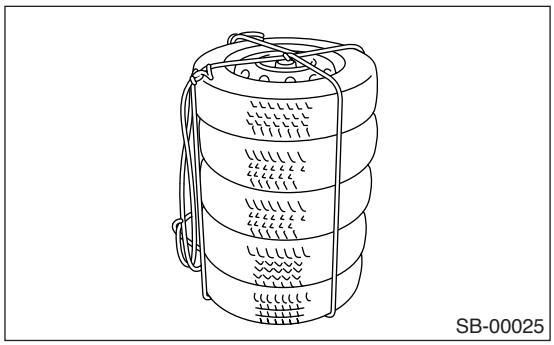


(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter E:
(Tool number 98299SA030)

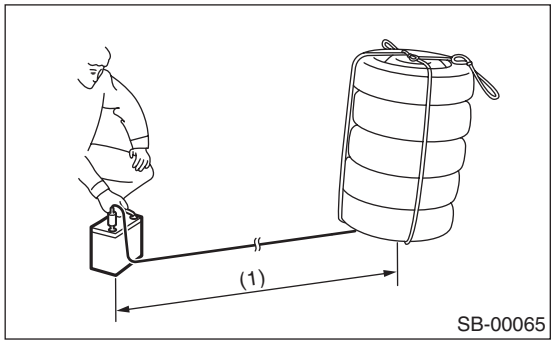
8) Connect the deployment adapter E connector to the airbag module.
9) Install the airbag module with opening side facing upward on a 14-inch or greater size wheel with tire.



10) Put three tires without wheels on the tire installed with the airbag module. Put on an additional tire with a wheel on top, and then fasten them tight with a rope.

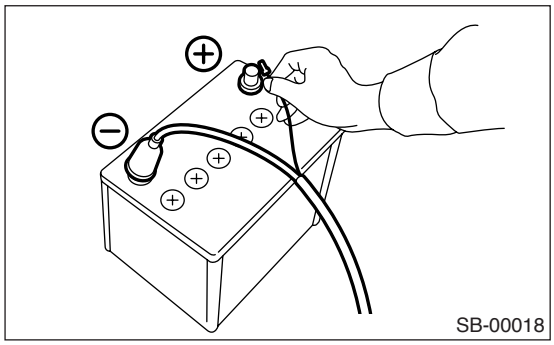


11) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



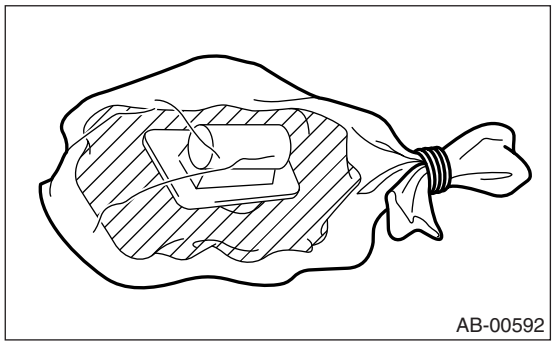
(1) 5 m (16 ft) or more

12) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



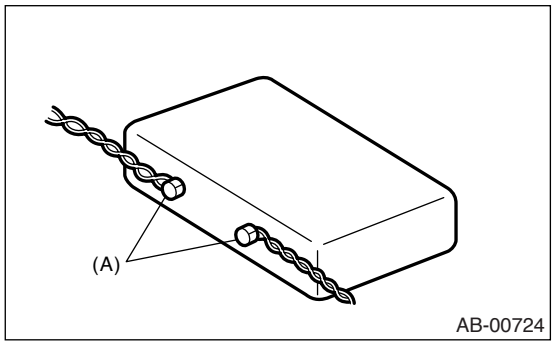
CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and then discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in airtight vinyl bag, and discard it.


AB-00592

3. SIDE AIRBAG MODULE

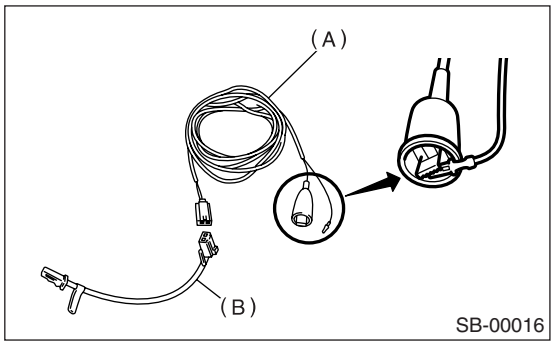
1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
4) Remove the side airbag module. <Ref. to AB-16, REMOVAL, Side Airbag Module.>
5) Install the nuts (A) to airbag module, and then bind them with bundled three automotive wire harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more].



AB-00724

6) Short the terminal to the alligator clip furnished as deployment tool (A).
7) Connect the deployment tool and deployment adapter A (B).

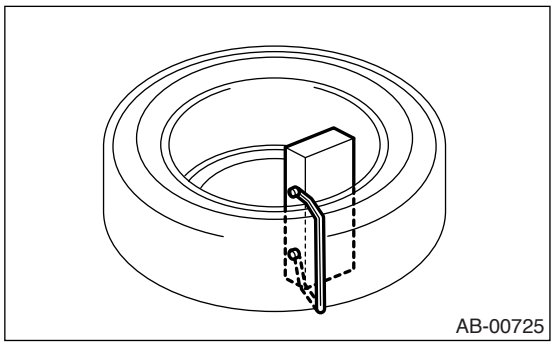
CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.



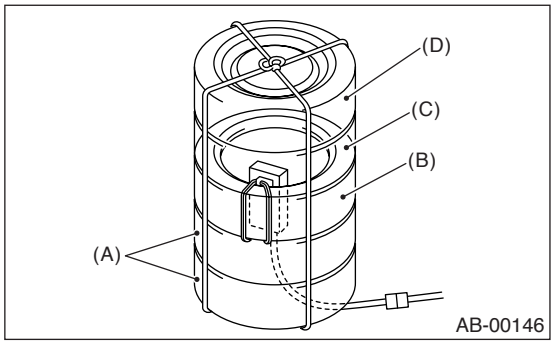
SB-00016

(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter A:
(Tool number 98299FC030)

8) Connect the deployment adapter A connector to airbag module.
9) Install the airbag module on a 14-inch or greater size tire without wheel.

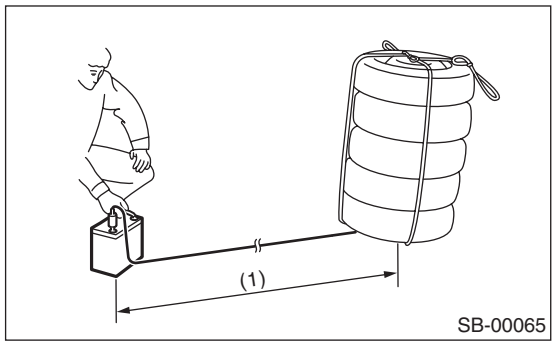

AB-00725

10) Put two tires without wheels (A) under the tire installed with the side airbag module (B). Put on an additional tire without a wheel (C), and then put a tire with a wheel (D) on top. Fasten them tight with a rope.



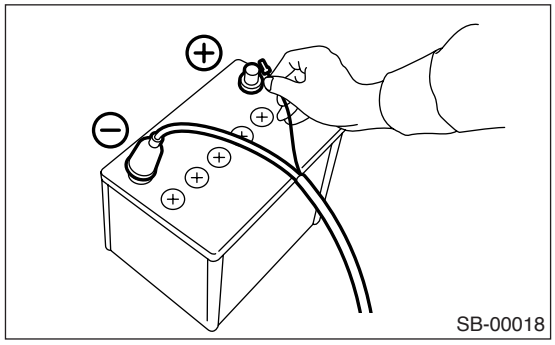
AB-00146

11) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (−) terminal.



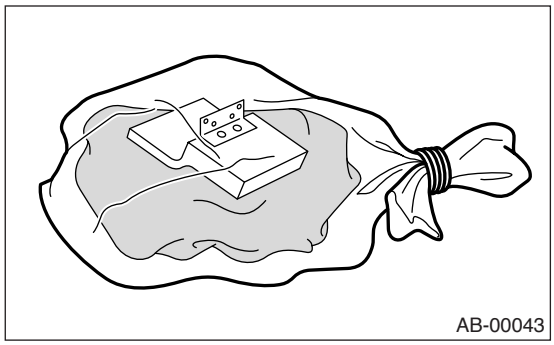
(1) 5 m (16 ft) or more

12) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



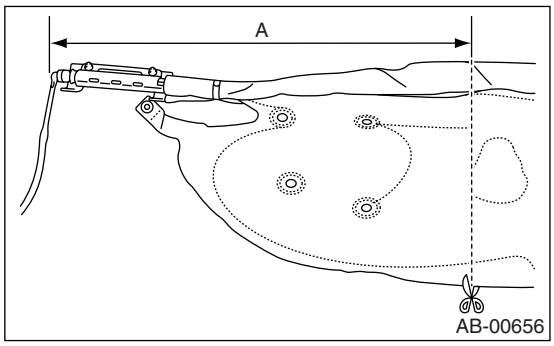
CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and discard it.
• Do not let water get on the deployed airbag module.

13) Wrap the deployed airbag module in airtight vinyl bag, and discard it.

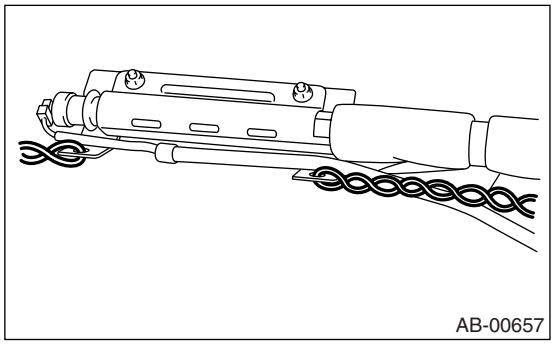


4. CURTAIN AIRBAG MODULE

1) Turn the ignition switch to OFF.
2) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
3) Remove the roof trim. <Ref. to EI-67, REMOVAL, Roof Trim.>
4) Remove the curtain airbag module. <Ref. to AB-18, REMOVAL, Curtain Airbag Module.>
5) Extend the airbag cloth and cut off the airbag at the position of 750 mm (29.5 in) (A) from inflator end.

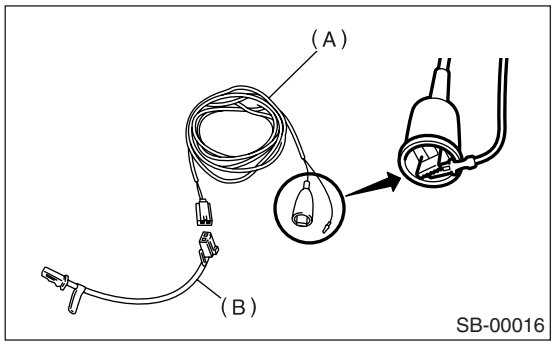


6) Bundle three automotive wire harnesses [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and then bind them through the holes in airbag module bracket.



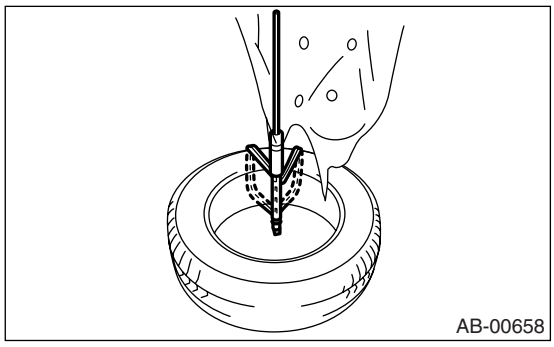
7) Short the terminal to the alligator clip furnished as deployment tool (A).
8) Connect the deployment tool and deployment adapter A (B).

CAUTION:
The deployment tool should be kept shorted terminals until just before deployment of airbag module.

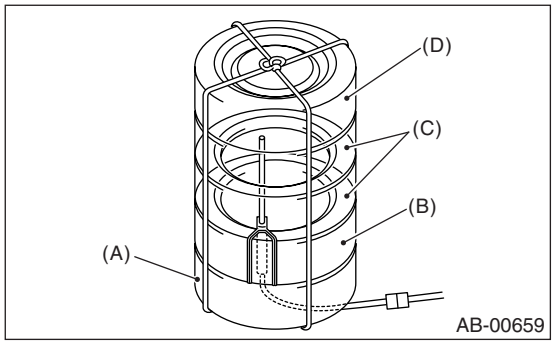


(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter A:
(Tool number 98299FC030)

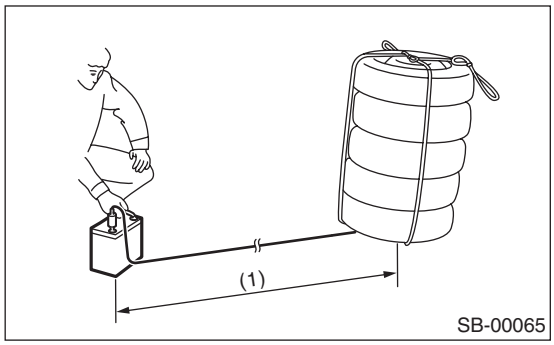
9) Connect the deployment adapter A connector to airbag module.
10) Install the airbag module on a 14-inch or greater size tire without wheel.



11) Put a tire without a wheel (A) under the tire installed with the curtain airbag module (B). Put on two additional tires without a wheels (C), and then put a tire with a wheel (D) on top. Fasten them tight with a rope.

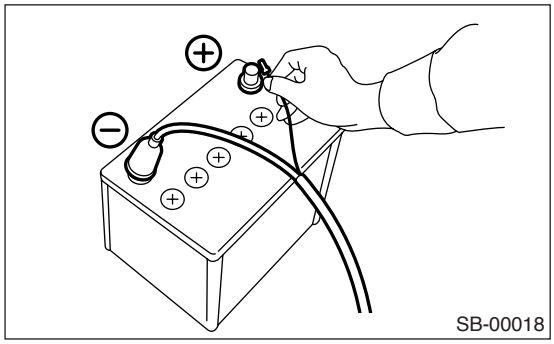


12) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



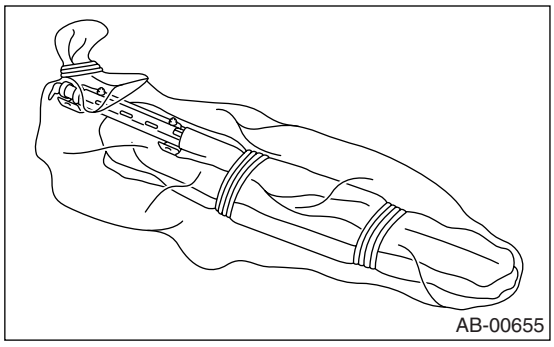
(1) 5 m (16 ft) or more

13) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the airbag module.



CAUTION:
• After deployment, the airbag module will be especially hot, leave it unattended for 40 minutes, and discard it.
• Do not let water get on the deployed airbag module.

14) Wrap the deployed airbag module in airtight vinyl bag, and discard it.



BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

AIRBAG SYSTEM (DIAGNOSTICS)

AB(diag)

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1.	Basic Diagnostic Procedure	2
2.	Check List for Interview	3
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1. Basic Diagnostic Procedure

A: PROCEDURE

Step		Check	Yes	No
1	**READ DTC.** <Ref. to AB(diag)-30, Read Diagnostic Trouble Code (DTC).>	Is the normal code detected?	Finish the diagnosis.	Go to step **2.**
2	**READ DTC.** <Ref. to AB(diag)-30, Read Diagnostic Trouble Code (DTC).>	Is DTC displayed?	Go to step **3.**	Go to “Airbag Warning Light Failure”. <Ref. to AB(diag)-33, Airbag Warning Light Failure.>
3	**PERFORM DIAGNOSIS.** 1) Judge the possible cause from “List of Diagnostic Trouble Code” <Ref. to AB(diag)-37, List of Diagnostic Trouble Code (DTC).>. 2) Inspect the DTC using “List of Diagnostic Trouble Code (DTC)”. 3) Repair the trouble cause. 4) Perform the clear memory mode. <Ref. to AB(diag)-32, Clear Memory Mode.> 5) Perform the inspection mode. <Ref. to AB(diag)-31, Inspection Mode.> 6) Read any DTC again.	Is DTC displayed?	Perform the procedure 1) to 5) in step 3.	Finish the diagnosis.

2. Check List for Interview

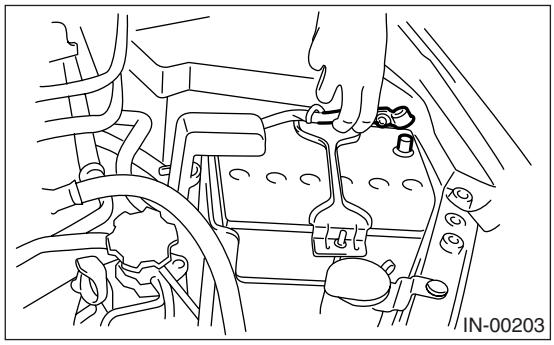
A: CHECK

Customer's Name		Inspector's Name	
Date Vehicle Brought In	/ /	Registration No.	
Odometer Reading	km miles	V.I.N.	
Date Problem Occurred	/ /	Registration Year	/ /
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Other:		
Temperature	°C (°F)		
Road Condition	❑ Level road ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Vehicle Operation	❑ Starting ❑ Idling ❑ Driving (❑ Constant speed ❑ Acceleration ❑ Deceleration ❑ Steering wheel turn ❑ Others:)		
Details of Problem			
Check Airbag Warning Light	❑ Normal (After turning the ignition switch to ON, lit for 6 seconds and goes off.) ❑ Remains ON ❑ Remains OFF		
DTC output	❑ Normal Code ❑ DTC: (Code:)		

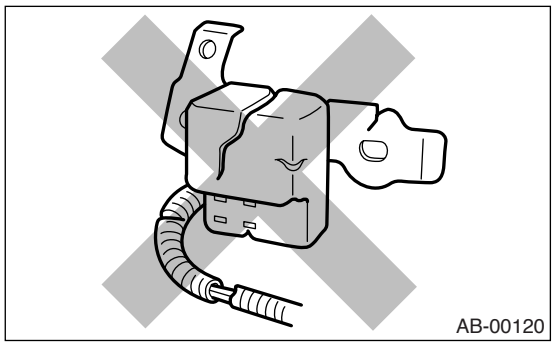
3. General Description

A: CAUTION

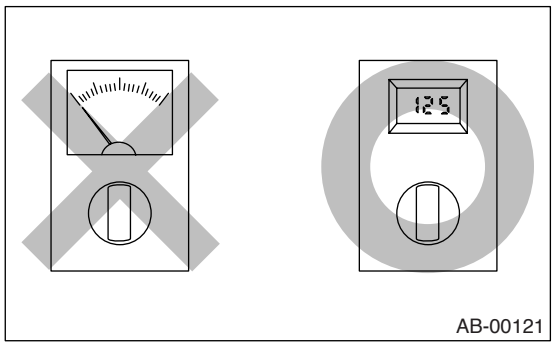
• When servicing a vehicle, be sure to turn the ignition switch to OFF, disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.
• The airbag system is equipped with a backup power source. If the airbag system is serviced within 20 seconds from the ground cable is disconnected, it may inflate.



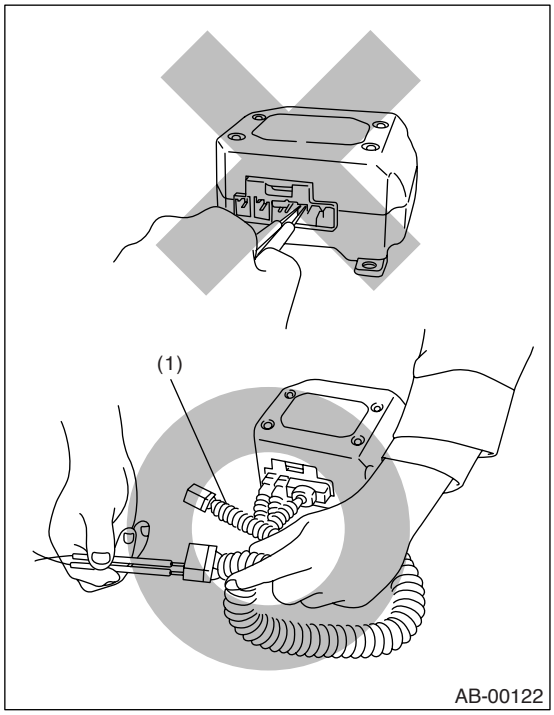
• If sensors, airbag module, airbag control module, pretensioner and harness are deformed or damaged, replace them with new parts.



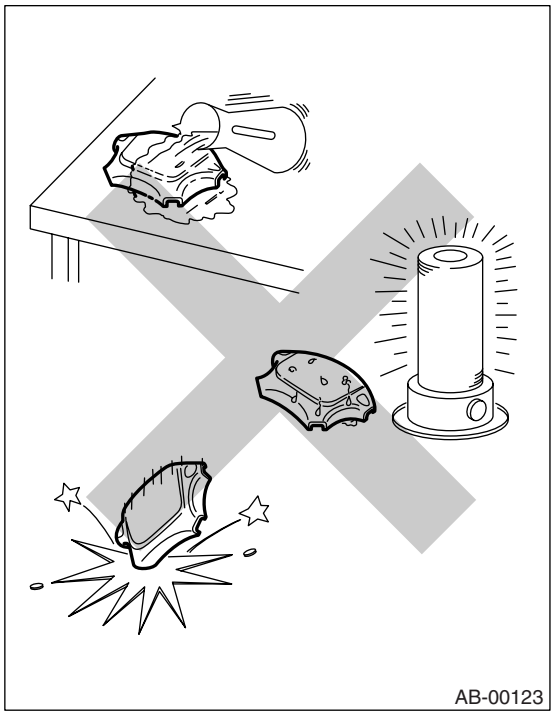
• Do not use the airbag system and pretensioners on other vehicles. When replacing parts, be sure to replace them with new ones.
• When checking the airbag system, be sure to use a digital circuit tester. Use of an analog circuit tester may cause the airbag to activate erroneously.



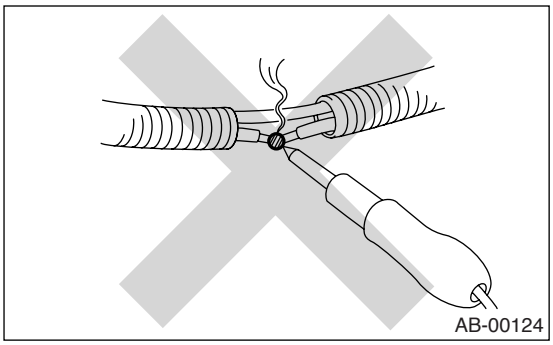
• When checking, use a test harness (1). Do not directly apply the tester probe to any connector terminal of the airbag.



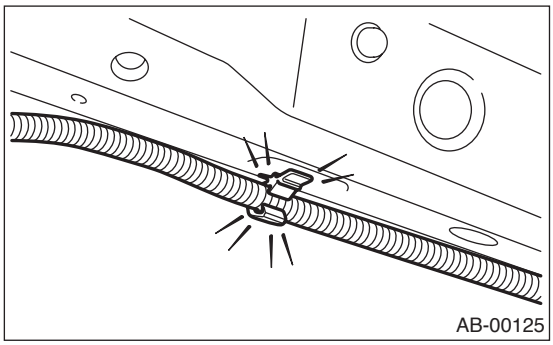
• Do not drop the airbag module, subject them to high temperature over 93°C (199°F), or let water, oil or grease get on them; the internal parts may be damaged and reliability is greatly lowered.



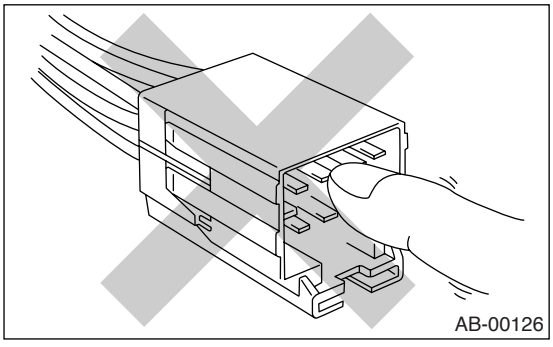
• If any damage, opening or rust is found on the airbag system wire harness, do not attempt to repair using soldering equipment. Be sure to replace the faulty harness with a new genuine part.



• Install the wire harness securely with the specified clips to avoid interference or tangled up with other parts.

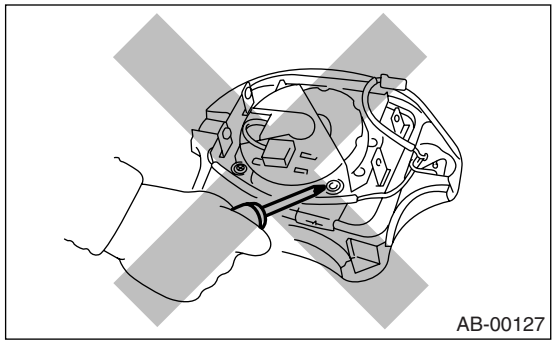


• Do not allow water or oil to come in contact with the connector terminals. Do not touch the connector terminals.

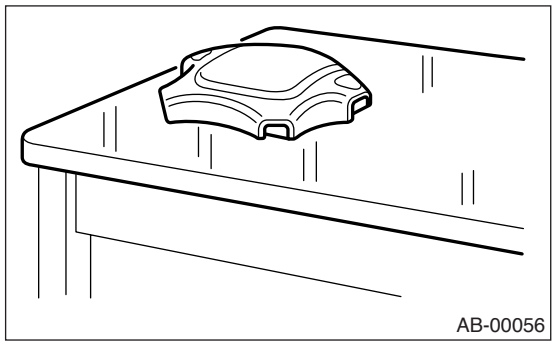


• Either of the airbag modules for driver, passenger, side or curtain, or pretensioner must not be disassembled.

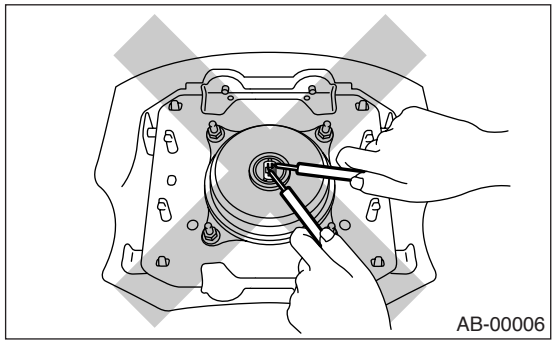
• The airbag module cannot be used again if once deployed.



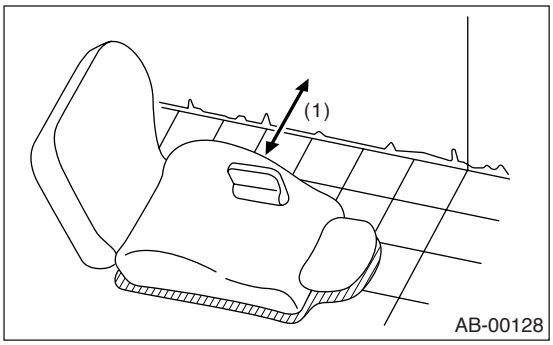
• After removal, keep the airbag module with the pad facing upward on a dry, clean and flat surface away from heat, light sources, moisture and dust.



• Do not check continuity of either of the airbag modules for driver, passenger, side or curtain, or pretensioner.

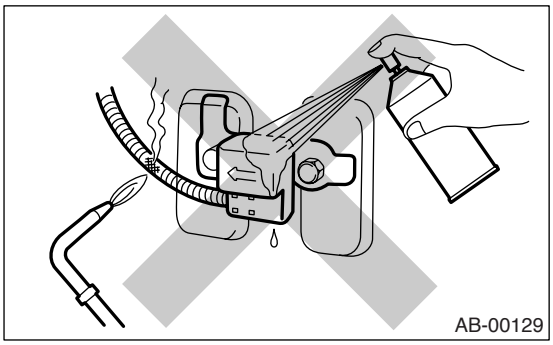


• The removed front seat with an airbag module must be kept at least 200 mm (8 in) away from walls and other objects.



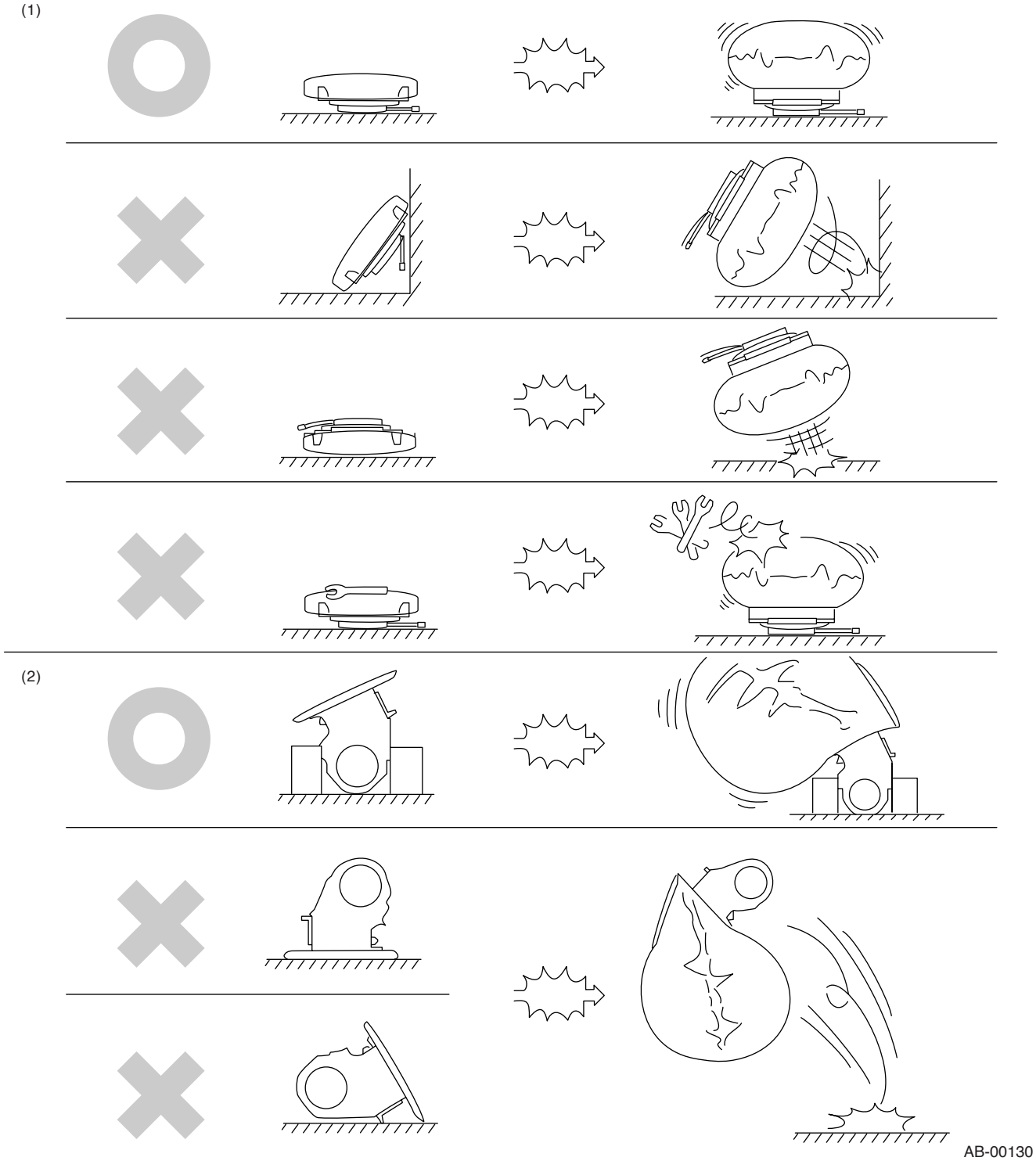
(1) 200 mm (8 in) or more

• When painting or performing sheet metal work on the front part of the vehicle, including the front wheel apron, front fender and front side frame, remove the front sub sensors and wire harness of the airbag system.
• When painting or performing sheet metal work on the side of the vehicle, including the side sill, center pillar and front and rear doors, remove the side airbag sensors and wire harness of the airbag system.



• Do not discard undeployed airbag modules. They could easily cause a serious accident if accidentally deployed.

• When storing a removed airbag module, do not place any objects on it or pile airbag modules on top of each other. If the airbag inflates for some reason when it is placed with its pad side facing downward or under any object, a serious accident may result.



(1) Driver's airbag module (2) Passenger's airbag module

B: INSPECTION

Measure the battery voltage and check electrolyte.

Standard voltage: 12 V

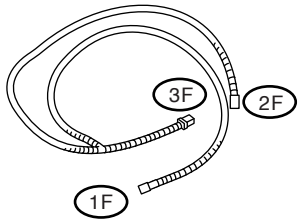
Specific gravity: Above 1.260

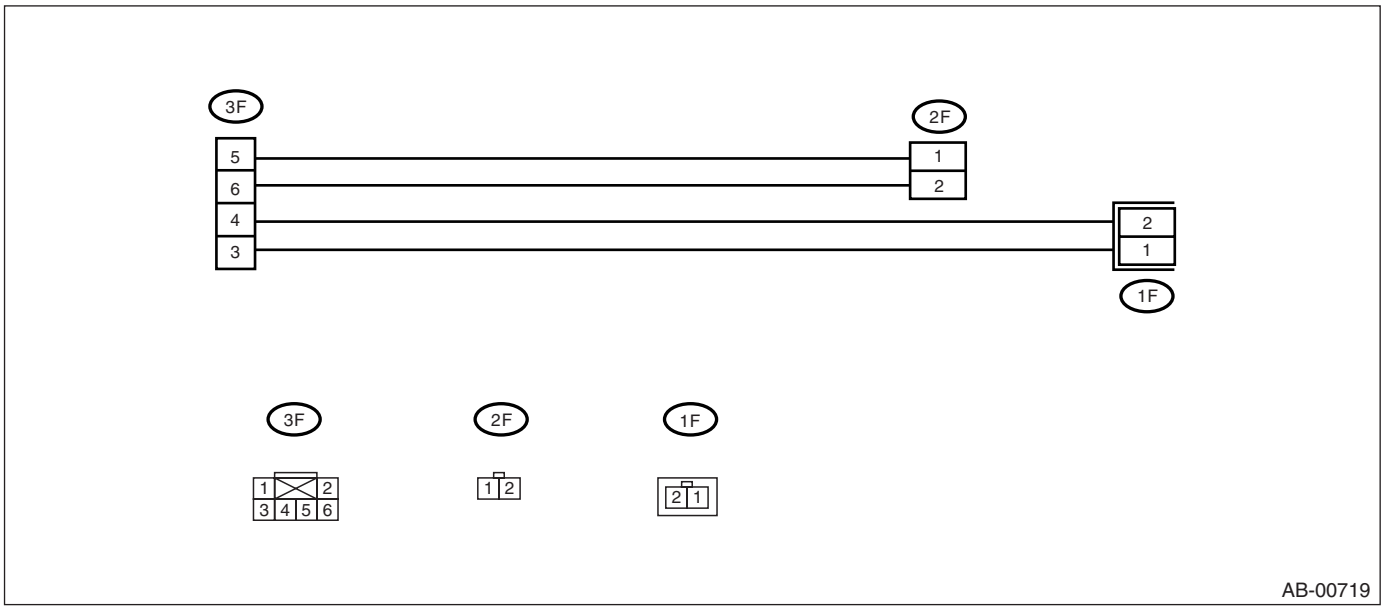
C: PREPARATION TOOL

CAUTION:
To check the voltage and resistance of airbag system component, be sure to use the specified test harness.

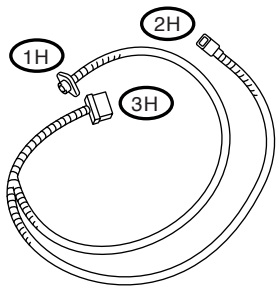
1. SPECIAL TOOL

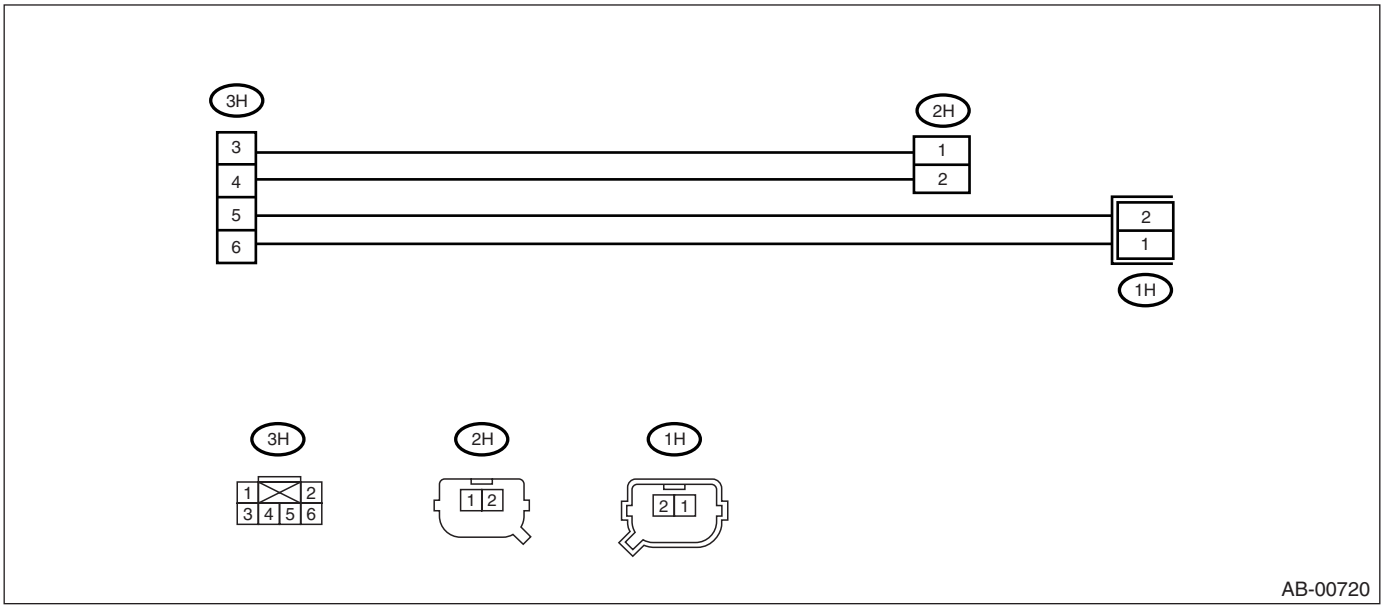
- TEST HARNESS F

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FC010	98299FC010	TEST HARNESS F	Used when measuring voltage and resistance of airbag module harnesses.

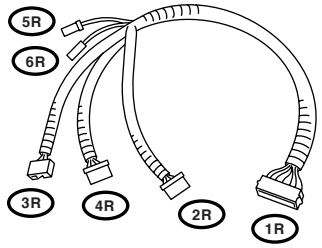


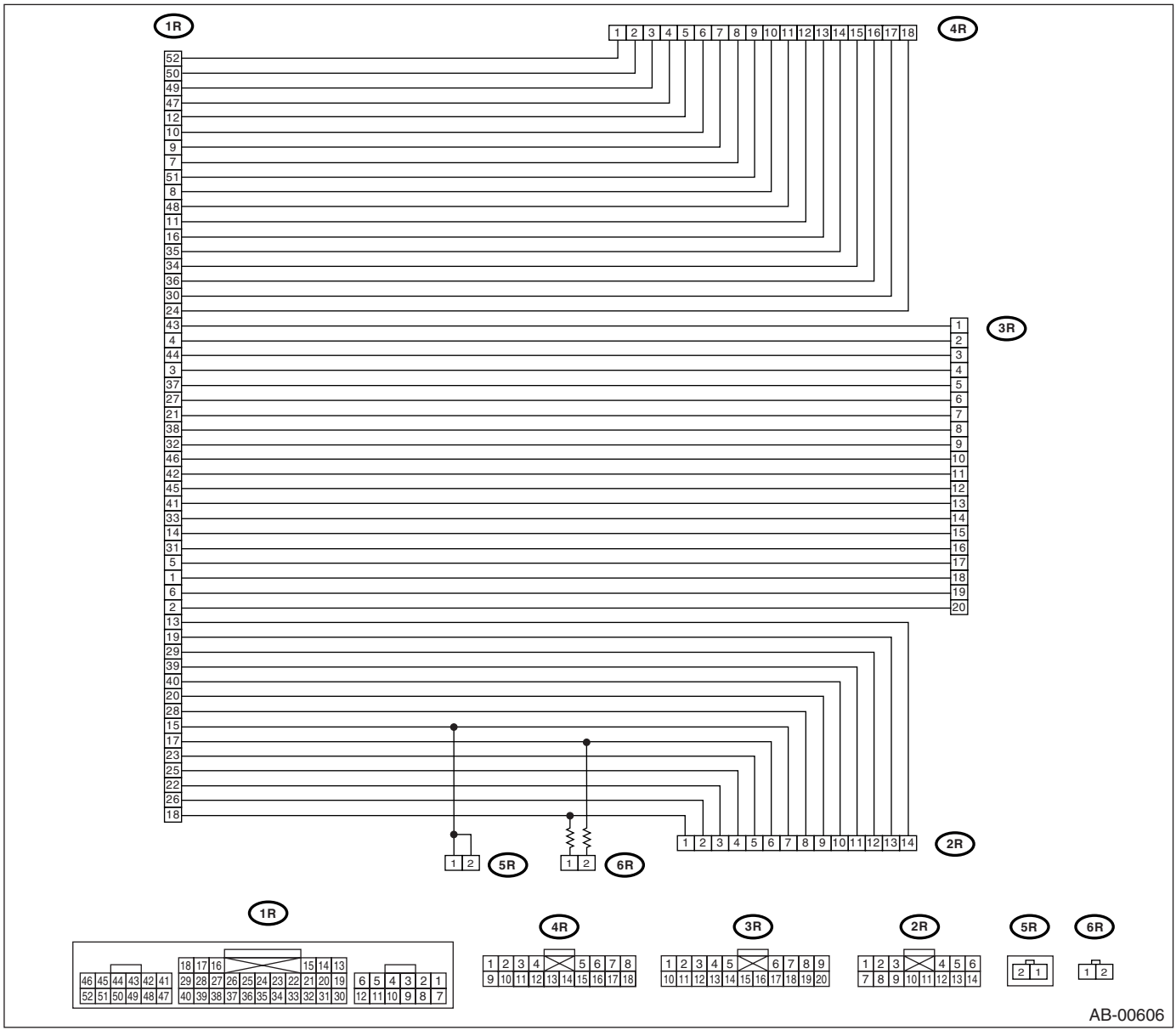
• TEST HARNESS H

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FA030	98299FA030	TEST HARNESS H	Used when measuring voltage and resistance of front sub-sensor.

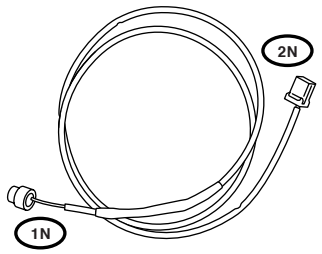


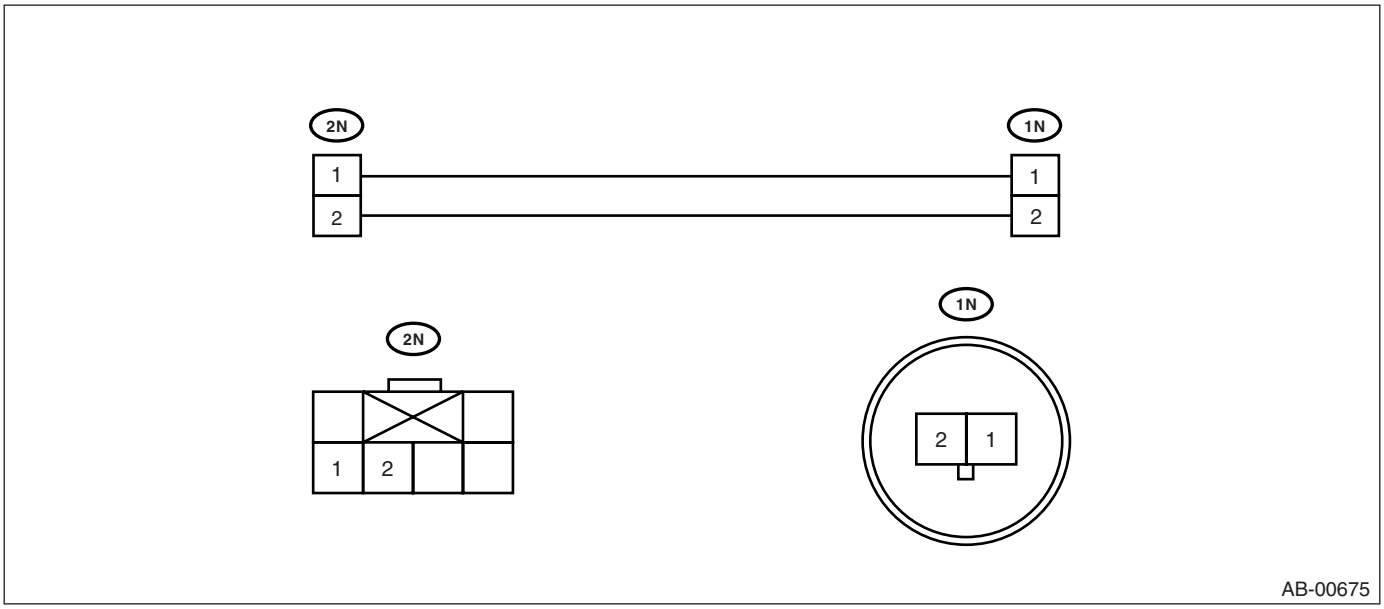
• TEST HARNESS R

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299FE030	98299FE030	TEST HARNESS R	Used when measuring voltage and resistance of airbag control module.

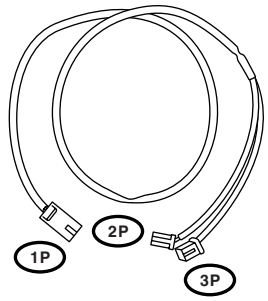


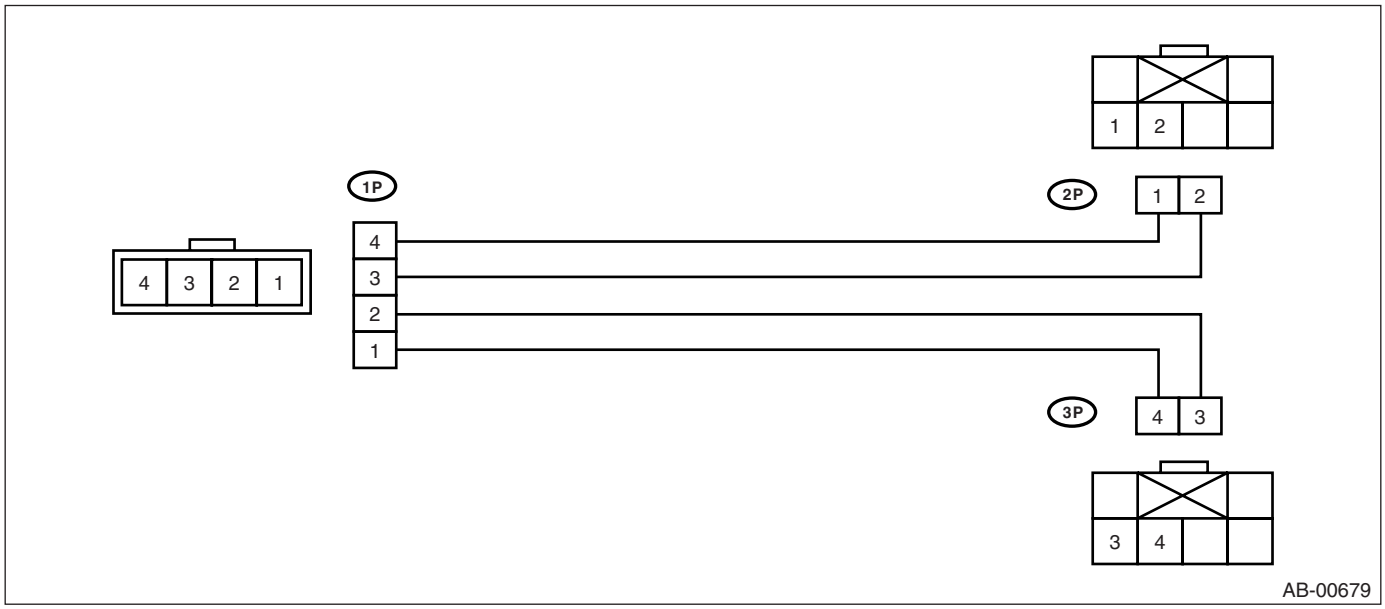
• TEST HARNESS N

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA000	98299SA000	TEST HARNESS N	Used when measuring voltage and resistance of driver's airbag module and seat belt pretensioner.

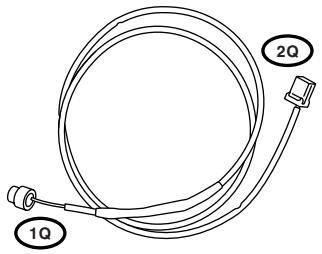


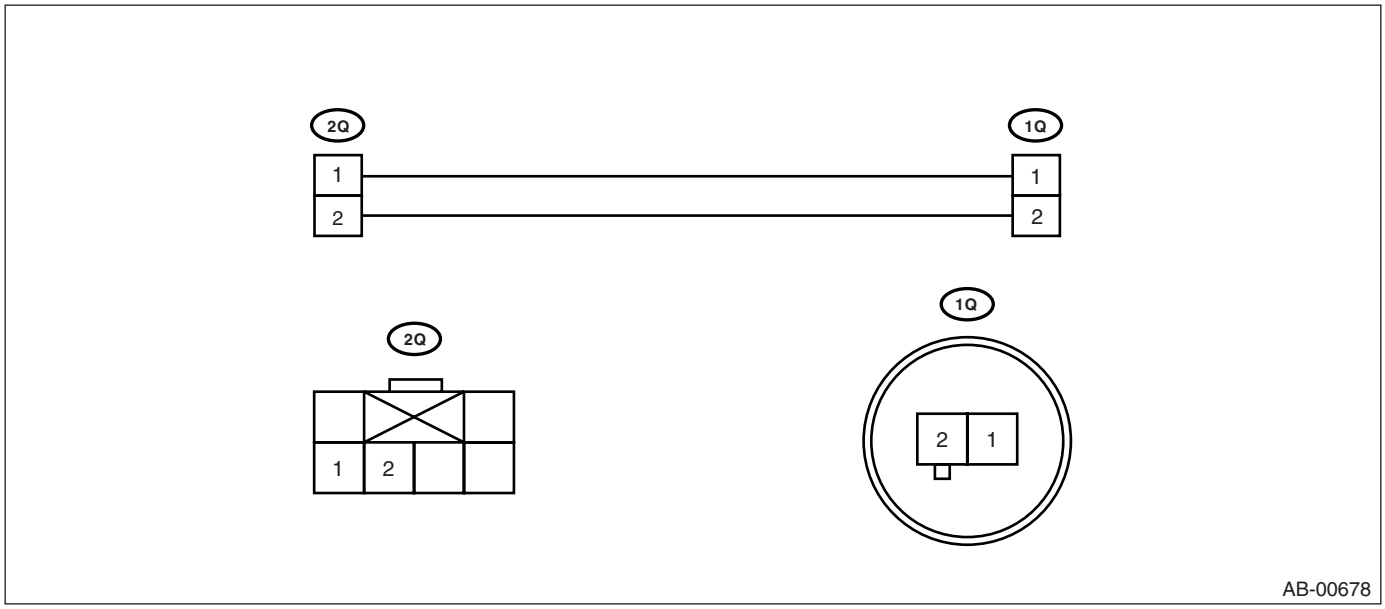
• TEST HARNESS P

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA020	98299SA020	TEST HARNESS P	Used when measuring voltage and resistance of driver's airbag module harness and passenger airbag module harness.



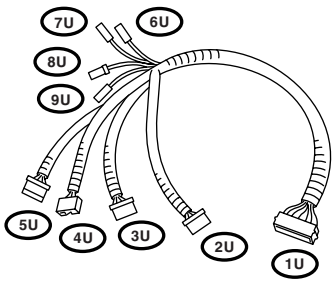
• TEST HARNESS Q

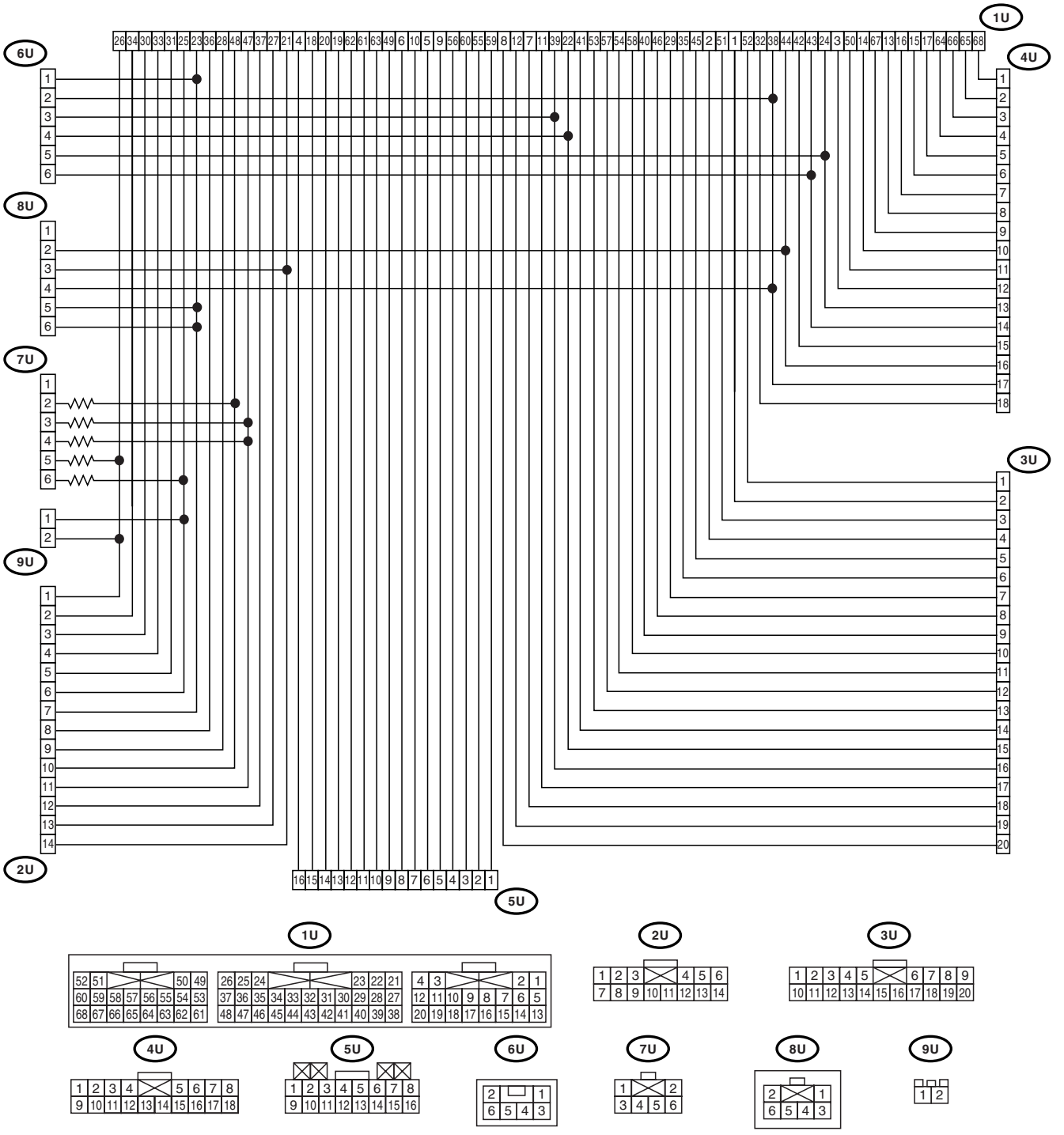
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA040	98299SA040	TEST HARNESS Q	Used when measuring voltage and resistance of driver's airbag module.



AB-00678

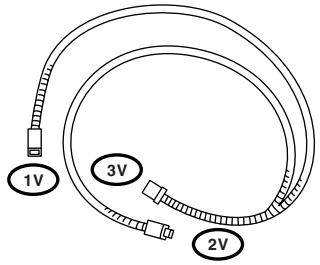
• TEST HARNESS U

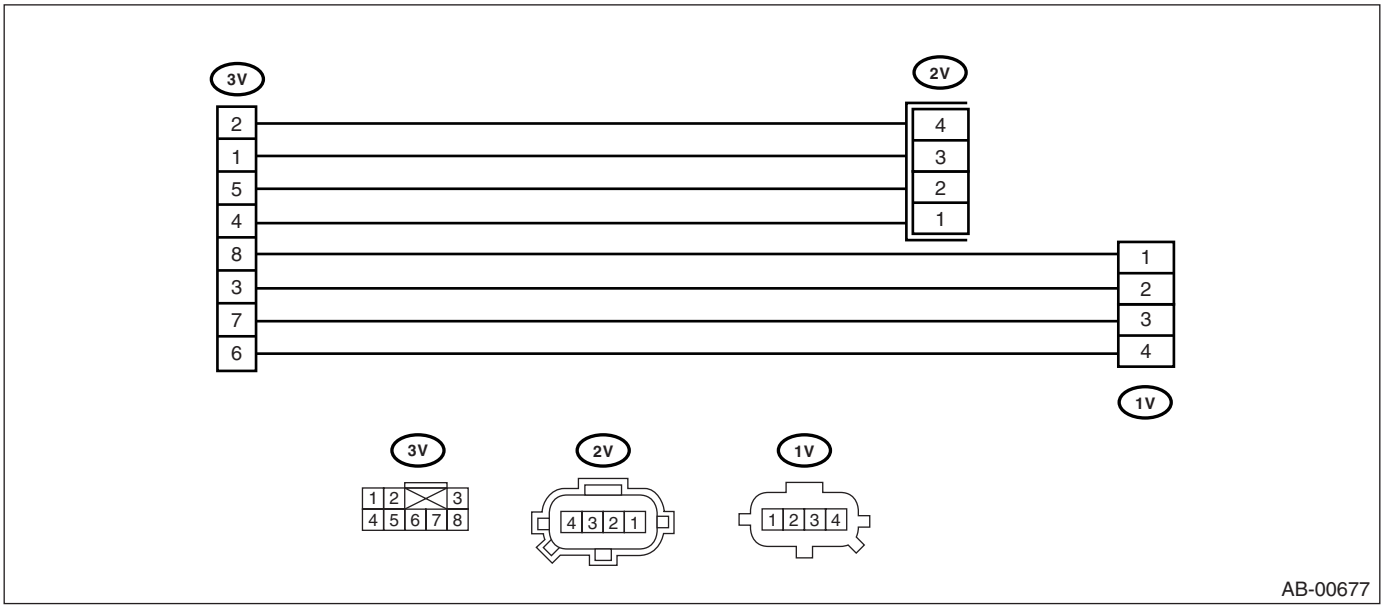
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG000	98299AG000	TEST HARNESS U	Used when measuring voltage and resistance of airbag control module.



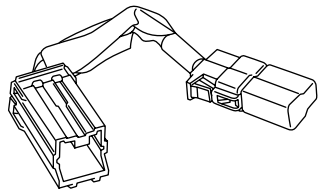
AB-00676

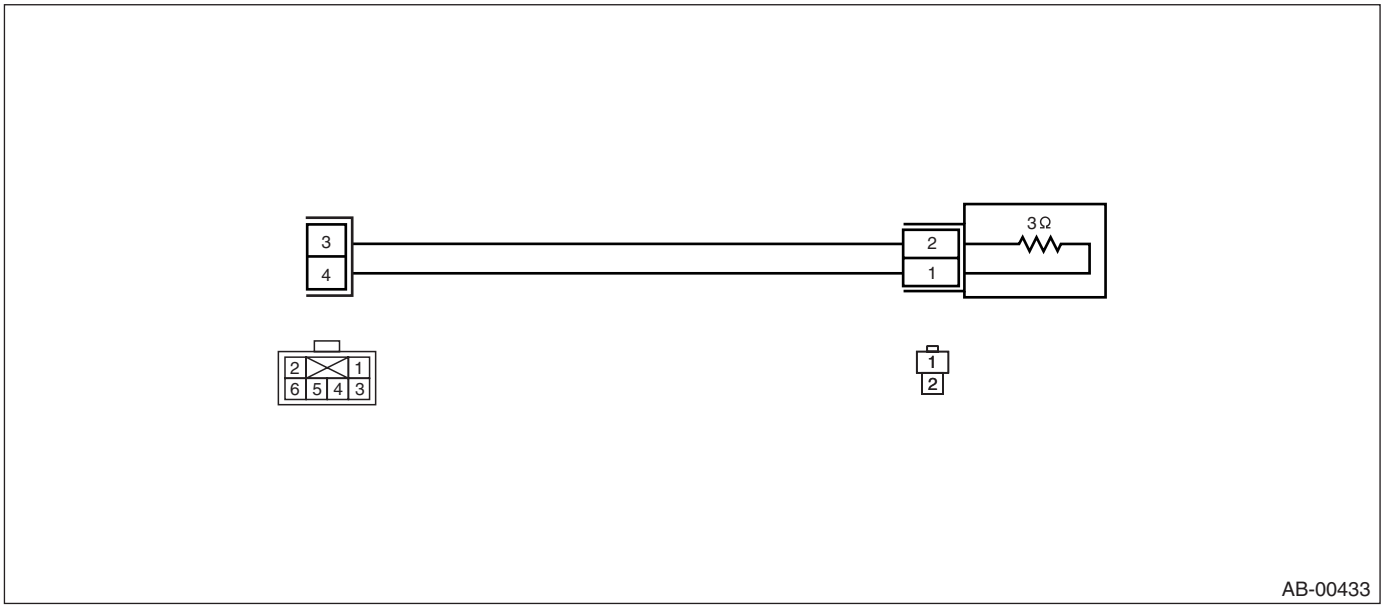
• TEST HARNESS V

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299AG010	98299AG010	TEST HARNESS V	Used when measuring voltage and resistance of side airbag sensor and curtain airbag sensor.



• AIRBAG RESISTOR

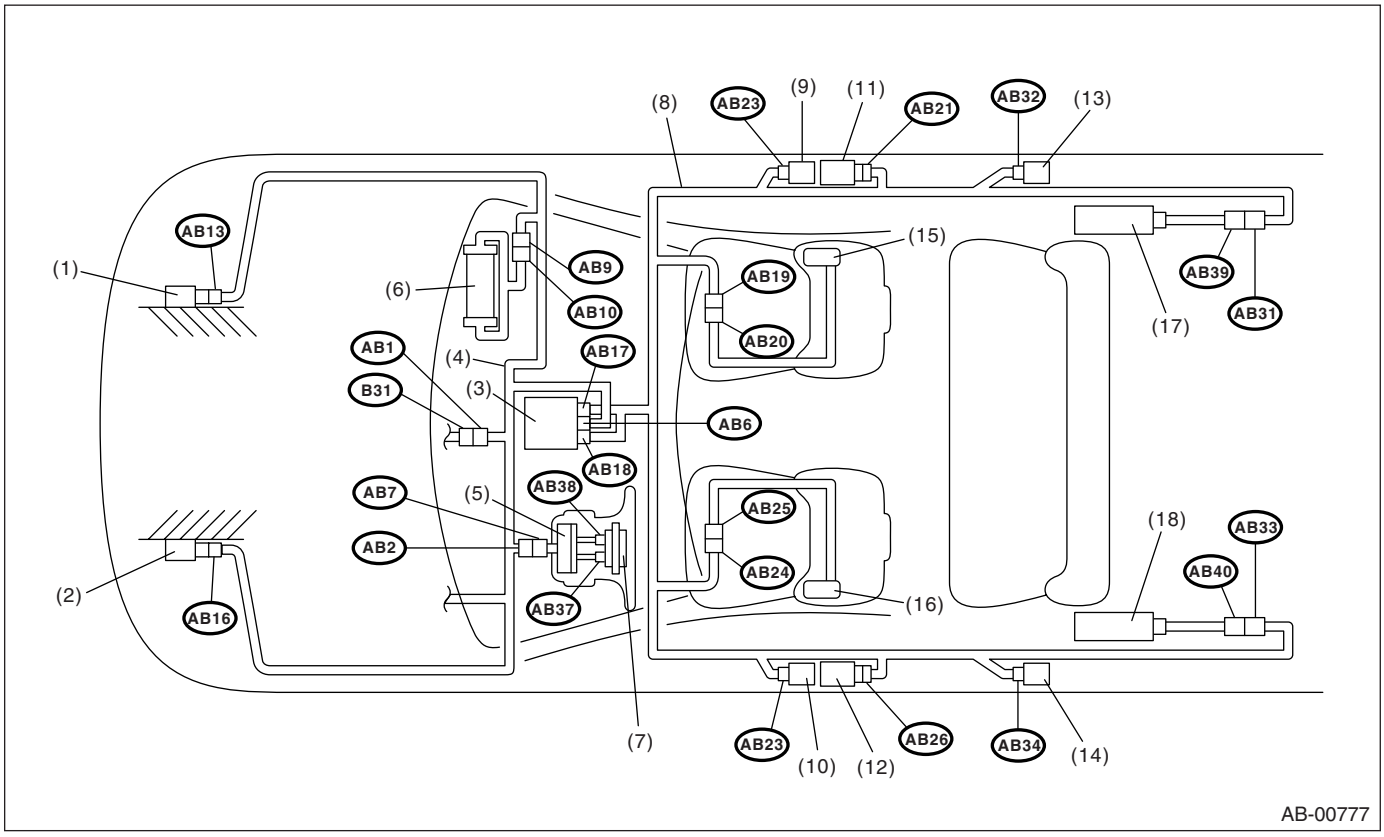
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299PA040	98299PA040	AIRBAG RESISTOR	Used in replacement of airbag module for which resistance value is same as airbag module.



4. Electrical Component Location

A: LOCATION

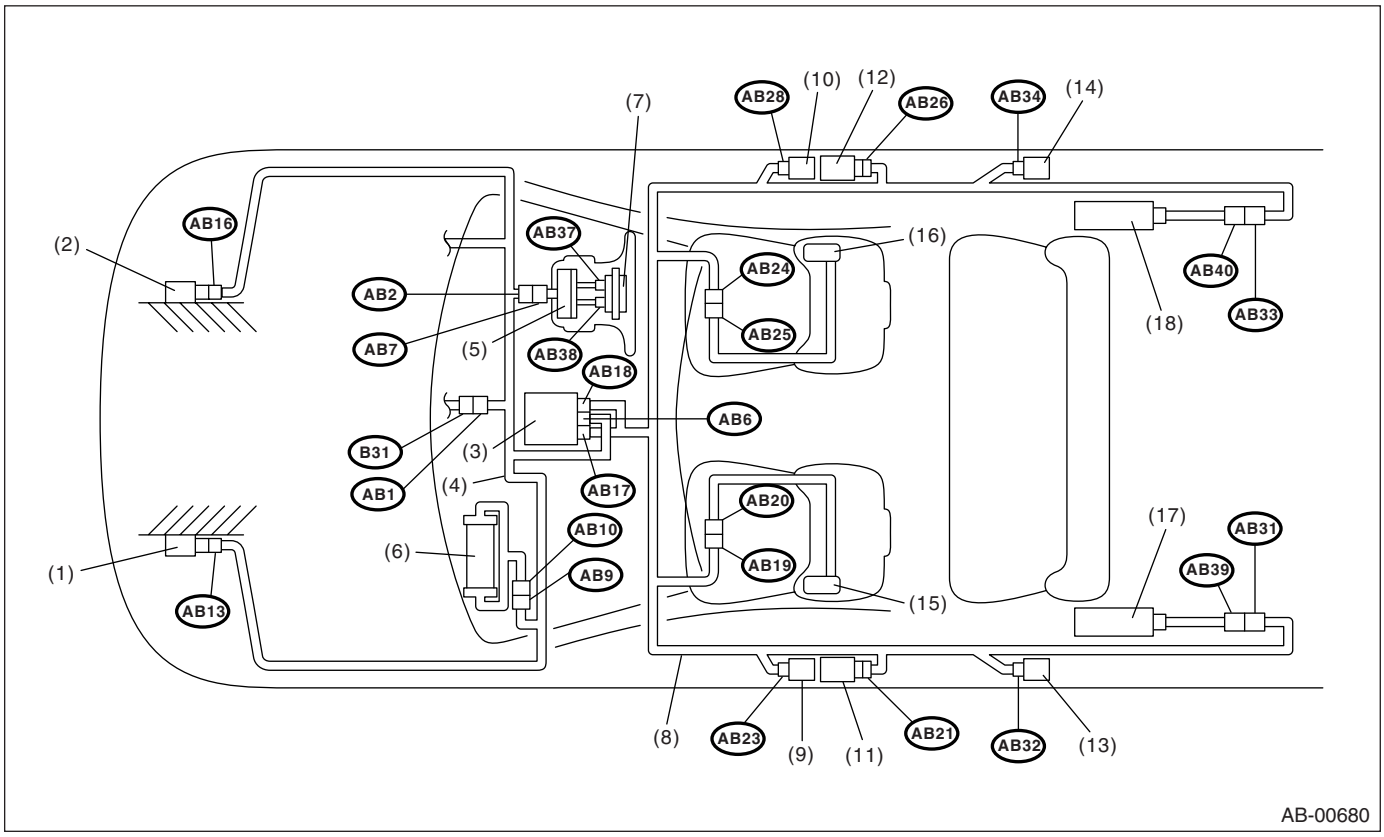
1. LHD MODEL



(1) Front sub-sensor (RH)
(2) Front sub-sensor (LH)
(3) Airbag control module with built-in safing and electric sensor
(4) Airbag main harness
(5) Roll connector
(6) Passenger's airbag inflator
(7) Driver's airbag inflator
(8) Airbag rear harness
(9) Side airbag sensor (RH)
(10) Side airbag sensor (LH)
(11) Seat belt pretensioner (RH)
(12) Seat belt pretensioner (LH)
(13) Curtain airbag sensor (RH)
(14) Curtain airbag sensor (LH)
(15) Side airbag inflator (RH)
(16) Side airbag inflator (LH)
(17) Curtain airbag inflator (RH)
(18) Curtain airbag inflator (LH)

Connector No.	(AB1)	(AB2)	(AB7)	(AB9)	(AB10)	(AB13)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)	(AB21)
Pin	6	4	4	4	4	2	2	20	20	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Black
Male/Female	Female	Female	Male	Female	Male	Female	Female	Male	Male	Female	Male	Female
Connector No.	(AB23)	(AB24)	(AB25)	(AB26)	(AB28)	(AB31)	(AB32)	(AB33)	(AB34)	(AB37)	(AB38)	(AB39)
Pin	4	2	2	2	4	2	4	2	4	2	2	2
Color	Yellow	Yellow	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Orange	Black	Yellow
Male/Female	Female	Female	Male	Female	Female	Female	Female	Female	Female	Female	Female	Male
Connector No.	(AB40)											
Pin	2											
Color	Yellow											
Male/Female	Male											

2. RHD MODEL



(1) Front sub-sensor (LH)
(2) Front sub-sensor (RH)
(3) Airbag control module with built-in safing and electric sensor
(4) Airbag main harness
(5) Roll connector
(6) Passenger's airbag inflator
(7) Driver's airbag inflator
(8) Airbag rear harness
(9) Side airbag sensor (LH)
(10) Side airbag sensor (RH)
(11) Seat belt pretensioner (LH)
(12) Seat belt pretensioner (RH)
(13) Curtain airbag sensor (LH)
(14) Curtain airbag sensor (RH)
(15) Side airbag inflator (LH)
(16) Side airbag inflator (RH)
(17) Curtain airbag inflator (LH)
(18) Curtain airbag inflator (RH)

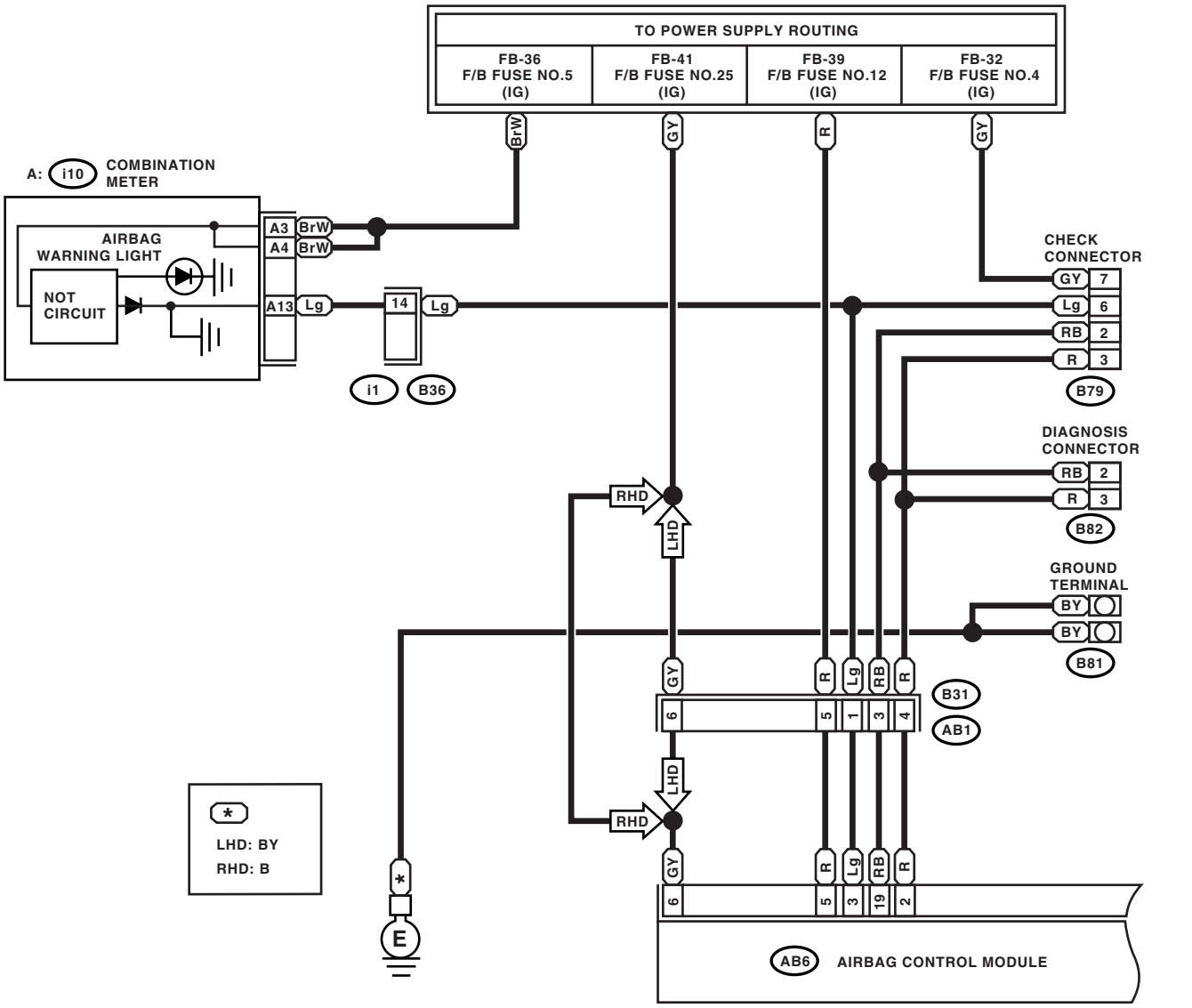
Connector No.	(AB1)	(AB2)	(AB7)	(AB9)	(AB10)	(AB13)	(AB16)	(AB17)	(AB18)	(AB19)	(AB20)	(AB21)
Pin	6	4	4	4	4	2	2	20	20	2	2	2
Color	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Black
Male/Female	Female	Female	Male	Female	Male	Female	Female	Male	Male	Female	Male	Female

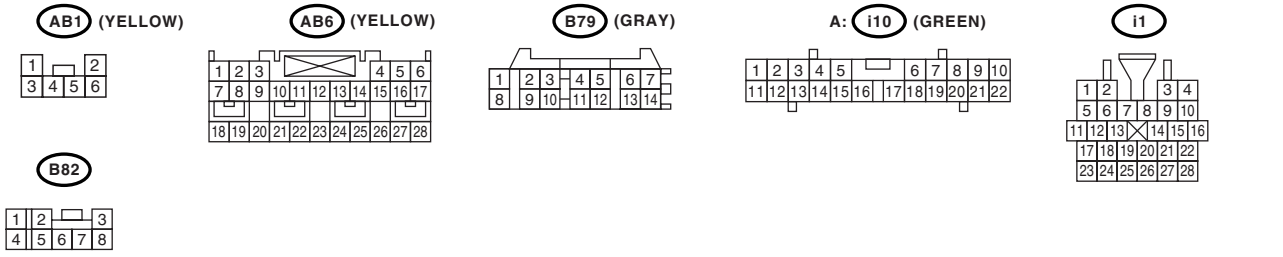
Connector No.	(AB23)	(AB24)	(AB25)	(AB26)	(AB28)	(AB31)	(AB32)	(AB33)	(AB34)	(AB37)	(AB38)	(AB39)
Pin	4	2	2	2	4	2	4	2	4	2	2	2
Color	Yellow	Yellow	Yellow	Black	Yellow	Yellow	Yellow	Yellow	Yellow	Orange	Black	Yellow
Male/Female	Female	Female	Male	Female	Female	Female	Female	Female	Female	Female	Female	Male

Connector No.	(AB40)											
Pin	2											
Color	Yellow											
Male/Female	Male											

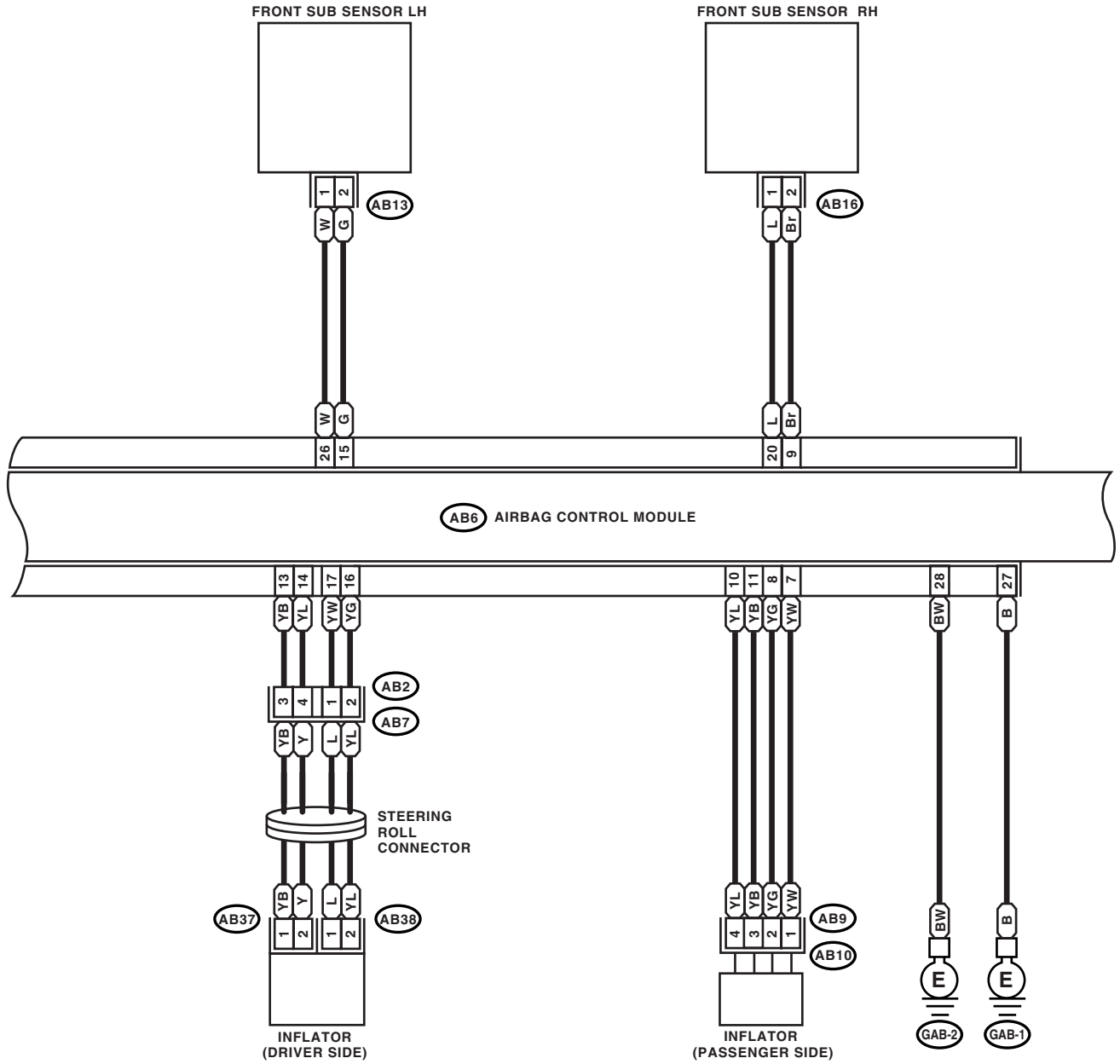
5. Airbag Control Module I/O Signal

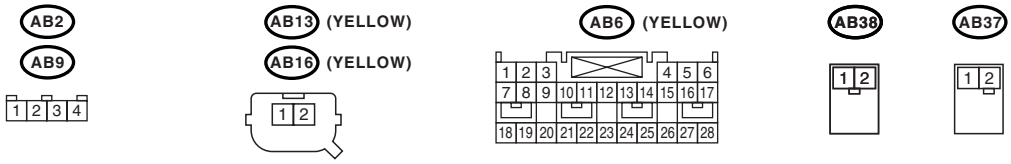
A: WIRING DIAGRAM



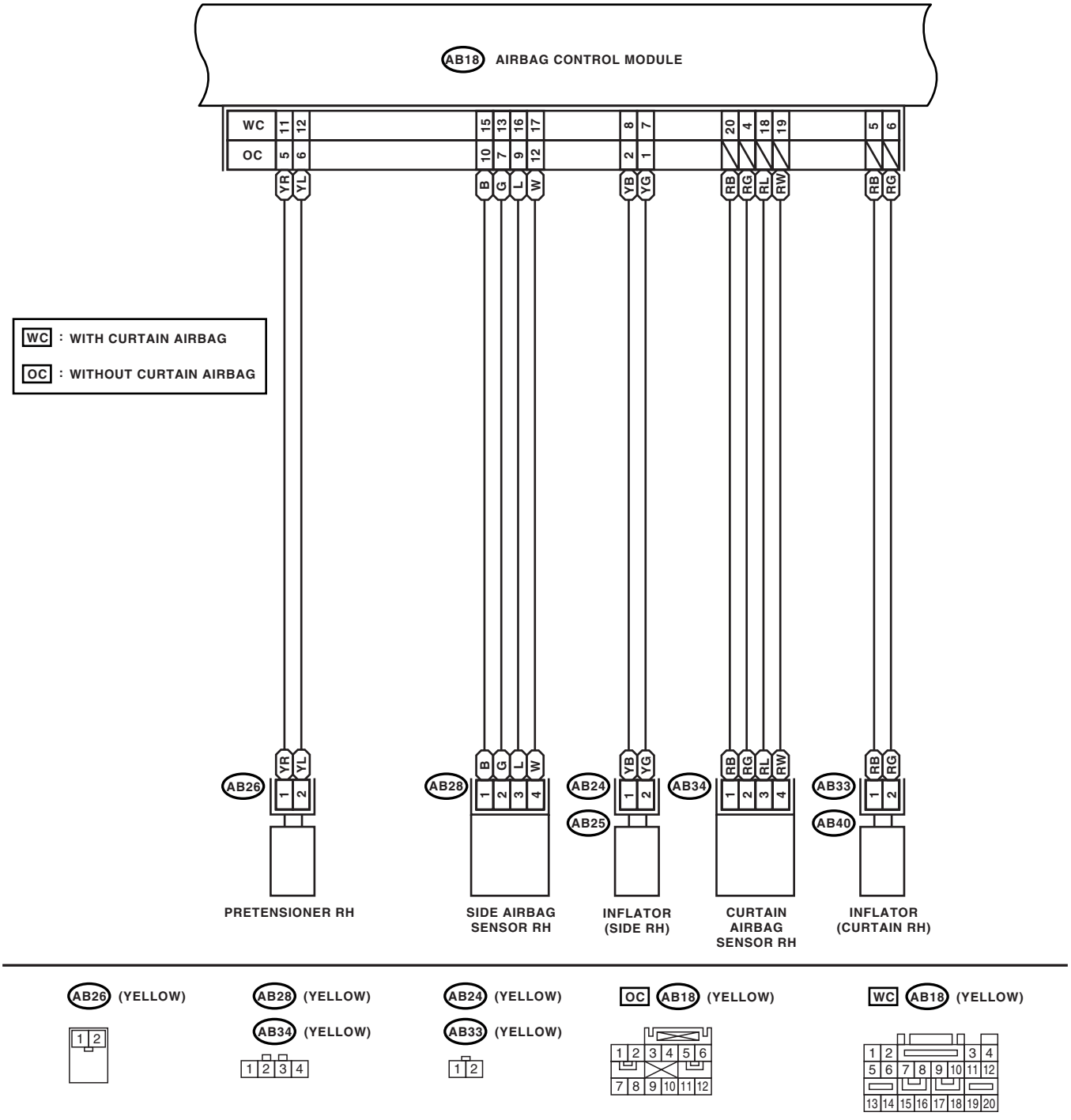


AB-00769

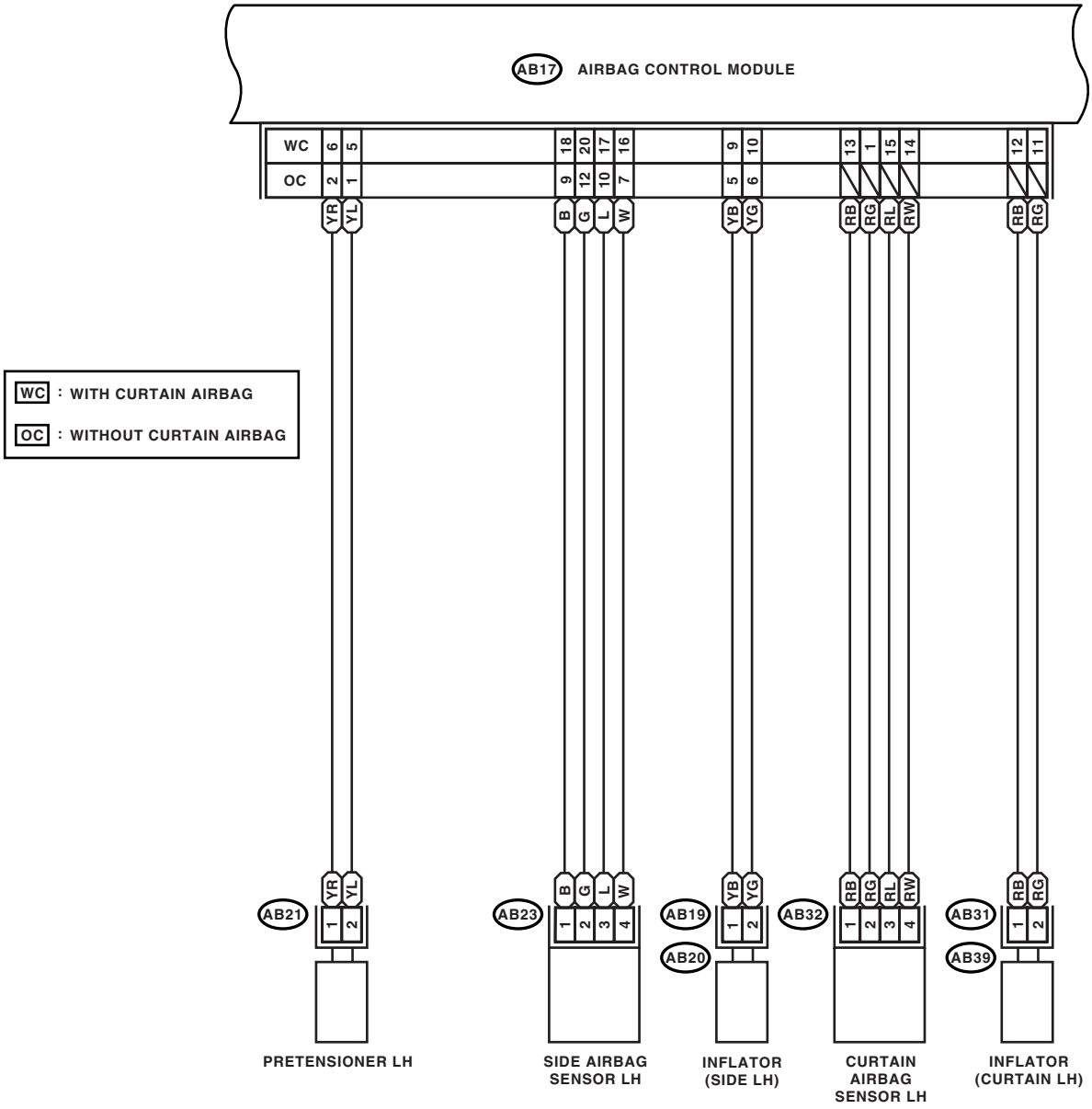

FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB13
AB16
W
G
L
Br
26
15
20
9
AB6 AIRBAG CONTROL MODULE
13
14
17
16
10
11
8
7
28
27
YB
YL
YW
YG
BW
B
AB2
AB7
3
4
1
2
Y
STEERING ROLL CONNECTOR
AB37
AB38
AB9
AB10
INFLATOR (DRIVER SIDE)
INFLATOR (PASSENGER SIDE)
E
GAB-2
GAB-1

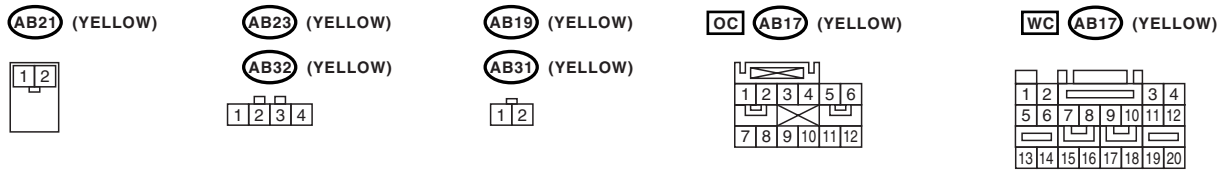

AB2
AB9
AB13 (YELLOW)
AB16 (YELLOW)
AB6 (YELLOW)
AB38
AB37

AB-00770


AB18 AIRBAG CONTROL MODULE
WC
OC
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
AB26
AB28
AB24
AB25
AB34
AB33
AB40
PRETENSIONER RH
SIDE AIRBAG SENSOR RH
INFLATOR (SIDE RH)
CURTAIN AIRBAG SENSOR RH
INFLATOR (CURTAIN RH)
AB26 (YELLOW)
AB28 (YELLOW)
AB34 (YELLOW)
AB24 (YELLOW)
AB33 (YELLOW)
OC AB18 (YELLOW)
WC AB18 (YELLOW)

AB-00771


AB17 AIRBAG CONTROL MODULE
WC
OC
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
AB21
AB23
AB19
AB20
AB32
AB31
AB39
PRETENSIONER LH
SIDE AIRBAG SENSOR LH
INFLATOR (SIDE LH)
CURTAIN AIRBAG SENSOR LH
INFLATOR (CURTAIN LH)


AB21 (YELLOW)
AB23 (YELLOW)
AB32 (YELLOW)
AB19 (YELLOW)
AB31 (YELLOW)
OC AB17 (YELLOW)
WC AB17 (YELLOW)

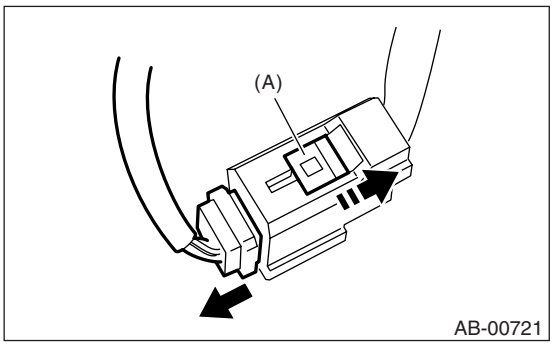
AB-00772

6. Airbag Connector

A: PROCEDURE

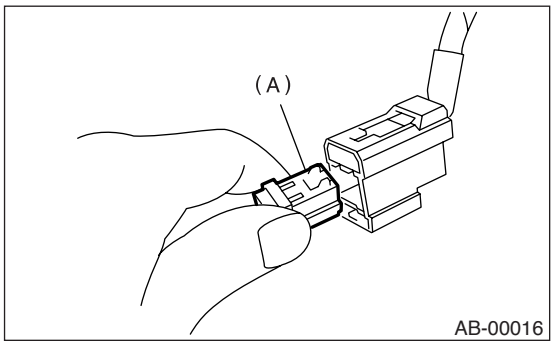
1. POWER SUPPLY

1) How to disconnect:
(1) Move the slide lock (A) in the direction of arrow.
(2) With the slide lock (A) moved, separate the connector.



CAUTION:
When pulling the slide lock or disconnecting the connector, be sure to hold onto the connector and not the wire.

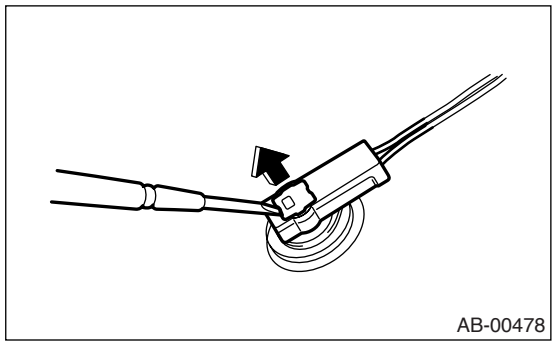
2) How to connect:
Holding the connector (A), and push it in carefully until a connecting sound is heard.



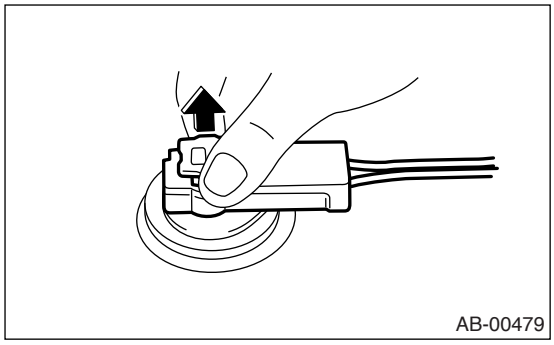
CAUTION:
Be sure to insert the connector in until it locks. Then pull on it gently to make sure that it is locked.

2. DRIVER'S AIRBAG MODULE AND PRETENSIONER

1) How to disconnect:
(1) Using a flat tip screwdriver, pry the push lock upward to unlock.

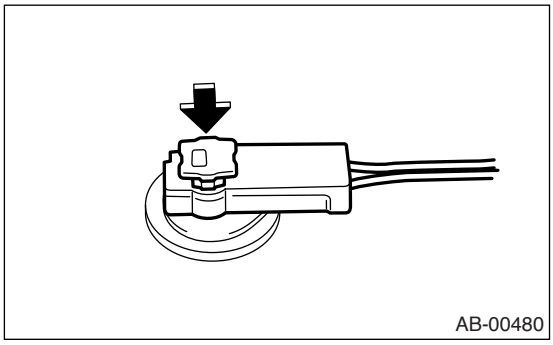


(2) Pull the connector to disconnect from driver's side airbag module assembly or retractor assembly.



2) How to connect:
Connect the connector in the reverse order of disconnecting. At this time, be sure to insert the push lock until a connecting sound is heard.

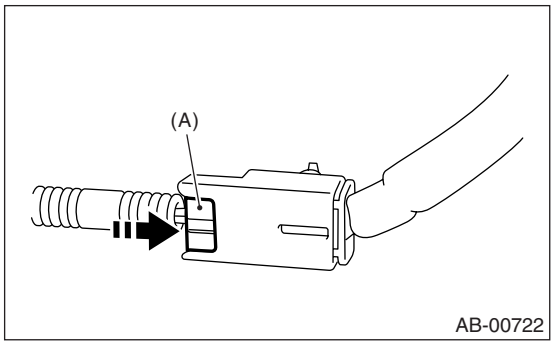
CAUTION:
• Be sure to insert the connector in until it locks. Then pull it gently to make sure that it is locked.
• Be sure to push the push lock in securely.



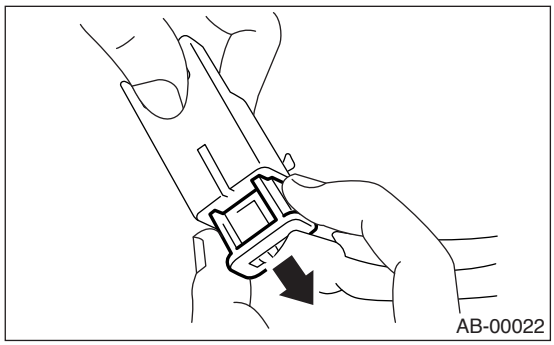
NOTE:
Connector can not be connected when the push lock is in lock position. To connect the connector, set the push lock to unlock.

3. DRIVER'S AIRBAG (BETWEEN AIRBAG MAIN HARNESS AND ROLL CONNECTOR), PASSENGER'S AIRBAG

1) How to disconnect:
(1) Push the slide lock (A) into the direction of arrow.



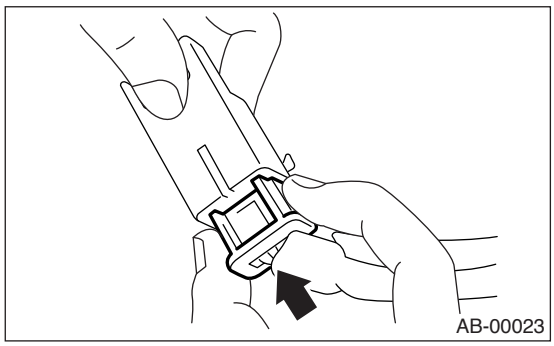
(2) With the slide lock pushed, separate the connector.



CAUTION:
Be sure to hold onto the connector and not wire when pulling the slide lock or disconnecting the connector.

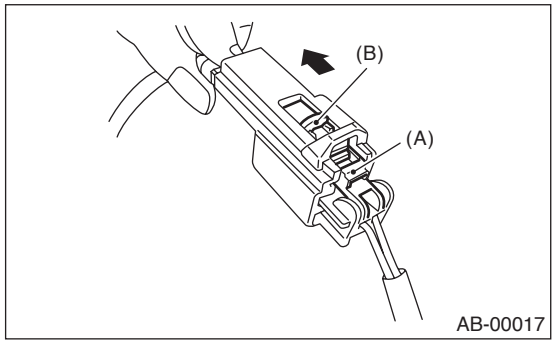
2) How to connect:
Holding the connector, push it in carefully until a connecting sound is heard.

CAUTION:
Be sure to insert the connector in until it locks. Then pull it gently to make sure that it is locked.



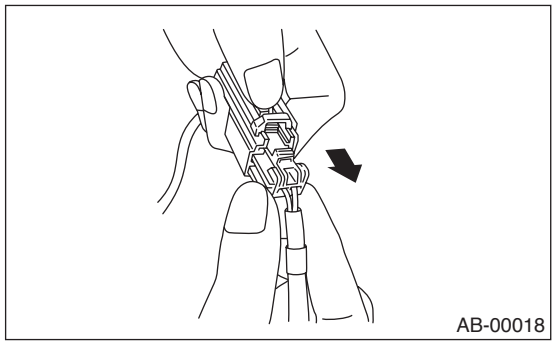
4. SIDE AIRBAG AND CURTAIN AIRBAG

1) How to disconnect:
(1) Push the lock arm (A).
(2) With the lock arm (A) pushed in, move the slide lock (B) in the direction of arrow.



(3) With the slide lock moved, release the lock arm (back to its original position), and disconnect the connector.

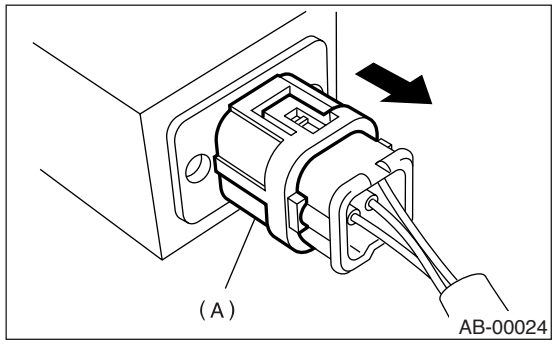
CAUTION:
Be sure to hold onto the connector and not wire when pulling the slide lock or disconnecting the connector.



5. FRONT SUB-SENSOR, SIDE AIRBAG SENSOR AND CURTAIN AIRBAG SENSOR

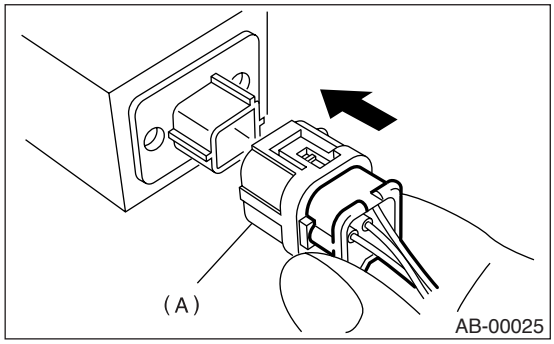
1) How to disconnect:
Holding outer part (A), pull it in the direction of arrow.

CAUTION:
Be sure to hold onto the connector and not wire when pulling the slide lock or disconnecting the connector.



2) How to connect:
Holding the connector, and push it in carefully until a connecting sound is heard.

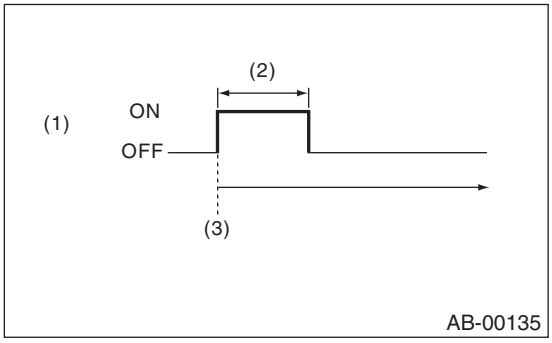
CAUTION:
• Outer side (A) move back, and so do not put your hand on the outer part.
• Be sure to insert the connector in until it locks. Then pull it gently to make sure that it is locked.



7. Airbag Warning Light Illumination Pattern

A: INSPECTION

Keep the ignition switch ON, and confirm that the airbag warning light remains off approx. 6 seconds after being turned on.

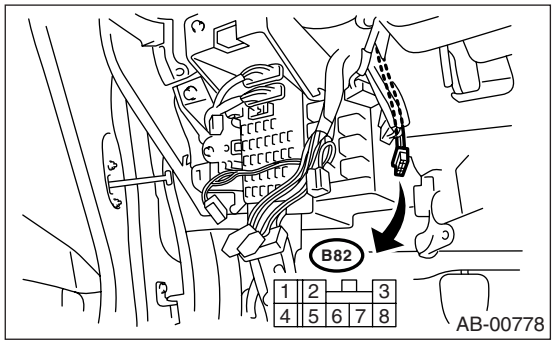


(1) Airbag warning light
(2) Approx. 6 sec.
(3) Ignition switch (ON)

8. Read Diagnostic Trouble Code (DTC)

A: OPERATION

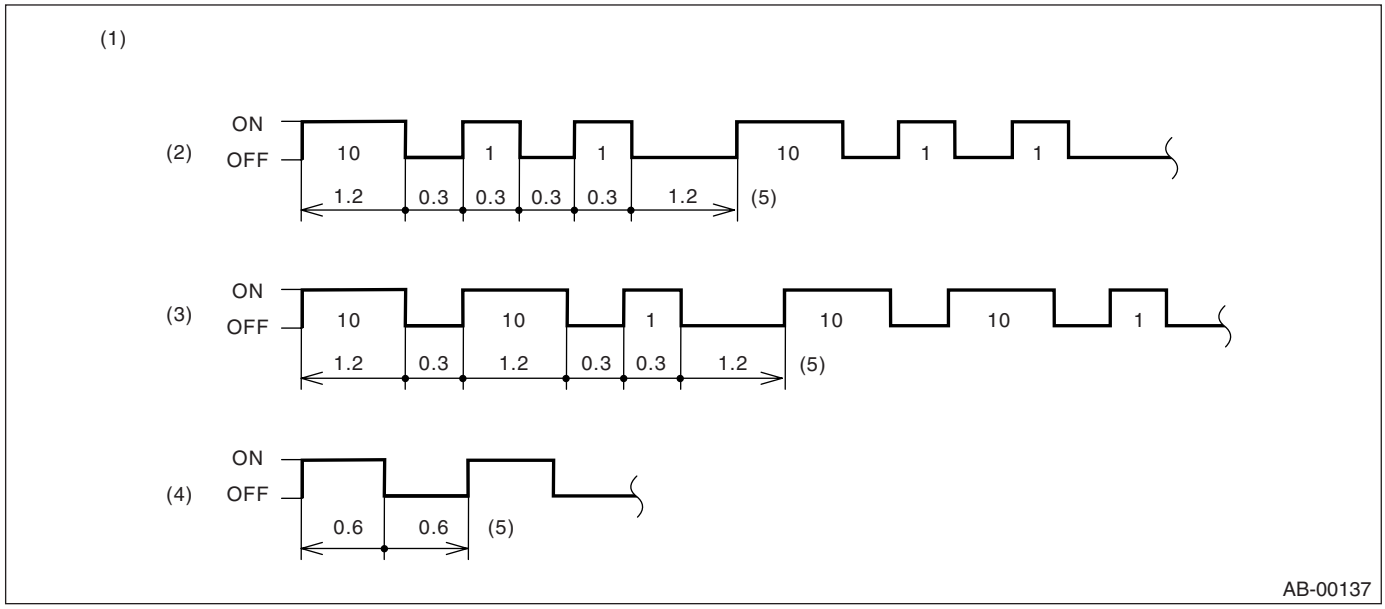
1) Remove the instrument panel lower cover upper. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Turn the ignition switch to ON.
3) Connect one of the ground terminals to the diagnosis connector terminal No. 2 in the instrument panel lower cover area.



NOTE:
The harness (yellow/black) of ground terminal is wrapped by tapes with the harness (red, red/black) of diagnosis connector.

4) Read the DTC by identifying the way airbag warning light blinks.
The airbag warning light blinks a DTC corresponding to the faulty parts.
The long segment (1.2 sec. on) indicates a “ten”, and the short segment (0.3 sec. on) indicates a “one”.

NOTE:
• “List of Diagnostic Trouble Code (DTC)” <Ref. to AB(diag)-37, List of Diagnostic Trouble Code (DTC).>
• “Airbag Warning Light Failure” <Ref. to AB(diag)-33, Airbag Warning Light Failure.>.



(1) For example
(2) Blinking code 12:
(3) Blinking code 21:
(4) Blinking normal code:
(5) Sec.

5) Turn the ignition switch to OFF, and disconnect the ground terminal from diagnosis connector terminal No. 2.
6) Wind the tape around the ground terminal and return it to its original position.

9. Inspection Mode

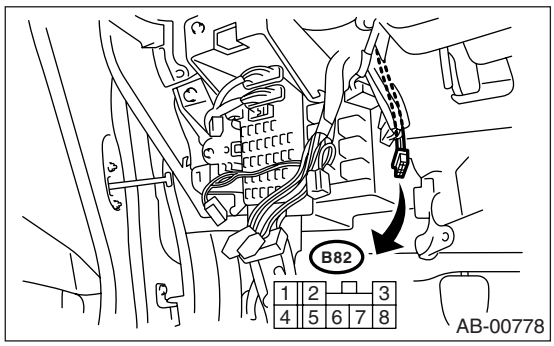
A: PROCEDURE

Recreate the circumstance by referring to the conditions described in the checklist.

10.Clear Memory Mode

A: OPERATION

1) Remove the instrument panel lower cover upper. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Turn the ignition switch to ON.
3) Connect one of the ground terminals to the diagnosis connector terminal No. 2 in the instrument panel lower cover area.



4) While the warning light blinks, connect another diagnosis terminal to the diagnosis connector terminal No. 3.
5) Once the memory is erased, the warning light returns the normal blink pattern (0.6 sec. on). Failure to recover to the normal blink rate indicates that trouble parts still remain. Having repaired such parts, erase the memory again and confirm that the blink rate has returned to normal.
6) When the memory has been cleared, disconnect the diagnosis terminal from the diagnosis connector.
7) Wind the tape around the ground terminal and return it to its original position.

11.Airbag Warning Light Failure

A: AIRBAG WARNING LIGHT REMAINS ON

DETECTING CONDITION:

- Airbag warning light failure
- Airbag control module to airbag warning light circuit is shorted or open.
- Grounding circuit is faulty.
- Airbag control module is faulty.
- (AB1) and (B31) are not connected properly.
- (AB6) is not connected properly to airbag control module.

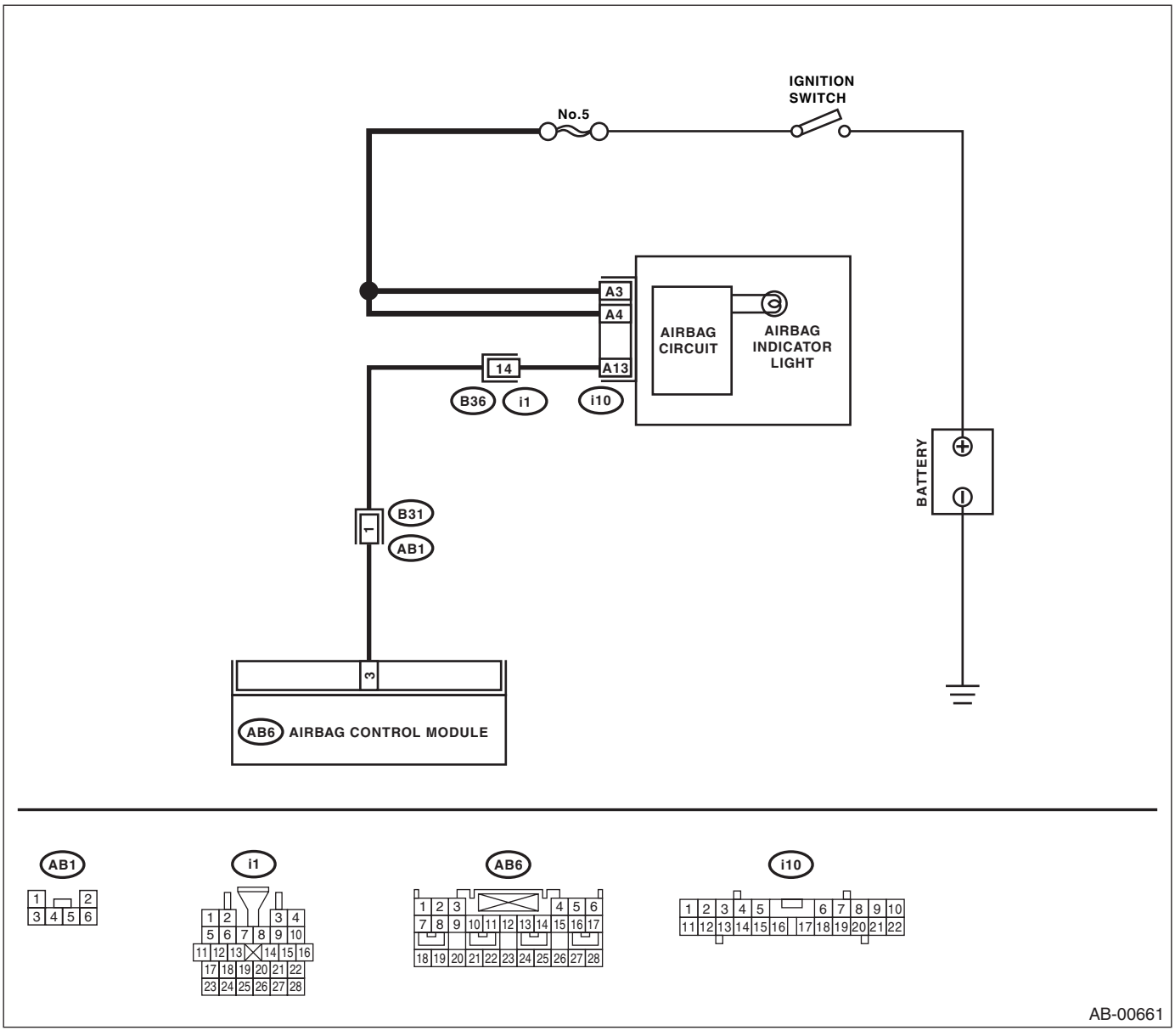
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from the battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Airbag Warning Light Failure

	Step	Check	Yes	No
1	**CHECK POOR CONTACT.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Confirm that the firm contact is secured between the airbag control module and connector (AB6). <Ref. to AB-20, Airbag Control Module.>	Is there poor contact in connector (AB6)?	Replace the airbag main harness with body harness or replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS.** 1) Remove the instrument panel lower cover and disconnect the connector (AB7) and (AB2). 2) Remove the instrument panel side cover of passenger side and disconnect the connector (AB10) and (AB9). 3) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 4) Connect the battery ground terminal and turn the ignition switch ON. 5) Connect the connectors (7U) and (8U) in the test harness U. NOTE: After problem has been eliminated, disconnect the connectors (7U) and (8U).	Does the airbag warning light go off?	Go to step **3.**	Go to step **4.**
3	**CHECK GROUND CIRCUIT.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from airbag control module. 3) Connect the connector (1U) in the test harness U to body harness connector (AB6). 4) Measure the resistance between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 10 — Chassis ground:*** ***(2U) No. 11 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Repair the chassis ground circuit.
4	**CHECK AIRBAG MAIN HARNESS AND BODY HARNESS.** 1) Disconnect the connector (7U) and (8U). 2) Remove the combination meter. 3) Measure the resistance between connector (i10) and connector (2U) in the test harness U. ***Connector & terminal*** ***(2U) No. 7 — (i10) No. 13:***	Is the resistance less than 10 Ω?	Replace the combination meter printed circuit. <Ref. to IDI-16, Combination Meter Assembly.>	Go to step **5.**
5	**CHECK POOR CONTACT IN CONNECTORS (AB1) AND (B31).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Confirm that firm contact is secured between connectors (AB1) and (B31).	Is there poor contact in connectors (AB1) and (B31)?	Repair the body harness or replace the airbag main harness with body harness.	Go to step **6.**
6	**CHECK AIRBAG MAIN HARNESS.** Check the airbag main harness for abnormalities.	Is anything unusual to airbag main harness?	Replace the airbag main harness with body harness.	Repair the body harness.

B: AIRBAG WARNING LIGHT REMAINS OFF

DETECTING CONDITION:

- Fuse No. 5 (in fuse box) is blown.
- Body harness circuit is open.
- Airbag warning light is faulty.
- Airbag main harness is faulty.
- Airbag control module is faulty.

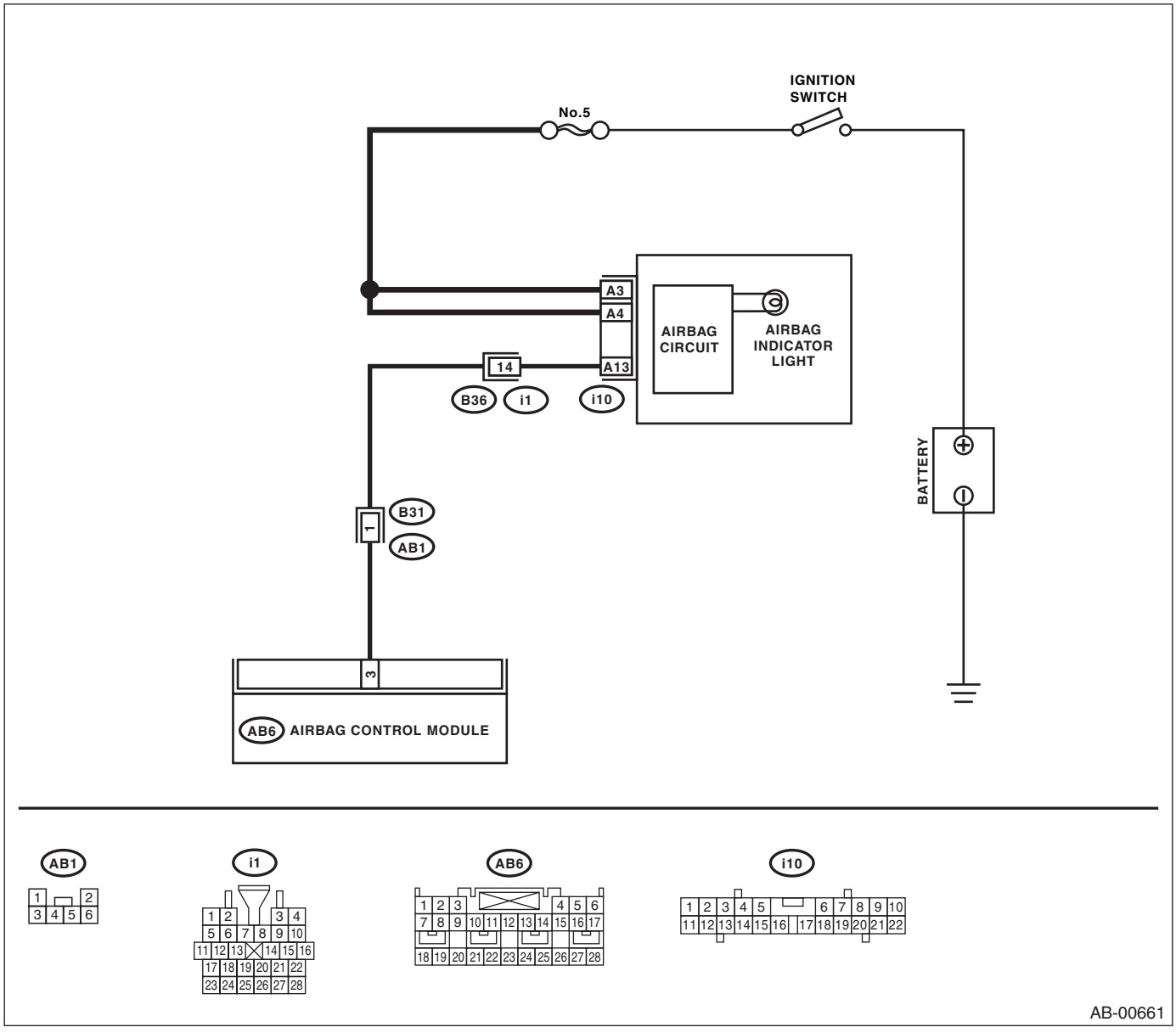
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Airbag Warning Light Failure

	Step	Check	Yes	No
1	**CHECK COMBINATION METER.** Turn the ignition switch to ON, and confirm that warning lights equipped in the combination meter are turned on.	Do warning lights other than the airbag turn on?	Go to step **2.**	Repair the combination meter power supply. <Ref. to IDI-3, Combination Meter System.>
2	**CHECK FUSE NO. 5 (IN MAIN FUSE BOX).** Remove the fuse No. 5 and perform visual inspection.	Is the fuse No. 5 (in main fuse box) blown out?	Replace the fuse No. 5. If the fuse No. 5 is blown again, go to step 3.	Go to step **3.**
3	**CHECK AIRBAG WARNING LIGHT CIRCUIT (IN COMBINATION METER).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB1) from (B31). 3) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light turn on?	Go to step **4.**	Replace the airbag warning light bulb or combination meter printed circuit. <Ref. to IDI-16, Combination Meter Assembly.>
4	**CHECK AIRBAG MAIN HARNESS.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Connect the connector (AB1) to (B31). 3) Disconnect the connector (AB6) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light turn on?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

12.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Memory function	Content of diagnosis	Reference
11	Experienced	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (Driver's side) circuit is open, shorted or shorted to ground. • Roll connector circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-41, DTC 11, Diagnostic Chart with Trouble Code.>
12	Experienced	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-44, DTC 12, Diagnostic Chart with Trouble Code.>
15	Experienced	• Airbag main harness circuit (Driver's side) is shorted to power supply. • Airbag module harness circuit (Driver's side) is shorted to power supply. • Roll connector is shorted to the power supply. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-46, DTC 15, Diagnostic Chart with Trouble Code.>
16	Experienced	• Airbag main harness circuit (Passenger's side) is shorted to power supply. • Airbag module harness circuit (Passenger's side) is shorted to power supply. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-48, DTC 16, Diagnostic Chart with Trouble Code.>
21	Experienced	Airbag control module is faulty.	<Ref. to AB(diag)-49, DTC 21, Diagnostic Chart with Trouble Code.>
22	Experienced	Front airbag module and seat belt pretensioner (LH/RH) are deployed.	<Ref. to AB(diag)-50, DTC 22, Diagnostic Chart with Trouble Code.>
23	None	(AB6), (AB17) and (AB18) are not connected properly to airbag control module.	<Ref. to AB(diag)-51, DTC 23, Diagnostic Chart with Trouble Code.>
24	None	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 25 (in joint box) is blown. • Airbag rear harness circuit is open.	<Ref. to AB(diag)-52, DTC 24, Diagnostic Chart with Trouble Code.>
25	Experienced	• Airbag control module is faulty. • Airbag main harness circuit is open. • Fuse No. 12 (in joint box) is blown. • Airbag rear harness circuit is open.	<Ref. to AB(diag)-54, DTC 25, Diagnostic Chart with Trouble Code.>
31	Experienced	• Front sub-sensor harness (RH) circuit is shorted. • Front sub-sensor harness (RH) circuit is open. • Front sub-sensor (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-56, DTC 31, Diagnostic Chart with Trouble Code.>

DTC	Memory function	Content of diagnosis	Reference
32	Experienced	• Front sub-sensor harness (LH) circuit is shorted. • Front sub-sensor harness (LH) circuit is open. • Front sub-sensor (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-58, DTC 32, Diagnostic Chart with Trouble Code.>
33	Experienced	Front sub-sensor (RH) is faulty.	<Ref. to AB(diag)-59, DTC 33, Diagnostic Chart with Trouble Code.>
34	Experienced	Front sub-sensor (LH) is faulty.	<Ref. to AB(diag)-59, DTC 34, Diagnostic Chart with Trouble Code.>
41	Experienced	• Side airbag harness (RH) is faulty. • Side airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-60, DTC 41, Diagnostic Chart with Trouble Code.>
42	Experienced	• Side airbag harness (LH) is faulty. • Side airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-65, DTC 42, Diagnostic Chart with Trouble Code.>
45	Experienced	• Side airbag harness (RH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-70, DTC 45, Diagnostic Chart with Trouble Code.>
46	Experienced	• Side airbag harness (LH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-73, DTC 46, Diagnostic Chart with Trouble Code.>
51	Experienced	• Side airbag sensor (RH) is faulty. • Side airbag harness (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-76, DTC 51, Diagnostic Chart with Trouble Code.>
52	Experienced	• Side airbag sensor (LH) is faulty. • Side airbag harness (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-79, DTC 52, Diagnostic Chart with Trouble Code.>
53	Experienced	Side airbag sensor (RH) is faulty.	<Ref. to AB(diag)-82, DTC 53, Diagnostic Chart with Trouble Code.>
54	Experienced	Side airbag sensor (LH) is faulty.	<Ref. to AB(diag)-82, DTC 54, Diagnostic Chart with Trouble Code.>
55	Experienced	• Side airbag module is deployed. • Curtain airbag module is deployed.	<Ref. to AB(diag)-82, DTC 55, Diagnostic Chart with Trouble Code.>
56	Experienced	• Curtain airbag sensor (RH) is faulty. • Curtain airbag harness (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-83, DTC 56, Diagnostic Chart with Trouble Code.>
57	Experienced	• Curtain airbag sensor (LH) is faulty. • Curtain airbag harness (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-85, DTC 57, Diagnostic Chart with Trouble Code.>

DTC	Memory function	Content of diagnosis	Reference
58	Experienced	Curtain airbag sensor (RH) is faulty.	<Ref. to AB(diag)-86, DTC 58, Diagnostic Chart with Trouble Code.>
59	Experienced	Curtain airbag sensor (LH) is faulty.	<Ref. to AB(diag)-86, DTC 59, Diagnostic Chart with Trouble Code.>
61	Experienced	• Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-87, DTC 61, Diagnostic Chart with Trouble Code.>
62	Experienced	• Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Pretensioner is faulty. • Pretensioner harness is faulty.	<Ref. to AB(diag)-90, DTC 62, Diagnostic Chart with Trouble Code.>
65	Experienced	• Seat belt pretensioner (RH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-93, DTC 65, Diagnostic Chart with Trouble Code.>
66	Experienced	• Seat belt pretensioner (LH) circuit is shorted to power supply. • Pretensioner is faulty. • Pretensioner harness is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-96, DTC 66, Diagnostic Chart with Trouble Code.>
71	Experienced	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (Driver's side) circuit is open, shorted or shorted to ground. • Roll connector circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-99, DTC 71, Diagnostic Chart with Trouble Code.>
72	Experienced	• Airbag main harness circuit is open, shorted or shorted to ground. • Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-102, DTC 72, Diagnostic Chart with Trouble Code.>
75	Experienced	• Airbag main harness circuit (Driver's side) is shorted to power supply. • Airbag module harness circuit (Driver's side) is shorted to power supply. • Roll connector is shorted to power supply. • Airbag control module is faulty. • Driver's airbag module is faulty.	<Ref. to AB(diag)-104, DTC 75, Diagnostic Chart with Trouble Code.>
76	Experienced	• Airbag main harness circuit (Passenger's side) is shorted to power supply. • Airbag module harness circuit (Passenger's side) is shorted to power supply. • Airbag control module is faulty. • Passenger's airbag module is faulty.	<Ref. to AB(diag)-106, DTC 76, Diagnostic Chart with Trouble Code.>

DTC	Memory function	Content of diagnosis	Reference
91	Experienced	• Curtain airbag harness (RH) is faulty. • Curtain airbag module (RH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-108, DTC 91, Diagnostic Chart with Trouble Code.>
92	Experienced	• Curtain airbag harness (LH) is faulty. • Curtain airbag module (LH) is faulty. • Airbag control module is faulty.	<Ref. to AB(diag)-110, DTC 92, Diagnostic Chart with Trouble Code.>
95	Experienced	• Curtain airbag harness (RH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-112, DTC 95, Diagnostic Chart with Trouble Code.>
96	Experienced	• Curtain airbag harness (LH) is shorted to power supply. • Airbag control module is faulty.	<Ref. to AB(diag)-114, DTC 96, Diagnostic Chart with Trouble Code.>

13.Diagnostic Chart with Trouble Code

A: DTC 11

DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver's side) circuit is open, shorted or shorted to ground.
- Roll connector circuit is open, shorted or shorted to ground.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

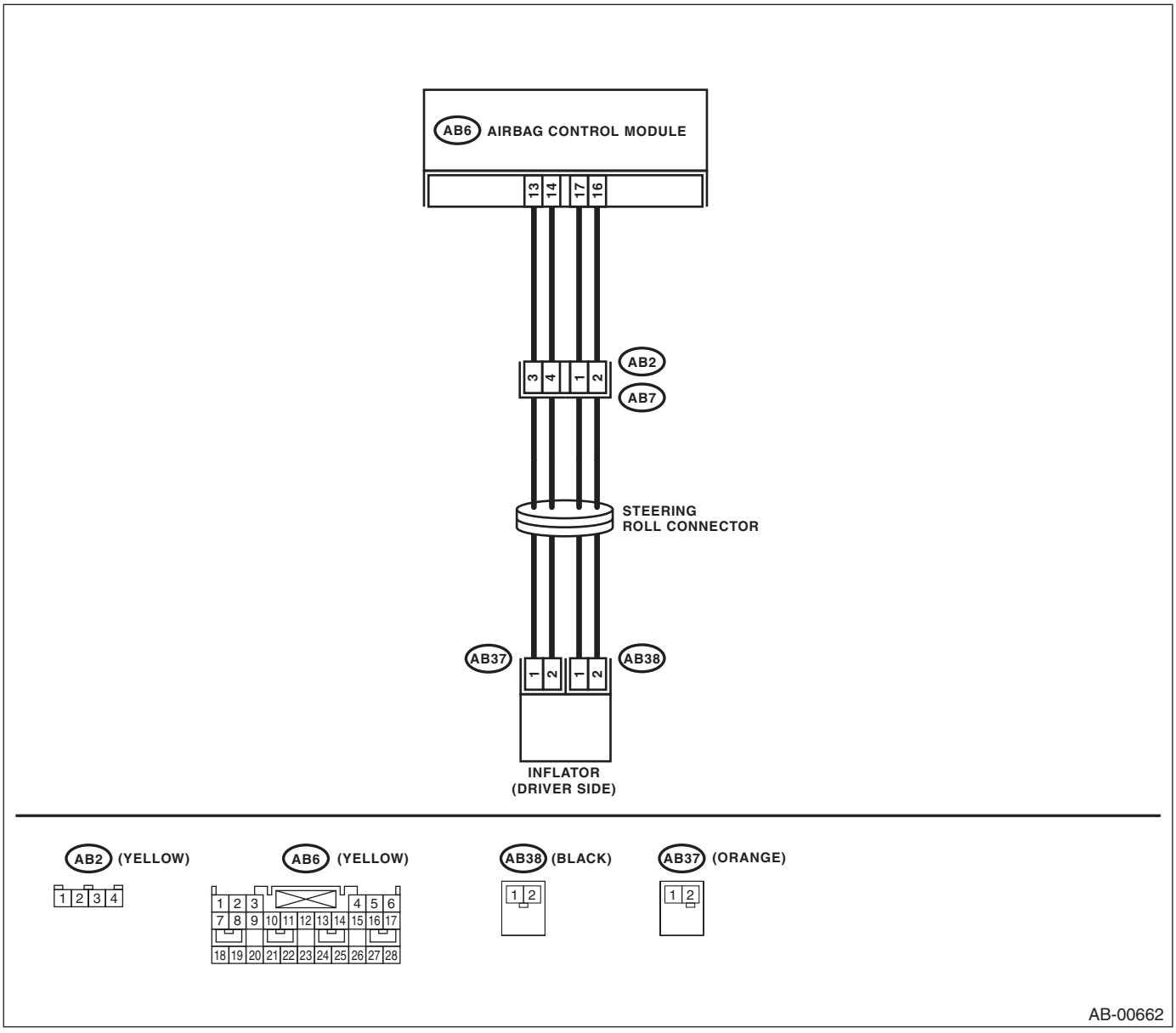
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.> 3) Connect the connector (1N) in the test harness N to connector (AB38). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the connectors (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-23, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel side cover of passenger's side and disconnect the connector (AB10) and (AB9). <Ref. to AB-15, Passenger's Airbag Module.> 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the resistance between connector (2U) in the test harness U and connector (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 2 — (2P) No. 1:*** ***(2U) No. 4 — (2P) No. 2:*** ***(2U) No. 8 — (3P) No. 3:*** ***(2U) No. 12 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4.**	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** Measure the resistance between connector (2U) terminals in the test harness U. ***Connector & terminal*** ***(2U) No. 2 — (2U) No. 4:*** ***(2U) No. 4 — Chassis ground:*** ***(2U) No. 2 — Chassis ground:*** ***(2U) No. 8 — (2U) No. 12:*** ***(2U) No. 8 — Chassis ground:*** ***(2U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

B: DTC 12

DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

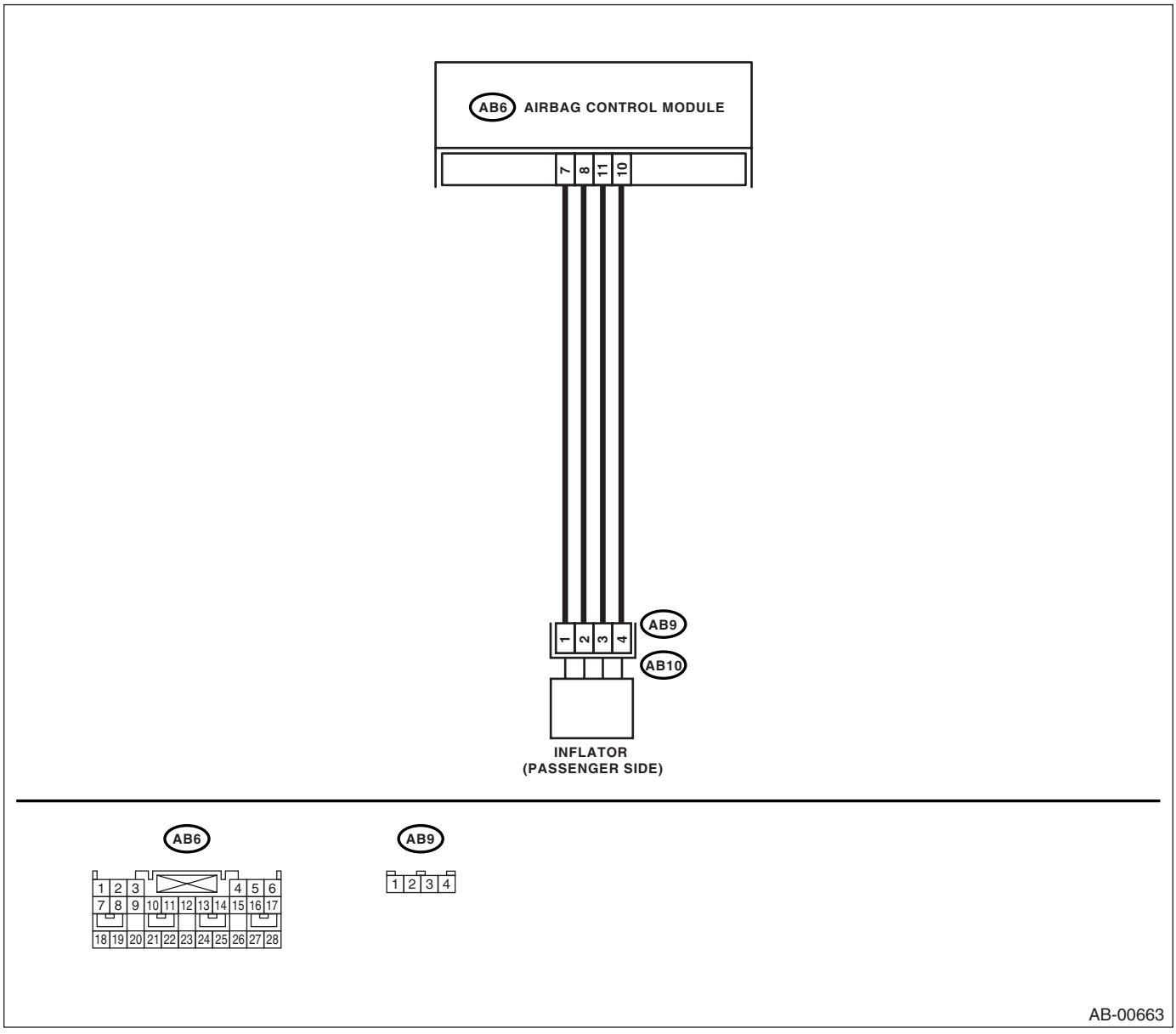
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel side cover on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 6) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the resistance between connector (2U) in the test harness U and connector (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 3 — (2P) No. 1:*** ***(2U) No. 5 — (2P) No. 2:*** ***(2U) No. 9 — (3P) No. 3:*** ***(2U) No. 13 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** Measure the resistance between connector (2U) terminals in the test harness U and between the connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 3 — (2U) No. 5:*** ***(2U) No. 3 — Chassis ground:*** ***(2U) No. 5 — Chassis ground:*** ***(2U) No. 9 — (2U) No. 13:*** ***(2U) No. 9 — Chassis ground:*** ***(2U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

C: DTC 15

DTC DETECTING CONDITION:

- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to the power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

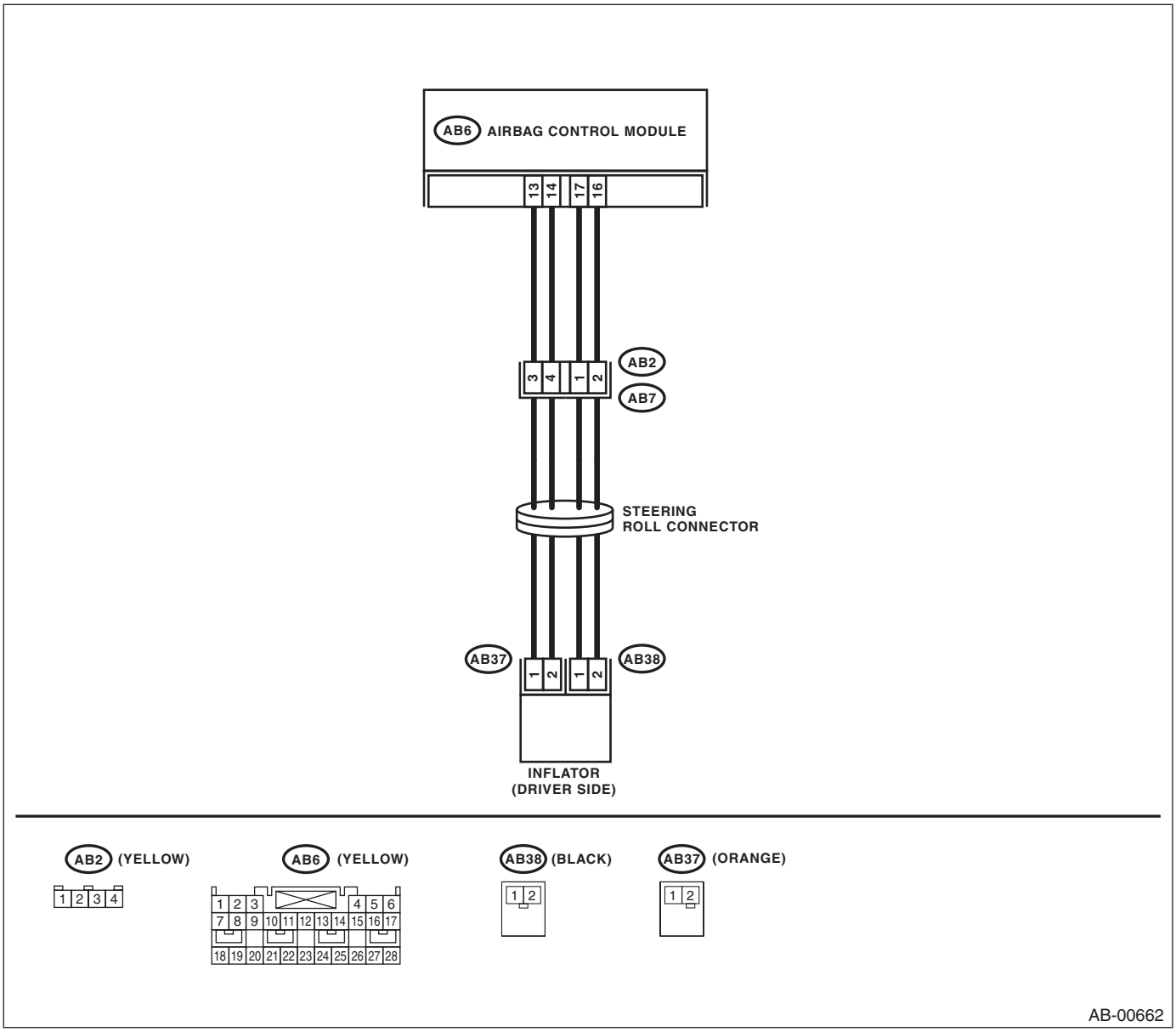
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.> 3) Connect the connector (AB38) to connector (1N) in the test harness N. 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the connectors (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-23, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel side cover of passenger's side and disconnect the connector (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Connect the battery ground terminal and turn the ignition switch ON. (engine OFF) 6) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 4 (+) — Chassis ground (−):*** ***(2U) No. 2 (+) — Chassis ground (−):*** ***(2U) No. 8 (+) — Chassis ground (−):*** ***(2U) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

D: DTC 16

DTC DETECTING CONDITION:

- Airbag main harness circuit (Passenger's side) is shorted to power supply.
- Airbag module harness circuit (Passenger's side) is shorted to power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

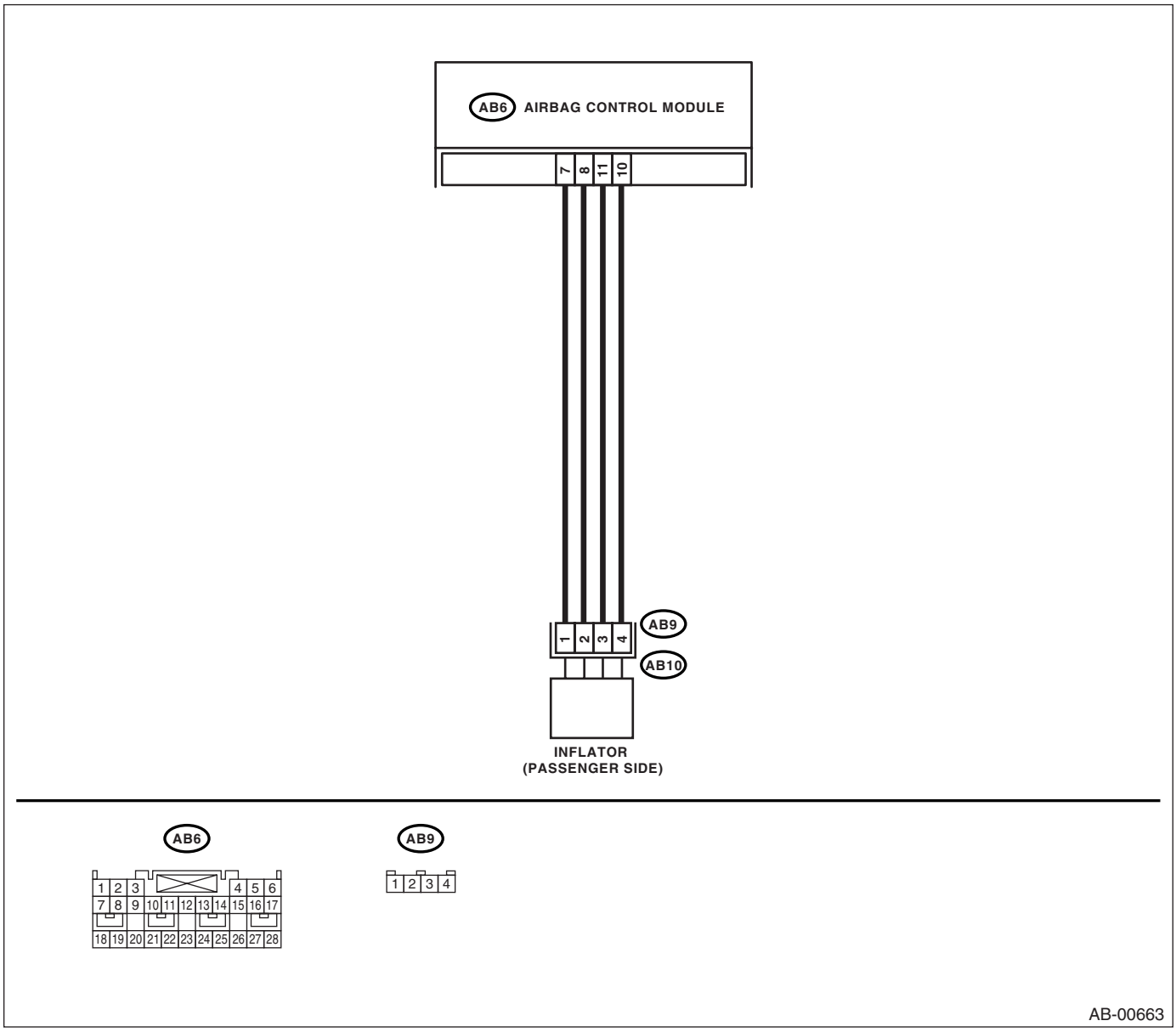
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel side cover on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 6) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 3 (+) — Chassis ground (–):*** ***(2U) No. 5 (+) — Chassis ground (–):*** ***(2U) No. 9 (+) — Chassis ground (–):*** ***(2U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

E: DTC 21

DTC DETECTING CONDITION:

Airbag control module is faulty.

CAUTION:

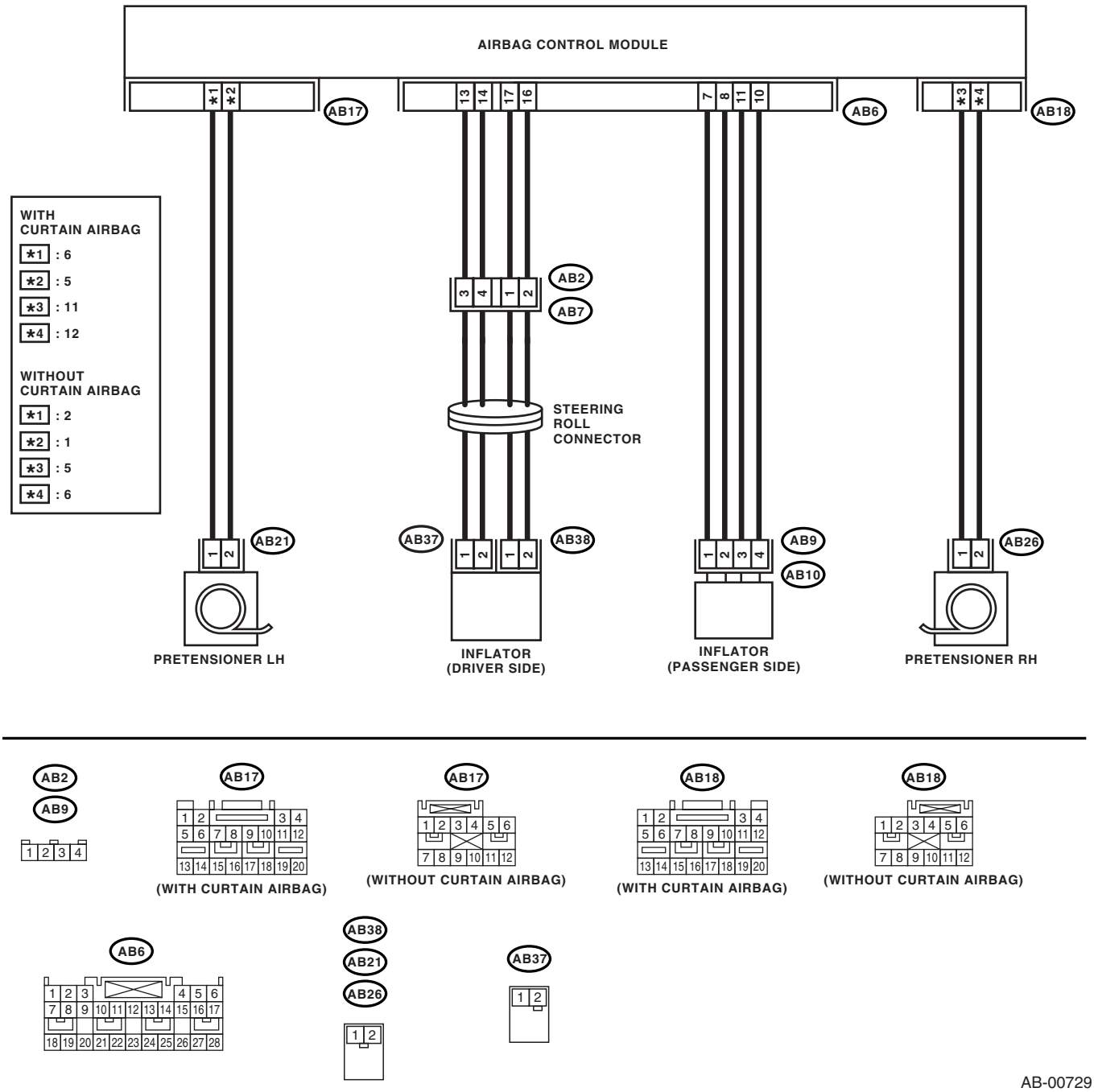
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

	Step	Check	Yes	No
1	**CHECK IF DTC 21 IS INDICATED.** Read the DTC. <Ref. to AB(diag)-30, Read Diagnostic Trouble Code (DTC).>	Is DTC 21 indicated for airbag warning light?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Perform the clear memory mode. <Ref. to AB(diag)-32, Clear Memory Mode.>

F: DTC 22

WIRING DIAGRAM:



AB-00729

This DTC is indicated when the front airbag module and the pretensioner are deployed.
Once this DTC is displayed, the memory cannot be cleared. Replace the following parts.

- Airbag control module. <Ref. to AB-20, Airbag Control Module.>
- Driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>
- Passenger's airbag module. <Ref. to AB-15, Passenger's Airbag Module.>
- Front sub-sensor of both sides. <Ref. to AB-24, Front Sub Sensor.>
- Front seat belt outer with pretensioner of both sides. <Ref. to SB-12, Front Seat Belt.>

G: DTC 23

DTC DETECTING CONDITION:

(AB6), (AB17) and (AB18) are not connected properly to airbag control module.

CAUTION:

Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

	Step	Check	Yes	No
1	**CHECK POOR CONTACT IN CONNECTORS (AB6), (AB17) AND (AB18).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connectors (AB6), (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.>	Is there rust or damage on the harness connector and the control module connector?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.> Replace the body harness with airbag main harness. Replace the body harness with side airbag harness.	Go to step **2.**
2	**CHECK POOR CONTACT IN CONNECTORS (AB6), (AB17) AND (AB18).** 1) Ensure that the connectors are firmly reconnected. 2) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Finish the diagnosis.	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>

H: DTC 24

DTC DETECTING CONDITION:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 25 (in joint box) is blown.
- Body harness circuit is open.

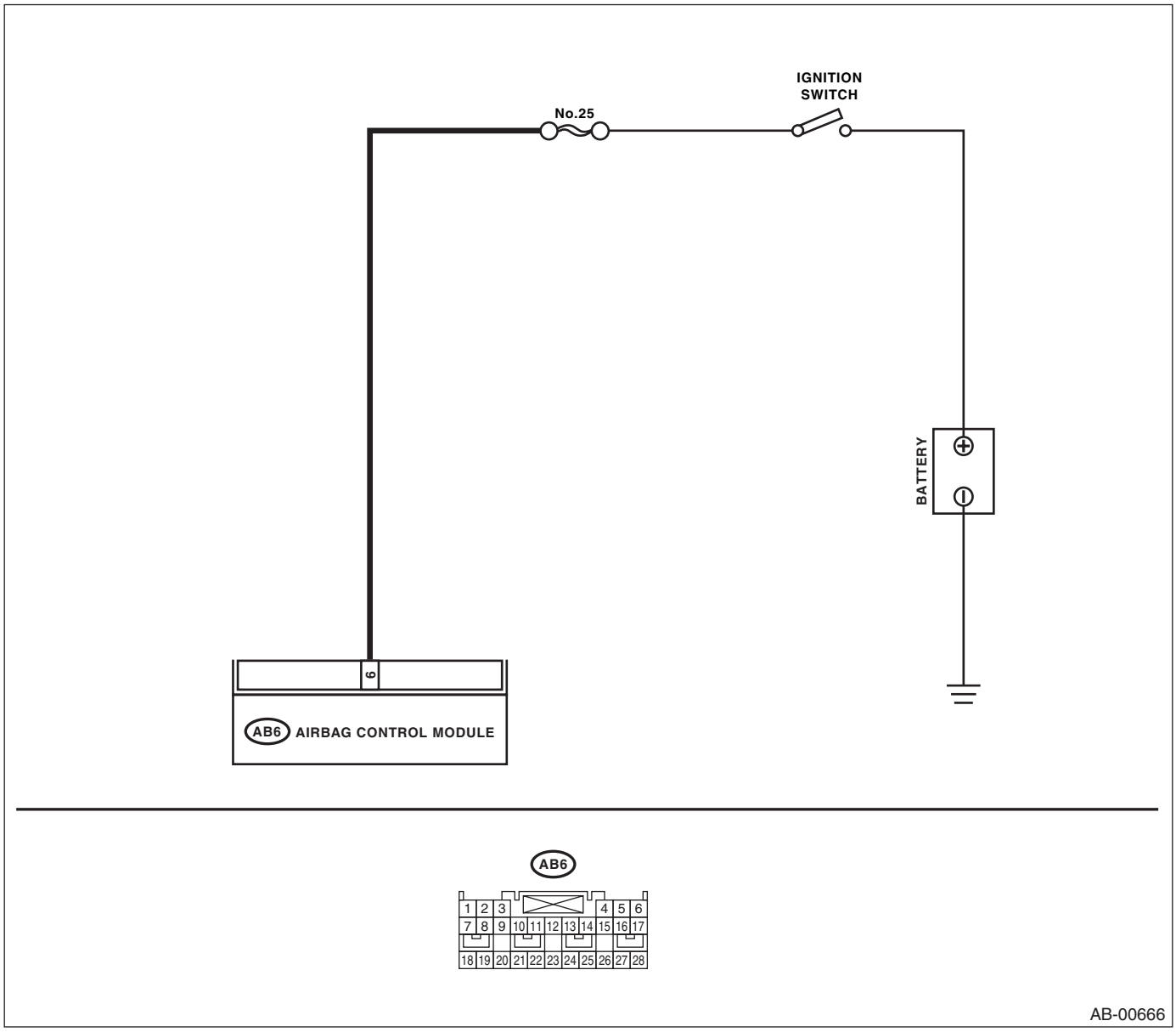
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from air-bag control module. <Ref. to AB-20, Airbag Control Module.> 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Connect the battery ground terminal and turn the ignition switch ON. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step **2.**
2	**CHECK FUSE NO. 25 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove the fuse No. 25 (in joint box) and perform visual inspection.	Is the fuse No. 25 blown out?	Replace the fuse No. 25. If fuse No. 25 is blown out again, repair the body harness.	Repair the body harness.

I: DTC 25

DTC DETECTING CONDITION:

- Airbag control module is faulty.
- Airbag main harness circuit is open.
- Fuse No. 12 (in joint box) is blown.
- Body harness circuit is open.

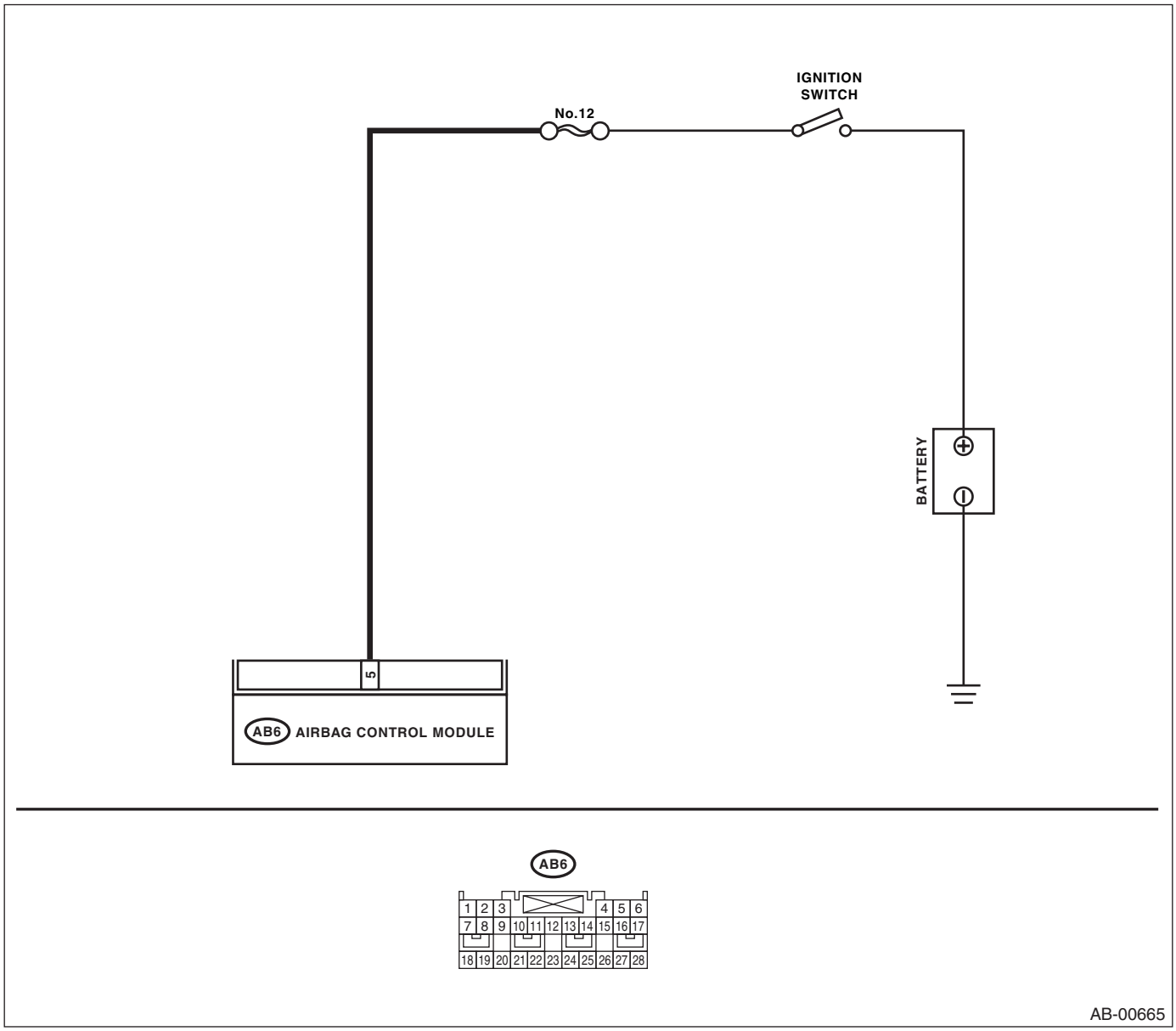
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from the battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG CONTROL MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB6) from air-bag control module. <Ref. to AB-20, Airbag Control Module.> 3) Connect the connector (1U) in the test harness U to connector (AB6). 4) Connect the battery ground terminal and turn the ignition switch ON. 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 6 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Go to step **2.**
2	**CHECK FUSE NO. 12 (IN JOINT BOX).** 1) Confirm that the ignition switch is turned OFF. 2) Remove the fuse No. 12 (in joint box) and perform visual inspection.	Is the fuse No. 12 blown out?	Replace the fuse No. 12. If fuse No. 12 is blown out again, repair the body harness.	Repair the body harness.

J: DTC 31

DTC DETECTING CONDITION:

- Front sub-sensor harness (RH) circuit is shorted.
- Front sub-sensor harness (RH) circuit is open.
- Front sub-sensor (RH) is faulty.
- Airbag control module is faulty.

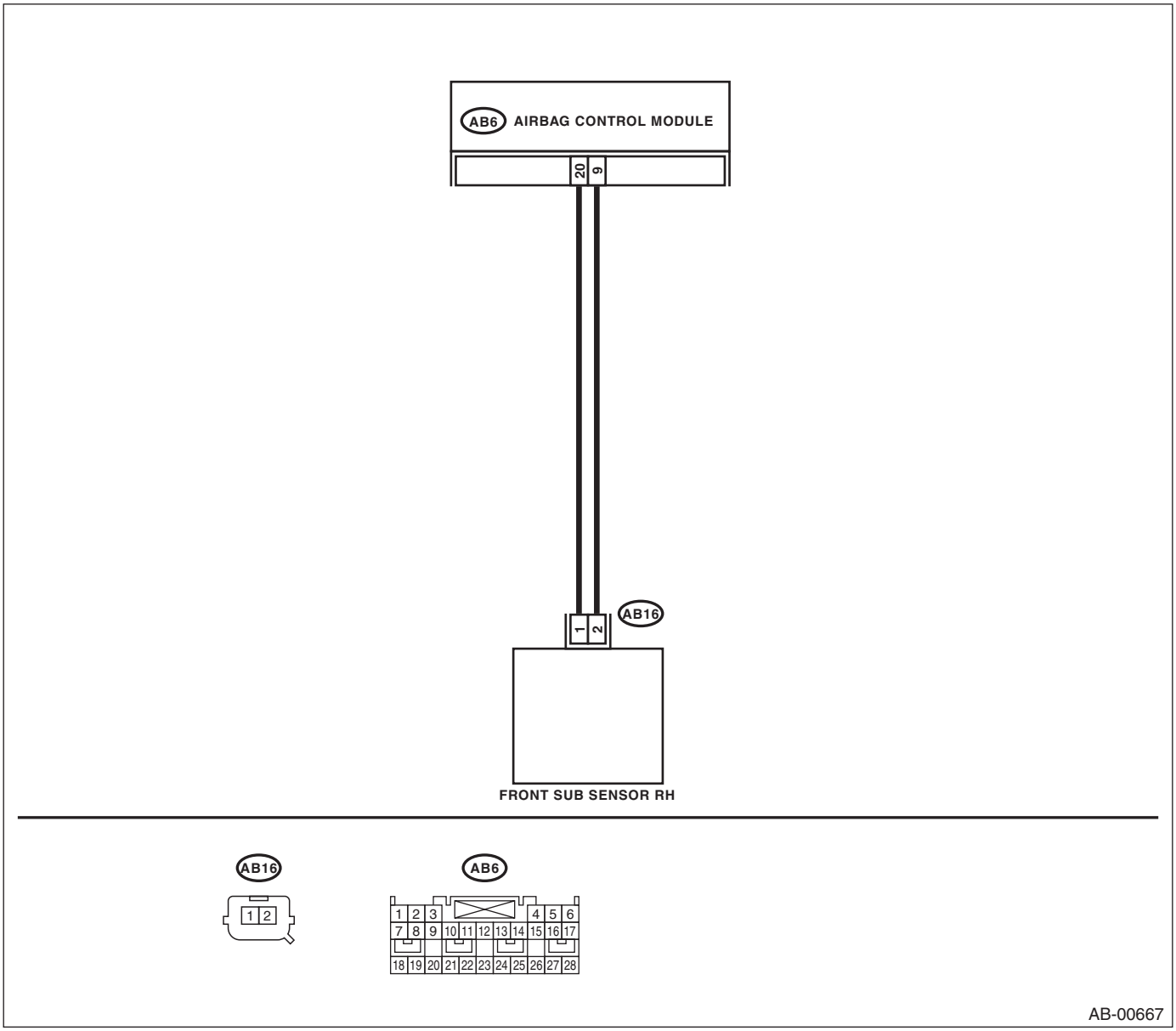
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from the battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG MAIN HARNESS (FRONT SUB-SENSOR HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel lower cover and disconnect the connector (AB7) and (AB2). 3) Remove the instrument panel side cover on passenger's side and disconnect the connector (AB10) and (AB9). 4) Disconnect the connector (AB6) from air-bag control module. <Ref. to AB-20, Airbag Control Module.> 5) Connect the connector (1U) in the test harness U to connector (AB6). 6) Disconnect the front sub-sensor (RH), and then connect the connector (1H) in the test harness H to connector (AB16). 7) Measure the resistance between connector (3U) in the test harness U and connector (3H) in the test harness H. ***Connector & terminal*** ***(3U) No. 7 — (3H) No. 5:*** ***(3U) No. 9 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag main harness with body harness.
2	**CHECK AIRBAG MAIN HARNESS (FRONT SUB-SENSOR HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 7 — Chassis ground:*** ***(3U) No. 9 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front sub-sensor (RH). <Ref. to AB-24, Front Sub Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

K: DTC 32

DTC DETECTING CONDITION:

- Front sub-sensor harness (LH) circuit is shorted.
- Front sub-sensor harness (LH) circuit is open.
- Front sub-sensor (LH) is faulty.
- Airbag control module is faulty.

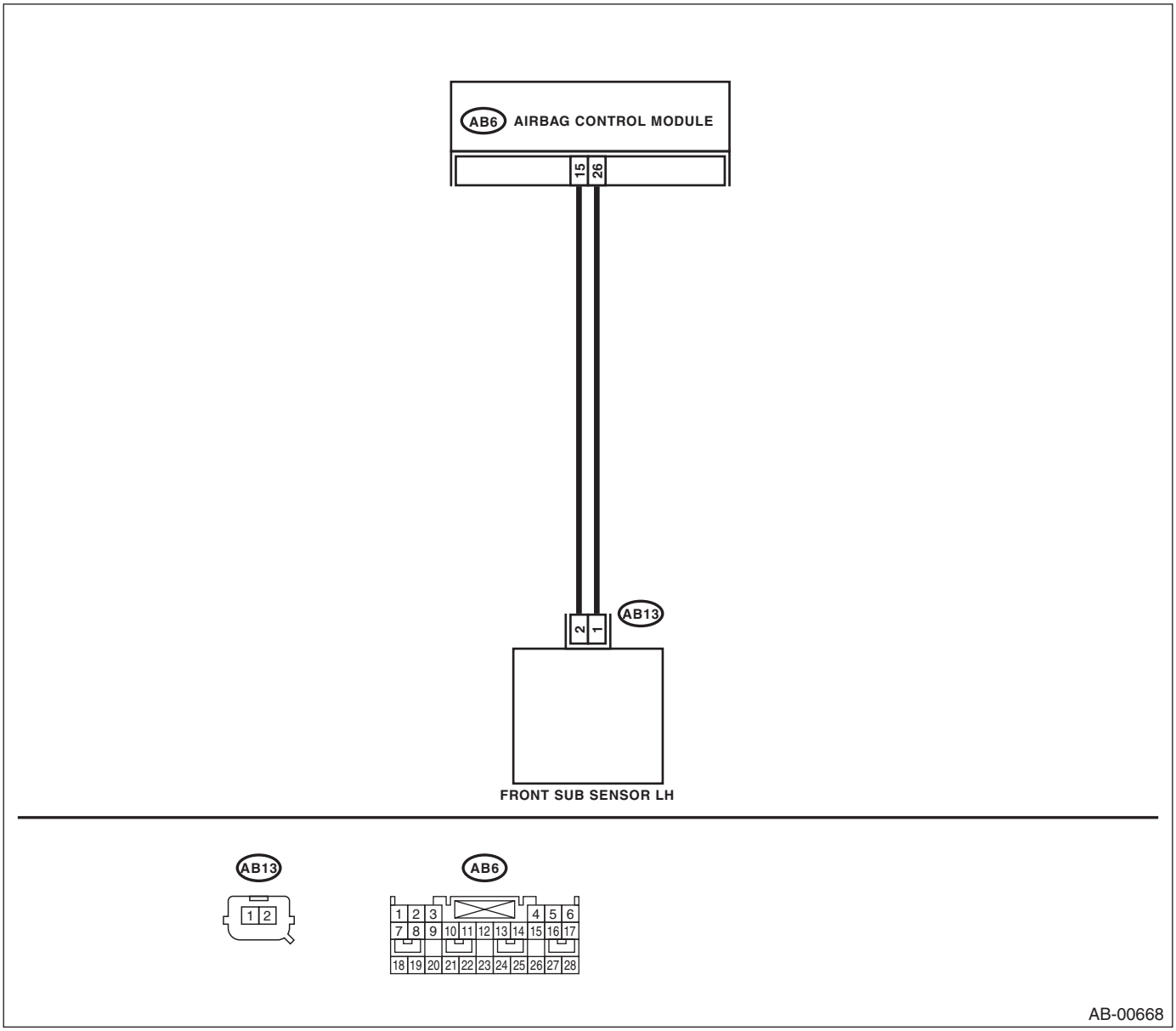
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG MAIN HARNESS (FRONT SUB-SENSOR HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel lower cover and disconnect the connector (AB7) and (AB2). 3) Remove the instrument panel side cover on passenger's side and disconnect the connector (AB10) and (AB9). 4) Disconnect the connector (AB6) from air-bag control module. <Ref. to AB-20, Airbag Control Module.> 5) Connect the connector (1U) in the test harness U to connector (AB6). 6) Disconnect the front sub-sensor (LH), and then connect the connector (1H) in the test harness H to connector (AB13). 7) Measure the resistance between connector (3U) in the test harness U and connector (3H) in the test harness H. ***Connector & terminal*** ***(3U) No. 6 — (3H) No. 5:*** ***(3U) No. 8 — (3H) No. 6:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag main harness with body harness.
2	**CHECK AIRBAG MAIN HARNESS (FRONT SUB-SENSOR HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 6 — Chassis ground:*** ***(3U) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the front sub-sensor (LH). <Ref. to AB-24, Front Sub Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

L: DTC 33

DTC DETECTING CONDITION:

Front sub-sensor (RH) is faulty.

When DTC 33 is displayed, the circuit within the front sub-sensor (RH) is faulty. Replace the front sub-sensor (RH). <Ref. to AB-24, Front Sub Sensor.>

M: DTC 34

DTC DETECTING CONDITION:

Front sub-sensor (LH) is faulty.

When DTC 34 is displayed, the circuit within the front sub-sensor (LH) is faulty. Replace the front sub-sensor (LH). <Ref. to AB-24, Front Sub Sensor.>

N: DTC 41

DTC DETECTING CONDITION:

- Side airbag harness (RH) is faulty.
- Side airbag module (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

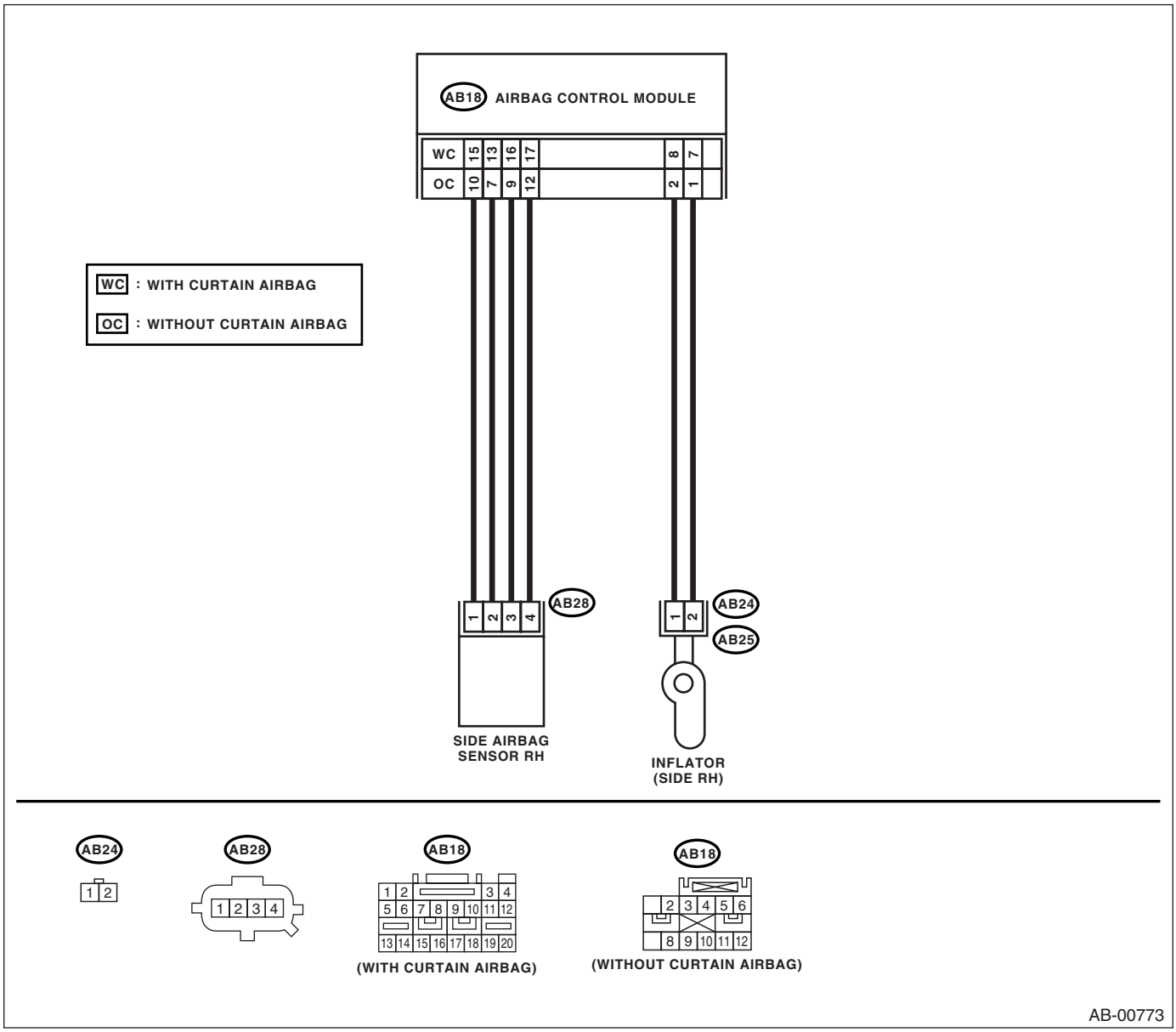
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to the connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (3U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(3U) No. 20 — (3F) No. 3:*** ***(3U) No. 18 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 20 — (3U) No. 18:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 20 — Chassis ground:*** ***(3U) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to the connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB18). 7) Measure the resistance between connector (3R) in the test harness R and connector (3F) in the test harness F. ***Connector & terminal*** ***(3R) No. 20 — (3F) No. 3:*** ***(3R) No. 18 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3R) terminals in the test harness R. ***Connector & terminal*** ***(3R) No. 20 — (3R) No. 18:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 20 — Chassis ground:*** ***(3R) No. 18 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

O: DTC 42

DTC DETECTING CONDITION:

- Side airbag harness (LH) is faulty.
- Side airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

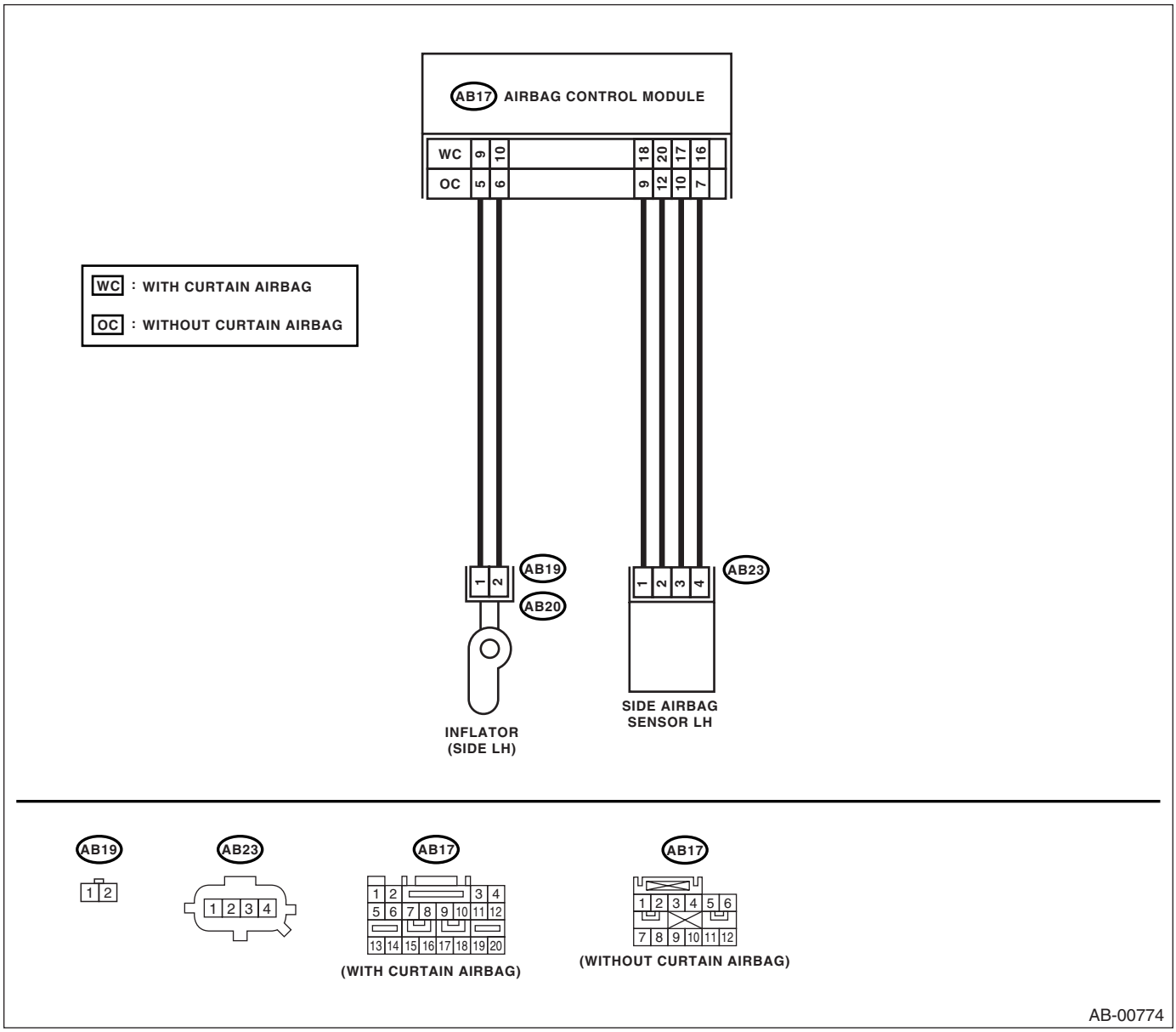
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (LH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (3U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(3U) No. 12 — (3F) No. 3:*** ***(3U) No. 10 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 12 — (3U) No. 10:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 12 — Chassis ground:*** ***(3U) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (LH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB17). 7) Measure the resistance between connector (3R) in the test harness R and connector (3F) in the test harness F. ***Connector & terminal*** ***(3R) No. 12 — (3F) No. 3:*** ***(3R) No. 10 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3R) terminals in the test harness R. ***Connector & terminal*** ***(3R) No. 12 — (3R) No. 10:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.

	Step	Check	Yes	No
6	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 12 — Chassis ground:*** ***(3R) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

P: DTC 45

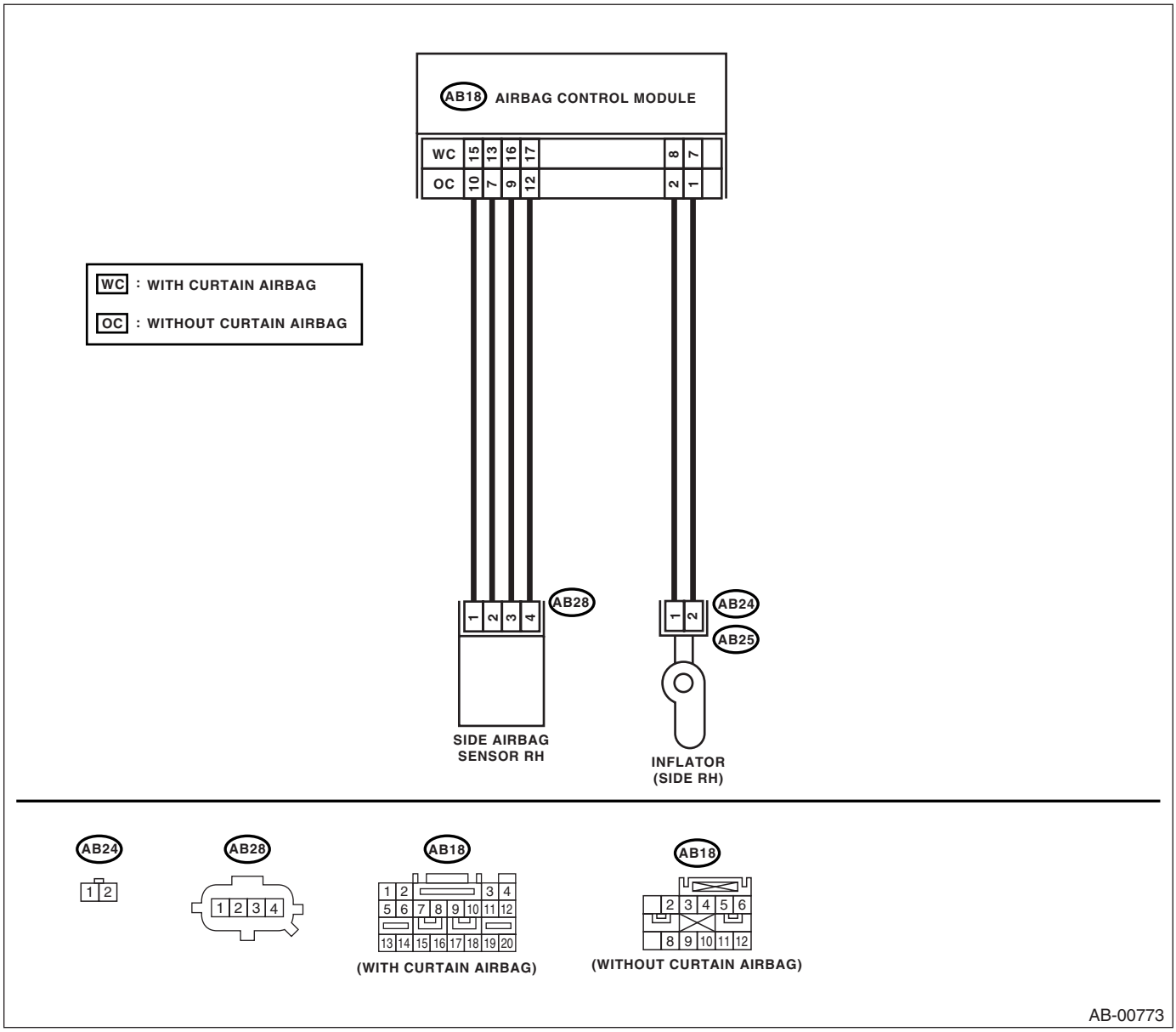
DTC DETECTING CONDITION:

- Side airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 20 (+) — Chassis ground (–):*** ***(3U) No. 18 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB25) from (AB24), and connect the connector (1F) in test harness F to connector (AB24). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the front seat with side airbag module (RH). <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 20 (+) — Chassis ground (–):*** ***(3R) No. 18 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

Q: DTC 46

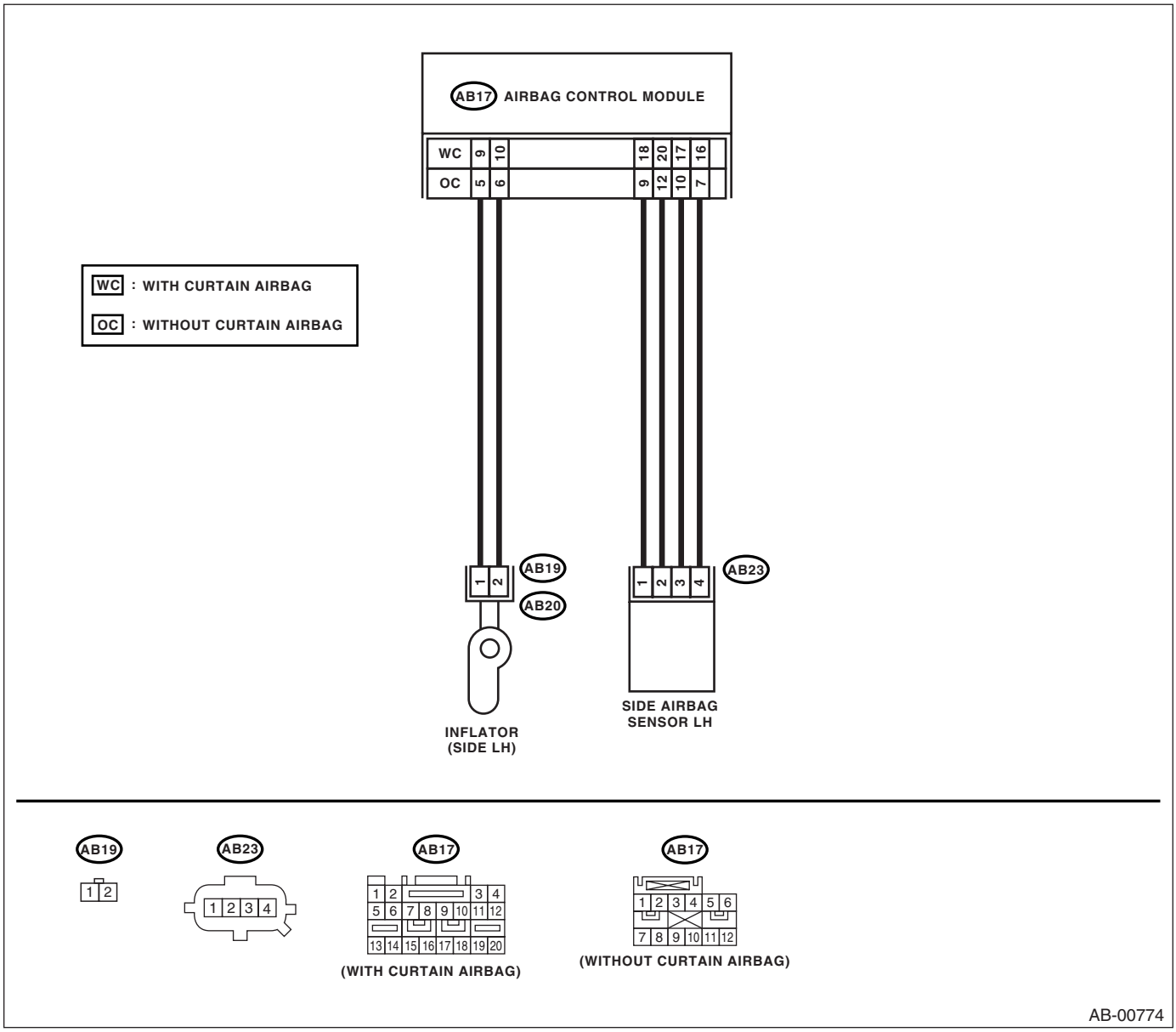
DTC DETECTING CONDITION:

- Side airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the side airbag module (LH) with front seat. <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 12 (+) — Chassis ground (–):*** ***(3U) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB20) from (AB19), and connect the connector (1F) in test harness F to connector (AB19). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the side airbag module (LH) with front seat. <Ref. to SE-7, Front Seat.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the airbag resistor from test harness. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 12 (+) — Chassis ground (–):*** ***(3R) No. 10 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

R: DTC 51

DTC DETECTING CONDITION:

- Side airbag sensor (RH) is faulty.
- Side airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

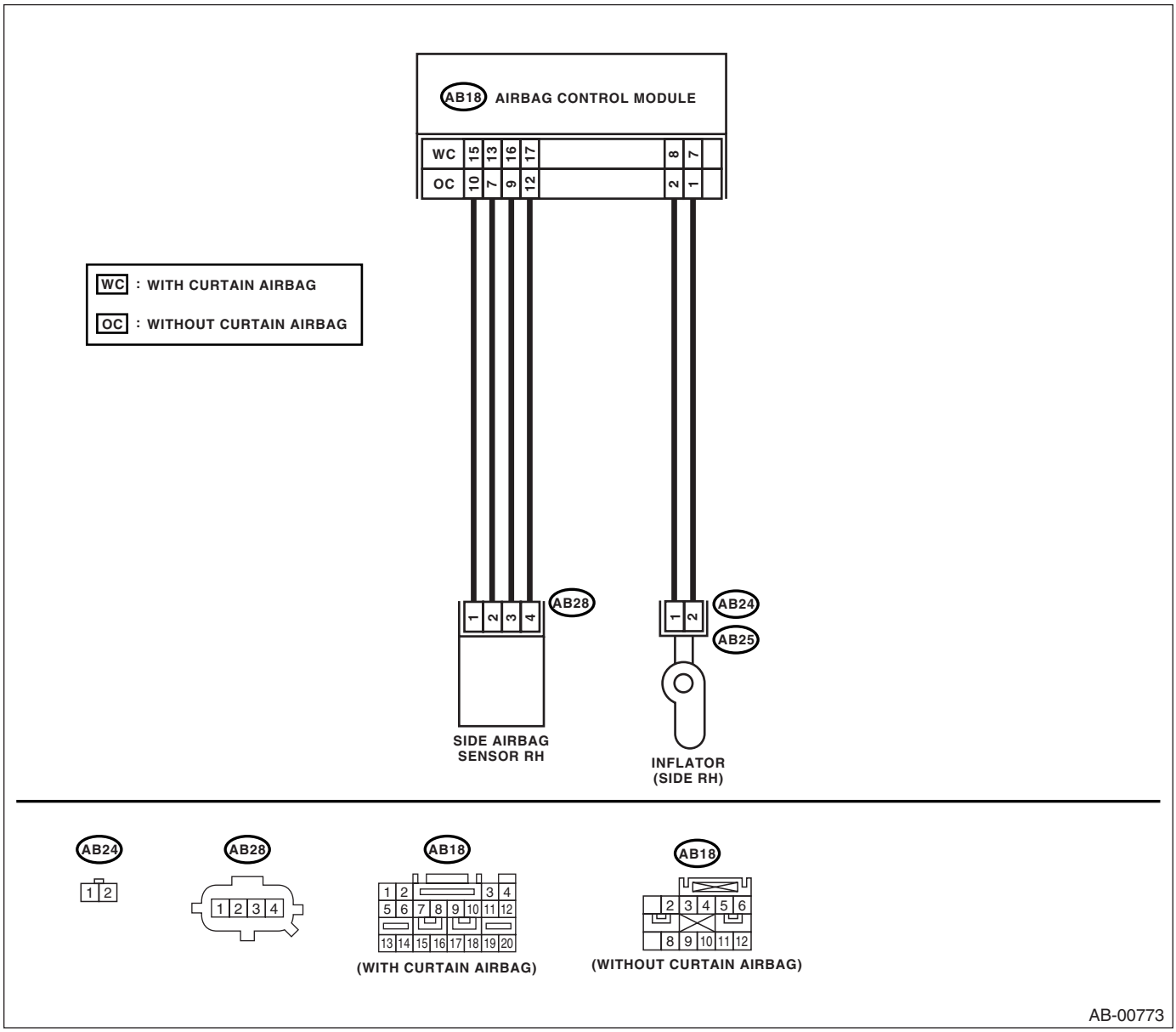
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



AB-00773

1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the connector (AB25) from (AB24). 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Disconnect the connector (AB28) from side airbag sensor (RH), and connect the connector (2V) in the test harness V to connector (AB28). 8) Measure the resistance between connector (4U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(4U) No. 5 — (3V) No. 2:*** ***(4U) No. 7 — (3V) No. 1:*** ***(4U) No. 8 — (3V) No. 5:*** ***(4U) No. 6 — (3V) No. 4:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS RH).** Measure the resistance between connector (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 5 — Chassis ground:*** ***(4U) No. 7 — Chassis ground:*** ***(4U) No. 8 — Chassis ground:*** ***(4U) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (RH). <Ref. to AB-21, Side Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB33) from curtain airbag module (RH). 4) Disconnect the connector (AB25) from (AB24). 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB18). 7) Disconnect the connector (AB28) from side airbag sensor (RH), and connect the connector (2V) in the test harness V to connector (AB28). 8) Measure the resistance between connector (4R) in the test harness R and connector (3V) in the test harness V. ***Connector & terminal*** ***(4R) No. 5 — (3V) No. 2:*** ***(4R) No. 7 — (3V) No. 1:*** ***(4R) No. 8 — (3V) No. 5:*** ***(4R) No. 6 — (3V) No. 4:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS RH).** Measure the resistance between connector (4R) in the test harness R and chassis ground. ***Connector & terminal*** ***(4R) No. 5 — Chassis ground:*** ***(4R) No. 7 — Chassis ground:*** ***(4R) No. 8 — Chassis ground:*** ***(4R) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (RH). <Ref. to AB-21, Side Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

S: DTC 52

DTC DETECTING CONDITION:

- Side airbag sensor (LH) is faulty.
- Side airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

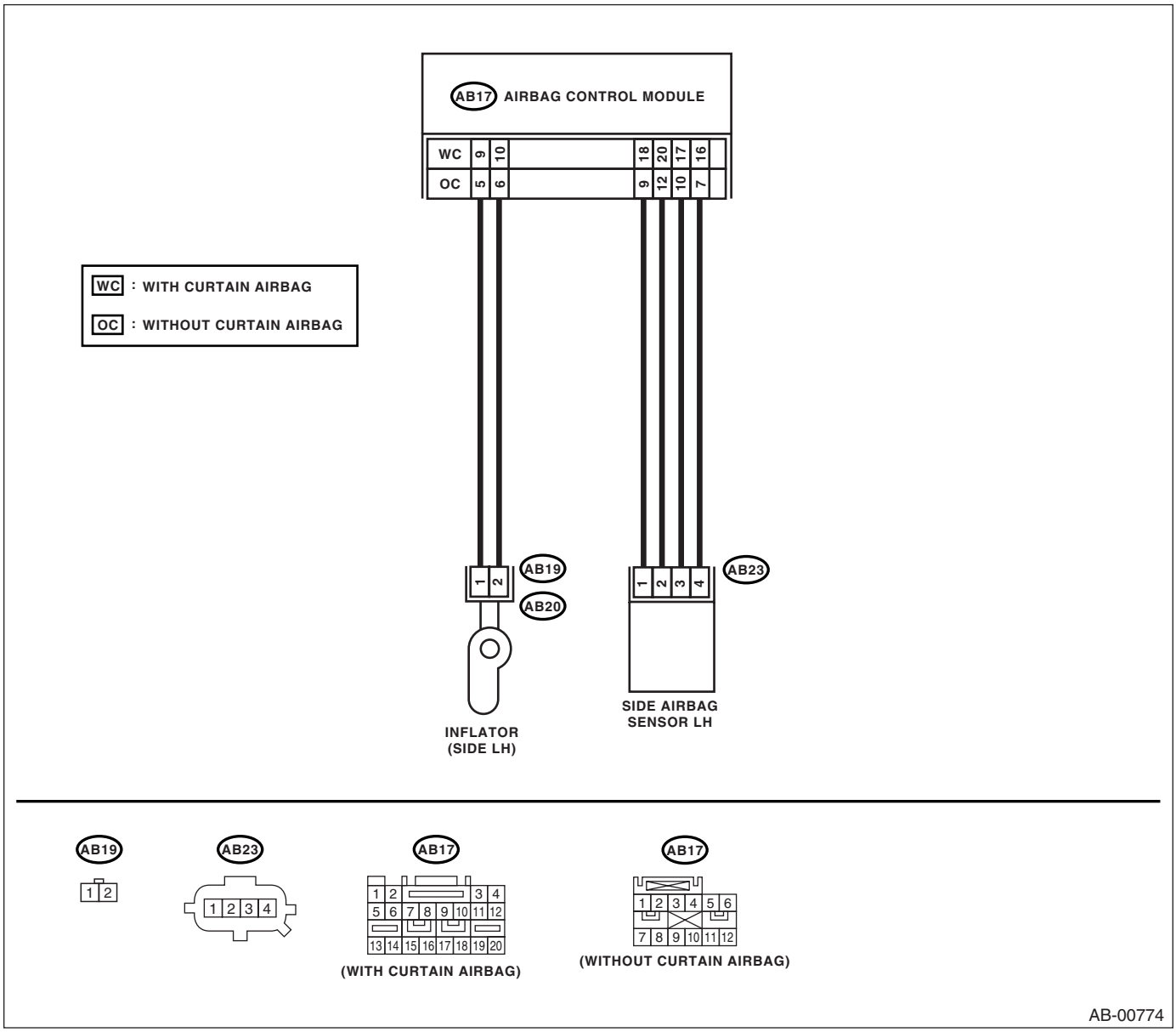
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the connector (AB20) from (AB19). 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the connector (AB23) from side airbag sensor (LH), and connect the connector (2V) in the test harness V to connector (AB23). 8) Measure the resistance between connector (4U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(4U) No. 3 — (3V) No. 4:*** ***(4U) No. 1 — (3V) No. 5:*** ***(4U) No. 2 — (3V) No. 1:*** ***(4U) No. 4 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS LH).** Measure the resistance between connector (4U) in the test harness U and chassis ground. ***Connector & terminal*** ***(4U) No. 3 — Chassis ground:*** ***(4U) No. 1 — Chassis ground:*** ***(4U) No. 2 — Chassis ground:*** ***(4U) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (LH). <Ref. to AB-21, Side Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB31) from curtain airbag module (LH). 4) Disconnect the connector (AB20) from (AB19). 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1R) in the test harness R to connector (AB17). 7) Disconnect the connector (AB23) from side airbag sensor (LH), and connect the connector (2V) in the test harness V to connector (AB23). 8) Measure the resistance between connector (4R) in the test harness R and connector (3V) in the test harness V. ***Connector & terminal*** ***(4R) No. 3 — (3V) No. 4:*** ***(4R) No. 1 — (3V) No. 5:*** ***(4R) No. 2 — (3V) No. 1:*** ***(4R) No. 4 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (SIDE AIRBAG SENSOR HARNESS LH).** Measure the resistance between connector (4R) in the test harness R and chassis ground. ***Connector & terminal*** ***(4R) No. 3 — Chassis ground:*** ***(4R) No. 1 — Chassis ground:*** ***(4R) No. 2 — Chassis ground:*** ***(4R) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the side airbag sensor (LH). <Ref. to AB-21, Side Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

T: DTC 53

DTC DETECTING CONDITION:

Side airbag sensor (RH) is faulty.

When DTC 53 is displayed, the circuit within the side airbag sensor (RH) is faulty. Replace the side airbag sensor (RH). <Ref. to AB-21, Side Airbag Sensor.>

U: DTC 54

DTC DETECTING CONDITION:

Side airbag sensor (LH) is faulty.

When DTC 54 is displayed, the circuit within the side airbag sensor (LH) is faulty. Replace the side airbag sensor (LH). <Ref. to AB-21, Side Airbag Sensor.>

V: DTC 55

This code is displayed when the side airbag module and curtain airbag module are deployed.

Once this code is displayed, the memory cannot be erased. Replace the following parts.

- Airbag control module. <Ref. to AB-20, Airbag Control Module.>
- Front seat with side airbag module. (Operating side) <Ref. to SE-7, Front Seat.>
- Side airbag sensor. (Operating side) <Ref. to AB-21, Side Airbag Sensor.>
- Curtain airbag module. (Operating side) <Ref. to AB-18, Curtain Airbag Module.>
- Curtain airbag sensor. (Operating side) <Ref. to AB-22, Curtain Airbag Sensor.>

W: DTC 56

DTC DETECTING CONDITION:

- Curtain airbag sensor (RH) is faulty.
- Curtain airbag harness (RH) is faulty.
- Airbag control module is faulty.

CAUTION:

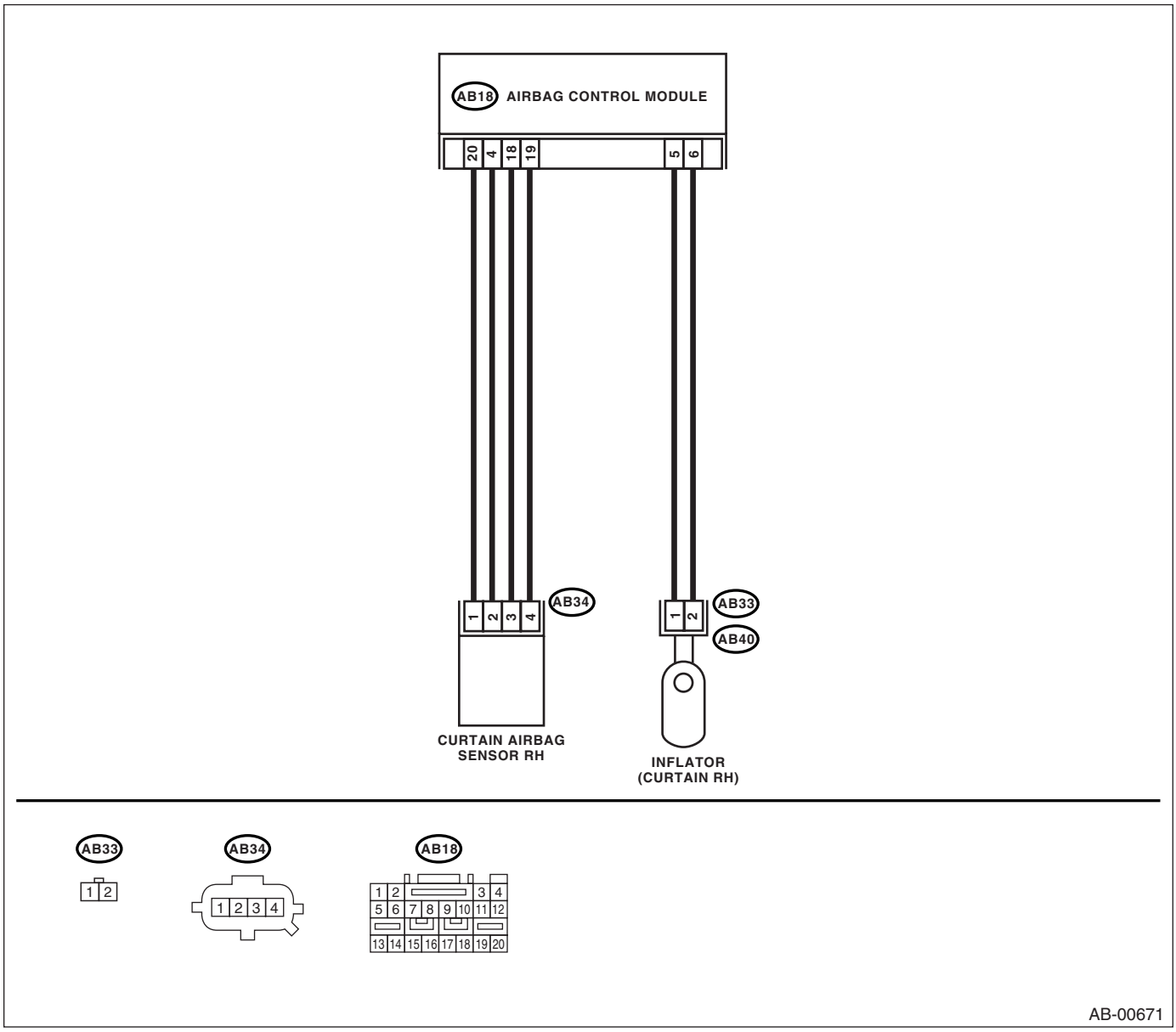
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG SENSOR HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from (AB40). 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Disconnect the connector (AB34) from curtain airbag sensor (RH), and connect the connector (2V) in the test harness V to connector (AB34). 8) Measure the resistance between connector (5U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(5U) No. 14 — (3V) No. 4:*** ***(5U) No. 16 — (3V) No. 5:*** ***(5U) No. 15 — (3V) No. 1:*** ***(5U) No. 13 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG SENSOR HARNESS RH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 14 — Chassis ground:*** ***(5U) No. 16 — Chassis ground:*** ***(5U) No. 15 — Chassis ground:*** ***(5U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the curtain airbag sensor (RH). <Ref. to AB-22, Curtain Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

X: DTC 57

DTC DETECTING CONDITION:

- Curtain airbag sensor (LH) is faulty.
- Curtain airbag harness (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

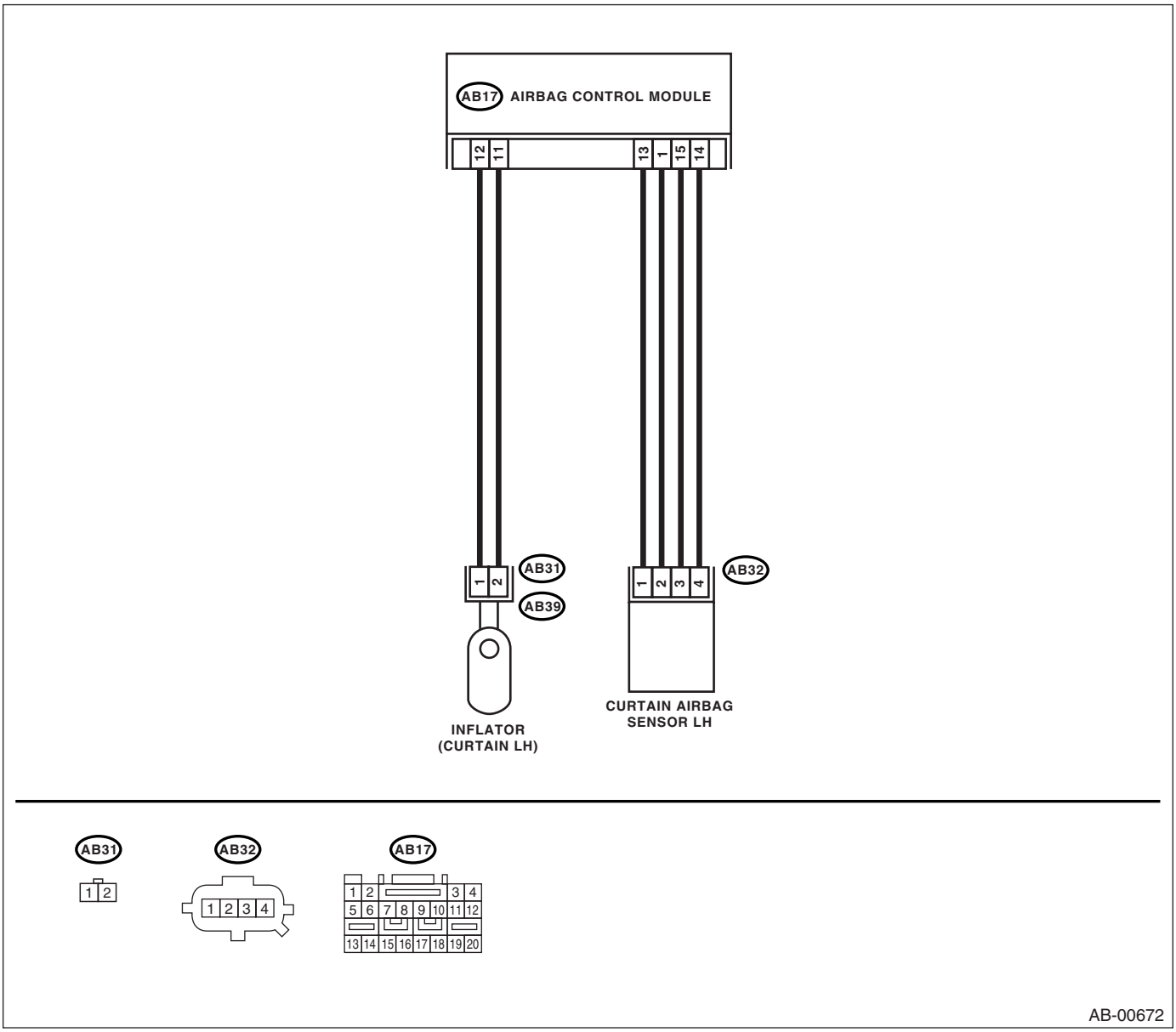
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG SENSOR HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from (AB39). 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Disconnect the connector (AB32) from curtain airbag sensor (LH), and connect the connector (2V) in the test harness V to connector (AB32). 8) Measure the resistance between connector (5U) in the test harness U and connector (3V) in the test harness V. ***Connector & terminal*** ***(5U) No. 11 — (3V) No. 4:*** ***(5U) No. 9 — (3V) No. 5:*** ***(5U) No. 10 — (3V) No. 1:*** ***(5U) No. 12 — (3V) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the airbag rear harness with body harness.
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG SENSOR HARNESS LH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 11 — Chassis ground:*** ***(5U) No. 9 — Chassis ground:*** ***(5U) No. 10 — Chassis ground:*** ***(5U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the curtain airbag sensor (LH). <Ref. to AB-22, Curtain Airbag Sensor.> When the sensor is not OK, though the sensor is replaced, replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

Y: DTC 58

DTC DETECTING CONDITION:

Curtain airbag sensor (RH) is faulty.

When DTC 58 is displayed, the circuit within the curtain airbag sensor (RH) is faulty. Replace the curtain airbag sensor (RH). <Ref. to AB-22, Curtain Airbag Sensor.>

Z: DTC 59

DTC DETECTING CONDITION:

Curtain airbag sensor (LH) is faulty.

When DTC 59 is displayed, the circuit within the curtain airbag sensor (LH) is faulty. Replace the curtain airbag sensor (LH). <Ref. to AB-22, Curtain Airbag Sensor.>

AA:DTC 61

DTC DETECTING CONDITION:

- Seat belt pretensioner (RH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

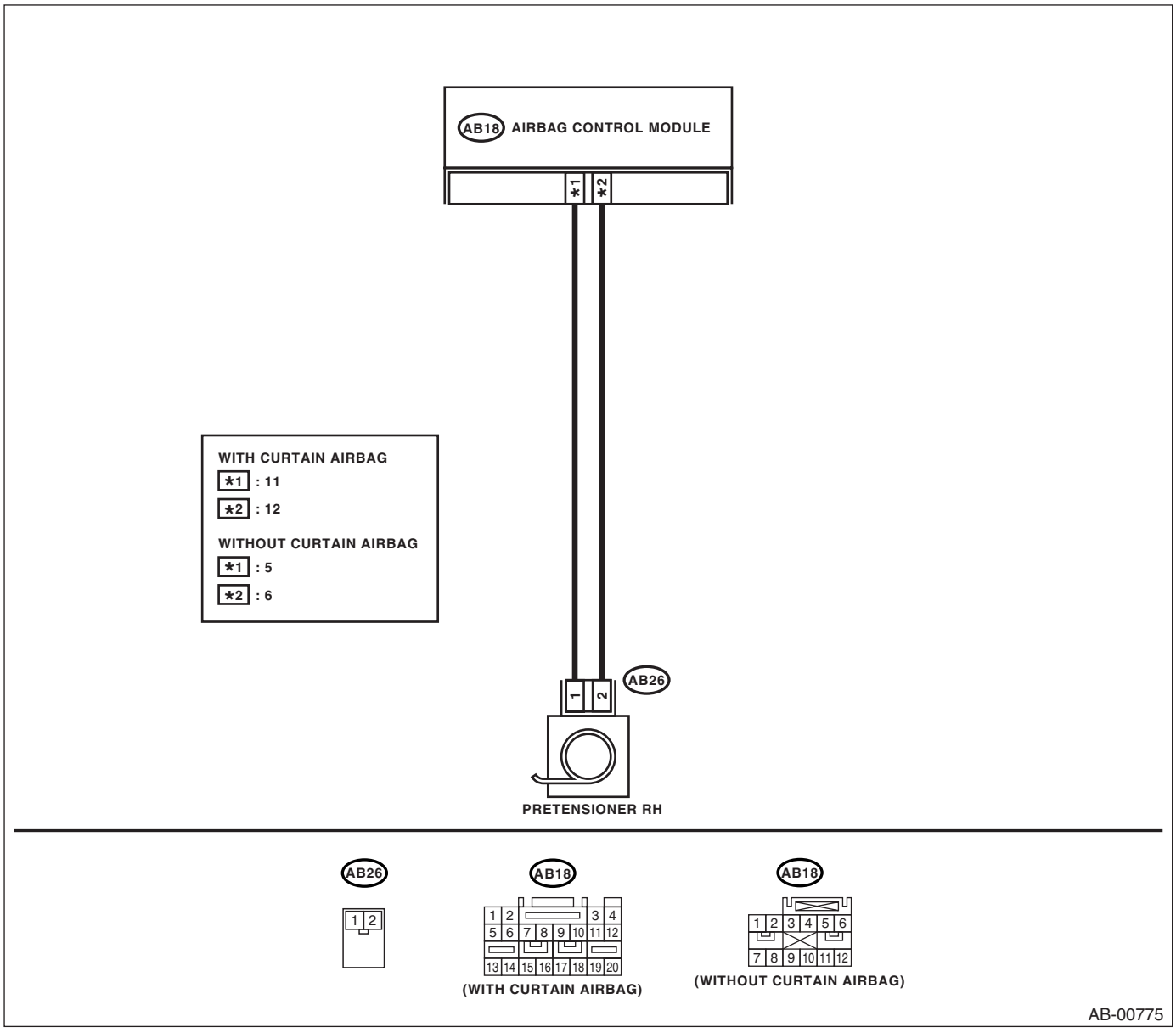
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB26). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (3U) in the test harness U and connector (2N) in the test harness N. ***Connector & terminal*** ***(3U) No. 17 — (2N) No. 1:*** ***(3U) No. 19 — (2N) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 19 — (3U) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 17 — Chassis ground:*** ***(3U) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB26). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 4) Connect the connector (1R) in the test harness R to connector (AB18). 5) Measure the resistance between connector (3R) in the test harness R and connector (2N) in the test harness N. ***Connector & terminal*** ***(3R) No. 17 — (3N) No. 1:*** ***(3R) No. 19 — (3N) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3R) terminals in the test harness R. ***Connector & terminal*** ***(3R) No. 19 — (3R) No. 17:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** Measure the resistance between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 17 — Chassis ground:*** ***(3R) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AB:DTC 62

DTC DETECTING CONDITION:

- Seat belt pretensioner (LH) circuit is open, shorted or shorted to ground.
- Airbag control module is faulty.
- Pretensioner is faulty.
- Pretensioner harness is faulty.

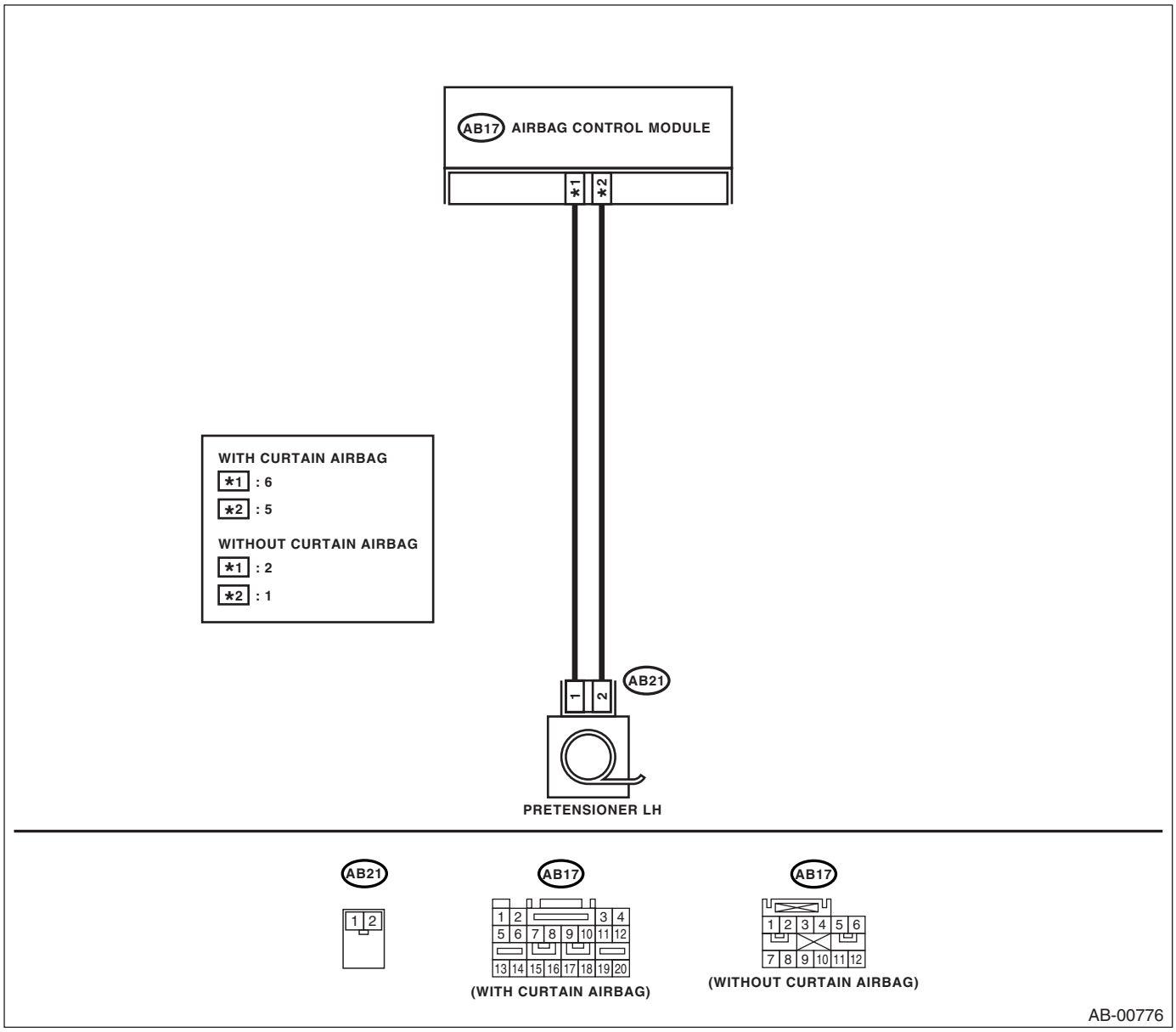
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB21). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (3U) in the test harness U and connector (2N) in the test harness N. ***Connector & terminal*** ***(3U) No. 13 — (2N) No. 2:*** ***(3U) No. 11 — (2N) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3U) terminals in the test harness U. ***Connector & terminal*** ***(3U) No. 11 — (3U) No. 13:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 11 — Chassis ground:*** ***(3U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to the connector (AB21). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 4) Connect the connector (1R) in the test harness R to connector (AB17). 5) Measure the resistance between connector (3R) in the test harness R and connector (2N) in the test harness N. ***Connector & terminal*** ***(3R) No. 13 — (2N) No. 2:*** ***(3R) No. 11 — (2N) No. 1:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3R) terminals in the test harness R. ***Connector & terminal*** ***(3R) No. 11 — (3R) No. 13:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** Measure the resistance between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 11 — Chassis ground:*** ***(3R) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AC:DTC 65

DTC DETECTING CONDITION:

- Seat belt pretensioner (RH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

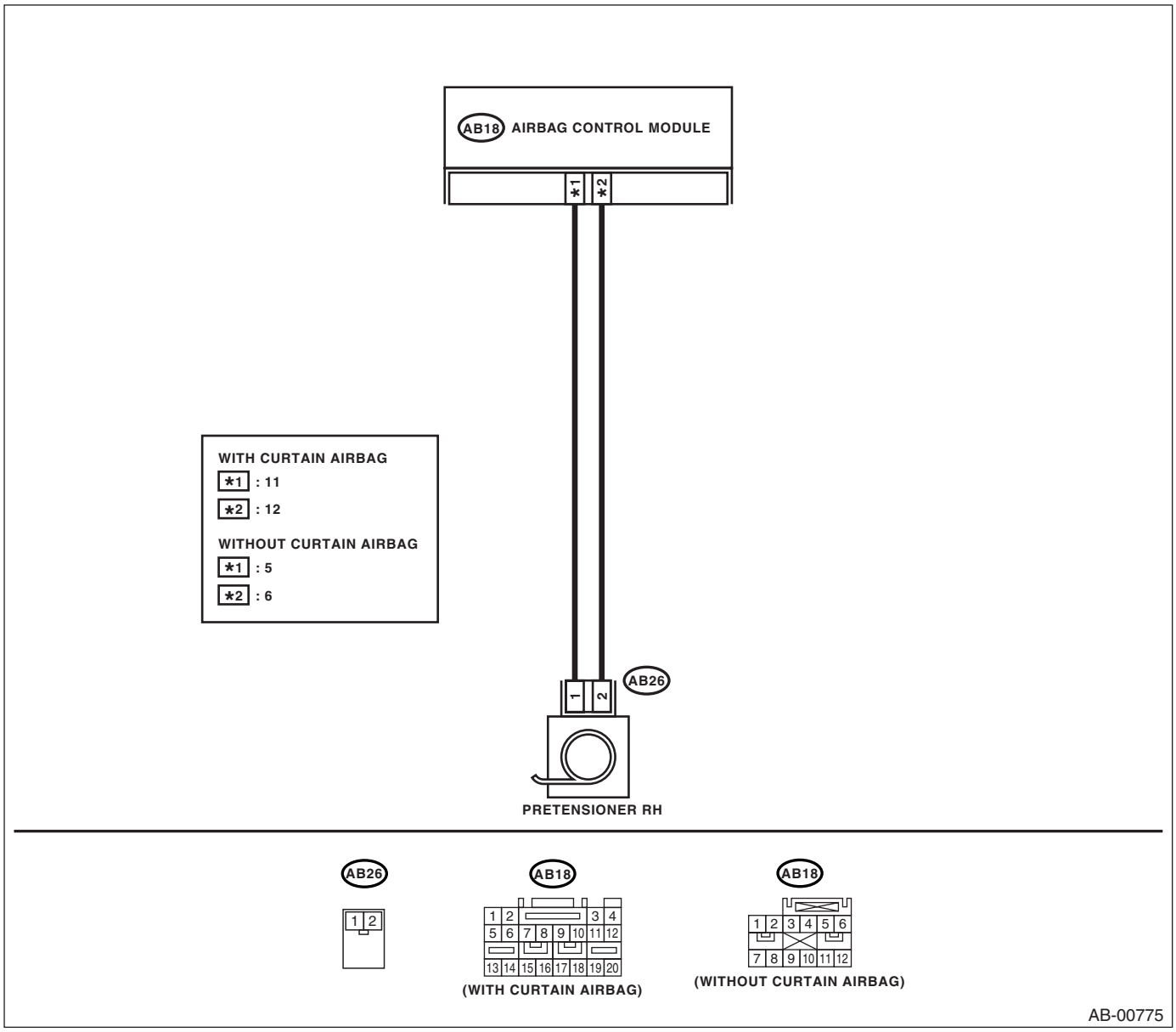
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB26). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the connector (AB33) from curtain airbag module (RH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 17 (+) — Chassis ground (–):*** ***(3U) No. 19 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB26). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connectors (AB17) and (AB18) from the airbag control modules. <Ref. to AB-20, Airbag Control Module.> 4) Connect the connector (1R) in the test harness R to connector (AB18). 5) Connect the battery ground terminal and turn the ignition switch ON. 6) Measure the voltage between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 19 (+) — Chassis ground (–):*** ***(3R) No. 17 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AD:DTC 66

DTC DETECTING CONDITION:

- Seat belt pretensioner (LH) circuit is shorted to power supply.
- Pretensioner is faulty.
- Pretensioner harness is faulty.
- Airbag control module is faulty.

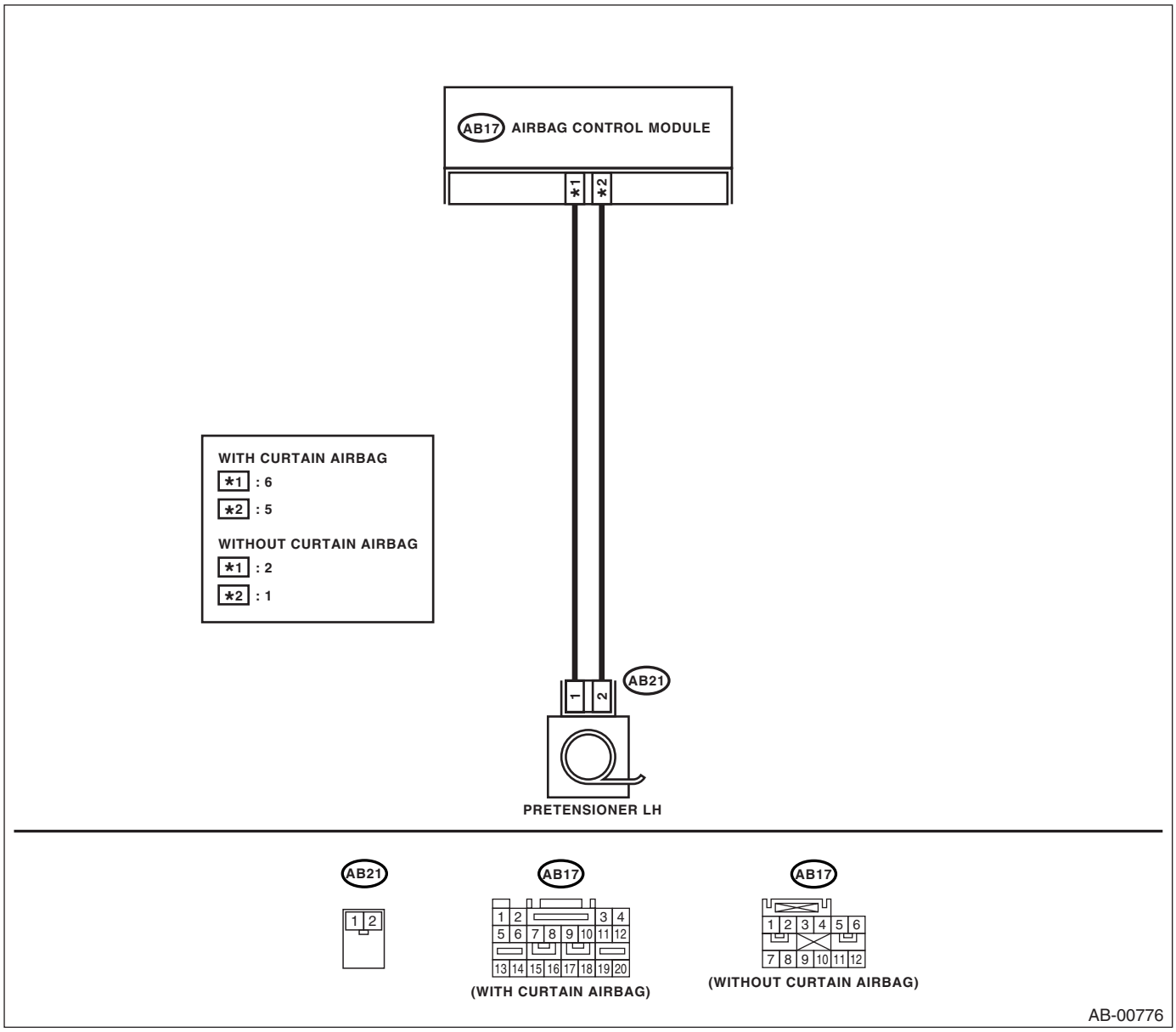
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



1. MODEL WITH CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to the connector (AB21). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the connector (AB31) from curtain airbag module (LH). 5) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (3U) in the test harness U and chassis ground. ***Connector & terminal*** ***(3U) No. 11 (+) — Chassis ground (–):*** ***(3U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

2. MODEL WITHOUT CURTAIN AIRBAG

	Step	Check	Yes	No
1	**CHECK SEAT BELT PRETENSIONER.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Connect the connector (1N) in the test harness N to connector (AB21). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (PRETENSIONER HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from test harness. 3) Disconnect the connectors (AB17) and (AB18) from airbag control modules. <Ref. to AB-20, Airbag Control Module.> 4) Connect the connector (1R) in the test harness R to connector (AB17). 5) Connect the battery ground terminal and turn the ignition switch ON. 6) Measure the voltage between connector (3R) in the test harness R and chassis ground. ***Connector & terminal*** ***(3R) No. 13 (+) — Chassis ground (−):*** ***(3R) No. 11 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AE:DTC 71

DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Driver's side) circuit is open, shorted or shorted to ground.
- Roll connector circuit is open, shorted or shorted to ground.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

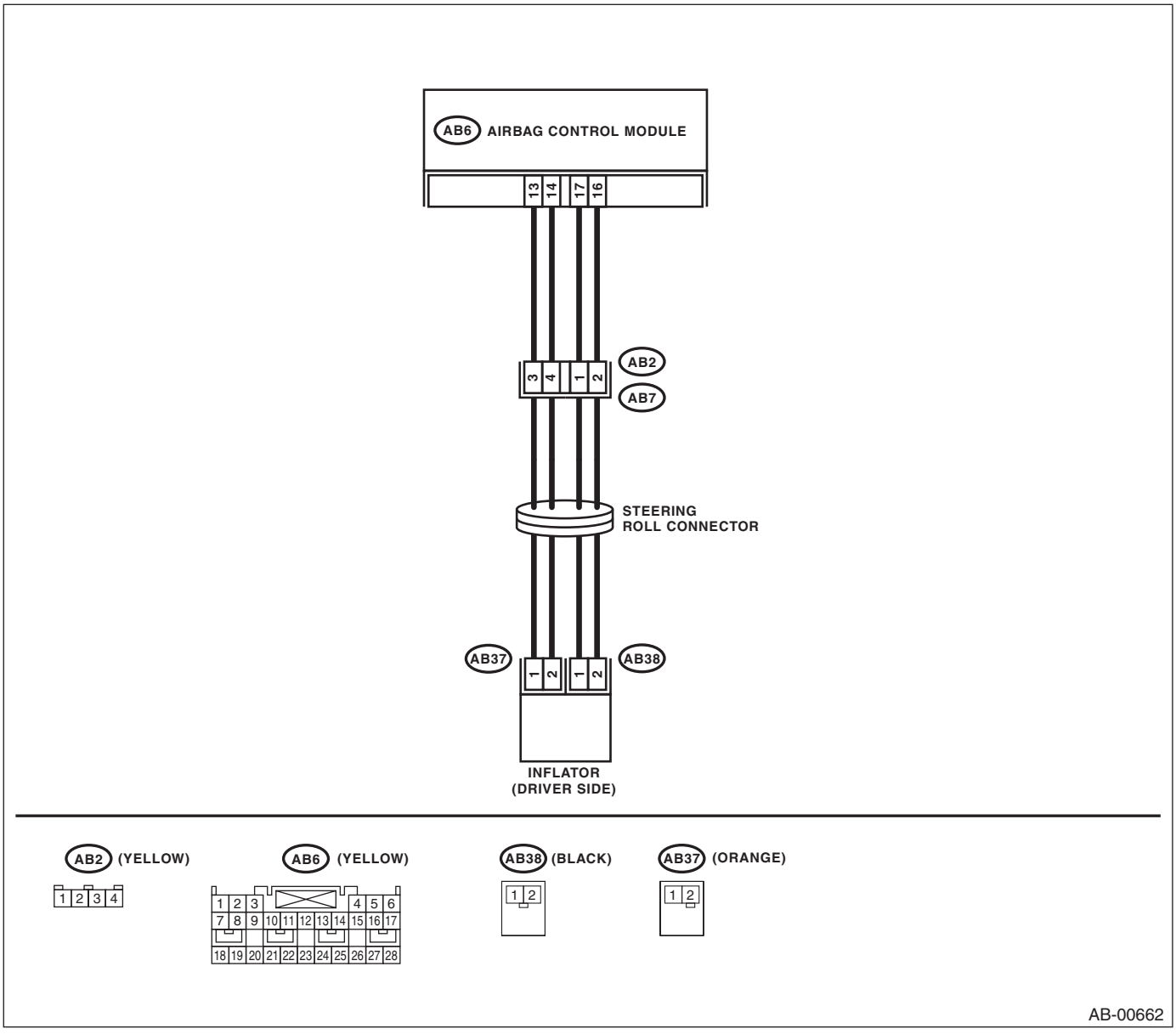
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



Diagnostic Chart with Trouble Code

	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.> 3) Connect the connector (1N) in the test harness N to connector (AB38). 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the connectors (1Q) in the test harness Q to connector (AB37). 6) Connect the airbag resistor to connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-23, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel side cover of passenger's side and disconnect the connector (AB10) and (AB9). <Ref. to AB-15, Passenger's Airbag Module.> 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the resistance between connector (2U) in the test harness U and connector (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 2 — (2P) No. 1:*** ***(2U) No. 4 — (2P) No. 2:*** ***(2U) No. 8 — (3P) No. 3:*** ***(2U) No. 12 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4.**	Replace the airbag main harness with body harness.

	Step	Check	Yes	No
4	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** Measure the resistance between connector (2U) terminals in the test harness U and between the connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 2 — (2U) No. 4:*** ***(2U) No. 4 — Chassis ground:*** ***(2U) No. 2 — Chassis ground:*** ***(2U) No. 8 — (2U) No. 12:*** ***(2U) No. 8 — Chassis ground:*** ***(2U) No. 12 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

AF:DTC 72

DTC DETECTING CONDITION:

- Airbag main harness circuit is open, shorted or shorted to ground.
- Airbag module harness (Passenger's side) circuit is open, shorted or shorted to ground.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

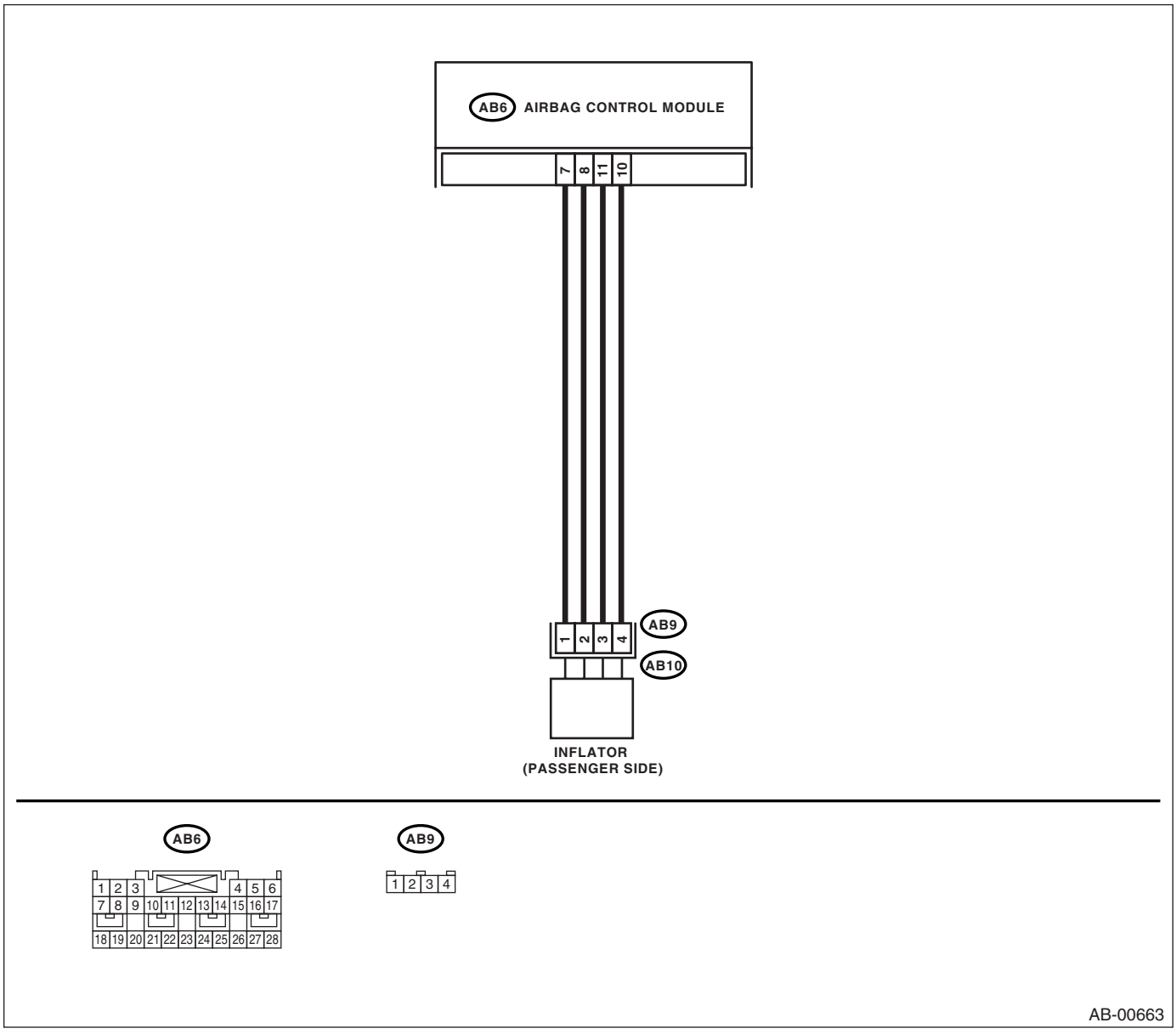
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel side cover on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 6) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the resistance between connector (2U) in the test harness U and connector (2P) and (3P) in the test harness P. ***Connector & terminal*** ***(2U) No. 3 — (2P) No. 1:*** ***(2U) No. 5 — (2P) No. 2:*** ***(2U) No. 9 — (3P) No. 3:*** ***(2U) No. 13 — (3P) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag main harness with body harness.
3	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** Measure the resistance between connector (2U) terminals in the test harness U and between the connector (2U) and chassis ground. ***Connector & terminal*** ***(2U) No. 3 — (2U) No. 5:*** ***(2U) No. 3 — Chassis ground:*** ***(2U) No. 5 — Chassis ground:*** ***(2U) No. 9 — (2U) No. 13:*** ***(2U) No. 9 — Chassis ground:*** ***(2U) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

AG:DTC 75

DTC DETECTING CONDITION:

- Airbag main harness circuit (Driver's side) is shorted to power supply.
- Airbag module harness circuit (Driver's side) is shorted to power supply.
- Roll connector is shorted to the power supply.
- Driver's airbag module is faulty.
- Airbag control module is faulty.

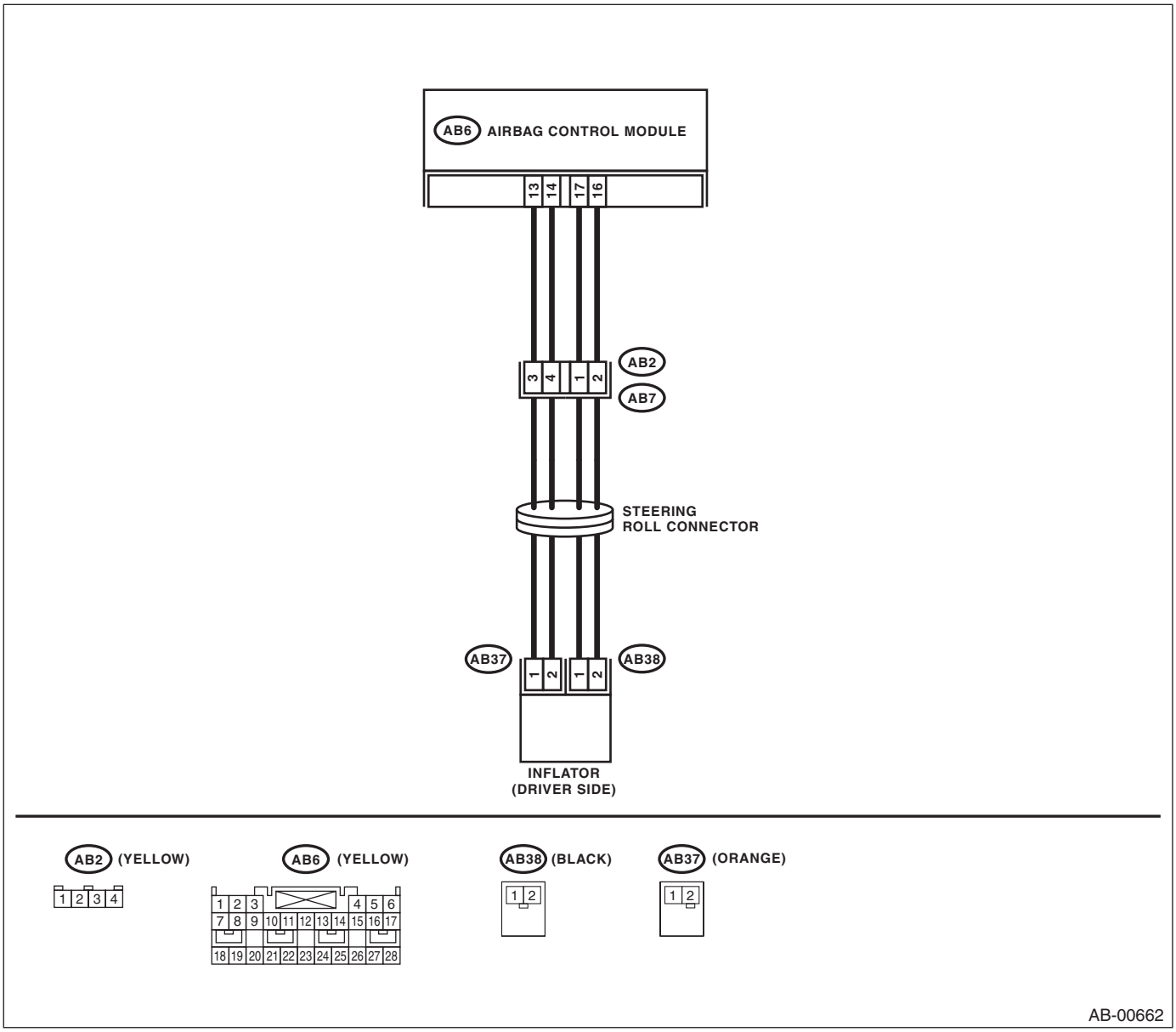
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK DRIVER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.> 3) Connect the connector (AB38) to connector (1N) in the test harness N. 4) Connect the airbag resistor to connector (2N) in the test harness N. 5) Connect the connectors (1Q) in the test harness Q to the connector (AB37). 6) Connect the airbag resistor to connector (2Q) in the test harness Q. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the driver's airbag module. <Ref. to AB-14, Driver's Airbag Module.>	Go to step **2.**
2	**CHECK ROLL CONNECTOR.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the test harness N from connector (AB38). 3) Disconnect the test harness Q from connector (AB37). 4) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 5) Connect the connector (1P) in the test harness P to connector (AB2). 6) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 7) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the roll connector. <Ref. to AB-23, Roll Connector.>	Go to step **3.**
3	**CHECK AIRBAG MAIN HARNESS (DRIVER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel side cover of passenger's side and disconnect the connector (AB10) and (AB9). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Connect the battery ground terminal and turn the ignition switch ON. (engine OFF) 6) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 4 (+) — Chassis ground (−):*** ***(2U) No. 2 (+) — Chassis ground (−):*** ***(2U) No. 8 (+) — Chassis ground (−):*** ***(2U) No. 12 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

AH:DTC 76

DTC DETECTING CONDITION:

- Airbag main harness circuit (Passenger's side) is shorted to power supply.
- Airbag module harness circuit (Passenger's side) is shorted to power supply.
- Passenger's airbag module is faulty.
- Airbag control module is faulty.

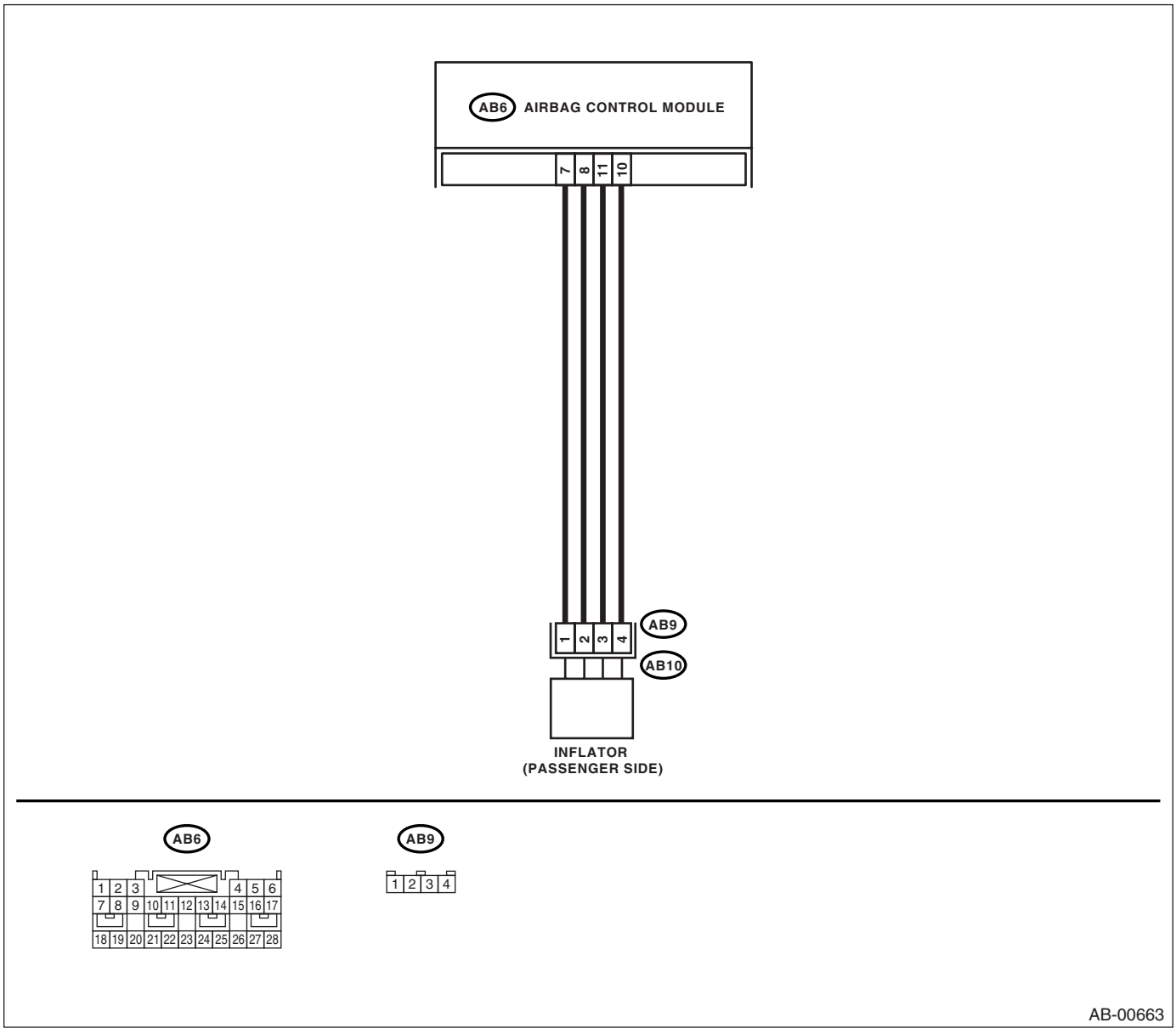
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK PASSENGER'S AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Remove the instrument panel side cover on the passenger's side. 3) Disconnect the connector (AB10) from (AB9). 4) Connect the connector (1P) in the test harness P to connector (AB9). 5) Connect the airbag resistor to connector (2P) and (3P) in the test harness P. 6) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the passenger airbag module. <Ref. to AB-15, Passenger's Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG MAIN HARNESS (PASSENGER'S AIRBAG HARNESS).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the airbag resistor from connector (2P) and (3P) in the test harness P. 3) Remove the instrument panel lower cover, disconnect the connector (AB7) from (AB2). 4) Disconnect the connector (AB6) from airbag control module, and connect the connector (1U) in the test harness U. <Ref. to AB-20, Airbag Control Module.> 5) Measure the voltage between connector (2U) in the test harness U and chassis ground. ***Connector & terminal*** ***(2U) No. 3 (+) — Chassis ground (–):*** ***(2U) No. 5 (+) — Chassis ground (–):*** ***(2U) No. 9 (+) — Chassis ground (–):*** ***(2U) No. 13 (+) — Chassis ground (–):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag main harness with body harness.

AI: DTC 91

DTC DETECTING CONDITION:

- Curtain airbag harness (RH) is faulty.
- Curtain airbag module (RH) is faulty.
- Airbag control module is faulty.

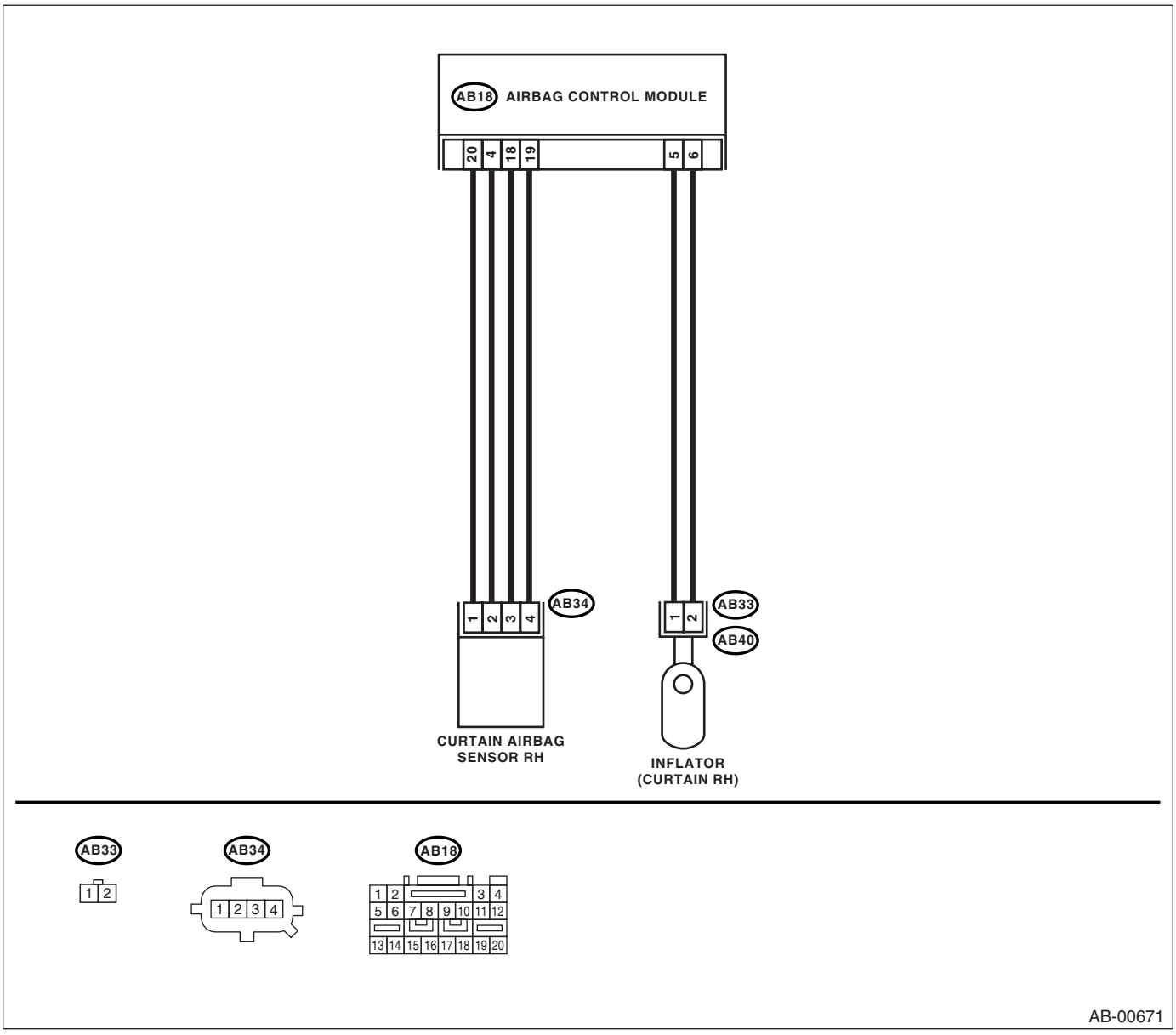
CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB33) from (AB40), and connect the connector (1F) in test harness F to connector (AB33). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the curtain airbag module (RH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Measure the resistance between connector (5U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(5U) No. 6 — (3F) No. 3:*** ***(5U) No. 8 — (3F) No. 4:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (5U) terminals in the test harness U. ***Connector & terminal*** ***(5U) No. 6 — (5U) No. 8:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.
6	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 6 — Chassis ground:*** ***(5U) No. 8 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AJ:DTC 92

DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is faulty.
- Curtain airbag module (LH) is faulty.
- Airbag control module is faulty.

CAUTION:

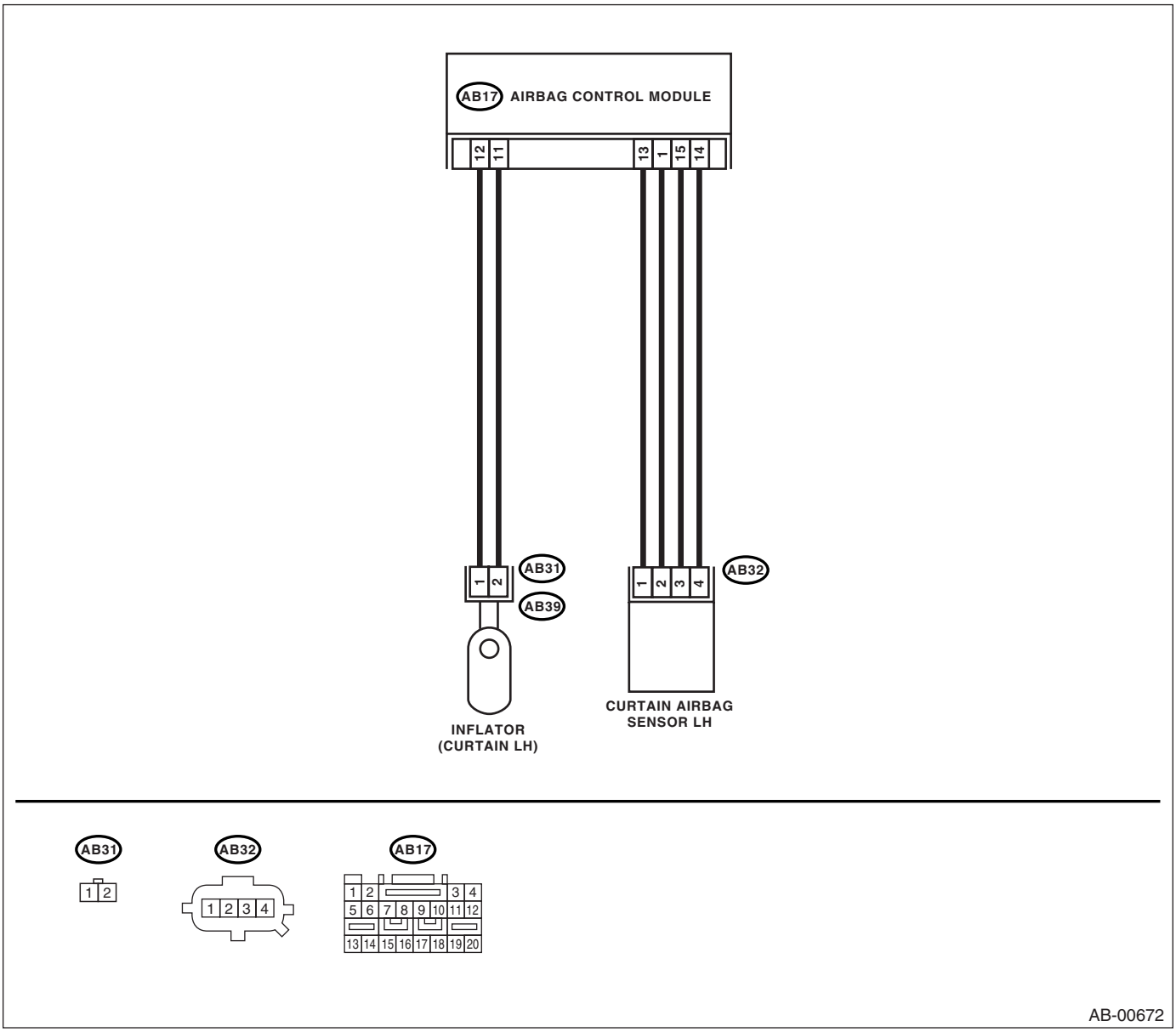
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB31) from (AB39), and connect the connector (1F) in test harness F to connector (AB31). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the curtain airbag module (LH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Measure the resistance between connector (5U) in the test harness U and connector (3F) in the test harness F. ***Connector & terminal*** ***(5U) No. 1 — (3F) No. 4:*** ***(5U) No. 3 — (3F) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3.**	Replace the airbag rear harness with body harness.
3	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (5U) terminals in the test harness U. ***Connector & terminal*** ***(5U) No. 1 — (5U) No. 3:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the airbag rear harness with body harness.
4	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between the terminals of connector (3F) in the test harness F. ***Connector & terminal*** ***(3F) No. 3 — (3F) No. 4:***	Is the resistance more than 1 MΩ?	Go to step **5.**	Replace the airbag rear harness with body harness.
5	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (3F) in the test harness F and chassis ground. ***Connector & terminal*** ***(3F) No. 3 — Chassis ground:*** ***(3F) No. 4 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **6.**	Replace the airbag rear harness with body harness.
6	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** Measure the resistance between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 1 — Chassis ground:*** ***(5U) No. 3 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AK:DTC 95

DTC DETECTING CONDITION:

- Curtain airbag harness (RH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

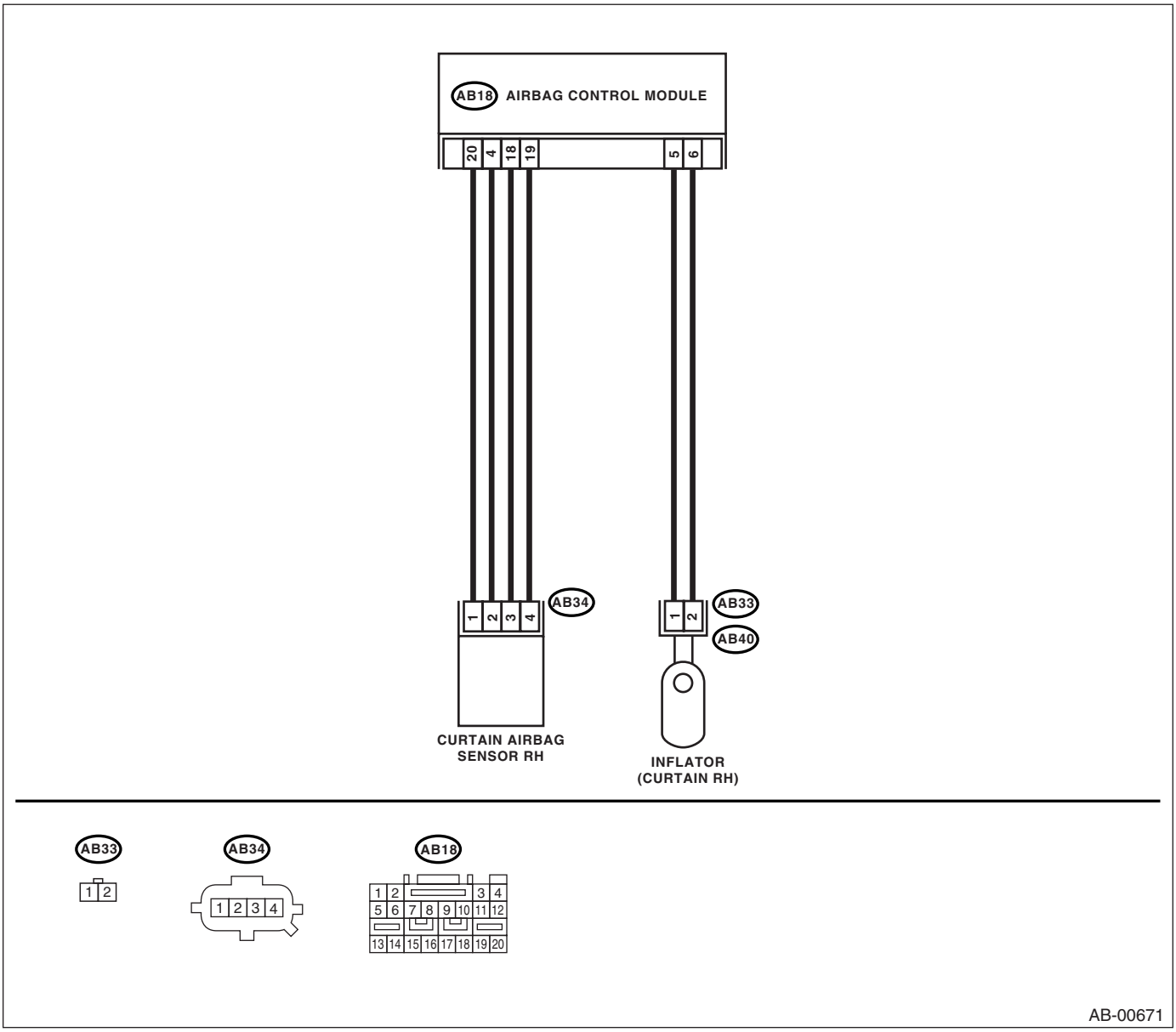
• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.

• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.

• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.

• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CURTAIN AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB33) from (AB40), and connect the connector (1F) in test harness F to connector (AB33). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the curtain airbag module (RH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS RH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB26) from seat belt pretensioner (RH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB24) from side airbag module (RH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB18) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB18). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 6 (+) — Chassis ground (−):*** ***(5U) No. 8 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

AL:DTC 96

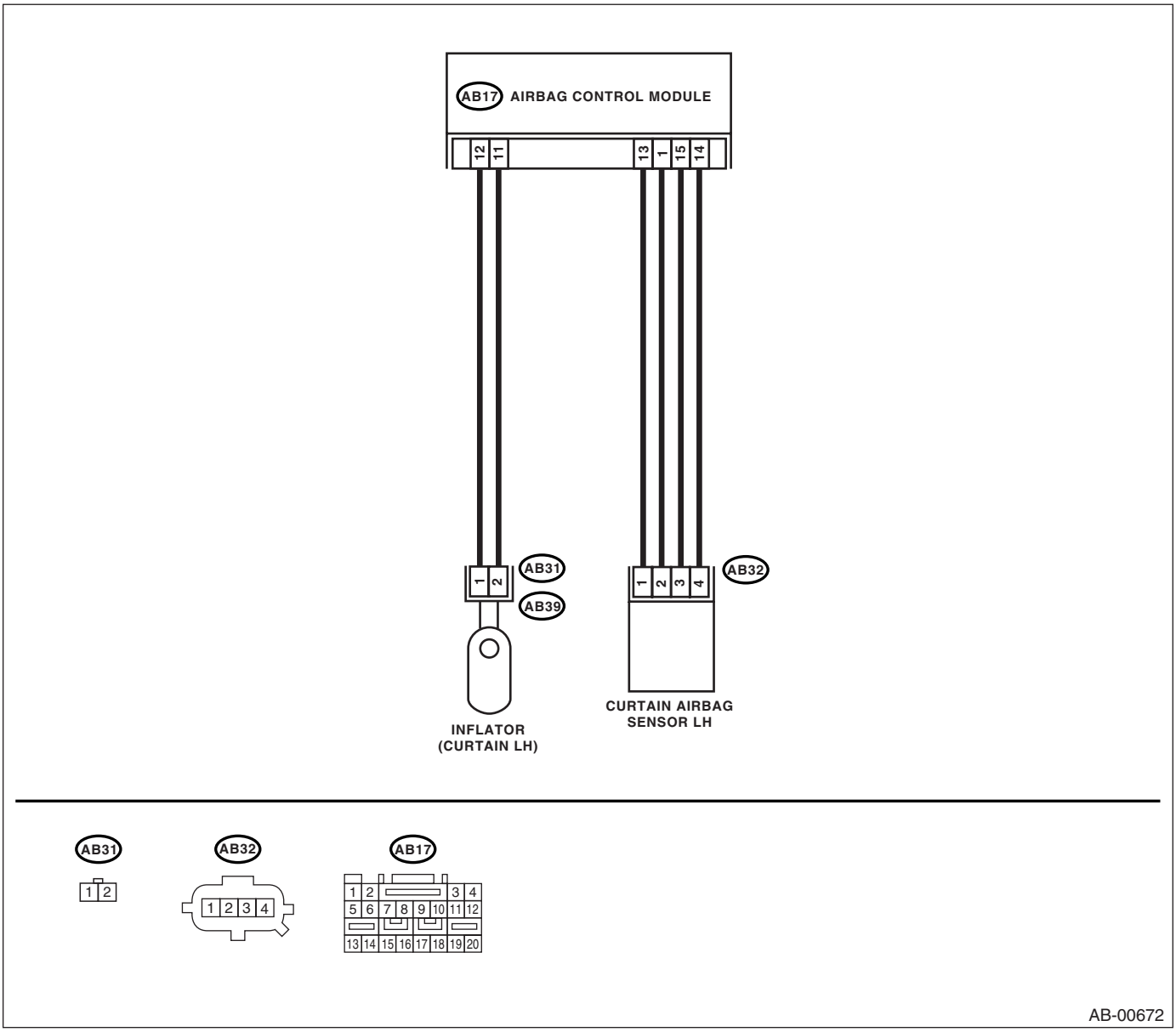
DTC DETECTING CONDITION:

- Curtain airbag harness (LH) is shorted to power supply.
- Airbag control module is faulty.

CAUTION:

• Before diagnosing the airbag system, be sure to turn the ignition switch OFF, disconnect the ground terminal from battery, and wait more than 20 seconds before starting to work.
• Before replacing the airbag module, seat belt pretensioner, roll connector, control module and sensor, reconnect each part and confirm that the warning light operates properly.
• When inspecting the airbag main harness, disconnect the airbag module connector of the driver's and passenger's seats for safety reasons.
• When inspecting the airbag rear harness, disconnect the side airbag module connector, curtain airbag module connector and seat belt pretensioner connector for safety reasons.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK SIDE AIRBAG MODULE.** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB31) from (AB39), and connect the connector (1F) in test harness F to the connector (AB31). 3) Connect the airbag resistor to connector (3F) in the test harness F. 4) Connect the battery ground terminal and turn the ignition switch ON.	Does the airbag warning light operate properly?	Replace the curtain airbag module (LH). <Ref. to AB-18, Curtain Airbag Module.>	Go to step **2.**
2	**CHECK AIRBAG REAR HARNESS (CURTAIN AIRBAG MODULE HARNESS LH).** 1) Turn the ignition switch OFF, disconnect the battery ground terminal, and wait more than 20 seconds. 2) Disconnect the connector (AB21) from seat belt pretensioner (LH). <Ref. to SB-12, Front Seat Belt.> 3) Disconnect the connector (AB19) from side airbag module (LH). 4) Disconnect the airbag resistor from the test harness F. 5) Disconnect the connector (AB17) from airbag control module. <Ref. to AB-20, Airbag Control Module.> 6) Connect the connector (1U) in the test harness U to connector (AB17). 7) Connect the battery ground terminal and turn the ignition switch ON. 8) Measure the voltage between connector (5U) in the test harness U and chassis ground. ***Connector & terminal*** ***(5U) No. 1 (+) — Chassis ground (−):*** ***(5U) No. 3 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Replace the airbag control module. <Ref. to AB-20, Airbag Control Module.>	Replace the airbag rear harness with body harness.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

SEAT BELT SYSTEM

SB

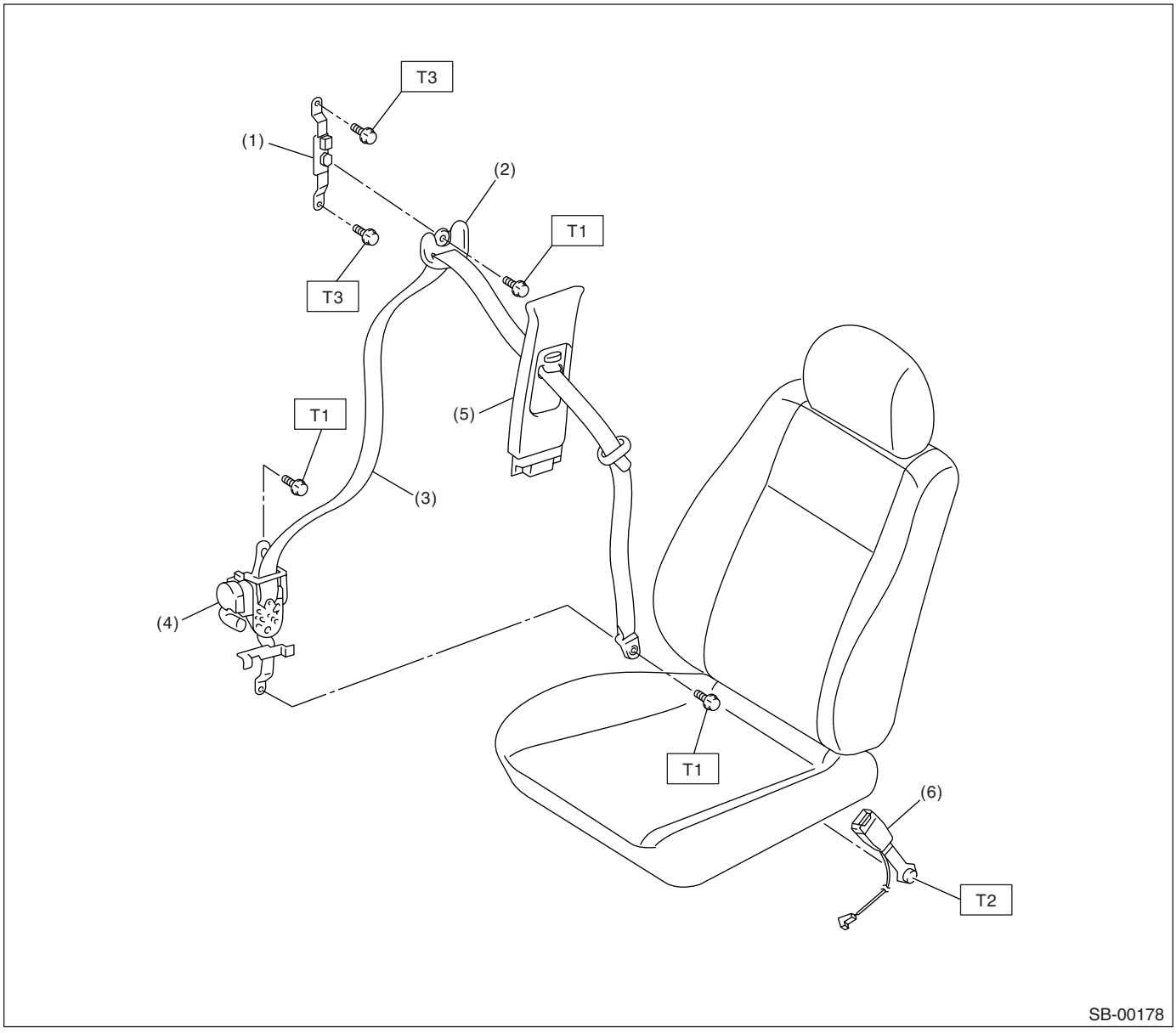
Page

1. General Description 2
2. Pretensioner Connector 6
3. Inspection Locations After a Collision 7
4. Seat Belt Warning System 8
5. Front Seat Belt 12
6. Rear Seat Belt 14
7. Disposal of Pretensioner 17

1. General Description

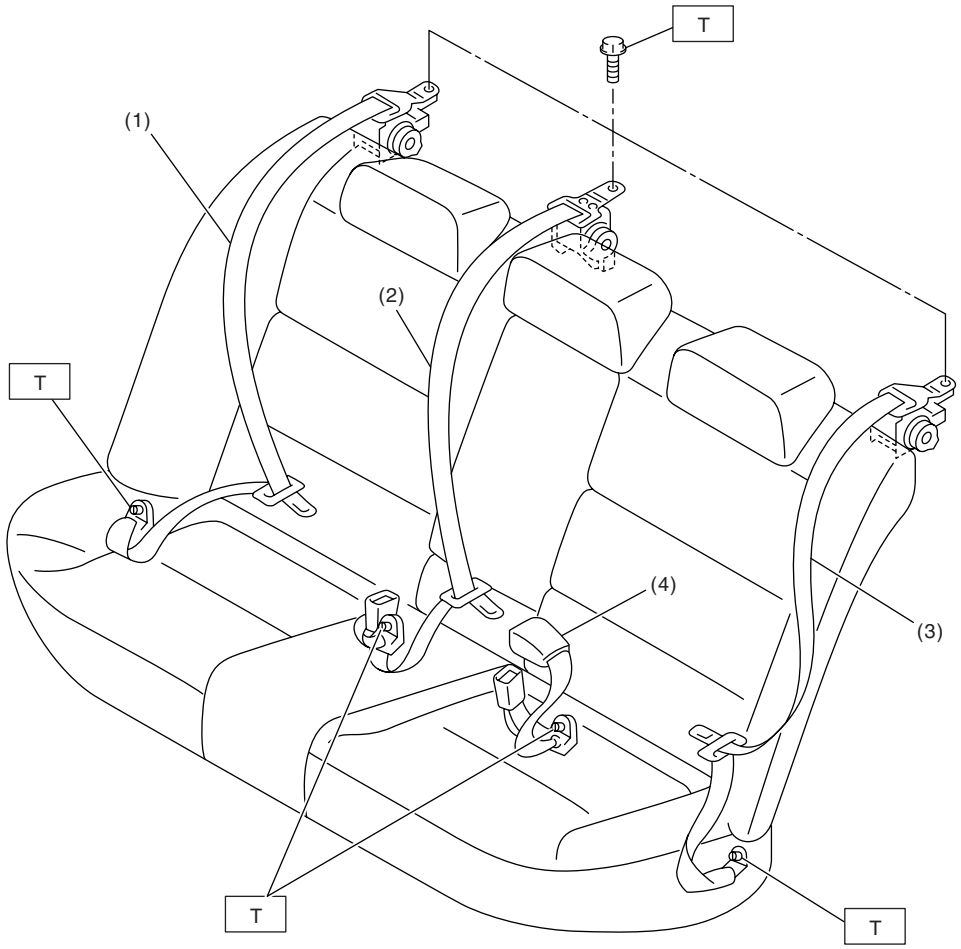
A: COMPONENT

1. FRONT SEAT BELT



(1)	Adjustable anchor ASSY	(4)	Seat belt retractor	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Shoulder anchor	(5)	Center pillar upper trim	***T1: 30 (3.1, 22)***
(3)	Outer seat belt ASSY	(6)	Inner seat belt ASSY	***T2: 38 (3.9, 28)***
				T3: 53 (5.4, 39)

2. REAR SEAT BELT (SEDAN MODEL)

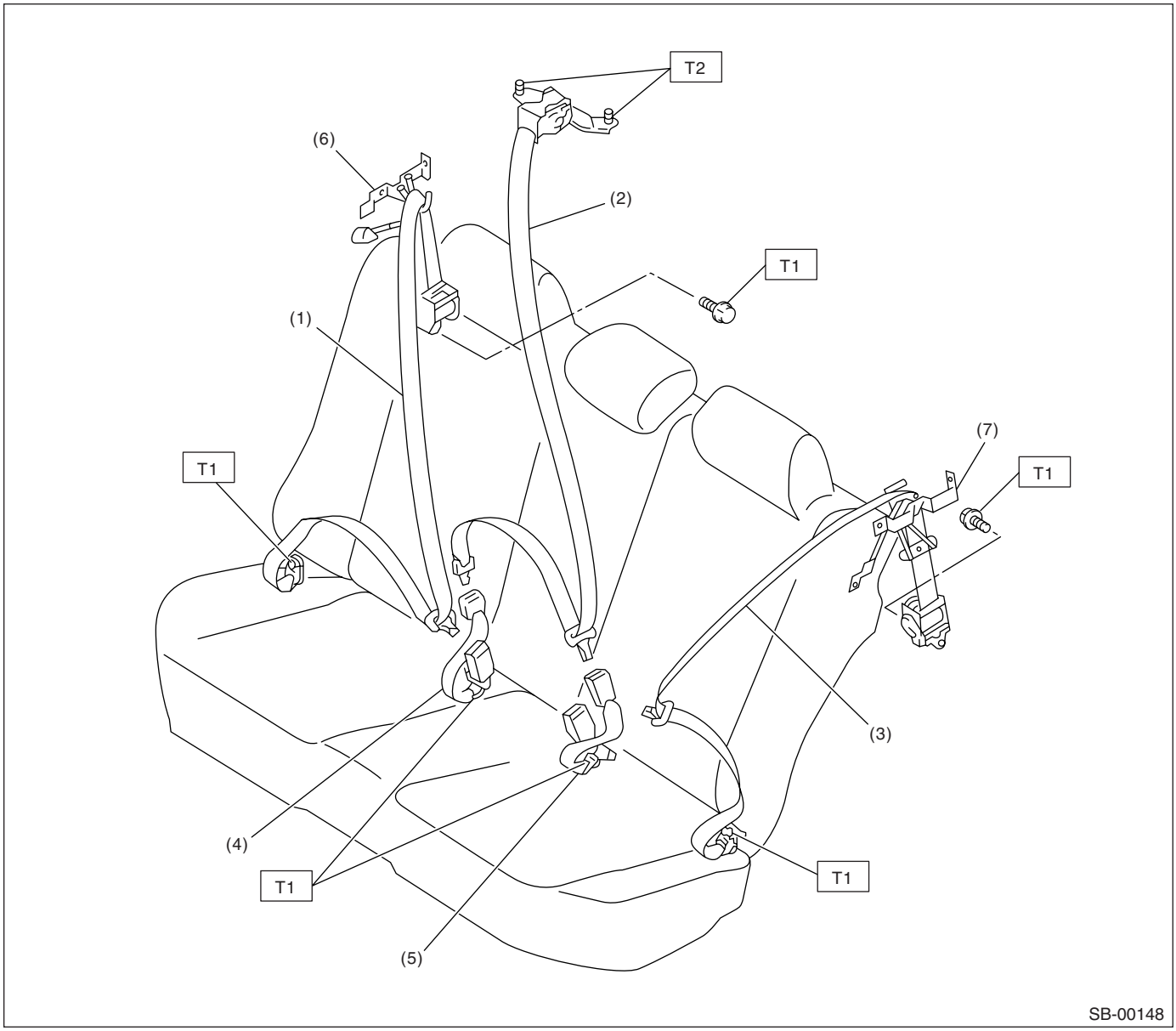


SB-00147

(1) Outer seat belt RH ASSY
(2) Shoulder seat belt CTR ASSY
(3) Outer seat belt LH ASSY
(4) Center seat belt LH ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T: 30 (3.1, 22)

3. REAR SEAT BELT (WAGON MODEL)



(1) Outer seat belt RH ASSY
(2) Shoulder seat belt CTR ASSY
(3) Outer seat belt LH ASSY
(4) Center seat belt RH ASSY
(5) Center seat belt LH ASSY
(6) Outer belt guide RH
(7) Outer belt guide LH

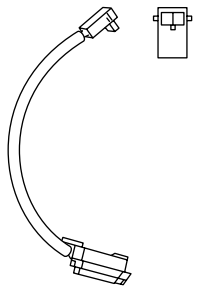
Tightening torque: N·m (kgf-m, ft-lb)
T1: 30 (3.1, 22)
T2: 53 (5.4, 39.1)

B: CAUTION

• Before starting service, turn the ignition switch to OFF, disconnect the battery ground cable and wait for 20 seconds or more.
• The pretensioner system has a backup power source. The pretensioner might deploy if you do not wait for 20 seconds or more before starting work.
• Do not drop or apply any impact to the pretensioner.
• If oil, grease or water gets on the pretensioner, wipe it off immediately with a dry cloth.
• Do not expose the pretensioner to high temperature or flame.
• Do not allow current to flow through or voltage to reach the pretensioner. Do not use a circuit tester to check resistance of the pretensioner.
• Do not disassemble or attempt to repair the pretensioner. If it is dented, cracked or deformed, replace it with a new one.
• Do not use the airbag or pretensioner parts from other vehicles. Always replace the parts with new ones.
• When handling a seat belt with deployed pretensioner, wear gloves and goggles. Wash your hands afterwards.
• Do not reuse a seat belt with deployed pretensioner.
• If the material gets in your eyes or on your skin during deployment, wash it away with clean water, and then consult a doctor.

C: PREPARATION TOOL

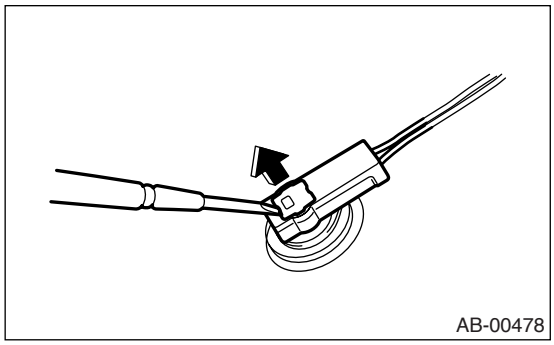
1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST98299SA010	98299SA010	DEPLOYMENT ADAPTER D	• Used for deploying the pretensioner. • Used with DEPLOYMENT TOOL (98299PA030).
ST98299PA030	98299PA030	DEPLOYMENT TOOL	• Used for deploying the pretensioner. • Used with DEPLOYMENT ADAPTER D (98299SA010).

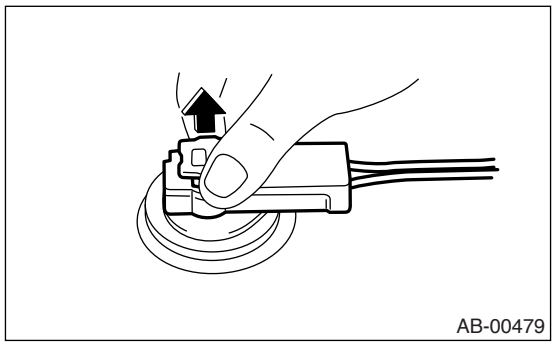
2. Pretensioner Connector

A: REMOVAL

1) Using a flat tip screwdriver, pry the push lock upward to unlock.



2) Pull out the connector to disconnect it from retractor assembly.

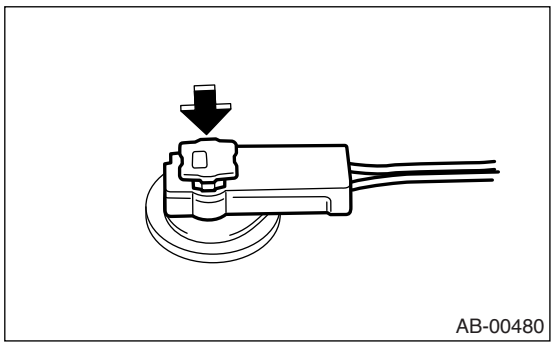


B: INSTALLATION

Connect the connector in the reverse order of disconnection. At this time, be sure to insert the push lock until a connecting sound is heard.

CAUTION:

- **Be sure to insert the connector in until it is locked. Then pull on it gently to make sure that it is locked.**
- **Be sure to push the push lock in securely.**



3. Inspection Locations After a Collision

A: INSPECTION

Check for the following, and replace with new parts if necessary.

• Center pillar lower garnish is discolored or cracked.

• Wire harness and connector are damaged.

4. Seat Belt Warning System

A: WIRING DIAGRAM

1. LHD MODEL

<Ref. to WI-308, LHD MODEL, WIRING DIAGRAM, Seat Belt Warning System.>

2. RHD MODEL

<Ref. to WI-309, RHD MODEL, WIRING DIAGRAM, Seat Belt Warning System.>

B: INSPECTION

TROUBLE SYMPTOM:

- Seat belt warning light does not come on or go off.
- Buzzer does not beep.

1. DRIVER'S SEAT

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT SYSTEM.** Check DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK VEHICLE SPEED SIGNAL.** Check DTC of ABS or vehicle dynamics control (VDC) using Subaru Select Monitor. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC	Go to step **3.**
3	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON (engine OFF). 3) Turn the Subaru Select Monitor switch to ON. 4) Read the data of "Driver's Seat SW input" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "Driver's Seat SW input" "OFF"?	Go to step **4.**	Check the harness between body integrated unit and chassis ground.
4	**CHECK SEAT BELT WARNING LIGHT.** Read the data of "D-belt warning light O/P" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "D-belt warning light O/P" "ON"? Or does the seat belt warning light on combination meter illuminate?	Go to step **5.**	Check the harness between ignition switch and body integrated unit.
5	**CHECK BODY INTEGRATED UNIT.** 1) Insert the tang plate into the driver's seat belt buckle. 2) Read the data of "Driver's Seat SW input" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "Driver's Seat SW input" "ON"?	Go to step **6.**	Check the body integrated unit.
6	**CHECK SEAT BELT WARNING LIGHT.** Read the data of "D-belt warning light O/P" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "D-belt warning light O/P" "OFF"? Or is the seat belt warning light on combination meter off?	Go to step **7.**	Check the harness between ignition switch and body integrated unit.

	Step	Check	Yes	No
7	**CHECK VEHICLE MODEL.**	Is the vehicle EC, EK or KA model?	Go to step **8.**	The seat belt warning light system is normal at this time. A temporary poor contact of harness connector may be the cause. Check the poor contact.
8	**CHECK SEAT BELT WARNING SYSTEM.** 1) Hold the tang plate disconnected from seat belt buckle. 2) Turn the ignition switch to ON.	Does the seat belt warning light illuminate?	Go to step **9.**	Replace the body integrated unit.
9	**CHECK SEAT BELT WARNING SYSTEM.** 1) Lift-up the vehicle. NOTE: Raise all wheels off floor. 2) Hold the tang plate disconnected from seat belt buckle. 3) Start the engine, and set the vehicle speed to more than 24 km/h (15MPH). NOTE: The speed difference between front and rear wheels may light the ABS or VDC warning light, but this indicates no malfunction. When diagnosis is finished, perform the ABS or VDC memory clearance procedure. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Does the seat belt warning light blink and the buzzer beep?	Go to step **10.**	Replace the body integrated unit.
10	**CHECK SEAT BELT WARNING SYSTEM.** While the seat belt warning light is blinking and the buzzer is beeping, decelerate the vehicle speed to less than 21 km/h (13 MPH).	Does the buzzer stop beeping and the seat belt warning light change from blinking to illuminating?	Go to step **11.**	Replace the body integrated unit.
11	**CHECK SEAT BELT WARNING SYSTEM.** 1) Start the engine, and set the vehicle speed to more than 24 km/h (15 MPH). 2) Wait for approx. 108 seconds while the seat belt warning light is blinking and the buzzer is beeping. NOTE: The speed difference between front and rear wheels may light the ABS or VDC warning light, but this indicates no malfunction. When diagnosis is finished, perform the ABS or VDC memory clearance procedure. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Does the buzzer stop beeping and the seat belt warning light change from blinking to illuminating?	The seat belt warning system is normal. A temporary poor contact of harness connector may be the cause. Check the poor contact.	Replace the body integrated unit.

2. PASSENGER'S SEAT

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT SYSTEM.** Check DTC of body integrated unit using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **2.**

	Step	Check	Yes	No
2	**CHECK VEHICLE SPEED SIGNAL.** Check DTC of ABS or VDC using Subaru Select Monitor. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Perform the diagnosis according to DTC.	Go to step **3.**
3	**CHECK BODY INTEGRATED UNIT.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON (engine OFF). 3) Turn the Subaru Select Monitor switch to ON. 4) Read the data of "P seatbelt SW input" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "P seatbelt SW input" "OFF"?	Go to step **4.**	Check the harness between body integrated unit and chassis ground.
4	**CHECK SEAT BELT WARNING LIGHT.** Read the data of "P-belt warning light O/P" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "P-belt warning light O/P" "ON"? Or does the passenger's seat belt warning light illuminate?	Go to step **5.**	Check the harness between ignition switch and body integrated unit.
5	**CHECK BODY INTEGRATED UNIT.** 1) Insert the tang plate into the passenger's seat belt buckle. 2) Read the data of "P seatbelt SW input" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "P seatbelt SW input" "ON"?	Go to step **6.**	Check the body integrated unit.
6	**CHECK SEAT BELT WARNING LIGHT.** Read the data of "P-belt warning light O/P" using Subaru Select Monitor. <Ref. to LAN(diag)-14, OPERATION, Subaru Select Monitor.>	Is the data of "P-belt warning light O/P" "OFF"? Or is the passenger's seat belt warning light off?	Go to step **7.**	Check the harness between ignition switch and body integrated unit.
7	**CHECK VEHICLE MODEL.**	Is the vehicle EC, EK or KA model?	Go to step **8.**	The seat belt warning system is normal at this time. A temporary poor contact of harness connector may be the cause. Check the poor contact.
8	**CHECK SEAT BELT WARNING SYSTEM.** 1) Hold the tang plate disconnected from seat belt buckle. 2) Turn the ignition switch to ON.	Does the seat belt warning light illuminate?	Go to step **9.**	Replace the body integrated unit.

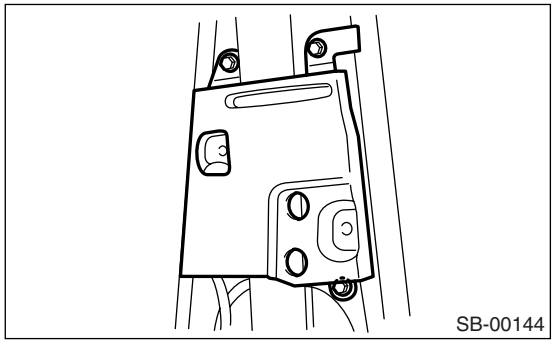
	Step	Check	Yes	No
9	**CHECK SEAT BELT WARNING SYSTEM.** 1) Lift-up the vehicle. NOTE: Raise all wheels off floor. 2) Insert the tang plate of driver's seat belt into seat belt buckle. 3) Hold the tang plate of passenger's seat belt disconnected from seat belt buckle. 4) Start the engine, and set the vehicle speed to more than 24 km/h (15 MPH). NOTE: The speed difference between front and rear wheels may light the ABS or VDC warning light, but this indicates no malfunction. When diagnosis is finished, perform the ABS or VDC memory clearance procedure. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Does the seat belt warning light blink and the buzzer beep?	Go to step **10.**	Replace the body integrated unit.
10	**CHECK SEAT BELT WARNING SYSTEM.** While the seat belt warning light is blinking and the buzzer is beeping, decelerate the vehicle speed to less than 21 km/h (13 MPH).	Does the buzzer stop beeping and the seat belt warning light change from blinking to illuminating?	Go to step **11.**	Replace the body integrated unit.
11	**CHECK SEAT BELT WARNING SYSTEM.** 1) Start the engine, and set the vehicle speed to more than 24 km/h (15 MPH). 2) Wait for approx. 108 seconds while the seat belt warning light is blinking and the buzzer is beeping. NOTE: The speed difference between front and rear wheels may light the ABS or VDC warning light, but this indicates no malfunction. When diagnosis is finished, perform the ABS or VDC memory clearance procedure. <Ref. to ABS(diag)-15, OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, OPERATION, Subaru Select Monitor.>	Does the buzzer stop beeping and the seat belt warning light change from blinking to illuminating?	The seat belt warning system is normal. A temporary poor contact of harness connector may be the cause. Check the poor contact.	Replace the body integrated unit.

5. Front Seat Belt

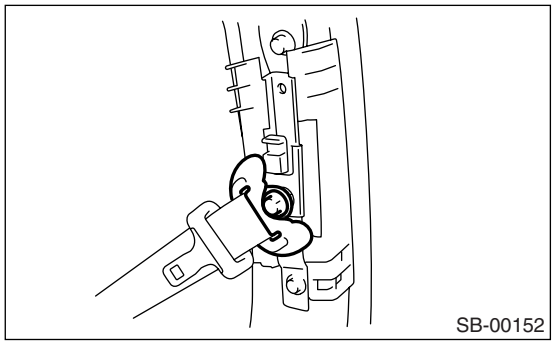
A: REMOVAL

1. OUTER SEAT BELT ASSEMBLY

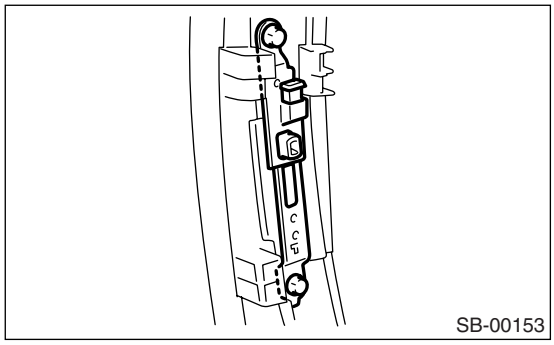
1) Turn the ignition switch to OFF, disconnect the battery ground cable from battery, and wait for more than 20 seconds before starting work.
2) Fold the backrest all the way forward, and then move the front seat all the way forward.
3) Remove the center pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
4) Remove the center pillar upper trim. <Ref. to EI-62, REMOVAL, Upper Inner Trim.>
5) Remove the bolt, and remove the center pillar inner protector lower.


SB-00144

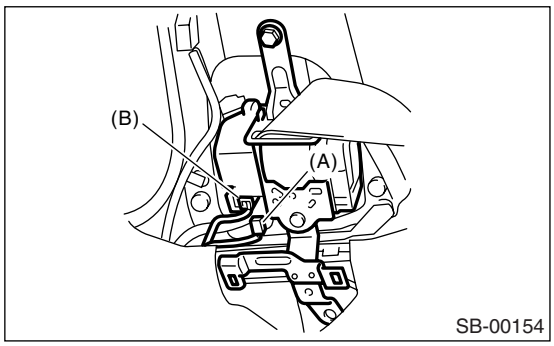
6) Remove the bolt, and then remove the shoulder anchor.


SB-00152

7) Remove the bolt, and then remove the adjustable anchor assembly.


SB-00153

8) Disconnect the pretensioner connector (A), and remove the bolt, and then remove the seat belt retractor.



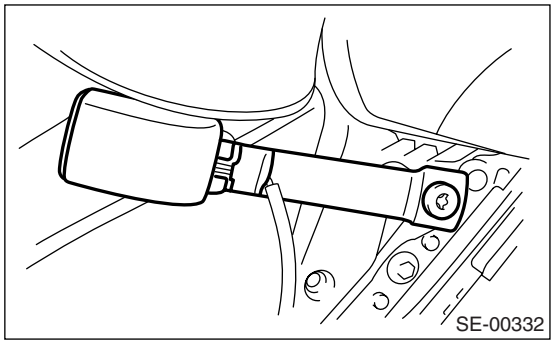
SB-00154

NOTE:
Disconnect the tension reducer connector (B) for the seat belt retractor with tension reducer function.

CAUTION:
• Do not drop or apply any impact to the pretensioner.
• Since the pretensioner and bracket are integrated as a unit, do not disassemble them.

2. INNER SEAT BELT ASSEMBLY

1) Turn the ignition switch to OFF, disconnect the battery ground cable from battery, and wait for more than 20 seconds before starting work.
2) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
3) Disconnect the seat belt warning light connector under the seat.
4) Remove the harness clips from seat rail.
5) Remove the TORX® bolt, and then remove the inner seat belt assembly.


SE-00332

B: INSTALLATION

1. OUTER SEAT BELT ASSEMBLY

Install in the reverse order of removal.

CAUTION:
• The parts of driver and passenger sides are not identical. Before installation, make sure that the correct part is used.
• Be careful not to twist the seat belts during installation.

Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

2. INNER SEAT BELT ASSEMBLY

Install in the reverse order of removal.

Tightening torque:
<Ref. to SB-2, FRONT SEAT BELT, COMPONENT, General Description.>

C: INSPECTION

1. OUTER SEAT BELT ASSEMBLY

Check for the following, and replace with new parts if necessary.
• Pretensioner is cracked or deformed.
• Seat belt is slackened, bent or worn. Seat belt is abnormally wound or extended.

2. INNER SEAT BELT ASSEMBLY

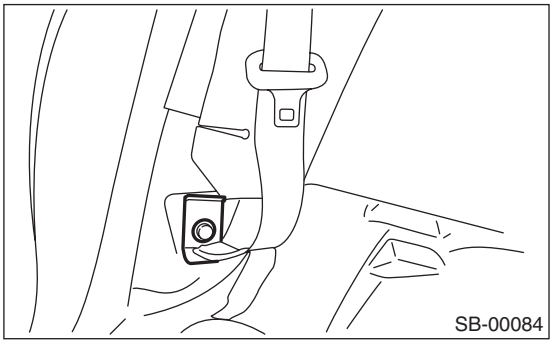
Check for the following, and replace with new parts if necessary.
• Inner seat belt assembly is deformed or damaged.
• Seat belt buckle cannot be engaged properly.

6. Rear Seat Belt

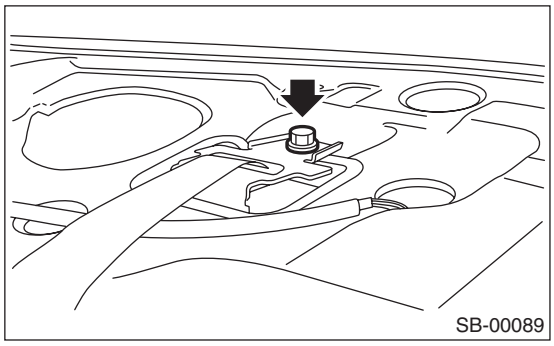
A: REMOVAL

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

1) Remove the rear seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
2) Remove the seat belt lower anchor bolt.

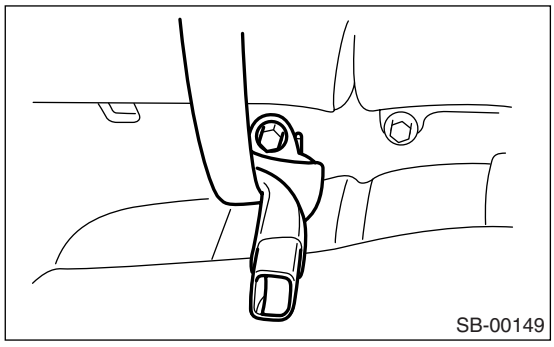

SB-00084

3) Remove the rear quarter trim. <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIRBAG), REMOVAL, Rear Quarter Trim.>
4) Remove the bolt to remove outer seat belt assembly.


SB-00089

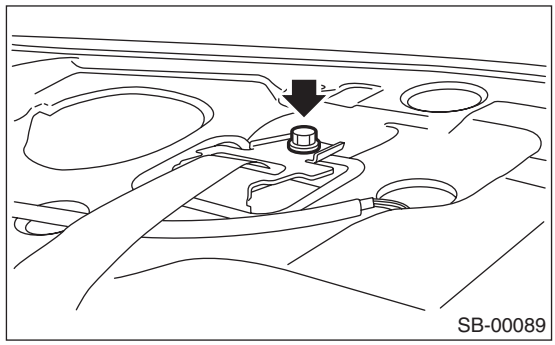
2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

1) Remove the rear cushion seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
2) Remove the seat belt lower anchor bolt.


SB-00149

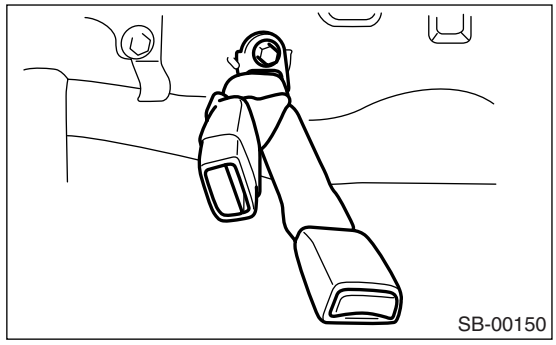
NOTE:
For the model with rear seat belt warning light, disconnect the connector of seat belt warning light.

3) Remove the rear quarter trim. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>
4) Remove the rear shelf trim. <Ref. to EI-70, REMOVAL, Rear Shelf Trim.>
5) Remove the bolt to remove shoulder seat belt assembly.


SB-00089

3. CENTER SEAT BELT LH ASSEMBLY (SEDAN MODEL)

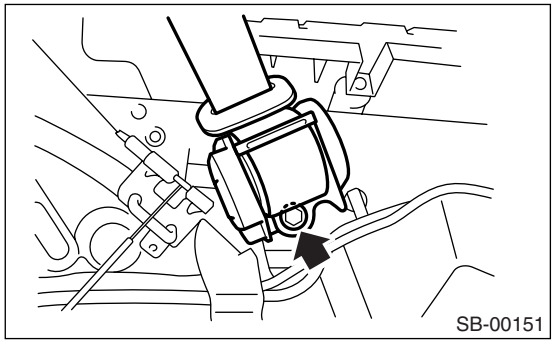
1) Remove the rear seat cushion. <Ref. to SE-14, REMOVAL, Rear Seat.>
2) Remove the bolt to remove center seat belt LH assembly.


SB-00150

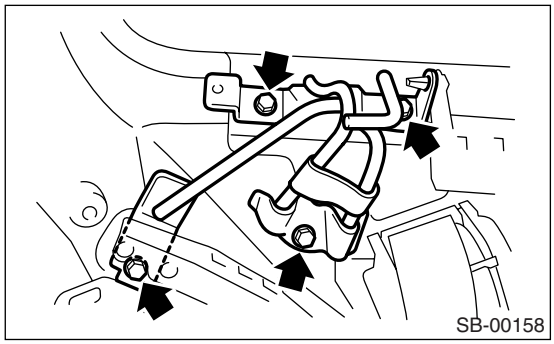
NOTE:
For the model with rear seat belt warning light, disconnect the connector of seat belt warning light.

4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

1) Remove the luggage floor box. <Ref. to EI-74, REMOVAL, Luggage Floor Box.>
2) Remove the rear seat cushion and backrest shoulder. <Ref. to SE-14, SEDAN MODEL, REMOVAL, Rear Seat.>
3) Remove the rear quarter lower trim. <Ref. to EI-63, WAGON MODEL, REMOVAL, Rear Quarter Trim.>
4) Remove the bolt to remove outer seat belt retractor.

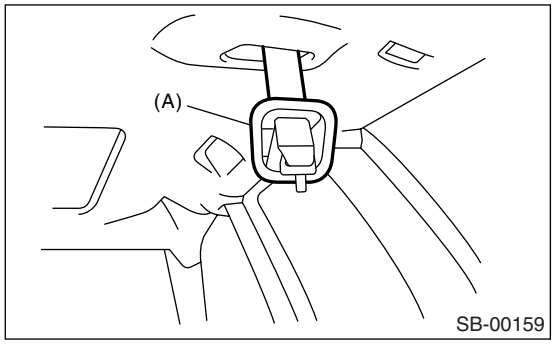

SB-00151

5) Remove the bolts to remove outer seat belt guide.


SB-00158

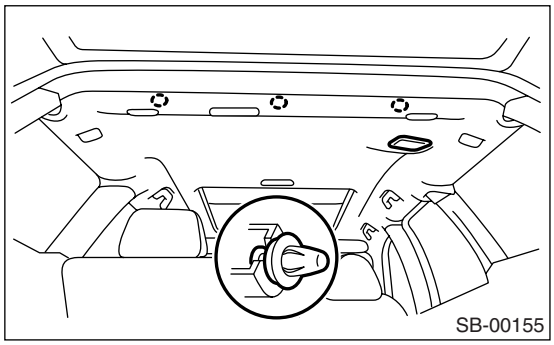
5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

1) Remove the quarter rear pillar trim. <Ref. to EI-63, WAGON MODEL, REMOVAL, Rear Quarter Trim.>
2) Remove the seat belt extract opening (A) from roof trim, and then inset it to the inside of roof trim.



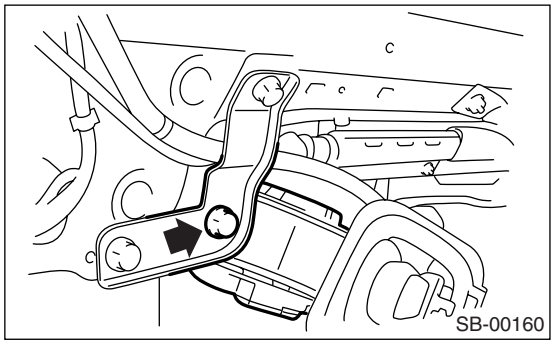
SB-00159

3) Remove the clips, and then lower the roof trim end.


SB-00155

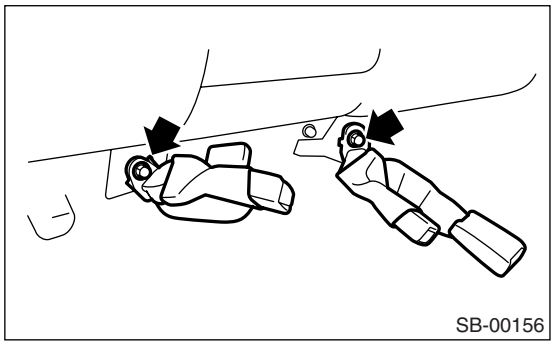
CAUTION:
When removing the roof trim clip, do not pull the roof trim end backward with excessive force, otherwise roof trim may be damaged.

4) Remove the bolt to remove seat belt retractor.


SB-00160

6. CENTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

1) Remove the rear seat cushion. <Ref. to SE-14, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove the bolts, and then detach the center seat belt assembly.


SB-00156

NOTE:
For the model with rear seat belt warning light, disconnect the connector of seat belt warning light.

B: INSTALLATION

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts are smoothly extended and wound.

2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts are smoothly extended and wound.

3. CENTER SEAT BELT LH ASSEMBLY (SEDAN MODEL)

Install in the reverse order of removal.

CAUTION:
During installation, make sure that the seat belts are not twisted.

4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

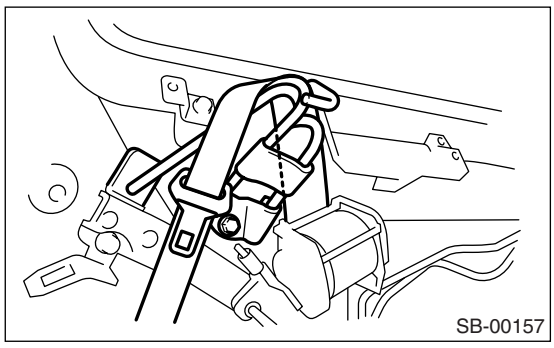
Install in the reverse order of removal.

CAUTION:
• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts are smoothly extended and wound.

5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

Install in the reverse order of removal.

CAUTION:
• After seat belt guide installation, make sure that the seat belts are wound.


SB-00157

• During installation, make sure that the seat belts are not twisted.
• After installation, make sure that the seat belts are smoothly extended and wound.

6. CENTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

Install in the reverse order of removal.

CAUTION:
During installation, make sure that the seat belts are not twisted.

C: INSPECTION

1. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent or wore. Seat belt is abnormally wound or extended.

2. SHOULDER SEAT BELT CTR ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent or wore. Seat belt is abnormally wound or extended.

3. CENTER SEAT BELT LH ASSEMBLY (SEDAN MODEL)

Check for the following, and replace with new parts if necessary.
• Inner belt is deformed or damaged.
• Seat belt buckle cannot be engaged properly.

4. OUTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent or wore. Seat belt is abnormally wound or extended.

5. SHOULDER SEAT BELT CTR ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Seat belt is slackened, bent or wore. Seat belt is abnormally wound or extended.

6. CENTER SEAT BELT RH ASSEMBLY AND LH ASSEMBLY (WAGON MODEL)

Check for the following, and replace with new parts if necessary.
• Inner belt is deformed or damaged.
• Seat belt buckle cannot be engaged properly.

7. Disposal of Pretensioner

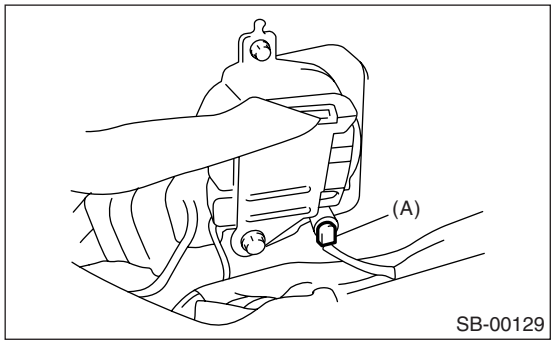
A: CAUTION

• Discard deployed pretensioners because it may cause serious personal injury when accidentally deployed.
• Deployment of the pretensioners should be done on a flat place free from any possible danger. Avoid deploying outdoors during rainy or windy weather.
• Wear protective gloves, safety goggles and earplugs during this operation. Wash your hands afterwards.
• Do not drop or damage the pretensioner.
• Because deploying of pretensioners cause a high-explosive noise, be sure to warn people in the area, and do not allow anyone within a 5 m (16 ft) radius of the disposal site.
• Some smoke will be emitted after deployment of the pretensioner. Therefore, it must be deployed in a well-ventilated place with no fire alarms nearby.
• After deployment, the pretensioner is especially hot, leave it unattended for 40 minutes or longer, and then discard it.
• Do not let water get on the deployed pretensioner.
• Wrap the deployed pretensioner in an airtight vinyl bag, and then discard it.
• If circumstances do not permit the pretensioner deployment, contact the SUBARU dealer.

B: PROCEDURE

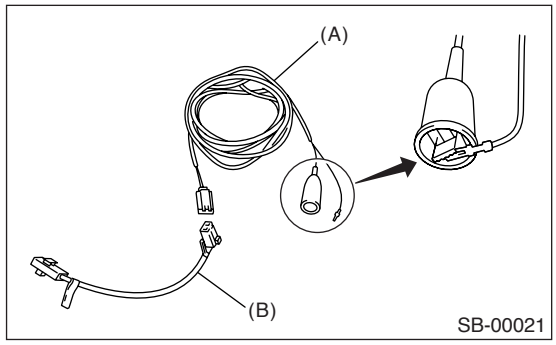
1. DEPLOYING OF PRETENSIONER WHILE INSTALLED IN VEHICLE

1) Fold the backrest all the way forward, and then move the front seat all the way forward.
2) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait more than 20 seconds.
3) Remove the center pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
4) Disconnect the pretensioner connector (A).



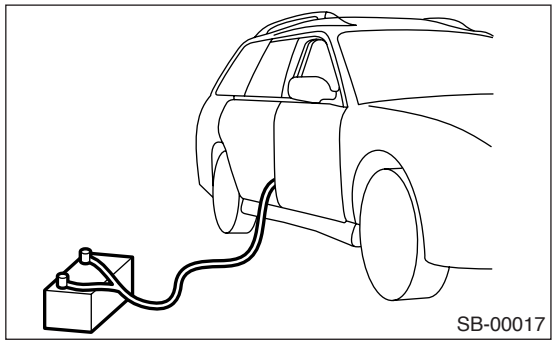
5) Short the terminal to alligator clip of deployment tool (A).
6) Connect the deployment tool and deployment adapter D (B).

CAUTION:
The terminals of deployment tool should be kept shorted until just before deployment of the pretensioner.

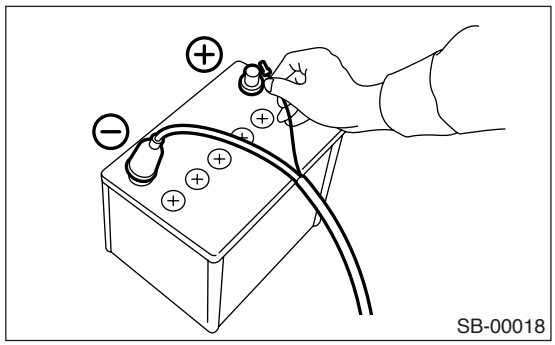


(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter D:
(Tool number 98299SA010)

7) Connect the deployment adapter D connector and pretensioner connector.
8) Extend the wiring of deployment tool to the limit, and make sure that the vehicle is empty. Close all windows, sunroof and rear gate completely.

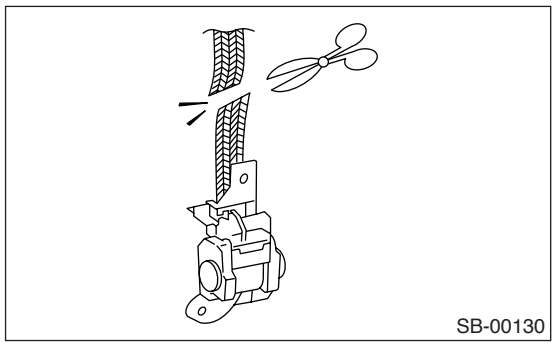


9) Move the battery at least 5 m (16 ft) from vehicle, and secure to the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.
10) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the pretensioner.

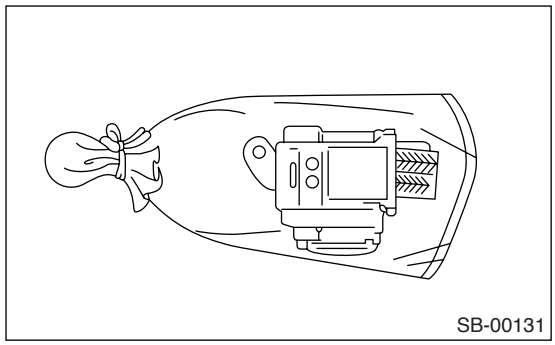


CAUTION:
• After deployment, the pretensioner is especially hot, leave it unattended for 40 minutes or longer, and then discard it.
• Do not let water get on the deployed pretensioner.

11) Remove the front outer belt. <Ref. to SB-12, REMOVAL, Front Seat Belt.>
12) Cut off the seat belt as close to retractor as possible.

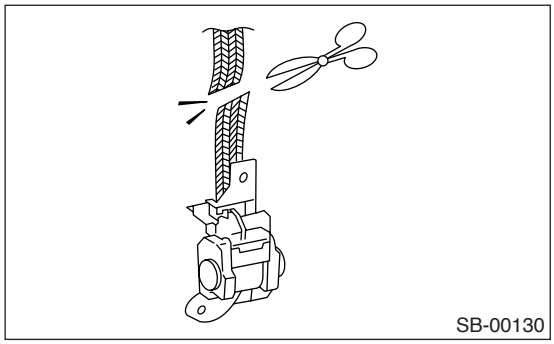

SB-00130

13) Wrap the deployed pretensioner in airtight vinyl bag, and discard it.


SB-00131

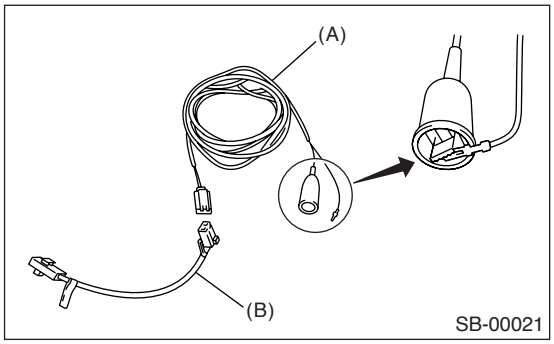
2. DEPLOYING OF PRETENSIONER AFTER REMOVAL FROM VEHICLE

1) Fold the backrest all the way forward, and then move the front seat all the way forward.
2) Turn the ignition switch to OFF, disconnect the battery ground terminal, and wait more than 20 seconds.
3) Remove the front outer belt. <Ref. to SB-12, REMOVAL, Front Seat Belt.>
4) Cut off the seat belt as close to retractor as possible.


SB-00130

5) Short the terminal to alligator clip of deployment tool.
6) Connect the deployment tool (A) and deployment adapter D (B).

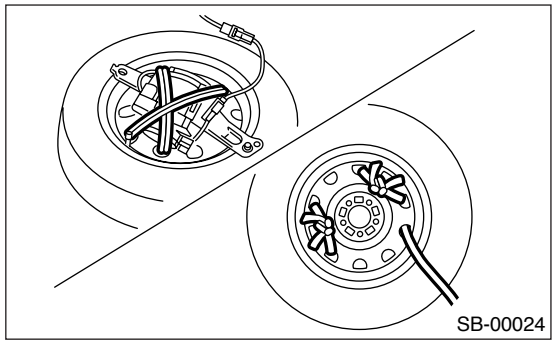
CAUTION:
The terminals of deployment tool should be kept shorted until just before deployment of the pretensioner.



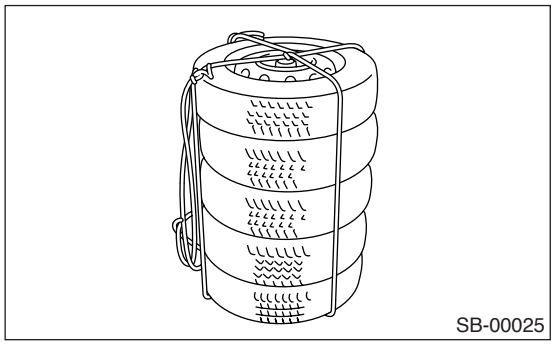
SB-00021

(A) Deployment tool:
(Tool number 98299PA030)
(B) Deployment adapter D:
(Tool number 98299SA010)

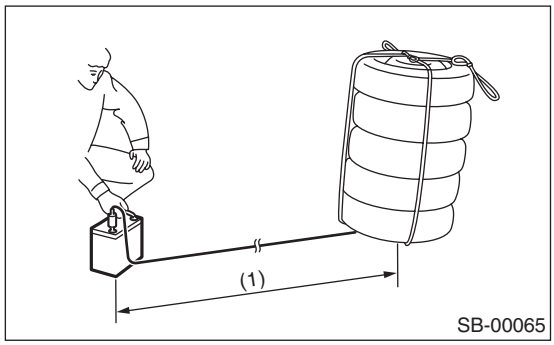
7) Connect the deployment adapter D connector and pretensioner connector.
8) Install the pretensioner on a wheel with tire. Then, bundle three automotive wire harness [each with a sectional area of 1.25 mm^2 (0.00194 sq in) or more], and bind them twofold around the pretensioner bracket and wheel.


SB-00024

9) Put three tires without wheels on the tire installed with pretensioner. Put on an additional tire with a wheel on top, and then fasten them tight with a rope.

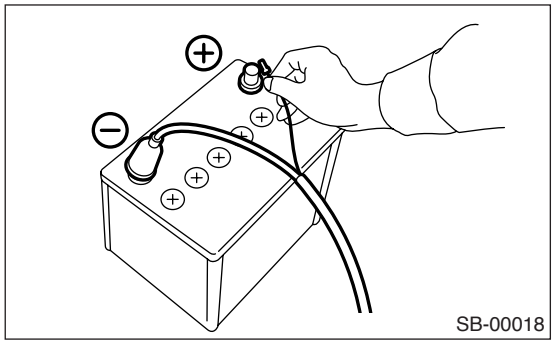


10) Move the battery at least 5 m (16 ft) from tires, and secure the nearby area. Connect the deployment tool alligator clip to the battery negative (–) terminal.



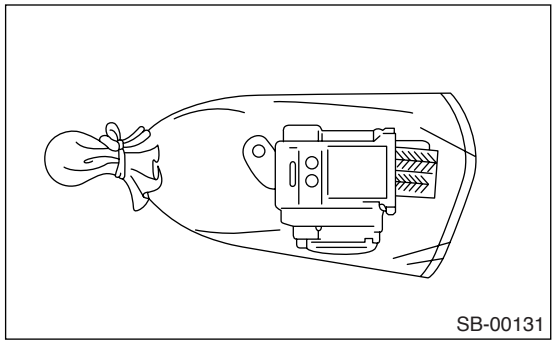
(1) 5 m (16 ft) or more

11) Connect the other cable of deployment tool to the battery positive (+) terminal, and deploy the pretensioner.



CAUTION:
• After deployment, the pretensioner is especially hot, leave it unattended for 40 minutes or longer, and then discard it.
• Do not let water get on the deployed pretensioner.

12) Wrap the deployed pretensioner in airtight vinyl bag, and discard it.



Disposal of Pretensioner

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

LIGHTING SYSTEM

LI

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1. General Description

A: SPECIFICATION

Headlight	Halogen type low beam		12 V — 55 W
	Halogen type high beam		12 V — 60 W
Front turn signal light			12 V — 21 W
Clearance/parking light			12 V — 5 W
Front fog light			12 V — 55 W
Side turn signal light			12 V — 2.7 W (LED)
Rear combination light	Sedan	Tail/stop light (Model with rear fog light)	12 V — 5/21 W
		Tail light (Model without rear fog light)	12 V — 5/21 W
		Stop light (Model without rear fog light)	12 V — 21 W
	Wagon	Tail/stop light	12 V — 5/21 W
	Turn signal light		12 V — 21 W
Back-up light	Sedan		12 V — 16 W
	Wagon		12 V — 21 W
License plate light			12 V — 5 W
Rear fog light	Sedan		12 V — 21 W
	Wagon		12 V — 2 W (LED)
High-mounted stop light	Sedan		12 V — 21 W
	Wagon		12 V — 1.3 W (LED)
Interior light			12 V — 8 W
Spot map light			12 V — 8 W
Luggage room light			12 V — 13 W
Trunk room light			12 V — 5 W
Glove box light			12 V — 1.4 W
Door step light			12 V — 3.5 W

B: CAUTION

• Before removing or installing parts, always disconnect the battery ground cable from battery. When replacing the audio, control module and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble the parts in the reverse order of disassembly procedure unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors securely during reassembly.
• After reassembly, make sure functional parts operate smoothly.

WARNING:
• The air bag system wiring harness is routed near electrical parts and switches. All air bag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the air bag system wiring harness when servicing electrical parts and switches.

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Headlight and Tail Light System

A: WIRING DIAGRAM

1. HALOGEN TYPE HEADLIGHT

<Ref. to WI-269, WIRING DIAGRAM, Headlight System.>

2. CLEARANCE LIGHT AND ILLUMINATION LIGHT

<Ref. to WI-259, WIRING DIAGRAM, Clearance Light and Illumination Light System.>

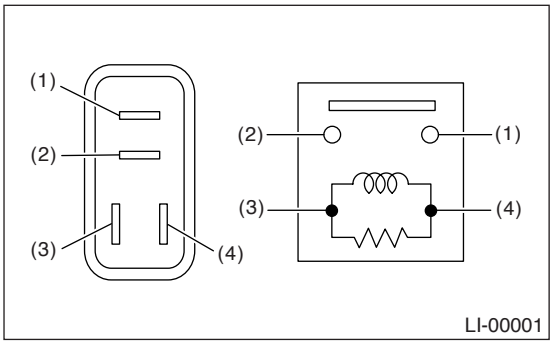
B: INSPECTION

1. HEADLIGHT SWITCH

<Ref. to LI-10, INSPECTION, Combination Switch (Light).>

2. HEADLIGHT RELAY

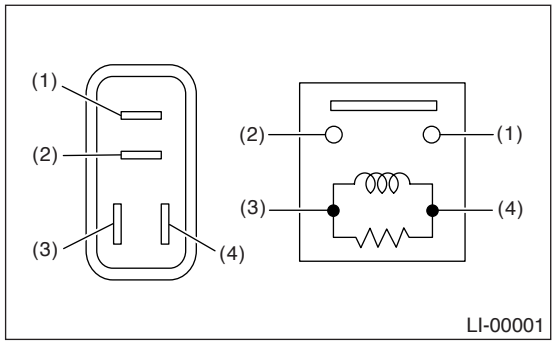
Measure the resistance between headlight relay terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. TAIL AND ILLUMINATION RELAY

Measure the resistance between tail and illumination relay terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

3. Front Fog Light System

A: WIRING DIAGRAM

1. FRONT FOG LIGHT

<Ref. to WI-267, WIRING DIAGRAM, Front Fog Light System.>

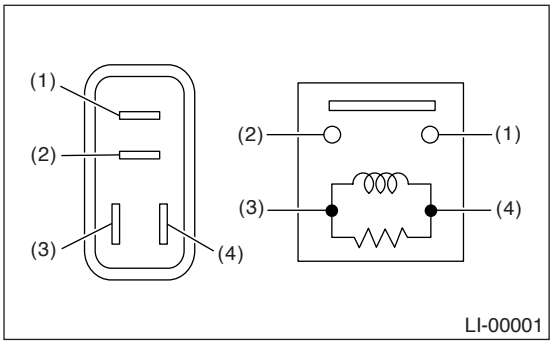
B: INSPECTION

1. FRONT FOG LIGHT SWITCH

Measure the resistance between front fog light switch terminals.
<Ref. to LI-10, INSPECTION, Combination Switch (Light).>

2. FRONT FOG LIGHT RELAY

Measure the resistance between front fog light relay terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

4. Rear Fog Light System

A: WIRING DIAGRAM

1. REAR FOG LIGHT

<Ref. to WI-279, WIRING DIAGRAM, Rear Fog Light System.>

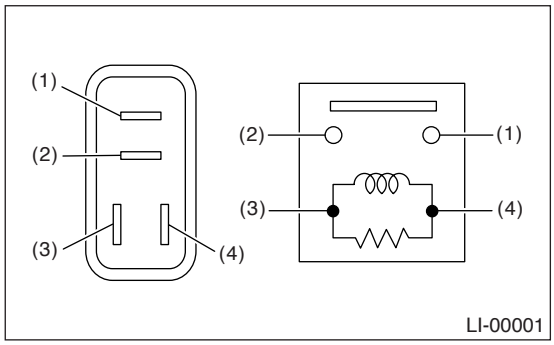
B: INSPECTION

1. REAR FOG LIGHT SWITCH

Measure the rear fog light switch resistance between terminals. <Ref. to LI-10, INSPECTION, Combination Switch (Light).>

2. REAR FOG LIGHT RELAY

Measure the resistance between rear fog light relay terminals while connecting terminal No. 4 to battery positive terminal and No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

5. Turn Signal Light and Hazard Light System

A: WIRING DIAGRAM

1. TURN SIGNAL LIGHT AND HAZARD LIGHT SYSTEM

<Ref. to WI-282, WIRING DIAGRAM, Turn Signal Light and Hazard Light System.>

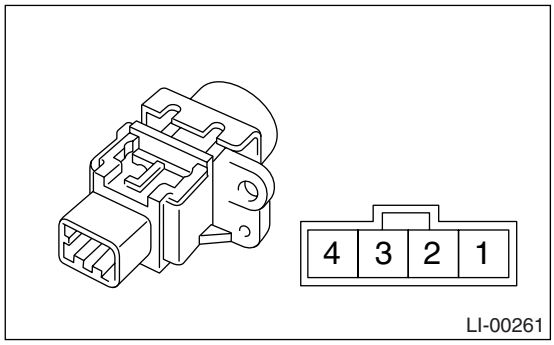
B: INSPECTION

1. TURN SIGNAL SWITCH

<Ref. to LI-10, INSPECTION, Combination Switch (Light).>

2. HAZARD SWITCH

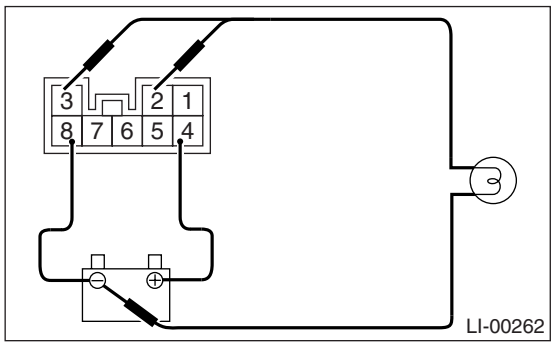
Measure the resistance between hazard switch terminals.



Switch position	Terminal No.	Standard
OFF	2 and 3	More than 1 MΩ
ON		Less than 1 Ω

3. TURN SIGNAL LIGHT AND HAZARD LIGHT MODULE

Connect the battery and turn signal light bulb to the module. The module is properly functioning if it blinks when power is supplied to the circuit.



6. Back-up Light System

A: WIRING DIAGRAM

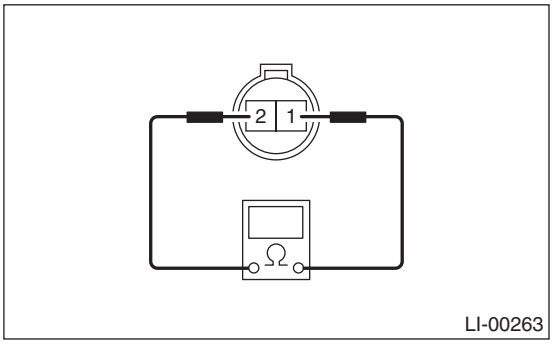
1. BACK-UP LIGHT

<Ref. to WI-257, WIRING DIAGRAM, Back-up Light System.>

B: INSPECTION

1. BACK-UP LIGHT SWITCH (MT MODEL)

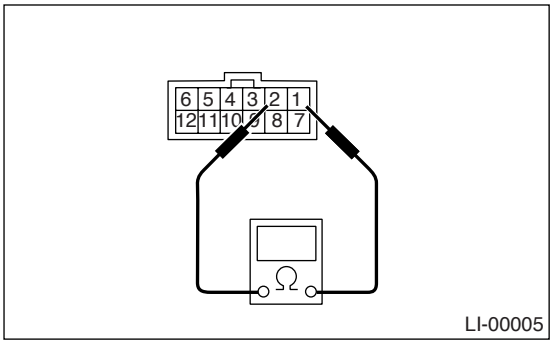
Measure the resistance between back-up light switch terminals.



Switch position	Terminal No.	Standard
When shift lever is set in reverse position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

2. INHIBITOR SWITCH (4AT MODEL)

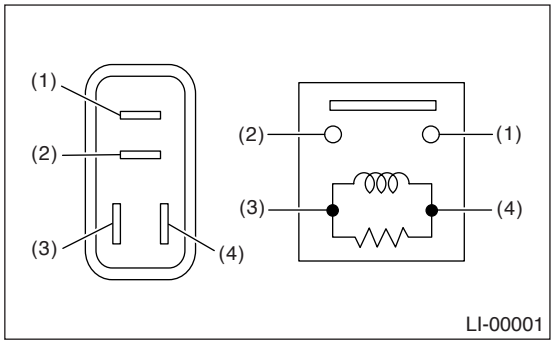
Measure the resistance between inhibitor switch terminals.



Switch position	Terminal No.	Standard
When the selector lever is in "R" range	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

3. BACK-UP LIGHT RELAY (5AT MODEL)

Measure the resistance between back-up light relay terminals when connecting terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground terminal.



Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No flow		More than 1 MΩ

NOTE:
Check other than back-up light relay. <Ref. to 4AT-52, INSPECTION, Inhibitor Switch.>

7. Stop Light System

A: WIRING DIAGRAM

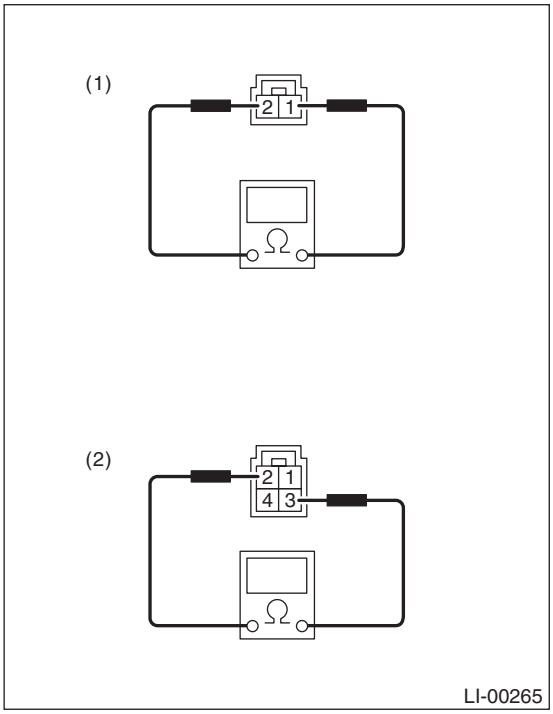
1. STOP LIGHT

<Ref. to WI-281, WIRING DIAGRAM, Stop Light System.>

B: INSPECTION

1. STOP LIGHT SWITCH

Measure the resistance between stop light switch terminals.



(1) Model without cruise control
(2) Model with cruise control

Switch position	Terminal No.	Standard
When brake pedal is depressed	Model without cruise control: 1 and 2	Less than 1 Ω
When brake pedal is released	Model with cruise control: 2 and 3	More than 1 MΩ

8. Room Light System

A: WIRING DIAGRAM

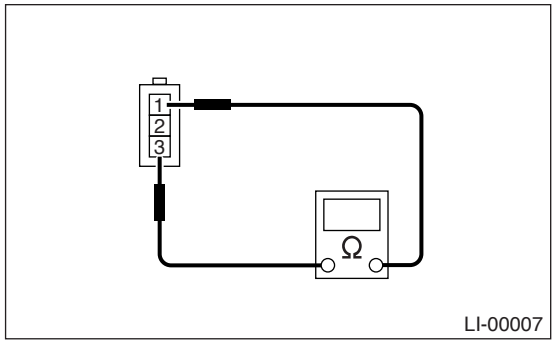
1. INTERIOR LIGHT

<Ref. to WI-271, WIRING DIAGRAM, Interior Light System.>

B: INSPECTION

1. DOOR SWITCH

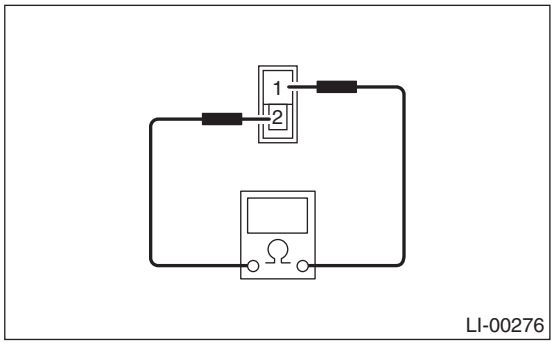
Measure the resistance between door switch terminals.



Switch position	Terminal No.	Standard
When door is opened	1 and 3	Less than 1 Ω
When door is closed		More than 1 MΩ

2. REAR GATE LATCH SWITCH

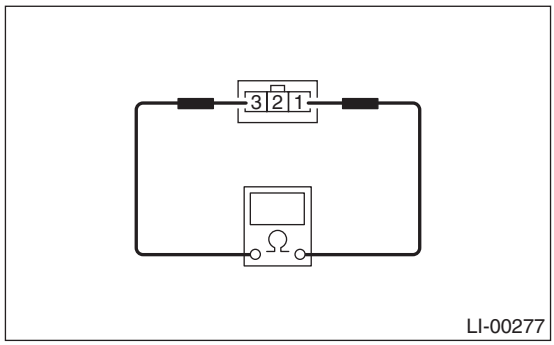
Measure the resistance between rear gate latch switch terminals.



Switch position	Terminal No.	Standard
When rear gate is opened	1 and 2	Less than 1 Ω
When rear gate is closed		More than 1 MΩ

3. TRUNK ROOM LIGHT SWITCH

Measure the resistance between trunk room light switch terminals.

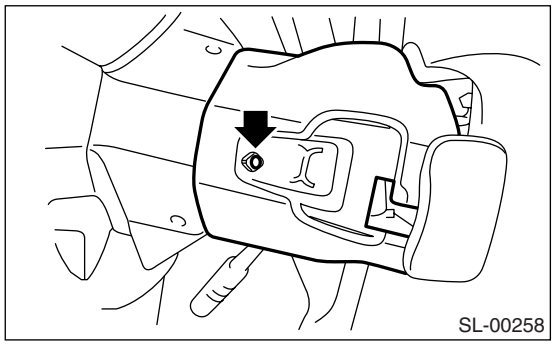


Switch position	Terminal No.	Standard
When trunk lid is opened	1 and 3	Less than 1 Ω
When trunk lid is closed		More than 1 MΩ

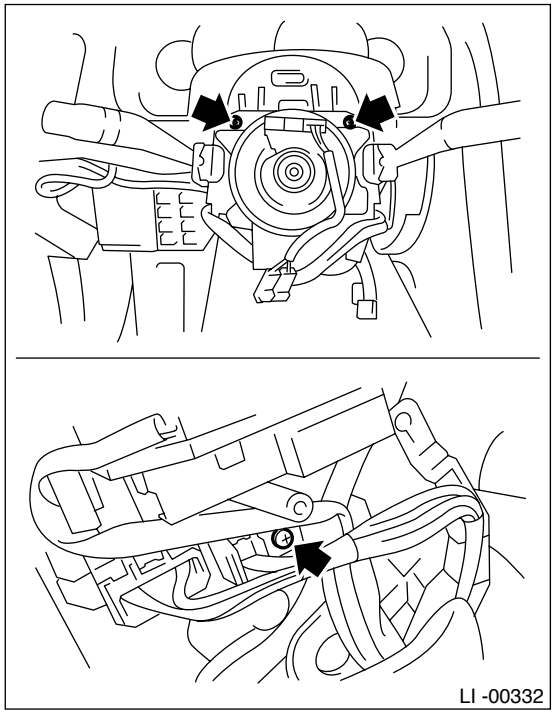
9. Combination Switch (Light)

A: REMOVAL

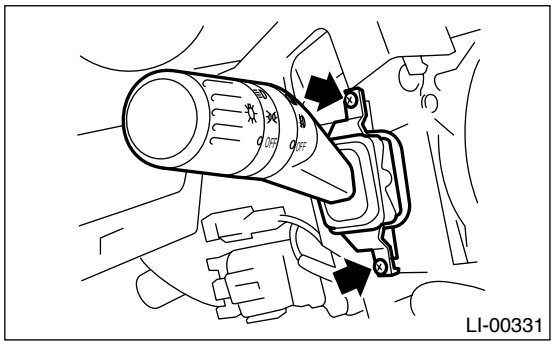
1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
3) Remove the screws and remove the steering column cover (upper and lower).



4) Disconnect the connector from combination switch.
5) Remove three screws, and pull the combination base switch assembly toward you. (Only for KA model)



6) Remove the screws which secure switch, then remove the combination switch.

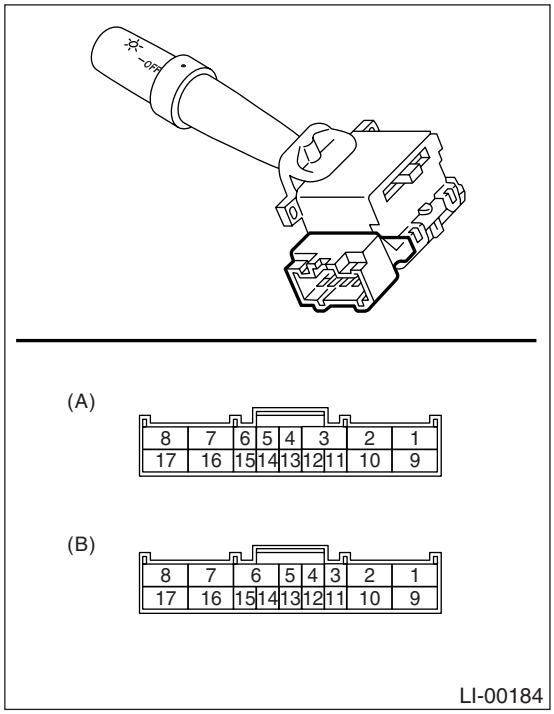


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance between combination switch terminals.



(A) LHD and EK model
(B) KA model

1. LIGHTING SWITCH

• LHD model

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	14 and 16	Less than 1 Ω
Head	13, 14 and 16	Less than 1 Ω

• EK model

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	14 and 16	Less than 1 Ω
Head	13, 14 and 10	Less than 1 Ω

• KA model

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
Tail	15 and 9	Less than 1 Ω
Head	14, 15 and 9	Less than 1 Ω

2. DIMMER & PASSING SWITCH

• LHD model

Switch position	Terminal No.	Standard
Passing	7, 8 and 16	Less than 1 Ω
Low beam	17 and 16	Less than 1 Ω
High beam	7 and 16	Less than 1 Ω

• EK model

Switch position	Terminal No.	Standard
Passing	8, 7 and 10	Less than 1 Ω
Low beam	17 and 10	Less than 1 Ω
High beam	7 and 10	Less than 1 Ω

• KA model

Switch position	Terminal No.	Standard
Passing	1, 2 and 9	Less than 1 Ω
Low beam	10 and 9	Less than 1 Ω
High beam	2 and 9	Less than 1 Ω

3. TURN SIGNAL SWITCH

• LHD model/EK model

Switch position	Terminal No.	Standard
Left	1 and 2	Less than 1 Ω
Neutral	—	More than 1 MΩ
Right	2 and 3	Less than 1 Ω

• KA model

Switch position	Terminal No.	Standard
Left	6 and 7	Less than 1 Ω
Neutral	—	More than 1 MΩ
Right	7 and 8	Less than 1 Ω

4. FRONT FOG LIGHT

• LHD model/EK model

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	10 and 11	Less than 1 Ω

• KA model

Switch position	Terminal No.	Standard
OFF	12 and 16	More than 1 MΩ
ON		Less than 1 Ω

5. REAR FOG LIGHT

• LHD model/EK model

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	12 and 10	Less than 1 Ω

• KA model

Switch position	Terminal No.	Standard
OFF	16 and 13	More than 1 MΩ
ON		Less than 1 Ω

10. Headlight Beam Leveler System

A: WIRING DIAGRAM

1. HEADLIGHT BEAM LEVELER SYSTEM

<Ref. to WI-243, WIRING DIAGRAM, Headlight Beam Leveler System.>

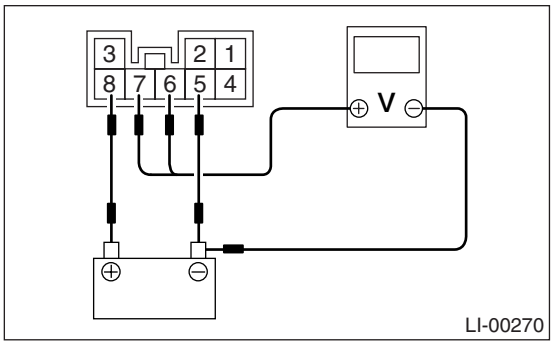
B: INSPECTION

1. HEADLIGHT BEAM LEVELER ACTUATOR

1) Turn on the headlights.
2) Confirm the headlight beam level is lowered by changing the switch position to 0 → 1 → 2 → 3 → 4 → 5.

2. HEADLIGHT BEAM LEVELER SWITCH

Connect the battery and headlight beam leveler switch connector to the circuit tester. Measure the voltage at each switch position.

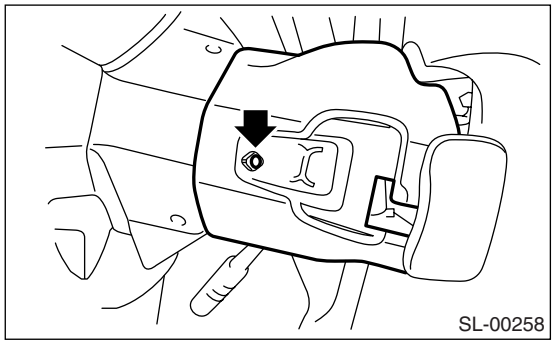


Switch position	Terminal No.	Standard
0	6, 7 (+) and battery (−)	Battery voltage
1		Battery voltage
2		Battery voltage
3		Battery voltage
4		Battery voltage
5		Battery voltage

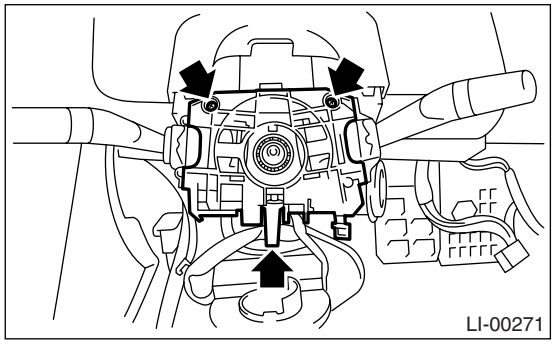
11.Combination Base Switch Assembly

A: REMOVAL

1) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>
2) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
3) Remove the screws and remove the steering column lower cover.



4) Remove the combination switch. <Ref. to LI-10, REMOVAL, Combination Switch (Light).> <Ref. to WW-8, REMOVAL, Combination Switch (Wiper).>
5) Remove the four screws and remove the roll connector.
6) Remove the three screws.



7) Disconnect the connector and remove the combination base switch assembly.

B: INSTALLATION

1) Install in the reverse order of removal.
2) Before installing steering wheel, be sure the direction of roll connector is adjusted with steering. <Ref. to AB-23, ADJUSTMENT, Roll Connector.>

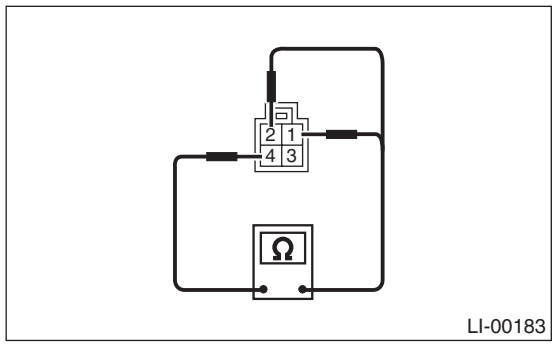
C: INSPECTION

1. COMBINATION BASE SWITCH ASSEMBLY

Inspect the combination base switch assembly and roll connector for crack or deformation. If any damage is found, replace with a new one.

2. PARKING SWITCH

Measure the resistance between parking switch terminals.

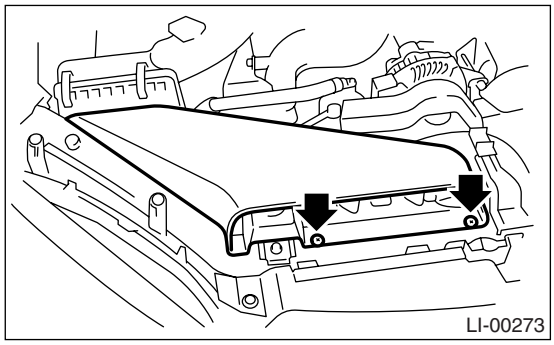


Switch position	Terminal No.	Standard
OFF	2 and 4	Less than 1 Ω
ON	1 and 4	Less than 1 Ω

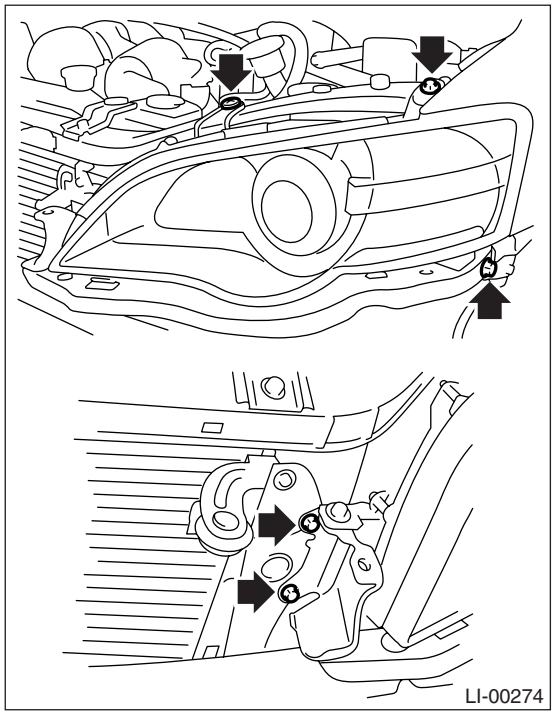
12.Headlight Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the air intake duct. (When removing the headlight RH)


LI-00273

3) Remove the front grille. <Ref. to EI-24, REMOVAL, Front Grille.>
4) Remove the front bumper. <Ref. to EI-30, REMOVAL, Front Bumper.>
5) Disconnect each harness connector.
6) Remove the 4 bolts and disengage clips, and then detach the headlight assembly.


LI-00274

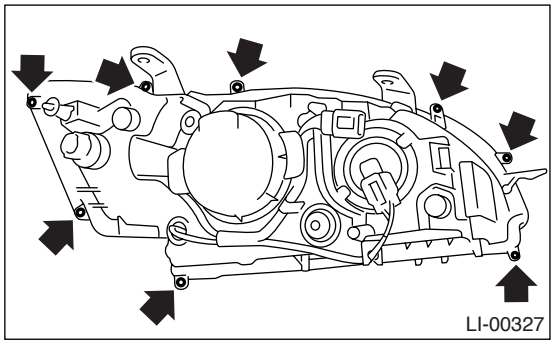
B: INSTALLATION

Install in the reverse order of removal.

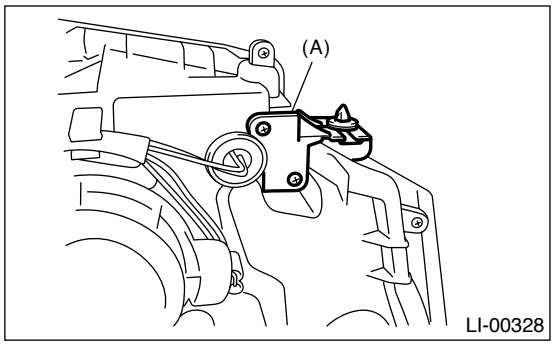
C: DISASSEMBLY

CAUTION:
- **Do not touch the bulb glass portion.**
- **Do not touch inside the lens (extension portion) or reflector portion.**
- **Replace the packing with a new one.**

1) Remove the headlight assembly. **<Ref. to LI-14,** REMOVAL**, Headlight Assembly.>**
2) Remove the eight screws.


LI-00327

3) Remove headlight side bracket.

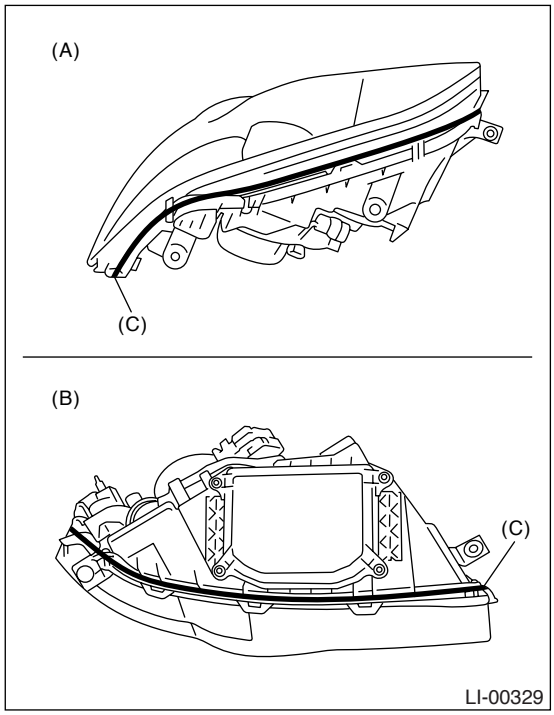


LI-00328

(A) Headlight side bracket

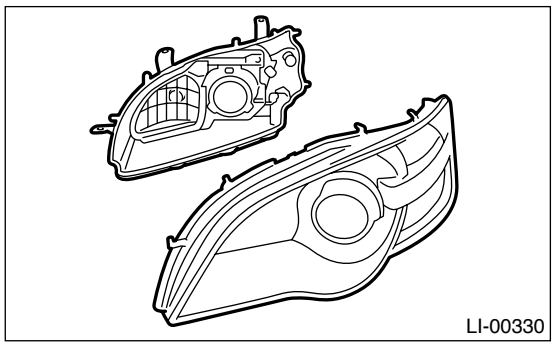
4) Heat the sealing portion between headlight assembly and lens using heating gun.

CAUTION:
Avoid heating one specific point of the seal portion and heating the headlight assembly to 100°C (212°F) or more.



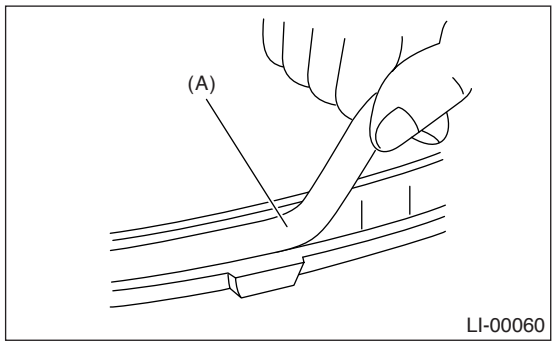
(A) Headlight ASSY upper
(B) Headlight ASSY lower
(C) Heated portion

5) Unhook the hook, and then take the lens off the headlight assembly.



6) Remove the packing (A) from seal groove.

CAUTION:
Completely remove the packing not to leave any chips behind.

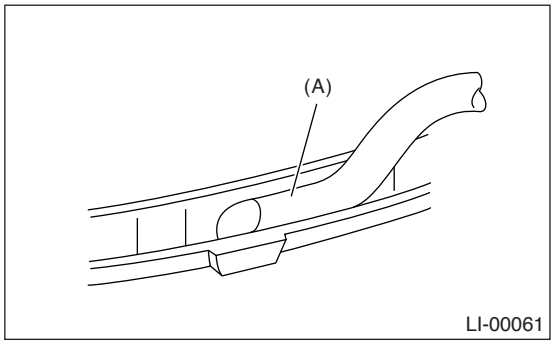


(A) Packing

D: ASSEMBLY

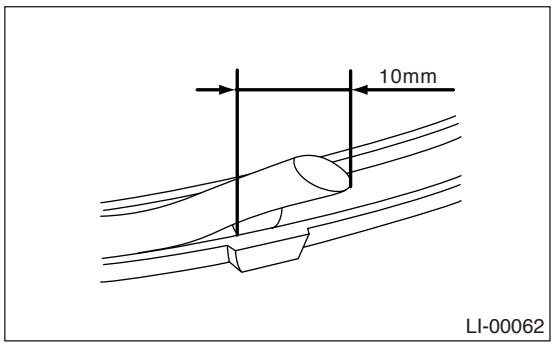
1) Cut the tip of packing (A) at an angle of 45°.
2) With the cut end facing upward, insert packing (A) into the groove around the seal.

CAUTION:
• If the packing protrudes, slowly take it off the groove.
• Do not stretch the packing. If the packing is stretched, seal fails.



(A) Packing

3) After making a round of the seal, cut its tip at an angle of 45°, with its length 10 mm (0.39 in) longer than the circumference of seal so that the tip overlaps the other. Then, press it onto the seal, using a screwdriver.



4) Match the positions of the lens and headlight assembly, and then insert the lens into the headlight assembly.

CAUTION:
Remove the turn signal light bulb and clearance/parking light bulb before removing the lens.

5) Secure the hook, and then install the clip and screw.
6) Put the seal portion of headlight assembly into the water and check that water does not enter inside the headlight.

CAUTION:
Be sure that water does not enter inside the headlight through the bulb socket and ventilation hole.

E: ADJUSTMENT

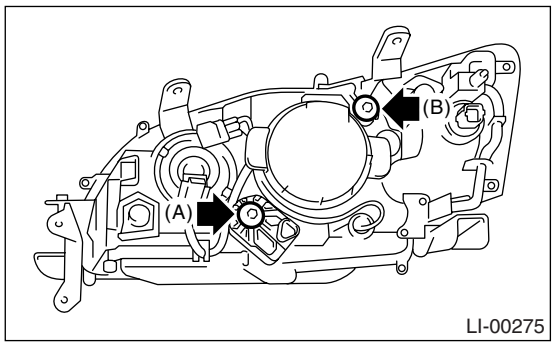
1. HEADLIGHT AIMING

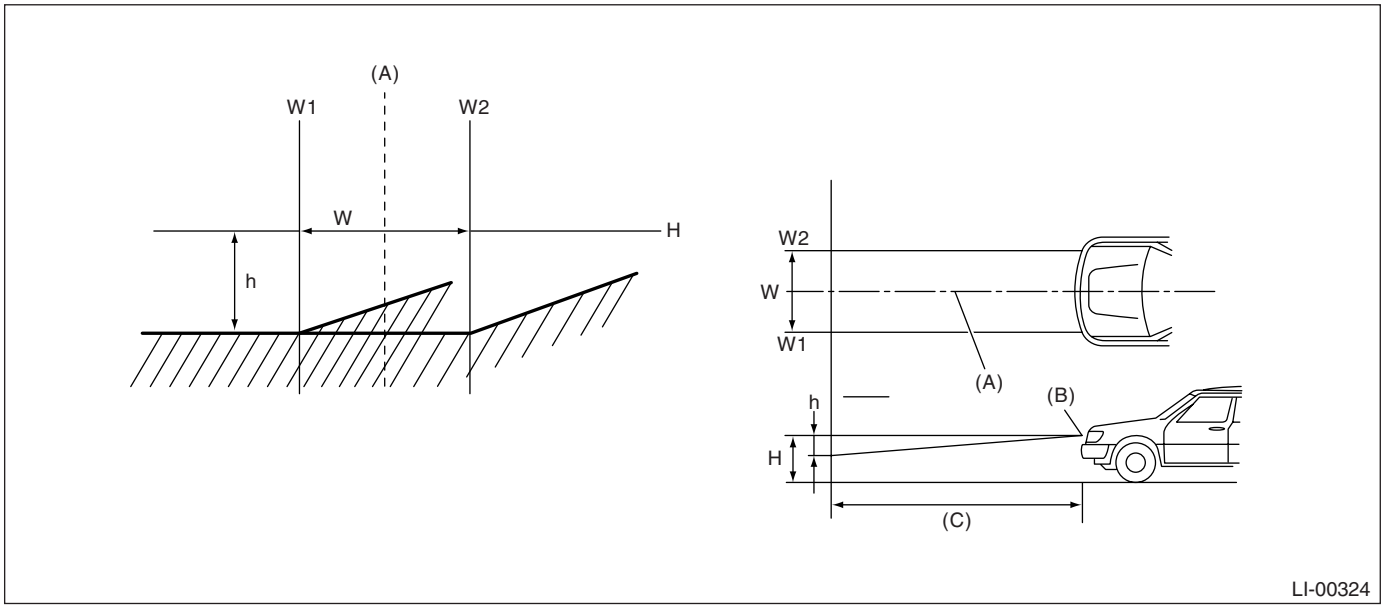
CAUTION:
Turn off the light before adjusting headlight beam level. If the light is necessary to check aiming, do not turn on for more than two minutes.

NOTE:
Before checking the headlight beam level, be sure of the following:
• The area around the headlight has not sustained any accident, damage or other type of deformation.
• Vehicle is parked on a level surface.
• The inflation pressure of tires is correct.
• Vehicle's fuel tank is fully filled.

1) Bounce the vehicle several times to normalize the suspension.
2) Make certain that someone is seated in the driver's seat.
3) Turn the headlights on and then adjust the low beam pattern.

NOTE:
• Position the headlight beam leveler switch to "0".
• Adjust the vertical aim (A) first, then horizontal aim (B).





(A) Vehicle center (B) Bulb center marking (C) 3 m (10 ft)

Illustration above shows the illumination pattern for LHD model. Illumination pattern for RHD model is symmetrically opposite.

W mm (in)	H mm (in)			h mm (in) at 3 m (10 ft)
	Sedan	Wagon		
	640 (25.20)	Except for OUTBACK	OUTBACK	
1,180 (46.46)		635 (25.00)	705 (27.76)	30 (1.18)

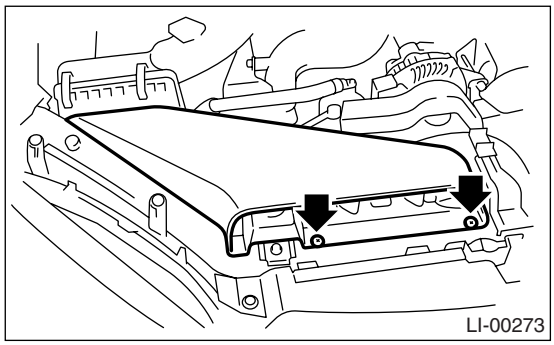
13.Headlight Bulb

A: REMOVAL

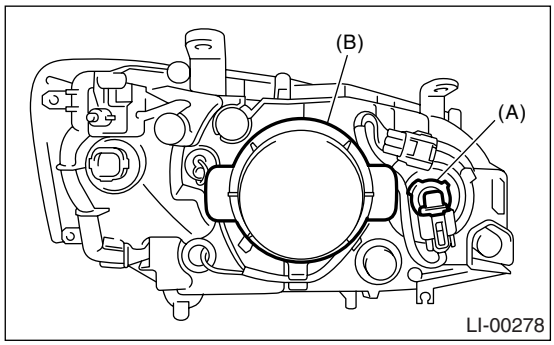
1. HIGH BEAM AND LOW BEAM

CAUTION:
• Because the halogen bulb operates at a high temperature, dirt and oil on the bulb surface reduces the bulb's service life. Hold the flange portion when replacing the bulb. Never touch the glass portion.
• Do not leave the headlight without a bulb for a long time. Dust, moisture, etc. entering the headlight may affect its performance.

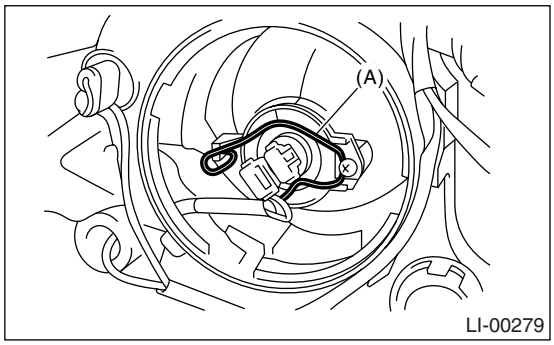
1) Disconnect the ground cable from battery.
2) Remove the air intake duct. (When removing the headlight bulb RH).



3) Remove the battery cover. (When removing the headlight bulb LH).
4) Tilt the washer tank filler neck. (When removing the headlight bulb LH).
5) Disconnect the harness connector.
6) Remove the bulb assembly (A) to remove high beam. To remove the low beam, remove the back cover (B), and then go to Step 7.



7) Remove the light bulb retaining spring (A) to remove bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

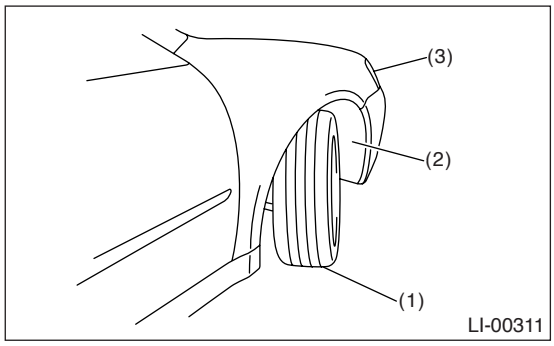
1. HALOGEN TYPE

1) Visually check the bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

14.Front Turn Signal Light Bulb

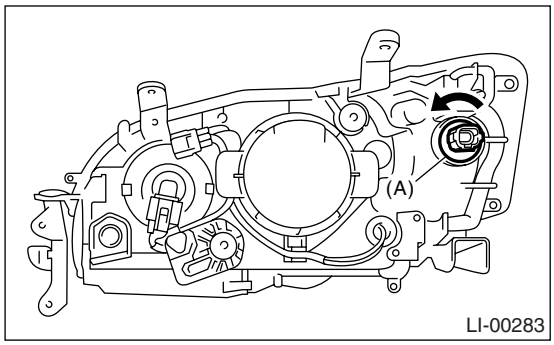
A: REMOVAL

1) When removing the turn signal light bulb, fully turn the steering wheels to opposite direction from desired turn signal light bulb.



(1) Turn the steering wheel fully.
(2) Mud guard
(3) Front turn signal light

2) Turn the mud guard inward.
3) Turn the socket (A) from wheel arch part, and then remove the front turn signal light bulb.



CAUTION:
For 5AT model, remove the turn signal light bulb LH from engine compartment with removing battery, because it can not be removed from wheel arch part.

B: INSTALLATION

Install in the reverse order of removal.

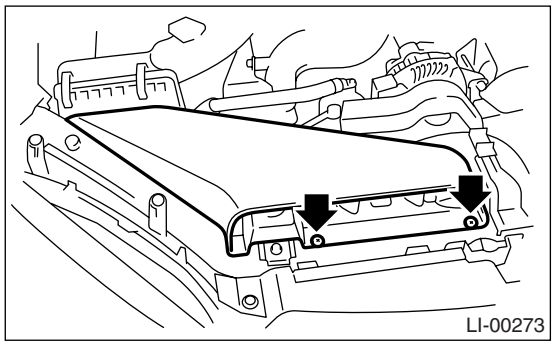
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

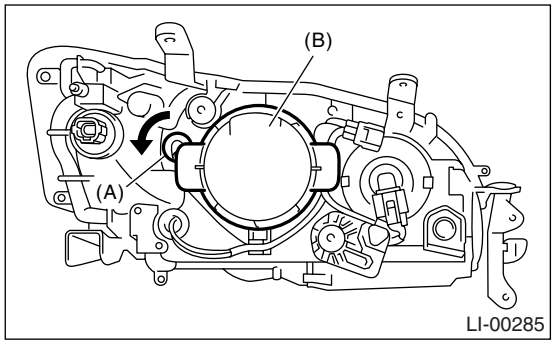
15.Clearance/Parking Light Bulb

A: REMOVAL

1) Remove the air intake duct. (When removing the clearance light/parking light bulb RH).



2) Remove the battery cover. (When removing the clearance light/parking light bulb LH)
3) Tilt the washer tank filler neck. (When removing the clearance/parking light bulb)
4) Remove the headlight low beam back cover (B).
5) Turn the socket (A) and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

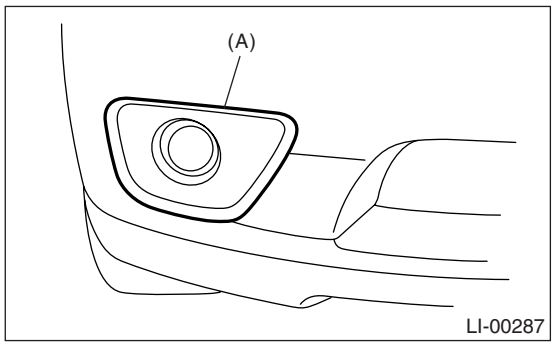
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

16.Front Fog Light Assembly

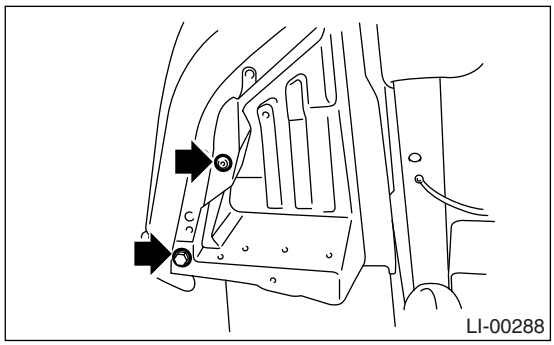
A: REMOVAL

1. EXCEPT FOR OUTBACK MODEL

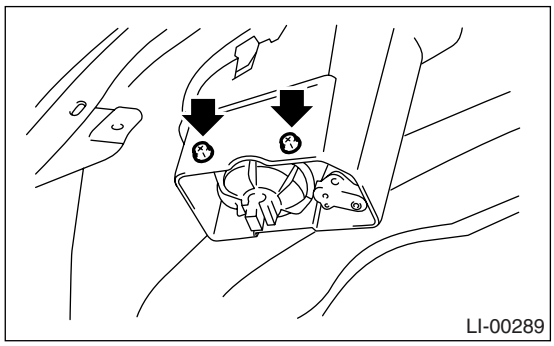
1) Disconnect the ground cable from battery.
2) Remove the front fog light cover (A).



3) Disengage the two clips, and then turn over the lower mud guard.

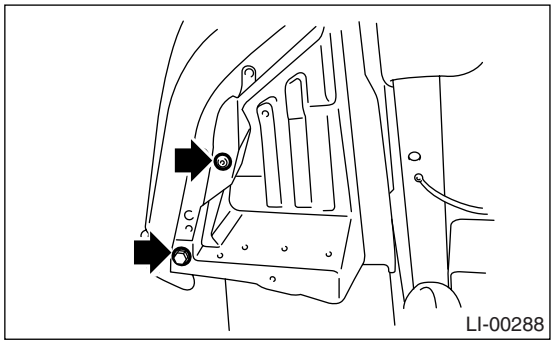


4) Disconnect the harness connector.
5) Remove the mounting bolts, and then detach the fog light assembly by pulling it.

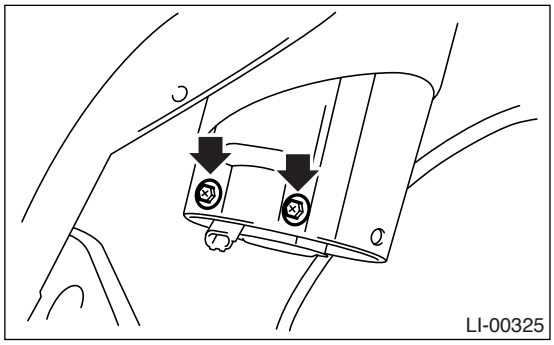


2. OUTBACK MODEL

1) Disconnect the ground cable from battery.
2) Remove the two clips, and then turn over the lower mud guard.



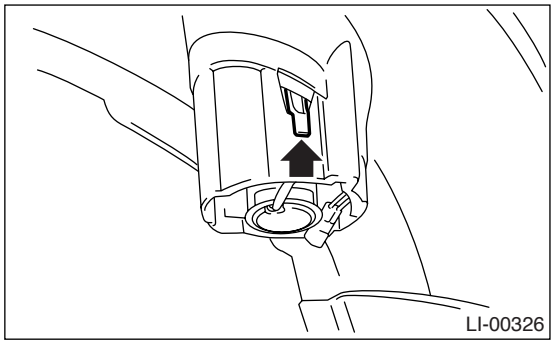
3) Disconnect the harness connector.
4) Remove the mounting bolts, and then detach the fog light assembly by pulling it.



B: INSTALLATION

Install in the reverse order of removal.

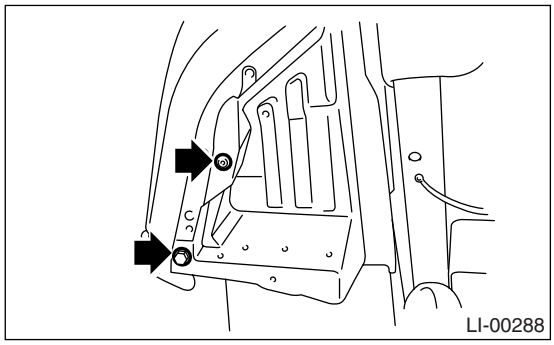
CAUTION:
When installing the fog light assembly, be sure to secure the upper hock.



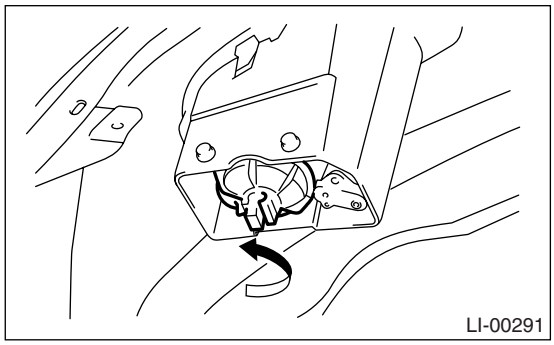
17.Front Fog Light Bulb

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Disengage the two clips, and then turn over the lower mud guard.



3) Disconnect the harness connector.
4) Remove the back cover.



5) Remove the spring retainer then detach the fog light bulb.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

18.Rear Fog Light

A: REMOVAL

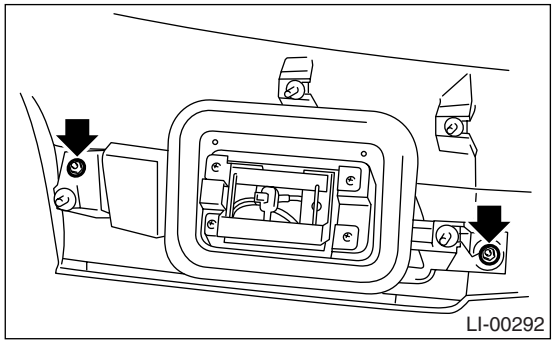
NOTE:
Rear fog light is installed to rear combination light of driver's side for sedan and rear gate garnish of driver's side for wagon.

1. SEDAN MODEL

Remove the rear combination light. <Ref. to LI-25, REMOVAL, Rear Combination Light Assembly.>

2. WAGON MODEL

1) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
2) Disconnect the harness connectors and remove the rear gate garnish. <Ref. to EI-76, REMOVAL, Rear Gate Garnish.>
3) Remove the mounting nuts and detach the rear fog light assembly.



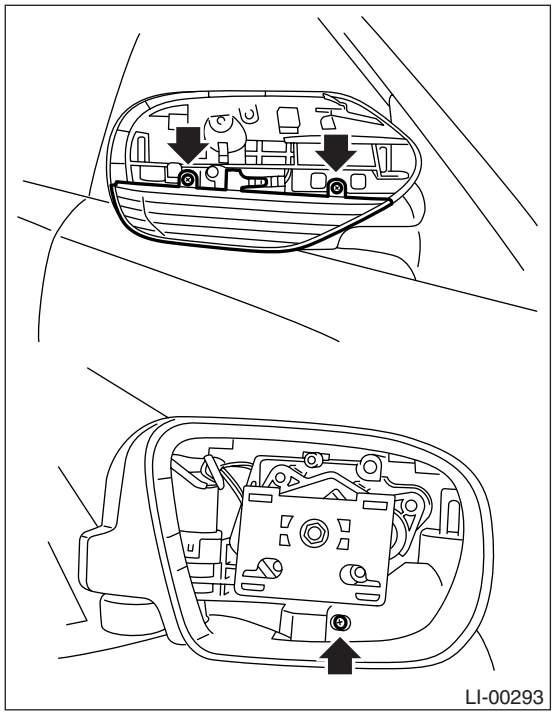
B: INSTALLATION

Install in the reverse order of removal.

19. Side Turn Signal Light Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the scalp caps. <Ref. to GW-17, REPLACEMENT, Scalp Cap.>
3) Remove the mirror. <Ref. to GW-19, REPLACEMENT, Outer Mirror.>
4) Disconnect the harness connector, remove the 3 mounting screws and then remove the side turn signal light assembly.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Install the side turn signal light assembly and check that it blinks normally.
2) If it does not blink normally, replace the side turn signal light assembly with a new one.

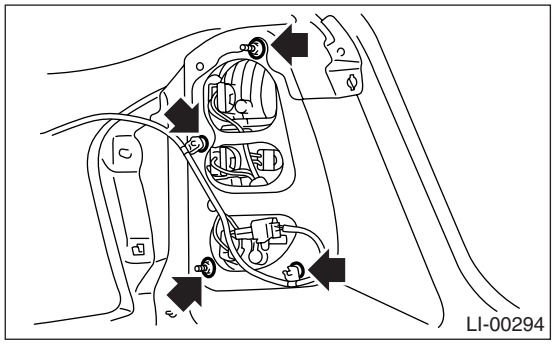
NOTE:
Since LED (Light Emitting Diode) is used for side turn signal light, replace the side turn signal light assembly when the LED is powered off.

20. Rear Combination Light Assembly

A: REMOVAL

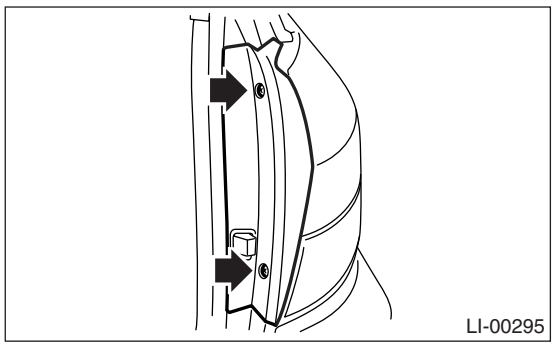
1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the trunk room side trim. <Ref. to EI-71, REMOVAL, Trunk Room Trim.>
3) Remove the four nuts, and then detach the rear combination light after disconnecting the connector.

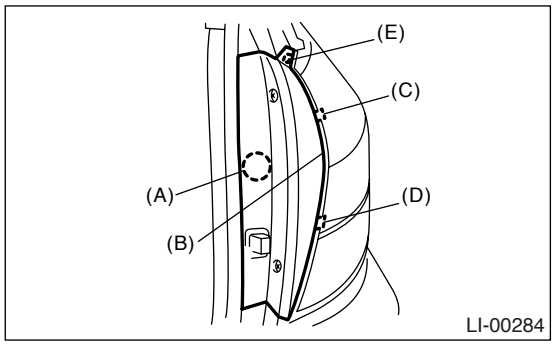


2. WAGON MODEL

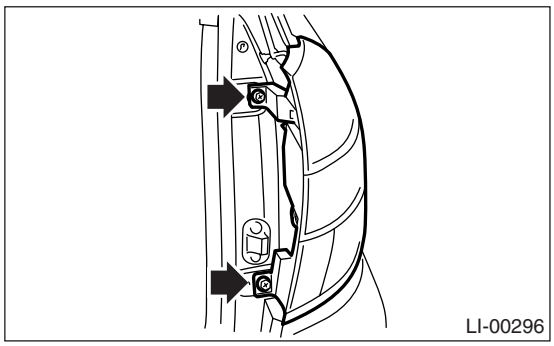
1) Disconnect the ground cable from battery.
2) Remove the clips.



3) While pressing the portion (A), insert your finger or flat-tip screwdriver wrapped with tape into the clearance (B) to remove pawls in the order of (C), (D), (E), and remove the rear combination cover.



4) Remove the two bolts, and then detach the rear combination light by pulling it to the rear side of vehicle.



5) Remove the rear combination light after turning the socket of tail/stop light bulb and rear turn signal light bulb to remove the bulbs.

B: INSTALLATION

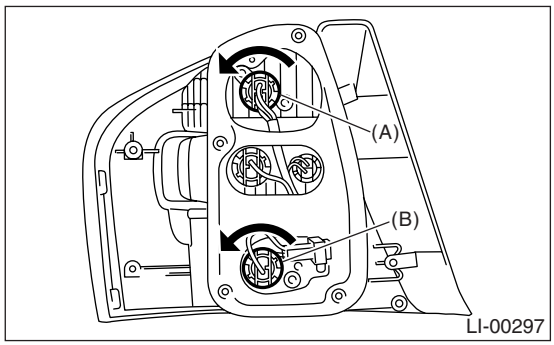
Install in the reverse order of removal.

21.Tail/Stop Light Bulb

A: REMOVAL

1. SEDAN MODEL

1) Remove the trunk side trim cover.
2) Turn the socket and remove the bulb.

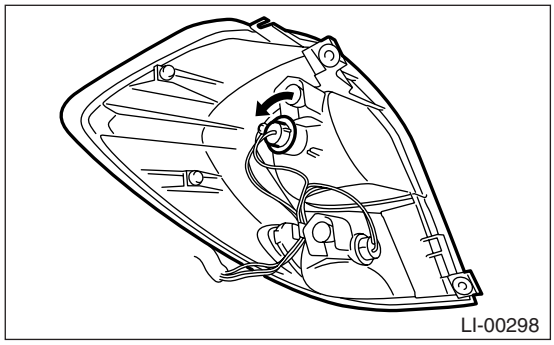


Model without rear fog light
(A) Tail light
(B) Stop light

Model with rear fog light
(A) Tail/stop light
(B) Rear fog light (Driver's side only)

2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-25, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

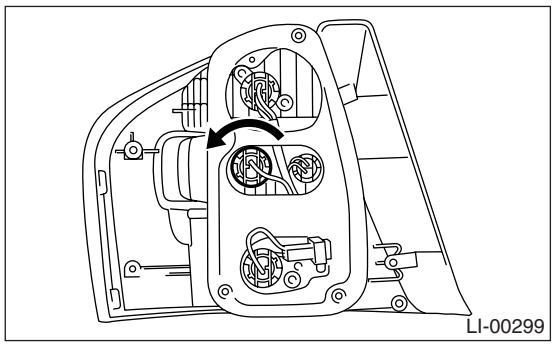
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

22.Rear Turn Signal Light Bulb

A: REMOVAL

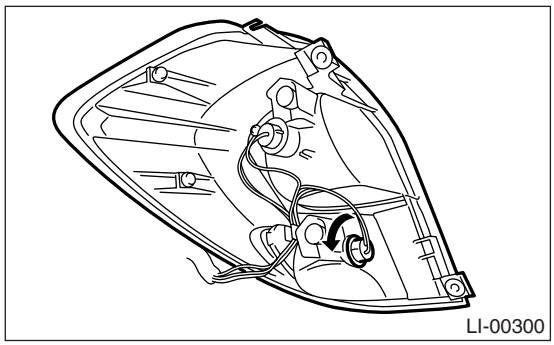
1. SEDAN MODEL

1) Remove the trunk side trim cover.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the rear combination light assembly. <Ref. to LI-25, WAGON MODEL, REMOVAL, Rear Combination Light Assembly.>
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

23.Back-up Light Assembly

A: REMOVAL

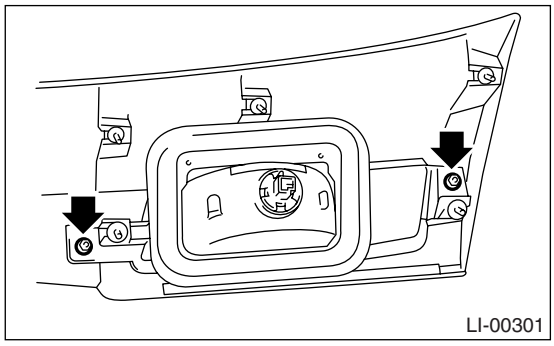
NOTE:
In case of model with rear fog light, back-up light is installed to only passenger's side.

1. SEDAN MODEL

Remove the rear combination light. <Ref. to LI-25, REMOVAL, Rear Combination Light Assembly.>

2. WAGON MODEL

1) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
2) Disconnect the harness connectors and remove the rear gate garnish. <Ref. to EI-76, REMOVAL, Rear Gate Garnish.>
3) Remove the mounting nuts and detach the back-up light assembly.



B: INSTALLATION

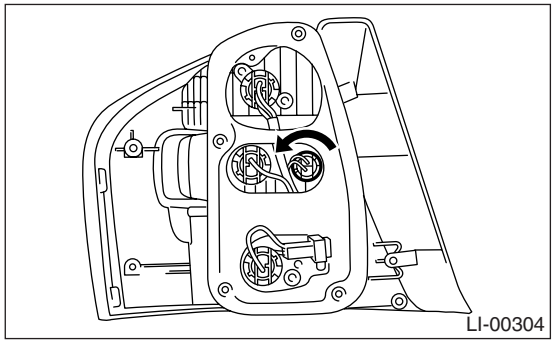
Install in the reverse order of removal.

24.Back-up Light Bulb

A: REMOVAL

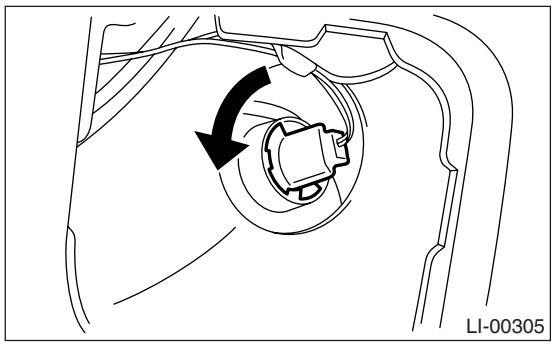
1. SEDAN MODEL

1) Remove the bulb inspection cover of trunk side trim.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the bulb inspection cover of rear gate trim.
2) Turn the socket and remove the bulb.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

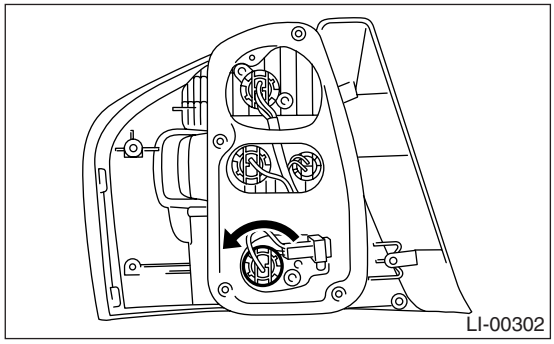
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

25.Rear Fog Light Bulb

A: REMOVAL

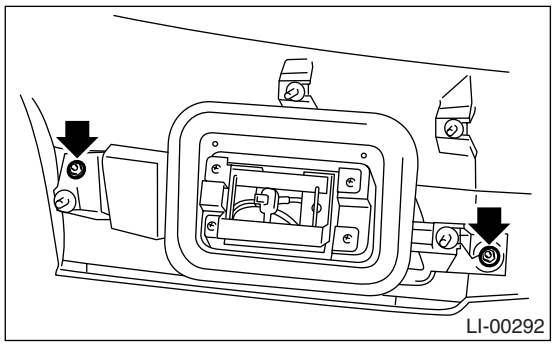
1. SEDAN MODEL

1) Remove the bulb inspection cover of trunk side trim.
2) Turn the socket and remove the bulb.



2. WAGON MODEL

1) Remove the rear fog light assembly. <Ref. to LI-23, REMOVAL, Rear Fog Light.>
2) Remove the mounting screws, and then remove the rear fog light assembly.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. SEDAN MODEL

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. WAGON MODEL

1) Install the rear fog light assembly to check that it illuminate normally.
2) If it does not illuminate, replace the rear fog light assembly with a new one.

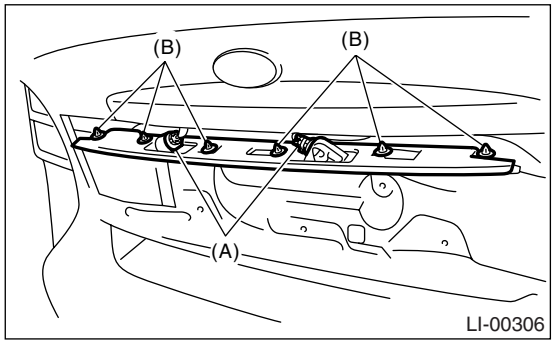
NOTE:
Since LED (Light Emitting Diode) is used for the rear fog light, replace the rear fog light assembly when the LED is powered off.

26.License Plate Light Assembly

A: REMOVAL

1. SEDAN MODEL

1) Remove the trunk lid garnish. <Ref. to EI-75, REMOVAL, Trunk Lid Garnish.>
2) Remove the trunk lid trim. <Ref. to EI-71, TRUNK LID TRIM, REMOVAL, Trunk Room Trim.>
3) Turn and remove the bulb socket (A). Disengage the clip (B) and remove the license plate light assembly.



B: INSTALLATION

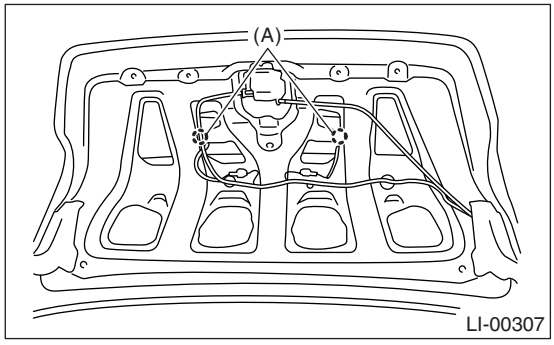
Install in the reverse order of removal.

27.License Plate Light

A: REMOVAL

1. SEDAN MODEL

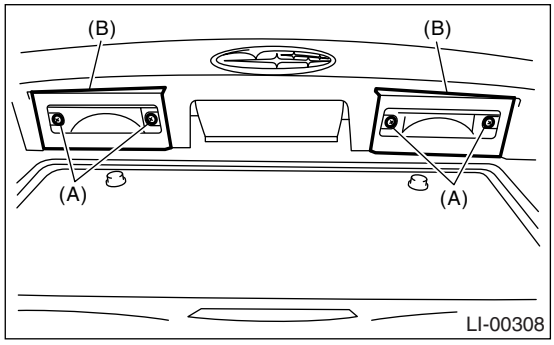
1) Remove the trunk lid trim. <Ref. to EI-71, TRUNK LID TRIM, REMOVAL, Trunk Room Trim.>
2) Turn and remove the bulb socket (A).



3) Remove the bulb.

2. WAGON MODEL

1) Remove the license plate light mounting screw (A) and then remove the lens (B).



2) Remove the bulb.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

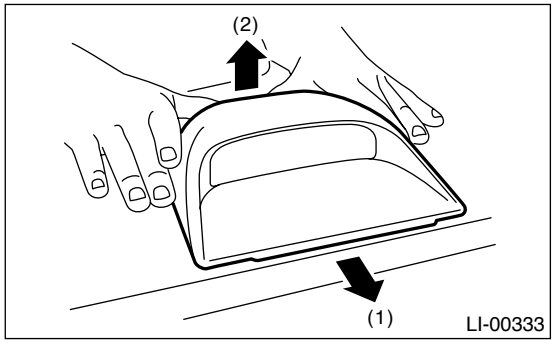
1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

28.High-mounted Stop Light

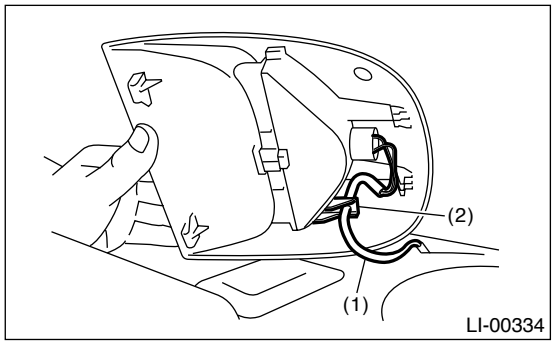
A: REMOVAL

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Push the high-mounted stop light backward of the vehicle (1), raise the rear portion of it (2) and remove the clips to remove it.

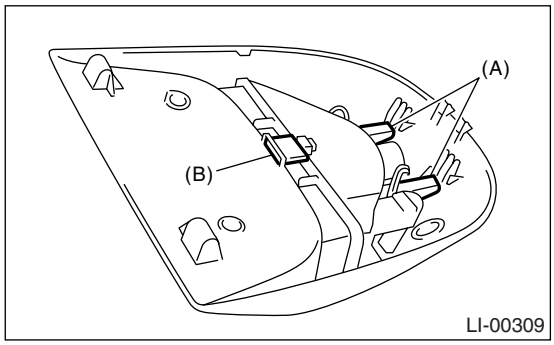


3) Remove the harness from clamp.

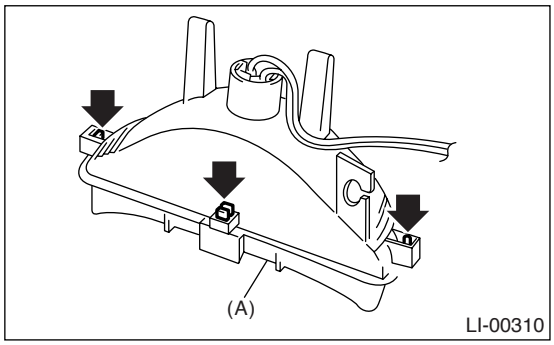


(1) Harness
(2) Clamp

4) Disengage two claws (A), pull out the high-mounted stop light from the cover and remove the claw (B).



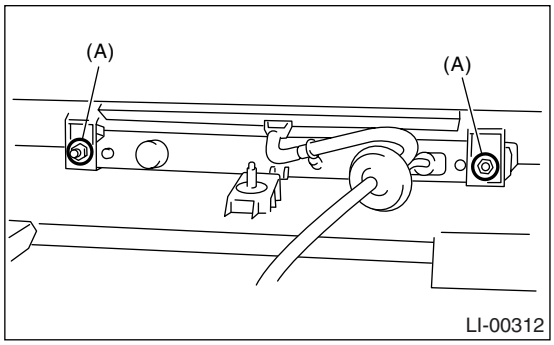
5) Disengage three claws and remove the lens (A).



6) Remove the bulb.

2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Detach the roof spoiler. <Ref. to EI-40, REMOVAL, Roof Spoiler.>
3) Remove the nuts (A), then detach the high-mounted stop light.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. SEDAN (STANDARD TYPE)

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. SEDAN (REAR SPOILER BUILT-IN TYPE) AND WAGON

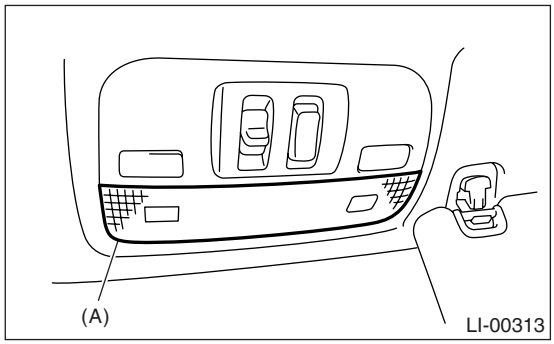
1) Install the high-mounted stop light to test if it illuminates normally.
2) If the high-mounted stop light does not illuminate, replace it with a new one.

NOTE:
Since LED (Light Emitting Diode) is used for the high-mounted stop light of wagon model, replace the high-mounted stop light assembly when the LED is powered off.

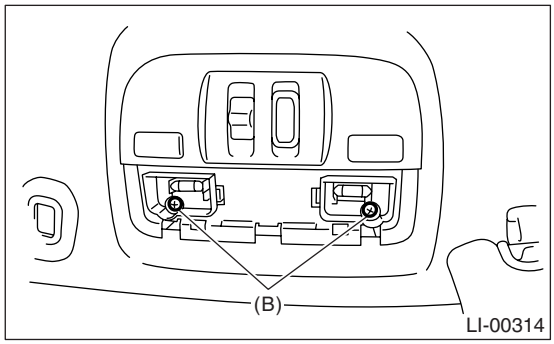
29.Spot Map Light

A: REMOVAL

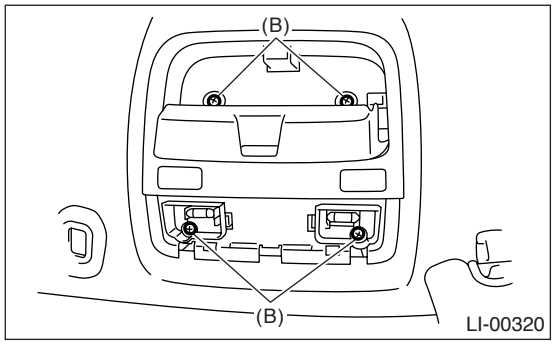
1) Disconnect the ground cable from battery.
2) Remove the lens (A) and spot map light mounting screws (B).



• Model with sunroof



• Model without sunroof



3) Disconnect the harness connectors and remove the spot map light.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. SPOT MAP LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. SPOT MAP LIGHT SWITCH

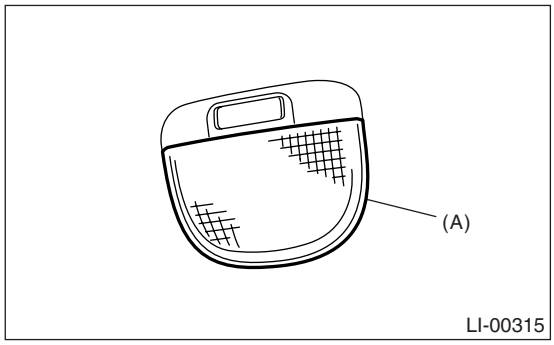
Measure the resistance between spot map light switch terminals.

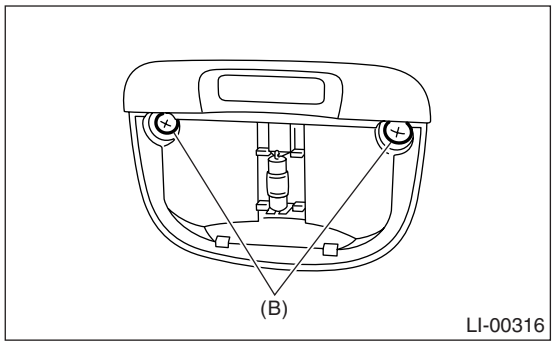
Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 2	18±5.4 Ω

30.Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens (A) and mounting screws (B).





3) Disconnect the harness connector and remove the room light.

B: INSTALLATION

Install in the reverse order of removal.

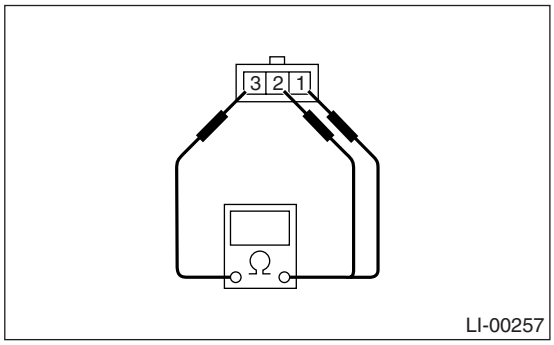
C: INSPECTION

1. ROOM LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. ROOM LIGHT SWITCH

Measure the resistance between room light switch terminals.

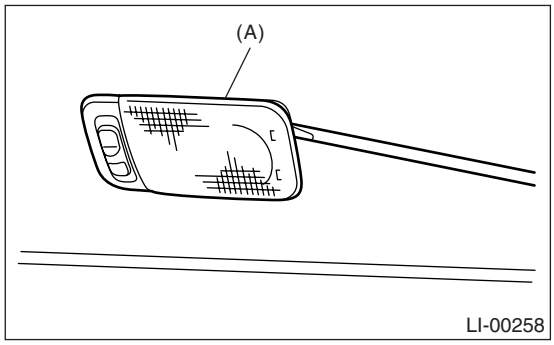


Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 3	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

31.Luggage Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove luggage room light body (A).



3) Disconnect the harness connector and remove the lens.

B: INSTALLATION

Install in the reverse order of removal.

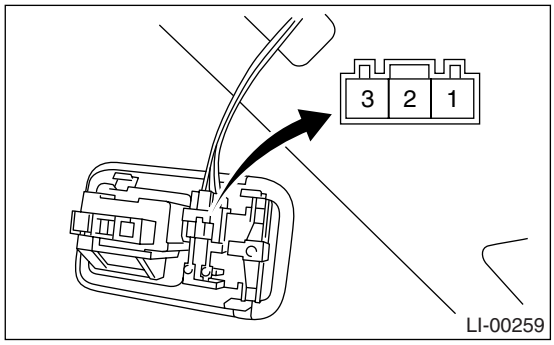
C: INSPECTION

1. LUGGAGE ROOM LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. LUGGAGE ROOM LIGHT SWITCH

Measure the resistance between luggage room light switch terminals.

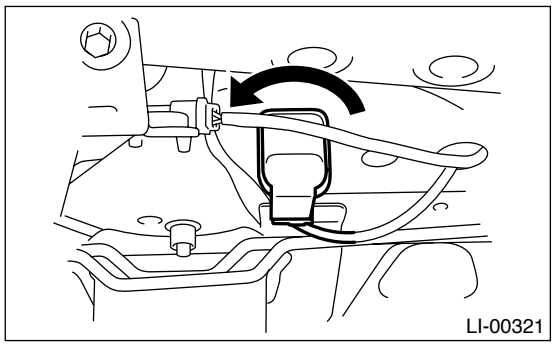


Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
ON	1 and 2	1.5±0.5 Ω
DOOR	2 and 3	1.5±0.5 Ω

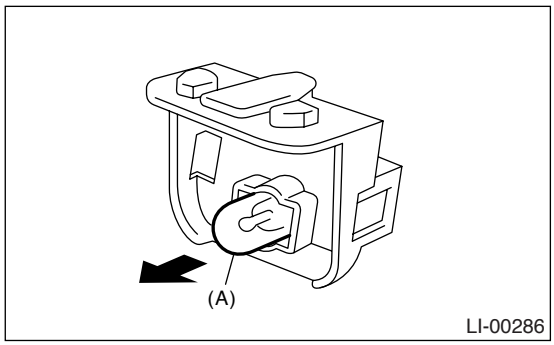
32.Trunk Room Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Turn the trunk room light counterclockwise to 60° to remove it and disconnect the harness connector.



3) Remove the bulb (A).



B: INSTALLATION

Install in the reverse order of removal.

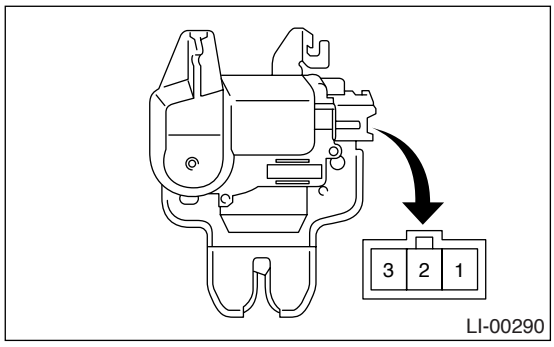
C: INSPECTION

1. TRUNK ROOM LIGHT BULB

1) Visually check the bulb for blow out.
2) Check the bulb specification. <Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

2. TRUNK LID SWITCH (TRUNK ROOM LIGHT SWITCH)

Measure the resistance between trunk lid switch terminals.

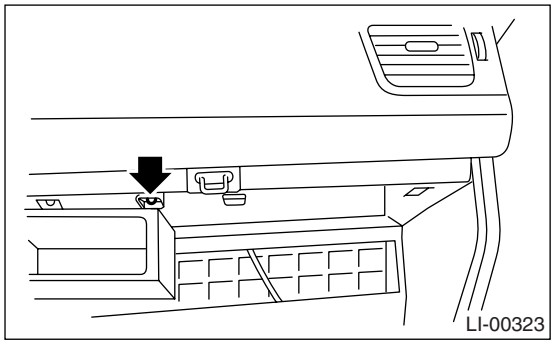


Trunk lid position	Terminal No.	Standard
Close	1 and 3	More than 1 MΩ
Open		1.5±0.5 Ω

33.Glove Box Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Disconnect the harness connector.
4) Remove the glove box light.



B: INSTALLATION

Install in the reverse order of removal.

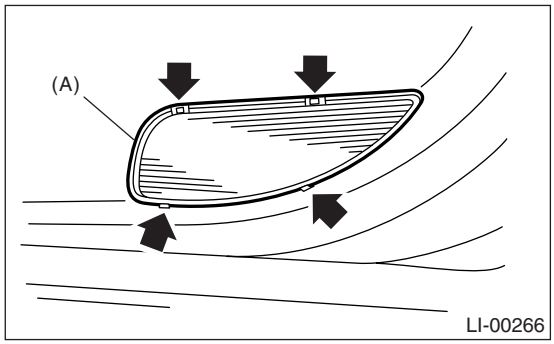
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

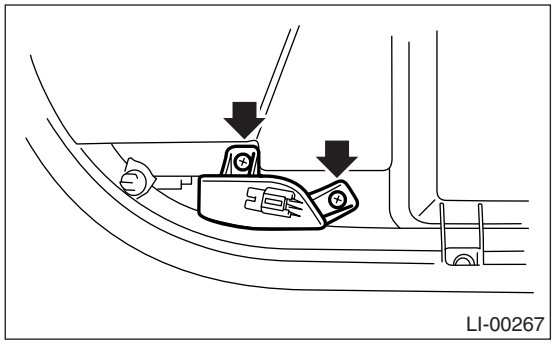
34.Door Step Light

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the lens (A), and then remove the door step light bulb.



3) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
4) Disconnect the harness connector.
5) Remove the mounting screw from rear side of trim and remove the door step light.



B: INSTALLATION

Install in the reverse order of removal.

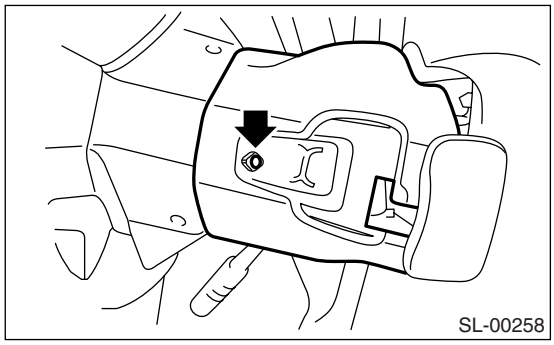
C: INSPECTION

1) Visually check the bulb for blow out.
2) Check the bulb specification.
<Ref. to LI-2, SPECIFICATION, General Description.>
3) If NG, replace the bulb with a new one.

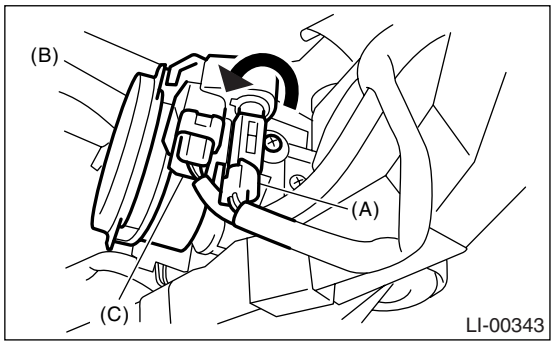
35.Ignition Switch Illumination

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the screws and detach the upper column cover and lower column cover.



3) Remove the instrument panel lower cover. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
4) Disconnect the ignition switch illumination connector (A).
5) Turn the ignition switch illumination connector to left and remove it.



(A) Ignition switch illumination connector
(B) Ignition switch illumination
(C) Immobilizer antenna connector

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH ILLUMINATION.** Make sure the ignition switch illumination illuminates when driver's side door is open.	Does the ignition switch illumination illuminate?	Ignition switch illumination is normal.	Go to step **2.**
2	**CHECK IGNITION SWITCH ILLUMINATION.** Make sure the ignition switch illumination blinks when ignition switch is turned to ON.	Does the ignition switch illumination blink?	Check the function setting of body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the ignition switch illumination circuit. <Ref. to SL-27, CHECK IGNITION SWITCH ILLUMINATION, INSPECTION, Keyless Entry System.>

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

WIPER AND WASHER SYSTEMS

WW

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2.	Wiper and Washer System	7
3.	Combination Switch (Wiper)	8
4.	Wiper Blade	13
5.	Washer Tank and Motor	16
6.	Front Wiper Arm	17
7.	Front Wiper Motor and Link	18
8.	Front Washer Nozzle	20
9.	Rear Wiper Arm	21
10.	Rear Wiper Motor	22
11.	Rear Washer	24

1. General Description

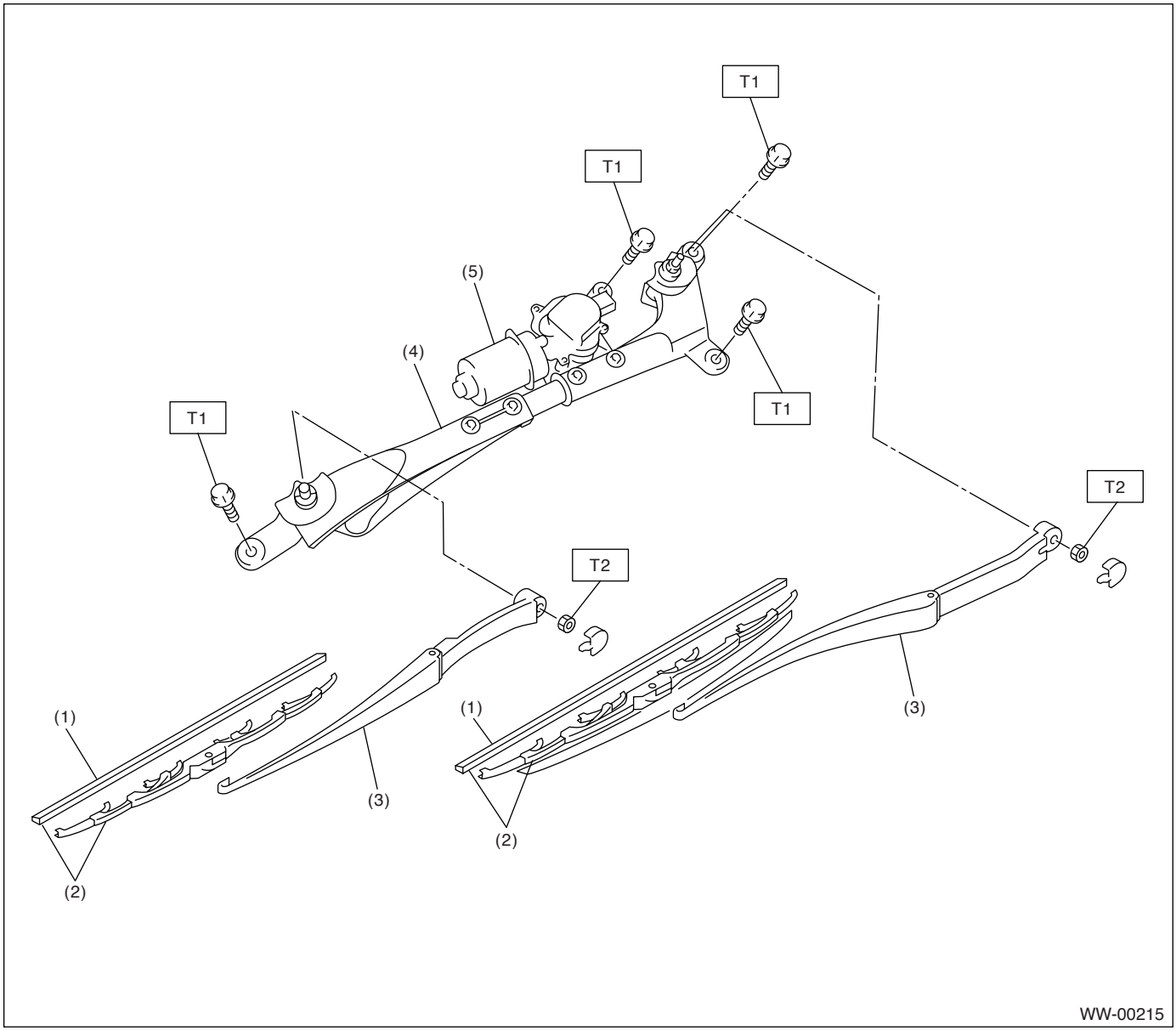
A: SPECIFICATION

Front wiper motor	Input	12 V — 72 W or less
Rear wiper motor	Input	12 V — 42 W or less
Front washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less
Rear washer motor	Pump type	Centrifugal
	Input	12 V — 36 W or less

B: COMPONENT

1. FRONT WIPER

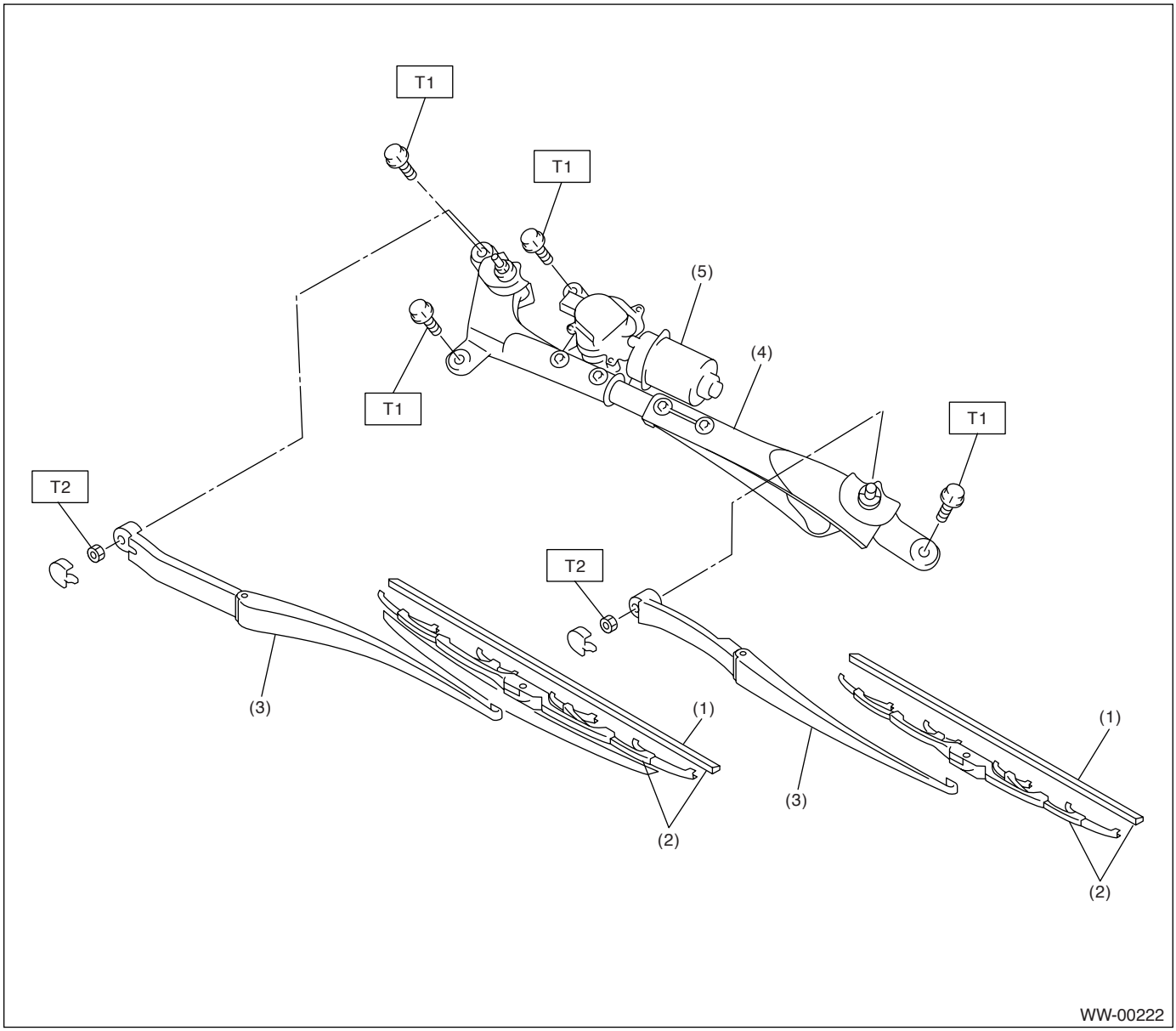
• LHD model



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper link ASSY
(5) Wiper motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.61, 4.4)
T2: 20 (2.0, 14.5)

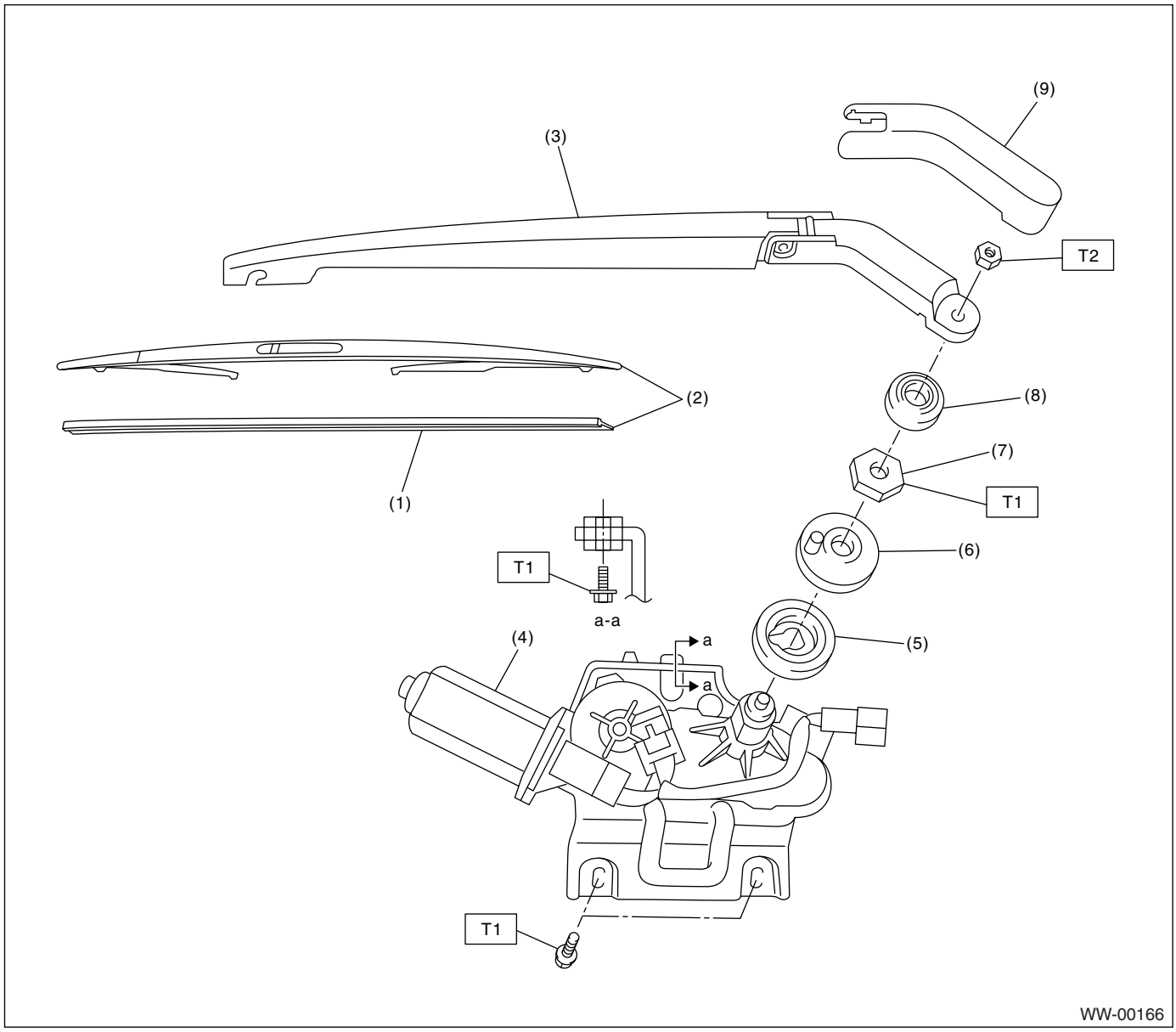
• RHD model



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper link ASSY
(5) Wiper motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.0 (0.61, 4.4)
T2: 20 (2.0, 14.5)

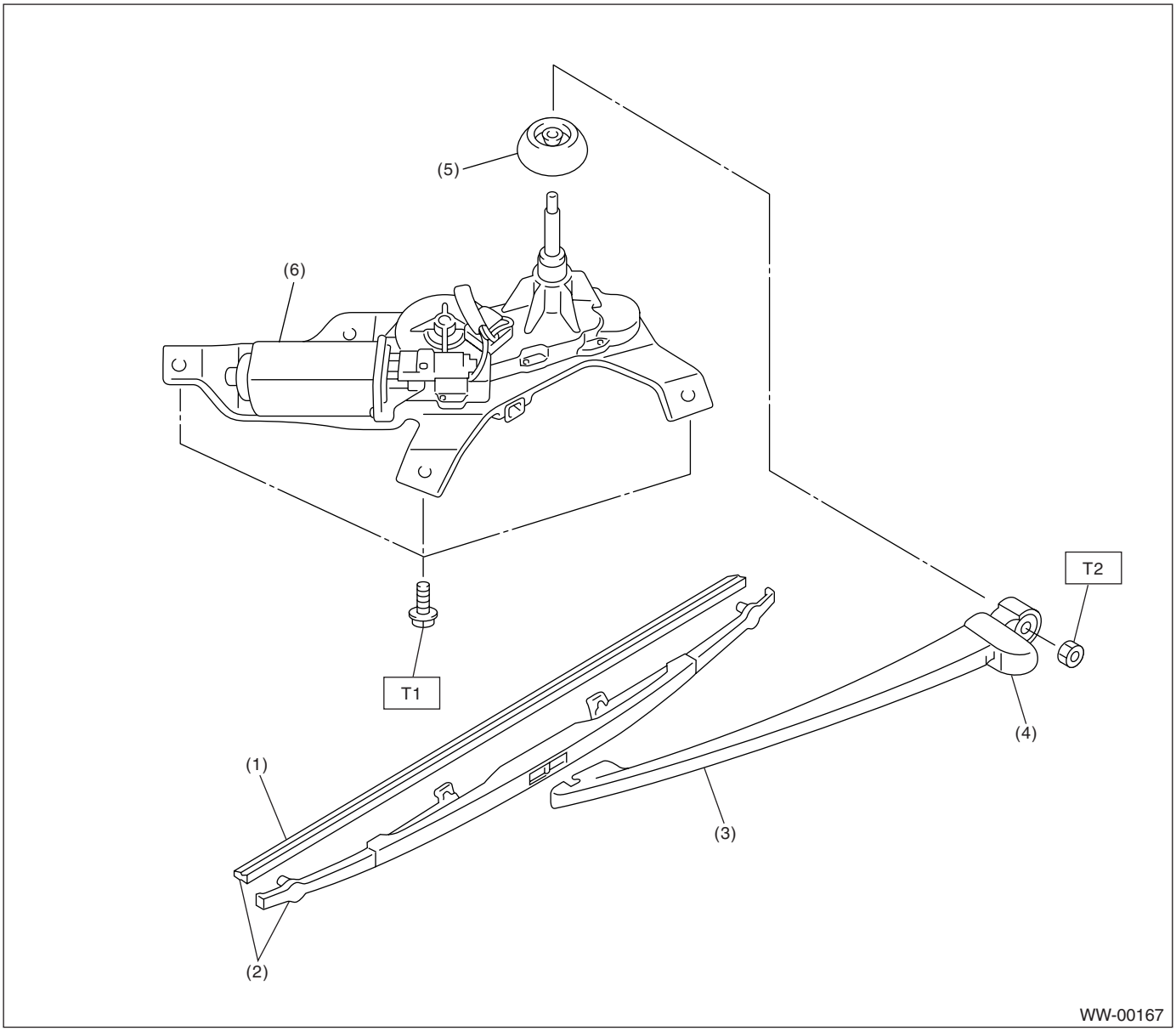
2. REAR WIPER (SEDAN MODEL)



(1) Wiper rubber
(2) Wiper blade ASSY
(3) Wiper arm
(4) Wiper motor ASSY
(5) Cushion
(6) Nozzle & hose ASSY
(7) Nut
(8) Cap
(9) Wiper arm cover

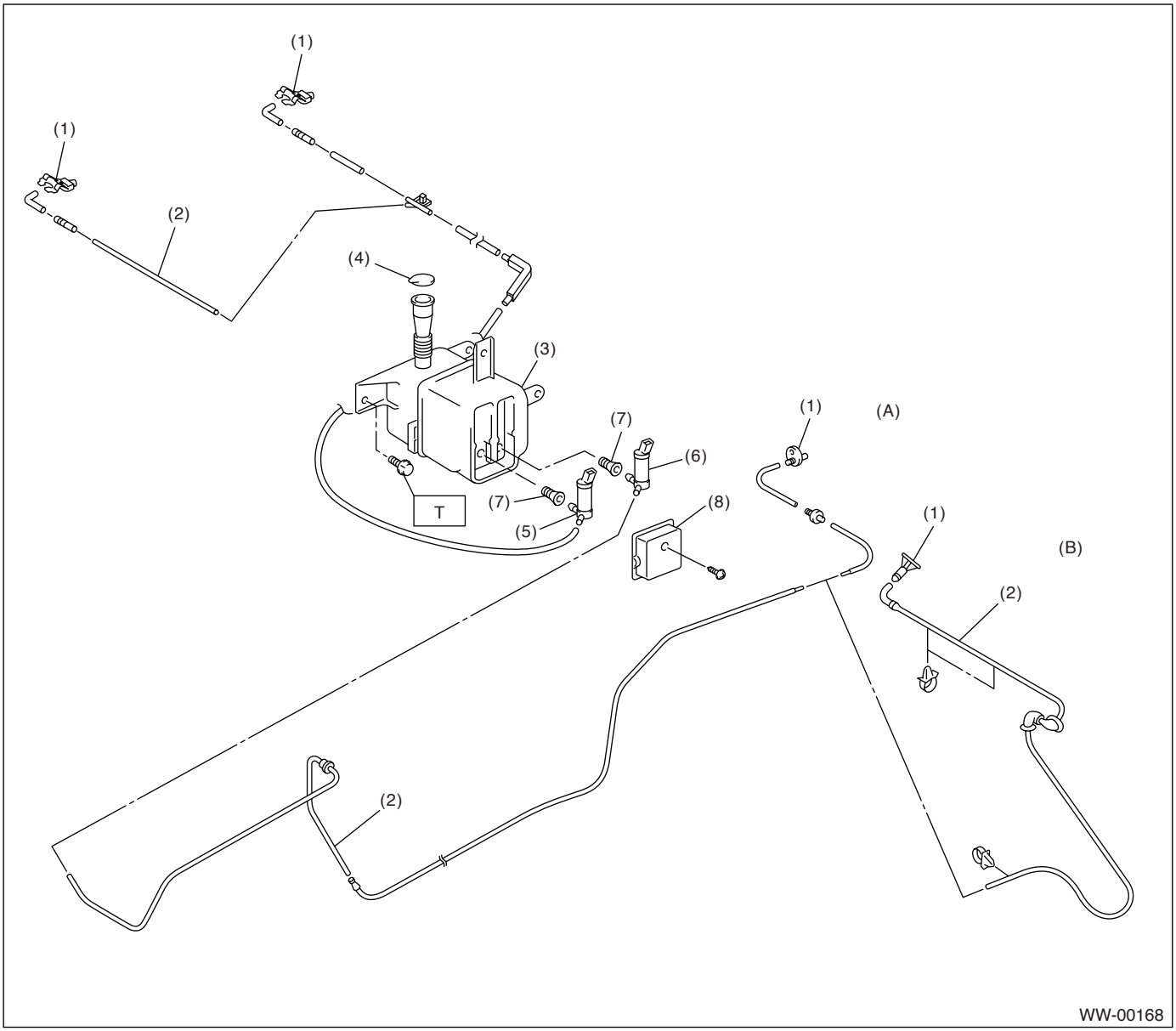
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 8.0 (0.82, 5.9)

3. REAR WIPER (WAGON MODEL)



(1)	Wiper rubber	(4)	Wiper arm cover	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Wiper blade ASSY	(5)	Cap	***T1: 7.5 (0.77, 6.0)***
(3)	Wiper arm	(6)	Wiper motor ASSY	***T2: 8.0 (0.82, 5.9)***

4. WASHER TANK



(A) Sedan model
(B) Wagon model

Tightening torque: N·m (kgf-m, ft-lb)
T: 6.0 (0.61, 4.4)

(1) Washer nozzle
(2) Washer hose
(3) Washer tank
(4) Washer tank cap
(5) Front washer motor
(6) Rear washer motor
(7) Grommet
(8) Washer motor cover

C: CAUTION

- Connect the connectors and hoses securely during reassembly.
- After reassembly, make sure functional parts operate smoothly.
- Be careful that wiring harnesses of airbag system pass near electrical parts and switches.
- Wiring harnesses and connectors of all airbag system are yellow color. Do not use a tester equipment on these circuits.
- Care must be taken when connecting the piping hose so that no bending, jamming, etc. are caused.
- If even a little oil or grease such as silicon oil gets in the tank and washer passages, an oil film is easily formed on the glass, causing the wiper to chatter and judder, therefore, be careful not to let this happen.

2. Wiper and Washer System

A: WIRING DIAGRAM

1. WIPER AND WASHER (FRONT) LHD MODEL

<Ref. to WI-324, LHD MODEL, WIRING DIAGRAM, Front Wiper and Washer System.>

2. WIPER AND WASHER (FRONT) RHD MODEL

<Ref. to WI-325, RHD MODEL, WIRING DIAGRAM, Front Wiper and Washer System.>

3. WIPER AND WASHER (REAR) LHD MODEL

<Ref. to WI-326, LHD MODEL, WIRING DIAGRAM, Rear Wiper and Washer System.>

4. WIPER AND WASHER (REAR) RHD MODEL

<Ref. to WI-327, RHD MODEL, WIRING DIAGRAM, Rear Wiper and Washer System.>

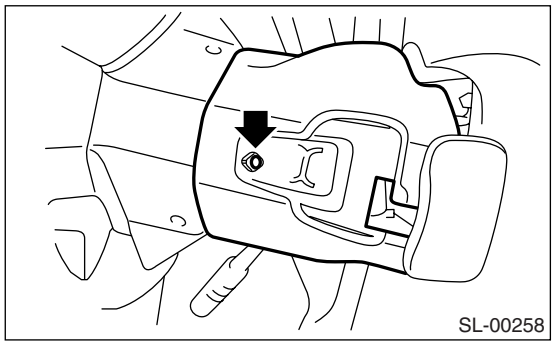
B: INSPECTION

Symptom	Repair order
Wiper and washers do not operate.	(1) Wiper fuse (Front: F/B No. 30, Rear: F/B No. 23) (2) Combination switch (3) Wiper motor ASSY (4) Wiring harness (5) Body integrated unit (rear wiper only)
Wipers do not operate in LO or HI.	(1) Combination switch (2) Wiper motor ASSY (3) Wiring harness
Wipers do not operate in INT.	(1) Combination switch (2) Wiper motor ASSY (3) Wiring harness (4) Body integrated unit (rear wiper only)
Washer motor does not operate.	(1) Washer switch (2) Washer motor (3) Wiring harness
Wipers do not operate when washer switch is ON.	(1) Washer motor (2) Wiring harness
Washer fluid spray does not operate properly.	(1) Washer motor (2) Washer hose and nozzle

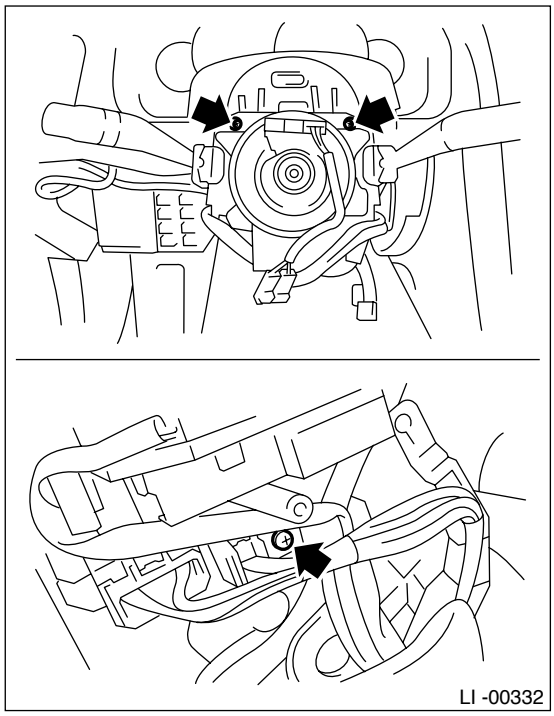
3. Combination Switch (Wiper)

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
3) Remove the screw to remove steering column cover (upper and lower).



4) Disconnect the connector from combination switch.
5) Remove the three screws, and pull out the combination base switch assembly toward you. (EC, EK, KS and K4 model)



6) Remove the switch securing screw to remove combination switch.

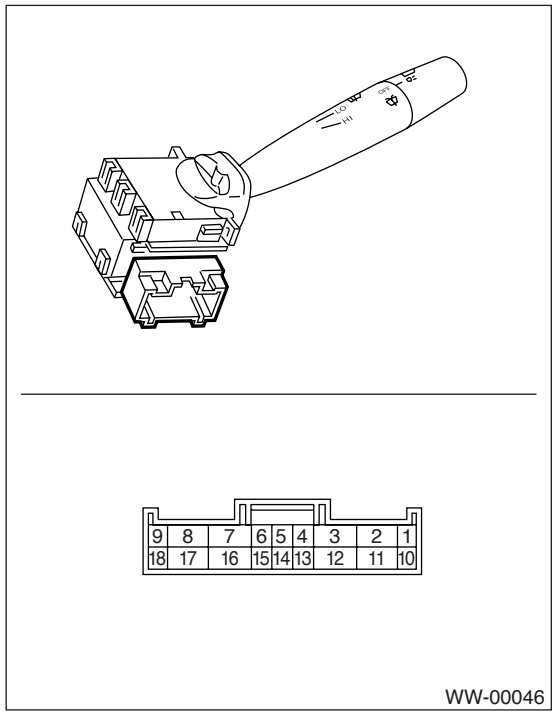
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. COMBINATION SWITCH

1) Inspect the continuity between each connector terminal.



• EC, EK, KS and K4 model

	Switch position	Terminal No.	Standard
Front	OFF	7 and 16	Less than 1 Ω
	INT	7 and 16	Less than 1 Ω
	LO	7 and 17	Less than 1 Ω
	HI	8 and 17	Less than 1 Ω
	Washer ON	2 and 11	Less than 1 Ω
Rear	Washer ON	2 and 11 12 and 10 2 and 10	Less than 1 Ω
	OFF	—	More than 1 MΩ
	INT	2 and 13	Less than 1 Ω
	ON	2 and 10	Less than 1 Ω
	Washer ON	2 and 12 12 and 10 2 and 10	Less than 1 Ω

• KA model

	Switch position	Terminal No.	Standard
Front	OFF	3 and 12	Less than 1 Ω
	INT	3 and 12	Less than 1 Ω
	LO	3 and 11	Less than 1 Ω
	HI	2 and 11	Less than 1 Ω
	Washer ON	8 and 17	Less than 1 Ω
Rear	Washer ON	8 and 16 16 and 18 8 and 18	Less than 1 Ω
	OFF	—	More than 1 MΩ
	INT	8 and 15	Less than 1 Ω
	ON	8 and 18	Less than 1 Ω
	Washer ON	8 and 16 16 and 18 8 and 18	Less than 1 Ω

2) If continuity is not as specified, replace the switch.

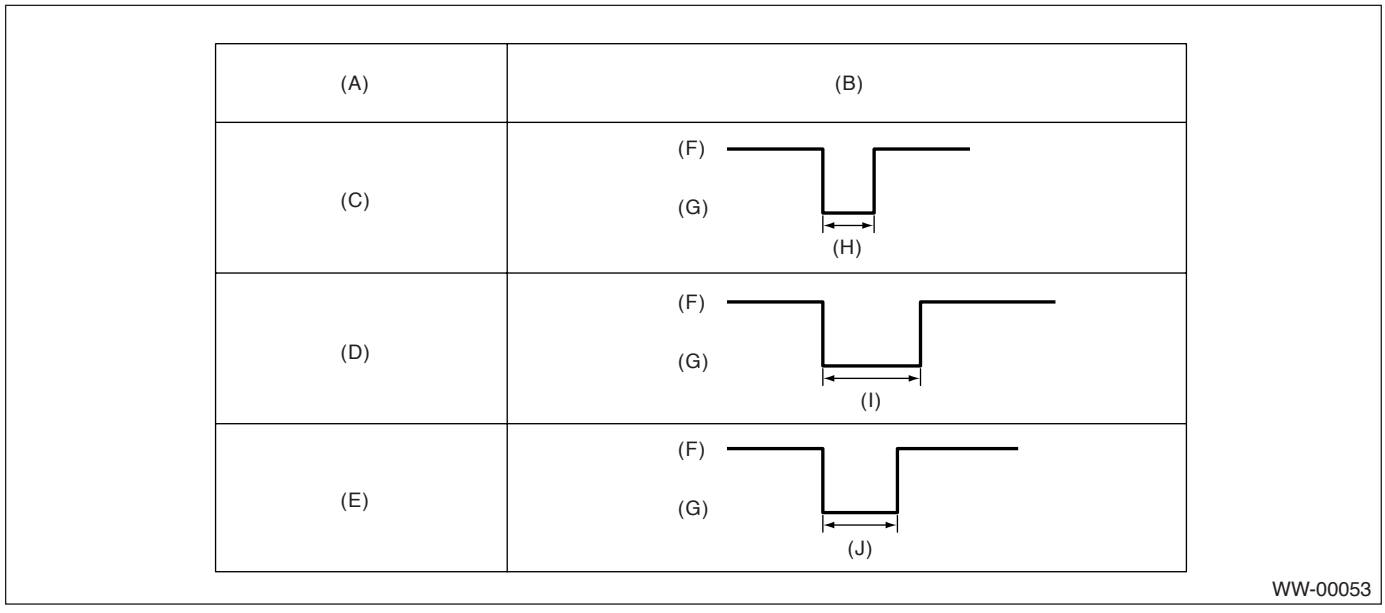
2. FRONT WIPER

1) Check with Subaru Select Monitor

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** When the front wiper switch is operated, check the input signal using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body Integrated Unit} from the main menu. 4) Select {Current Data Display & Save}. 5) When the front wiper switch is set to LO or HI, check the input signal.	Is the input signal normal?	End.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

2) Intermittent operation inspection
   (1) Turn the wiper switch to INT.
   (2) Adjust the intermittent control switch to MAX.
   (3) Apply the battery voltage to switch terminal No. 16 and 2 (EC, EK, KS and K4 model) or terminal No. 12 and 8 (KA model).
   (4) Measure the voltage between combination switch terminals.

Terminals
No. 7 — No. 2: EC, EK, KS and K4 model
No. 3 — No. 8: KA model



(A) Switch position
(B) Voltage
(C) MIN.
(D) MAX.
(E) Non-intermittent type
(F) 12 V
(G) 0 V
(H) Approx. 2 sec.
(I) 16±6 sec.
(J) 3±1 sec.

3) If operation is not as specified, replace the switch.

3. REAR WIPER

1) Check with Subaru Select Monitor

	Step	Check	Yes	No
1	**CHECK INPUT OF REAR WIPER.** Check the input from body integrated unit using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body Integrated Unit} from the main menu. 4) Select {Current Data Display & Save}. 5) Check the input of rear wiper switch.	Is the input normal?	Go to step **2.**	Check the rear wiper switch. <Ref. to WW-8, INSPECTION, Combination Switch (Wiper).>
2	**CHECK OUTPUT OF BODY INTEGRATED UNIT.** When the rear wiper switch is operated, check the output using Subaru Select Monitor. 1) Turn the ignition switch to ON. 2) Operate the rear wiper switch to set to each position of ON and INT. 3) At this time, check the output of body integrated unit.	When it is set to ON, is ON output continuously? When it is set to INT, is ON/OFF output repeatedly? (INT OFF time (when vehicle parked): 3 seconds for Sedan, 12 seconds for Wagon)	Check the rear wiper motor. <Ref. to WW-23, INSPECTION, Rear Wiper Motor.>	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

2) Rear wiper motor circuit check

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT OF REAR WIPER MOTOR.** 1) Disconnect the harness connector of rear wiper motor. 2) Turn the ignition switch to ACC. 3) Measure the voltage between the rear wiper motor harness connector terminal and chassis ground. ***Connector & terminal*** ***Sedan model*** ***(R132) No. 1 (+) — Chassis ground (−):*** ***Wagon model*** ***(D43) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	• Check the fuse (No. 23 in fuse & relay box). • Check the fusible link (No. 7 in main fuse box).
2	**CHECK GROUND CIRCUIT OF REAR WIPER MOTOR.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between the rear wiper motor harness connector terminal and chassis ground. ***Connector & terminal*** ***Sedan model*** ***(R132) No. 3 — Chassis ground:*** ***Wagon model*** ***(D43) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the open circuit of rear wiper motor ground cable.

Step		Check	Yes	No
3	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND REAR WIPER MOTOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of body integrated unit. 3) Disconnect the harness connector of rear wiper motor. 4) Measure the resistance between the harness connector terminals of body integrated unit and rear wiper motor. ***Connector & terminal*** ***Sedan model*** ***(B280) No. 1 — (R132) No. 2:*** ***(B280) No. 8 — (R132) No. 4:*** ***Wagon model*** ***(B280) No. 1 — (D43) No. 2:*** ***(B280) No. 8 — (D43) No. 4:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the open circuit of harness between body integrated unit and rear wiper motor.
4	**CHECK OPERATION OF REAR WIPER MOTOR.** 1) Remove the rear wiper motor. 2) Check the rear wiper motor. <Ref. to WW-23, INSPECTION, Rear Wiper Motor.>	Does the rear wiper motor rotate normally?	End.	Replace the rear wiper motor.

NOTE:
Rear wiper intermittent time (AT model only)

Select lever position (AT model only)	Vehicle speed (km/h (MPH))	Intermittent stopping time (sec.)	
		Sedan	Wagon
Rev	—	Continuous operation	
Except for reverse mode	80 — (50 —)	12	3
	50 — 80 (31 — 50)	9	6
	20 — 50 (12 — 31)	6	9
	0 — 20 (0 — 12)	3	12

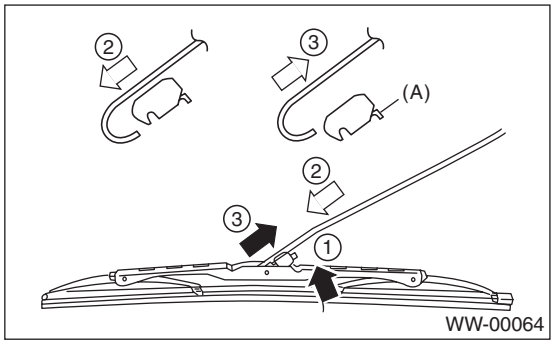
4. Wiper Blade

A: REMOVAL

CAUTION:
When replacing wiper blades or etc., be sure to stand up the driver side wiper arm first, then passenger side wiper arm next. Also, when putting the wiper arms back, be sure to start with passenger side first, then driver side next. Doing this in the reverse order may result in damage of passenger side wiper arm by hitting with driver side wiper blade.

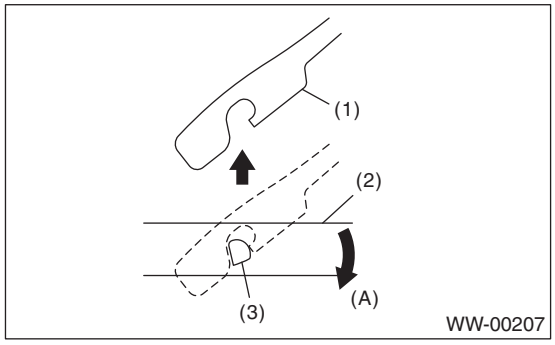
1. FRONT

While pushing the locking clip (A) up, pull out the blade from arm to the arrow direction.



2. REAR

Turn the blade in the direction of arrow (A) and remove it from arm.



(A) Turn the wiper blade.
(1) Wiper arm
(2) Wiper blade
(3) Installing part of wiper blade

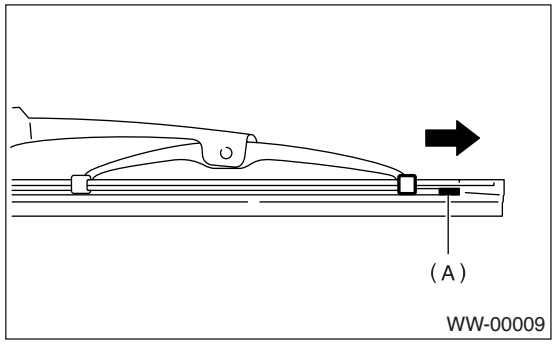
B: INSTALLATION

1) Install in the reverse order of removal.
2) Confirm that the clip is locked securely.

C: DISASSEMBLY

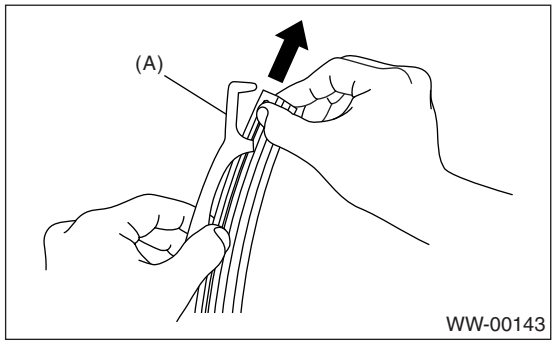
1. METAL TYPE

Pull side (A) of the wiper rubber stopper and remove the rubber from blade assembly.



2. RESIN TYPE

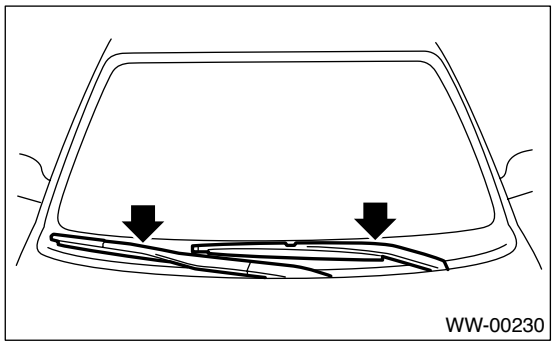
Pull the wiper rubber top slightly from the stopper (A) and pull out fully.



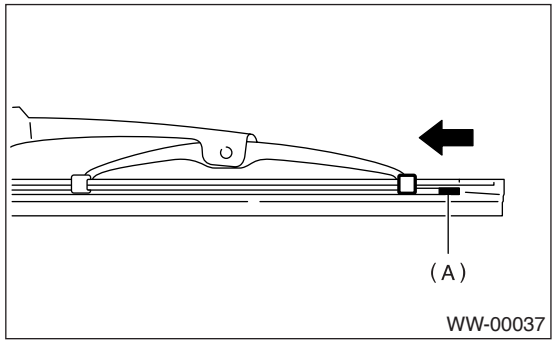
D: ASSEMBLY

1. METAL TYPE

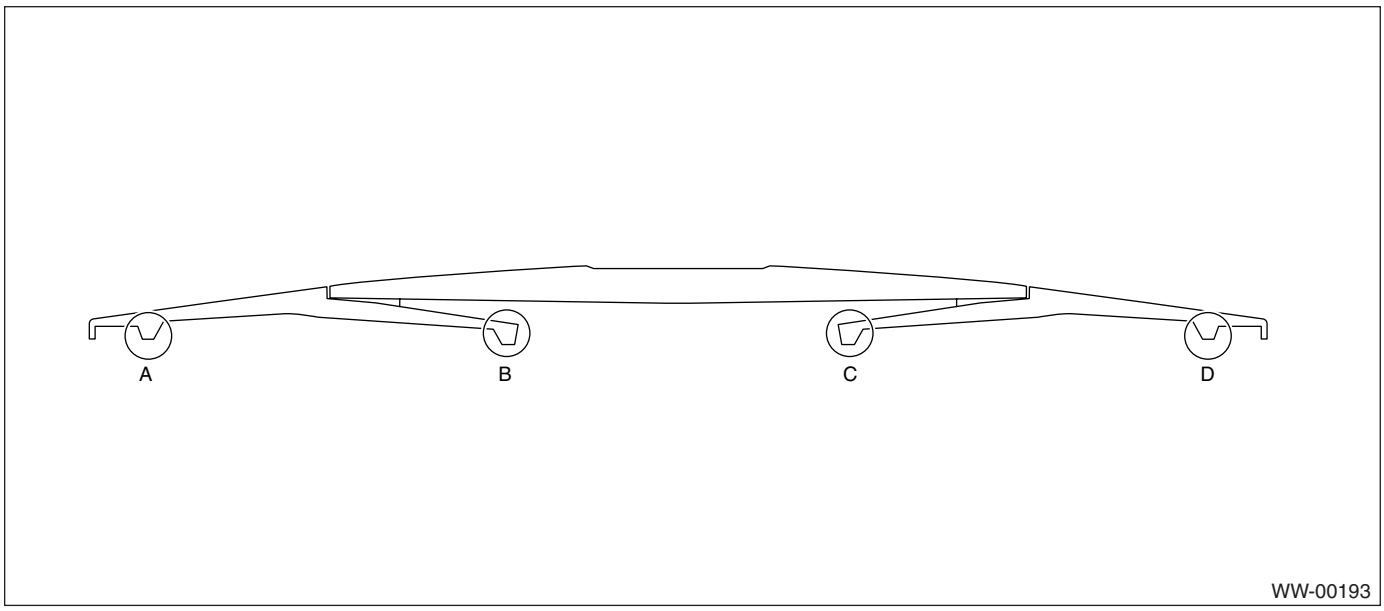
1) Insert the wiper rubber onto blade so that the stopper is in the position shown in the figure.



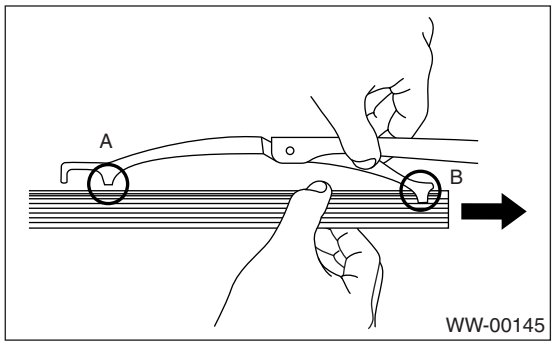
2) Make sure the wiper rubber is securely fastened to the pull stopper (A).



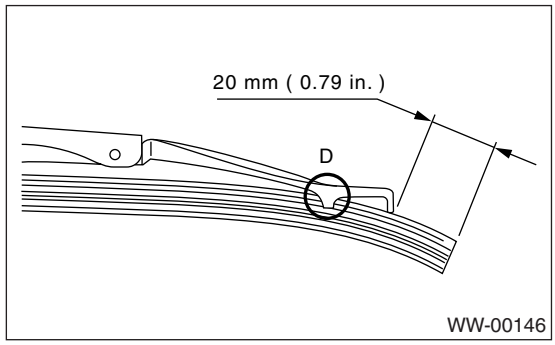
2. RESIN TYPE



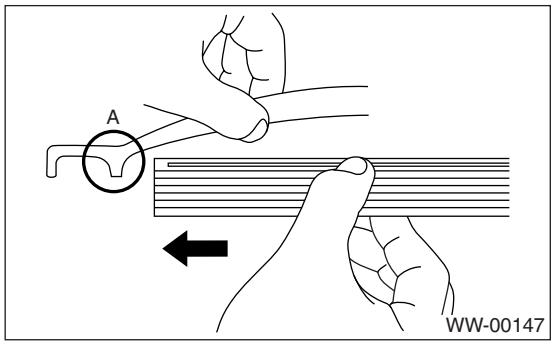
1) Insert the wiper rubber through the claw (B).



2) Insert the wiper rubber until its top end protrudes approx. 20 mm (0.79 in) from stopper (D).



3) Insert the wiper rubber into the claw (A).



E: INSPECTION

1) When the wiper does not perform well, inspect the followings:

• Make sure the movable part of the wiper blade assembly moves smoothly.

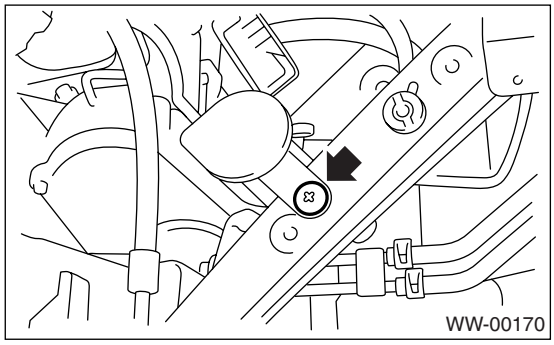
• Make sure the wiper rubber is not deformed or damaged.

2) If damaged, replace with new one.

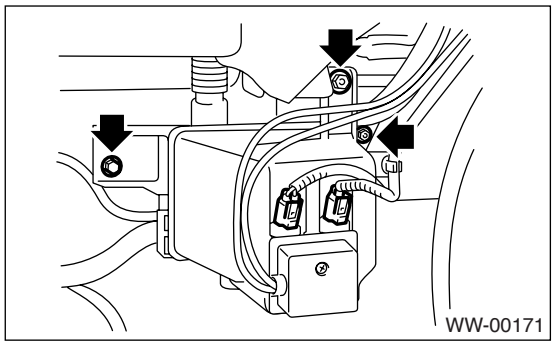
5. Washer Tank and Motor

A: REMOVAL

1) Open the hood.
2) Disconnect the ground cable from battery.
3) Remove the front bumper. <Ref. to EI-30, REMOVAL, Front Bumper.>
4) Remove the clip holding washer water supply tap.



5) Remove the two bolts and one nut, hose, connector and washer motor cover, and then remove the washer tank.



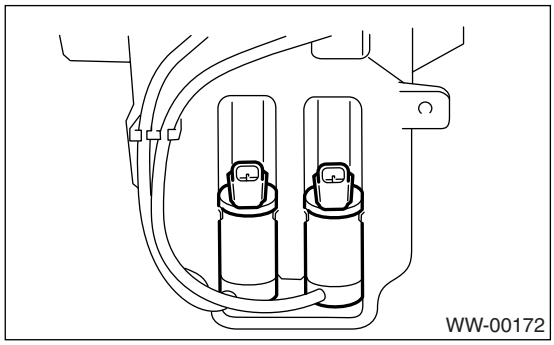
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
6.0 N·m (0.61 kgf-m, 4.4 ft-lb)

C: DISASSEMBLY

Pull out the washer motor from tank.

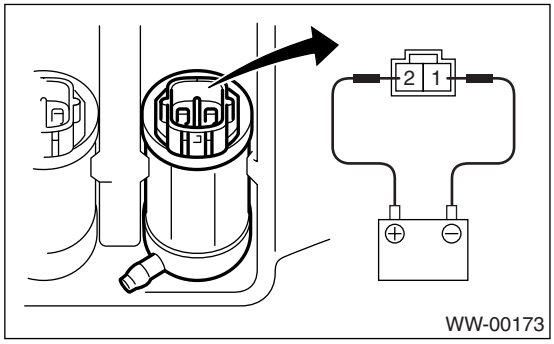


D: ASSEMBLY

1) Assemble in the reverse order of disassembly.
2) Confirm that water does not leak from installation area of motor.

E: INSPECTION

Apply battery voltage to the connector terminal of the washer motor and make sure the motor operates.

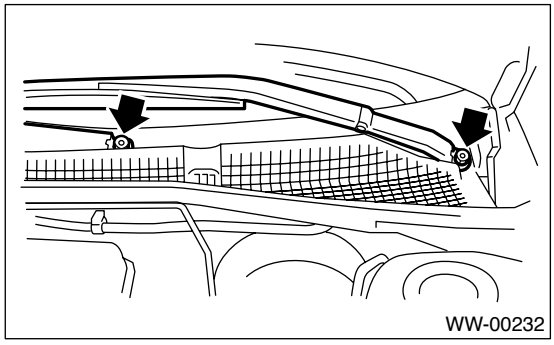


6. Front Wiper Arm

A: REMOVAL

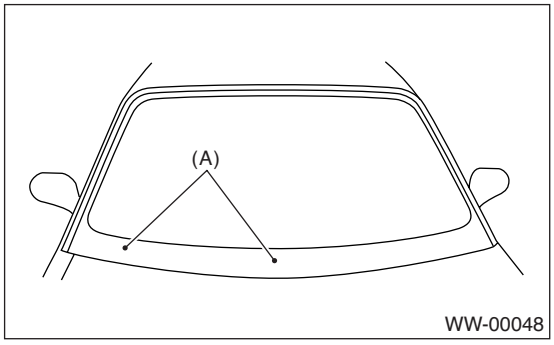
CAUTION:
When replacing wiper blades or etc., be sure to stand up the driver side wiper arm first, then passenger side wiper arm next. Also, when putting the wiper arms back, be sure to start with passenger side first, then driver side next. Doing this in the reverse order may result in damage of passenger side wiper arm by hitting with driver side wiper blade.

1) Open the hood.
2) Remove the cap.
3) Remove the nut to remove wiper arm.


WW-00232

B: INSTALLATION

1) Install in the reverse order of removal.
2) Operate the wiper once.
3) Align the wiper blade to ceramic print point mark (A) of front window panel.

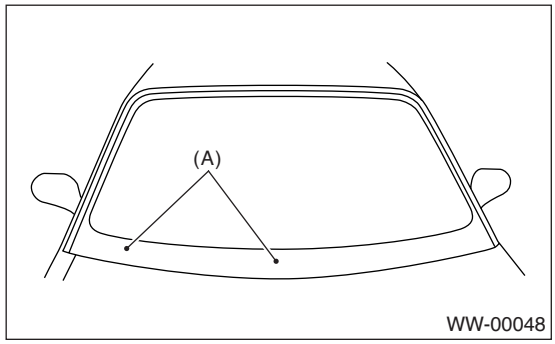


WW-00048

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

C: ADJUSTMENT

Operate the wiper once. Align the wiper blade to ceramic print point mark (A) of front window panel.

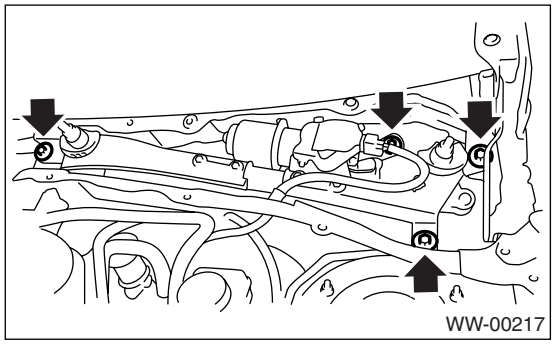


WW-00048

7. Front Wiper Motor and Link

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the cowl panel. <Ref. to EI-39, REMOVAL, Cowl Panel.>
3) Disconnect the connector of wiper motor assembly.
4) Remove the bolt to remove wiper assembly.


WW-00217

NOTE:
Wiper motor and wiper link can not be disassembled, because those are assembly part.

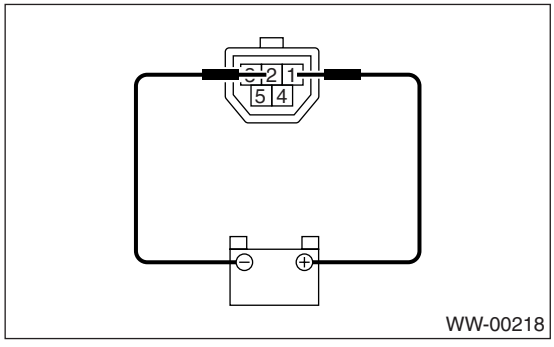
B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-2, FRONT WIPER, COMPONENT, General Description.>

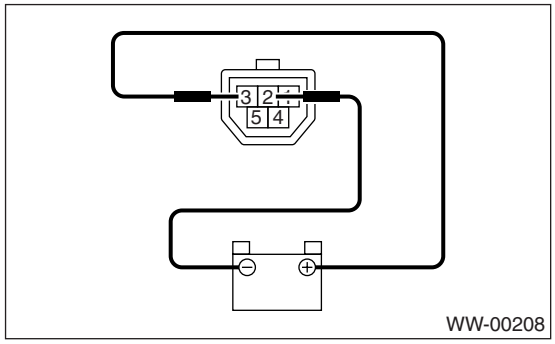
C: INSPECTION

1) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at low speed.
• LHD model



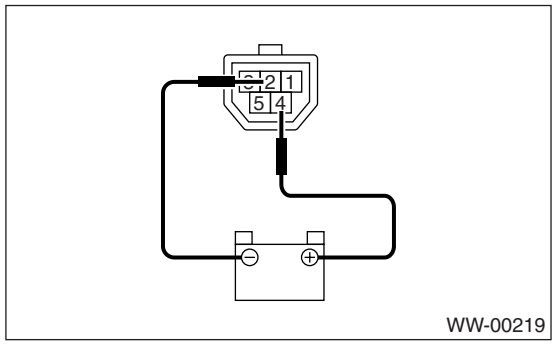
WW-00218

• RHD model



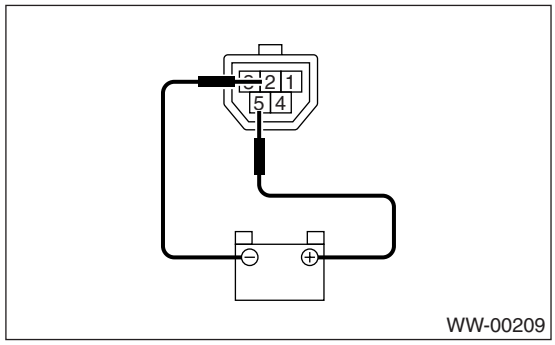
WW-00208

2) When the battery is connected to the terminal of connectors, confirm that the wiper motor operates at high speed.
• LHD model



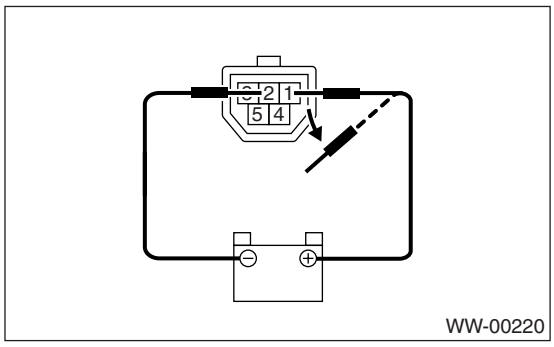
WW-00219

• RHD model



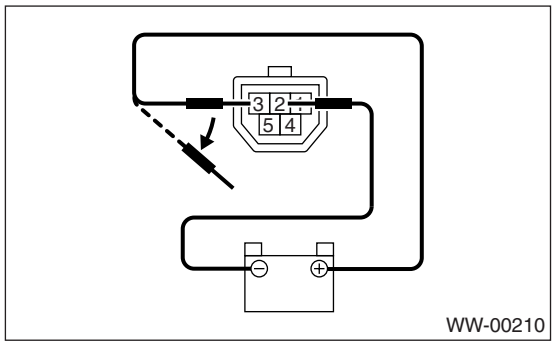
WW-00209

3) Connect the battery to terminals of connector, and remove the terminal connection with wiper motor rotated at low speed, and stop the wiper motor through operation.
• LHD model



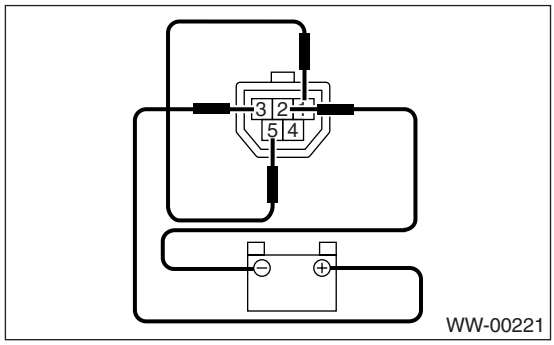
WW-00220

• RHD model

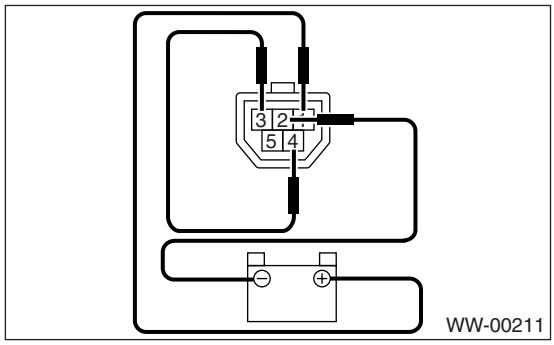


4) Connect the battery and confirm that the wiper motor stops at automatic stop position after the wiper motor operates at low speed again.

• LHD model



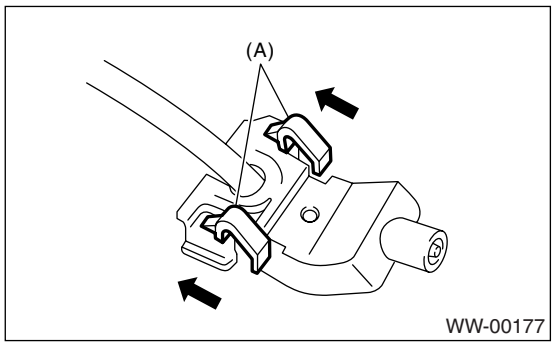
• RHD model



8. Front Washer Nozzle

A: REMOVAL

1) Remove the front hood insulator. <Ref. to EB-13, FRONT HOOD INSULATOR, REMOVAL, Front Hood.>
2) Hold the pawl of washer nozzle (A) toward the arrow direction, and remove the washer nozzle.



3) Remove the washer hose from washer nozzle.

B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the washer nozzle position. <Ref. to WW-20, ADJUSTMENT, Front Washer Nozzle.>

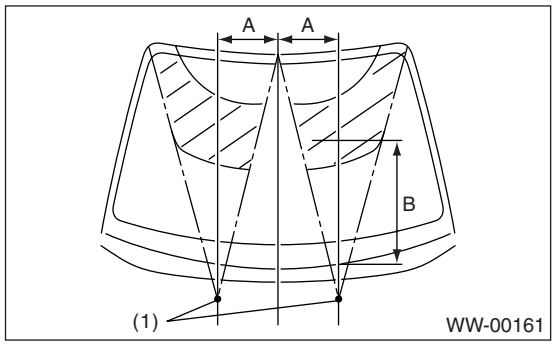
C: INSPECTION

- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT

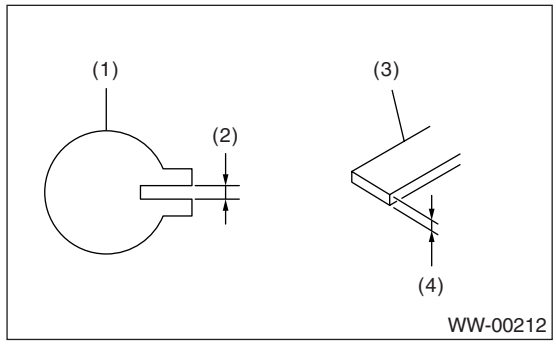
1) Turn the wiper switch to OFF position.
2) While the vehicle is at standstill, adjust the washer injection position as shown in the figure.

Injection position:
A: 250 mm (9.84 in)
B: 435 mm (17.13 in)



(1) Nozzle

Injection angle should be adjusted with 0.5 mm (0.020 in) thickness steel scale. Use maximum thickness of 0.5 mm steel scale, because the injection slit width of washer nozzle is 0.6 mm (0.024 in). Adjusting with a flat tip driver may damage the injection slit and cause the faulty injection.



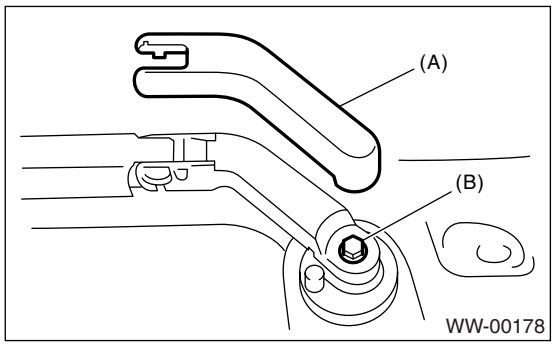
(1) Inside of washer nozzle injection
(2) 0.6 mm (0.024 in)
(3) Steel scale
(4) Max. 0.5 mm (0.020 in)

9. Rear Wiper Arm

A: REMOVAL

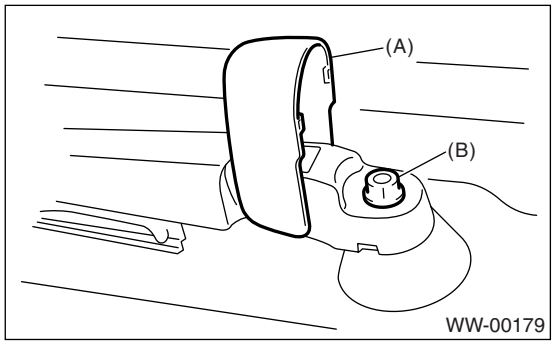
1. SEDAN MODEL

1) Detach the wiper arm cover (A).
2) Remove the nut (B) to remove wiper arm.



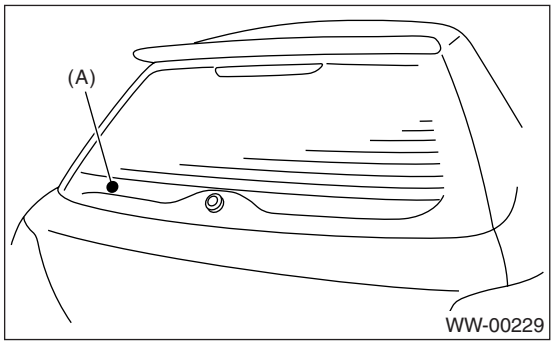
2. WAGON MODEL

1) Detach the wiper arm cover (A).
2) Remove the nut (B) to remove wiper arm.



B: INSTALLATION

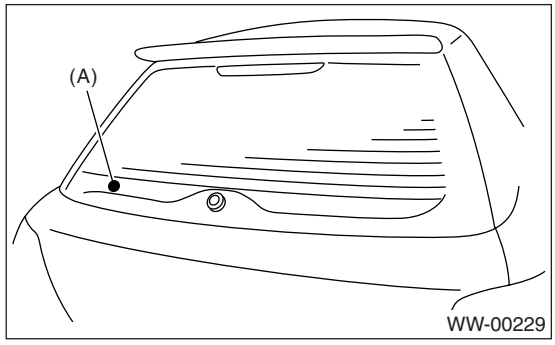
1) Install in the reverse order of removal.
2) Operate the rear wiper once.
3) Align the blade with the marking (A) of glass.



Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-4, REAR WIPER (SEDAN MODEL), COMPONENT, General Description.>

C: ADJUSTMENT

1) Operate the rear wiper once.
2) Align the blade with the marking (A) of glass.

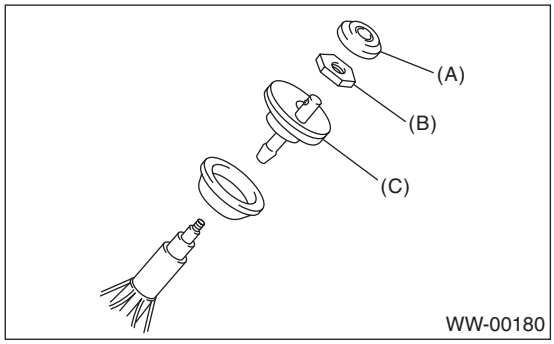


10.Rear Wiper Motor

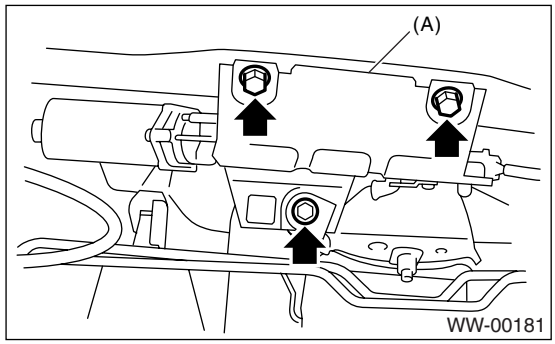
A: REMOVAL

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear wiper arm. <Ref. to WW-21, SEDAN MODEL, REMOVAL, Rear Wiper Arm.>
3) Remove the cap (A) and nut (B) from rear wiper shaft.
4) Raise the nozzle & hose assembly (C) to disconnect the washer tube and remove the nozzle & hose assembly (C).

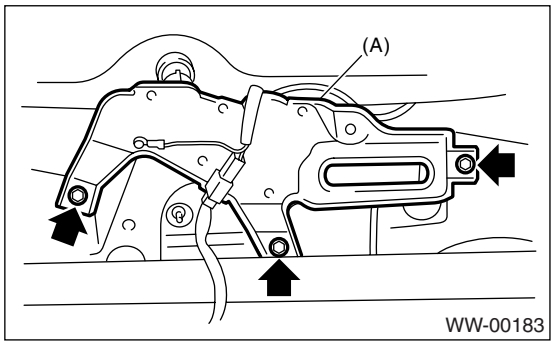


5) Disconnect the harness connector of wiper motor assembly.
6) Remove the bolts to remove wiper motor assembly (A).



2. WAGON MODEL

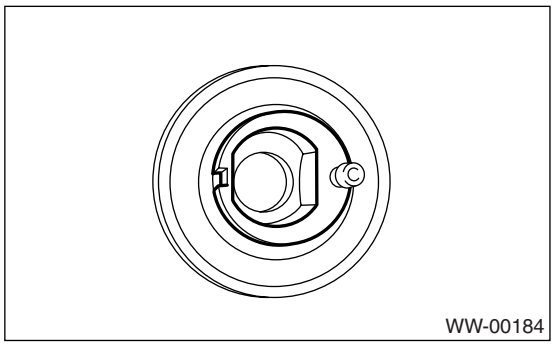
1) Disconnect the ground cable from battery.
2) Remove the rear wiper arm. <Ref. to WW-21, WAGON MODEL, REMOVAL, Rear Wiper Arm.>
3) Remove the rear gate lower trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
4) Disconnect the harness connector of wiper motor assembly.
5) Remove the bolts to remove wiper motor assembly (A).



B: INSTALLATION

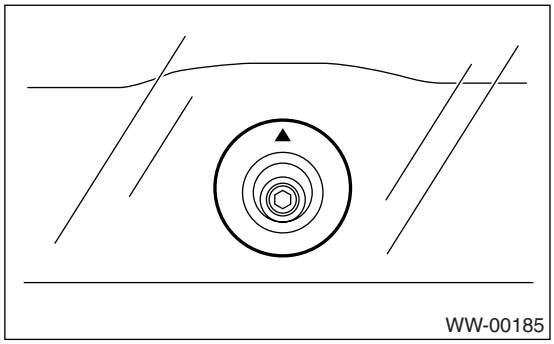
1. SEDAN MODEL

1) Install in the reverse order of removal.
2) Align the cutout of reverse side of nozzle & hose assembly with the cutout of rear wiper shaft for installation.



2. WAGON MODEL

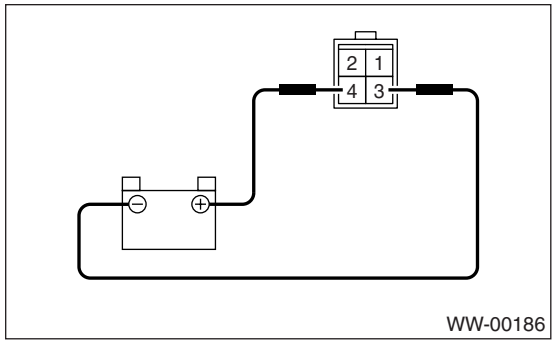
1) Install in the reverse order of removal.
2) Be sure that the pivot cap with the arrow mark facing up, as shown in the figure.



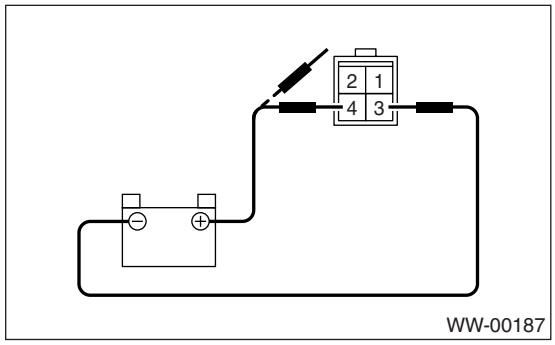
Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to WW-5, REAR WIPER (WAGON MODEL), COMPONENT, General Description.>

C: INSPECTION

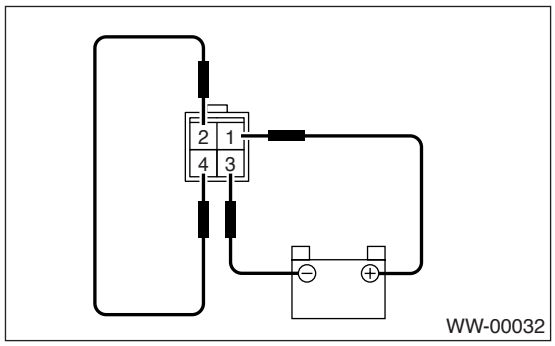
1) Connect the battery to wiper motor connector and confirm that wiper motor operates.



2) Connect the battery to terminals of connector, and remove the terminal connection with wiper motor rotated, and stop the wiper motor through operation.



3) Connect the battery and confirm that the wiper motor stops at automatic stop position after the wiper motor operates at low speed again.

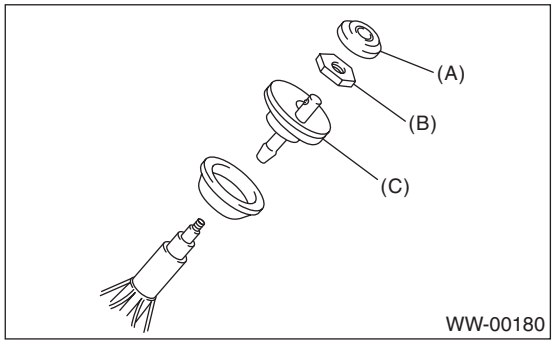


11.Rear Washer

A: REMOVAL

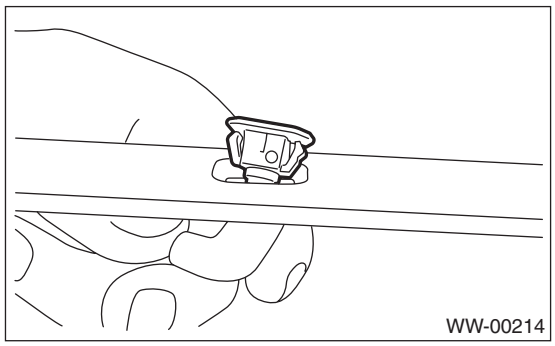
1. SEDAN MODEL

1) Remove the rear wiper arm. <Ref. to WW-21, SEDAN MODEL, REMOVAL, Rear Wiper Arm.>
2) Remove the cap (A) and nut (B) from rear wiper shaft.
3) Raise the nozzle & hose assembly (C) to disconnect the washer hose, and remove the nozzle & hose assembly (C).



2. WAGON MODEL

1) Detach the roof spoiler. <Ref. to EI-40, REMOVAL, Roof Spoiler.>
2) Remove the washer hose from washer nozzle.
3) Push the pawl of nozzle from the reverse side of roof spoiler with a flat tip screwdriver or equivalent, and remove the washer nozzle.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the washer nozzle. <Ref. to WW-24, ADJUSTMENT, Rear Washer.>

C: INSPECTION

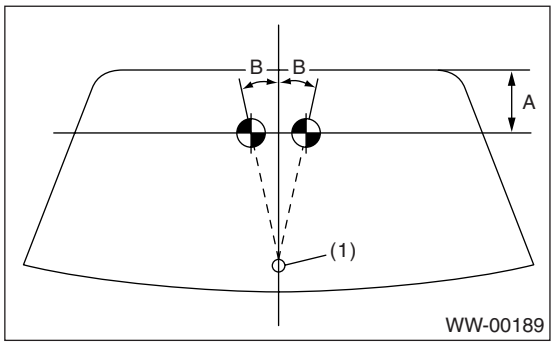
- Make sure the nozzle and hose are not clogged.
- Make sure the hose is not bent.

D: ADJUSTMENT

1) Turn the wiper switch to OFF position.
2) While the vehicle is at standstill, adjust the washer injection position as shown in the figure.

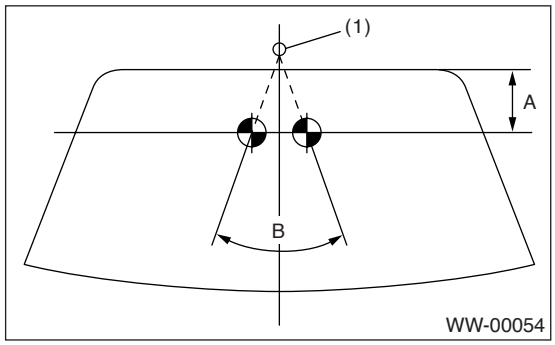
NOTE:
Injection position of rear washer nozzle is adjustable only for sedan model.

- Sedan model



(1) Nozzle
(A) 310 mm (12.20 in)
(B) 5.5°

- Wagon model



(1) Nozzle
(A) 70 mm (2.76 in)
(B) 70°

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

ENTERTAINMENT

ET

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3.	Front Accessory Power Supply Socket System	4
4.	Audio	5
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6.	Tweeter	7
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1. General Description

A: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing the audio, control unit, and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors securely during reassembly.
• After reassembly, make sure the functional parts operate smoothly.

B: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Conductive silver composition (DUPONT No. 4817 or equivalent)	Used for repairing antenna wire.

2. Audio System

A: WIRING DIAGRAM

<Ref. to WI-116, WIRING DIAGRAM, Audio System.>

B: INSPECTION

Symptom	Repair order
No power coming in. (No display and no sound from speakers)	(1) Check the fuse and power supply for audio. (2) Check the audio ground. (3) Remove the audio and repair it.
A specific speaker does not operate.	(1) Check the speaker. (2) Check the output circuit between audio and speaker.
Audio generates noise with engine running.	(1) Check the audio ground. (2) Check the generator. (3) Check the ignition coil. (4) Remove the audio and repair it.
AM (MW, LW: Europe only) and FM modes are weak or noisy.	(1) Check the antenna. (2) Check the antenna amplifier. (3) Check the noise suppressor. (4) Check the audio ground. (5) Remove the audio and repair it.

3. Front Accessory Power Supply Socket System

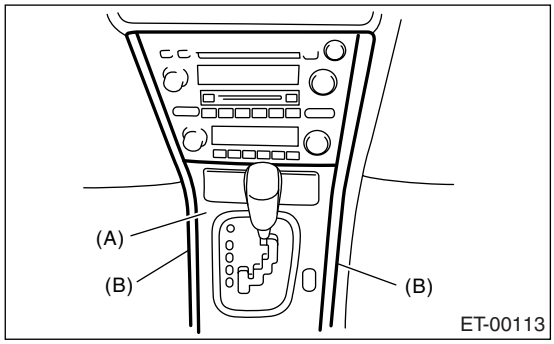
A: WIRING DIAGRAM

<Ref. to WI-242, WIRING DIAGRAM, Front Accessory Power Supply Socket System.>

4. Audio

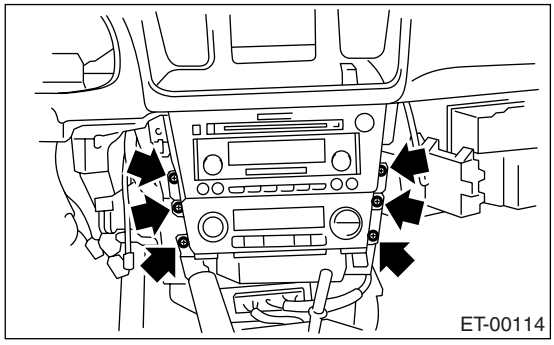
A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
3) Remove the console front panel. <Ref. to EI-54, REMOVAL, Center Console.>
4) Remove the console side garnish. <Ref. to EI-54, REMOVAL, Center Console.>



(A) Console front panel
(B) Console side garnish

5) Remove the screws, and slightly pull the audio out from center console.



6) Disconnect the harness connector and antenna feeder cord, and then remove the audio.

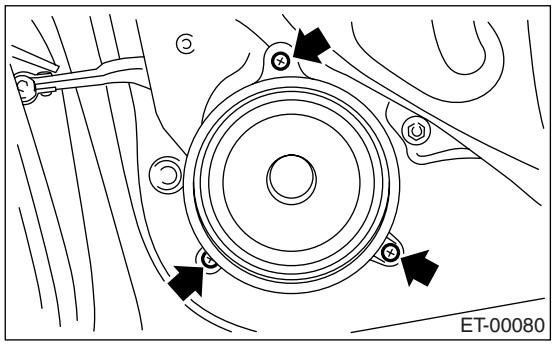
B: INSTALLATION

Install in the reverse order of removal.

5. Front Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the front speaker mounting screws.



4) Disconnect the harness connector and remove front speaker.

B: INSTALLATION

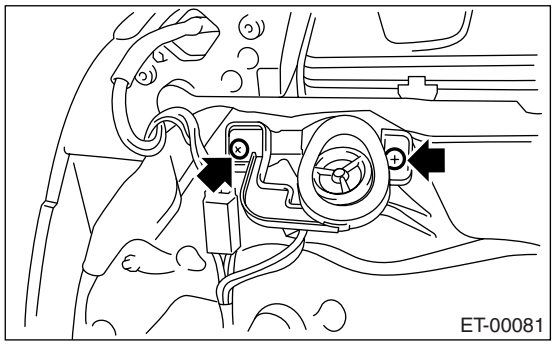
Install in the reverse order of removal.

6. Tweeter

A: REMOVAL

1. MODEL WITH TWEETER

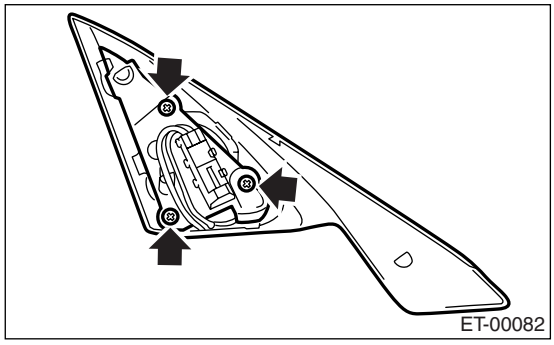
1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the tweeter mounting screws.



4) Disconnect the harness connector and remove tweeter.

2. MODEL WITH MCINTOSH AUDIO SYSTEM

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the gusset cover. <Ref. to GW-18, REMOVAL, Outer Mirror Assembly.>
4) Disconnect the harness connector and remove tweeter.



B: INSTALLATION

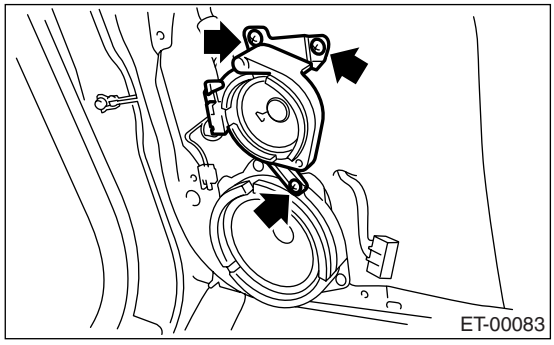
Install in the reverse order of removal.

7. Squawker

A: REMOVAL

NOTE:
Model with McIntosh audio system only.

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the squawker mounting screws.



4) Disconnect the harness connectors and remove squawker.

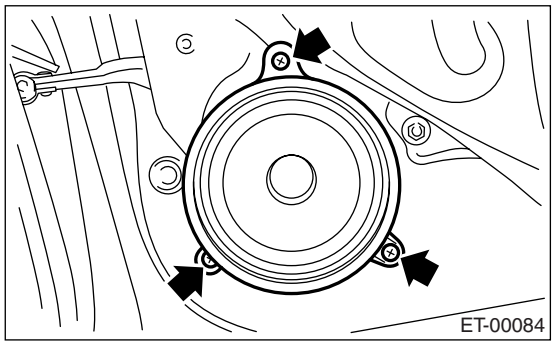
B: INSTALLATION

Install in the reverse order of removal.

8. Rear Speaker

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the rear speaker mounting screws.



4) Disconnect the harness connector and remove the rear speaker.

B: INSTALLATION

Install in the reverse order of removal.

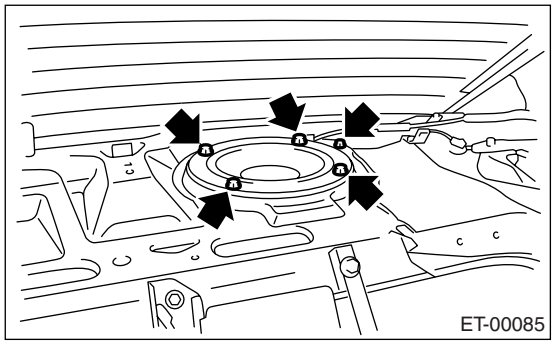
9. Woofer

A: REMOVAL

1. SEDAN MODEL

NOTE:
Model with McIntosh audio system only.

1) Disconnect the ground cable from battery.
2) Remove the rear shelf trim. <Ref. to EI-70, REMOVAL, Rear Shelf Trim.>
3) Remove the woofer mounting screws.

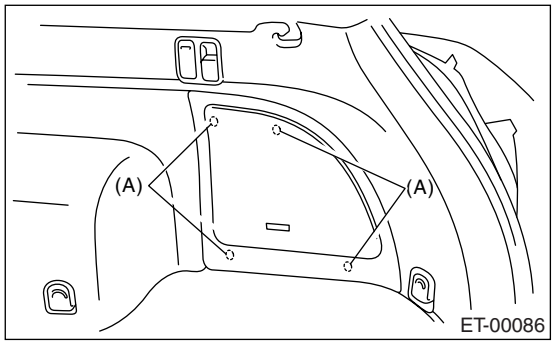


4) Disconnect the harness connector and detach woofer.

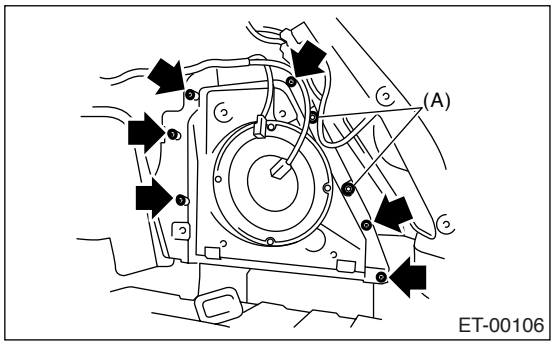
2. WAGON MODEL

NOTE:
Model with McIntosh audio system only.

1) Disconnect the ground cable from battery.
2) Remove the hooks (A) and detach woofer cover. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>



3) Remove the quarter lower trim. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>
4) Remove the woofer bracket mounting clips (A) and screws, and then remove the woofer bracket.



5) Disconnect the harness connector and detach woofer.

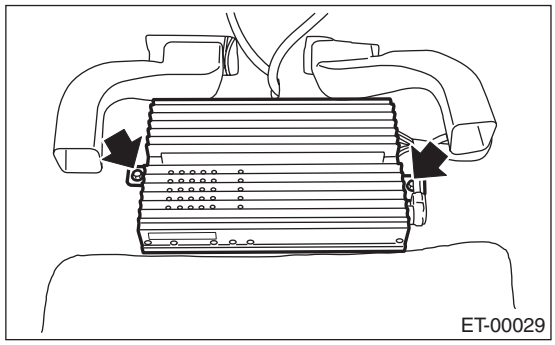
B: INSTALLATION

Install in the reverse order of removal.

10.Power Amplifier

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the passenger's seat. <Ref. to SE-7, REMOVAL, Front Seat.>
3) Disconnect the harness connector.
4) Remove the nuts to remove power amplifier.



B: INSTALLATION

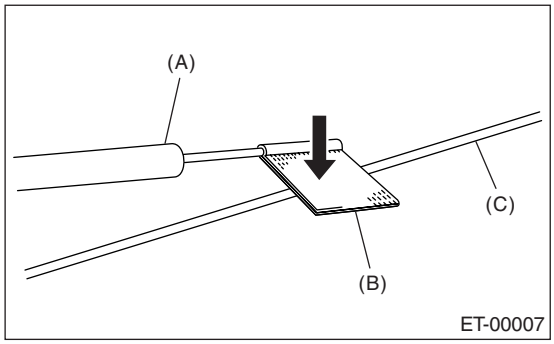
Install in the reverse order of removal.

11.Antenna

A: INSPECTION

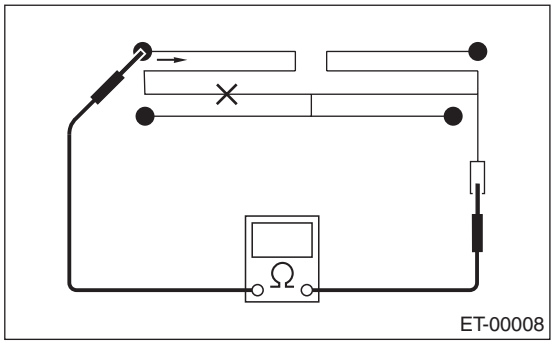
Measure the resistance between antenna terminal and each antenna wire.
If an antenna wire is OK, resistance will be less than 1 Ω. If an antenna wire is broken, resistance will be more than 1 MΩ.

NOTE:
When checking the continuity, wind a piece of aluminum foil around the tip of tester probe and press the foil against wire with your finger.



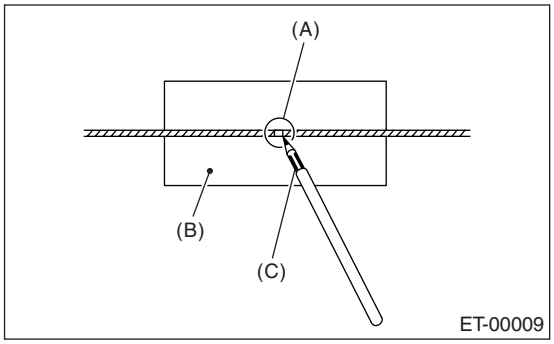
(A) Tester probe
(B) Aluminum foil
(C) Antenna wire

To locate the broken point, move the probe along antenna wire.



B: REPAIR

1) Clean the antenna wire and surrounding area with a cloth dampened by alcohol.
2) Paste a thin masking film on the glass along broken wire.
3) Apply conductive silver composition (DUPONT No. 4817) on the broken portion with a drawing pen.



(A) Broken portion
(B) Masking film
(C) Conductive silver composition

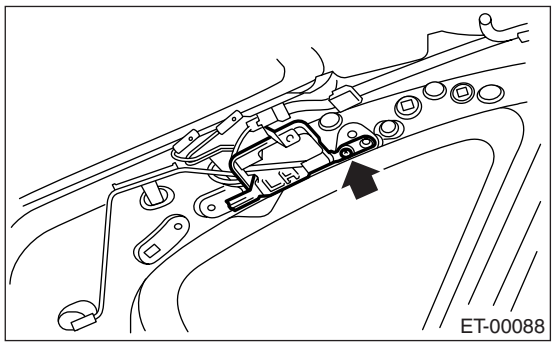
4) Dry out the deposited portion.
5) After repair has been completed, measure the resistance in repaired wire.

12.Antenna Amplifier

A: REMOVAL

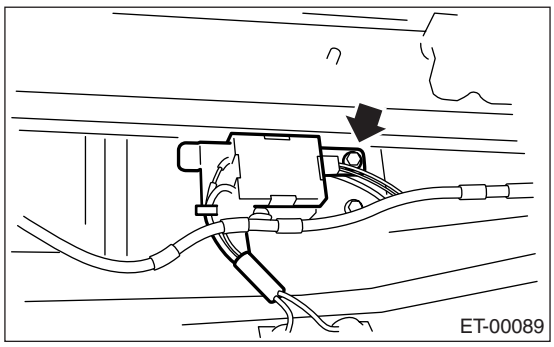
1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear quarter trim. <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIR-BAG), REMOVAL, Rear Quarter Trim.>
3) Disconnect the harness connectors and terminals.
4) Remove the curtain airbag module. <Ref. to AB-18, REMOVAL, Curtain Airbag Module.>
5) Remove the screw and detach antenna amplifier.



2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
3) Disconnect the harness connectors and terminals.
4) Remove the screw and detach antenna amplifier.



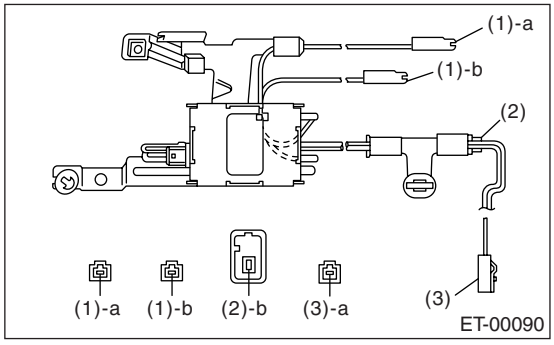
B: INSTALLATION

Install in the reverse order of removal.

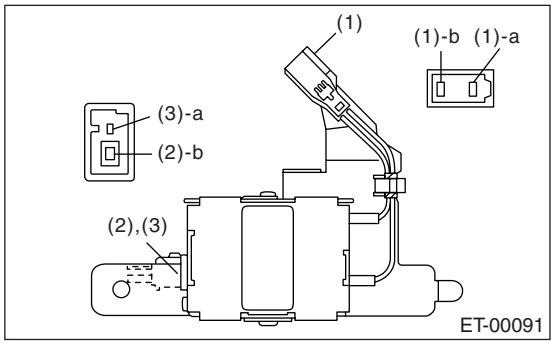
C: INSPECTION

Measure the resistance of antenna amplifier.

- Sedan model



- Wagon model



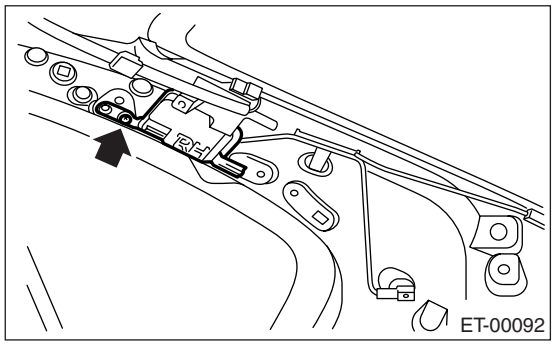
Terminal No.	Standard
1-a and Amplifier body	More than 10 kΩ
1-b and Amplifier body	More than 10 kΩ
2-a and Amplifier body	More than 10 kΩ
3-a and Amplifier body	More than 10 kΩ

13.Noise Suppressor

A: REMOVAL

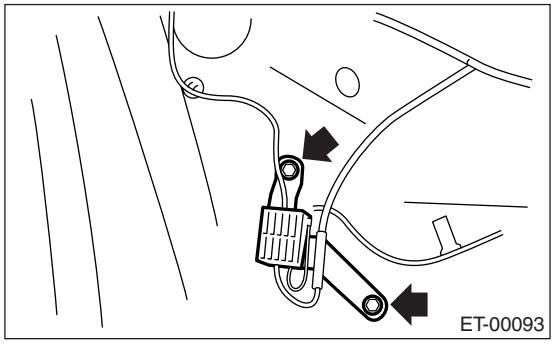
1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear quarter trim. <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIR-BAG), REMOVAL, Rear Quarter Trim.>
3) Remove the curtain airbag module. <Ref. to AB-18, REMOVAL, Curtain Airbag Module.>
4) Disconnect the harness connector from noise suppressor.
5) Remove the harness clip.
6) Remove the screw and detach noise suppressor.



2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
3) Disconnect the harness connector from noise suppressor.
4) Remove the screws and detach noise suppressor.



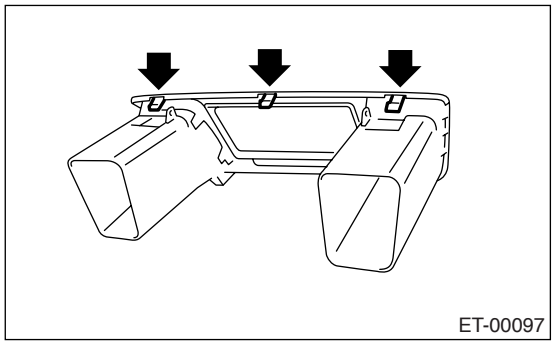
B: INSTALLATION

Install in the reverse order of removal.

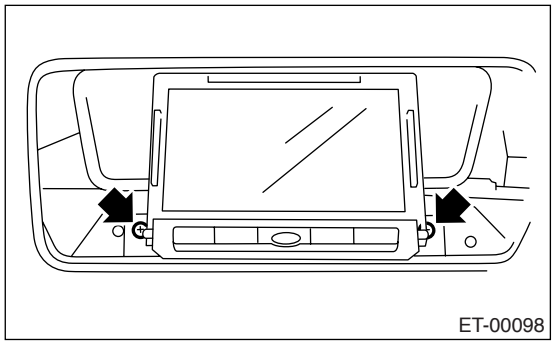
14.Navigation Display

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the clips, and then remove the center upper panel.



3) Remove the display mounting screws.



4) Disconnect the harness connector, and then remove the navigation display.

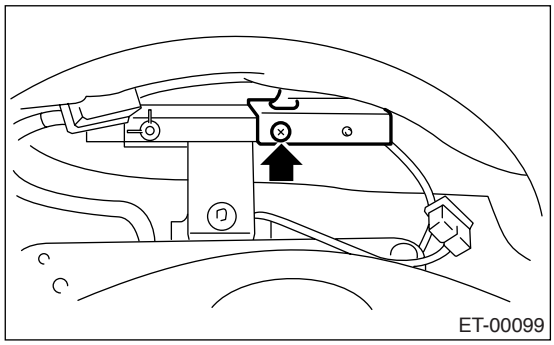
B: INSTALLATION

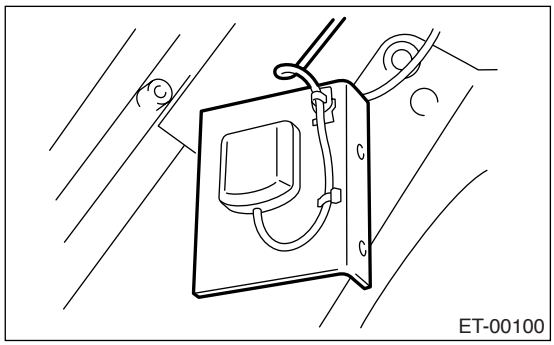
Install in the reverse order of removal.

15.GPS Antenna

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the combination meter. <Ref. to IDI-16, REMOVAL, Combination Meter Assembly.>
3) Remove the GPS antenna mounting screw, and then remove the GPS antenna.





4) Remove the audio. <Ref. to ET-5, REMOVAL, Audio.>
5) Remove the GPS antenna cord connector from steering support beam stay (on the driver's side).

B: INSTALLATION

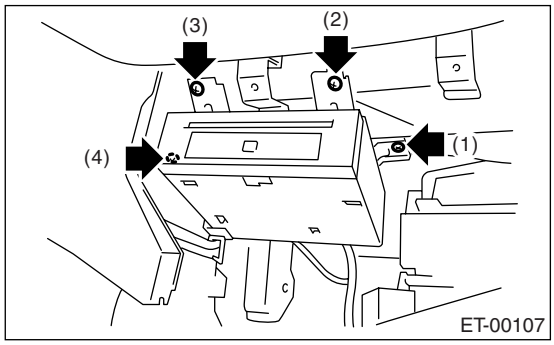
Install in the reverse order of removal.

16.Navigation Body

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the navigation body mounting screws in numerical order and pull it out.

NOTE:
To remove the screw (4) easier, move the navigation body after removing the screw (3).



4) Remove the harness connector and antenna cable, and then remove the navigation body.

B: INSTALLATION

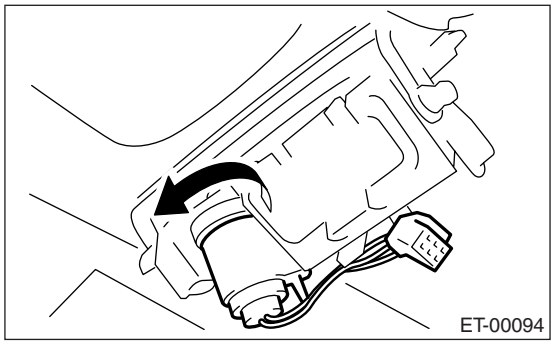
Install in the reverse order of removal.

17.Front Accessory Power Supply Socket

A: REMOVAL

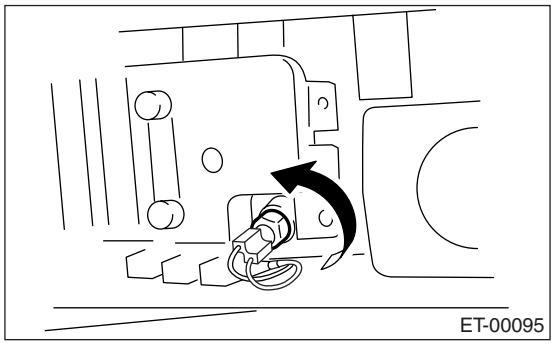
1. FRONT

1) Disconnect the ground cable from battery.
2) Remove the console front panel. <Ref. to EI-54, REMOVAL, Center Console.>
3) Disconnect the harness connector, and remove the accessory power supply socket.



2. REAR

1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
3) Disconnect the harness connector, and remove the accessory power supply socket.



B: INSTALLATION

Install in the reverse order of removal.

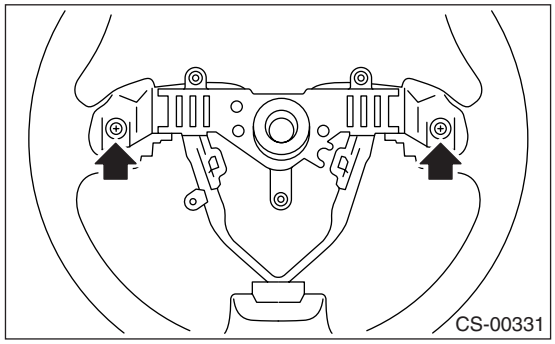
18.Steering Satellite Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tire to the straight-ahead position.
3) Remove the airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

WARNING:
With the airbag module equipped, always refer to "Airbag System" when performing the airbag module repair service. <Ref. to AB-14, INSPECTION, Driver's Airbag Module.>

4) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
5) Remove the cover from steering wheel.
6) Remove each one of satellite switch mounting screw from the LH and RH side.

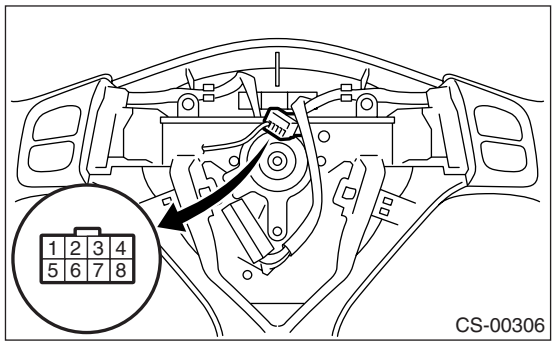


7) Remove the satellite switch.

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION



Step		Check	Yes	No
1	**MUTE SWITCH CONTINUITY CHECK.** 1) Press the mute switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 7 — No. 6:***	Is the resistance approx. 22 Ω?	Go to step **2.**	Replace the satellite switch.
2	**VOLUME SWITCH CONTINUITY CHECK.** 1) Press the volume switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 7 — No. 6: Volume up*** ***No. 7 — No. 6: Volume down***	Is the resistance approx. 90 Ω? (Volume up) Is the resistance approx. 200 Ω? (Volume down)	Go to step **3.**	Replace the satellite switch.
3	**MODE SWITCH CONTINUITY CHECK.** 1) Press the mode switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 7 — No. 6:***	Is the resistance approx. 360 Ω?	Go to step **4.**	Replace the satellite switch.
4	**SEEK SWITCH CONTINUITY CHECK.** 1) Press the seek switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 7 — No. 6: Seek up*** ***No. 7 — No. 6: Seek down***	Is the resistance approx. 690 Ω? (Seek up) Is the resistance approx. 1.5 kΩ? (Seek down)	Go to step **5.**	Replace the satellite switch.
5	**CHECK SATELLITE SWITCH INSULATION.** 1) Not to operate the satellite switch. 2) Measure the resistance between satellite switch connector terminals. ***Terminals*** ***No. 7 — No. 6:***	Is the resistance approx. 4.7 kΩ?	Satellite switch is normal.	Replace the satellite switch.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

COMMUNICATION SYSTEM

COM

Page

1. General Description 2
2. Horn System 3
3. Horn 4
4. Horn Switch 5

1. General Description

A: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When replacing audio, control module, and other parts provided with memory functions, record memory contents before disconnecting the battery ground cable. Otherwise, the memory will be erased.
• Reassemble in reverse order of disassembly, unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors securely during reassembly.
• After reassembly, make sure functional parts operate smoothly.

B: PREPARATION TOOL

1. GENERAL TOOLS

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Horn System

A: WIRING DIAGRAM

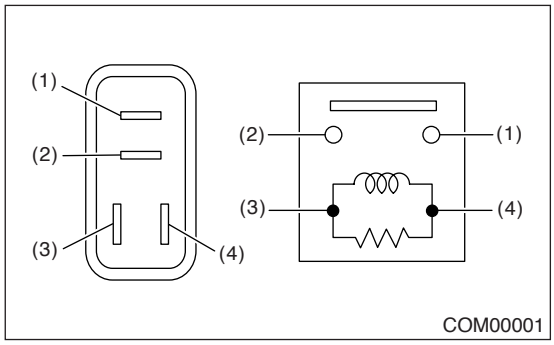
1. HORN

<Ref. to WI-245, WIRING DIAGRAM, Horn System.>

B: INSPECTION

1. HORN RELAY

Measure the horn relay resistance between terminals (indicated in table below) when connecting the terminal No. 4 to battery positive terminal and terminal No. 3 to battery ground cable.

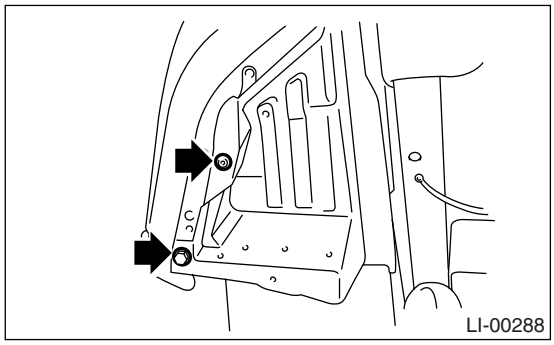


Current	Terminal No.	Standard
Flow	1 and 2	Less than 1 Ω
No Flow		More than 1 MΩ

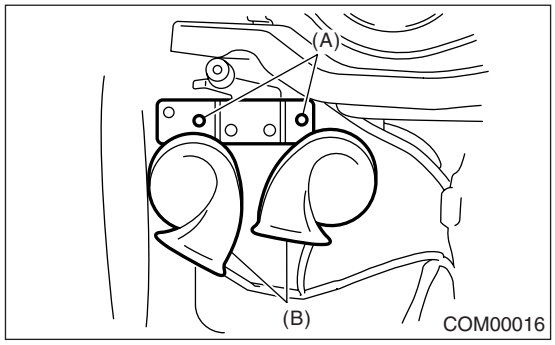
3. Horn

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the two clips and turn up the lower mud guard RH.



3) Remove the horn bracket mounting bolt (A).
4) Disconnect the harness connector and remove the horn assembly (B).

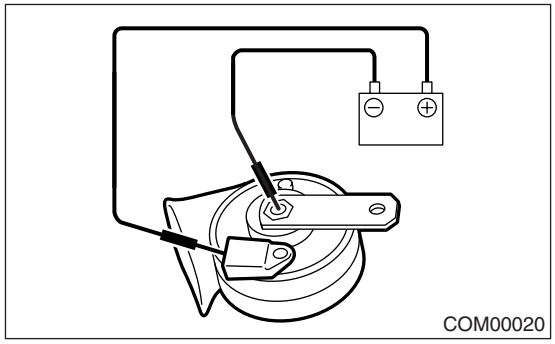


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

With 12 V direct current supplied between horn terminals, check that the horn sounds properly.



4. Horn Switch

A: REMOVAL

WARNING:
Before servicing, be sure to read the notes in AB section for proper handling of driver's airbag module. <Ref. to AB-4, CAUTION, General Description.>

NOTE:
Horn switch is a unit with the driver's airbag module.

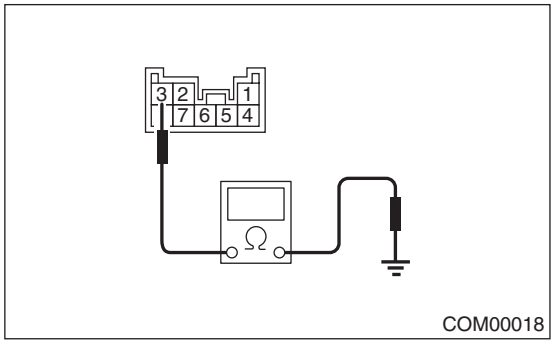
1) Disconnect the ground cable from battery.
2) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance between horn switch terminal and chassis ground.



Switch position	Terminal No.	Resistance
When horn switch is pushed.	3 and Chassis ground	Less than 1 Ω
When horn switch is not pushed.		More than 1 MΩ

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GLASS/WINDOWS/MIRRORS

GW

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3.	Power Window Control Switch	9
4.	Front Door Glass	10
5.	Front Regulator and Motor Assembly	15
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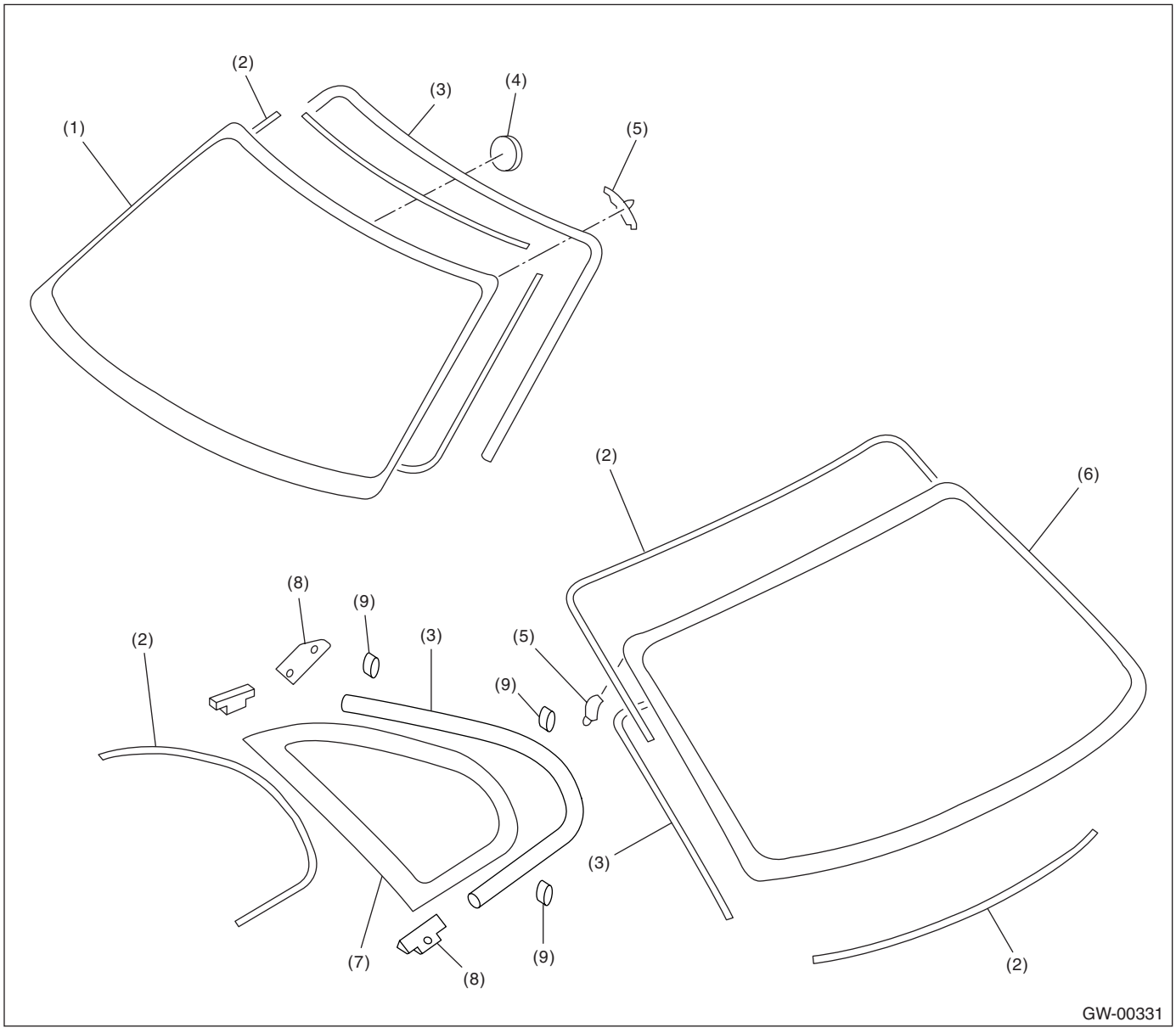
20.	Rearview Mirror	35
21.	Wiper Deicer System	36
22.	Wiper Deicer Switch	37

1. General Description

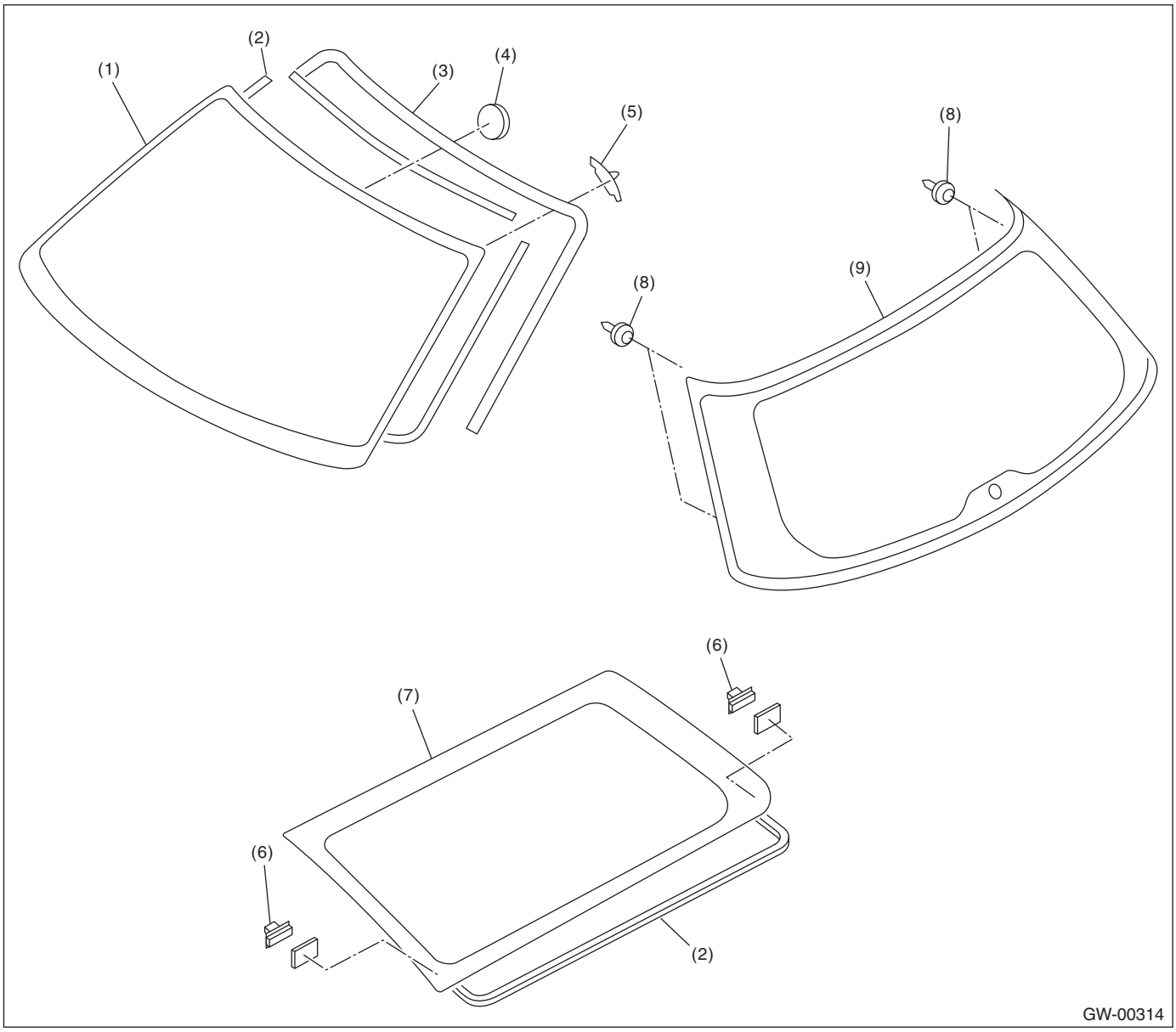
A: COMPONENT

1. FIXED GLASS (SEDAN MODEL)



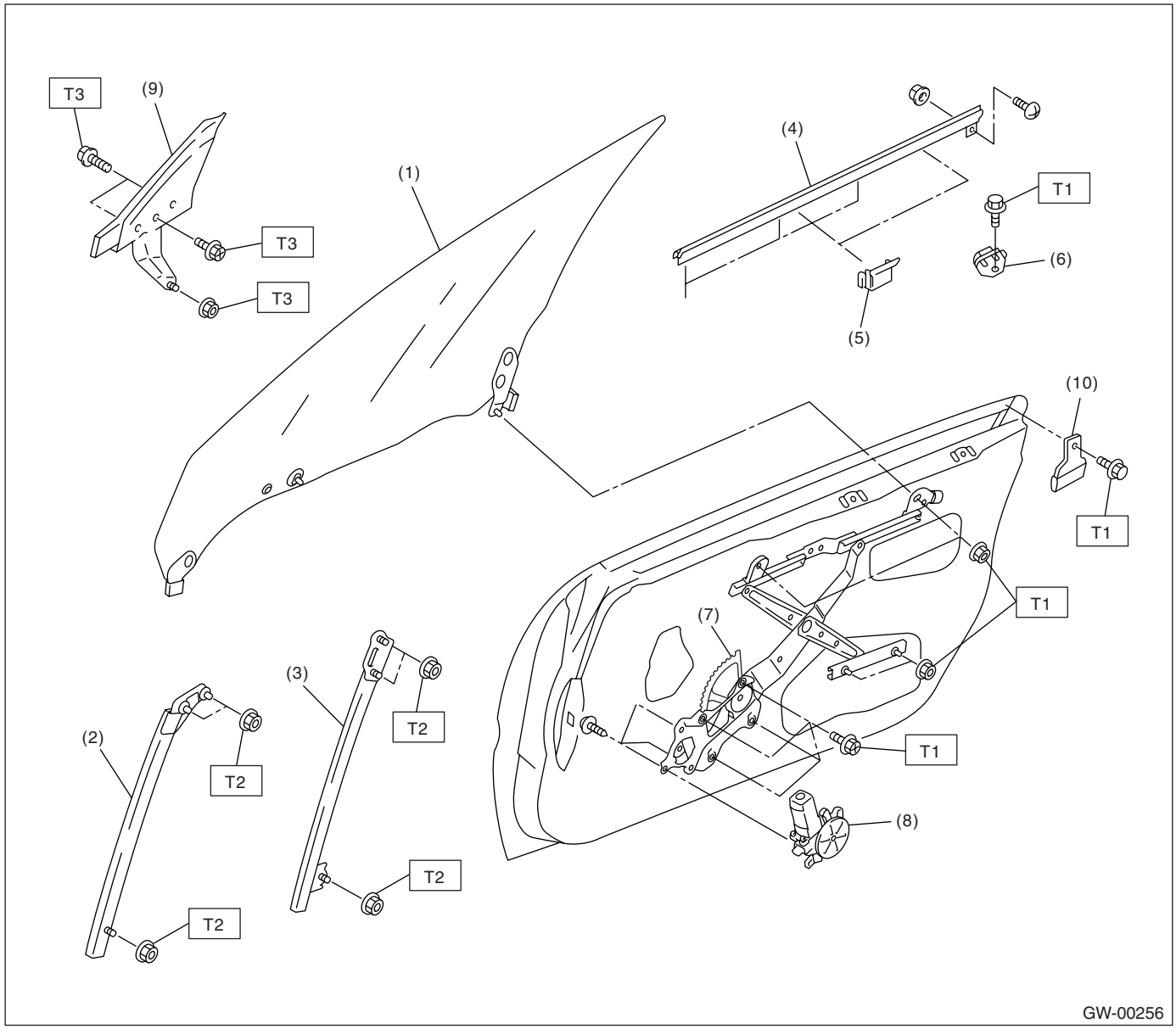
(1) Windshield glass
(2) Dam rubber
(3) Molding
(4) Rearview mirror mount
(5) Locating pin
(6) Rear window glass
(7) Six light glass
(8) Bracket
(9) Clip

2. FIXED GLASS (WAGON MODEL)



(1) Windshield glass
(2) Dam rubber
(3) Molding
(4) Rearview mirror mount
(5) Locating pin
(6) Fastener
(7) Rear quarter glass
(8) Locating pin
(9) Glass

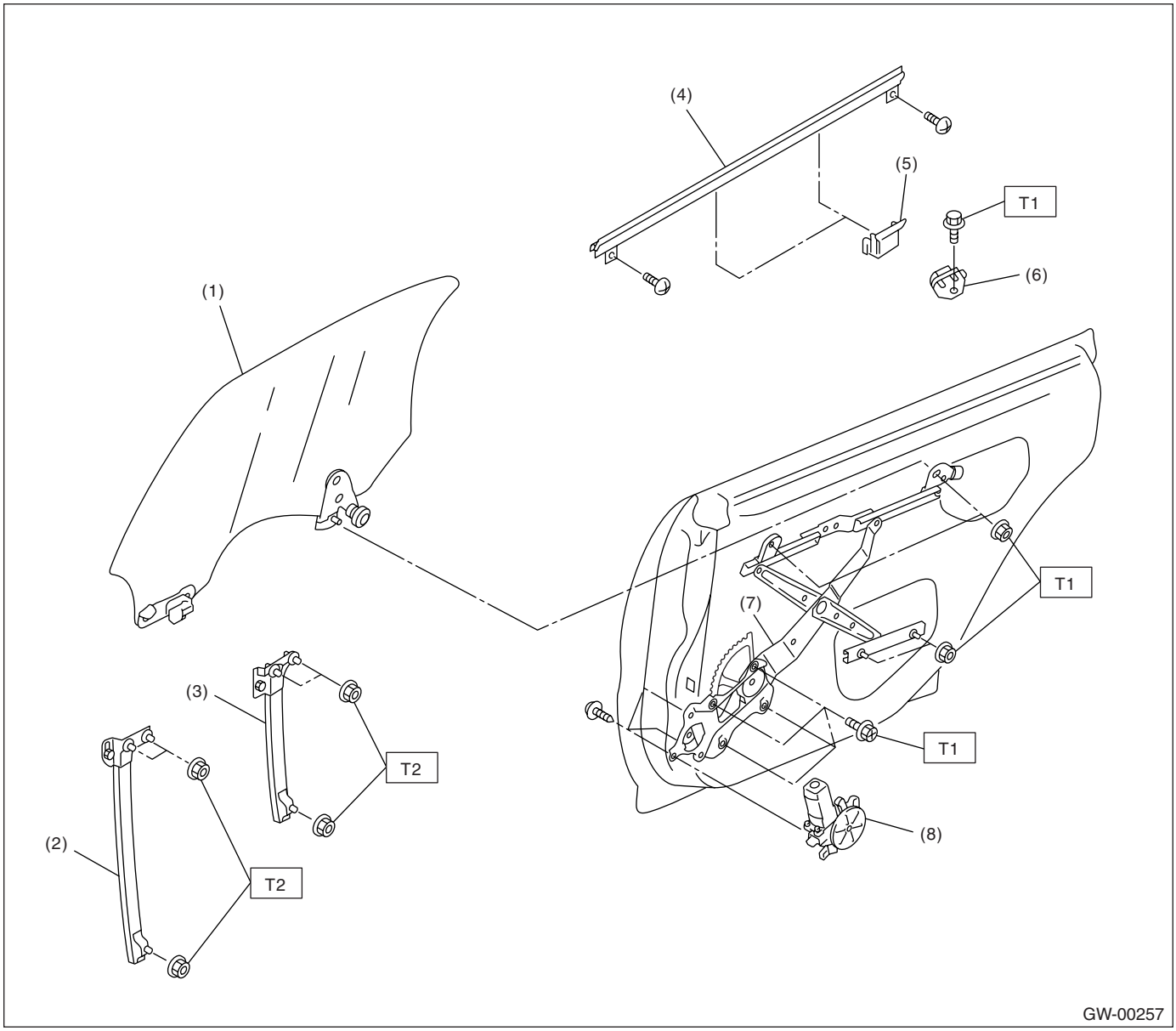
3. FRONT DOOR GLASS



(1)	Glass	(6)	Stabilizer (Inner)
(2)	Door sash (Front)	(7)	Regulator ASSY
(3)	Door sash (Rear)	(8)	Motor ASSY
(4)	Weather strip	(9)	Mirror gusset
(5)	Stabilizer (Outer)	(10)	Guide ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 13.7 (1.4, 10.1)
T3: 5.9 (0.60, 4.4)

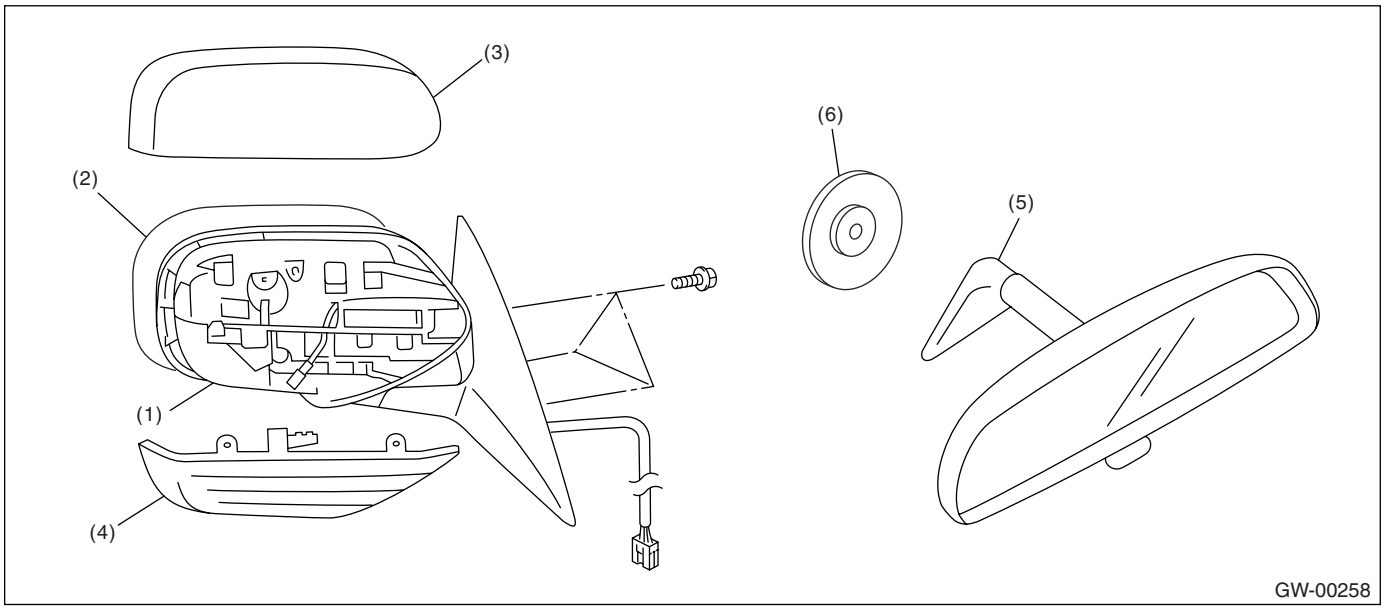
4. REAR DOOR GLASS



(1) Glass
(2) Door sash (Front)
(3) Door sash (Rear)
(4) Weather strip
(5) Stabilizer (Outer)
(6) Stabilizer (Inner)
(7) Regulator ASSY
(8) Motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 13.7 (1.4, 10.1)

5. MIRROR



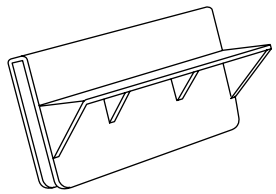
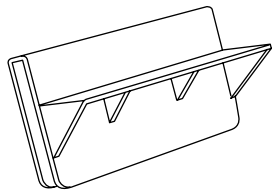
(1) Outer mirror
(2) Mirror
(3) Scalp cap
(4) Side turn signal light
(5) Rearview mirror
(6) Mount

B: CAUTION

• When electrical connectors are disconnected, always conduct an operational check after connecting them again.
• Avoid impact and damage to the glass.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST61299AE000	61299AE000	SPACER	Used for adjusting the upper end position of front door glass. (Glass thickness: 5 mm (0.197 in))
 ST61299AE010	61299AE010	SPACER	Used for adjusting the upper end position of rear door glass. (Glass thickness: 4 mm (0.157 in))

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for checking voltage and continuity.
Piano wire	Used for removing the window glass.
Windshield glass knife	Used for removing the window glass.

2. Power Window System

A: WIRING DIAGRAM

<Ref. to WI-294, Power Window System.>

B: INSPECTION

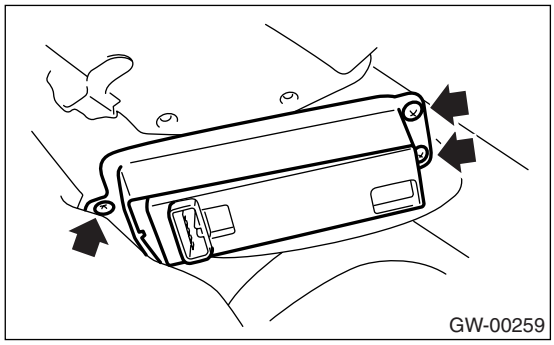
Symptom	Repair order
All power windows do not operate.	(1) Fuse (SBF-5) (2) Power window circuit breaker (3) Power window relay (4) Wiring harness (5) Body integrated unit
One window does not operate.	(1) Power window main switch (2) Power window sub switch (3) Power window motor (4) Wiring harness
“Window Lock” does not operate.	Power window main switch

3. Power Window Control Switch

A: REMOVAL

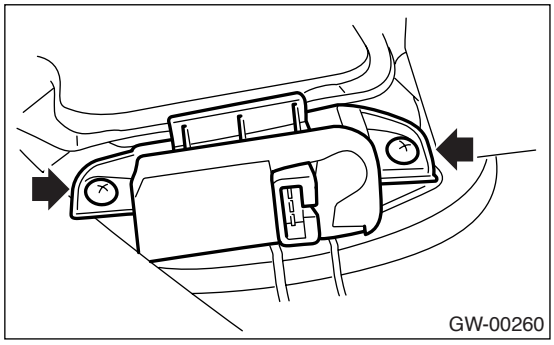
1. MAIN SWITCH

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Disconnect the harness connector.
4) Remove the screws from the reverse side of front door trim to remove the power window main switch.



2. SUB SWITCH

1) Disconnect the ground cable from battery.
2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Disconnect the connector.
4) Remove the screws from the reverse side of door trim to remove the power window sub switch.



B: INSTALLATION

1. MAIN SWITCH

Install in the reverse order of removal.

2. SUB SWITCH

Install in the reverse order of removal.

C: INSPECTION

1. MAIN SWITCH

Measure switch resistance.
• LHD model

	Switch position	Terminal No.	Standard
Driver's seat	AUTO UP	10 and 2, 7 and 1	Less than 1 Ω
	UP	10 and 2, 7 and 1	Less than 1 Ω
	DOWN	10 and 1, 7 and 2	Less than 1 Ω
	AUTO DOWN	10 and 1, 7 and 2	Less than 1 Ω

• RHD model

	Switch position	Terminal No.	Standard
Driver's seat	AUTO UP	11 and 1, 14 and 2	Less than 1 Ω
	UP	11 and 1, 14 and 2	Less than 1 Ω
	DOWN	11 and 2, 14 and 1	Less than 1 Ω
	AUTO DOWN	11 and 2, 14 and 1	Less than 1 Ω

Replace the main switch if faulty.

2. SUB SWITCH

Measure switch resistance.

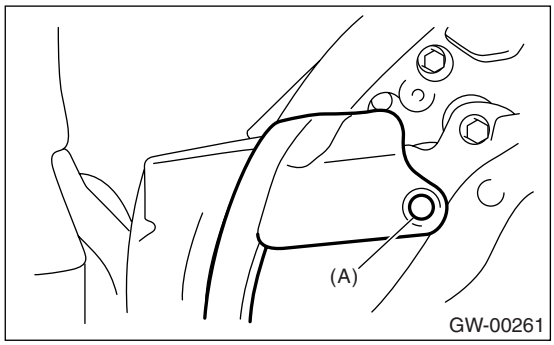
	Switch position	Terminal No.	Standard
Passenger's seat and rear	UP	2 and 3, 4 and 5	Less than 1 Ω
	OFF	1 and 2, 4 and 5	Less than 1 Ω
	DOWN	1 and 2, 3 and 4	Less than 1 Ω

Replace the sub switch if faulty.

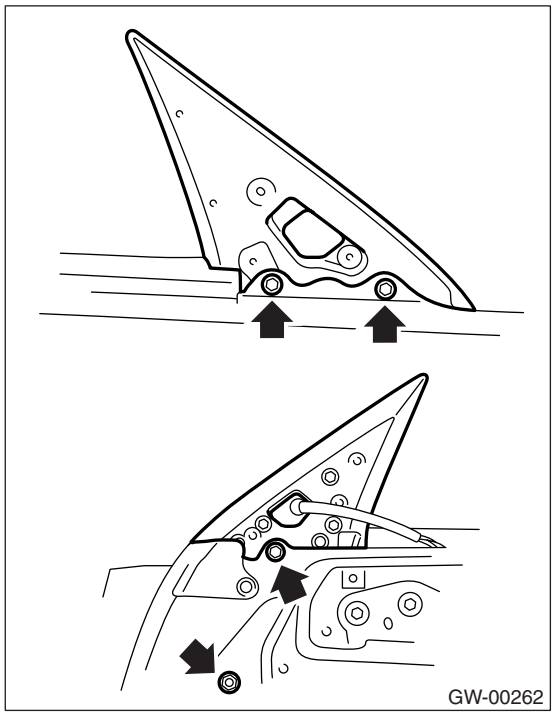
4. Front Door Glass

A: REMOVAL

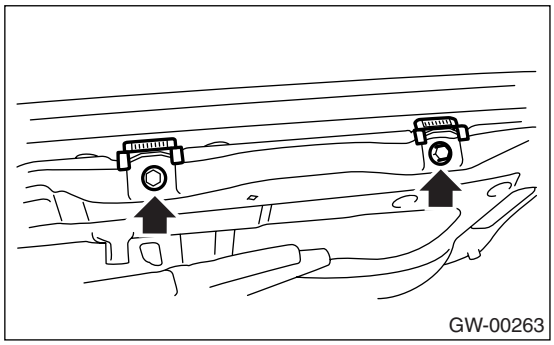
1) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
2) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Front Sealing Cover.>
3) Remove the outer mirror assembly. <Ref. to GW-18, REMOVAL, Outer Mirror Assembly.>
4) Remove the clip (A), and remove the front end of weather strip.



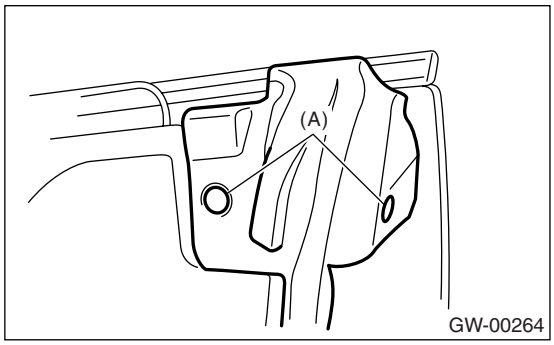
5) Remove the gusset.



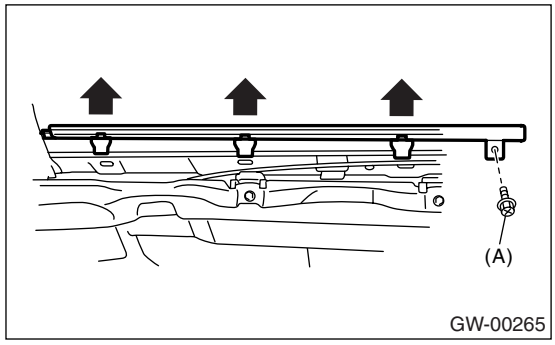
6) Remove the stabilizer.



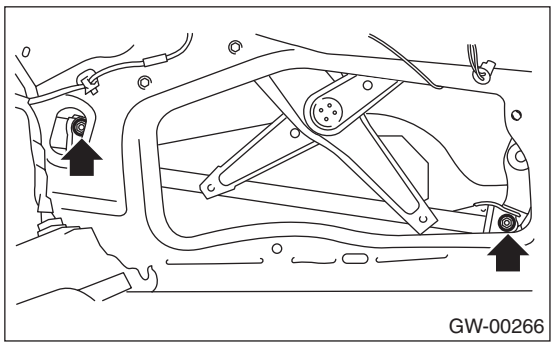
7) Remove the clips (A), and remove the rear end of weather strip.



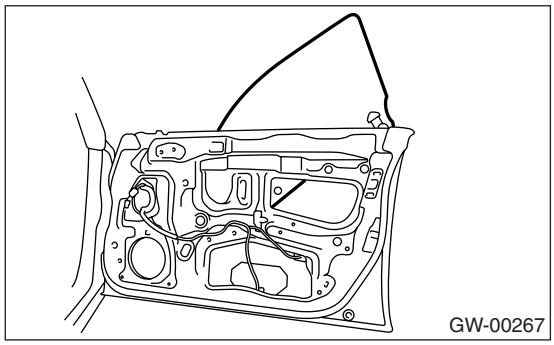
8) Remove the screw (A) from the rear end of weather strip outer to remove weather strip outer.



9) Remove the screws to remove guide assembly.
10) Operate the power window switch to move glass to position shown in the figure, and then remove the two nuts through service holes.



11) Remove the door glass.



CAUTION:
• Since the gear may be disengaged, do not turn regulator in the closing direction after removal of the glass.
• Avoid impact and damage to the glass.

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Make sure that glass stay is placed securely in sash.

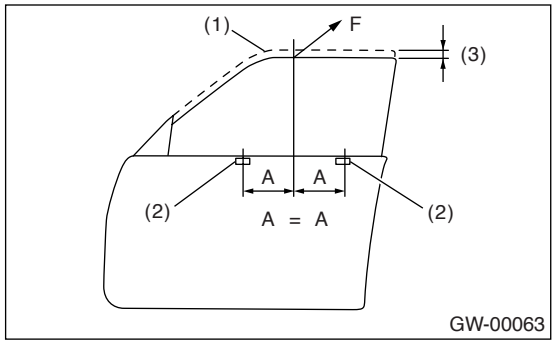
2) Adjust the front door glass. <Ref. to GW-11, ADJUSTMENT, Front Door Glass.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-4, FRONT DOOR GLASS, COMPONENT, General Description.>

C: ADJUSTMENT

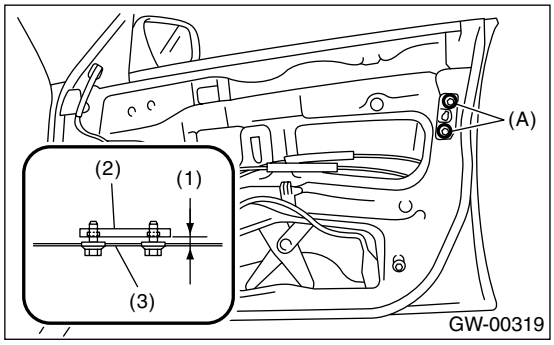
NOTE:
Before adjustment, ensure that all adjusting bolts of stabilizer, upper stopper and sash are loose and door glass is raised so that it is in contact with weather strip.

1) Temporarily tighten one adjusting bolt on one side of rear sash at the midpoint of slotted hole in the inner panel.
2) Temporarily tighten the regulator B-channel in a position at the top of slotted hole.
3) Lower the door glass 10 — 15 mm (0.39 — 0.59 in) from fully closed position. While applying outward pressure of 45.0± 5.0 N (4.5±0.5 kgf, 9.9±1.1 lb) (F) to upper edge of glass above midpoint of two outer stabilizers, press the inner stabilizer at pressure of 25±5 N (2.5±0.5 kgf, 5.5±1.1 lb) to the glass, then secure it.

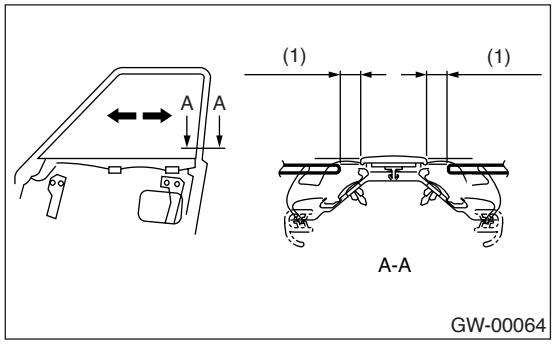


(1) Fully closed position
(2) Stabilizer
(3) 10 — 15 mm (0.39 — 0.59 in)

4) For adjustment of clearance between front glass and center pillar cover, loosen the nuts (A), and move the glass sash back and forward until clearance becomes the value shown.

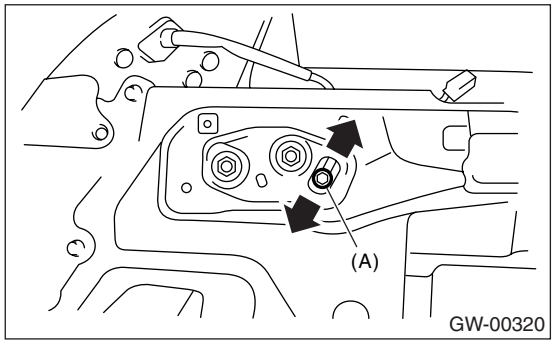


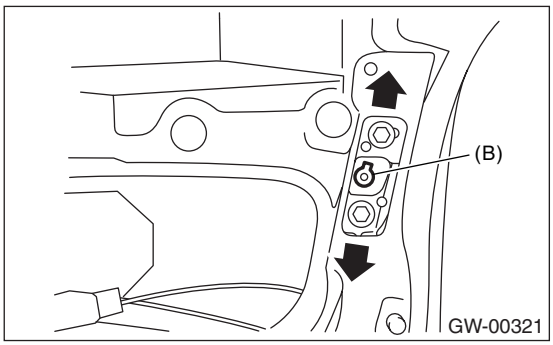
(1) Adjust a line parallel
(2) Sash
(3) Inner panel



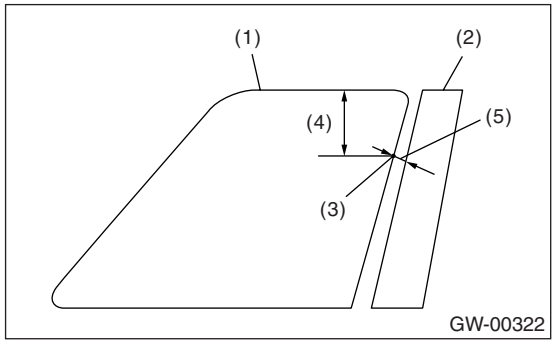
(1) 11 mm (0.433 in)

5) To adjust the upper end and lower end of center pillar, loosen the stopper bolt (A) or nut (B) securing door sash, move the stopper position until the clearance between center pillar cover is equal.



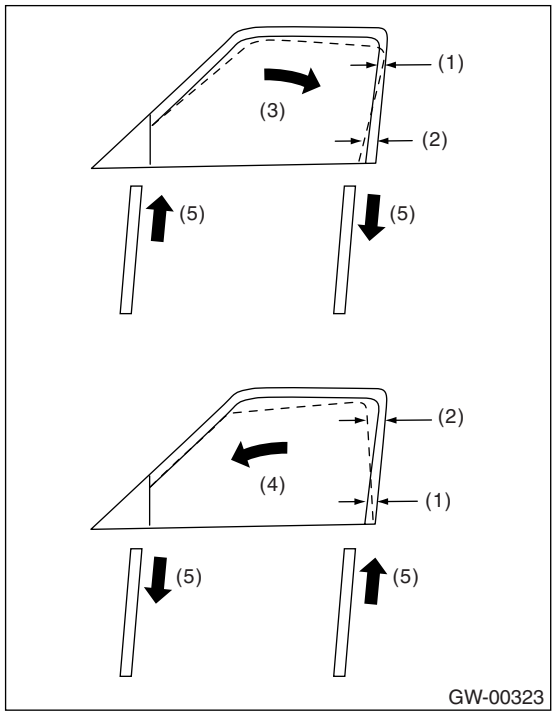


CAUTION:
Perform the measurement of clearance between center pillar at less than 50 mm (1.969 in) from upper end of window glass.



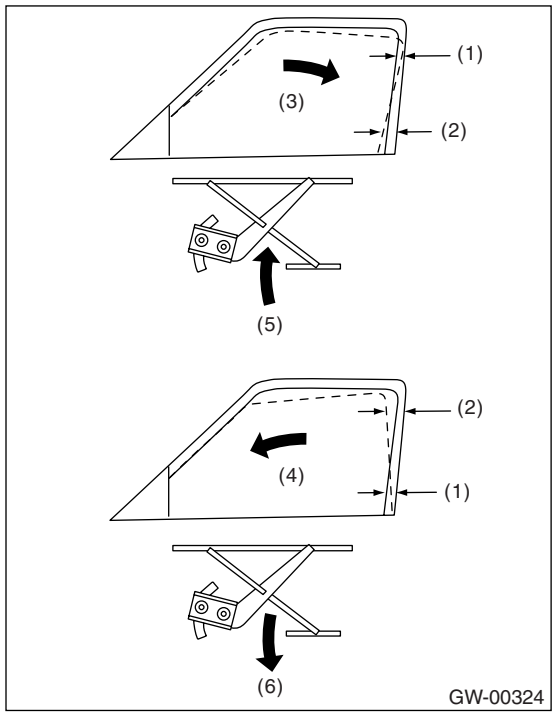
(1) Glass
(2) Center pillar cover
(3) Check point
(4) 50 mm (1.969 in)
(5) 11 mm (0.433 in)

6) Adjust so that the upper and lower ends of center pillar are the same size.



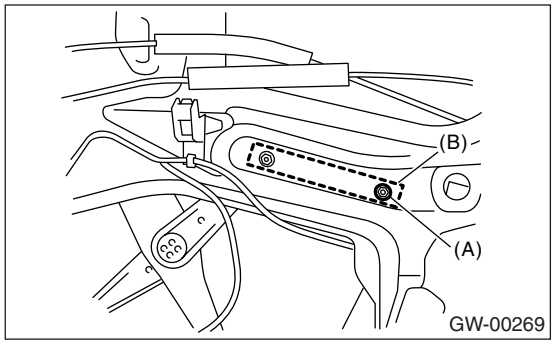
(1) Narrow
(2) Wide
(3) Glass tilts too far rearward
(4) Glass tilts too far forward
(5) Stopper adjusting direction

7) After adjusting the clearance between center pillar, up and down the glass several times to check glass contact to stopper when glass is fully closed. Adjust it to contact the front and rear stopper simultaneously.



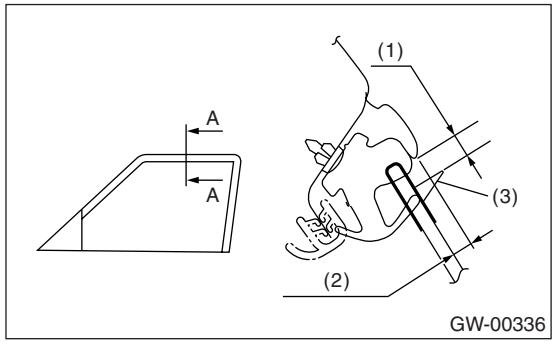
(1) Narrow
(2) Wide
(3) When the stopper of door sash (rear) contacts first
(4) When the stopper of door sash (front) contacts first
(5) Raise B channel
(6) Lower B channel

8) For adjustment of the upper and lower ends of center pillar, loosen the adjusting nut (A) of B-channel (B).



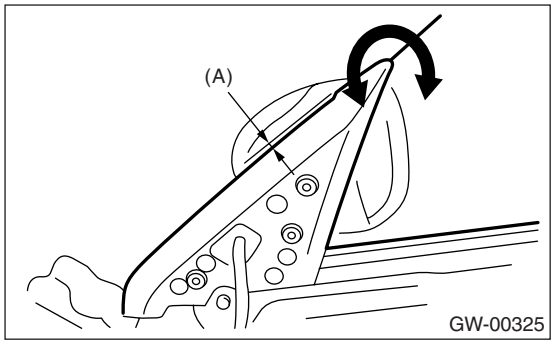
9) For glass stroke adjustment, install the ST to glass, close the door, and raise the glass with regulator until positional relationship between glass and weather strip becomes as shown. And secure the glass so that the upper stopper correctly touches the glass holder.

ST 61299AE000 SPACER
(Glass thickness: 5 mm (0.197 in) for front door glass)



(1) 3.2 — 4.8 mm (0.126 — 0.189 in)
(2) 7 mm (0.276 in)
(3) ST

For preventing wind noise, adjust the glass at the position where tip of gusset is raised up a little.

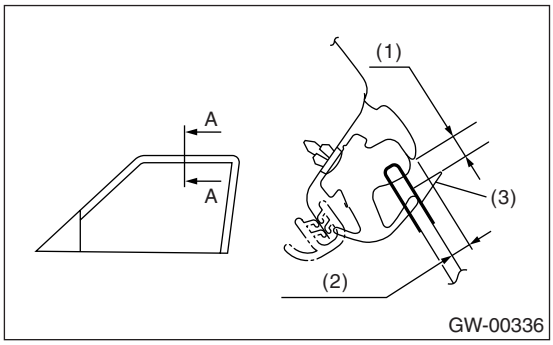


(A) 0 — 1.5 mm (0 — 0.059 in)

10) After stabilizer adjustment, carry out the glass cohesion adjustment. First, visually ensure the positional relationship between retainer & molding and glass of the roof side, and then begin with rear sash adjustment. Install the ST to glass and adjust two adjusting bolts alternately step by step to obtain dimensions shown below (cross-section A).

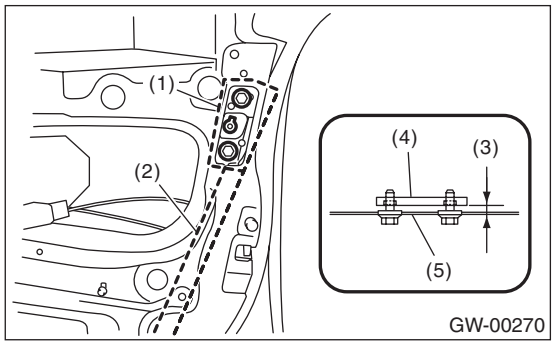
NOTE:
If two nuts are loosened at the same time, the sash moves back and forth. Therefore, when one nut is adjusted, secure the other.

11) Make the same adjustment of two adjusting bolts of rear sash.
ST 61299AE000 SPACER
(Glass thickness: 5 mm (0.197 in) for front door glass)



(1) 3.2 — 4.8 mm (0.126 — 0.189 in)
(2) 7 mm (0.276 in)
(3) ST

NOTE:
Do not tilt the sash bracket to inner panel during adjustment. Otherwise smooth regulator operation cannot be achieved.

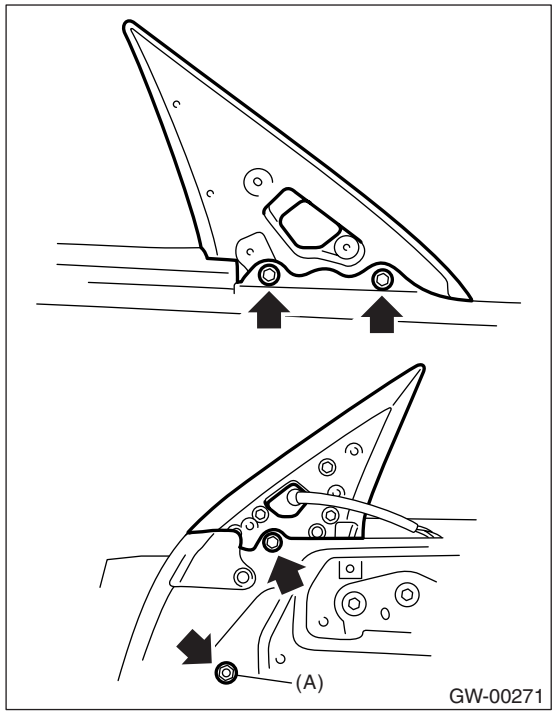


(1) Sash bracket
(2) Rear sash
(3) Adjust a line parallel
(4) Sash
(5) Inner panel

12) Make adjustment of front sash in the same manner as that of rear sash.

NOTE:
Although front and rear sashes must, as a rule, be adjusted in the same manner, in some door installation, the adjustment in a different manner may be required. However, adjustment of one sash to the maximum amount and the other to the minimum amount is not permitted. Such adjustment may result in application of excessive load to regulator.

13) After adjustments, tighten the nuts.
14) After adjustment of the glass, close the door. If there is a gap between outer lip of gusset and glass surface, adjust the gap with adjusting bolt (A) in lower fitting part of gusset to prevent generation of wind noise.
15) During adjustment, loosen the other three clamping bolts.

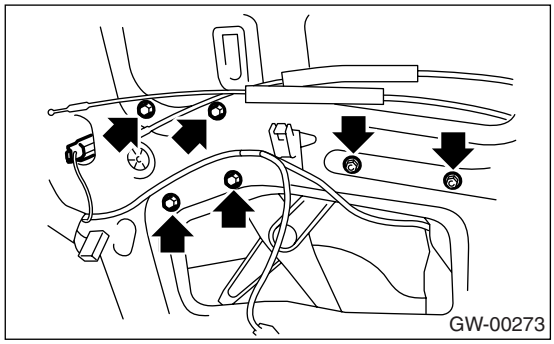


16) After adjustment, tighten the bolts and nuts.

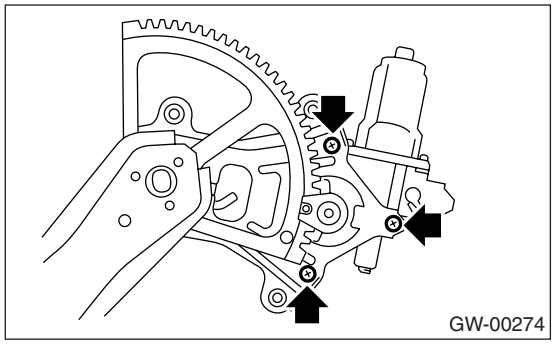
5. Front Regulator and Motor Assembly

A: REMOVAL

1) Remove the door glass. <Ref. to GW-10, REMOVAL, Front Door Glass.>
2) Disconnect the motor connector.
3) Remove the four bolts and two nuts to remove regulator assembly.



4) Remove the screws to remove motor assembly.



NOTE:
When removing the motor assembly, secure the arm correctly, because the regulator arm moves in the force of balancing spring.

B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the front door glass. <Ref. to GW-11, ADJUSTMENT, Front Door Glass.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-4, FRONT DOOR GLASS, COMPONENT, General Description.>

C: INSPECTION

1) Make sure that the power window motor rotates properly when the battery voltage is applied to the terminals of motor connector.
2) Change polarity of battery connection to terminals to ensure that the motor rotates in reverse direction.

6. Remote Control Mirror System

A: WIRING DIAGRAM

<Ref. to WI-306, Remote Control Mirror System.>

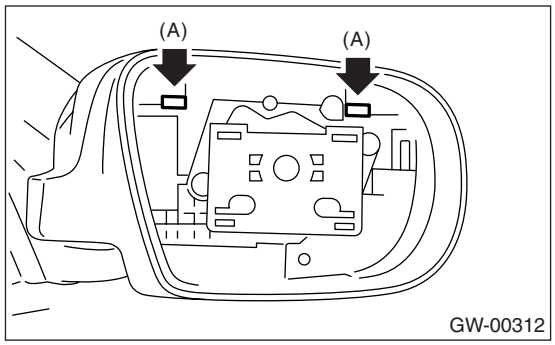
B: INSPECTION

Symptom	Repair order
All function does not operate.	(1) Fuse (F/B No. 6) (2) Mirror switch (3) Wiring harness
One side of the mirror motor does not operate.	(1) Mirror switch (2) Mirror motor (3) Wiring harness
Mirror heater does not operate.	(1) Mirror switch (2) Mirror heater (3) Wiring harness

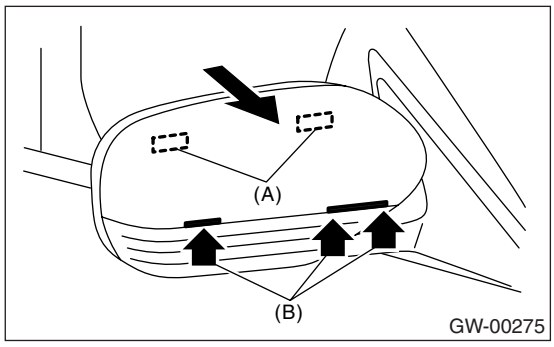
7. Scalp Cap

A: REPLACEMENT

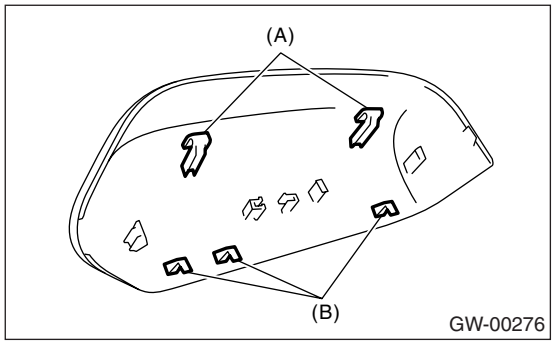
1) Remove the outer mirror. <Ref. to GW-19, REPLACEMENT, Outer Mirror.>
2) Press-in the upper side clips (A) from inside of door mirror.



3) Pull the scalp cap frontward of door mirror, remove the upper side clips (A) and lower side hooks (B), and then remove the scalp cap.



4) Insert the lower hooks (B) of scalp cap to door mirror and push the upper clips (A) in.



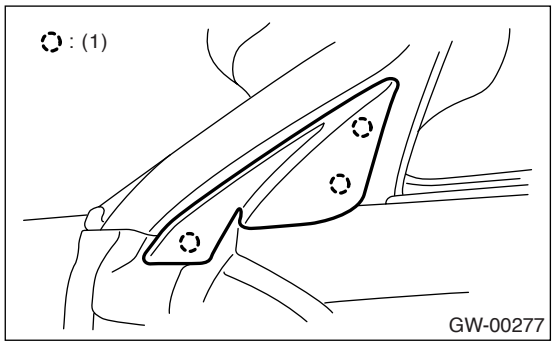
5) Install the scalp cap securely.

CAUTION:
Do not remove the scalp cap forcibly. The lower hooks may be damaged.

8. Outer Mirror Assembly

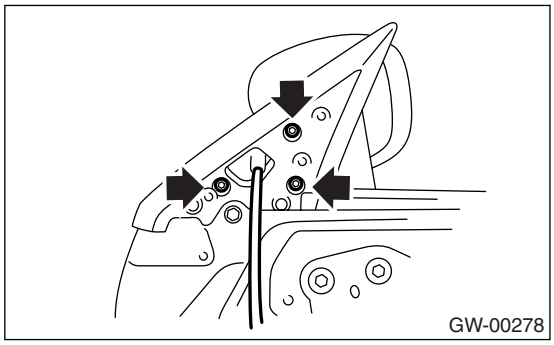
A: REMOVAL

1) Remove the mirror gusset cover.



(1) Hook

2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Disconnect the mirror connector.
4) Remove the screws to remove mirror assembly.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Check that the rearview mirror moves properly when the battery voltage is applied to terminals.

- Model without mirror heater

Switch position	Terminal No.
OFF	—
UP	6 (+) and 3 (–) or 8 (–)
DOWN	3 (+) or 8 (+) and 6 (–)
LEFT	7 (+) and 3 (–) or 8 (–)
RIGHT	3 (+) or 8 (+) and 7 (–)

- Model with mirror heater

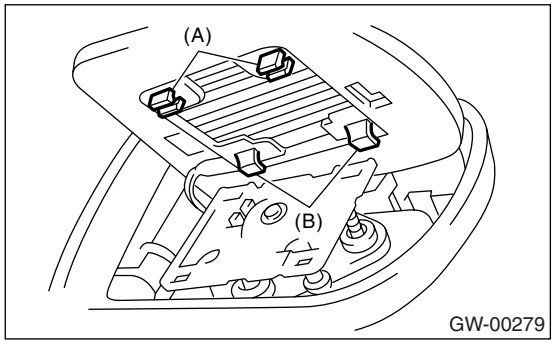
Switch position	Terminal No.
OFF	—
UP	7 (+) and 3 (–) or 9 (–)
DOWN	3 (+) or 9 (+) and 7 (–)
LEFT	8 (+) and 3 (–) or 9 (–)
RIGHT	3 (+) or 9 (+) and 8 (–)

Replace the outer mirror assembly if defective.

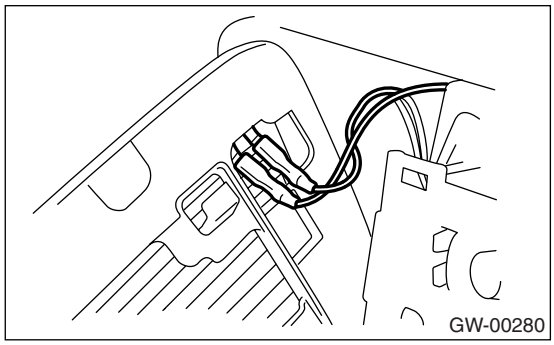
9. Outer Mirror

A: REPLACEMENT

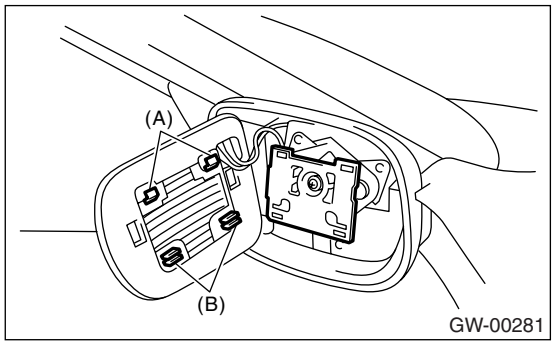
1) Face the mirror upward.
2) Use a flat tip screwdriver to remove clip (A).
3) Lift the lower mirror up to remove hooks (B).



4) Disconnect the mirror heater connector from the end of mirror. (Model with mirror heater)



5) Catch the hooks (A) and install clips (B).

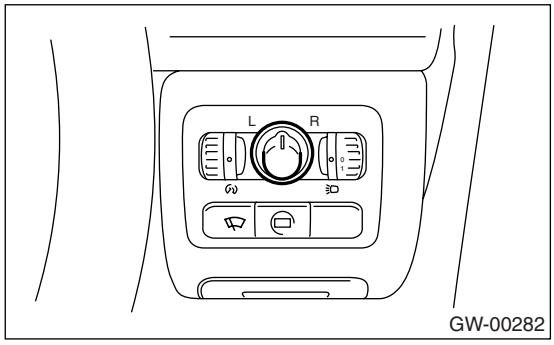


CAUTION:
• When removing the mirror, be careful not to damage the back side of mirror with a flat tip screwdriver.
• When installing the mirror, insert the hook and clip securely.

10. Remote Control Mirror Switch

A: REMOVAL

1) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Disconnect the connector.



3) Remove the remote control mirror switch from instrument panel lower cover.

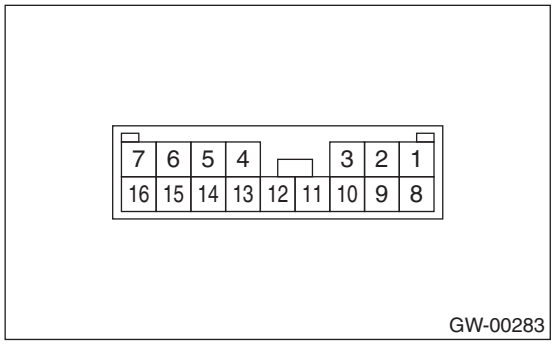
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. REMOTE CONTROL MIRROR SWITCH

Move the remote control mirror switch to each position and check continuity between terminals.



• Change over switch R

Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
UP	10 and 12, 15 and 14	Less than 1 Ω
DOWN	10 and 15, 12 and 14	Less than 1 Ω
LEFT	10 and 11, 15 and 14	Less than 1 Ω
RIGHT	10 and 15, 11 and 14	Less than 1 Ω

• Change over switch L

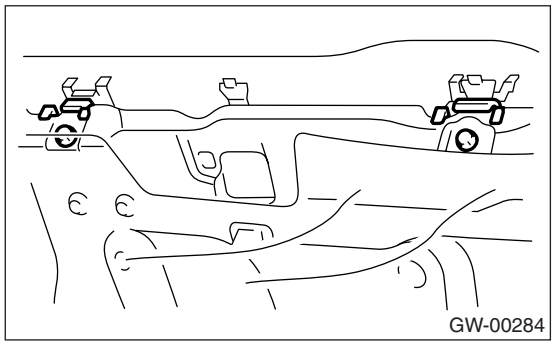
Switch position	Terminal No.	Standard
OFF	—	More than 1 MΩ
UP	10 and 8, 15 and 14	Less than 1 Ω
DOWN	10 and 15, 8 and 14	Less than 1 Ω
LEFT	10 and 9, 15 and 14	Less than 1 Ω
RIGHT	10 and 15, 9 and 14	Less than 1 Ω

Replace the remote control mirror switch if defective.

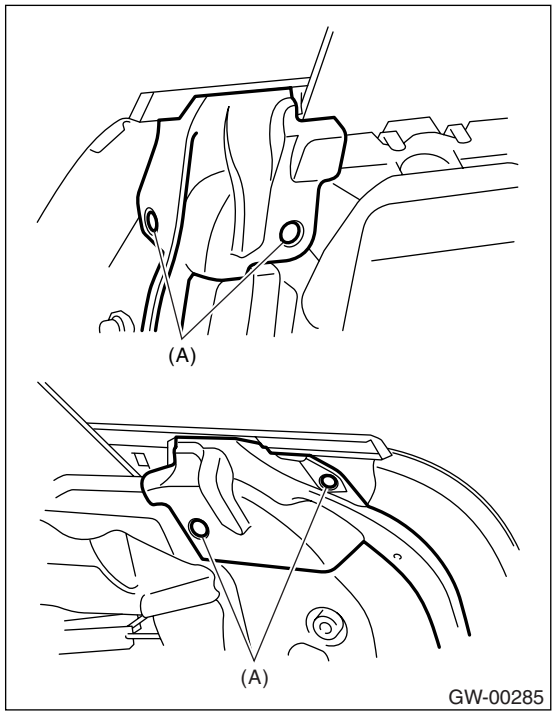
11.Rear Door Glass

A: REMOVAL

1) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
2) Remove the sealing cover. <Ref. to EB-24, REMOVAL, Rear Sealing Cover.>
3) Remove the stabilizer.

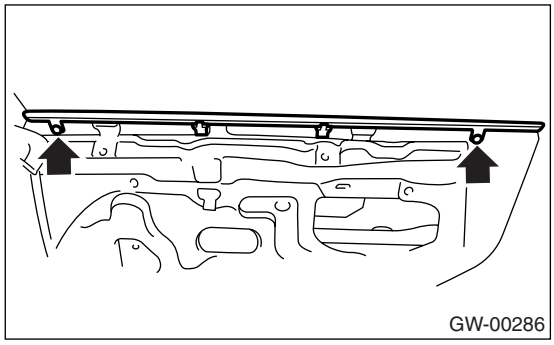

GW-00284

4) Remove the clips (A), and remove the front end and rear end of weather strip.

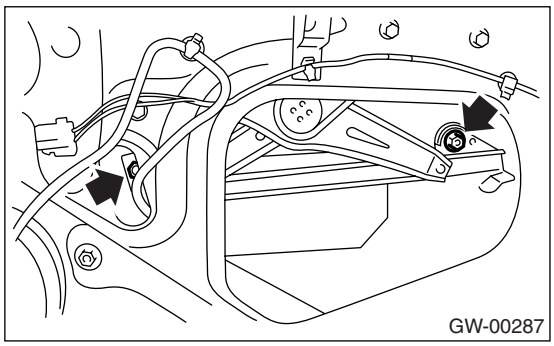


GW-00285

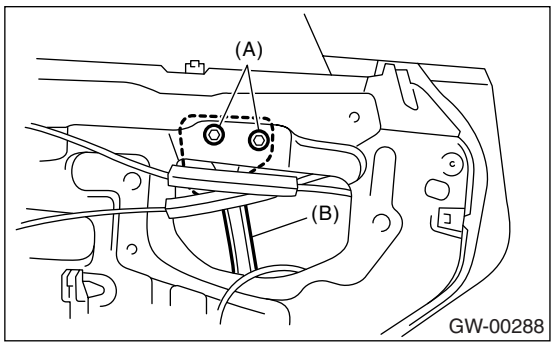
5) Loosen the two screws to remove weather strip outer.


GW-00286

6) Operate the power window switch to move the glass to position shown in the figure, and then remove the two nuts through service holes.


GW-00287

7) Remove the rear sash retaining nuts (A) and move rear sash (B) backward.



GW-00288

8) Remove the door glass.

CAUTION:
• Since the gear may be disengaged, do not turn regulator in the closing direction after removal of the glass.
• Avoid impact and damage to the glass.

B: INSTALLATION

1) Install in the reverse order of removal.

CAUTION:
Make sure that glass stay is placed securely in sash.

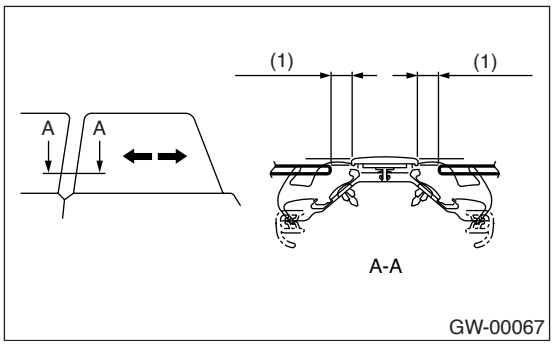
2) Adjust the rear door glass. <Ref. to GW-23, ADJUSTMENT, Rear Door Glass.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-5, REAR DOOR GLASS, COMPONENT, General Description.>

C: ADJUSTMENT

NOTE:
The rear door glass, as a rule, should be adjusted in the same manner as front door glass, although they are different in dimension. <Ref. to GW-11, ADJUSTMENT, Front Door Glass.>

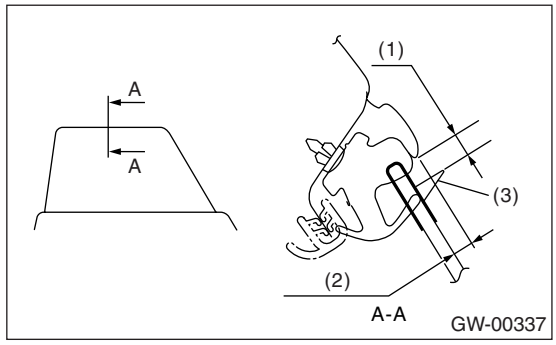
1) Adjust the glass position using the following dimensions as a guide line.



(1) 11 mm (0.433 in)

NOTE:
• If dimensions are smaller than the given dimensions, glass may get caught in weather strip during lifting/lowering operation and may not be fully open.
• After adjustment, move the glass up and down to check whether it is caught.

2) Install the ST to glass and adjust the glass adhesion to the value shown.
ST 61299AE010 SPACER
(Glass thickness: 4 mm (0.157 in) for rear door glass)



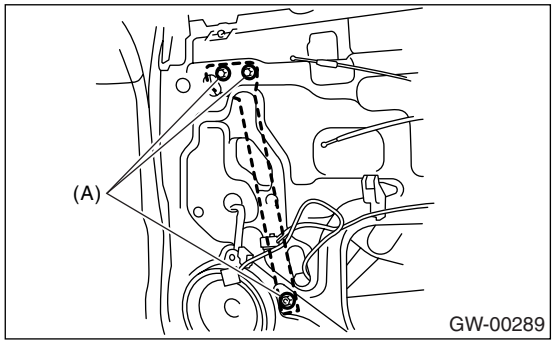
(1) 3.2 — 4.8 mm (0.126 — 0.189 in)
(2) 7 mm (0.276 in)
(3) ST

NOTE:
• If rear glass adhesion is higher than necessary, glass may get caught in weather strip of center pillar corner, resulting in early wear of weather strip. Care should be taken for adjustment.
• After adjustment, move the glass up and down to check whether it is caught.

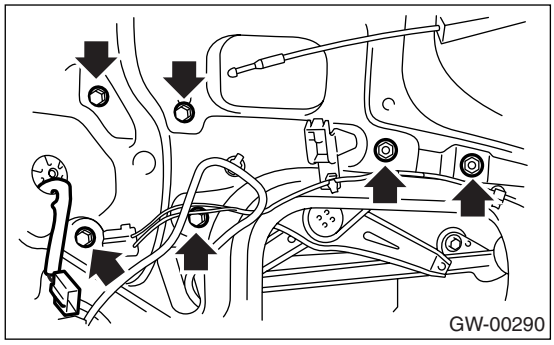
12. Rear Regulator and Motor Assembly

A: REMOVAL

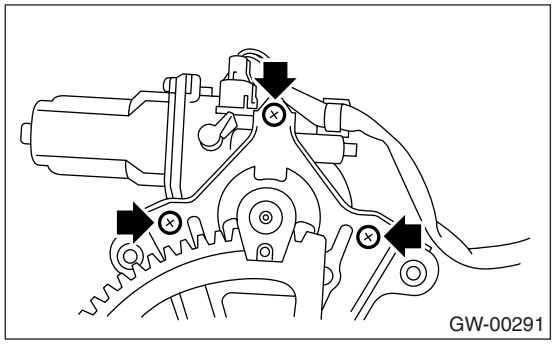
1) Remove the rear door glass. <Ref. to GW-22, REMOVAL, Rear Door Glass.>
2) Remove the nut (A) to remove front sash.



3) Disconnect the motor connector.
4) Remove the four bolts and two nuts to remove regulator assembly.



5) Remove the screws to remove motor assembly.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Adjust the rear door glass. <Ref. to GW-23, ADJUSTMENT, Rear Door Glass.>

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to GW-5, REAR DOOR GLASS, COMPONENT, General Description.>

C: INSPECTION

1) Make sure that the power window motor rotates properly when the battery voltage is applied to the terminals of motor connector.
2) Change polarity of battery connection to terminals to ensure that the motor rotates in reverse direction.

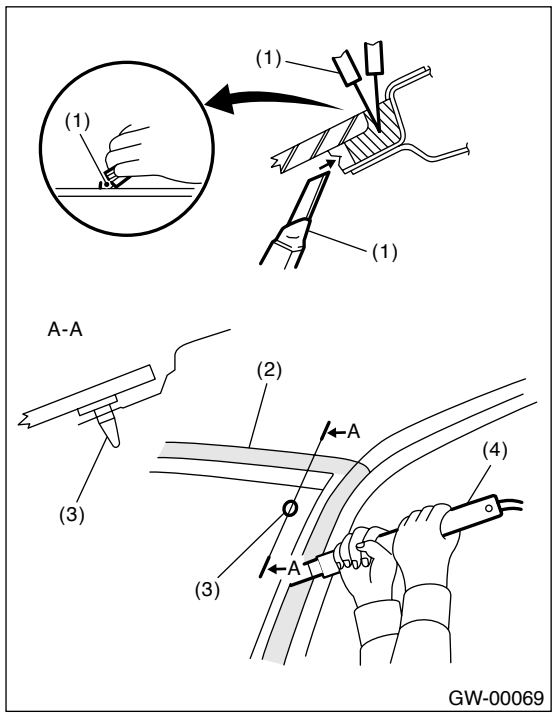
13.Windshield Glass

A: REMOVAL

1. USING WINDSHIELD GLASS KNIFE

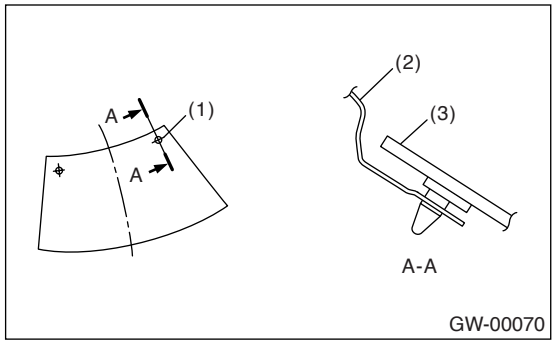
1) Remove the cowl panel. <Ref. to EI-39, REMOVAL, Cowl Panel.>
2) Remove the glass molding.
3) Tape the body side of the circumference of windshield glass for protection.
4) Apply sufficient amount of soapy water to the adhesive part.
5) Insert the windshield glass knife into adhesive part.
6) While holding the knife edge and windshield glass edge at a right angle, move the windshield glass knife in parallel to the windshield glass edge along face and edge of windshield glass to cut the adhesive part.

NOTE:
• Do not twist windshield glass knife.
• Cutting of adhesive part shall be started with wider gap between windshield glass and body.



(1) Putty knife
(2) Tape for protection
(3) Locating pin
(4) Windshield glass knife

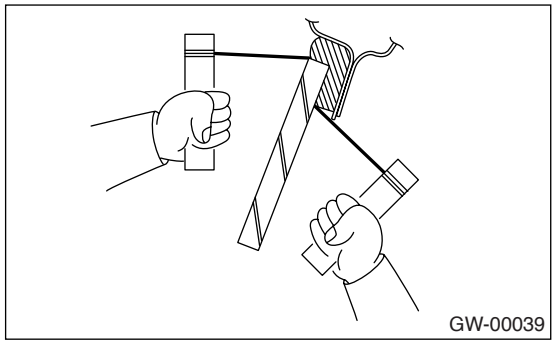
• Because the locating pins are bonded to the corners of glass, use piano wire to cut the pin.



(1) Locating pin
(2) Body panel
(3) Windshield glass

2. USING PIANO WIRE

1) Remove the cowl panel. <Ref. to EI-39, REMOVAL, Cowl Panel.>
2) Remove the molding.
3) Tape the body side of the circumference of windshield glass for protection.
4) Make a hole in the adhesive part using drill or knife.
5) Pass the piano wire through the hole, and attach securely both the wire ends to pieces of wood.



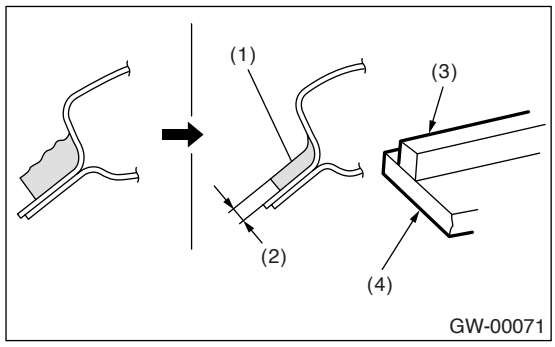
6) Pull the wire ends alternately to cut off the adhesive part.

CAUTION:
• Do not tightly pull the piano wire against the windshield glass edge.
• Be careful not to damage interior and exterior parts.
• When removal is made with area close to instrument panel, place a protection plate over it. Pay particular attention to the removal.
• Do not cross piano wires. Otherwise they may be cut.

B: INSTALLATION

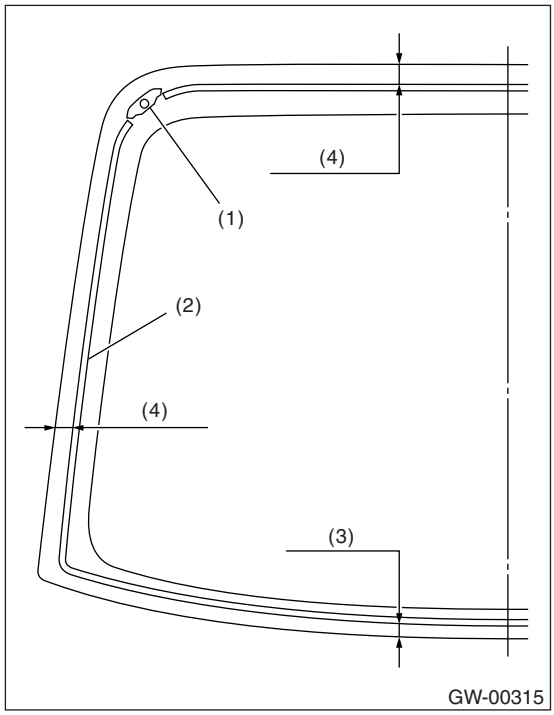
1) Clean the external circumference of windshield glass with alcohol or white gasoline.
2) Remove the adhesive layer on the body using cutter knife to obtain smooth face of 2 mm (0.08 in) thick.

CAUTION:
Be careful not to damage the body and paint surface.



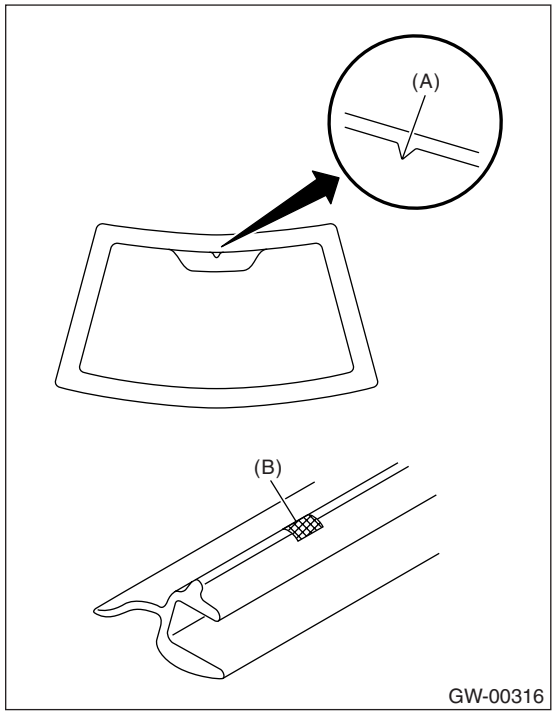
(1) Adhesive
(2) 2 mm (0.08 in)
(3) Dam rubber
(4) Glass

3) Clean the body with alcohol or white gasoline to eliminate cutting power, dust and dirt completely from body.
4) Align the locating pin of glass side with the hole of body side, and place the glass on the body.
5) Adjust the glass position to make uniform clearance between body and glass in four corners.



(1) Locating pin
(2) Dam rubber
(3) 9 mm (0.354 in)
(4) 11 mm (0.433 in)

6) Remove the glass temporarily from body.
7) Install the dam rubber.
8) Fit molding mark (B) to notch (A) of glass side and install the molding to entire perimeter of glass.



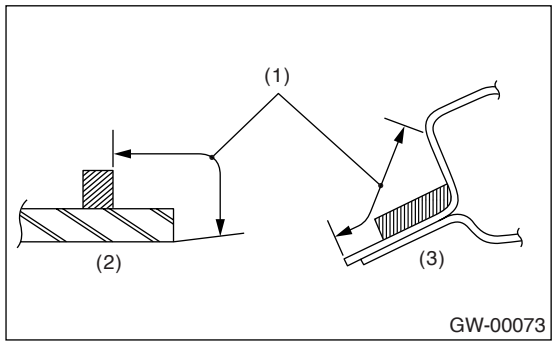
9) Apply two types of primers to the adhesive layer of glass using sponge.

Glass primer:
Betawipe VP04604
Betaprime 5001

10) Apply primer to the adhesive layer of body.

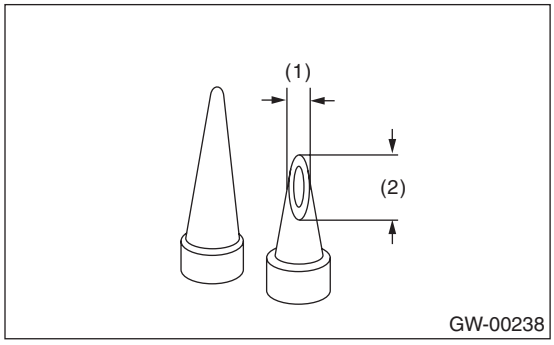
Painted surface primer:
Betaprime 5402

NOTE:
• Primer once attached to the painted surface of the body and internal trim is hard to wipe off. Mask the circumference of such area.
• Let primer dry for about ten minutes before installing the glass.
• Do not touch the surface coated with primer.



(1) Application of primer
(2) Glass side
(3) Body side

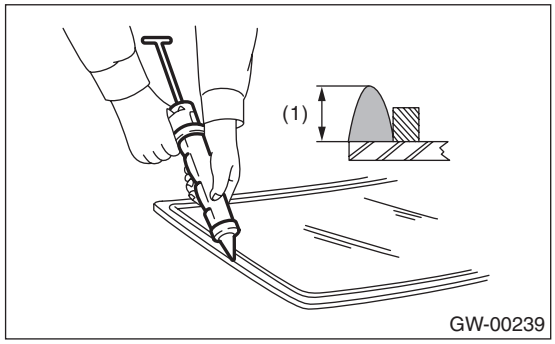
11) Cut off the cartridge nozzle tip as shown and set it in sealant gun.



(1) 10 mm (0.39 in)
(2) 15 mm (0.59 in)

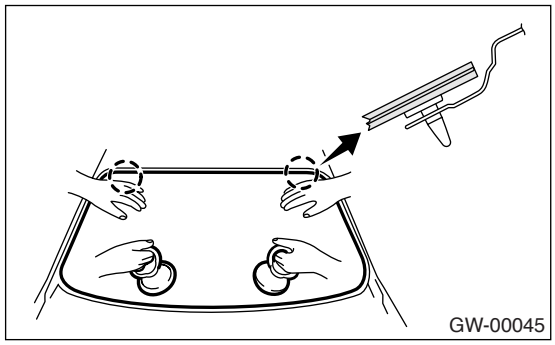
12) Apply adhesive to the glass end surface as shown.

Adhesive:
Gurit-ESSEX
Betaseal 1502 or equivalent



(1) 9 — 12 mm (0.35 — 0.47 in)

13) Fit the locating pins using suction rubber cup to install windshield glass.



14) Lightly press the windshield glass for tight fit.
15) Make flush the adhesive surface jutted out using spatula.
16) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

17) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

18) Install the cowl panel. <Ref. to EI-39, INSTALLATION, Cowl Panel.>

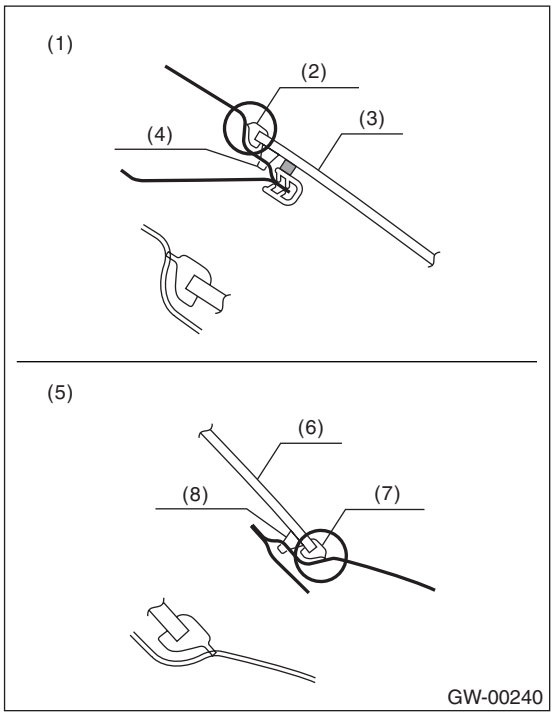
14.Rear Gate Glass

A: REMOVAL

1) Remove the rear wiper motor. <Ref. to WW-22, REMOVAL, Rear Wiper Motor.>
2) Disconnect the electrical connectors from rear defogger terminal.
3) Remove the glass in the same procedure as for windshield glass. <Ref. to GW-25, REMOVAL, Windshield Glass.>

B: INSTALLATION

1) Apply adhesive in the same procedure as for windshield glass. <Ref. to GW-26, INSTALLATION, Windshield Glass.>
2) Insert the glass clip pin into rear gate hole, and after pushing on the area around the clip pin to secure it, push lightly all around the area to seal it.
3) About one hour after installation, conduct a leak test.



(1) Upside
(2) Molding
(3) Glass
(4) Adhesive
(5) Downside
(6) Glass
(7) Molding
(8) Adhesive

4) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.
• When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

5) Connect the rear defogger terminals.
6) Install the rear wiper. <Ref. to WW-22, INSTALLATION, Rear Wiper Motor.>

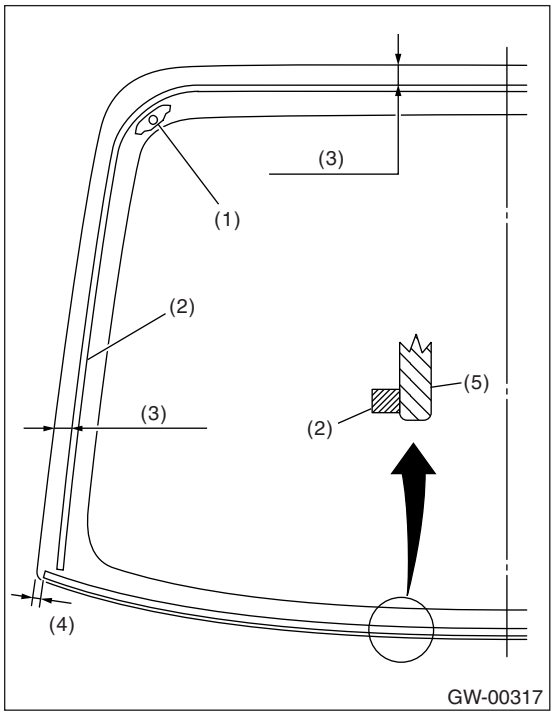
15.Rear Window Glass

A: REMOVAL

1) Disconnect the electrical connectors from rear defogger terminal.
2) Remove the glass in the same procedure as for windshield glass. <Ref. to GW-25, REMOVAL, Windshield Glass.>

B: INSTALLATION

1) Bond the dam rubber.



(1) Locating pin (bonded)
(2) Dam rubber
(3) 11 mm (0.433 in)
(4) 4 mm (0.157 in)
(5) Rear window glass

2) Install the glass in the same procedure as for windshield glass. <Ref. to GW-26, INSTALLATION, Windshield Glass.>
3) Connect the connector to the rear defogger and antenna terminals.
4) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

5) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

16.Rear Window Defogger System

A: WIRING DIAGRAM

<Ref. to WI-304, Rear Window Defogger System.>

B: INSPECTION

Symptom	Repair order
Rear window defogger does not operate.	(1) Fuse (M/B No. 10) (F/B No. 22) (2) Rear defogger relay (3) Defogger switch (4) Rear defogger condenser (5) Defogger wire (6) Wiring harness (7) Body integrated unit

NOTE:
Rear window defogger system can be customized on the touch panel in center display or Subaru Select Monitor.

System name	Initial setting	Customize setting
Rear window defogger timer	OFF after 15 min.	Repeat 15 min. operation and 2 min. stop.

17.Rear Window Defogger

A: INSPECTION

1. WITH SUBARU SELECT MONITOR

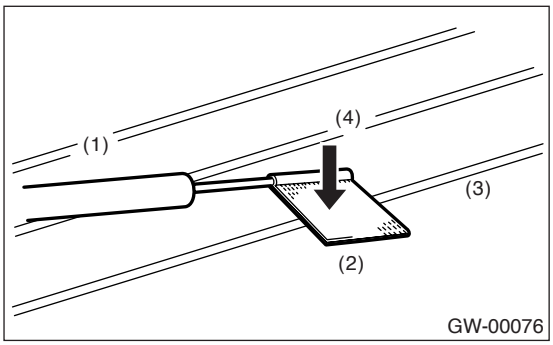
CAUTION:
Check that the rear window defogger timer is in initial setting or customize setting before inspection.

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** When the rear window defogger switch is operated, check the input signal using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body Integrated Unit} from «Main Menu». 4) Select {Current Data Display & Save}. 5) When the rear window defogger switch is set to ON, check the input signal.	After rear defogger switch is set to ON, does it turn to OFF in 15 minutes? Or does it repeat 15 minutes operation and 2 minutes stop?	END.	Replace the body integrated unit. <Ref. to SL-46, REMOVAL, Body Integrated Unit.>

2. HEAT WIRE INSPECTION

CAUTION:
When wiping stain on glass off with cloth, use a dry and soft cloth and move it along the heat wire to avoid damage to the heat wire.

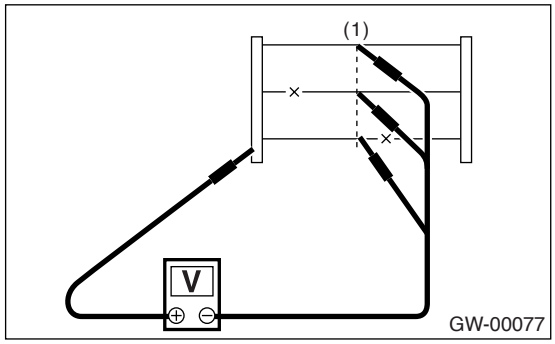
1) Turn the ignition switch to ON.
2) Turn the defogger switch to ON.
3) Wrap the tips of tester probe with aluminum foil to avoid damage to heat wire.



(1) Tester probe
(2) Aluminum foil
(3) Heat wire
(4) Push

4) Measure the voltage at heat wire center with DC voltmeter.

Standard voltage:
Approx. 6 V



(1) Center of heat wire

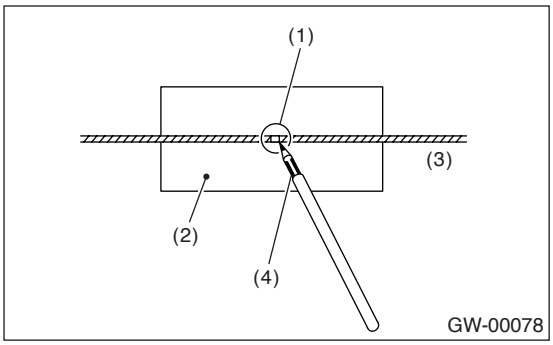
Voltage	Criteria
Approx. 6 V	Normal Operation
Approx. 12 V or 0 V	Broken

NOTE:
• If the measured value is 12 volts, heat wire is open between heat wire center and positive (+) terminal of tester probe.
• If zero volt, heat wire is open between wire center and ground.

5) Connect the tester probe of positive lead of voltmeter to positive terminal of heat wire and move tester probe of negative lead along the heat wire up to the negative terminal end. If voltage changes from zero to several volts during movement of tester probe, heat wire is open at the voltage change point.

B: REPAIR

1) Clean the broken portion with alcohol or white gasoline.
2) Mask both side of wire with thin film.
3) Apply the conductive silver composition (DU-PONT No. 4817) to the broken portion.



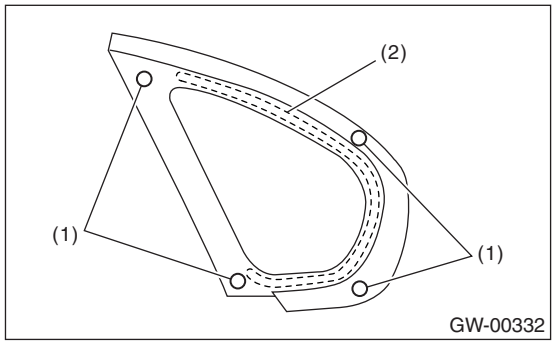
(1) Broken portion
(2) Thin film
(3) Broken wire
(4) Conductive silver composition (DUPONT No. 4817)

4) After repair, check the wire.

18.Rear Quarter Glass

A: REMOVAL

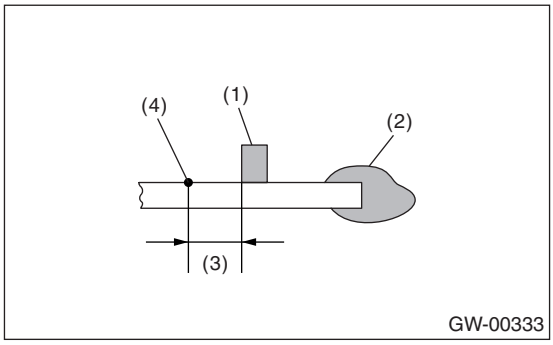
Remove the glass in the same procedure as for windshield glass. <Ref. to GW-25, REMOVAL, Windshield Glass.>



(1) Locating pin
(2) Dam rubber

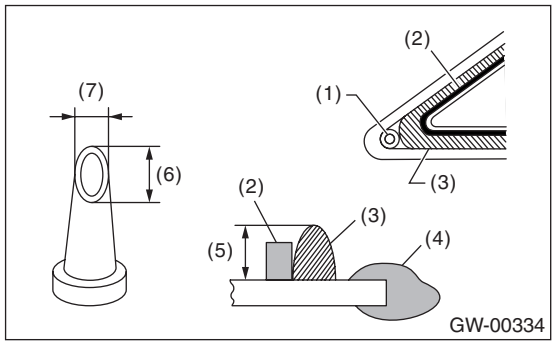
B: INSTALLATION

1) Install the dam rubber.



(1) Dam rubber
(2) Molding
(3) 10.5 mm (0.413 in) (constant)
(4) Ceramic terminal

2) Cut out the nozzle head and apply adhesive to the glass end surface as shown.



(1) Locating pin
(2) Dam rubber
(3) Adhesive
(4) Molding
(5) 8 — 10 mm (0.31 — 0.39 in)
(6) 15 mm (0.59 in)
(7) 10 mm (0.39 in)

3) Install the glass in the same procedure as for windshield glass. <Ref. to GW-26, INSTALLATION, Windshield Glass.>
4) After completion of all work, allow the vehicle to stand for about 24 hours.

NOTE:
• When door is opened/closed after glass is bonded, always lower the door glass and then open/close it carefully.
• Move the vehicle slowly.
• For minimum drying time and vehicle standing time before driving after bonding, follow instructions or instruction manual from the adhesive manufacturer.

5) After curing of adhesive, pour the water on external surface of vehicle to check that there are no water leaks.

NOTE:
When a vehicle is returned to the user, tell him or her that the vehicle should not be subjected to heavy impact for at least three days.

19.Sun Roof Glass

A: REMOVAL

<Ref. to SR-6, REMOVAL, Glass Lid.>

B: INSTALLATION

<Ref. to SR-7, INSTALLATION, Glass Lid.>

C: ADJUSTMENT

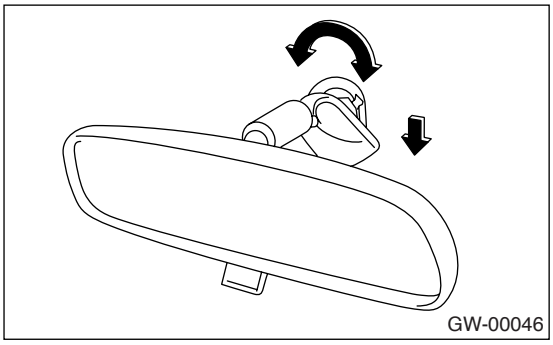
<Ref. to SR-7, ADJUSTMENT, Glass Lid.>

20.Rearview Mirror

A: REMOVAL

NOTE:
Never reuse the spring. Prepare a new spring before removal.

1) Turn the mirror base 90° clockwise or counterclockwise to remove it.



2) Remove the spring from rearview mirror mount.

CAUTION:
Be careful not to damage the mirror surface.

3) When the rearview mirror mount is damaged, use the piano wire or spatula to remove.

CAUTION:
Be careful not to damage the windshield glass.

B: INSTALLATION

1) When the rearview mirror mount is removed, clean the old adhesive, and mate with the windshield glass mark to install.

Adhesive:
REPAIR KIT IN MR (Part No. 65029FC000) or equivalent

2) Ensure the rearview mirror mount is securely attached and then install the spring to it.
3) Install in the reverse order of removal.

C: INSPECTION

Check that the mirror is not damaged.
Check that the spring is not damaged.

21.Wiper Deicer System

A: WIRING DIAGRAM

<Ref. to WI-328, Wiper Deicer System.>

B: INSPECTION

Symptom	Repair order
Wiper deicer does not operate.	(1) Fuse (F/B No. 4, 9) (2) Wiper deicer relay (3) Wiper deicer switch (4) Wiring harness (5) Body integrated unit

Refer to “Rear Window Defogger” for inspection.
<Ref. to GW-31, INSPECTION, Rear Window Defogger.>

NOTE:
Wiper deicer system can be customized on the touch panel in center display or Subaru Select Monitor.

System name	Initial setting	Customize setting
Wiper deicer timer	OFF after 15 min.	Continuous operation*

*: When one of following items is occurred, finish the continuous operation and goes to OFF after 15 min.
- Ambient temperature that is more than 10°C (41°F) continues for 10 sec.
- Malfunction occurs on ambient temperature sensor
- Vehicle speed that is below 15 km/h (9 MPH) continues 15 min.
- Malfunction occurs on CAN communication

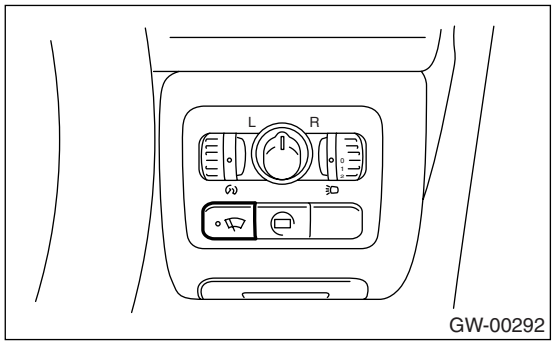
C: REPAIR

Refer to “Rear Window Defogger” for repair.
<Ref. to GW-32, REPAIR, Rear Window Defogger.>

22.Wiper Deicer Switch

A: REMOVAL

1) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
2) Disconnect the harness connector and remove the wiper deicer switch.



B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

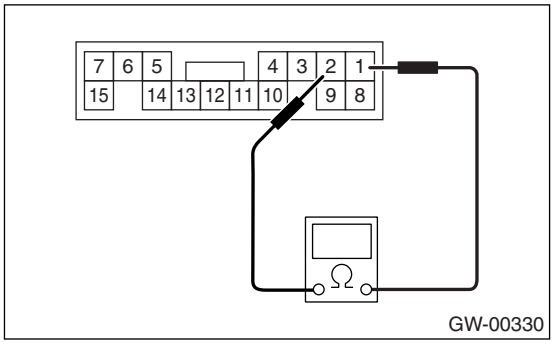
1. WITH SUBARU SELECT MONITOR

CAUTION:
Check that the wiper deicer timer is in initial setting or customize setting before inspection.

	Step	Check	Yes	No
1	**CHECK INPUT SIGNAL TO BODY INTEGRATED UNIT.** When the wiper deicer switch is operated, check the input signal using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body Integrated Unit} from «Main Menu». 4) Select {Current Data Display & Save}. 5) When the wiper deicer switch is set to ON, check the input signal.	After the wiper deicer switch is set to ON, does it turn to OFF in 15 minutes? Or does it operates continuously?	END.	Replace the body integrated unit. <Ref. to SL-46, REMOVAL, Body Integrated Unit.>

2. CHECK SWITCH

Remove the wiper deicer switch and measure the switch resistance.



Switch position	Terminal No.	Standard
OFF	1 and 2	More than 1 MΩ
ON		Less than 1 Ω

Replace the wiper deicer switch if faulty.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

BODY STRUCTURE

BS

Page
1. General Description 2

1. General Description

A: SPECIFICATION

Refer to “Body repair manual” for body structure, datum points and datum dimensions. <Ref. to Pub No. L0879GJ.>

BODY SECTION

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INSTRUMENTATION/DRIVER INFO

IDI

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2.	Combination Meter System	3
3.	Clock System	13
4.	Combination Meter Assembly	16
5.	Speedometer	18
6.	Tachometer	19
7.	Fuel Gauge	20
8.	Water Temperature Gauge	21
9.	Clock	22

1. General Description

A: SPECIFICATION

Combination meter	Speedometer	Stepping motor type
	Tachometer	
	Water temperature gauge	
	Fuel gauge	
	Malfunction indicator light	LED
	Oil pressure warning light	
	ABS warning light	
	Airbag warning light	
	Seat belt warning light	
	Door open warning light	
	Brake fluid and parking brake warning light	
	Low fuel warning light	
	Charge warning light	
	ATF temperature warning light	
	AWD warning light	
	Vehicle dynamics control (VDC) warning light	
	Vehicle dynamics control (VDC) indicator light	
	Turn signal indicator light	
	HI-beam indicator light	
	Immobilizer indicator light	
	Cruise indicator light	
	Cruise set indicator light	
	Front fog light indicator light	
	Rear fog light indicator light	
	AWD LO indicator light	
	SPORT indicator light	
	AT select lever position indicator light	
	Light illumination indicator light	
	Meter illumination light	
	LCD back light	
	Odo/Trip indicator	LCD
	SPORT shift indicator	

B: CAUTION

- Be careful not to damage the meters and instrument panel.
- Be careful not to damage the meter glass.
- Make sure the electrical connector is connected securely.
- After installation, make sure that each meter operates normally.
- Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.
- Do not apply an excessive force on the printed circuit.
- Do not drop or otherwise apply impact.
- When the combination meter of model with immobilizer has been replaced, be sure to perform the registration procedure of immobilizer.

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Combination Meter System

A: WIRING DIAGRAM

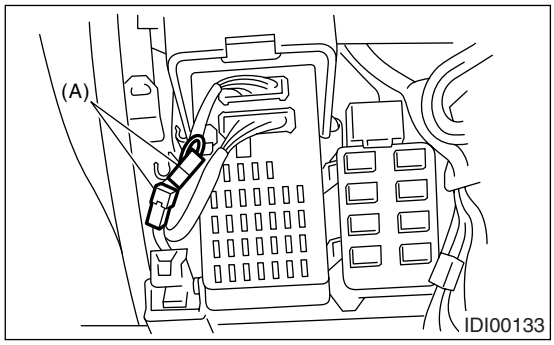
1. COMBINATION METER

<Ref. to WI-130, WIRING DIAGRAM, Combination Meter.>

B: INSPECTION

1. SELF-DIAGNOSIS

The self-diagnosis (checking of each meter, warning light, indicator, illumination, LCD, buzzer sound) of combination meter can be performed in the following procedure.
1) Connect the diagnostic connector (A) near the fuse & relay box.



2) Turn the ignition switch to ON.
3) While meter indicator needle deflecting, press the odo/trip meter knob twice.

NOTE:
When odo/trip meter knob is pressed only once, display mode is shifted to DTC display mode. <Ref. to IDI-12, DTC DISPLAY MODE, INSPECTION, Combination Meter System.>

When the self-diagnosis function is operated, the checking of warning light, indicator, and LCD display is performed, hereafter, every pressing the odo/trip meter knob, the operation check is performed in the order of meter, illumination and buzzer. <Ref. to IDI-4, LIST OF SELF-DIAGNOSIS MODE OPERATION, INSPECTION, Combination Meter System.> To cancel the self-diagnosis mode, set the ignition switch to OFF or disconnect the diagnosis connector.

NOTE:
When the engine starts during diagnosis, the self-diagnosis mode is not cancelled, however, once the vehicle starts driving, the self-diagnosis mode is cancelled automatically for safety.

2. LIST OF SELF-DIAGNOSIS MODE OPERATION

Speedometer, tachometer, fuel gauge, water temperature gauge	Microcomputer running type warning light, indicator light	AT select lever position indicator light	Odo/Trip indicator	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer, speed warning buzzer)
Step 0. Processing to self-diagnosis mode						
Operating initial operation	Initial illuminating	Normal	Normal	Initial illuminating	Initial illuminating	Not beep.
Step 1-1. Check each indication after initial operation						
Repeat the sweep operation (After holding on lowest position for one second, reaches to highest position within 5 seconds, and after holding on highest position for one second, reaches to lowest position within 5 seconds).	Light ON	With the highest brightness, illuminate the position sequentially at a cycle of 1.5 seconds.	Perform the segment check. For the illumination order, refer to the illumination order table.	Perform the segment check. For the illumination order, refer to the illumination order table.	Light at the highest brightness.	Not beep.
Step 1-2. Press the trip knob (trip knob input is not accepted till the meter indicator needle reaches the highest position): sweep complete, AT select lever position indicator display is set						
After completing sweep in step 1-1, back to lowest position.	Light ON	Keep the position indicated when the trip knob is pressed.	Underbar " _ " is displayed.	"1" is displayed.	Light at the highest brightness.	Not beep.
Step 2-1. Press the trip knob, and hold it: Check each meter						
All meters are moved simultaneously in every 0.5 sec. from the lowest position to highest position. Speedometer/ Tachometer: Approx. 5 degrees at every movement. Water temperature gauge/Fuel gauge: Approx. 2 degrees at every movement.	Light OFF	Keep the position indicated that set in step 1-2.	Display the current meter directing angle on odometer. Ex.) Display "135054" when Speedometer/ Tachometer: 135 degree, Water temperature gauge/Fuel gauge: 54 degree.	"▼2" is displayed.	Light at the highest brightness.	Not beep.
Step 2-2. Release the trip knob: Specifying the meter directing position						
Stop at directing position when the trip knob is released.	Light OFF	Keep the position indicated that specified at step 1-2.	Display the current meter directing angle on odometer.	"2" is displayed.	Light at the highest brightness.	Not beep.
Step 3-1. Press the trip knob, and hold it: Check illumination						

Speedometer, tachometer, fuel gauge, water temperature gauge	Microcomputer running type warning light, indicator light	AT select lever position indicator light	Odo/Trip indicator	SPORT shift indicator	Illumination (indicator needle, plate, ring, LCD)	Buzzer (SPORT shift buzzer, speed warning buzzer)
Keep the position that specified at step 2-2.	Light OFF	Varying from the highest brightness (ILL6) to the lowest luminescence (ILL1) every second. After reaching at ILL1, repeat it from ILL6.	Illumination brightness is displayed. (From ILL6 to ILL1)	"▼3" is displayed.	Varying from the highest brightness (ILL6) to the lowest luminescence (ILL1) every second. After reaching at ILL1, repeat it from ILL6.	Not beep.
Step 3-2. Release the trip knob: Specifying the illumination brightness						
Keep the position that specified at step 2-2.	Light OFF	Keep the brightness at the time when the trip knob is released.	Display the brightness at the time when the trip knob is released.	"3" is displayed.	Keep the brightness at the time when the trip knob is released.	Not beep.
Step 4-1. Press the trip knob: Check the beeping of SPORT shift buzzer (AT model)						
All meter indicator needle returns to lowest position.	Light OFF	Light at the highest brightness. Keep the position indicated that set in step 1-2.	Illumination brightness is displayed.	"▲▼8" is displayed. Blinks with buzzer.	Light at the highest brightness.	SPORT shift buzzer beeps.
Step 4-2. Press the trip knob: Check the VDC indicator light (Model with VDC)						
All meter indicator needle returns to lowest position.	VDC warning light and VDC operation indicator light blink.	Light at the highest brightness. Keep the position indicated that set in step 1-2.	Illumination brightness is displayed.	"4" is displayed.	Light at the highest brightness.	Not beep.
Step 4-3. Press the trip knob: Check the speed warning buzzer (KS model)						
Speedometer indicates the vehicle speed, which was detected when the speed warning started.	Light OFF	Light at the highest brightness. Keep the position indicated that set in step 1-2.	Illumination brightness is displayed.	"4" is displayed.	Light at the highest brightness.	Speed warning buzzer beeps.
Step 5. Press the trip knob: Complete the self-diagnosis 1 cycle						
All meter indicator needle returns to lowest position, and go back to step 1 after completion.						

• Illuminating order table

Illuminating order	1	2	3	4	5	6	7	8	9	10	11	
Trip meter A/B	AB	A	B	A	B	A	B	A	B	A	B	
Odo/trip meter	8888.8 888888	00000 000000	1111.1 111111	22222 222222	3333.3 333333	44444 444444	5555.5 555555	66666 666666	7777.7 777777	88888 888888	9999.9 999999	
SPORT shift indicator	8	1	2	3	4	5	1	2	3	4	5	Go back to 1 and repeat
▲ ▼	▲ ▼	▲	▼	▲	▼	▲	▼	▲	▼	▲	▼	
AT select lever position indicator	P	P	R	R	R	N	N	N	D	D	D	
Display time (sec.)	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	

3. SYMPTOM CHART

Symptom	Repair order	Reference
Combination meter assembly does not operate.	(1) Power supply (2) Ground circuit (3) Combination meter	<Ref. to IDI-8, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Combination Meter System.>
Speedometer does not operate.	(1) ABSCM or VDCCM (2) Harness (3) Combination meter	<Ref. to IDI-8, CHECK ABSCM OR VDCCM, INSPECTION, Combination Meter System.>
Tachometer does not operate.	(1) ECM (2) Harness (3) Combination meter	<Ref. to IDI-9, CHECK ENGINE CONTROL MODULE, INSPECTION, Combination Meter System.>
Fuel gauge does not operate.	(1) Communication circuit (2) Fuel level sensor (3) Harness (4) Combination meter	<Ref. to IDI-9, CHECK FUEL LEVEL SENSOR., INSPECTION, Combination Meter System.>
Water temperature gauge does not operate.	(1) Communication circuit (2) Engine coolant temperature sensor (3) Harness (4) Combination meter	<Ref. to IDI-11, CHECK ENGINE COOLANT TEMPERATURE SENSOR., INSPECTION, Combination Meter System.>
Error display is shown on the odo/trip meter.	Communication circuit	<Ref. to IDI-11, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>

CAUTION:
When measuring the voltage and resistance of each control module or sensor, use a tapered pin with a diameter of less than 0.64 mm (0.025 in) in order to avoid poor contact. Do not insert the pin of more than 2 mm (0.08 in) in diameter.

4. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY FOR COMBINATION METER.** 1) Remove the combination meter. <Ref. to IDI-16, REMOVAL, Combination Meter Assembly.> 2) Disconnect the combination meter harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 3, No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between the ignition switch and combination meter.
2	**CHECK POWER SUPPLY FOR COMBINATION METER.** Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 1, No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short between the fuse and combination meter.
3	**CHECK GROUND CIRCUIT OF COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Measure the resistance of harness between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 11, No. 12 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

5. CHECK ABSCM OR VDCCM

	Step	Check	Yes	No
1	**CHECK VEHICLE SPEED SIGNAL.** 1) Lift up the vehicle and support it with rigid racks. 2) Drive the vehicle faster than 10 km/h (6 MPH). **Warning:** **Be careful not to get caught in the running wheels.** 3) Measure the voltage between combination meter connector and chassis ground. ***Connector & terminal*** ***(i10) No. 19 (+) — Chassis ground (–):***	Is the voltage less than 1 V ←→ 5 V or more?	Replace the meter case assembly.	Go to step **2.**
2	**CHECK HARNESS BETWEEN ABSCM OR VDCCM AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ABSCM or VDCCM and combination meter. 3) Measure the resistance between ABSCM or VDCCM harness connector and combination meter harness connector. ***Connector & terminal*** ***Model without VDC*** ***(B301) No. 23 — (i10) No. 19:*** ***Model with VDC*** ***(B310) No. 36 — (i10) No. 19:***	Is the resistance less than 10 Ω?	Model without VDC: Check the ABSCM. <Ref. to ABS(diag)-2, Basic Diagnostic Procedure.> Model with VDC: Check the VDCCM. <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Repair the wiring harness.

6. CHECK ENGINE CONTROL MODULE

Step		Check	Yes	No
1	**CHECK ECM SIGNAL.** 1) Start the engine. 2) Measure the voltage between ECM connector and engine ground. ***Connector & terminal*** ***2.0 L non-turbo model and 2.5 L KS, KA model*** ***(B135) No. 27 (+) — Chassis ground (−):*** ***2.0 L turbo model, 3.0 L model and 2.5 L EC, K4, EK model*** ***(B134) No. 23 (+) — Chassis ground (−):***	Is the voltage more than 0 ←→ 14 V?	Go to step **2.**	Check the ECM. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK HARNESS BETWEEN COMBINATION METER AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from ECM and combination meter. 3) Measure the resistance between ECM harness connector and combination meter harness connector. ***Connector & terminal*** ***2.0 L non-turbo model and 2.5 L KS, KA model*** ***(B135) No. 27 — (i10) No. 20:*** ***2.0 L turbo model, 3.0 L model and 2.5 L EC, K4, EK model*** ***(B134) No. 23 — (i10) No. 20:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

7. CHECK FUEL LEVEL SENSOR.

Step		Check	Yes	No
1	**CHECK COMMUNICATION ERROR DISPLAY.** 1) Set the ignition switch to ON. 2) Check that the error code is displayed in odo/trip meter.	Is the error code “Er xx” displayed in odo/trip meter?	Check the communication circuit. <Ref. to IDI-11, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step **2.**
2	**CHECK FUEL LEVEL SENSOR.** 1) Remove the fuel level sensor. <Ref. to FU(H4SO 2.0)-49, REMOVAL, Fuel Level Sensor.> <Ref. to FU(H4SO 2.5)-51, REMOVAL, Fuel Level Sensor.> <Ref. to FU(H4DOTC)-51, REMOVAL, Fuel Level Sensor.> <Ref. to FU(H6DO)-50, REMOVAL, Fuel Level Sensor.> 2) Measure the resistance between fuel level sensor terminals when the float is in FULL or EMPTY position. ***Terminals*** ***No. 1 — No. 4:***	Is the resistance 1.0 — 3.0 Ω (FULL) or 31 — 33 Ω (EMPTY)?	Go to step **3.**	Replace the fuel level sensor.

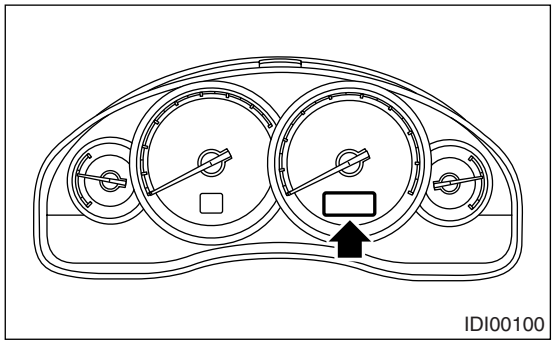
	Step	Check	Yes	No
3	**CHECK FUEL SUB LEVEL SENSOR.** 1) Remove the fuel sub level sensor. <Ref. to FU(H4SO 2.0)-50, REMOVAL, Fuel Sub Level Sensor.> <Ref. to FU(H4SO 2.5)-52, REMOVAL, Fuel Sub Level Sensor.> <Ref. to FU(H4DOTC)-52, REMOVAL, Fuel Sub Level Sensor.> <Ref. to FU(H6DO)-51, REMOVAL, Fuel Sub Level Sensor.> 2) Measure the resistance between fuel sub level sensor terminals when the float is in FULL or EMPTY position. ***Terminals*** ***No. 1 — No. 2:***	Is the resistance 1.0 — 3.0 Ω (FULL) or 61 — 63 Ω (EMPTY)?	Go to step **4.**	Replace the fuel sub level sensor.
4	**CHECK HARNESS BETWEEN FUEL SUB-LEVEL SENSOR AND BODY INTEGRATED UNIT.** 1) Disconnect the connector from body integrated unit. 2) Measure the resistance between fuel sub level sensor harness connector terminal and body integrated unit harness connector terminal. ***Connector & terminal*** ***(R59) No. 1 — (B281) No. 19:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the wiring harness.
5	**CHECK HARNESS BETWEEN FUEL LEVEL SENSOR AND FUEL SUB LEVEL SENSOR.** Measure the resistance between fuel level sensor harness connector terminal and fuel sub level sensor harness connector terminal. ***Connector & terminal*** ***(R58) No. 1 — (R59) No. 2:***	Is the resistance less than 10 Ω?	Go to step **6.**	Repair the wiring harness.
6	**CHECK FUEL LEVEL SENSOR GROUND CIRCUIT.** Measure the resistance between fuel level sensor harness connector terminal and chassis ground. ***Connector & terminal*** ***(R58) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the meter case assembly.	Repair the wiring harness.

8. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

	Step	Check	Yes	No
1	**CHECK COMMUNICATION ERROR DISPLAY.** 1) Set the ignition switch to ON. 2) Check that the error code is displayed in odo/trip meter.	Is the error code “Er xx” displayed in odo/trip meter?	Check the communication circuit. <Ref. to IDI-11, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Go to step **2.**
2	**CHECK ENGINE COOLANT TEMPERATURE SENSOR.** Check the engine coolant temperature sensor. <Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>	Is the engine coolant temperature sensor OK?	Replace the meter case assembly.	Replace the engine coolant temperature sensor.

9. COMMUNICATION ERROR DISPLAY

When the following error code is displayed in the odo/trip meter, inspect the communication circuit since the communication malfunction is generated between each control module. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>


IDI00100

Error code	Remarks
Er IU	Malfunction in integrated unit
Er ––	Simultaneous malfunction of high/low speed CAN communication
Er HC	Malfunction of high-speed CAN communication
Er LC	Malfunction of low-speed CAN communication
Er EG	EGI Communication malfunction
Er TC	TCM Communication malfunction
Er Ab	ABSCM/VDCCM Communication malfunction
Er SP	ABSCM/VDCCM DTC information, vehicle speed pulse malfunction
Er SS	Wheel speed data malfunction

10.DTC DISPLAY MODE

When DTC display mode is operated, {ECM}, {TCM}, {ABSCM/VDCCM} is displayed repeatedly in this order by pressing the odo/trip meter button. DTC is displayed in the following table according to type of control module, receiving DTC, DTC detected, No DTC. If CAN communication is broken down, "-----" is displayed.

Control module	Condition	Display
ECM	Receiving DTC	Trip "A" + "P (blinking)"
	DTC detected	Trip "A" + "Pxxxx"
	No DTC	Trip "A" + "P----"
TCM	Receiving DTC	Trip "B" + "P (blinking)"
	DTC detected	Trip "B" + "Pxxxx"
	No DTC	Trip "B" + "P----"
ABSCM/VDCCM	Receiving DTC	Trip "A" + "C (blinking)"
	DTC detected	Trip "A" + "Cxxxx"
	No DTC	Trip "A" + "C----"
When CAN communication is broken down.	—	"-----"

3. Clock System

A: WIRING DIAGRAM

1. CLOCK

<Ref. to WI-129, WIRING DIAGRAM, Clock System.>

B: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
No display is shown.	(1) Power supply (2) Clock body	<Ref. to IDI-14, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Clock System.>
Illumination does not illuminate.	(1) Illumination power supply (2) Clock body	<Ref. to IDI-14, CHECK ILLUMINATION CIRCUIT, INSPECTION, Clock System.>
Brightness does not change even when bright switch is pressed.	(1) Bright switch (2) Clock body	<Ref. to IDI-14, CHECK BRIGHT CIRCUIT, INSPECTION, Clock System.>
“Acc” or “ign” is displayed.	ACC or ignition power supply	<Ref. to IDI-15, CHECK ACC OR IGNITION POWER SUPPLY, INSPECTION, Clock System.>
“Err” is displayed in all items.	(1) Communication circuit between combination meter and clock (2) Clock body	<Ref. to IDI-15, CHECK COMMUNICATION CIRCUIT, INSPECTION, Clock System.>
“Err” is displayed when a specified item is selected.	Communication circuit between combination meter and each control module	<Ref. to IDI-11, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>

2. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK CLOCK POWER SUPPLY.** 1) Disconnect the clock harness connector. 2) Measure the voltage between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 10 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between fuse and clock.
2	**CHECK CLOCK GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 6 — Chassis ground:***	Is the resistance less than 10 Ω?	Replace the clock body.	Repair the wiring harness.

3. CHECK ILLUMINATION CIRCUIT

	Step	Check	Yes	No
1	**CHECK ILLUMINATION CIRCUIT POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the clock harness connector. 3) Turn the ignition switch and lighting switch to ON. 4) Measure the voltage between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 1 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the clock body.	Check the harness for open or short between fuse and clock.

4. CHECK BRIGHT CIRCUIT

	Step	Check	Yes	No
1	**CHECK BRIGHT CIRCUIT POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the clock harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the clock body.	Go to step **2.**
2	**CHECK HARNESS BETWEEN CLOCK AND BODY INTEGRATED UNIT.** 1) Turn the ignition switch to OFF. 2) Disconnect harness connector of body integrated unit. 3) Measure the resistance between clock harness connector and body integrated unit harness connector. ***Connector & terminal*** ***(i59) No. 2 — (i84) No. 30:***	Is the resistance less than 10 Ω?	Replace the body integrated unit.	Repair the wiring harness.

5. CHECK ACC OR IGNITION POWER SUPPLY

	Step	Check	Yes	No
1	**CHECK ACC POWER SUPPLY.** 1) Turn the ignition switch to OFF. 2) Disconnect the clock harness connector. 3) Turn the ignition switch to ACC. 4) Measure the voltage between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 9 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the open circuit in harness between fuse and clock.
2	**CHECK THE IGNITION POWER SUPPLY.** 1) Turn the ignition switch to ON. 2) Measure the voltage between clock harness connector and chassis ground. ***Connector & terminal*** ***(i59) No. 8 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Replace the clock body.	Check the open circuit in harness between fuse and clock.

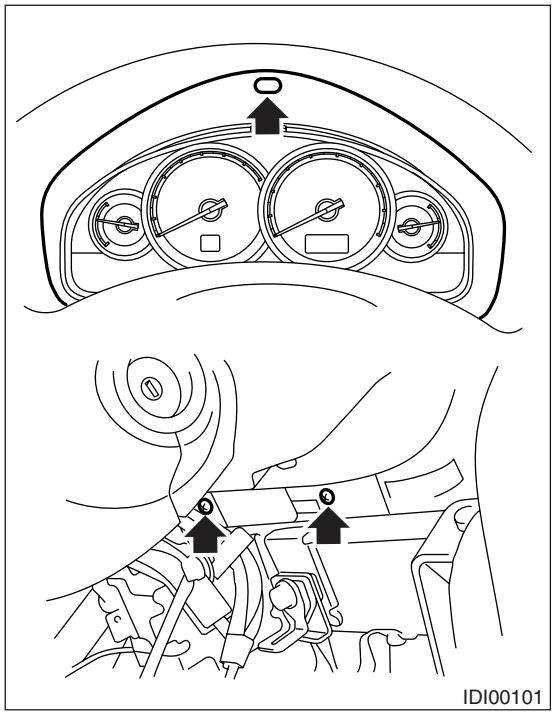
6. CHECK COMMUNICATION CIRCUIT

	Step	Check	Yes	No
1	**CHECK THE HARNESS BETWEEN CLOCK AND COMBINATION METER.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness of clock and combination meter. 3) Measure the resistance between harness connectors of clock and combination meter. ***Connector & terminal*** ***(i59) No. 5 — (i10) No. 18:***	Is the resistance less than 10 Ω?	Go to step **2.**	Repair the wiring harness.
2	**CHECK COMMUNICATION ERROR DISPLAY.** 1) Connect all the disconnected connectors. 2) Turn the ignition switch to ON. 3) Check that the error code is displayed in odo/trip meter.	Is the error code “Er xx” displayed in odo/trip meter?	Check the communication circuit. <Ref. to IDI-11, COMMUNICATION ERROR DISPLAY, INSPECTION, Combination Meter System.>	Replace the clock body.

4. Combination Meter Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Set the tilt steering at the lowest position.
3) Remove the instrument panel under cover and lower cover of driver's seat side. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
4) Remove the screws of combination meter (one for upper side, two for lower side) and pull tilting the meter toward you.



5) Disconnect the connector in the rear side of combination meter to remove meter.

CAUTION:
• Be careful not to damage the meter or instrument panel.
• Pay particular attention to avoid damaging the meter glass.

B: INSTALLATION

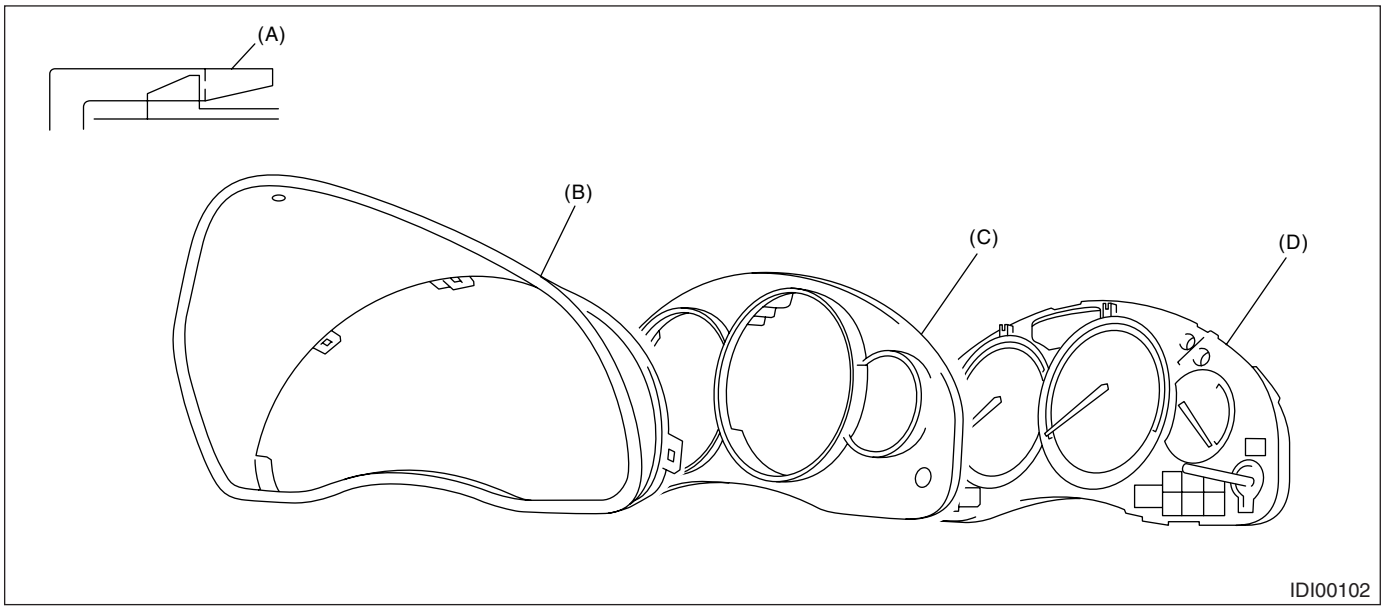
Install in the reverse order of removal.

CAUTION:
• Make sure the electrical connector is connected securely.
• Make sure that each meter operates normally.
• When the combination meter of model with immobilizer has been replaced, be sure to perform the registration procedure of immobilizer.

C: DISASSEMBLY

CAUTION:
- **Use gloves to avoid damage and getting fingerprints on the glass surface and meter surfaces.**
- **Be careful not to apply excessive force to the trip knob.**
- **Be sure not to touch the meter indicator needle.**

Remove the pawl (A), and then detach the meter glass assembly (B) and meter panel assembly (C) from meter case assembly (D).



1. BULB REPLACEMENT

LEDs are used for all of warning lights and indicator lights of combination meters, replace the meter case assembly if faulty.

D: ASSEMBLY

Assemble in the reverse order of disassembly.

5. Speedometer

A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the speedometer alone. (Do not remove the cover on the back side.)

6. Tachometer

A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the tachometer alone. (Do not remove the cover on the back side.)

7. Fuel Gauge

A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the fuel gauge alone. (Do not remove the cover on the back side.)

8. Water Temperature Gauge

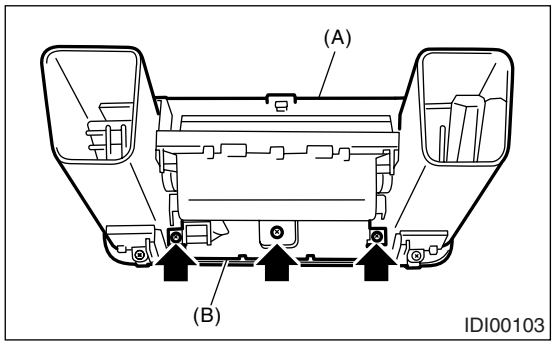
A: SPECIFICATION

Since the meter case assembly cannot be disassembled, do not remove or inspect the water temperature gauge alone. (Do not remove the cover on the back side.)

9. Clock

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the center air vent grille. <Ref. to AC-44, REMOVAL, Air Vent Grille.>
3) Loosen the screws, and then remove the clock (B) from center air vent grille (A).



B: INSTALLATION

Install in the reverse order of removal.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

SEATS

SE

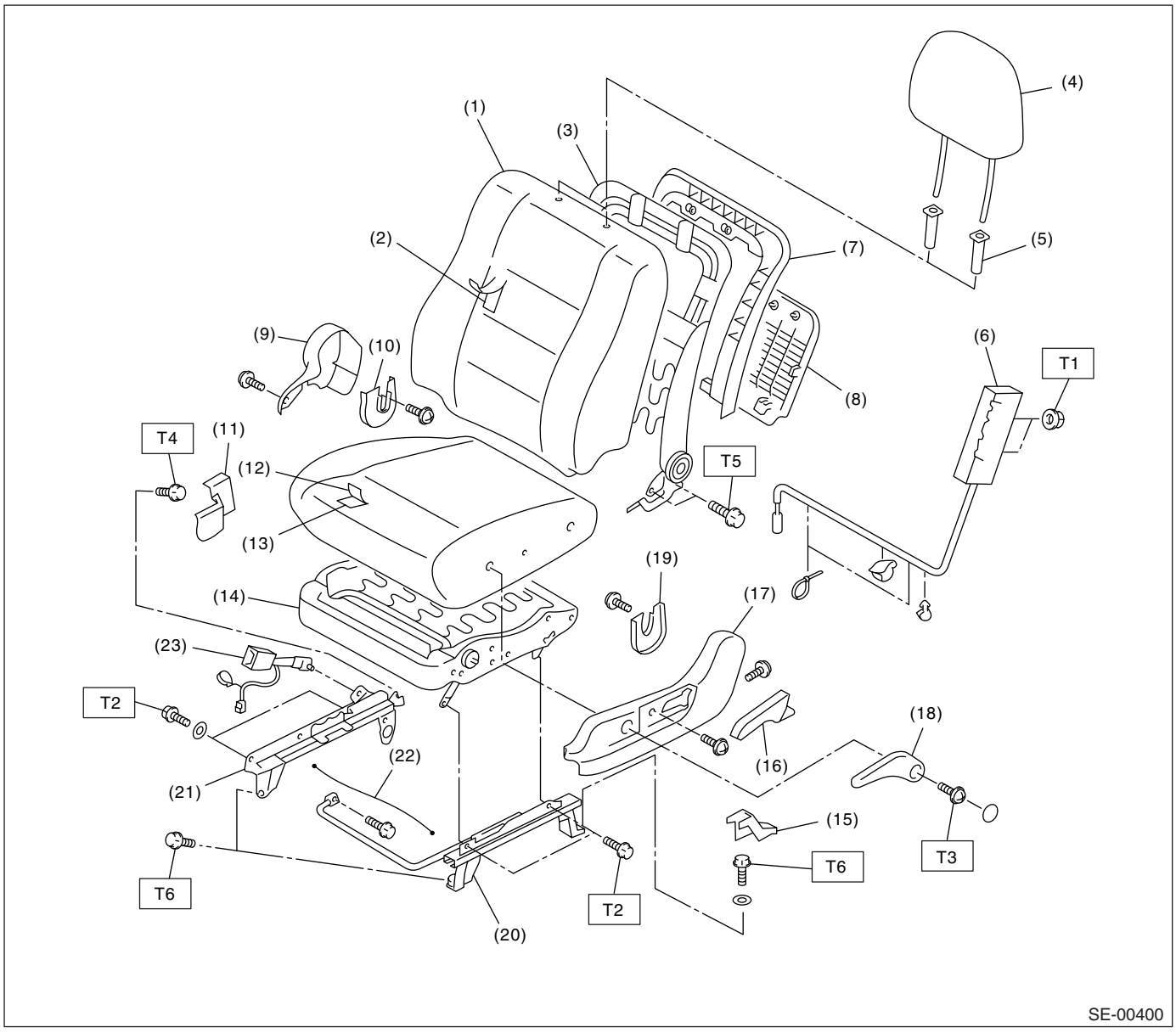
Page

1. General Description 2
2. Front Seat 7
3. Rear Seat 14
4. Seat Heater System 19

1. General Description

A: COMPONENT

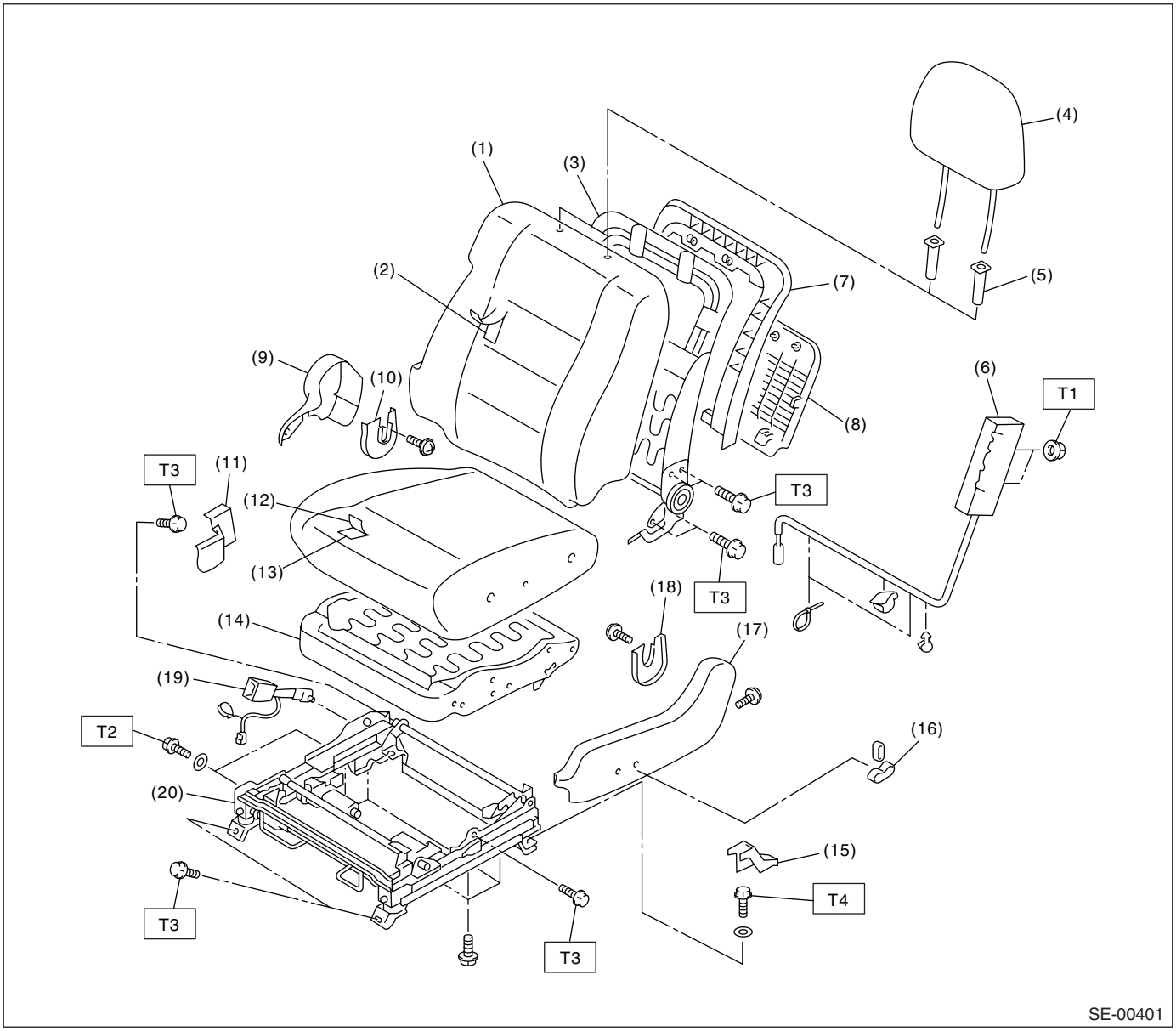
1. FRONT SEAT (STANDARD SEAT)



(1) Backrest cover
(2) Backrest pad
(3) Backrest frame ASSY
(4) Headrest ASSY
(5) Headrest lock bushing
(6) Side airbag module
(7) Cover frame
(8) Backrest back cover
(9) Seat hinge inner cover
(10) Hinge inner cover RH
(11) Bolt cover inner
(12) Seat cushion cover
(13) Seat cushion pad
(14) Seat cushion frame ASSY
(15) Bolt cover outer
(16) Reclining lever
(17) Seat hinge outer cover
(18) Lifter lever
(19) Hinge inner cover LH
(20) Outer slide rail
(21) Inner slide rail
(22) Connecting wire
(23) Inner belt

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.61, 4.43)
T2: 10 (1.02, 7.38)
T3: 22 (2.24, 16.2)
T4: 30 (3.06, 22.1)
T5: 52 (5.30, 38.4)
T6: 53 (5.40, 39.1)

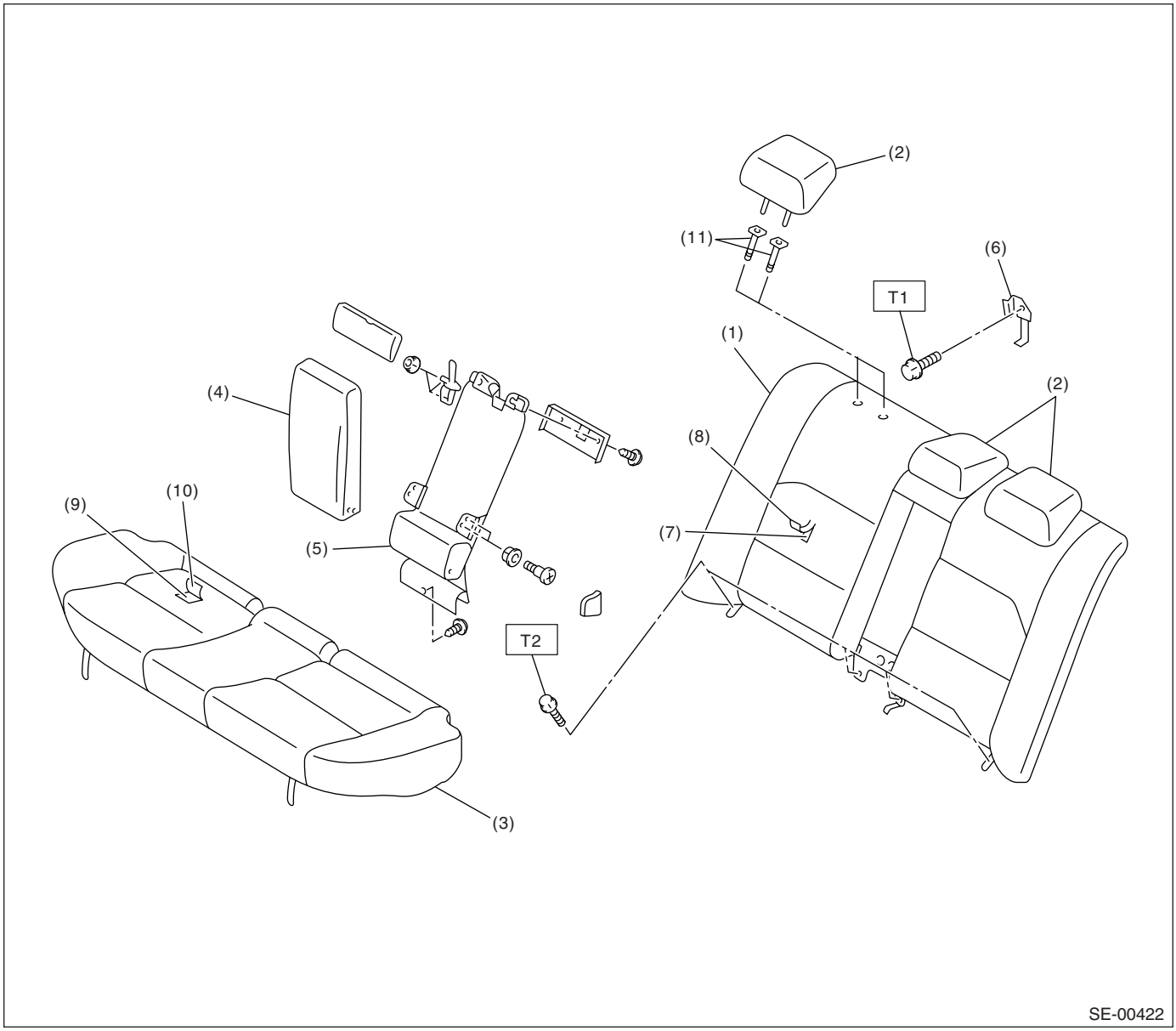
2. FRONT SEAT (POWER SEAT)



(1) Backrest cover
(2) Backrest pad
(3) Backrest frame ASSY
(4) Headrest ASSY
(5) Headrest lock bushing
(6) Side airbag module
(7) Cover frame
(8) Backrest back cover
(9) Seat hinge inner cover
(10) Hinge inner cover RH
(11) Bolt cover inner
(12) Seat cushion cover
(13) Seat cushion pad
(14) Seat cushion frame ASSY
(15) Bolt cover outer
(16) Seat switch
(17) Seat hinge outer cover
(18) Hinge inner cover LH
(19) Inner belt
(20) Seat rail ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6 (0.61, 4.43)
T2: 22 (2.24, 16.2)
T3: 52 (5.30, 38.4)
T4: 53 (5.40, 39.1)

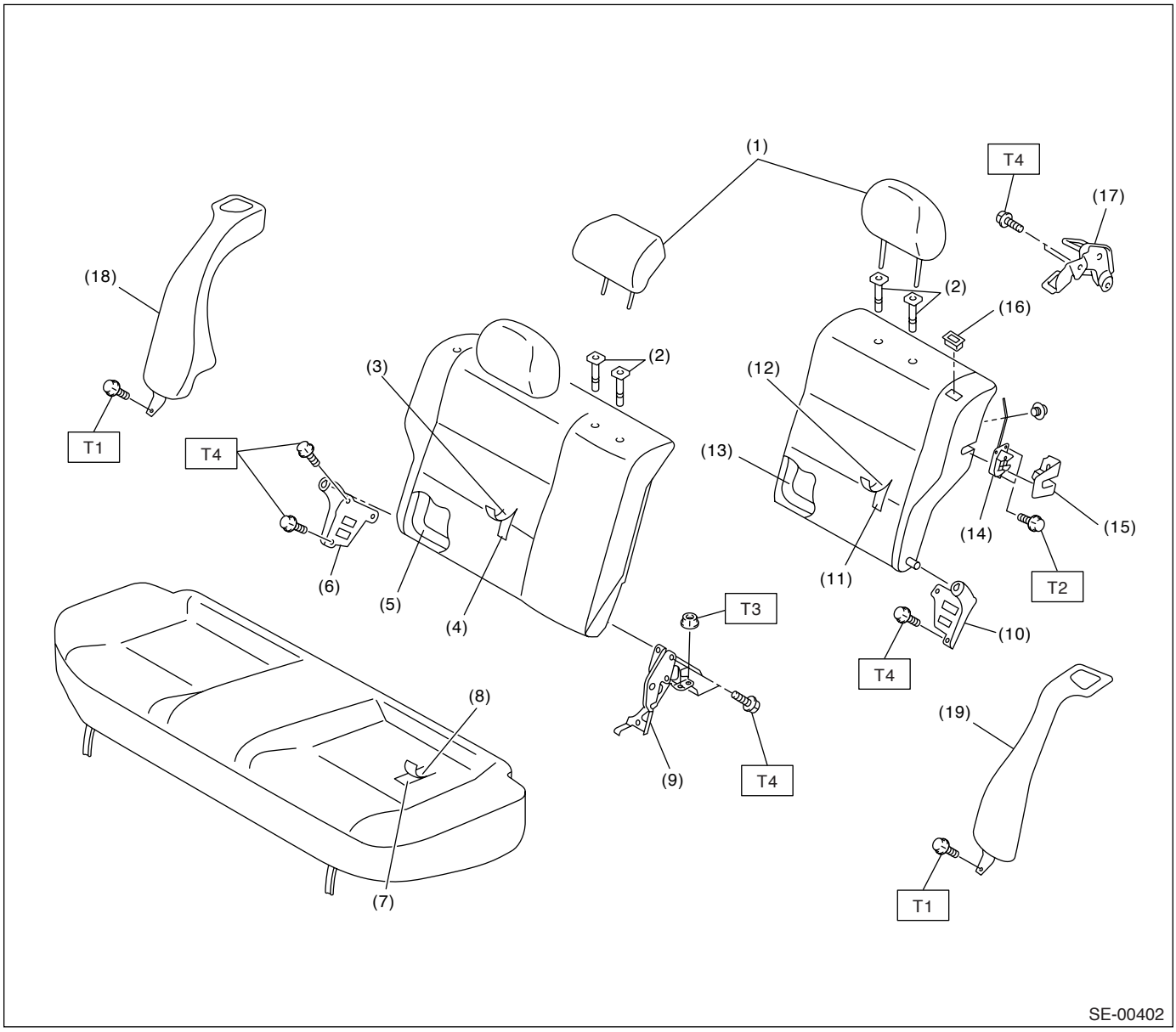
3. REAR SEAT (SEDAN MODEL)



(1) Backrest
(2) Headrest
(3) Cushion
(4) Armrest
(5) Center through frame
(6) Hook
(7) Backrest pad ASSY
(8) Backrest cover ASSY
(9) Rear pad & cushion frame ASSY
(10) Rear cushion cover
(11) Headrest bushing

Tightening torque: N·m (kgf-m, ft-lb)
T1: 10 (1.02, 7.38)
T2: 24.5 (2.5, 18.1)

4. REAR SEAT (WAGON MODEL)



(1) Headrest
(2) Headrest bushing
(3) Backrest cover RH
(4) Backrest pad RH
(5) Backrest frame RH
(6) Hinge ASSY RH
(7) Seat cushion pad
(8) Seat cushion cover
(9) Hinge ASSY CTR
(10) Hinge ASSY LH
(11) Backrest pad LH
(12) Backrest cover LH
(13) Backrest frame LH
(14) Seat back latch
(15) Seat back latch cover
(16) Holder & button
(17) Striker
(18) Backrest shoulder RH
(19) Backrest shoulder LH

Tightening torque: N·m (kgf-m, ft-lb)
T1: 13.7 (1.40, 10.1)
T2: 22 (2.24, 16.2)
T3: 24.5 (2.5, 18.1)
T4: 33 (3.3, 24.6)

B: CAUTION

When removing the front seat from a side airbag loaded vehicle, follow cautions given in the airbag section. <Ref. to AB-4, CAUTION, General Description.>

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Long nose pliers	Used for removing the hog ring.
Hog ring pliers	Used for installing the hog ring.
TORX® T50	Used for removing and installing the inner seat belt.

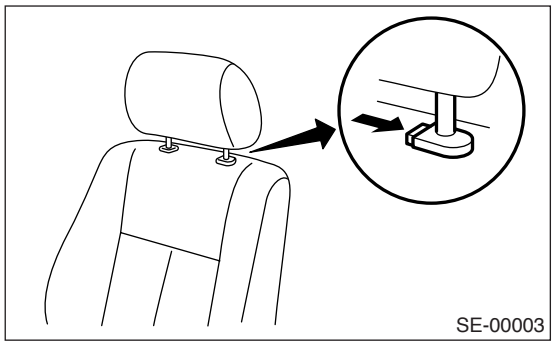
2. Front Seat

A: REMOVAL

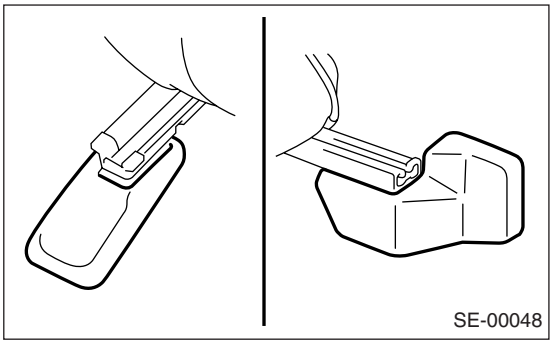
1) Disconnect the ground cable from battery, and wait for more than 20 seconds before starting work.

CAUTION:
The airbag system is fitted with a backup power source. After disconnecting the battery ground cable, the airbag may deploy if you do not wait for 20 seconds before starting the repair of air-bag system.

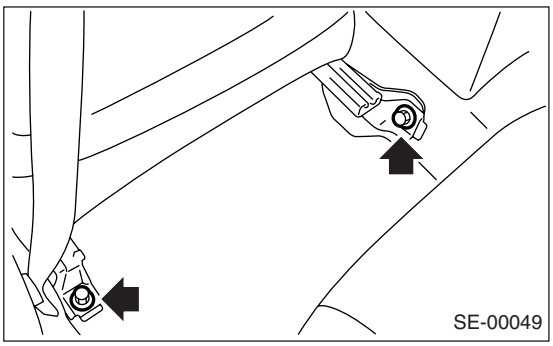
2) While pressing the headrest lock button, remove the headrest.


SE-00003

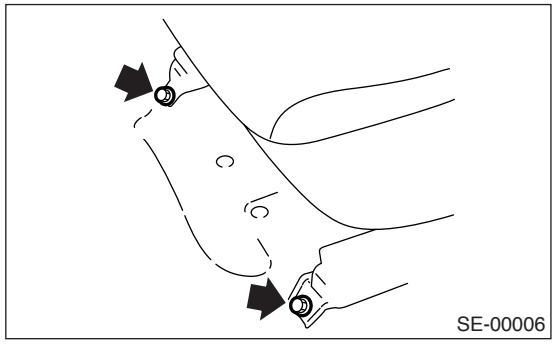
3) Tilt the backrest forward.
4) Move the seat to full front end.
5) Remove the bolt cover at the rear side of slide rail.


SE-00048

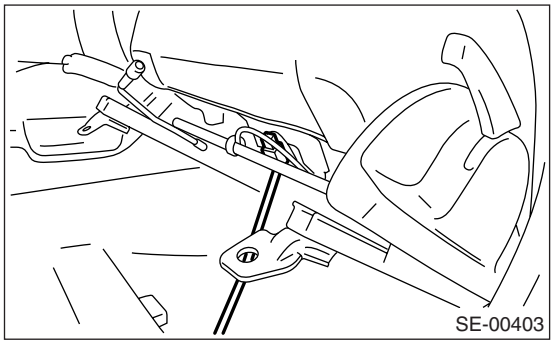
6) Remove the two bolts at the rear side of slide rail.


SE-00049

7) Move the seat to full rear end.
8) Remove the two bolts at the front side of slide rail.


SE-00006

9) Disconnect the connector under the seat.
- Seat belt warning light connector
- Side airbag connector (model with side airbag)
- Seat heater connector (model with seat heater)


SE-00403

10) Remove the front seat from vehicle.

B: INSTALLATION

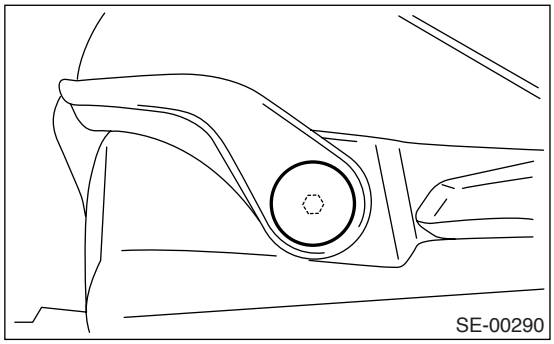
Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, FRONT SEAT (STANDARD SEAT), COMPONENT, General Description.>

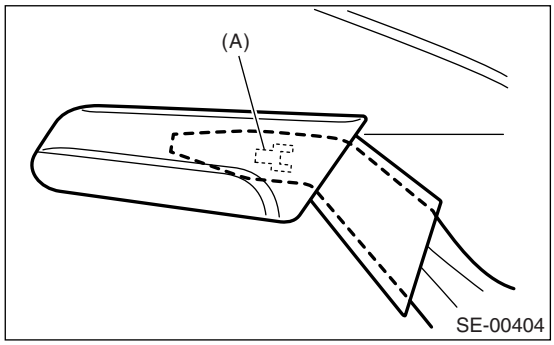
C: DISASSEMBLY

1. STANDARD SEAT

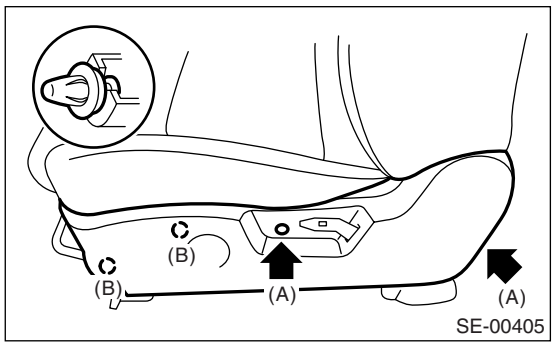
1) Remove the seat from vehicle. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Remove the seat lifter cover using a flat tip screwdriver and loosen the inner bolt to remove seat lifter lever.


SE-00290

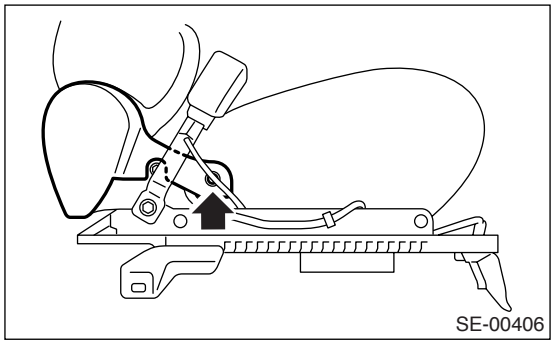
3) Remove the hook (A) and detach reclining lever cover.



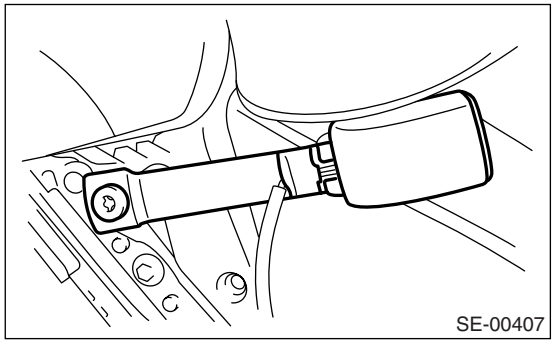
4) Remove the screws (A) and clips (B), and then detach the seat hinge outer cover.



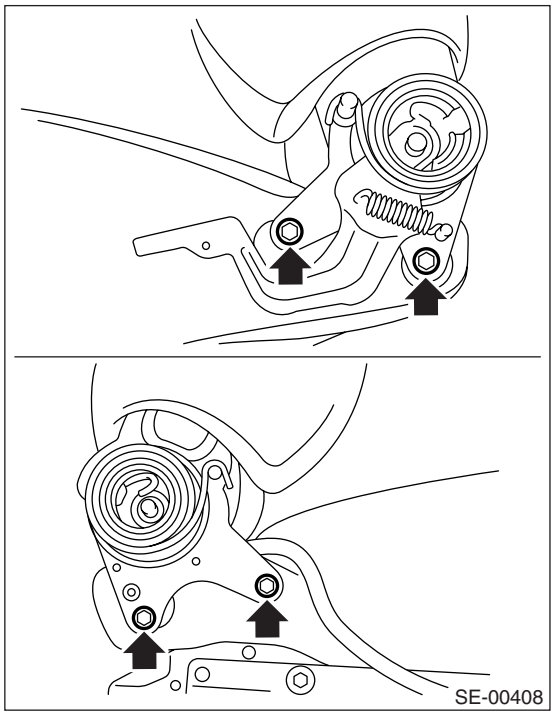
5) Loosen the screws to detach seat hinge inner cover.



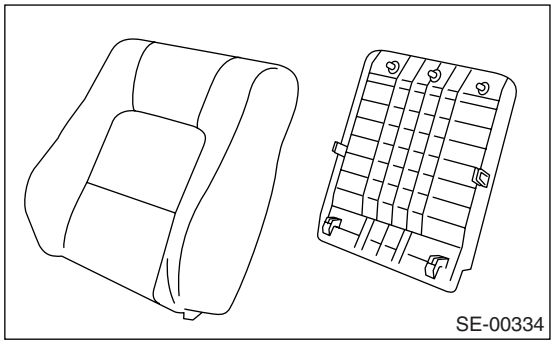
6) Remove the TORX® bolt, and then remove the inner belt.



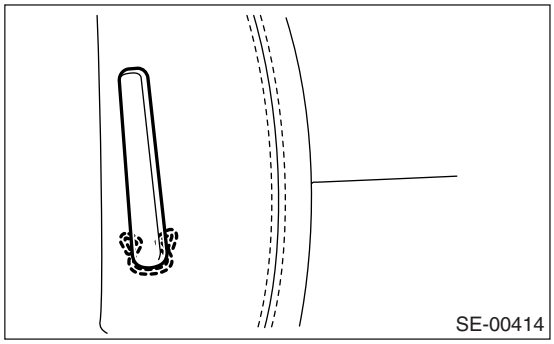
7) Remove the two bolts from reclining hinge on each side.



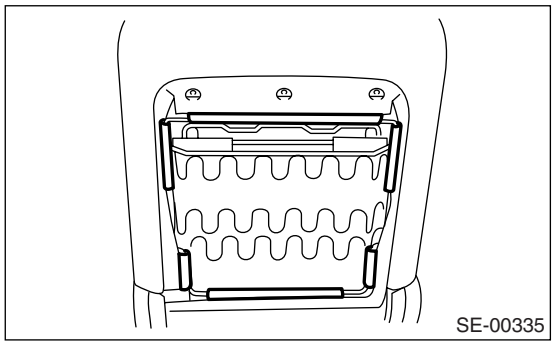
8) Remove the clips and hooks, and then detach the backrest back cover.



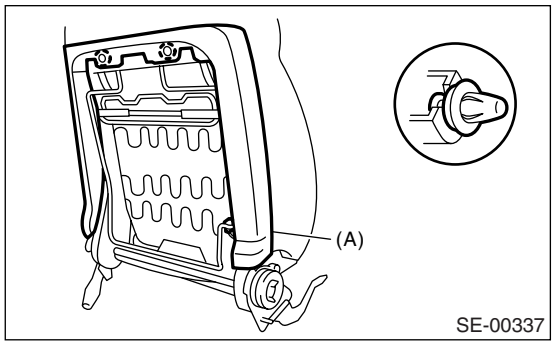
9) Remove the lock clip, and then remove the lumber support lever.



10) Remove the hooks at the rear side of backrest.

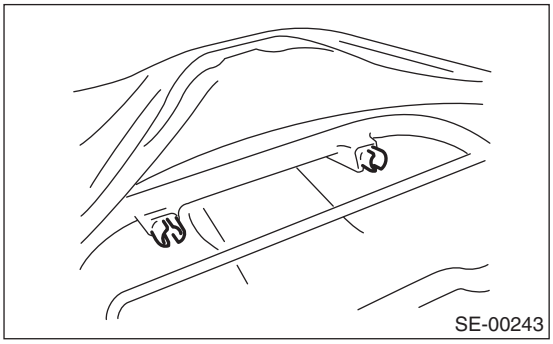


11) Remove the cover frame (A).

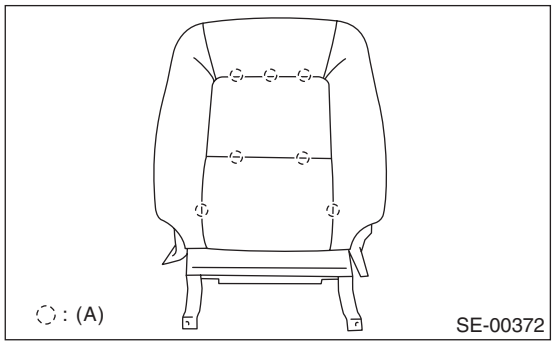


12) Remove the headrest lock bushing.

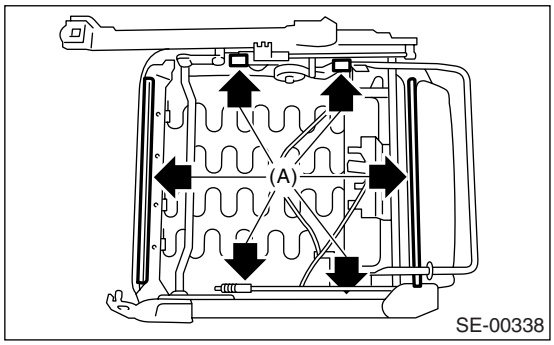
NOTE:
Push outside to remove it from the inside of seat.



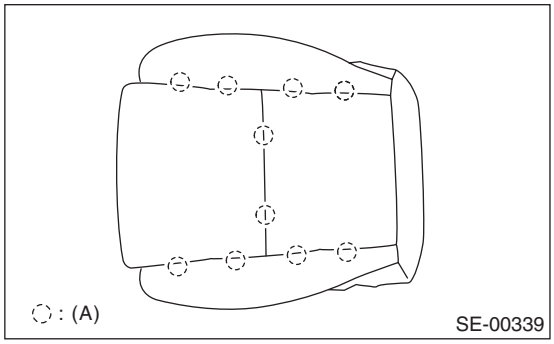
13) Pull out the backrest frame assembly.
14) Remove the hog rings (A) on the front side of backrest, and then remove the backrest cover from backrest.



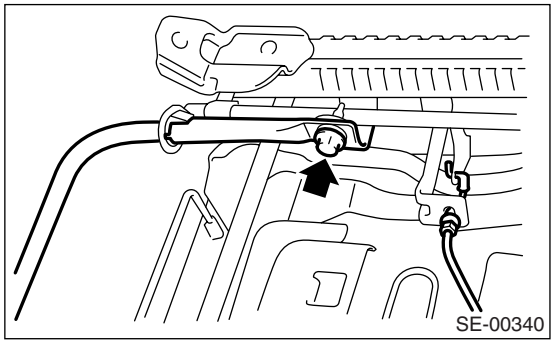
15) Remove the hooks (A), and then remove the seat cushion frame assembly.



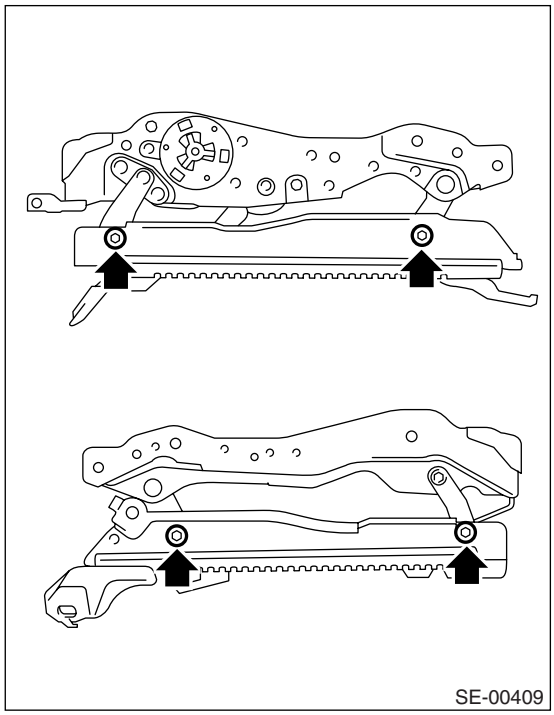
16) Remove the hog rings (A), and then remove the seat cushion cover from seat cushion pad.



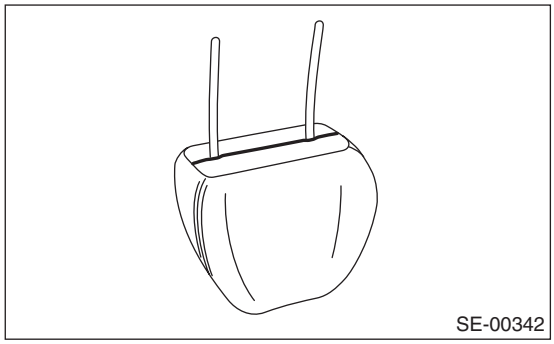
17) Remove the bolt of sliding adjustment bar and connecting wire.



18) Remove the bolts, and then remove the slide rail.

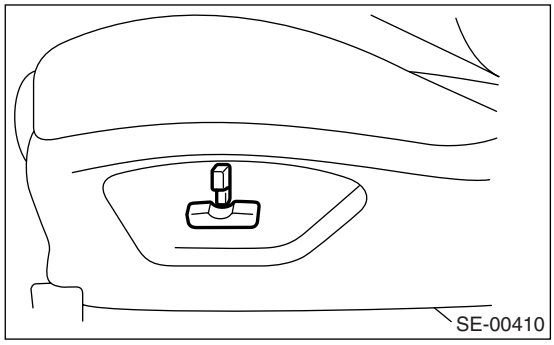


19) Remove the hooks and hog rings at the bottom of headrest, and then remove the headrest cover from headrest.

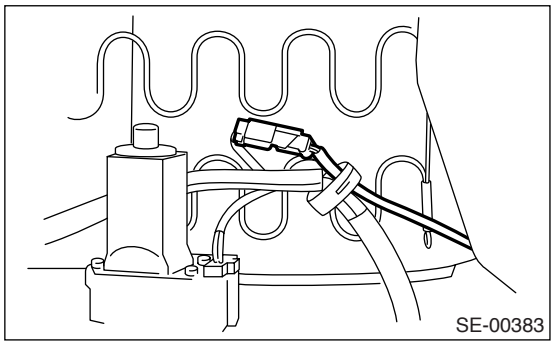


2. POWER SEAT

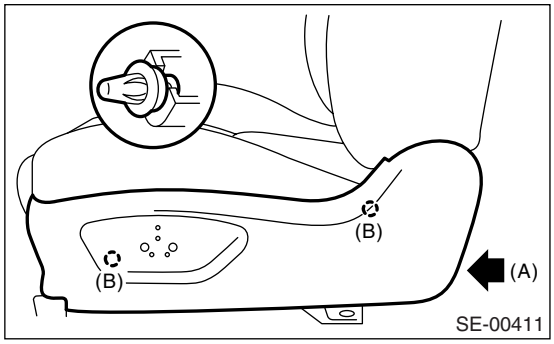
1) Remove the seat from vehicle. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Remove the seat switch knob.



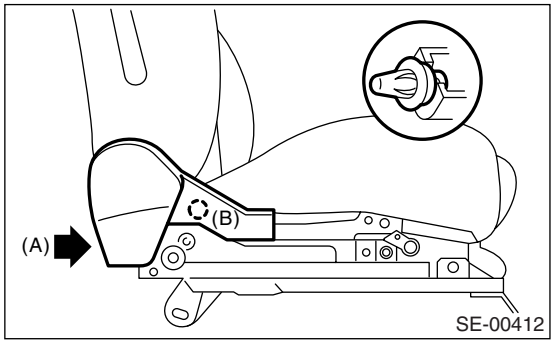
3) Disconnect the connector of reclining motor from the back of seat cushion.



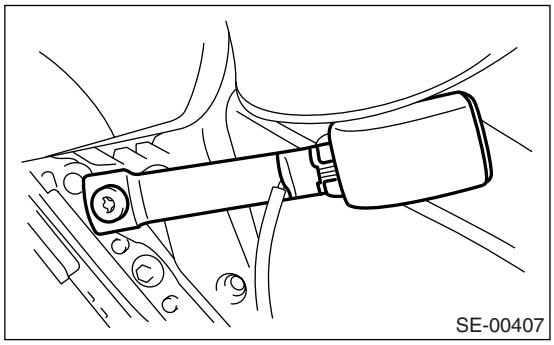
4) Remove the screw (A) and clips (B), and then disconnect the seat switch connector to remove seat hinge outer cover.



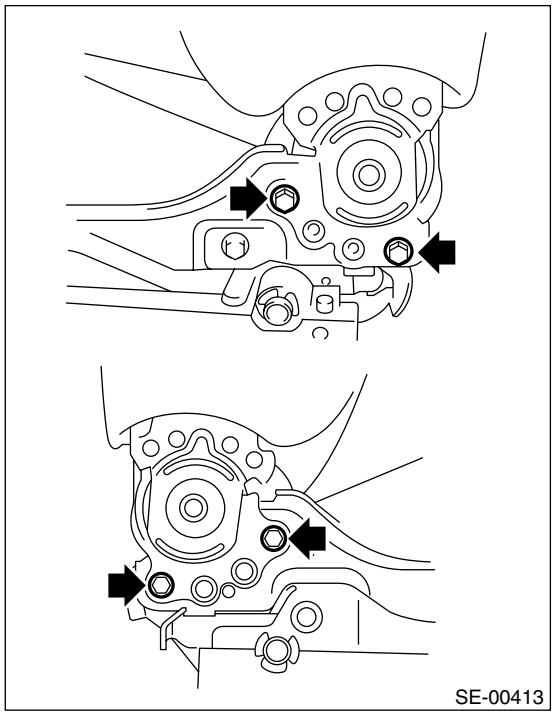
5) Remove the screw (A) and clip (B), and then remove the seat hinge inner cover.



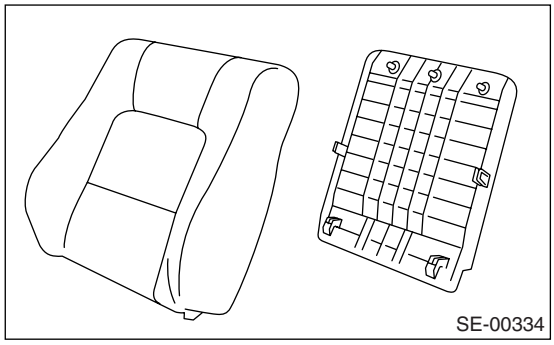
6) Remove the TORX® bolt, and then remove the inner belt.



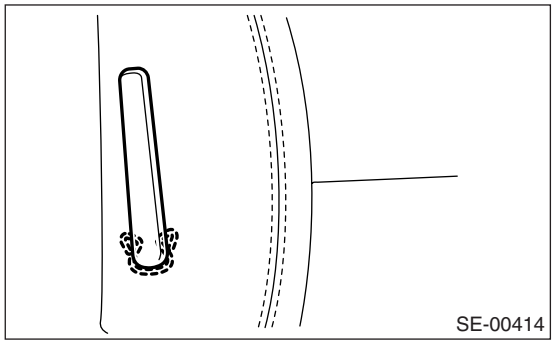
7) Remove the two bolts from the reclining hinge on each left and right side.


SE-00413

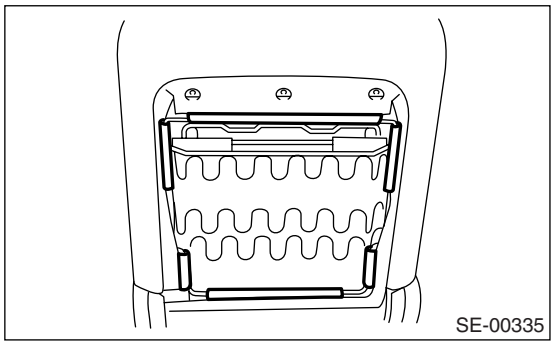
8) Remove the clips and hooks, and then detach the backrest back cover.


SE-00334

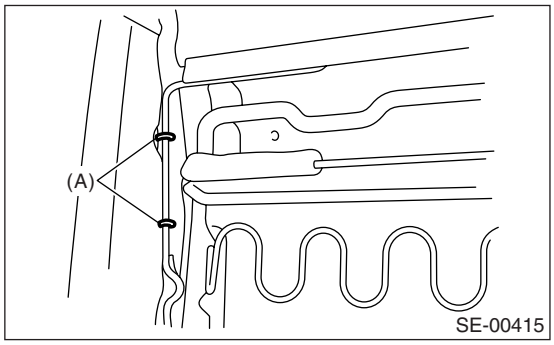
9) Remove the lock clip, and then remove the lumber support lever.


SE-00414

10) Remove the hooks at the rear side of backrest.

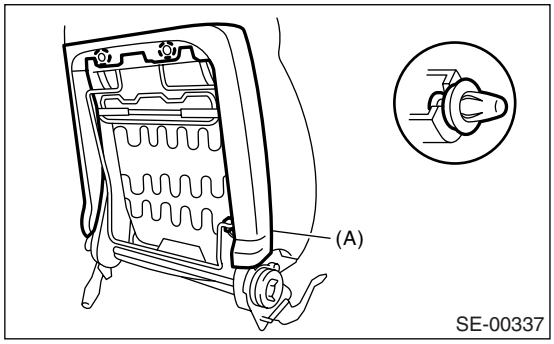

SE-00335

NOTE:
For the seat with side airbag, the airbag module installation side is secured with hog rings (A).



SE-00415

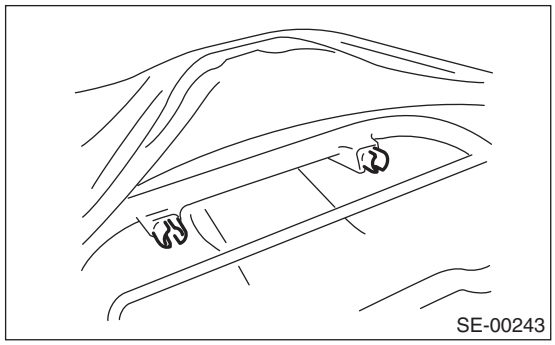
11) Remove the cover frame (A).



SE-00337

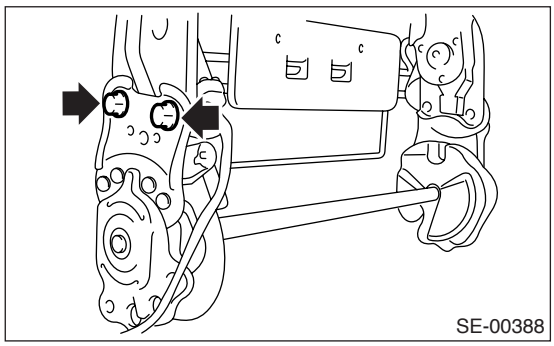
12) Remove the headrest lock bushing.

NOTE:
Push outside to remove it from the inside of seat.

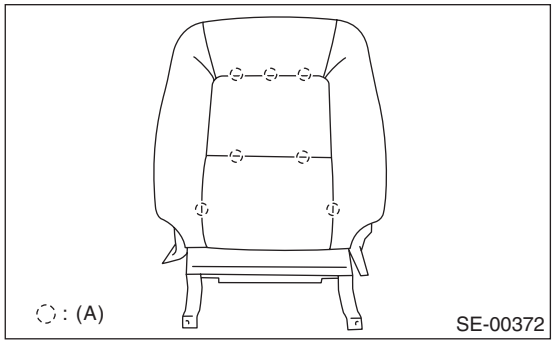

SE-00243

13) Pull out the backrest frame assembly.

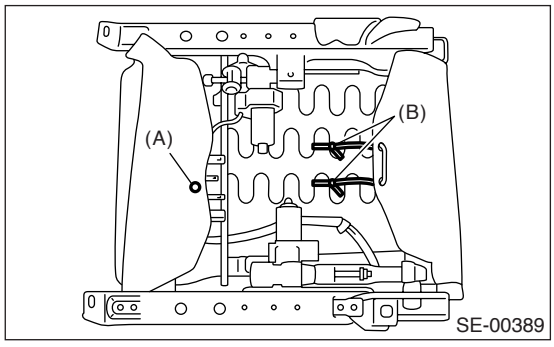
14) Remove the two bolts on each left and right side, and then remove the reclining motor assembly.



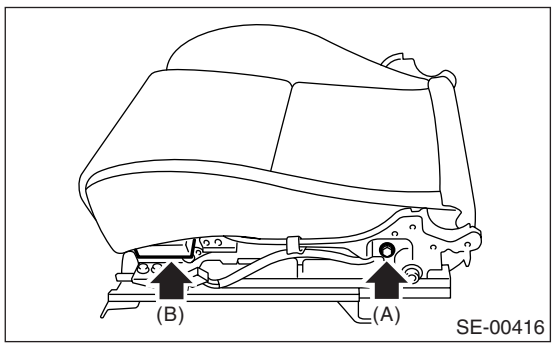
15) Remove the hog rings (A) on the front side of backrest, and then remove the backrest cover from backrest.



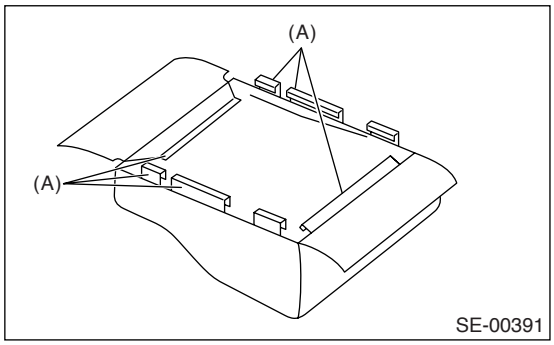
16) Remove the clip (A) and straps (B) on the back of seat cushion.



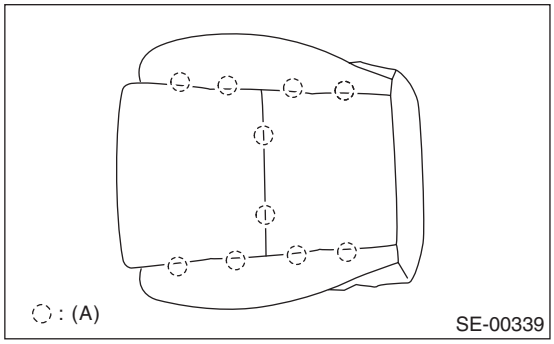
17) Remove the bolt (A) and hook (B) on left and right side, and then remove the seat cushion frame from seat rail assembly.



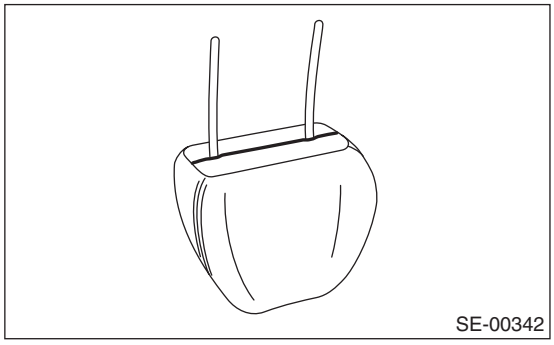
18) Remove the hooks (A), and then remove the seat cushion from seat cushion frame.



19) Remove the hog rings (A), and then remove the seat cushion cover from seat cushion pad.



20) Remove the hooks and hog rings at the bottom of headrest, and then remove the headrest cover from headrest.



D: ASSEMBLY

1. STANDARD SEAT

Assemble in the reverse order of disassembly.

2. POWER SEAT

Assemble in the reverse order of disassembly.

CAUTION:
When the backrest cover is not installed securely, the side airbag module may not be deployed properly, therefore keep strictly to the following procedure.

- **Be careful not to stain or damage the backrest cover during assembly.**
- **Always use new hog rings.**

• Secure the hog ring using hog ring pliers.
• Install the hog rings to the specified points securely and make sure that no wrinkle or twisting on the backrest cover.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-2, FRONT SEAT (STANDARD SEAT), COMPONENT, General Description.>

E: INSPECTION

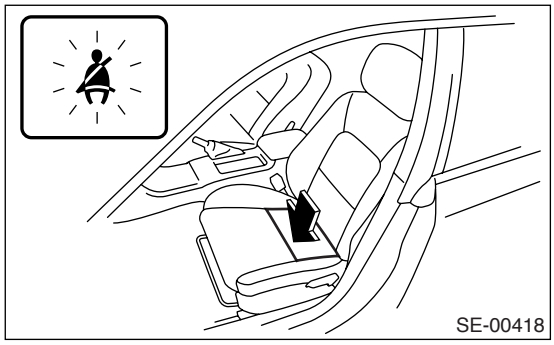
1. SEAT COVER

Check that no tear or fray on the backrest cover and seat cushion cover.

NOTE:
When the side airbag equipped model has tear or fray on the door side of backrest cover, the side airbag may not be deployed properly. Replace it with new one in such a case.

2. SEATING SENSOR

Make sure the passenger's seat belt warning light illuminates when applying load to the rear surface of passenger's seat cushion. If not, replace the seat cushion pad with a new one.

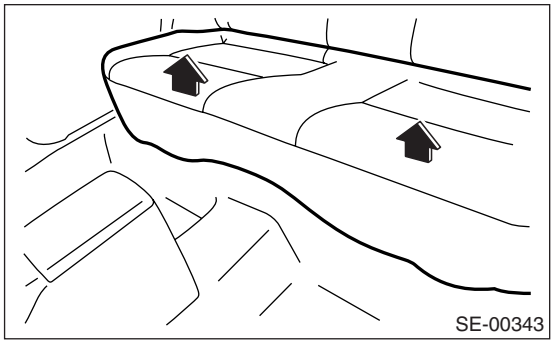

SE-00418

3. Rear Seat

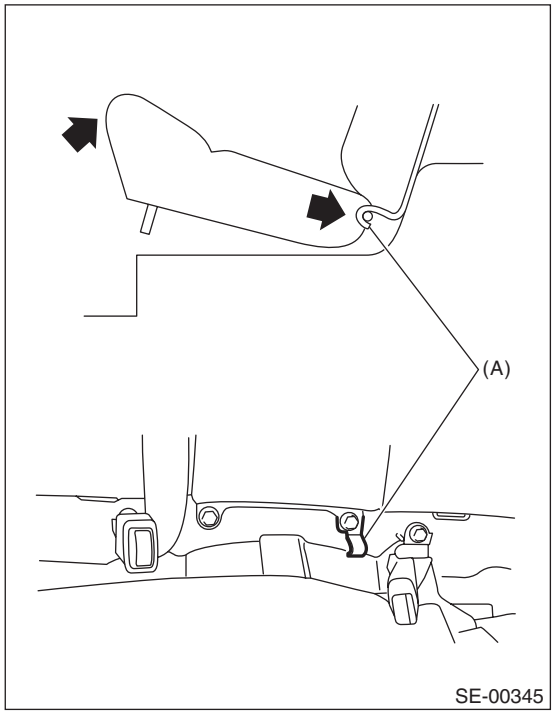
A: REMOVAL

1. SEDAN MODEL

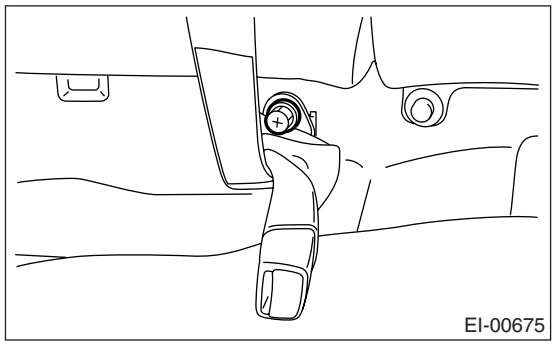
1) Remove the two hooks while lifting up the rear seat cushion.



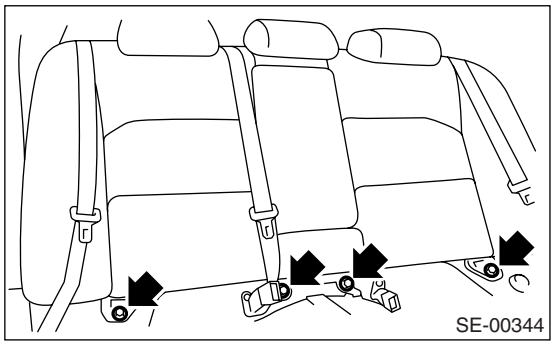
2) Remove the hook (A) by pushing it backward while lifting up the front side of seat cushion to detach seat cushion.



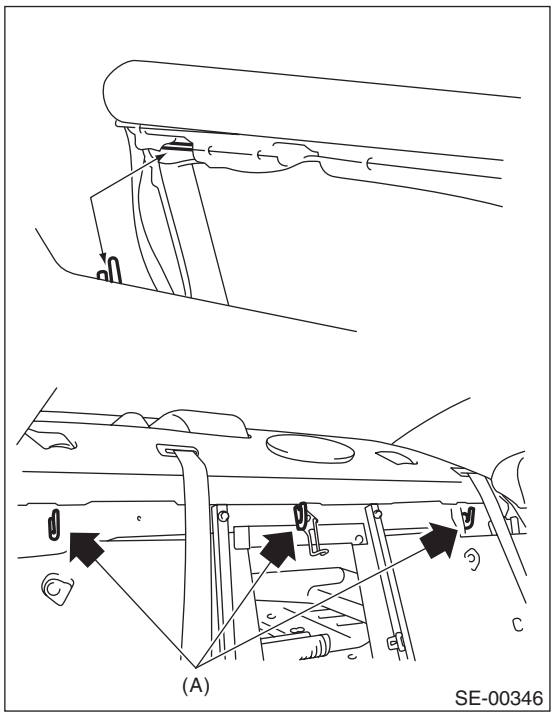
3) Remove the lower anchor bolt of rear center seat belt.



4) Remove the bolts which secure the bottom of backrest.

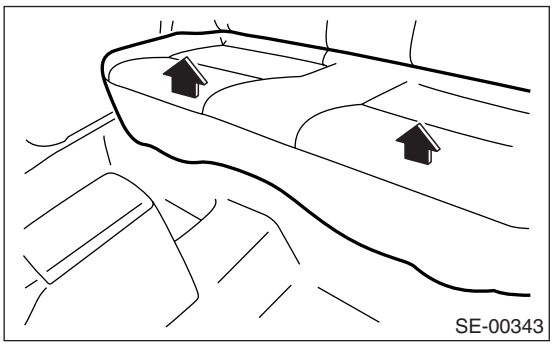


5) Remove the anchor part on backrest side from the hook on body side (A) while lifting up the backrest to detach it from vehicle.

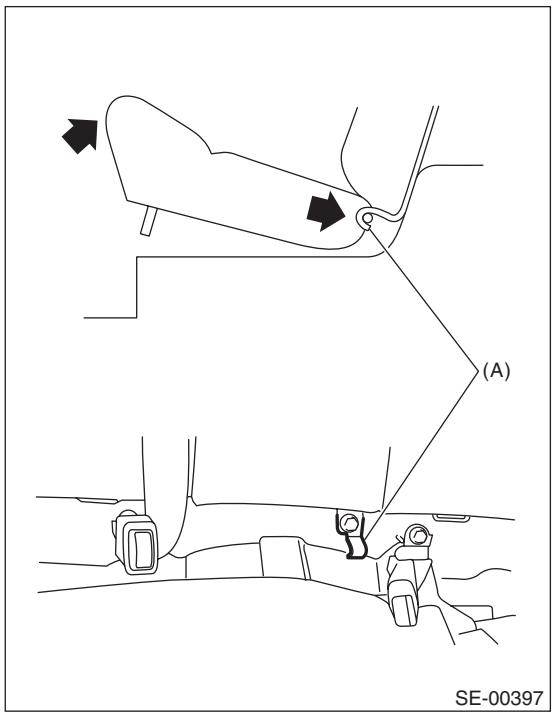


2. WAGON MODEL

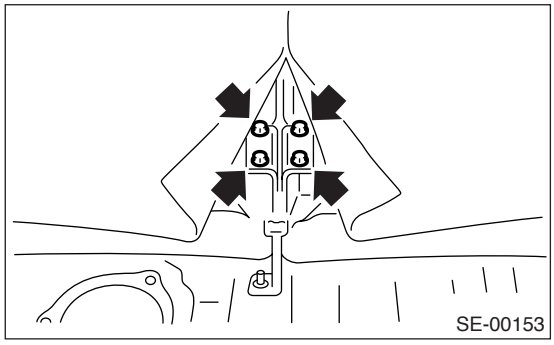
1) Disconnect the ground cable from battery.
2) Remove the two hooks while lifting up the rear seat cushion.



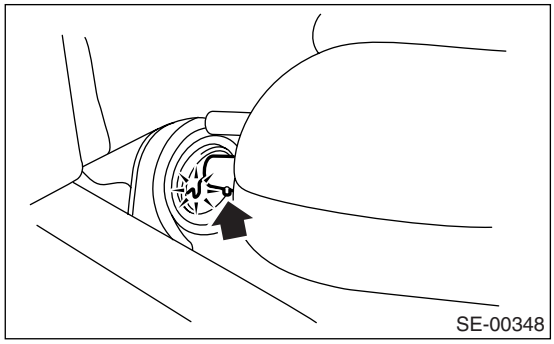
3) Remove the hook (A) by pushing it backward while lifting up the front side of seat cushion to detach seat cushion.



4) Remove the headrest, and then tilt the backrest forward.
5) Remove the luggage floor box. <Ref. to EI-74, REMOVAL, Luggage Floor Box.>
6) Remove the hinge assembly CTR bolts.

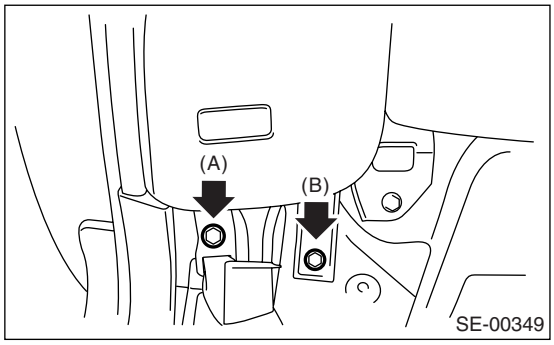


7) Remove the backrest from hinge assembly LH (hinge assembly RH).

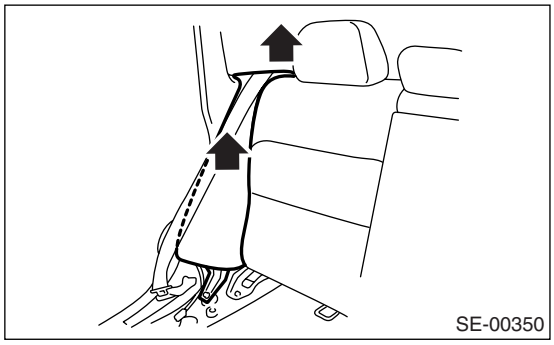


NOTE:
The backrest cannot be detached when the hinge assembly side does not mate with the backrest pin position.

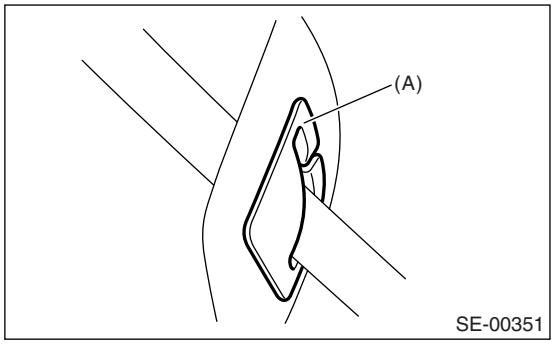
8) Remove the lower anchor bolt (A) of outer seat belt and backrest shoulder bolt (B).



9) Remove the backrest shoulder with lifting it up.



10) Remove the belt cover (A) from backrest shoulder cover, and then pull out the seat belt.



B: INSTALLATION

1. SEDAN MODEL

Install in the reverse order of removal.

NOTE:
• After installing the backrest, make sure that each seat belt operates normally.
• Make sure that they are secured on each hook of vehicle side.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-4, REAR SEAT (SEDAN MODEL), COMPONENT, General Description.>

2. WAGON MODEL

Install in the reverse order of removal.

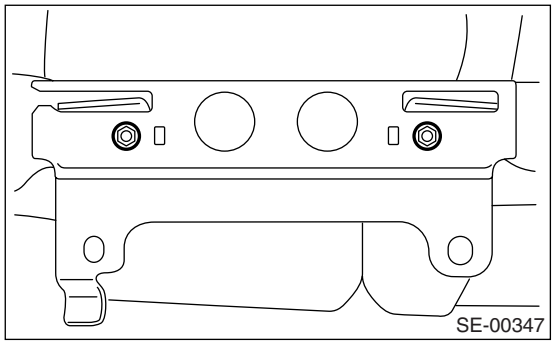
NOTE:
• After installing the backrest, make sure that each seat belt operates normally.
• Make sure that they are secured on each hook of vehicle side.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to SE-5, REAR SEAT (WAGON MODEL), COMPONENT, General Description.>

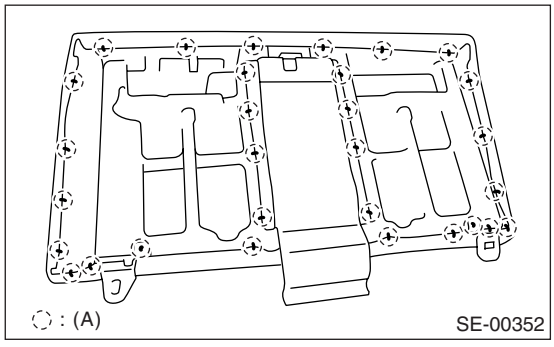
C: DISASSEMBLY

1. SEDAN MODEL

1) Remove the rear seat. <Ref. to SE-14, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove the headrest.
3) Remove the nuts, and then detach the trunk through assembly.

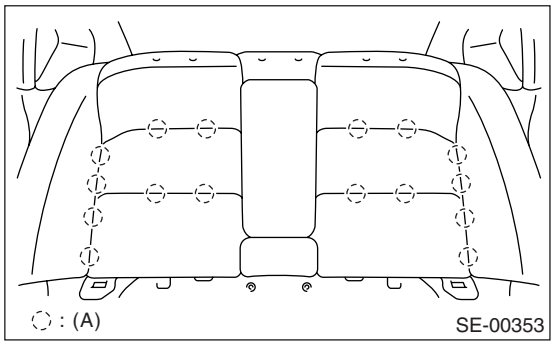

SE-00347

4) Remove the hog rings (A) on the rear side of backrest.



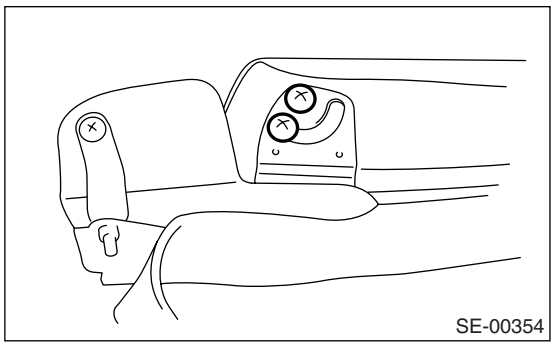
SE-00352

5) Remove the hog rings (A) on the front side of backrest.

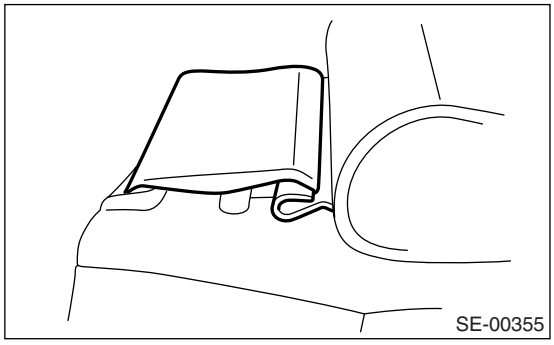


SE-00353

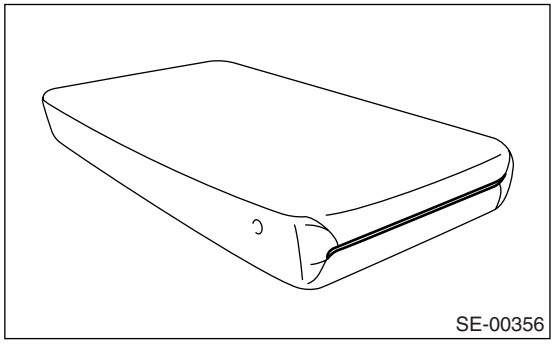
6) Remove both sides of armrest hinge covers, and loosen the screws to remove armrest.


SE-00354

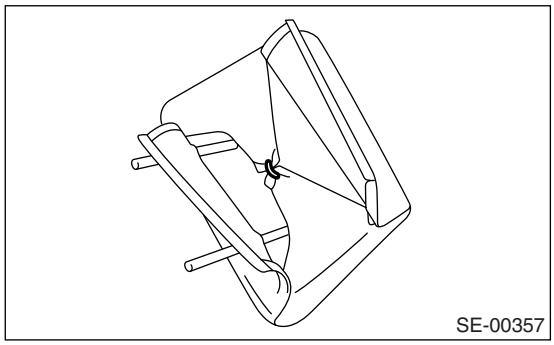
7) Remove the hook, and then detach the center through cover.


SE-00355

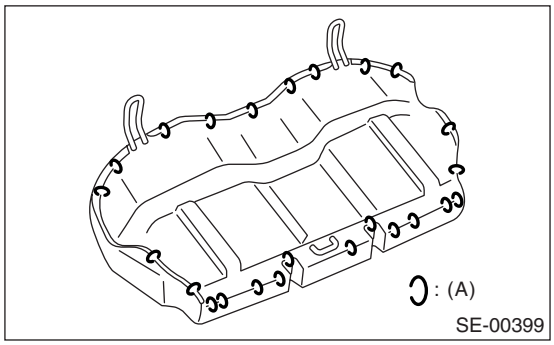
8) Remove the hook, and then remove the armrest cover.


SE-00356

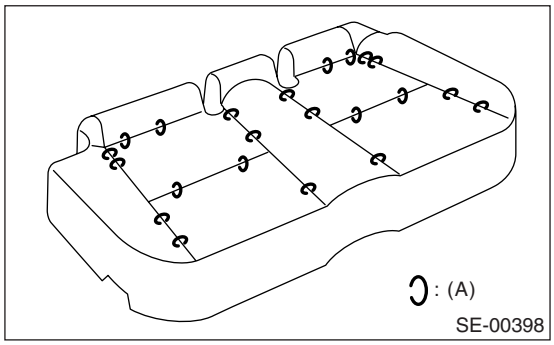
9) Remove the hook and hog ring, and then remove the headrest cover.



10) Remove the hog rings (A) on the rear side of seat cushion.



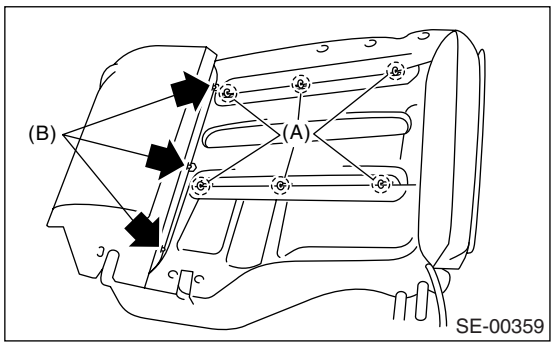
11) Remove the hog rings (A), and then remove the seat cushion cover.



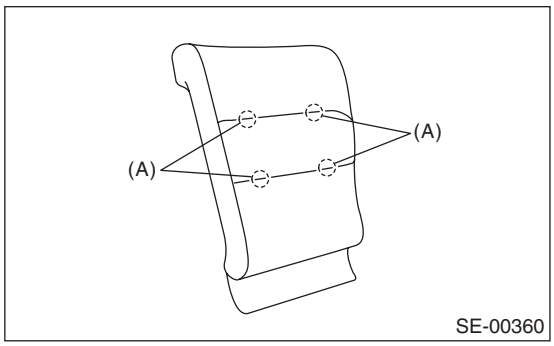
2. WAGON MODEL

1) Remove the rear seat. <Ref. to SE-14, WAGON MODEL, REMOVAL, Rear Seat.>

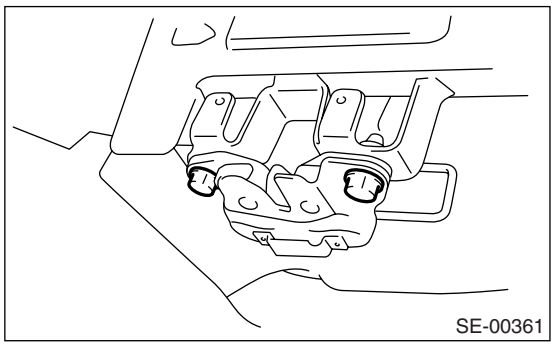
2) Remove the hooks at the bottom of backrest assembly LH, and then turn over the backrest cover to remove the hog rings (A) and hooks (B).



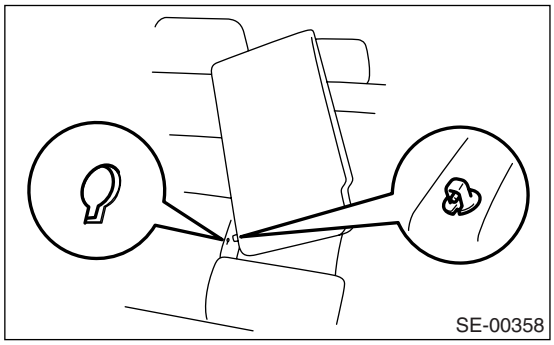
3) Remove the hog rings (A) on the front side of backrest, and then remove the backrest cover.



4) Remove the bolts, and then remove the backrest latch.

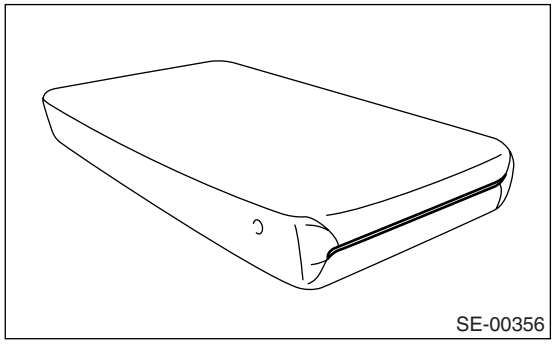


5) Loosen the screws to remove the armrest from backrest assembly RH.

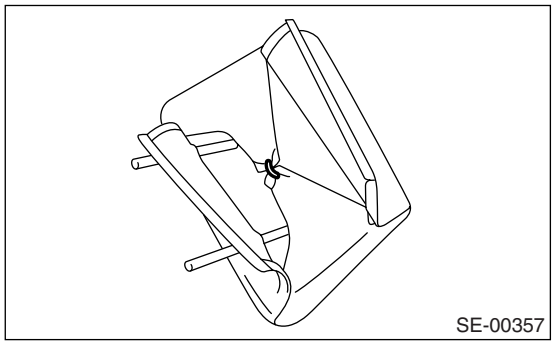


NOTE:
Armrest cannot be removed when backrest assembly RH side does not mate with armrest side pin position.

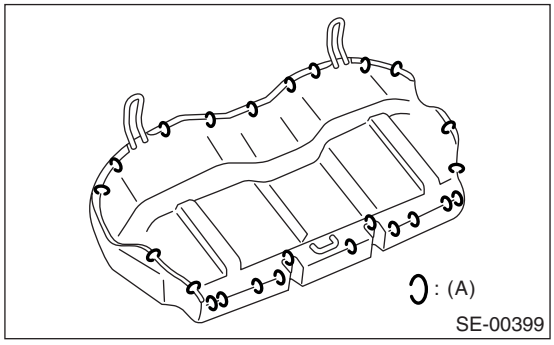
6) After this operation, refer to the step 2) to disassemble backrest assembly RH.
7) Remove the hook, and then remove the armrest cover.


SE-00356

8) Remove the hook and hog ring, and then remove the headrest cover.

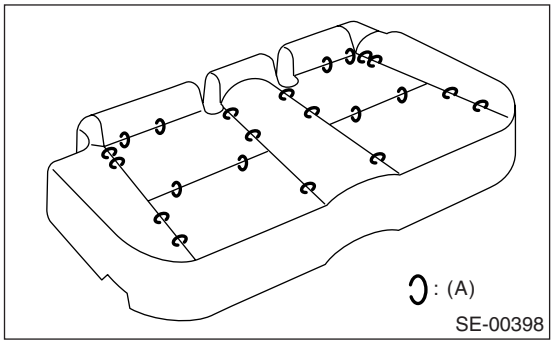

SE-00357

9) Remove the hog rings (A) on the rear side of seat cushion.



SE-00399

10) Remove the hog rings (A), and then remove the seat cushion cover.



SE-00398

D: ASSEMBLY

1. SEDAN MODEL

Assemble in the reverse order of disassembly.

NOTE:
• Do not contaminate or damage the cover.
• While installing the hog rings, prevent the seat from getting wrinkled.

CAUTION:
• Always use new hog rings.
• Secure the hog ring using hog ring pliers.
• Install the hog rings to the specified points securely and be sure to prevent backrest cover from wrinkle or twisting.

2. WAGON MODEL

Assemble in the reverse order of disassembly.

NOTE:
• Do not contaminate or damage the cover.
• While installing the hog rings, prevent the seat from getting wrinkled.

CAUTION:
• Always use new hog rings.
• Secure the hog ring using hog ring pliers.
• Install the hog rings to the specified points securely and be sure to prevent backrest cover from wrinkle or twisting.

E: INSPECTION

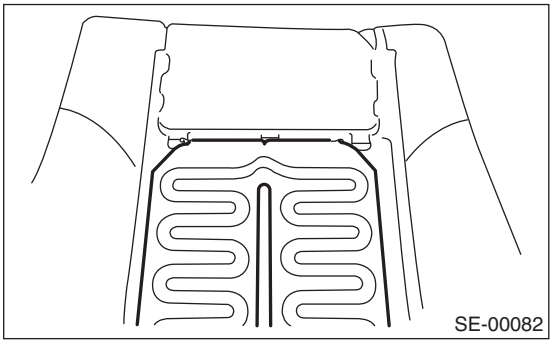
Check that no tear or fray on the seat cover.

4. Seat Heater System

A: REMOVAL

1. SEAT HEATER UNIT

1) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Remove the backrest cover and seat cushion cover of front seat. <Ref. to SE-7, DISASSEMBLY, Front Seat.>
3) Remove the hog ring, and then remove the seat heater unit.



2. SEAT HEATER SWITCH

1) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
2) Remove the seat heater switch from console box.

B: INSTALLATION

1. SEAT HEATER UNIT

Install in the reverse order of removal.

2. SEAT HEATER SWITCH

Install in the reverse order of removal.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

SECURITY AND LOCKS

SL

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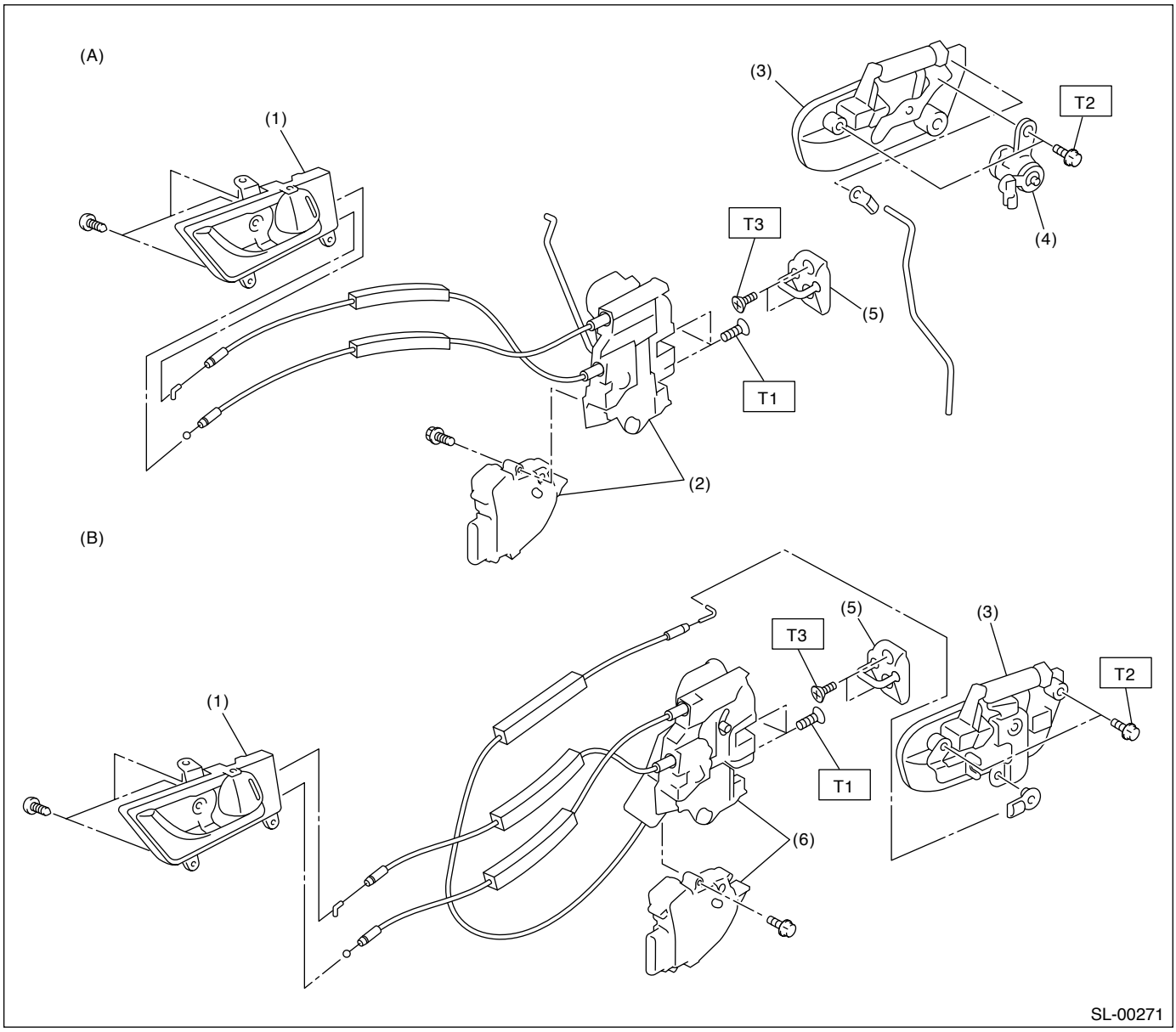
1. General Description

A: COMPONENT

1. DOOR LOCK ASSEMBLY

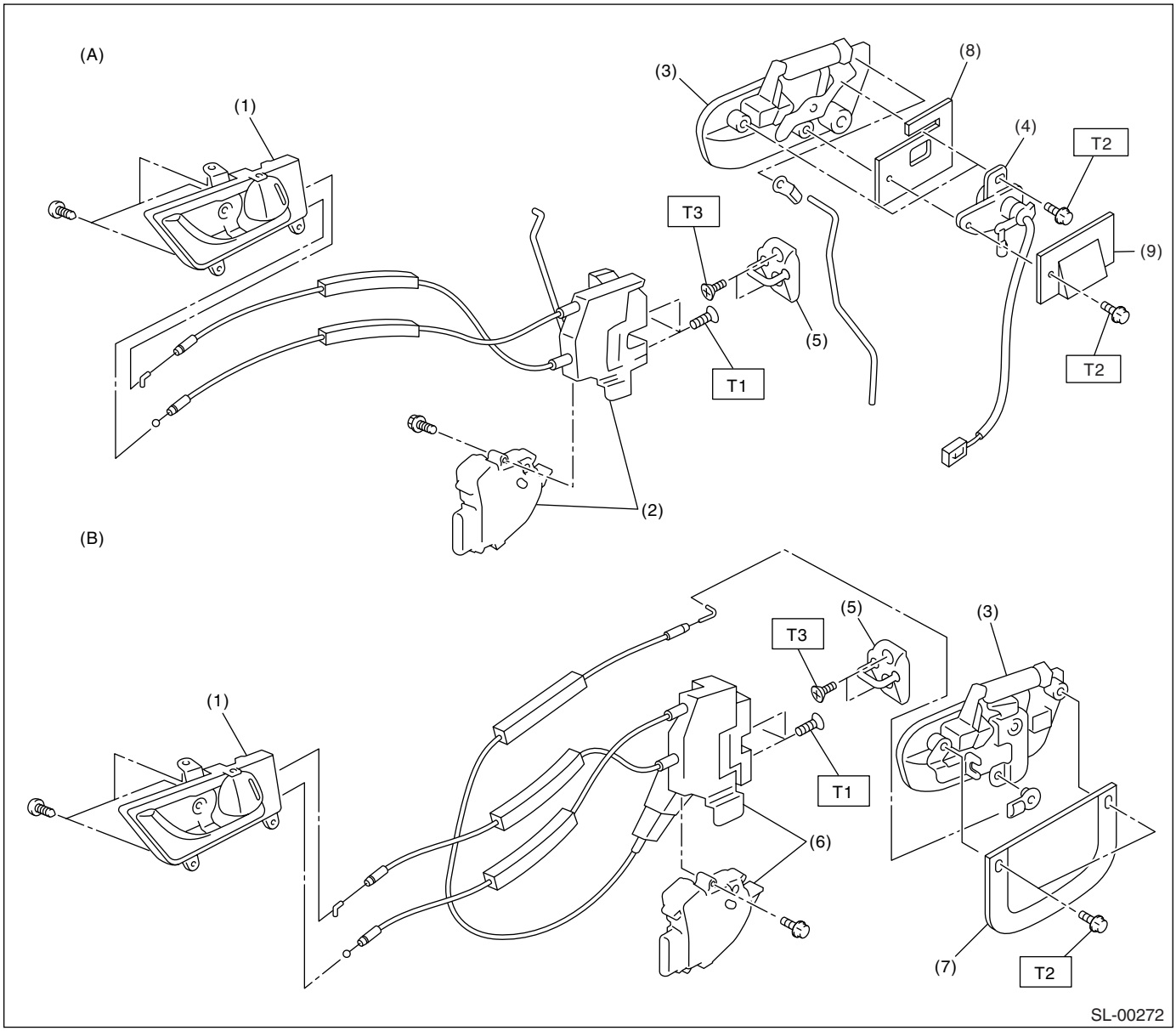
- Model without double lock



(A)	Front	(B)	Rear
(1)	Inner remote ASSY	(4)	Key cylinder
(2)	Front door latch & door lock actuator ASSY	(5)	Striker
(3)	Door outer handle	(6)	Rear door latch & door lock actuator ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 7.5 (0.76, 5.5)
T3: 18 (1.8, 13.3)

• Model with double lock



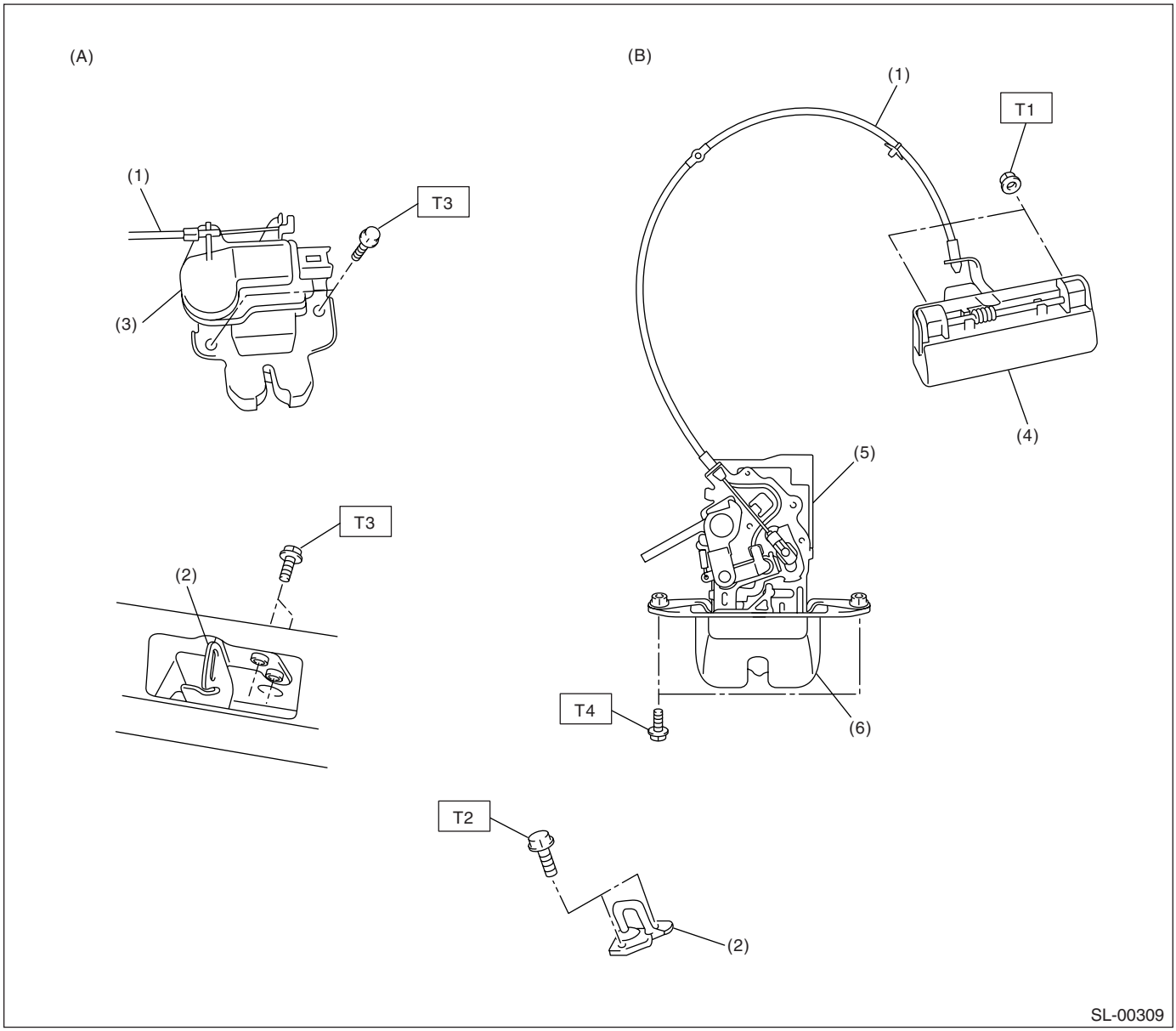
(A) Front
(B) Rear

(1) Inner remote ASSY
(2) Front door latch & door lock actuator ASSY
(3) Door outer handle
(4) Key cylinder (switch)
(5) Striker
(6) Rear door latch & door lock actuator ASSY
(7) Outer handle bracket
(8) Key cylinder cover A
(9) Key cylinder cover B

Tightening torque: N·m (kgf-m, ft-lb)
T1: 6.5 (0.66, 4.8)
T2: 7.5 (0.76, 5.5)
T3: 18 (1.8, 13.3)

2. TRUNK LID AND REAR GATE LOCK

• Model without double lock

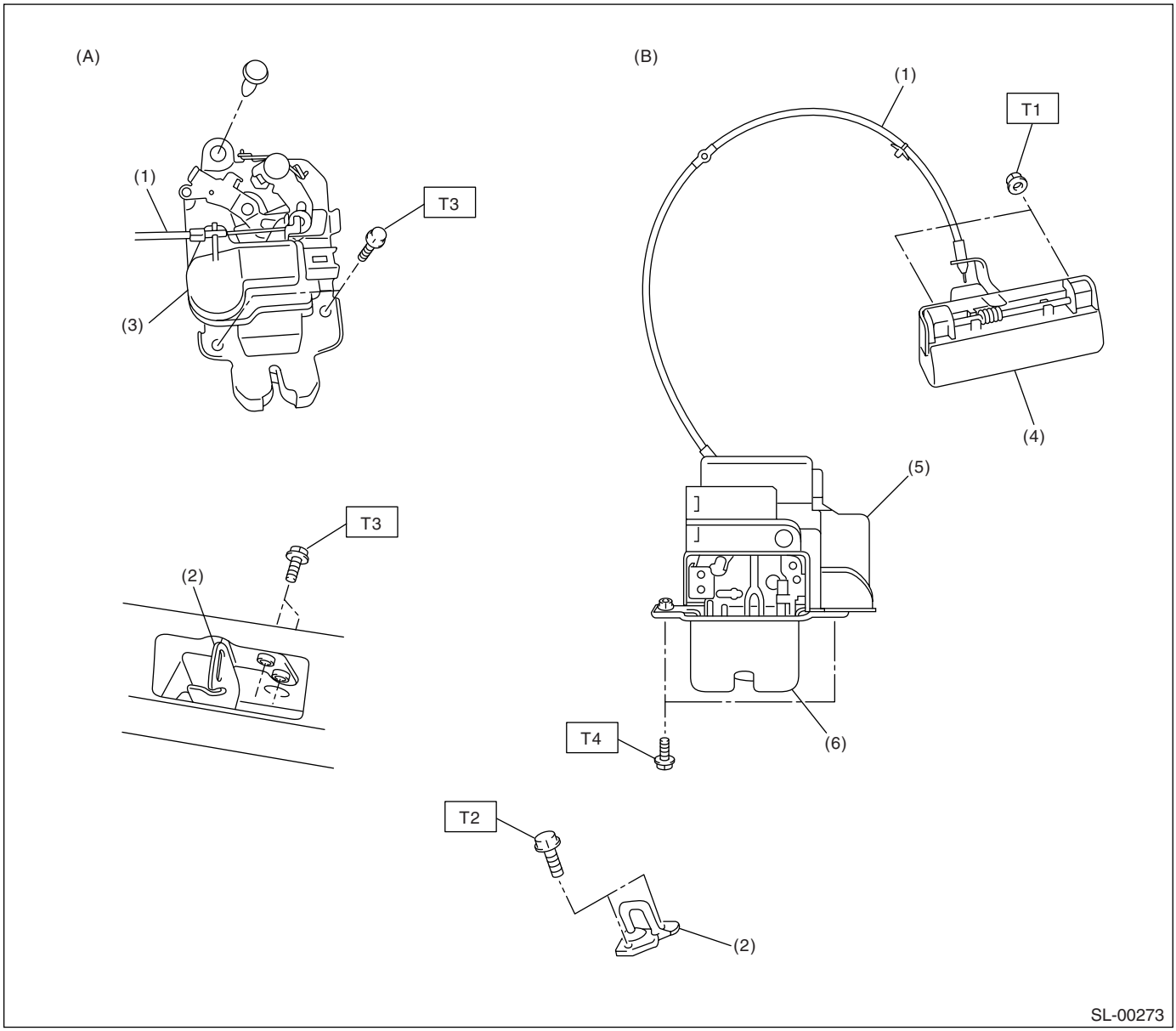


(A) Trunk
(B) Rear gate

(1) Cable
(2) Striker
(3) Trunk lid lock ASSY
(4) Rear gate outer handle
(5) Rear gate actuator
(6) Rear gate latch

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 25 (2.5, 18.4)
T3: 7.35 (0.75, 5.39)
T4: 18 (1.8, 13.3)

• Model with double lock



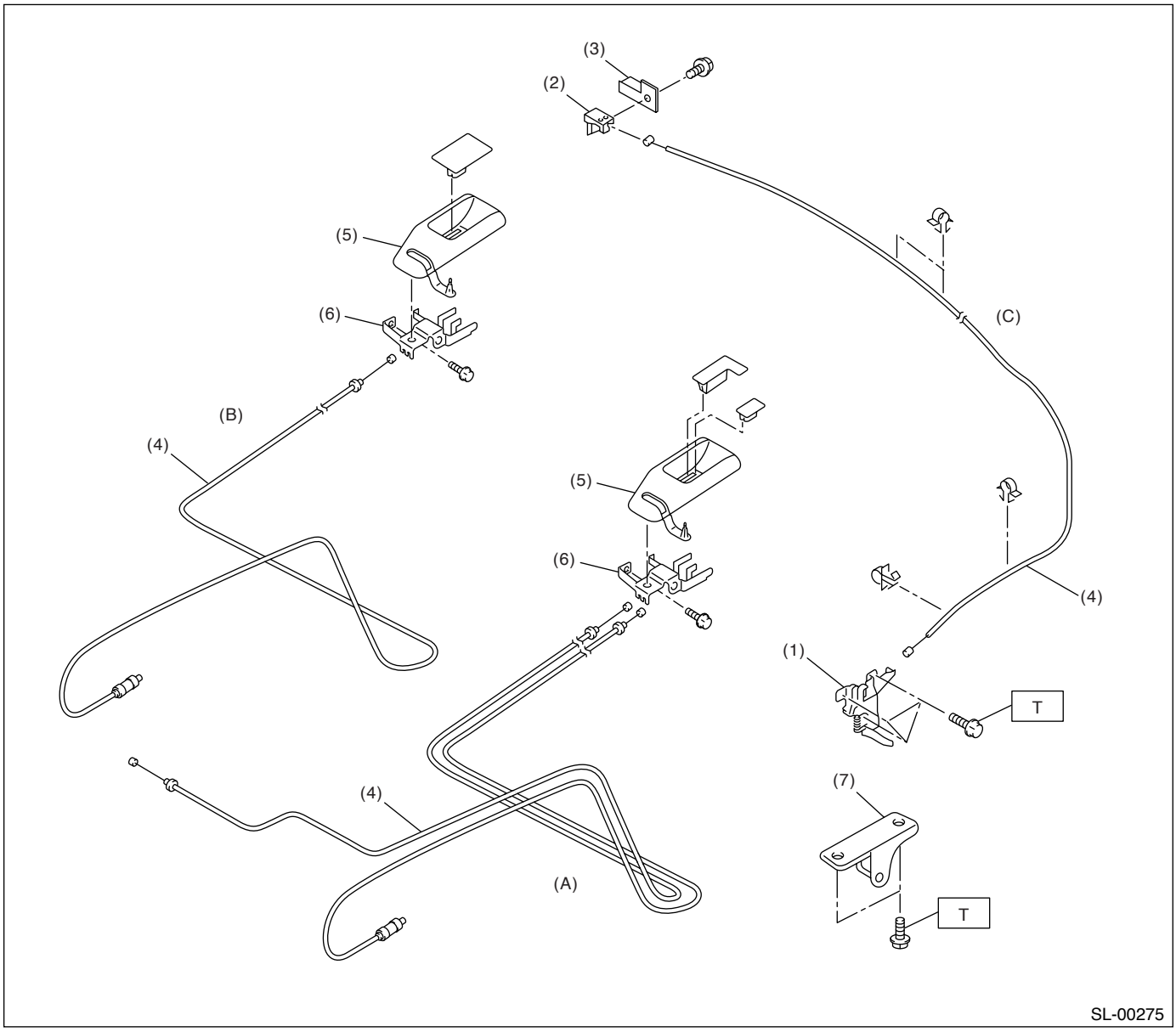
(A) Trunk

(B) Rear gate

(1) Cable
(2) Striker
(3) Trunk lid lock ASSY
(4) Rear gate outer handle
(5) Rear gate actuator
(6) Rear gate latch ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 25 (2.5, 18.4)
T3: 7.35 (0.75, 5.39)
T4: 18 (1.8, 13.3)

3. FRONT HOOD LOCK AND REMOTE OPENERS

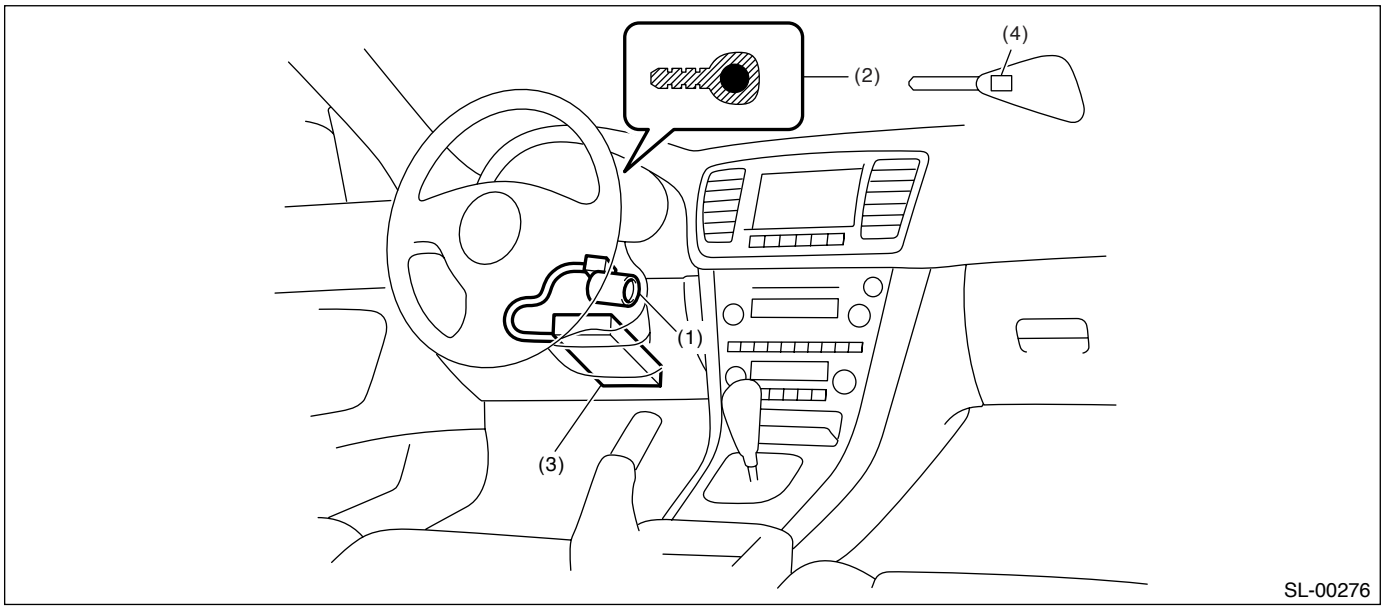


(A) Sedan model
(B) Wagon model
(C) Hood

(1) Front hood lock ASSY
(2) Lever ASSY
(3) Lever ASSY bracket
(4) Cable
(5) Cover
(6) Pull handle ASSY
(7) Striker

Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.36, 24.2)

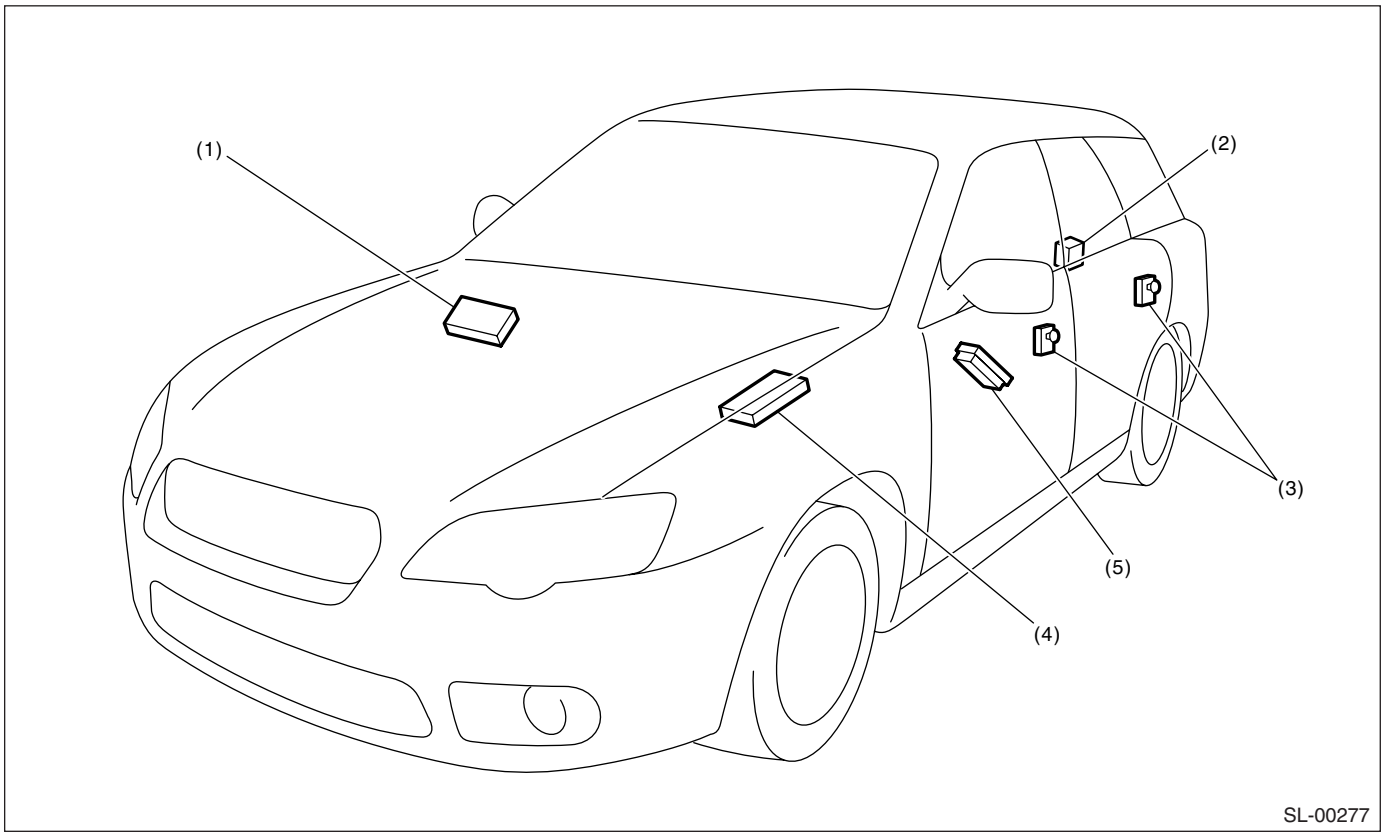
4. IMMOBILIZER SYSTEM



(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Body integrated unit
(4) Transponder

NOTE:
Body integrated unit location for RHD model is symmetrically opposite.

5. KEYLESS ENTRY SYSTEM



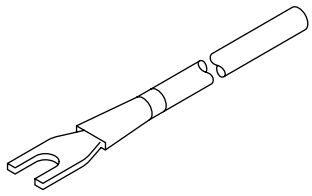
(1) Keyless Entry Control Module
(2) Rear gate latch switch (Wagon)
(3) Door switch
(4) Body integrated unit
(5) Power window main switch

B: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When repairing the audio, control module, etc. which are provided with memory functions, record the memory contents before disconnecting the ground cable from battery. Otherwise, these contents are erased upon disconnection.
• Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
• Adjust the parts to the specifications described in this manual if so designated.
• Connect the connectors securely during reassembly.
• After reassembly, ensure the functional parts operate smoothly.
• The air bag system wiring harness is routed near electrical parts and switches.
• All air bag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the ignition key cylinder.

C: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925580000	925580000	PULLER	Used for removing trim clip.

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.
Drill	Used for replacing ignition key lock.

2. Door Lock Control System

A: WIRING DIAGRAM

1. DOOR LOCK CONTROL

<Ref. to WI-248, WIRING DIAGRAM, Keyless Entry System.>

B: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
The door lock control system does not operate.	1. Check the fuse.	<Ref. to SL-11, CHECK FUSE, INSPECTION, Door Lock Control System.>
	2. Check the power supply and ground circuit for body integrated unit.	<Ref. to SL-11, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>
	3. Check the door lock switch and circuit.	<Ref. to SL-11, CHECK DOOR LOCK SWITCH, INSPECTION, Door Lock Control System.>
	4. Check the door lock actuator and circuit.	<Ref. to SL-12, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The door lock switch does not operate.	Check the door lock switch.	<Ref. to SL-11, CHECK DOOR LOCK SWITCH, INSPECTION, Door Lock Control System.>
A specific door lock actuator does not operate.	Check the door lock actuator and circuit.	<Ref. to SL-12, CHECK DOOR LOCK ACTUATOR AND CIRCUIT, INSPECTION, Door Lock Control System.>
The key cylinder lock switch does not operate. (Model with double lock)	Check the key cylinder lock switch and circuit.	<Ref. to SL-13, CHECK KEY CYLINDER LOCK SWITCH AND CIRCUIT, INSPECTION, Door Lock Control System.>
The double lock does not operate. (Model with double lock)	Check the door lock actuator (double lock) and circuit.	<Ref. to SL-14, CHECK DOOR LOCK ACTUATOR (DOUBLE LOCK) AND CIRCUIT, INSPECTION, Door Lock Control System.>

2. CHECK FUSE

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 3 (in the fuse and relay box) and No. 7 (in the fuse and relay box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-11, CHECK POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Door Lock Control System.>

3. CHECK POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 34 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short circuit between body integrated unit and fuse.
2	**CHECK GROUND CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, 9, 22 — Chassis ground:***	Is the resistance less than 10 Ω?	The power supply and ground circuit are OK.	Repair the harness.

4. CHECK DOOR LOCK SWITCH

	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH.** Check the input from door lock switch to body integrated unit using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {body integrated unit} from main menu. 4) Select {Current Data Display & Save}. 5) Check the input to body integrated unit by operating the door lock switch.	Is the normal input signal displayed when the door lock switch is moved to LOCK/UNLOCK?	The door lock switch is OK.	Go to step **2.**
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the body integrated unit harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 15 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Go to step **4.**

	Step	Check	Yes	No
3	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***(i84) No. 29 — Chassis ground:***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **4.**
4	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 4 — No. 7:*** ***RHD model:*** ***(D7) No. 4 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **5.**	Replace the door lock switch.
5	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 5 — No. 7:*** ***RHD model:*** ***(D7) No. 5 — No. 14:***	Is the resistance less than 1 Ω?	Check the harness for open circuits or shorts between the body integrated unit and the door lock switch.	Replace the door lock switch.

5. CHECK DOOR LOCK ACTUATOR AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground of body integrated unit when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
2	**CHECK OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal and chassis ground of body integrated unit when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***(i84) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
3	**CHECK POWER WINDOW MAIN SWITCH OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal of power window main switch and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***(D7) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Replace the power window main switch. <Ref. to GW-9, Power Window Control Switch.>

	Step	Check	Yes	No
4	**CHECK POWER WINDOW MAIN SWITCH OUTPUT SIGNAL.** Measure the voltage between the harness connector terminal of power window main switch and chassis ground when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***(D7) No. 5 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **5.**	Replace the power window main switch. <Ref. to GW-9, Power Window Control Switch.>
5	**CHECK DOOR LOCK ACTUATOR.** Check the door lock actuator. • Front Door Lock Actuator <Ref. to SL-31, Front Door Lock Actuator.> • Rear Door Lock Actuator <Ref. to SL-35, Rear Door Lock Actuator.> • Rear Gate Latch Lock Actuator <Ref. to SL-37, Rear Gate Latch Assembly.>	Is the door lock actuator OK?	Check the harness for open or short circuit between body integrated unit and door lock actuator.	Replace the door lock actuator.

6. CHECK KEY CYLINDER LOCK SWITCH AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK KEY CYLINDER LOCK SWITCH CIRCUIT.** 1) Disconnect the body integrated unit harness connector. 2) Measure the resistance between harness connector terminal and chassis ground when turning the key cylinder lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 3 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **2.**	Go to step **3.**
2	**CHECK KEY CYLINDER LOCK SWITCH CIRCUIT.** Measure the resistance between harness connector terminal and chassis ground when turning the key cylinder lock switch to UNLOCK. ***Connector & terminal*** ***(i84) No. 12 — Chassis ground:***	Is the resistance less than 10 Ω?	Key cylinder lock switch is OK.	Go to step **3.**
3	**CHECK KEY CYLINDER LOCK SWITCH.** 1) Disconnect the key cylinder lock switch connector. 2) Measure the resistance between key cylinder lock switch terminals when turning the key cylinder lock switch to LOCK. ***Terminals*** ***No. 1 — No. 2***	Is the resistance less than 1 Ω?	Go to step **4.**	Replace the key cylinder lock switch.
4	**CHECK KEY CYLINDER LOCK SWITCH.** Measure the resistance between key cylinder lock switch terminals when turning the key cylinder lock switch to UNLOCK. ***Terminals*** ***No. 2 — No. 3***	Is the resistance less than 1 Ω?	Check the harness for open or short circuits between body integrated unit and key cylinder lock switch.	Replace the key cylinder lock switch.

7. CHECK DOOR LOCK ACTUATOR (DOUBLE LOCK) AND CIRCUIT

	Step	Check	Yes	No
1	**CHECK OUTPUT SIGNAL.** Measure the resistance between body integrated unit harness connector terminal and chassis ground when turning the key cylinder lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 35 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Replace the body integrated unit.
2	**CHECK OUTPUT SIGNAL.** Measure the resistance between body integrated unit harness connector terminal and chassis ground when turning the key cylinder lock switch to UNLOCK. ***Connector & terminal*** ***(i84) No. 35 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Replace the body integrated unit.
3	**CHECK DOOR LOCK ACTUATOR.** Check the door lock actuator. Front door lock actuator: <Ref. to SL-31, Front Door Lock Actuator.> Rear door lock actuator: <Ref. to SL-35, Rear Door Lock Actuator.>	Is the door lock actuator normal?	Check the harness for open or short circuits between body integrated unit and door lock actuator.	Replace the door lock actuator.

3. Keyless Entry System

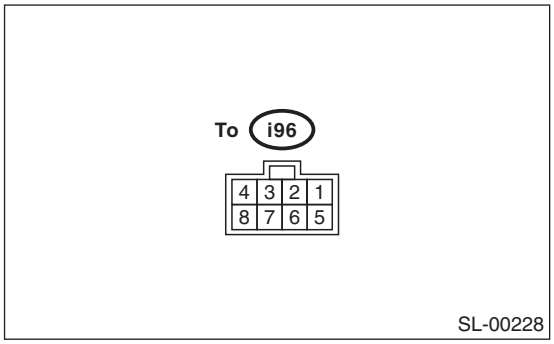
A: WIRING DIAGRAM

1. KEYLESS ENTRY

<Ref. to WI-248, WIRING DIAGRAM, Keyless Entry System.>

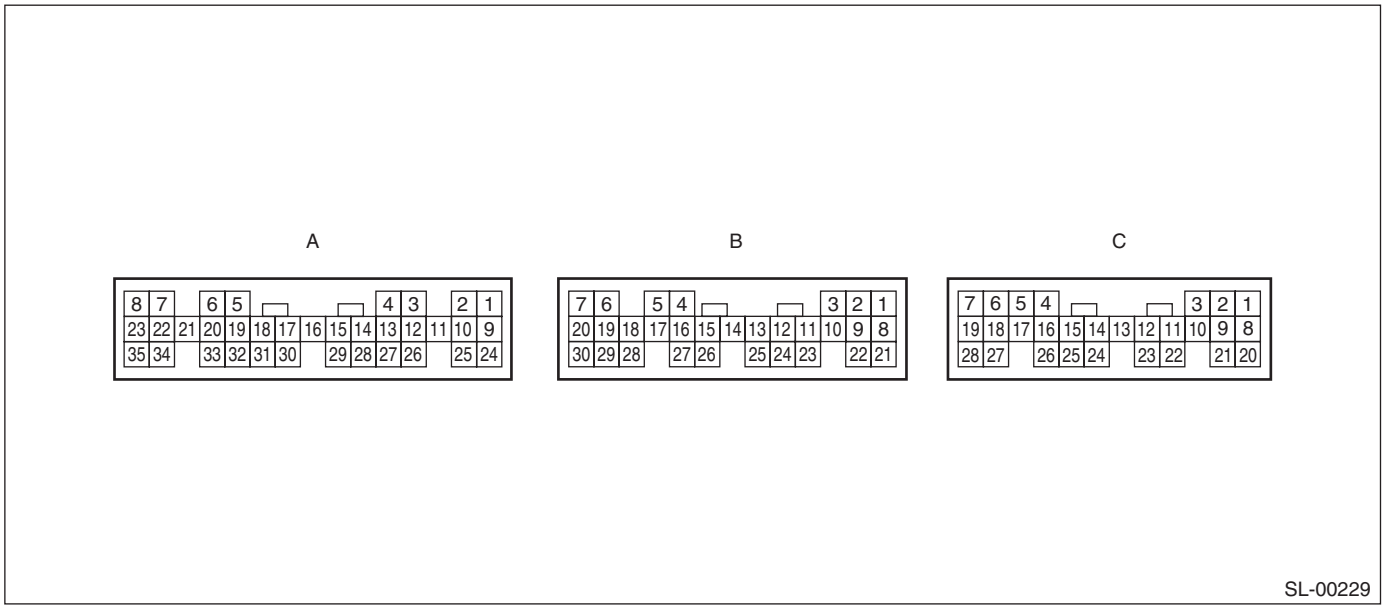
B: ELECTRICAL SPECIFICATION

1. KEYLESS ENTRY CONTROL UNIT



Remarks	Terminal No.	Measuring conditions
Body integrated unit	3 (OUTPUT)	Battery voltage cannot be measured because of digital signal.
Power supply (Backup)	4	Battery voltage is constantly present.
Ground	7	0 V is constantly present.

2. BODY INTEGRATED UNIT



Remarks	Terminal No.	Measuring conditions
Ignition switch (ON)	A1 (INPUT)	Battery voltage is present when ignition switch is turned ON.
Door and rear gate lock actuator (Model without double lock) Front double lock actuator RH, door and rear gate lock actuator (Model with double lock)	A7 (OUTPUT)	Battery voltage is present when pressing the LOCK button of keyless transmitter.
Door and rear gate lock actuator	A8 (OUTPUT)	Battery voltage is present when pressing the UNLOCK button of keyless transmitter.
Keyless entry control module	A9 (INPUT)	Communication line (Cannot be measured because of digital signal)
Double lock condition detecting switch (Model with double lock)	A16 (OUTPUT)	Battery voltage is present when pressing the LOCK button of keyless transmitter.
Trunk lid switch or rear gate latch switch	A17 (INPUT)	0 V is present when opening the trunk lid or rear gate.
Rear door switch RH	A18 (INPUT)	0 V is present when opening the rear door RH.
Front door switch RH	A19 (INPUT)	0 V is present when opening the front door RH.
Ground	A21	0 V is constantly present.
Trunk lid actuator	A22 (OUTPUT)	Battery voltage is present when pressing the TRUNK button of keyless transmitter.
Front door actuator driver's side (Model without double lock)	A23 (OUTPUT)	Battery voltage is present when pressing the UNLOCK button of keyless transmitter.
Power window main switch (door lock switch)	A26	CAN communication line (Cannot be measured because of digital signal)
	A27	
Rear door switch LH	A31 (INPUT)	0 V is present when opening the rear door LH.
Front door switch LH	A32 (INPUT)	0 V is present when opening the front door LH.
Power supply	A34	Battery voltage is constantly present.
Front double lock actuator RH (Model with double lock)	A35 (OUTPUT)	Battery voltage is present when pressing the LOCK button of keyless transmitter.
Room light	B3 (INPUT)	• 0 V is present when pressing the UNLOCK button of keyless transmitter. • 0 V is present when opening the door.
Power supply	B7	Battery voltage is constantly present.
Turn signal & hazard circuit	B12 (OUTPUT)	Battery voltage is present when pressing the LOCK button or UNLOCK button of keyless transmitter.
Ground	B22	0 V is constantly present.

Remarks	Terminal No.	Measuring conditions
Power supply	C1	Battery voltage is constantly present.
Power supply	C2	Battery voltage is constantly present.
Key warning switch	C7 (INPUT)	Battery voltage is present when inserting the key into ignition switch.
Ground	C8	0 V is constantly present.
Ground	C9	0 V is constantly present.
Registration connector	C22	0 V is present when connecting the registration connector.

C: INSPECTION

1. SYMPTOM CHART

Symptom	Repair order	Reference
None of the functions of keyless entry system operate.	1. Check the keyless transmitter battery.	<Ref. to SL-20, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the fuse.	<Ref. to SL-21, CHECK FUSE, INSPECTION, Keyless Entry System.>
	3. Check the keyless entry control module.	<Ref. to SL-21, CHECK KEYLESS ENTRY CONTROL MODULE, INSPECTION, Keyless Entry System.>
	4. Check the power supply and ground circuit for the body integrated unit.	<Ref. to SL-22, CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>
	5. Check the key warning switch.	<Ref. to SL-24, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	6. Check the door switch.	<Ref. to SL-23, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	7. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
The keyless transmitter cannot be registered.	1. Check the keyless transmitter battery.	<Ref. to SL-20, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check registration connector circuit.	<Ref. to SL-22, CHECK REGISTRATION CONNECTOR., INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-24, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door lock switch signal.	<Ref. to SL-26, CHECK DOOR LOCK SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Door lock or unlock does not operate. NOTE: If the door lock control system does not operate when using the door lock switch, check the door lock control system. <Ref. to SL-10, INSPECTION, Door Lock Control System.>	1. Check the keyless transmitter battery.	<Ref. to SL-20, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the keyless entry control module.	<Ref. to SL-21, CHECK KEYLESS ENTRY CONTROL MODULE, INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-24, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the door switch.	<Ref. to SL-23, CHECK DOOR SWITCH, INSPECTION, Keyless Entry System.>
	5. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

Symptom	Repair order	Reference
Trunk lid unlock does not operate. (Sedan model)	1. Check the keyless transmitter battery.	<Ref. to SL-20, CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION, INSPECTION, Keyless Entry System.>
	2. Check the keyless entry control module.	<Ref. to SL-21, CHECK KEYLESS ENTRY CONTROL MODULE, INSPECTION, Keyless Entry System.>
	3. Check the key warning switch.	<Ref. to SL-24, CHECK KEY WARNING SWITCH, INSPECTION, Keyless Entry System.>
	4. Check the trunk lid lock actuator.	<Ref. to SL-25, CHECK TRUNK LID LOCK ACTUATOR, INSPECTION, Keyless Entry System.>
	5. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Hazard light does not operate.	1. Check the hazard light operation.	<Ref. to SL-25, CHECK HAZARD LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Room light does not operate.	1. Check the room light operation.	<Ref. to SL-24, CHECK ROOM LIGHT OPERATION, INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
Ignition switch illumination does not operate.	1. Check the ignition switch illumination.	<Ref. to SL-27, CHECK IGNITION SWITCH ILLUMINATION, INSPECTION, Keyless Entry System.>
	2. Check the body integrated unit.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

2. CHECK KEYLESS TRANSMITTER BATTERY AND FUNCTION

	Step	Check	Yes	No
1	**CHECK KEYLESS TRANSMITTER BATTERY.** 1) Remove the battery from keyless transmitter. <Ref. to SL-47, REMOVAL, Keyless Transmitter.> 2) Check the battery voltage. <Ref. to SL-47, INSPECTION, Keyless Transmitter.>	Is the voltage more than 2 V?	Go to step **2.**	Replace the keyless transmitter battery. <Ref. to SL-47, Keyless Transmitter.>
2	**CHECK KEYLESS TRANSMITTER.** Register the keyless transmitter which operates normally on other vehicles to inspection target vehicle. <Ref. to SL-47, REGISTRATION OF KEYLESS TRANSMITTER, REPLACEMENT, Keyless Transmitter.> 1) Close all the doors and rear gate of inspection target vehicle. 2) Using keyless transmitter, lock and unlock the doors and rear gate of inspection target vehicle.	Is the inspection target vehicle operates lock and unlock normally?	Go to step **3.**	Due to vehicle malfunction, continue the keyless entry system diagnosis.
3	**CHECK KEYLESS TRANSMITTER.** Register the keyless transmitter of inspection target vehicle to another vehicle which operates keyless system normally. <Ref. to SL-47, REGISTRATION OF KEYLESS TRANSMITTER, REPLACEMENT, Keyless Transmitter.>	Is the keyless transmitter registered correctly?	Go to step **4.**	Replace the keyless transmitter. <Ref. to SL-47, REGISTRATION OF KEYLESS TRANSMITTER, REPLACEMENT, Keyless Transmitter.>
4	**CHECK KEYLESS TRANSMITTER.** Check the registered keyless transmitter. 1) Close all the doors and rear gate of the vehicle which operates keyless system normally. 2) Using keyless transmitter, lock and unlock the doors and rear gate of vehicle.	Is the vehicle operates lock and unlock normally?	Keyless transmitter is normal.	Replace the keyless transmitter. <Ref. to SL-47, REGISTRATION OF KEYLESS TRANSMITTER, REPLACEMENT, Keyless Transmitter.>

CAUTION:
Be sure to reset the keyless transmitter, which is registered from other vehicle to inspection target vehicle, and the vehicle, to which is registered keyless transmitter, to the condition of before inspection. (Register the keyless transmitter to original condition.)

3. CHECK FUSE

Step		Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 3 (in the fuse and relay box) and No. 7 (in the fuse and relay box).	Is the fuse blown out?	Replace the fuse with a new one.	Check the power supply and ground circuit. <Ref. to SL-22, CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT, INSPECTION, Keyless Entry System.>

4. CHECK KEYLESS ENTRY CONTROL MODULE

Step		Check	Yes	No
1	**CHECK DIAGNOSTIC TROUBLE CODE (DTC)** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body integrated unit} from main menu. 4) Select the {Diagnostic Trouble Code}. 5) Check that the DTC is displayed.	Is DTC B0500 “Keyless UART com. Malfunction” displayed?	Go to step **2.**	Keyless entry control module is normal.
2	**CHECK POWER SUPPLY.** 1) Disconnect the keyless entry control module harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(i96) No. 4 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open circuits and shorts between the keyless entry control module and fuse.
3	**CHECK GROUND CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(i96) No. 7 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the harness.
4	**CHECK KEYLESS ENTRY CONTROL MODULE CIRCUIT.** 1) Disconnect harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(i84) No. 9 — (i96) No. 3:***	Is the resistance less than 10 Ω?	Replace the keyless entry control module. <Ref. to SL-45, Keyless Entry Control Unit.>	Repair the harness.

5. CHECK BODY INTEGRATED UNIT POWER SUPPLY AND GROUND CIRCUIT

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY OF BODY INTEGRATED UNIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (–):*** ***(B281) No. 2 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short between body integrated unit and fuse.
2	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8 — Chassis ground:*** ***(B281) No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

6. CHECK REGISTRATION CONNECTOR.

	Step	Check	Yes	No
1	**CHECK REGISTRATION CONNECTOR INPUT VOLTAGE.** 1) Disconnect the registration connector. 2) Measure the voltage between the body integrated unit harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 22 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Go to step **2.**	Repair the harness.
2	**CHECK REGISTRATION CONNECTOR INPUT VOLTAGE.** 1) Connect the registration connector. 2) Measure the voltage between the body integrated unit harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 22 (+) — Chassis ground (–):***	Is the voltage 0 V?	Registration connector circuit is OK.	Repair the harness.

7. CHECK DOOR SWITCH

	Step	Check	Yes	No
1	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***Front door RH:*** ***(i84) No. 19 (+) — Chassis ground (−):*** ***Front door LH:*** ***(i84) No. 32 (+) — Chassis ground (−):*** ***Rear door RH:*** ***(i84) No. 18 (+) — Chassis ground (−):*** ***Rear door LH:*** ***(i84) No. 31 (+) — Chassis ground (−):*** ***Rear gate:*** ***(i84) No. 17 (+) — Chassis ground (−):***	Is the voltage 0 V when each door or rear gate is opened?	Go to step **2.**	Go to step **3.**
2	**CHECK DOOR SWITCH CIRCUIT.** Measure the voltage between the body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***Front door RH:*** ***(i84) No. 19 (+) — Chassis ground (−):*** ***Front door LH:*** ***(i84) No. 32 (+) — Chassis ground (−):*** ***Rear door RH:*** ***(i84) No. 18 (+) — Chassis ground (−):*** ***Rear door LH:*** ***(i84) No. 31 (+) — Chassis ground (−):*** ***Rear gate:*** ***(i84) No. 17 (+) — Chassis ground (−):***	Is the voltage more than 10 V when each door or rear gate is closed?	The door switch is OK.	Go to step **3.**
3	**CHECK DOOR SWITCH.** 1) Disconnect the door switch harness connector. 2) Measure the resistance between door switch terminals. ***Connector & terminal*** ***(R12) Front RH door switch:*** ***(R9) Front LH door switch:*** ***(R16) Rear RH door switch:*** ***(R22) Rear LH door switch:*** ***No. 1 — No. 3:*** ***Rear gate latch switch (Wagon model):*** ***(D46) No. 1 — No. 2:***	Is the resistance more than 1 MΩ when door switch is pushed?	Go to step **4.**	Replace the door switch.
4	**CHECK DOOR SWITCH.** Measure the resistance between door switch terminals. ***Connector & terminal*** ***(R12) Front RH door switch:*** ***(R9) Front LH door switch:*** ***(R16) Rear RH door switch:*** ***(R22) Rear LH door switch:*** ***No. 1 — No. 3:*** ***Rear gate latch switch (Wagon model):*** ***(D46) No. 1 — No. 2:***	Is the resistance less than 1 Ω when door switch is released?	Check the harness for open or short between body integrated unit and door switch.	Replace the door switch.

8. CHECK KEY WARNING SWITCH

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Go to step **2.**
2	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Disconnect the harness connector of body integrated unit. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Go to step **4.**
3	**CHECK KEY WARNING SWITCH CIRCUIT.** 1) Remove the key from ignition switch. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B281) No. 7 (+) — Chassis ground (−):***	Is the voltage 0 V?	The key warning switch is OK.	Go to step **4.**
4	**CHECK KEY WARNING SWITCH.** 1) Disconnect the key warning switch harness connector. 2) Insert the key into ignition switch. (LOCK position) 3) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***(B350) No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **5.**	Replace the key warning switch.
5	**CHECK KEY WARNING SWITCH.** 1) Remove the key from ignition switch. 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***(B350) No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Check the following: • Harness for open circuits and shorts between the key warning switch and fuse • Harness for open or short between the body integrated unit and key warning switch	Replace the key warning switch.

9. CHECK ROOM LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK ROOM LIGHT OPERATION.** Make sure the room light illuminates when the room light switch is turned to ON.	Does the room light illuminate?	Go to step **2.**	Check the room light circuit.
2	**CHECK HARNESS BETWEEN ROOM LIGHT AND BODY INTEGRATED UNIT.** 1) Disconnect the body integrated unit harness connector and room light harness connector. 2) Measure the resistance between the body integrated unit harness connector terminal and room light harness connector terminal. ***Connector & terminal*** ***(B280) No. 3 — (R52) No. 2:***	Is the resistance less than 10 Ω?	The room light operation circuit is OK.	Check the harness for open or short between body integrated unit and room light.

10.CHECK HAZARD LIGHT OPERATION

	Step	Check	Yes	No
1	**CHECK HAZARD LIGHT OPERATION.** Make sure the hazard light blinks when hazard switch is turned to ON.	Does the hazard light blink?	Go to step **2.**	Check the hazard light circuit.
2	**CHECK OUTPUT TO HAZARD LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Select {Body integrated unit} from main menu. 6) Select {ECM customizing}. 7) Check {Hazard answer-back setup}, and then switch to ON setting if necessary. 8) Select {Current Data Display & Save}. 9) When operating the LOCK/UNLOCK button of keyless transmitter, check the hazard output signal of body integrated unit.	Is output signal present when operating the keyless transmitter LOCK/UNLOCK button?	Go to step **3.**	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
3	**CHECK CIRCUIT OF HAZARD LIGHT.** 1) Disconnect the harness connector of body integrated unit. 2) Disconnect the turn signal & hazard unit harness connector. 3) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 12 — (B32) No. 8:***	Is the resistance less than 10 Ω?	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Repair the harness.

11.CHECK TRUNK LID LOCK ACTUATOR

	Step	Check	Yes	No
1	**CHECK TRUNK LID LOCK ACTUATOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the key warning switch harness connector. 3) Connect the Subaru Select Monitor to data link connector. 4) Turn the ignition switch to ON. 5) Select {Body integrated unit} from main menu. 6) Select {Current Data Display & Save}. 7) When operating the TRUNK button of keyless transmitter, check the trunk unlock output signal of body integrated unit.	Is output signal present when operating the keyless transmitter TRUNK button?	Go to step **2.**	Check the body integrated unit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
2	**CHECK THE CIRCUIT OF TRUNK LID ACTUATOR.** 1) Disconnect harness connector of body integrated unit. 2) Disconnect the trunk lid actuator harness connector. 3) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i84) No. 22 — (R186) No. 2:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.

	Step	Check	Yes	No
3	**CHECK THE GROUND CIRCUIT OF TRUNK LID ACTUATOR.** 1) Disconnect the trunk lid actuator harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(R186) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Check the trunk lid lock actuator. <Ref. to SL-39, Trunk Lid Lock Assembly.>	Repair the harness.

12.CHECK DOOR LOCK SWITCH

	Step	Check	Yes	No
1	**CHECK DOOR LOCK SWITCH.** Check the input signal from door lock switch to body integrated module using Subaru Select Monitor. 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch to ON. 3) Select {Body integrated unit} from main menu. 4) Select {Current Data Display & Save}. 5) Check the input signal to body integrated unit by operating the door lock switch.	Is the normal input signal displayed when the door lock switch is moved to LOCK/UNLOCK?	The door lock switch is OK.	Go to step **2.**
2	**CHECK DOOR LOCK SWITCH CIRCUIT.** 1) Disconnect the body integrated unit harness connector. 2) Measure the resistance between the harness connector terminal and chassis ground when moving the door lock switch to LOCK. ***Connector & terminal*** ***(i84) No. 15 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Go to step **4.**
3	**CHECK DOOR LOCK SWITCH CIRCUIT.** Measure the resistance between the harness connector terminal and chassis ground when the door lock switch is moved to UNLOCK. ***Connector & terminal*** ***(i84) No. 29 — Chassis ground:***	Is the resistance less than 10 Ω?	The door lock switch is OK.	Go to step **4.**
4	**CHECK DOOR LOCK SWITCH.** 1) Disconnect the door lock switch harness connector. 2) Measure the resistance between the door lock switch terminals when moving the door lock switch to LOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 4 — No. 7:*** ***RHD model:*** ***(D7) No. 4 — No. 14:***	Is the resistance less than 1 Ω?	Go to step **5.**	Replace the door lock switch.
5	**CHECK DOOR LOCK SWITCH.** Measure the resistance between the door lock switch terminals when moving the door lock switch to UNLOCK. ***Connector & terminal*** ***LHD model:*** ***(D7) No. 5 — No. 7:*** ***RHD model:*** ***(D7) No. 5 — No. 14:***	Is the resistance less than 1 Ω?	Check the harness for open circuits or shorts between the body integrated unit and the door lock switch.	Replace the door lock switch.

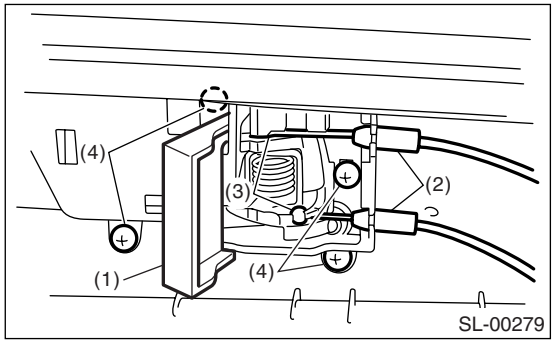
13.CHECK IGNITION SWITCH ILLUMINATION

	Step	Check	Yes	No
1	**CHECK FUSE.** Remove and visually check the fuse No. 14 (in the main fuse box).	Is the fuse blown out?	Replace the fuse with a new one.	Go to step **2.**
2	**CHECK POWER SUPPLY.** 1) Disconnect the ignition switch illumination harness connector. 2) Measure the voltage between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B224) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open circuits and shorts between the ignition switch illumination and fuse.
3	**CHECK IGNITION SWITCH ILLUMINATION CIRCUIT.** 1) Disconnect the harness connector of body integrated unit and ignition switch illumination harness connector. 2) Measure the resistance between body integrated unit harness connector terminal and ignition switch illumination harness connector terminal. ***Connector & terminal*** ***(B280) No. 4 — (B224) No. 1:***	Is the resistance less than 10 Ω?	Replace the ignition switch illumination bulb with a new one. <Ref. to LI-40, REMOVAL, Ignition Switch Illumination.>	Check the harness for open circuits and shorts between the body integrated unit and ignition switch illumination.

4. Front Inner Remote

A: REMOVAL

1) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
2) Remove the back cover (1) of inner remote.
3) Remove the outer cable (2).
4) Remove the wire end ball (3).
5) Remove the screws (4), and detach the inner remote handle.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works correctly after installation.

C: INSPECTION

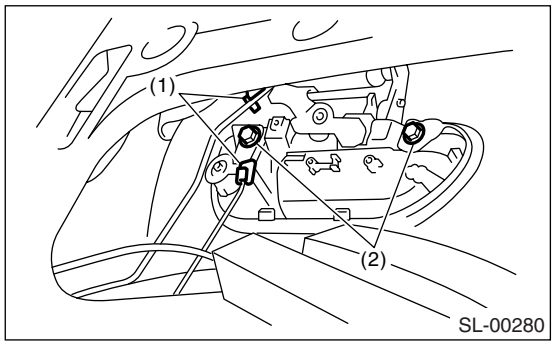
1) Check the outer wire and inner wire for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the front door latch & door lock actuator assembly.
2) Check the lever, rod and wire for smooth operation.

5. Front Outer Handle

A: REMOVAL

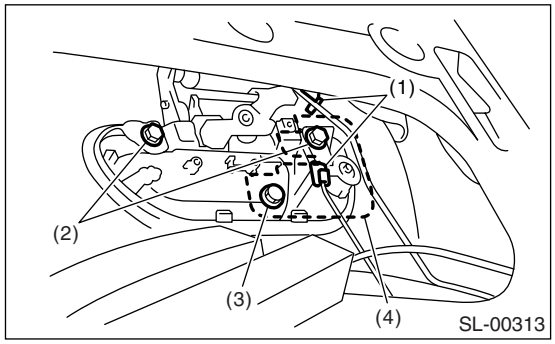
1. MODEL WITHOUT DOUBLE LOCK

1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the wire from front inner remote. <Ref. to SL-28, REMOVAL, Front Inner Remote.>
4) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Front Sealing Cover.>
5) Remove the rod clamps (1).
6) Remove the bolts (2), and then detach the front outer handle.



2. MODEL WITH DOUBLE LOCK

1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the wire from front inner remote. <Ref. to SL-28, REMOVAL, Front Inner Remote.>
4) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Front Sealing Cover.>
5) Remove the bolt (3), and then remove the key cylinder cover B (4).
6) Remove the rod clamps (1).
7) Remove the bolt (2), and then remove the key cylinder.
8) Remove the key cylinder cover A, and then detach the front outer handle.



CAUTION:
Do not apply excessive force to remove the handle from door panel. Otherwise door panel may be deformed.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works correctly after installation.

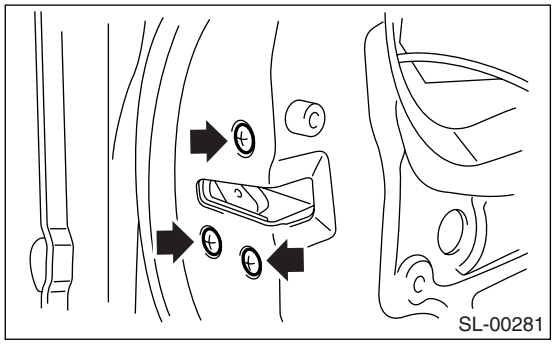
C: INSPECTION

1) Check the rod for deformation.
2) Check the lever and rod for smooth operation.

6. Front Door Latch and Door Lock Actuator Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the wires from front inner remote. <Ref. to SL-28, REMOVAL, Front Inner Remote.>
4) Remove the sealing cover. <Ref. to EB-20, REMOVAL, Front Sealing Cover.>
5) Remove the front door glass. <Ref. to GW-10, REMOVAL, Front Door Glass.>
6) Remove the rear sash. <Ref. to GW-15, REMOVAL, Front Regulator and Motor Assembly.>
7) Remove the key cylinder cover B, and remove the key rod from key cylinder. (Model with double lock)
8) Open the handle rod cover of latch assembly.
9) Remove the three screws.



10) Remove the front door latch & door lock actuator assembly, and disconnect the connector.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

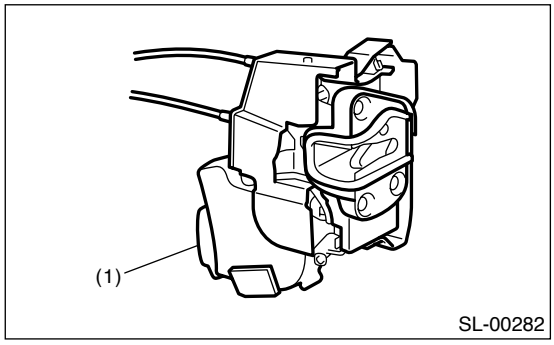
C: INSPECTION

1) Check the rod, outer wire and inner wire for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the front door latch & door lock actuator assembly.
2) Check the lever, rod and wire for smooth operation.

7. Front Door Lock Actuator

A: REMOVAL

1) Remove the front door latch & door lock actuator assembly. <Ref. to SL-30, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
2) Remove the pawl of front door latch security cover, and then remove the cover. (Model without double lock)
3) Remove the screw from the front door latch and door lock actuator, and then remove the door lock actuator. (Model without double lock)



(1) Front door lock actuator

B: INSTALLATION

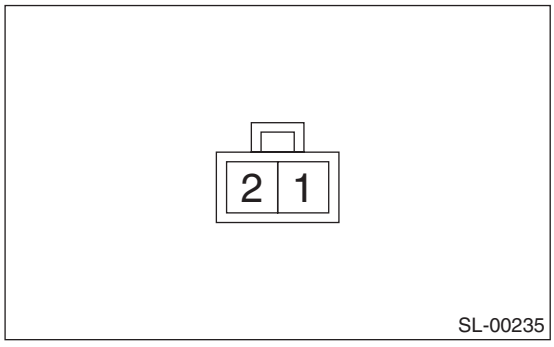
Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

C: INSPECTION

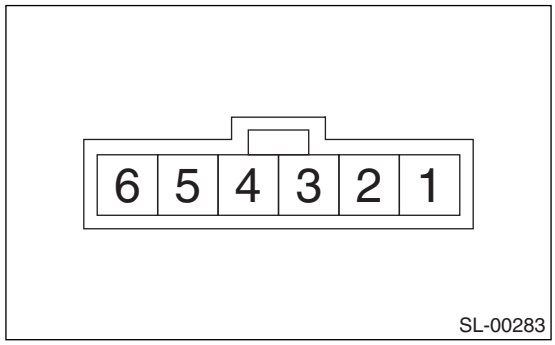
1) Disconnect the door lock actuator harness connector.
2) Connect the battery to door lock actuator terminals.
If defective, replace the door lock actuator.

1. Model without double lock



Terminal No.	Actuator operation
No. 2 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 2 (–)	Locked → Unlocked

2. Model with double lock



DOOR ACTUATOR RH:

Terminal No.	Actuator operation
No. 5 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 5 (–)	Locked → Unlocked
No. 6 (+) and No. 1 (–)	Double lock released → Double lock set
No. 1 (+) and No. 6 (–)	Double lock set → Double lock released

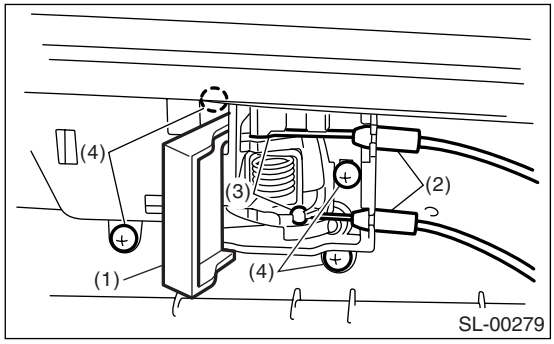
DOOR ACTUATOR LH:

Terminal No.	Actuator operation
No. 2 (+) and No. 6 (–)	Unlocked → Locked
No. 6 (+) and No. 2 (–)	Locked → Unlocked
No. 1 (+) and No. 6 (–)	Double lock released → Double lock set
No. 6 (+) and No. 1 (–)	Double lock set → Double lock released

8. Rear Inner Remote

A: REMOVAL

1) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
2) Remove the back cover (1) of inner remote.
3) Remove the outer cable (2).
4) Remove the wire end ball (3).
5) Remove the screws (4), and detach the inner remote handle.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the inner remote works correctly after installation.

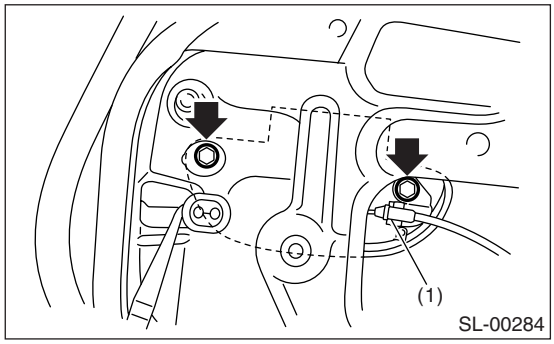
C: INSPECTION

1) Check the outer wire and inner wire for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the rear door latch & door lock actuator assembly.
2) Check the lever, rod and wire for smooth operation.
3) Check the child safety lock for correct operations.

9. Rear Outer Handle

A: REMOVAL

1) Raise the rear door glass to the top position.
2) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the sealing cover. <Ref. to EB-24, REMOVAL, Rear Sealing Cover.>
4) Remove the rear door latch assembly. <Ref. to SL-34, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
5) Remove the wire from wire clamp (1) of outer handle.
6) Remove the two bolts.



7) Detach the outer handle bracket. (Model with double lock)
8) Detach the rear outer handle.

CAUTION:
Do not apply excessive force to remove the handle from door panel. Otherwise door panel may be deformed.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works correctly after installation.

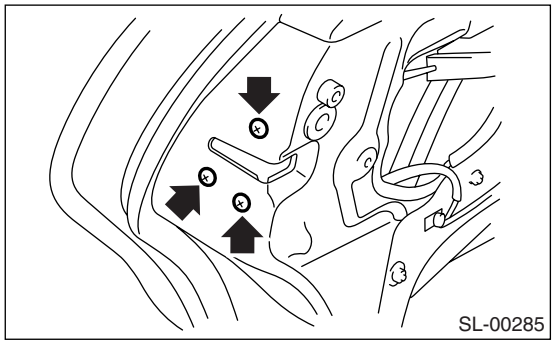
C: INSPECTION

1) Check the wires for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the rear door latch & door lock actuator assembly.
2) Check the lever and wire for smooth operation.

10. Rear Door Latch and Door Lock Actuator Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the wires from rear inner remote. <Ref. to SL-32, REMOVAL, Rear Inner Remote.>
4) Remove the sealing cover. <Ref. to EB-24, REMOVAL, Rear Sealing Cover.>
5) Remove the rear door glass. <Ref. to GW-22, REMOVAL, Rear Door Glass.>
6) Remove the rear sash. <Ref. to GW-24, REMOVAL, Rear Regulator and Motor Assembly.>
7) Take out the wire from wire clamp of outer handle.
8) Detach the outer handle bracket. (Model with double lock)
9) Remove the three screws.



10) Disconnect the connectors, and then remove the rear door latch & door lock actuator assembly.

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

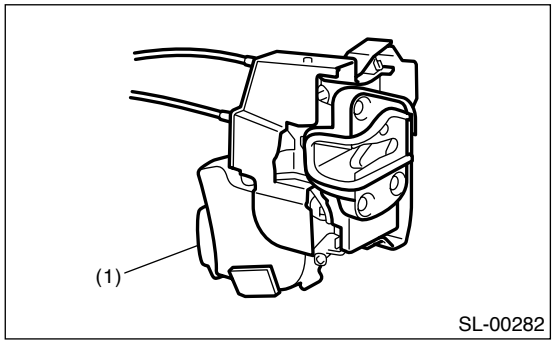
C: INSPECTION

1) Check the wires for deformation. When it is deformed, straighten it because failure operations may occur. When it is unrepairable, replace the rear door latch & door lock actuator assembly.
2) Check the lever and wire for smooth operation.

11.Rear Door Lock Actuator

A: REMOVAL

1) Remove the rear door latch & door lock actuator assembly. <Ref. to SL-34, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
2) Remove the pawl of rear door latch security cover, and then remove the cover. (Except for EK model)
3) Remove the screw from the rear door latch and door lock actuator, and then remove the door lock actuator. (Except for EK model)



(1) Rear door lock actuator

B: INSTALLATION

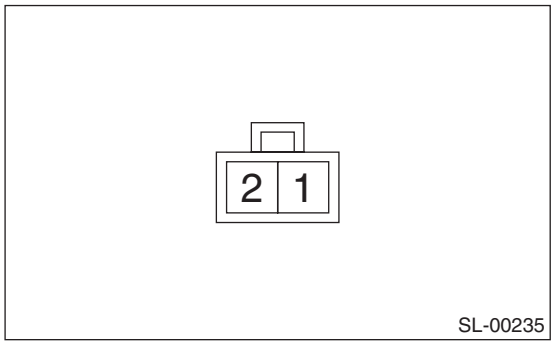
Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

C: INSPECTION

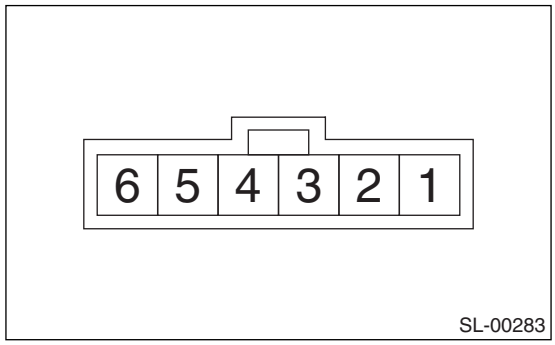
1) Disconnect the door lock actuator harness connector.
2) Connect the battery to door lock actuator terminals.
If defective, replace the door lock actuator.

1. Model without double lock



Terminal No.	Actuator operation
No. 2 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 2 (–)	Locked → Unlocked

2. Model with double lock



DOOR ACTUATOR RH:

Terminal No.	Actuator operation
No. 5 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 5 (–)	Locked → Unlocked
No. 6 (+) and No. 1 (–)	Double lock released → Double lock set
No. 1 (+) and No. 6 (–)	Double lock set → Double lock released

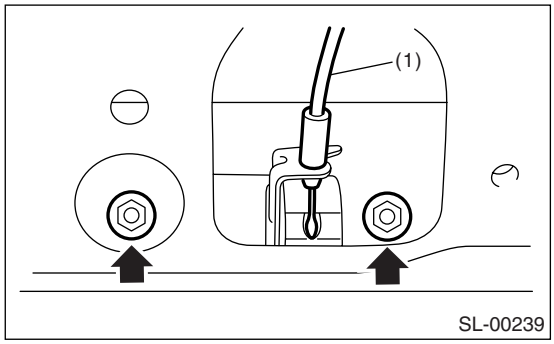
DOOR ACTUATOR LH:

Terminal No.	Actuator operation
No. 2 (+) and No. 6 (–)	Unlocked → Locked
No. 6 (+) and No. 2 (–)	Locked → Unlocked
No. 1 (+) and No. 6 (–)	Double lock released → Double lock set
No. 6 (+) and No. 1 (–)	Double lock set → Double lock released

12.Rear Gate Outer Handle

A: REMOVAL

1) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
2) Remove the rear gate garnish. <Ref. to EI-76, REMOVAL, Rear Gate Garnish.>
3) Remove the two nuts to take out the rear gate outer handle.
4) Remove the rear gate outer handle cable.



(1) Rear gate handle cable

B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the outer handle works correctly after installation.

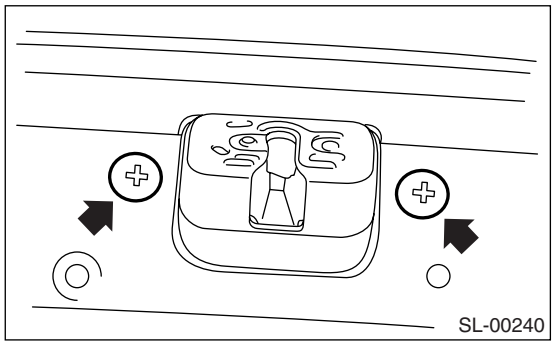
C: INSPECTION

1) Check the rear gate handle cable for deformation.
2) Check the rear gate outer handle and rear gate handle cable for smooth operation.

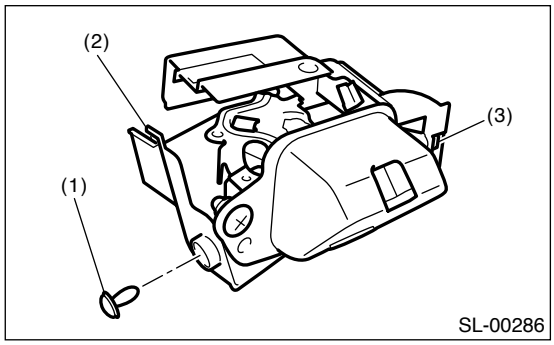
13.Rear Gate Latch Assembly

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
3) Remove the two screws.

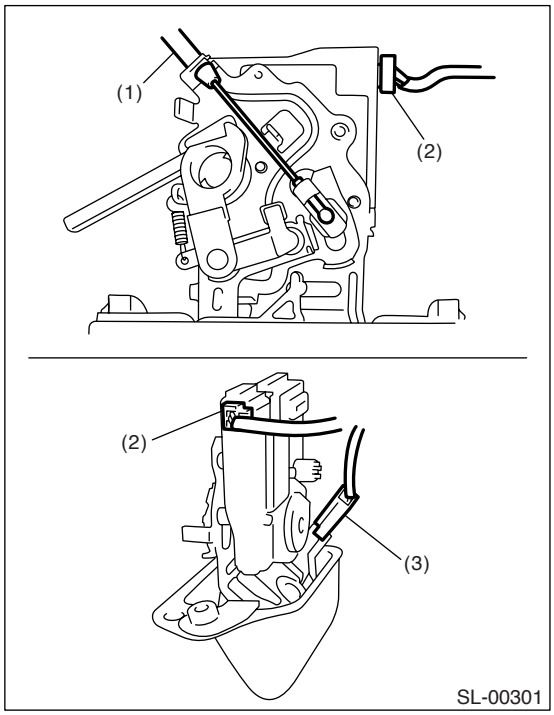


4) Remove the rear gate latch cover. (Model with double lock)



(1) Clip
(2) Claw
(3) Hook

5) Disconnect the each connector and rear gate handle cable.



(1) Rear gate handle cable
(2) Rear gate lock actuator connector
(3) Rear gate latch switch connector

6) Remove the rear gate latch assembly.

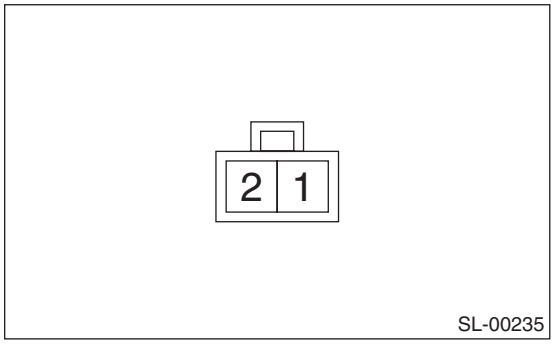
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure the lock works correctly after installation.

C: INSPECTION

1) Disconnect the rear gate lock actuator harness connector.
2) Connect the battery to rear gate lock actuator terminals.



Terminal No.	Actuator operation
No. 2 (+) and No. 1 (–)	Unlocked → Locked
No. 1 (+) and No. 2 (–)	Locked → Unlocked

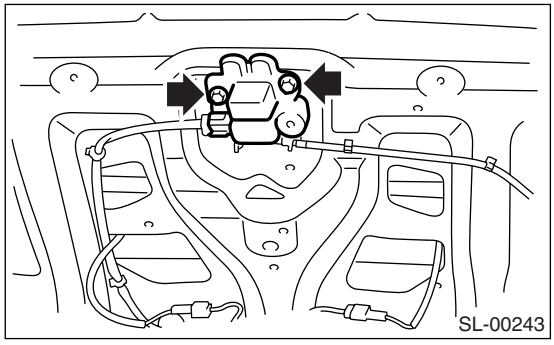
Replace the rear gate latch assembly if faulty.
3) Check the rear gate handle cable for deformation.
4) Check the lever and rear gate handle cable for smooth operation.

14.Trunk Lid Lock Assembly

A: REMOVAL

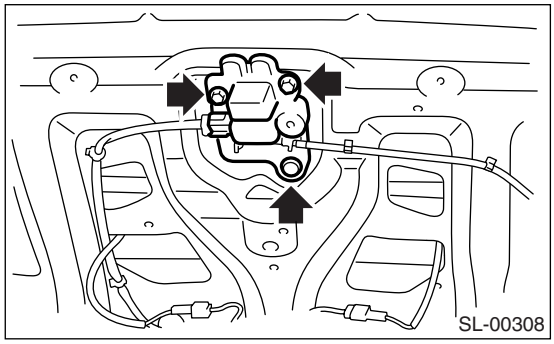
1. MODEL WITHOUT DOUBLE LOCK

1) Disconnect the connectors and detach the trunk opener cable.
2) Remove the two bolts to remove trunk lid lock assembly.



2. MODEL WITH DOUBLE LOCK

1) Disconnect the connectors and detach the trunk opener cable.
2) Remove the two bolts and clip to remove trunk lid lock assembly.



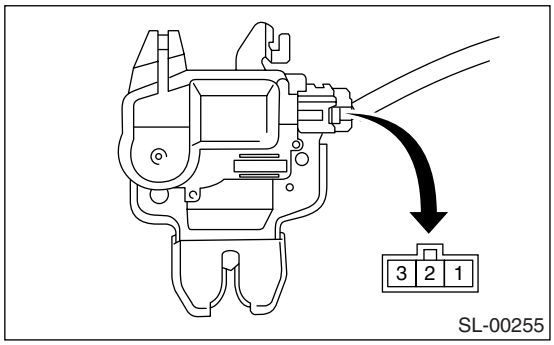
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
• Apply grease to the movable part.
• Make sure the lock works correctly after installation.

C: INSPECTION

1) Disconnect the trunk lid actuator harness connector.
2) Connect the battery to trunk lid actuator terminals.



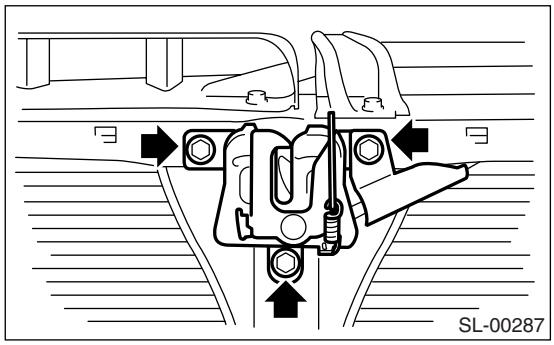
Terminal No.	Actuator operation
No. 2 (+) and No. 1 (–)	Locked → Unlocked

If defective, replace the trunk lid actuator.
3) Check the striker for deformation or abnormal wear.
4) Check the safety lever for improper movement.
5) Check other levers and the spring for rust formation and unsmooth movement.
6) Check the trunk opener cable for smooth operation.

15.Front Hood Lock Assembly

A: REMOVAL

1) Open the front hood.
2) Remove the bolts, and then detach the front hood lock assembly.
3) Remove the release cable from lock assembly.



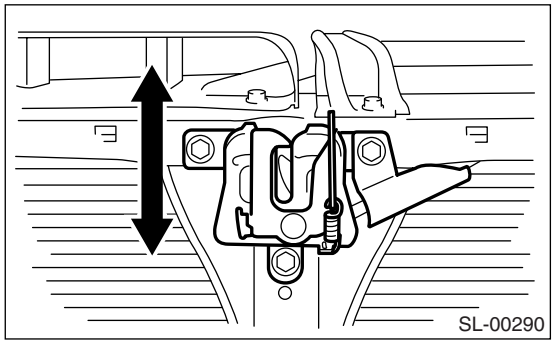
B: INSTALLATION

Install in the reverse order of removal.

NOTE:
- Apply grease to the movable part.
- Make sure the release cable works correctly after installation.

C: ADJUSTMENT

Loosen the bolt, and adjust the lock assembly while moving it up and down.



D: INSPECTION

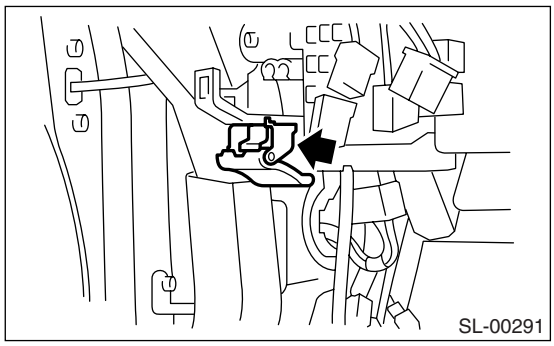
1) Check the striker for deformation or abnormal wear.
2) Check the safety lever for improper movement.
3) Check other levers and the spring for rust formation and unsmooth movement.

16.Remote Openers

A: REMOVAL

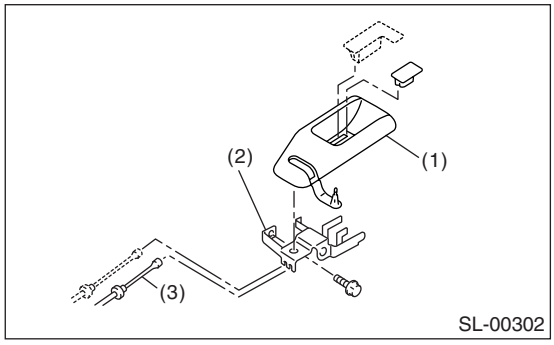
1. FRONT HOOD OPENER

1) Remove the release cable from hood lock.
2) Remove the bolt, and then detach the opener lever.



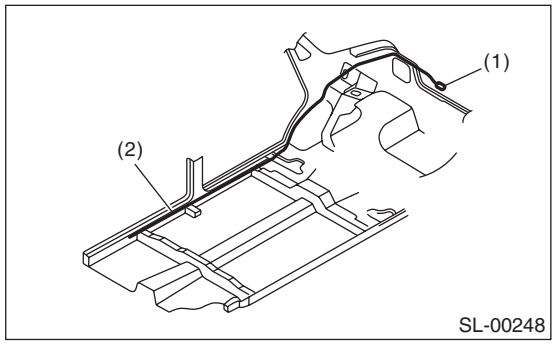
2. TRUNK LID OPENER

1) Remove the rear seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
2) Remove the center pillar lower trim, side sill cover, rear pillar lower trim and floor mat on the driver's side. Remove the clip holding cable.
3) Remove the bolt, and then detach the opener pull handle.



(1) Cover
(2) Pull handle ASSY
(3) Cable

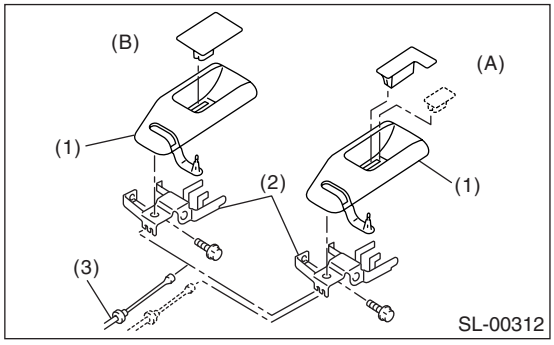
4) Remove the cable from opener pull handle.
5) Remove the trunk lid lock assembly from trunk lid.
6) Remove the cable from trunk lid lock assembly.



(1) Trunk lid lock ASSY
(2) Cable

3. FUEL FLAP OPENER

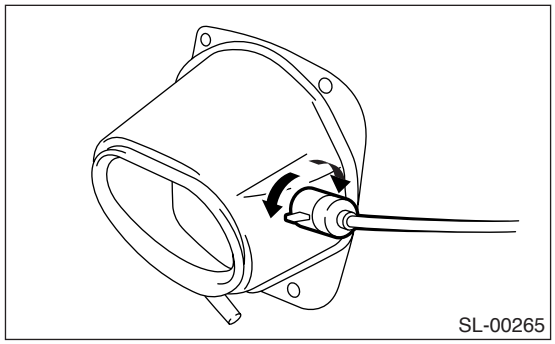
1) Remove the rear seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
2) Remove the center pillar lower trim, side sill cover, rear pillar lower trim and floor mat on the driver's side. Remove the clip holding cable.
3) Remove the bolt, and then detach the opener pull handle.



(A) Sedan model
(B) Wagon model
(1) Cover
(2) Pull handle ASSY
(3) Cable

4) Remove the cable from opener pull handle.
5) Remove the rear quarter trim RH. <Ref. to EI-63, REMOVAL, Rear Quarter Trim.>

6) Rotate the fuel lock inside of the quarter panel to 90° and remove. (Either right or left turn)



B: INSTALLATION

1. FRONT HOOD OPENER

Install in the reverse order of removal.

2. TRUNK LID OPENER

Install in the reverse order of removal.

3. FUEL FLAP OPENER

Install in the reverse order of removal.

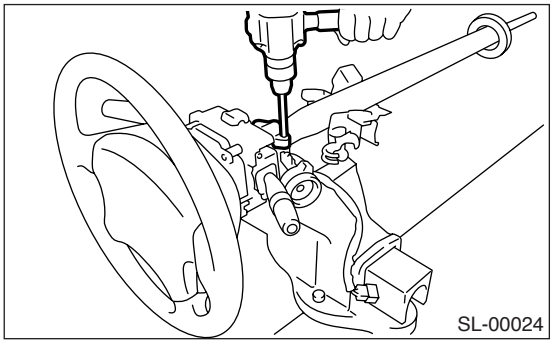
C: INSPECTION

Make sure the front hood, trunk lid and fuel flap open and close smoothly.

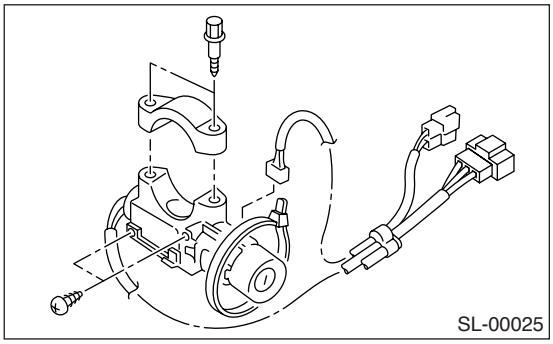
17.Ignition Key Lock

A: REPLACEMENT

1) Disconnect the ground cable from battery.
2) Remove the steering column. <Ref. to PS-23, REMOVAL, Tilt Steering Column.>
3) Secure the steering column in a vise. Remove the bolt with a drill.

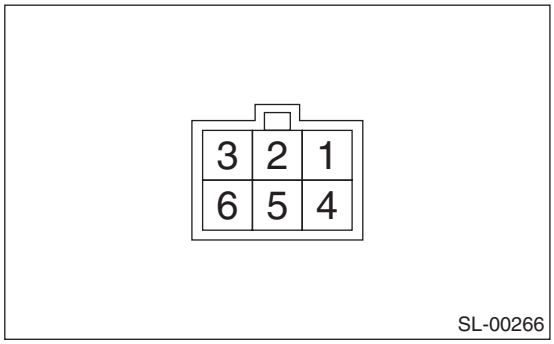

SL-00024

4) Remove the ignition key lock.
5) Using a new bolt, tighten the bolts all the way.


SL-00025

B: INSPECTION

1) Remove the instrument panel lower panel.
2) Remove the lower column cover.
3) Unfasten the fixing clip which secures harness, and then disconnect the connector of the ignition switch from body harness.
4) Turn the ignition key plate to each position and check the continuity between terminals of ignition connector.



SL-00266

Switch position	Terminal No.	Standard
LOCK	—	—
ACC	No. 3 and No. 4	Less than 1 Ω
ON	No. 3 and No. 1 and No. 4 No. 3 and No. 6	Less than 1 Ω
ST	No. 3 and No. 1 No. 3 and No. 2 and No. 6	Less than 1 Ω

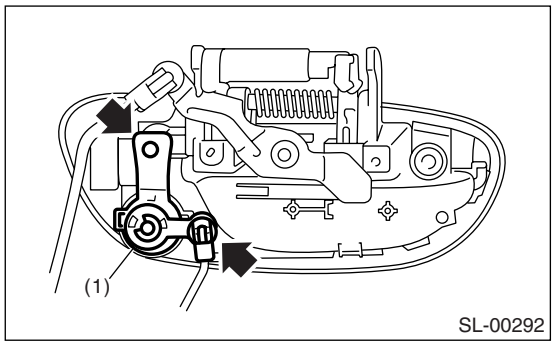
If NG, replace the ignition switch.

18.Key Lock Cylinders

A: REPLACEMENT

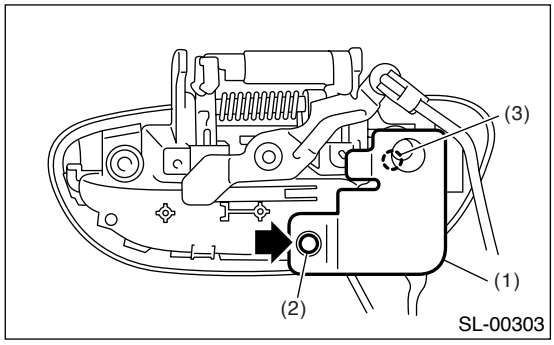
1. MODEL WITHOUT DOUBLE LOCK

1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the sealing cover.
4) Remove the rod clamp. Remove the bolt. Replace the key cylinder (1).



2. MODEL WITH DOUBLE LOCK

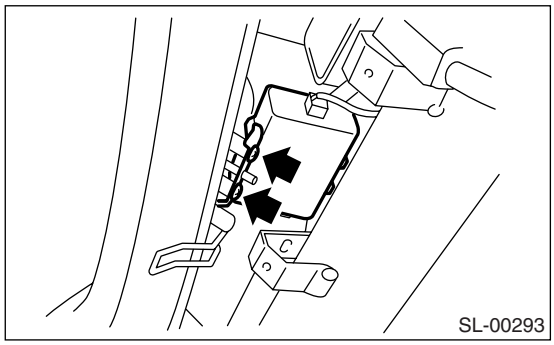
1) Raise the front door glass to the top position.
2) Remove the door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the sealing cover.
4) Remove the bolt (2), and remove the key cylinder cover (1).
5) Remove the rod clamp. Remove the bolt (3). Replace the key cylinder.



19.Keyless Entry Control Unit

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
3) Remove the screw, then remove the keyless entry control unit while disconnecting the connector.



B: INSTALLATION

Install in the reverse order of removal.

20. Body Integrated Unit

A: REMOVAL

NOTE:
• Prepare the security ID plate.
• Prepare all registered immobilizer keys for the model with immobilizer.
• Make a registration of immobilizer for the model with immobilizer. For detailed operation procedure, refer to “IMMOBILIZER REGISTRATION MANUAL”.
• If replacing the body integrated unit, check the current setting and note it. <Ref. to LAN(diag)-17, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>

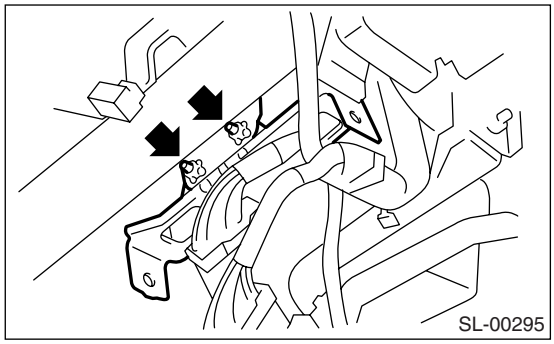
1) Disconnect the ground cable from battery.
2) Remove the instrument panel lower panel on driver’s side. <Ref. to EI-56, REMOVAL, Instrument Panel Assembly.>
3) Disconnect the connector of body integrated unit.

CAUTION:
Be careful to keep water and other foreign materials away from body integrated unit.

4) Remove the body integrated unit from the body integrated unit mounting bracket using flat tip screwdriver.

CAUTION:
Be careful not to damage the unit when removing it forcibly from the bracket.

5) Remove the clutch pedal stopper arm. (MT model) <Ref. to CL-26, REMOVAL, Clutch Pedal.>
6) Remove two body integrated unit bracket mounting bolts, and remove the bracket.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Make sure it comforms to the current setting condition after installation. <Ref. to LAN(diag)-17, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>

21.Keyless Transmitter

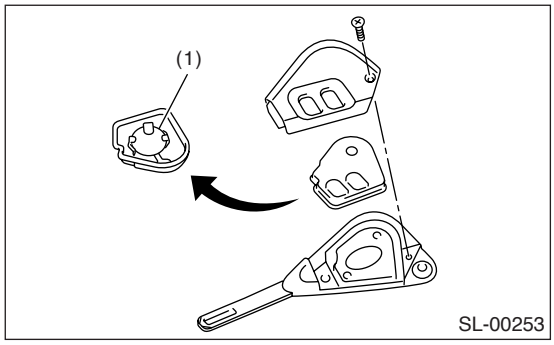
A: REMOVAL

1. KEYLESS TRANSMITTER BATTERY

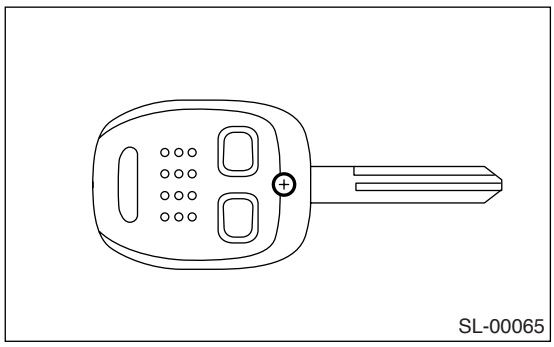
Remove the screw from keyless transmitter, and remove the keyless transmitter battery (1).

NOTE:
To prevent static electricity damage to the keyless transmitter printed circuit board, touch the steel area of building with hand to discharge static electricity carried on body or clothes before disassembling the keyless transmitter.

• Except for EK model



• EK model



B: INSTALLATION

1. KEYLESS TRANSMITTER BATTERY

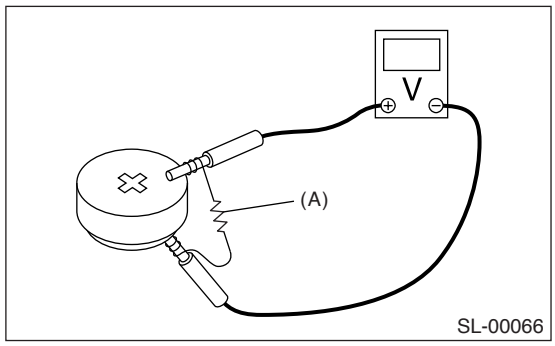
Install in the reverse order of removal.

C: INSPECTION

1. KEYLESS TRANSMITTER BATTERY

Measure the voltage between the keyless transmitter battery (+) terminal and (−) terminal.

NOTE:
• Battery discharge occurs during the measurement. Complete the measurement within 5 seconds.
• During the battery voltage measurement, the voltage falls more than 1.8 volts in 3 seconds period.



(A) Resistance 47 Ω

Tester connection		Standard
(+)	(−)	
Battery Positive terminal	Battery Ground terminal	2.5 — 3.0 V

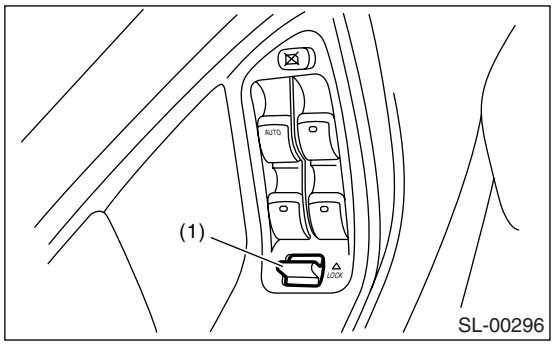
If NG, replace the battery. (Use CR1620 or equivalent.)

D: REPLACEMENT

1. REGISTRATION OF KEYLESS TRANSMITTER

NOTE:
• A maximum of four keyless transmitter can be registered for each individual vehicle.
• When replacing or adding the keyless transmitter, new registration of keyless transmitter is necessary.
• When replacing the keyless transmitter, registration to immobilizer system is also necessary.

1) Remove the keyless transmitter from the ignition switch.
2) Remove the lower trim cover at driver's side, then connect the registration connectors. (1 pole white connector)
3) Press the door lock switch (1) located under the power window main switch to UNLOCK. (Make sure the room light blinks and buzzer sounds, and then system is in registration mode.)



4) While pressing the button of keyless transmitter to be registered twice with door lock switch pressed to UNLOCK. (Button for LOCK, UNLOCK and TRUNK are acceptable)
5) When the registration is completed normally, the door lock actuator will lock → unlock. If the lock → unlock operation is not carried out, repeat the procedure 4).

NOTE:
• When pressing the keyless transmitter button, slowly press for first and second (press longer for second) to check operation of door lock actuator.
• Do not press the button of keyless transmitter more than twice.
• Do not batter the button of keyless transmitter.

6) Repeat the steps 4) if there is an additional keyless transmitter to be registered.
7) Pull out the registration connector, and install the lower trim cover at driver's side.

NOTE:
• The transmitter can be registered only when the door lock switch is remain pushed to UNLOCK.
• Continuing to press the door lock switch to UNLOCK again allows to be registered although the door lock switch is released for once.
• When adding the keyless transmitter, re-registration of keyless transmitter which was already registered is necessary.

2. CLEAR OF KEYLESS TRANSMITTER

1) Remove the keyless transmitter from ignition switch.
2) Remove the lower trim cover at driver's side, then connect the registration connectors. (1 pole white connector)
3) Press the door lock switch located under the power window main switch to LOCK. (Make sure the room light blinks and buzzer sounds, and system becomes in clear mode.)
4) While pressing door lock switch to LOCK, insert and remove the key on ignition switch 10 times within 10 seconds.
5) When the clearing is completed normally, the door lock actuator will lock → unlock. If the lock → unlock operation is not carried out, repeat the procedure 4).
6) Pull out the registration connector, and install the lower trim cover at driver's side.

NOTE:
• The transmitter can be cleared only when the door lock switch is remain pushed to LOCK.
• Continuing to press the door lock switch to LOCK again allows to be cleared although the door lock switch is released for once.
• If changing from registration mode to clear mode, you cannot go to clear mode unless completing the registration mode. The reverse case is same as this.

22.Immobilizer Control Unit

A: NOTE

The control of immobilizer system is carried out in body integrated unit.

B: REMOVAL

<Ref. to SL-46, REMOVAL, Body Integrated Unit.>

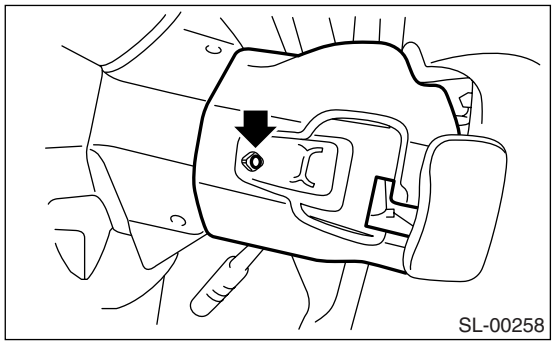
C: INSTALLATION

Install in the reverse order of removal.

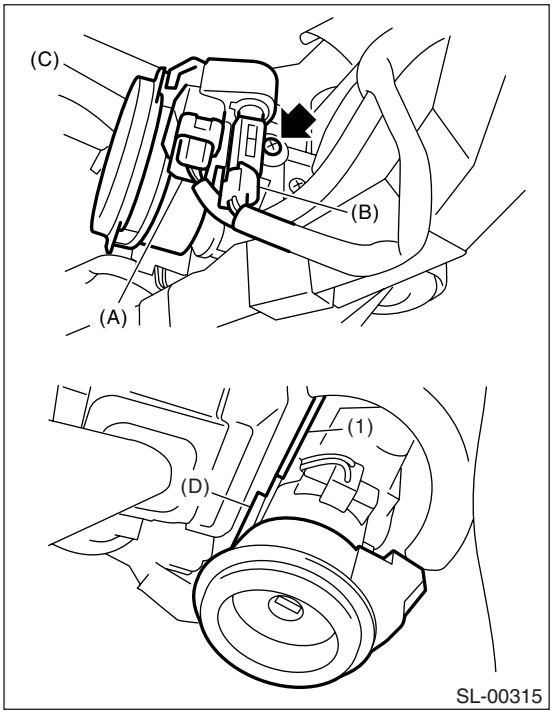
23.Immobilizer Antenna

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the screws, and detach the upper column cover and lower column cover.



3) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
4) Disconnect the immobilizer antenna connector (A) and ignition switch lighting connector (B).
5) Loosen the screw and release the lock (D) at opposite side using flat-tip screwdriver (1), and then detach the immobilizer antenna (C).



CAUTION:
Do not apply excessive force to remove the immobilizer antenna and lock. Otherwise they may be broken because those parts are the products made of a plastic.

B: INSTALLATION

Install in the reverse order of removal.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)

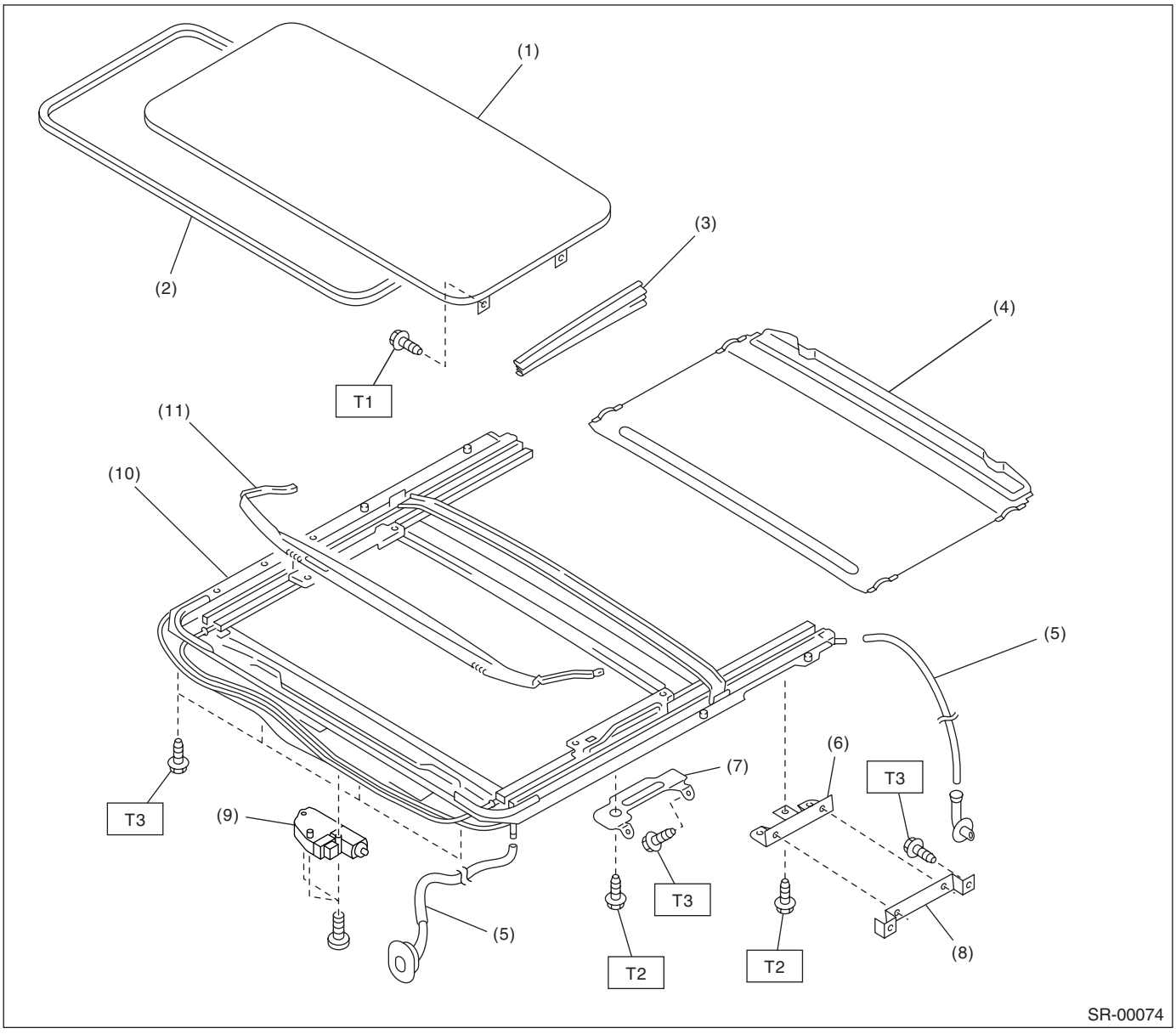
SR

		Page
1.	General Description	2
2.	Sunroof Control System	5
3.	Glass Lid	6
4.	Sunroof Assembly	9
5.	Sunroof Motor	12
6.	Sunroof Switch	15

1. General Description

A: COMPONENT

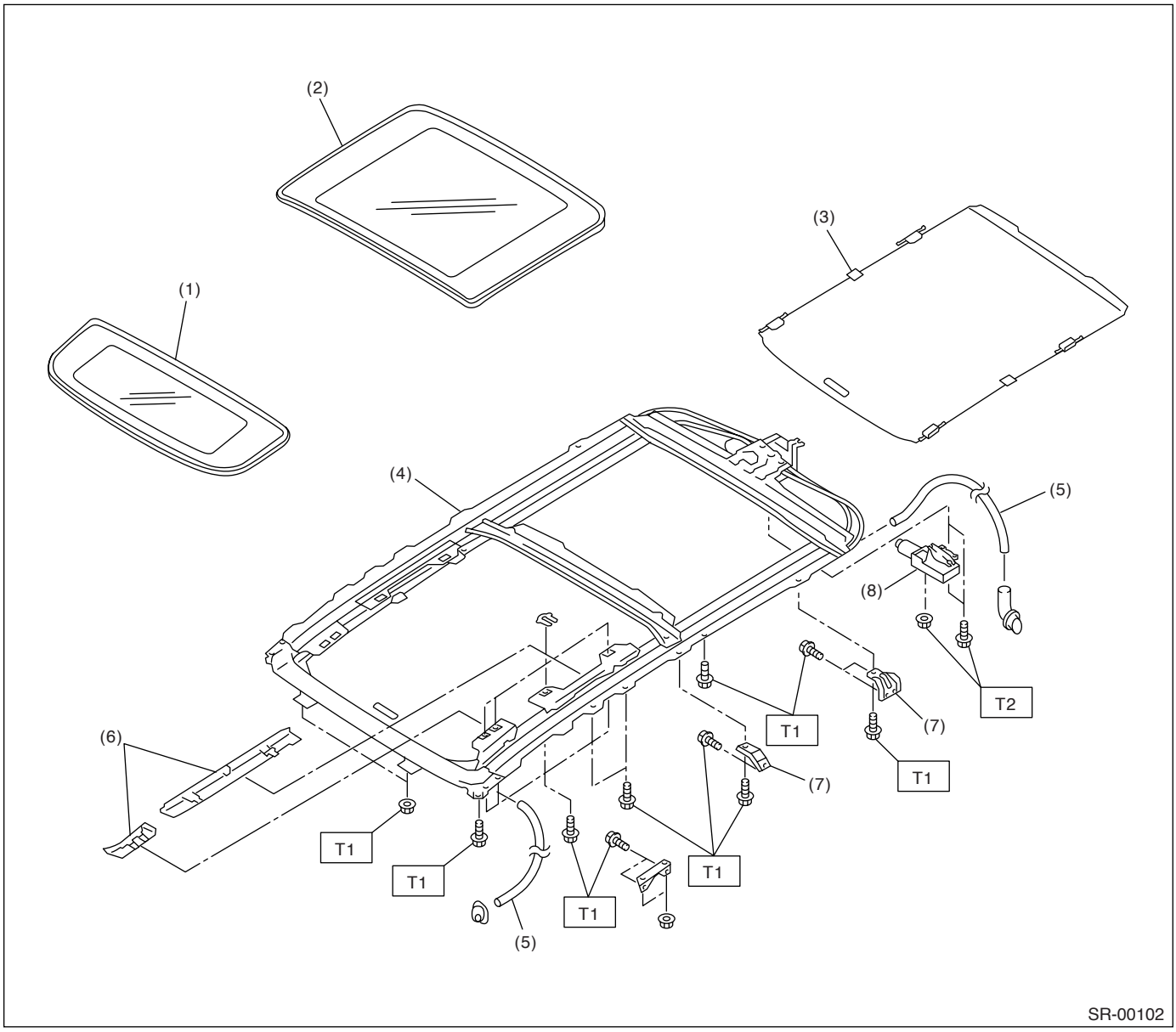
1. SEDAN MODEL



(1) Glass lid
(2) Weatherstrip
(3) Guide rail cover
(4) Sunshade
(5) Drain tube
(6) Assist rail bracket (Rear)
(7) Assist rail bracket (Front)
(8) Sunroof bracket (Rear)
(9) Motor ASSY
(10) Frame ASSY
(11) Deflector

Tightening torque: N·m (kgf-m, ft-lb)
T1: 4.5 (0.46, 3.3)
T2: 6.0 (0.61, 4.4)
T3: 7.5 (0.76, 5.3)

2. WAGON MODEL



(1) Glass lid (Front)
(2) Glass lid (Rear)
(3) Sunshade
(4) Frame ASSY
(5) Drain tube
(6) Cover (Front and rear)
(7) Frame bracket
(8) Motor ASSY

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.3)
T2: 4.5 (0.46, 3.0)

B: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable. When replacing the audio, control unit, and other parts provided with memory functions, record the memory contents before disconnecting the battery ground cable in order to prevent memory deletion.
• Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
• Adjust parts to the given specifications.
• Connect the connectors securely for reassembly.
• After reassembly, make sure functional parts operate smoothly.

C: PREPARATION TOOL

1. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Sunroof Control System

A: WIRING DIAGRAM

1. SUNROOF

<Ref. to WI-316, WIRING DIAGRAM, Sunroof System.>

B: INSPECTION

Symptom	Inspection order
Water leakage	(1) Check roof panel and glass lid for improper or poor sealing. (2) Check drain tube for clogging. (3) Check sunroof frame seal and body for improper fit.
Booming noise, wind noise and other noise	(1) Check glass lid and roof panel for improper clearance. (2) Check sunshade and roof trim for improper clearance.
Motor noise	(1) Check installing part of motor for looseness. (2) Check gears and bearings for wear. (3) Check cable for wear. (4) Check cable pipe for deformities.
Failure of sunroof (Motor operates properly.)	(1) Check guide rail for foreign particles. (2) Check guide rail for improper installation. (3) Check parts for mutual interference. (4) Check cable slider for improper clinching. (5) Check cable for improper installation.
Motor does not rotate or rotate improperly.	(1) Check fuse for blown out. (2) Check switch for improper function. (3) Check motor for incorrect terminal voltage. (4) Check the relay for improper operation. (5) Check poor grounding system. (6) Check harness for open or short and terminals for poor connections.
Failure turn of glass lid	Check guide rail for foreign particles.

• Failure turn of glass lid while driving rough road.

Glass lid has auto-reverse function. When applied above specified force to the glass lid, the lid turns back and stops. When operating the glass lid (open or close) while driving the rough road, the lid judges vibration as a force and may causes failure turns. When the failure turn is occurred, the initialize operation is required with following procedure.

1. INITIALIZE OPERATION (SEDAN MODEL)

1) Tilt up the glass lid.
2) Release the switch once, and press the tilt up switch again for 15 seconds.
3) When the glass lid is raised a little and returned to tilt up position, release the switch for the moment. (Initialization of position detecting function)
4) Keep pressing the tilt up switch within 5 seconds from releasing the switch, glass lid tilts down → slides open → slides close operation automatically. (Time gap of more than 5 seconds will result in cancellation of position detecting function.)
5) Initialize operation is completed.

2. INITIALIZE OPERATION (WAGON MODEL)

1) Apply the force to glass lid in the direction of glass lid open while glass lid (rear) is closing, and then reverse the lid five times in a row.

However, in the following situation, the initialize operation is canceled.

• When the lid is fully closed once during auto-reverse operation five times in a row.
• When the interval of auto-reverse operation is more than 30 seconds once.

2) When the operation of glass lid shift to brink operation*, fully close the lid on switch operation.
3) Initialize operation is completed.

*Brink operation: Although keep pressing the switch, glass lid operates only at a moment when the switch is pressed.

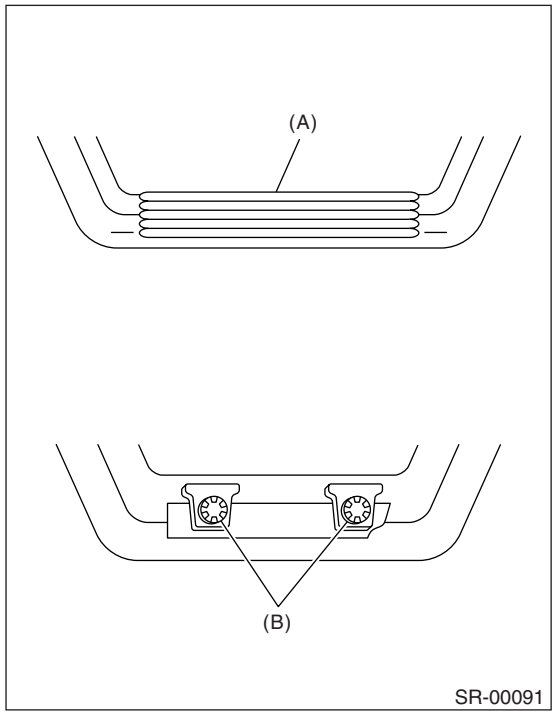
3. Glass Lid

A: REMOVAL

1. SEDAN MODEL

1) Completely close the glass lid, and then open the sunshade.
2) Remove the cover (A), and then remove the TORX® bolts (B).

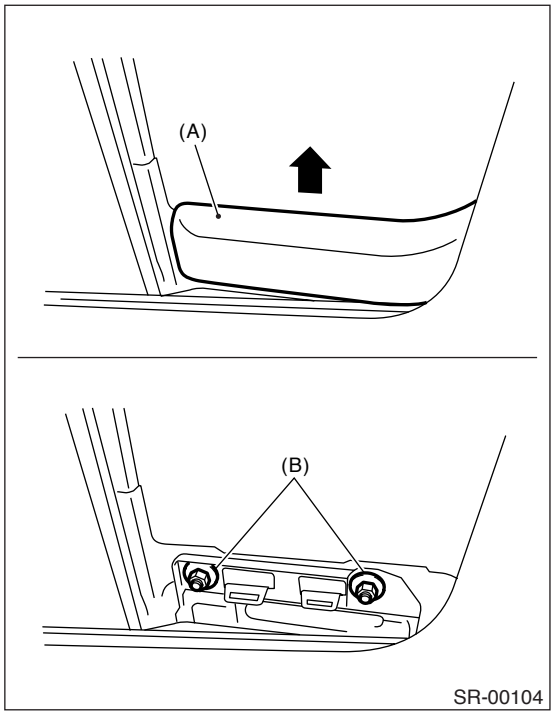
CAUTION:
TORX® bolts are applied with thread locker. If they are removed, replace with new ones.



3) Remove the glass lid carefully.

2. WAGON MODEL (FRONT)

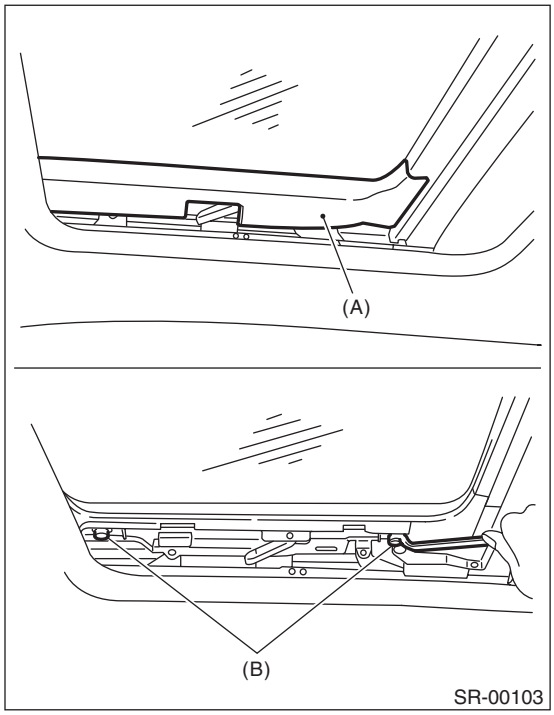
1) Open the sunshade.
2) Pull out the cover (A) toward arrow mark, and then remove the nut (B).



3) Remove the glass lid (front) carefully.

3. WAGON MODEL (REAR)

1) Tilt up the glass lid (front), and then open the sunshade.
2) Remove the cover (A), and then remove the nut (B).



3) Remove the glass lid carefully.

B: INSTALLATION

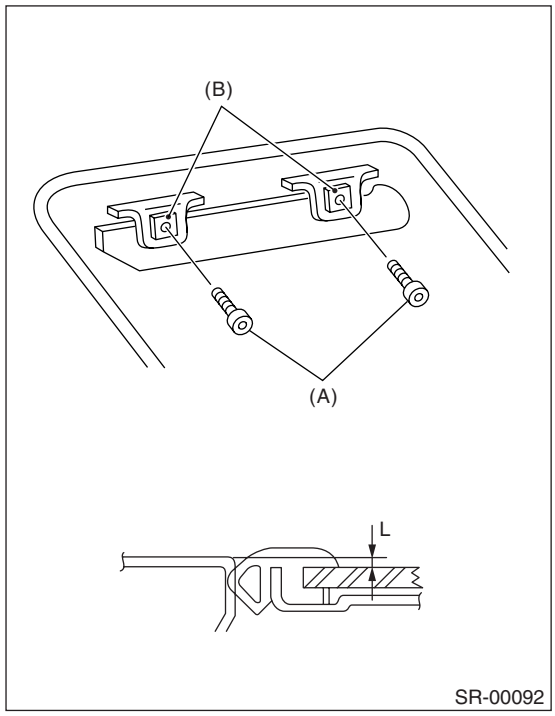
Install in the reverse order of removal.

C: ADJUSTMENT

1. SEDAN MODEL

Loosen the glass lid mounting TORX® bolts (A), and then adjust the height with moving 9.5 mm (0.374 in) nut (B) on lid side.

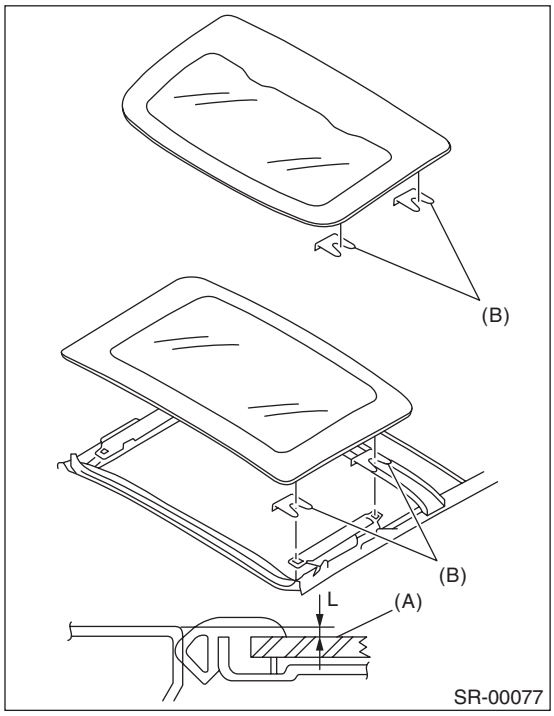
Difference in height between glass lid and roof panel L:
2.0±1.0 mm (0.079±0.039 in)



2. WAGON MODEL

Loosen the glass lid installation nuts, and then adjust the height by adding (max: four pieces) or extracting (min: zero piece) shims (B) (standard: two pieces) which installed between glass lid (A) and body.

Difference in height between glass lid and roof panel L:
2.0±1.0 mm (0.079±0.039 in)

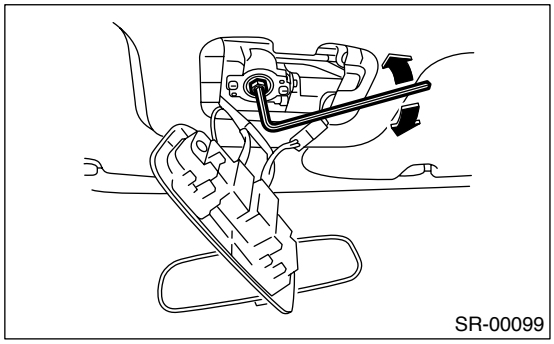


D: FORCED DRIVE

If glass lid dose not operate or is not supplied with power, move the glass lid using the emergency handle (wrench)*.
*: Emergency handle (L shape general purpose hexagon wrench)
Sedan model: bolt width 4 mm (0.16 in)
Wagon model: bolt width 5 mm (0.20 in)

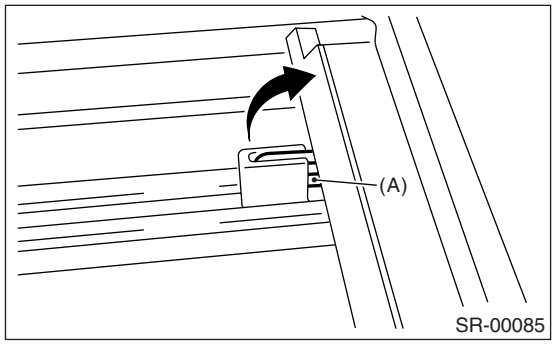
1. SEDAN MODEL

1) Remove the spot map light. <Ref. to LI-34, REMOVAL, Spot Map Light.>
2) Insert the wrench securely until it touches the motor shaft edge.
3) Turn the wrench, and move the glass lid.
- Turning right, the glass lid open.
- Turning left, the glass lid close.

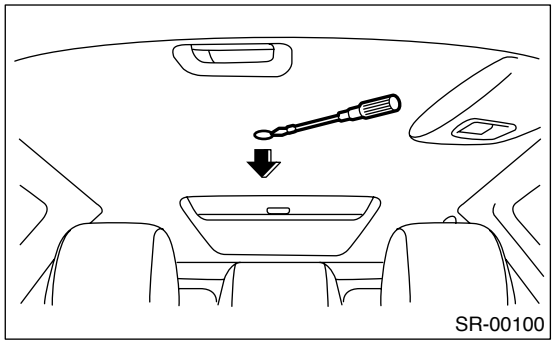


2. WAGON MODEL

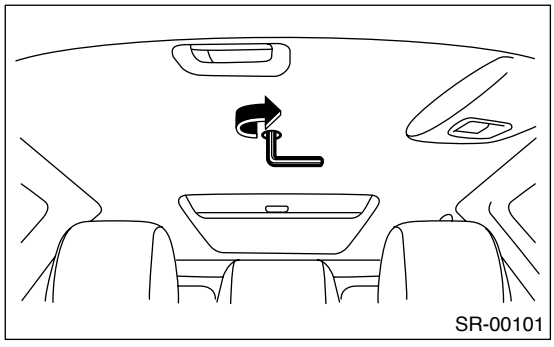
1) Raise the left and right side hook (A) of sunshade.



2) Slide the sunshade forward.
3) Remove the plug in the rear side of roof trim.



4) Insert the wrench securely until it touches the motor shaft edge.
5) Turn the wrench to right, and close the glass lid (front and rear).



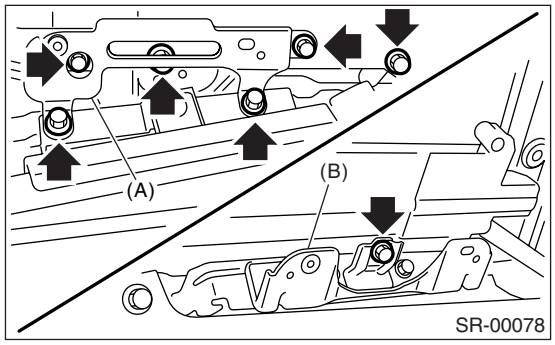
CAUTION:
After forced drive, the initialize operation is required. <Ref. to SR-5, INSPECTION, Sunroof Control System.>

4. Sunroof Assembly

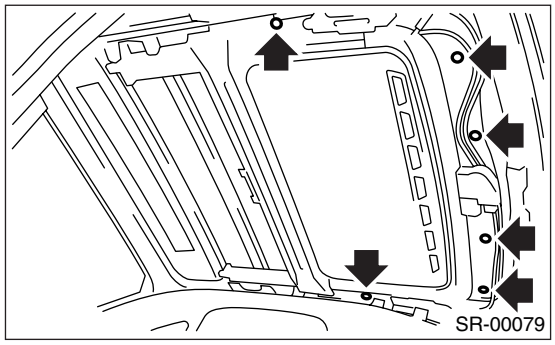
A: REMOVAL

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the roof trim. <Ref. to EI-67, SEDAN MODEL, REMOVAL, Roof Trim.>
3) Disconnect the harness connector of sunroof motor.
4) Remove the glass lid. <Ref. to SR-6, SEDAN MODEL, REMOVAL, Glass Lid.>
5) Remove the drain tube from frame assembly.
6) Remove the assist rail bracket (front) (A) and sunroof bracket (rear) (B).

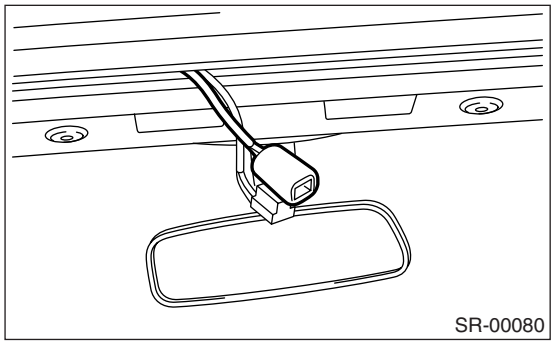


7) Remove the nuts, and then remove the frame assembly.

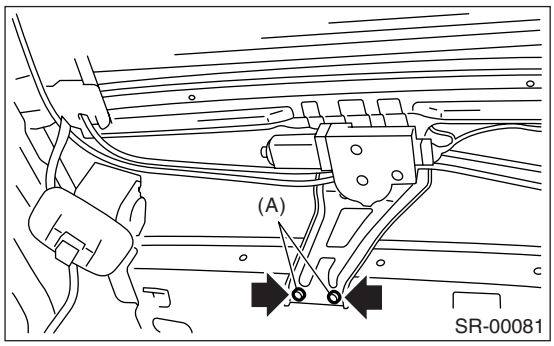


2. WAGON MODEL

1) Disconnect the ground cable from battery.
2) Remove the roof trim. <Ref. to EI-67, WAGON MODEL, REMOVAL, Roof Trim.>
3) Disconnect the harness connector of motor assembly.

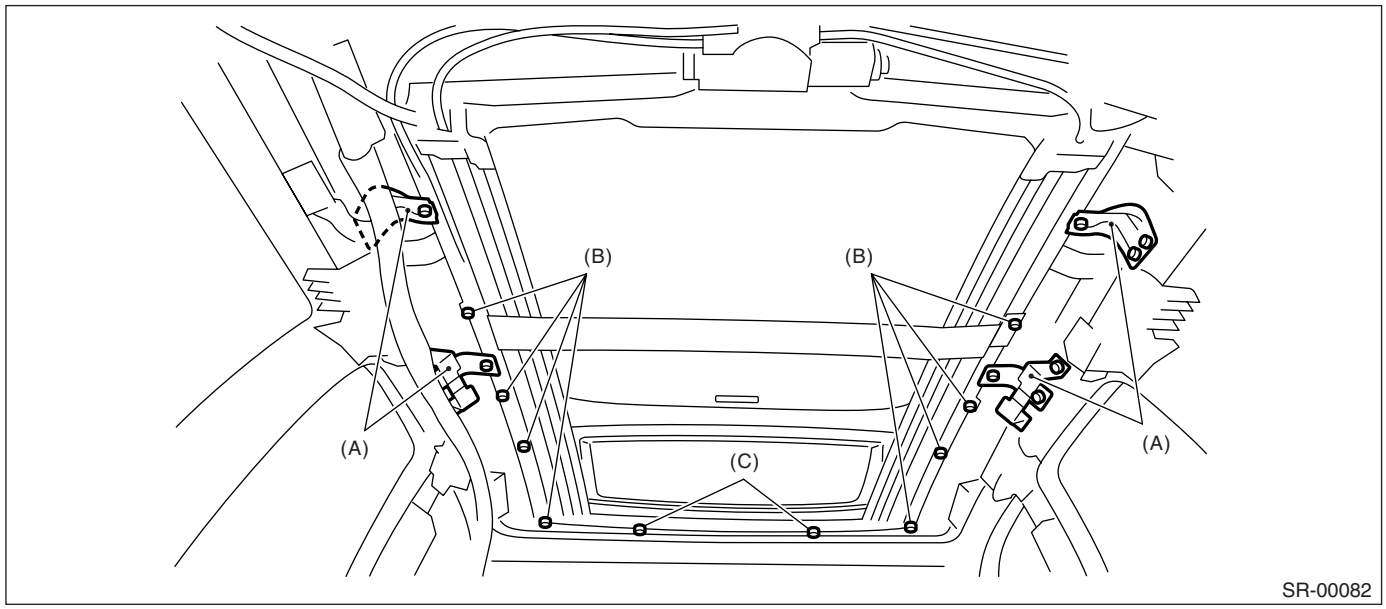


4) Remove the front and rear glass lid. <Ref. to SR-6, WAGON MODEL (FRONT), REMOVAL, Glass Lid.> <Ref. to SR-6, WAGON MODEL (REAR), REMOVAL, Glass Lid.>
5) Remove the installation bolts (A) on rear side frame bracket of frame assembly.



6) Remove the drain tube from frame assembly.
7) Remove the frame bracket (A).

8) Remove the bolts (B) and nuts (C), and then remove the frame assembly.



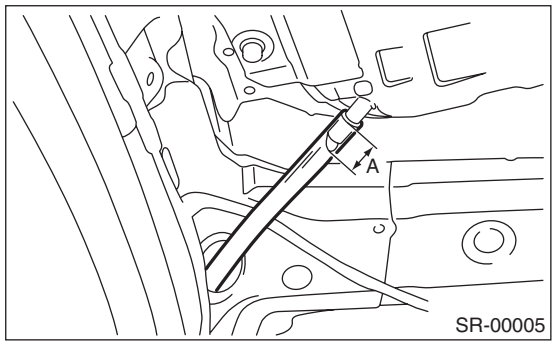
B: INSTALLATION

Install in the reverse order of removal.

CAUTION:
Be careful not to snag the harness.

NOTE:
• Be sure to connect the harness connector.
• When installing the drain tube, insert it securely into drain pipe.

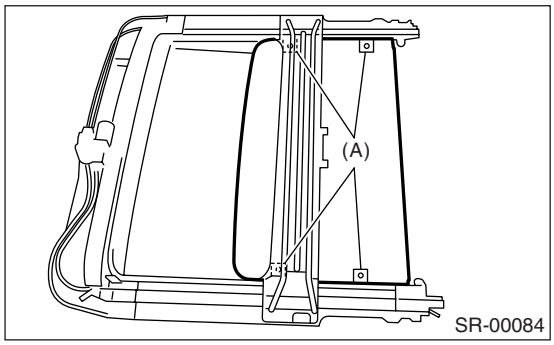
Length A:
15 mm (0.59 in) or more



C: DISASSEMBLY

1. SEDAN MODEL

1) Remove the glass lid.
2) Slide the sunshade to full front end.
3) Remove the screw from the slider bracket (A) of roof side.

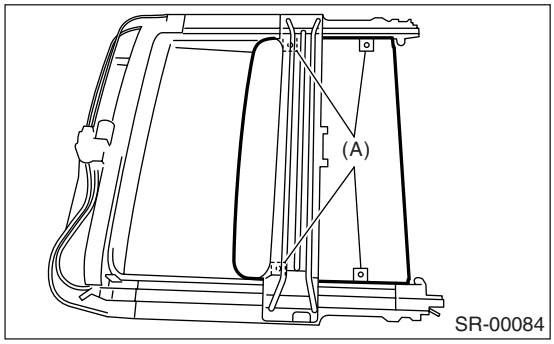


4) Pull out the sunshade from roof opening.

NOTE:
For sedan model, sunshade can be removed/installed with frame assembly installed to the vehicle.

2. WAGON MODEL (FRONT)

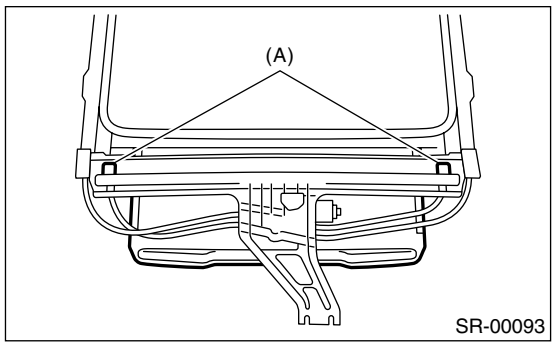
1) Remove the frame assembly. <Ref. to SR-9, REMOVAL, Sunroof Assembly.>
2) Slide the sunshade to fully open position, and then remove the screw from slider bracket (A).



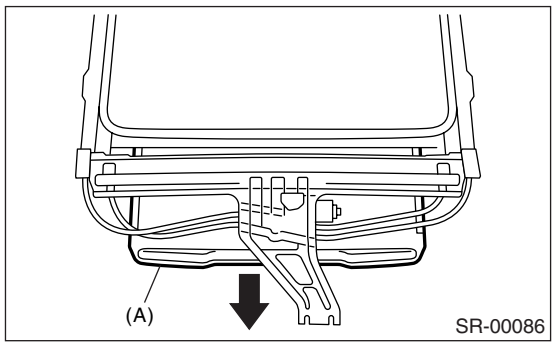
3) Pull out the sunshade to backward.

3. WAGON MODEL (REAR)

1) Remove the frame assembly.
2) Remove the shade stopper (A) of sunshade.



3) Pull out the sunshade (A) from sunroof frame.



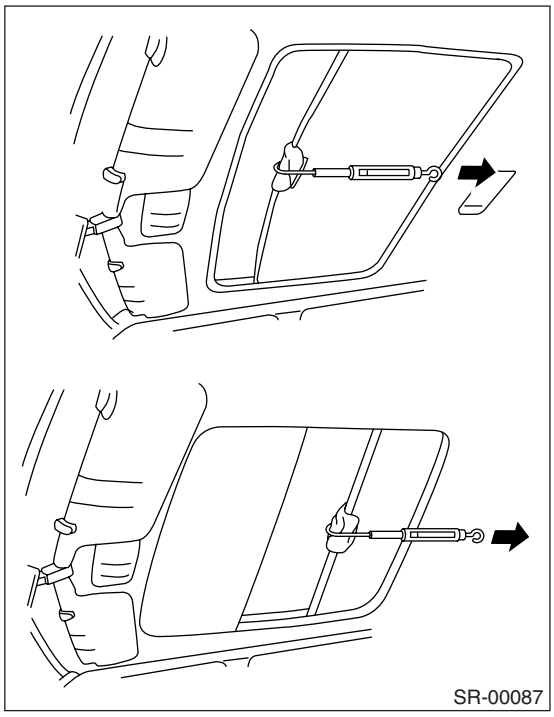
D: ASSEMBLY

Assemble in the reverse order of disassembly.

E: INSPECTION

1. CHECK FOR MOVING LOAD OF SUNSHADE

1) Attach a spring balance to sunshade edge using a cloth.



2) Pull the spring balance to measure moving load of the sunshade.

Moving load of sunshade:
Standard value
18.0±5.0 N (1.8±0.5 kgf, 13±3.7 lb)

NOTE:
Moving load is larger at the beginning of pulling a spring balance, so take a spring balance reading while sunshade sliding smoothly.

3) If moving load exceeds specifications, check the glass lid, sunshade and frame assembly for improper installation.

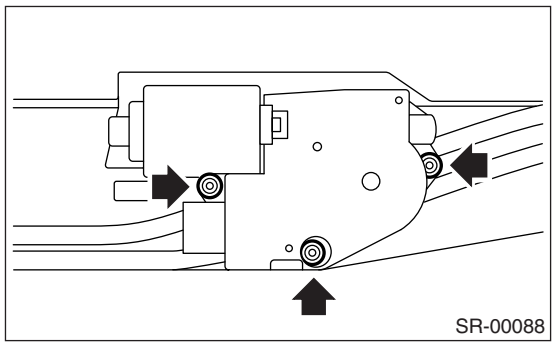
5. Sunroof Motor

A: REMOVAL

CAUTION:
• When removing the clip, use great care not to damage the roof trim.
• Never rotate the sunroof motor after removing it.

1. SEDAN MODEL

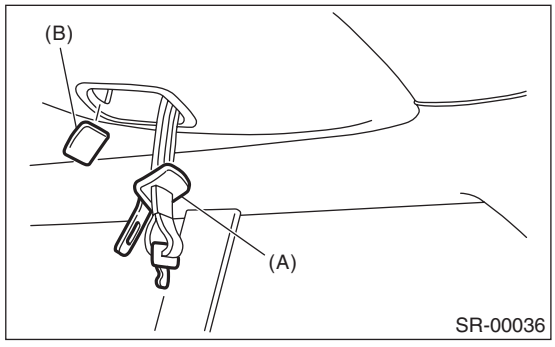
1) Completely close the glass lid.
2) Disconnect the ground cable from battery.
3) Remove the roof trim. <Ref. to EI-67, SEDAN MODEL, REMOVAL, Roof Trim.>
4) Disconnect the harness connector, and then remove the motor assembly mounting screw.



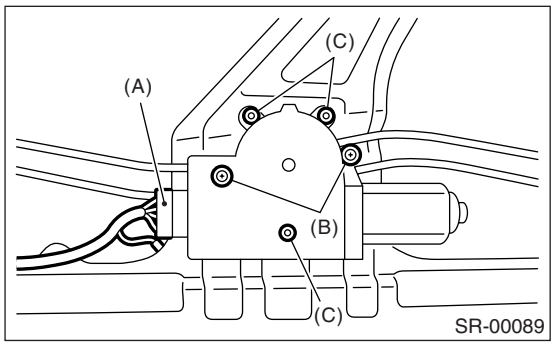
CAUTION:
When removing the motor assembly, secure the cable wires to prevent moves.

2. WAGON MODEL

1) Fully close the glass lid (front) and glass lid (rear).
2) Disconnect the ground cable from battery.
3) Remove the luggage room light. <Ref. to LI-36, REMOVAL, Luggage Room Light.>
4) Remove the roof trim. <Ref. to EI-67, WAGON MODEL, REMOVAL, Roof Trim.>
5) Pass the seat belt tongue (A) located on center of rear seat through the hole, and then pull it out to the opposite side of trim.



6) Remove the clips, and then drop the rear end of roof trim.
7) Disconnect the harness connector (A), and then remove the motor assembly mounting bolt (B) and nuts (C).

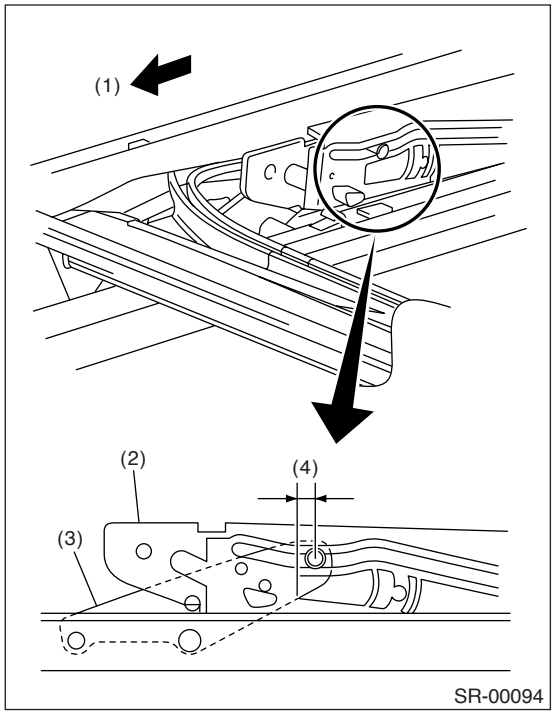


B: INSTALLATION

CAUTION:
When installing the motor assembly, be careful not to move the sunroof cable.

1. SEDAN MODEL

1) Align the coulisse assembly and link assembly in the same position.



(1) Front
(2) Coulisse ASSY
(3) Link ASSY
(4) 4.7 mm (0.185 in)

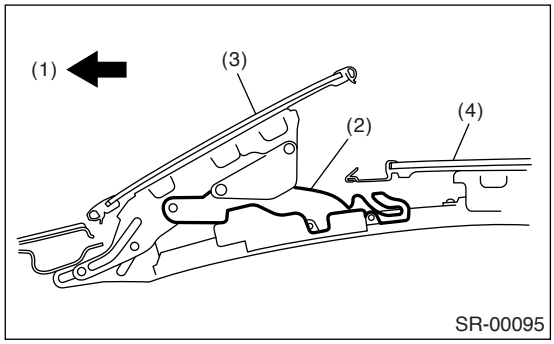
2) Install the motor assembly.
3) Connect the harness connector of motor assembly, and then connect the battery ground cable to battery.
4) Perform the initialize operation of motor.
   (1) Tilt up the glass lid.
   (2) Release the switch once, and press the tilt up switch again for 15 seconds.
   (3) When the glass lid is raised a little and on tilt up position, release the switch for the moment.
   (4) Keep pressing the tilt up switch within 5 seconds from releasing the switch, glass lid tilts down → slides open → slides close operation automatically, and then initialize operation is completed.
5) Check the operation of sunroof with following table.

Operation	Switch position
(1) Glass lid closes completely.	Close
(2) Glass lid tilt up to the top position.	Tilt up
(3) Glass lid lowers completely.	Tilt down
(4) Glass lid opens completely.	Open
(5) Glass lid closes 150 mm (5.91 in) away from completely closed position.	Close
(6) Glass lid closes completely.	Close

6) Install the trim in the reverse order of removal.

2. WAGON MODEL

Check that the wedge of glass lid (front) bracket part is contacting in the direction of vehicle front.
At this time, the lid is at fully open position.



(1) Front
(2) Wedge
(3) Glass lid (Front)
(4) Glass lid (Rear)

1) Install the motor assembly.
2) After the installation of motor assembly, check again that the wedge of glass lid (front) bracket part is contacting in the direction of vehicle front.
3) Connect the harness connector of motor assembly, and then connect the battery ground cable to battery.
4) Perform the initialize operation of motor.
• When replacing the motor with a new one, fully close the glass once and perform the initialization of position, because the movement of glass lid shifts to brink operation.
• When reusing the motor, operate the auto-reverse function five times in a row to shifts brink operation, and then perform the initialization of position.
5) Check the operation of sunroof with following table.

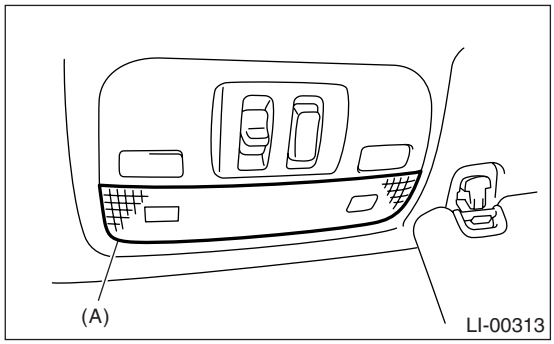
Operation	Switch position
(1) Glass lid (front) and glass lid (rear) closes completely.	Close
(2) Glass lid (front) tilt up to the ventilating position.	Open
(3) Glass lid (front) tilts up to top position, and glass lid (rear) opens near the completely open position.	Open
(4) Glass lid (rear) opens completely.	Open
(5) Glass lid (rear) closes on 150 mm (5.91 in) from rear end of tilted up glass lid (front).	Close
(6) Glass lid (rear) closes completely.	Close
(7) Glass lid (front) lowers, and then glass lid (front) and glass lid (rear) closes completely.	Close

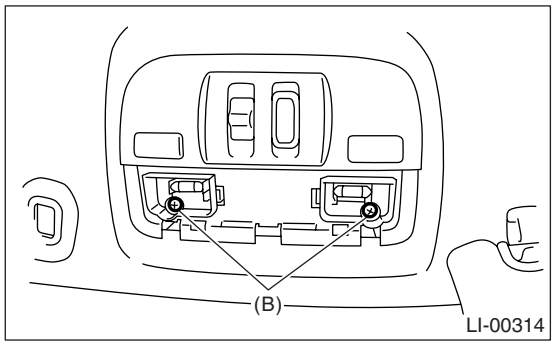
6) Install the trim in the reverse order of removal.

6. Sunroof Switch

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the spot map light lens (A) and sunroof switch mounting screws (B).





3) Disconnect the harness connector, and then remove the sunroof switch.

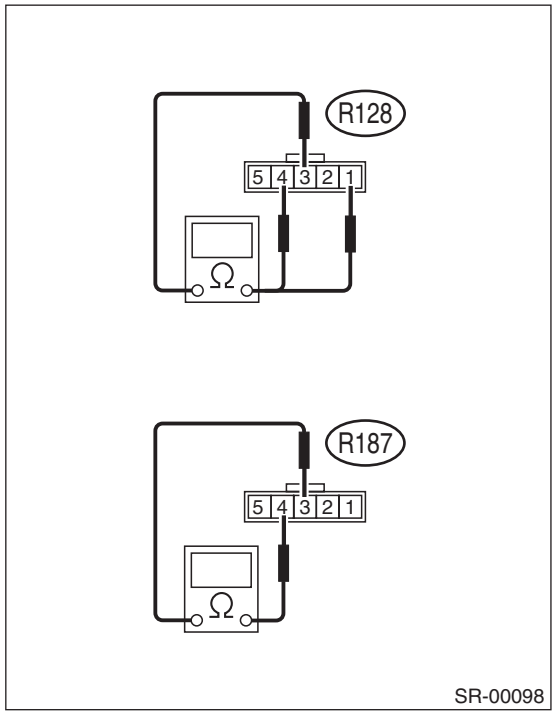
B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

1. SEDAN MODEL

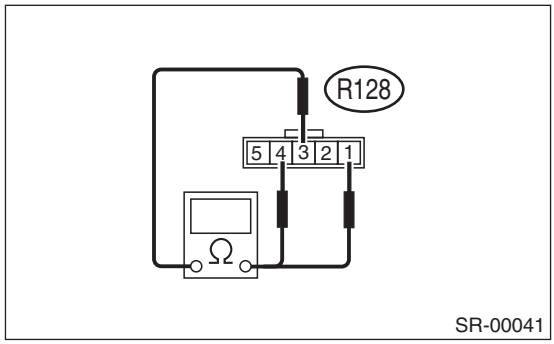
Measure the sunroof switch resistance.



Switch position	Terminal No.	Standard	Connector No.
Open	1 and 3	Less than 1 Ω	R128
Close	3 and 4	Less than 1 Ω	
Tilt up	4 and 3	Less than 1 Ω	R187
Tilt down	3 and 4	Less than 1 Ω	

2. WAGON MODEL

Measure the sunroof switch resistance.



Switch position	Terminal No.	Standard
Open	1 and 3	Less than 1 Ω
Close	3 and 4	Less than 1 Ω

NOTE:
If glass lid does not operate or is not supplied with power, move the glass lid using the emergency handle. <Ref. to SR-7, FORCED DRIVE, Glass Lid.>

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

EXTERIOR/INTERIOR TRIM

EI

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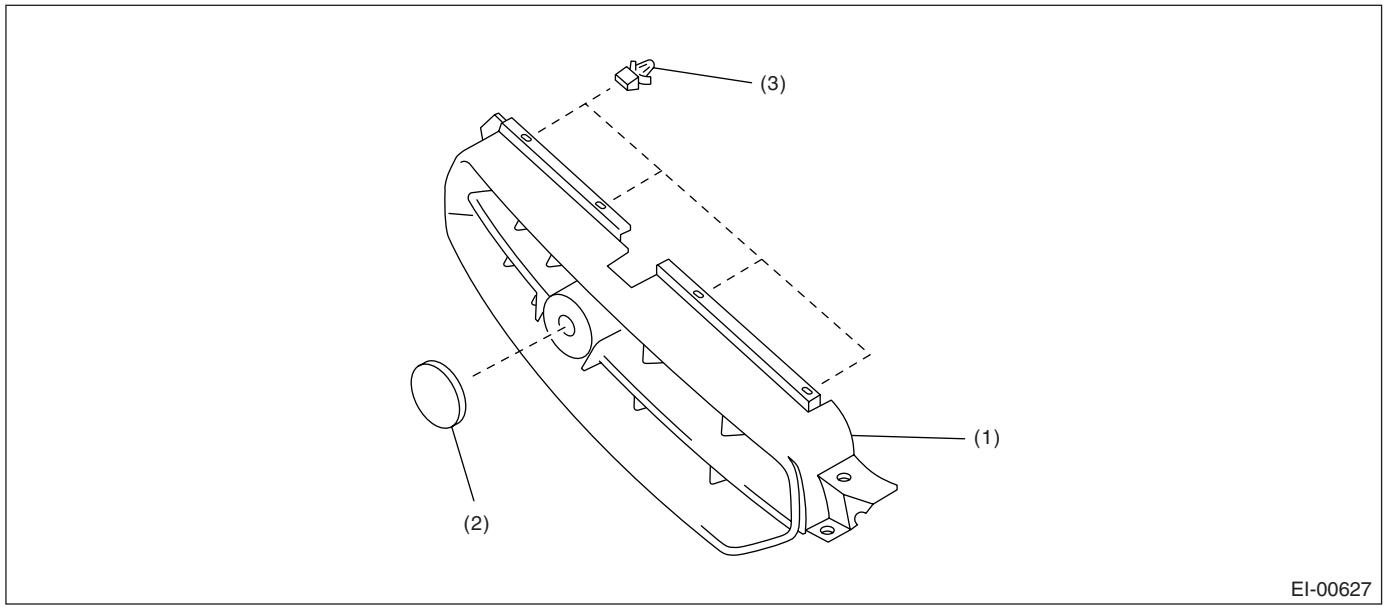
1. General Description

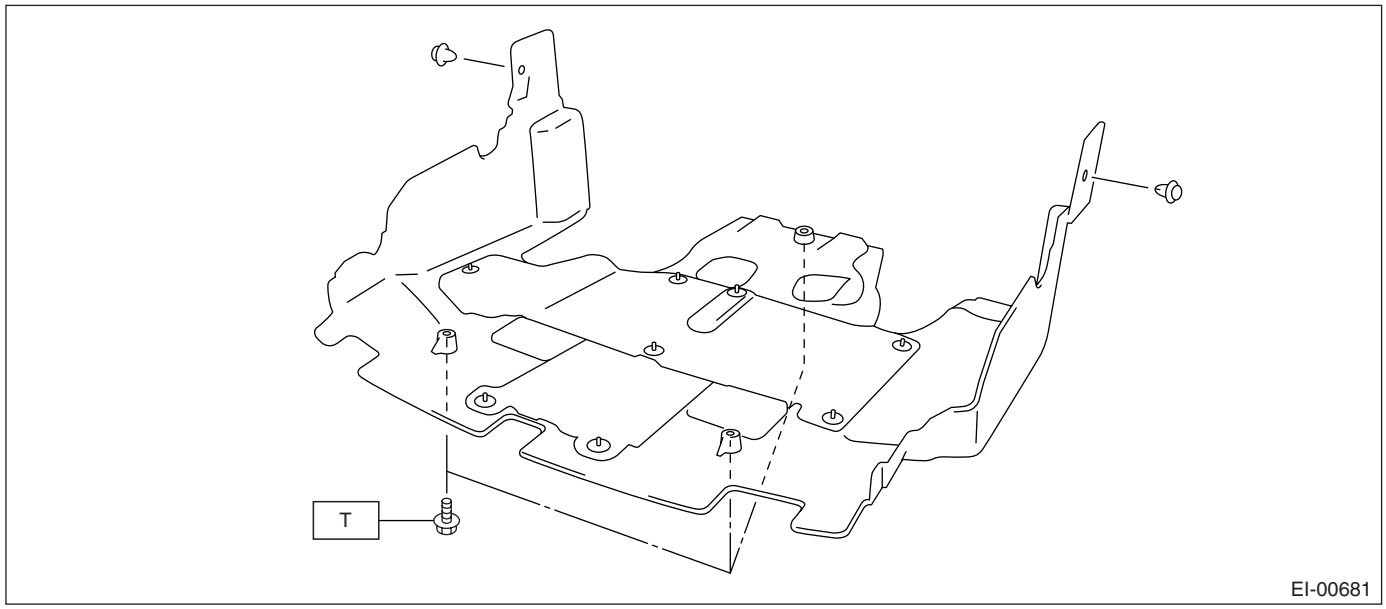
A: COMPONENT

1. FRONT GRILLE



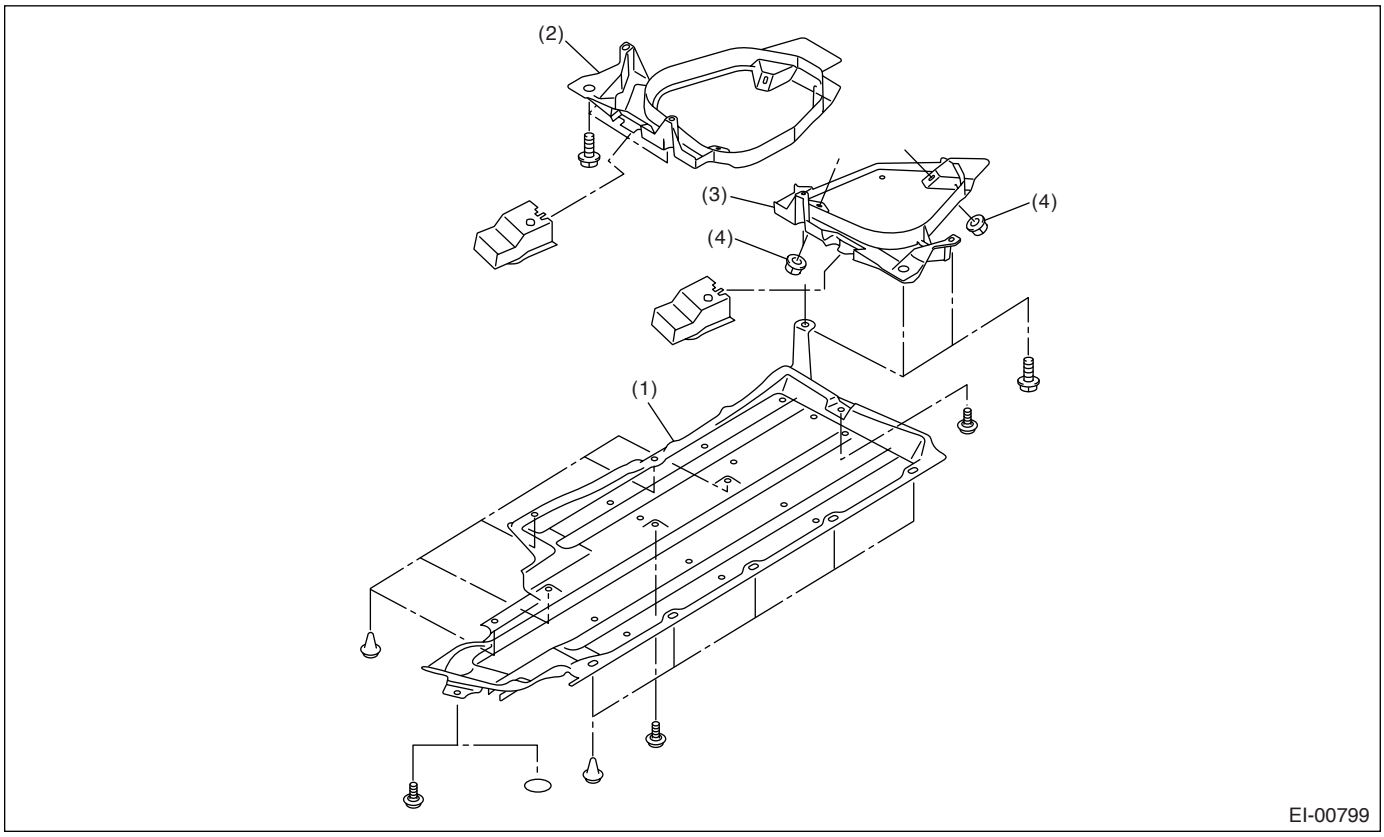
(1) Front grille
(2) Front grille emblem
(3) Front grille clip

2. UNDER COVER



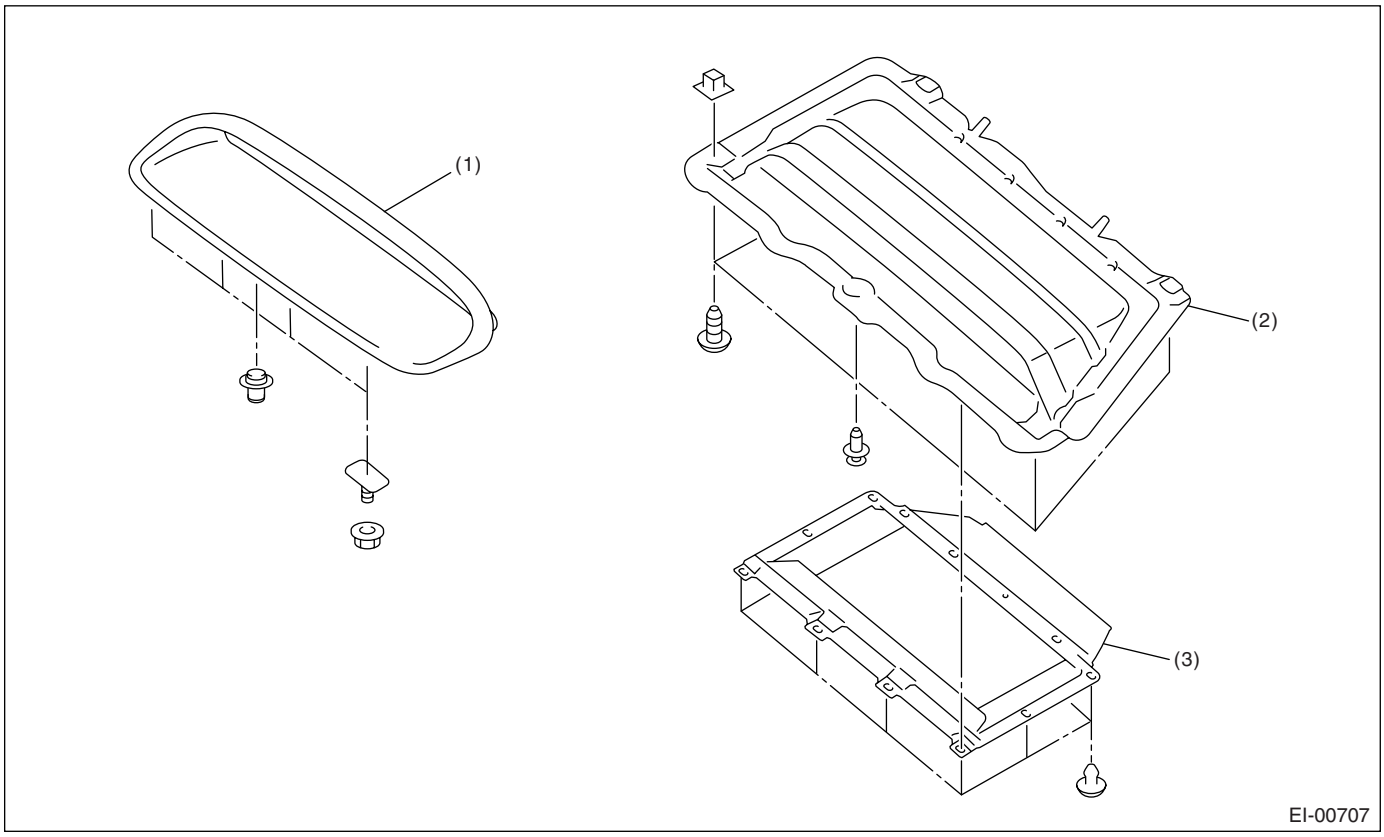
Tightening torque: N·m (kgf-m, ft-lb)
T: 14 (1.42, 10.3)

3. UNDER PROTECTOR



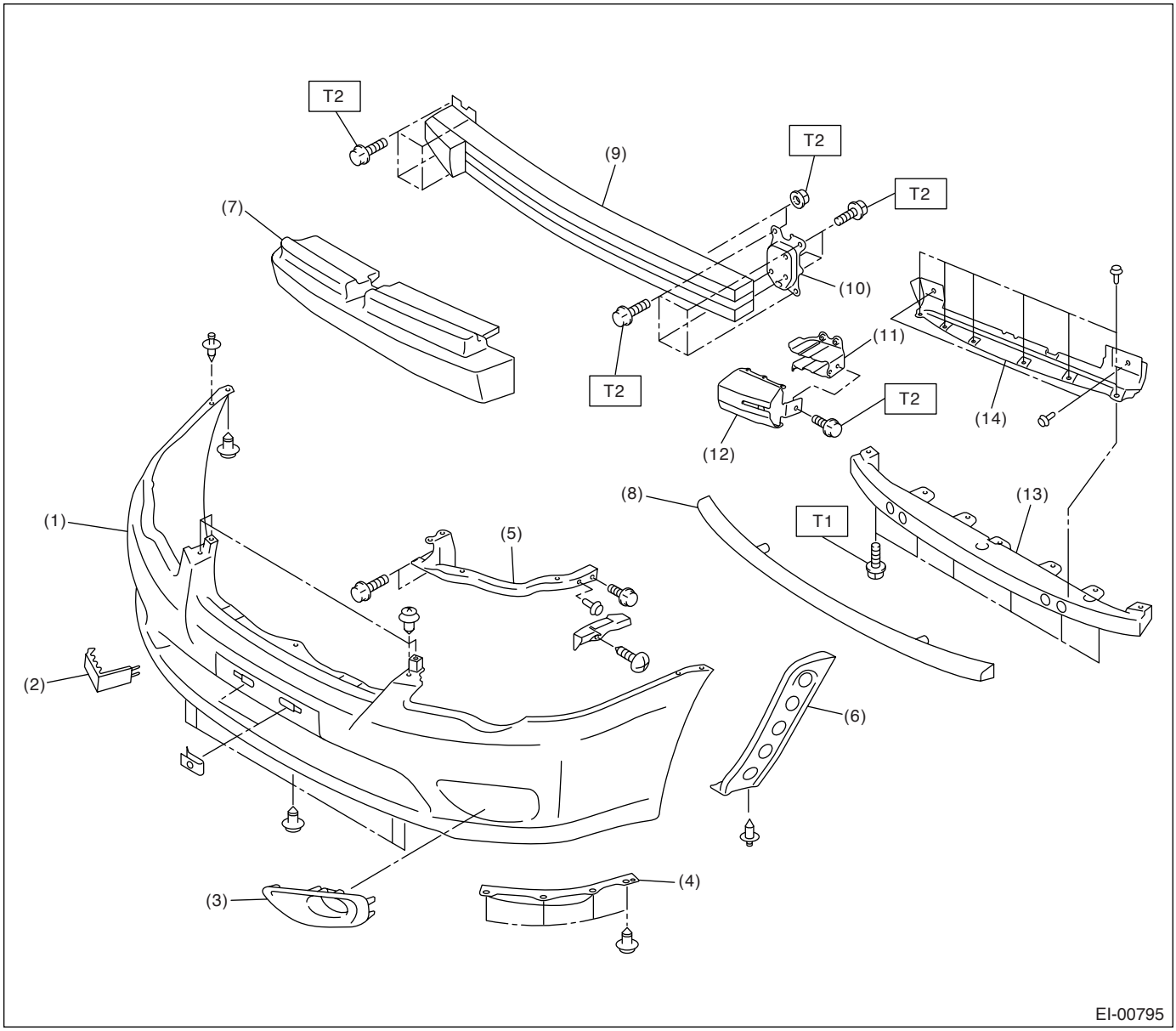
(1) Floor under protector
(2) Fuel tank protector RH
(3) Fuel tank protector LH
(4) Plastic nut

4. FRONT HOOD GRILLE



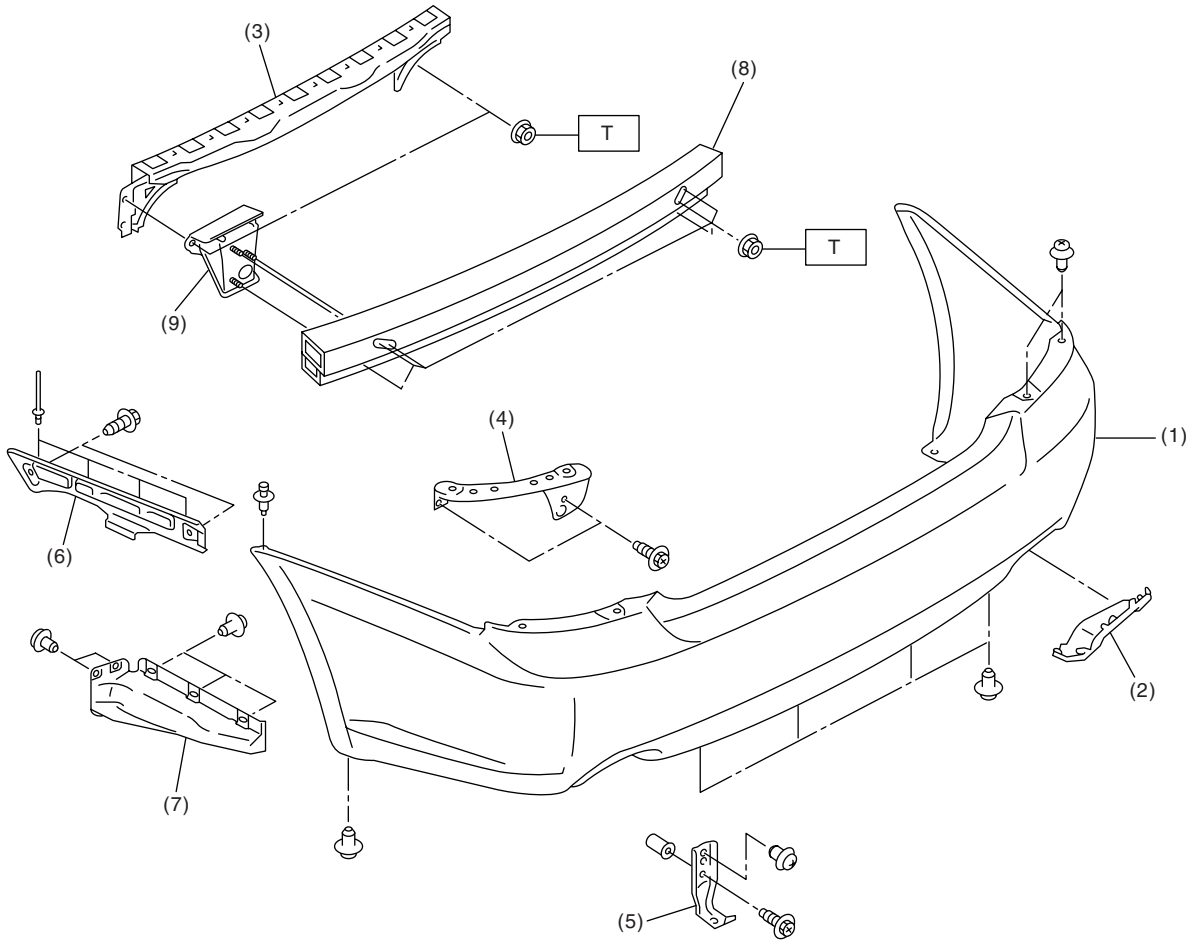
(1) Front hood grille
(2) Grille duct upper
(3) Grille duct lower

5. FRONT BUMPER



(1)	Bumper face	(7)	Energy absorber foam upper	(13)	Lower center bracket
(2)	Towing hook cover	(8)	Energy absorber foam lower	(14)	Radiator guide
(3)	Fog light cover	(9)	Main beam reinforcement		
(4)	Lower side bracket	(10)	Main beam bracket	***Tightening torque: N·m (kgf-m, ft-lb)***	
(5)	Upper bracket	(11)	Bracket support	***T1:***	***7.5 (0.77, 5.5)***
(6)	Side bracket	(12)	Energy absorber side	***T2:***	***33 (3.4, 24)***

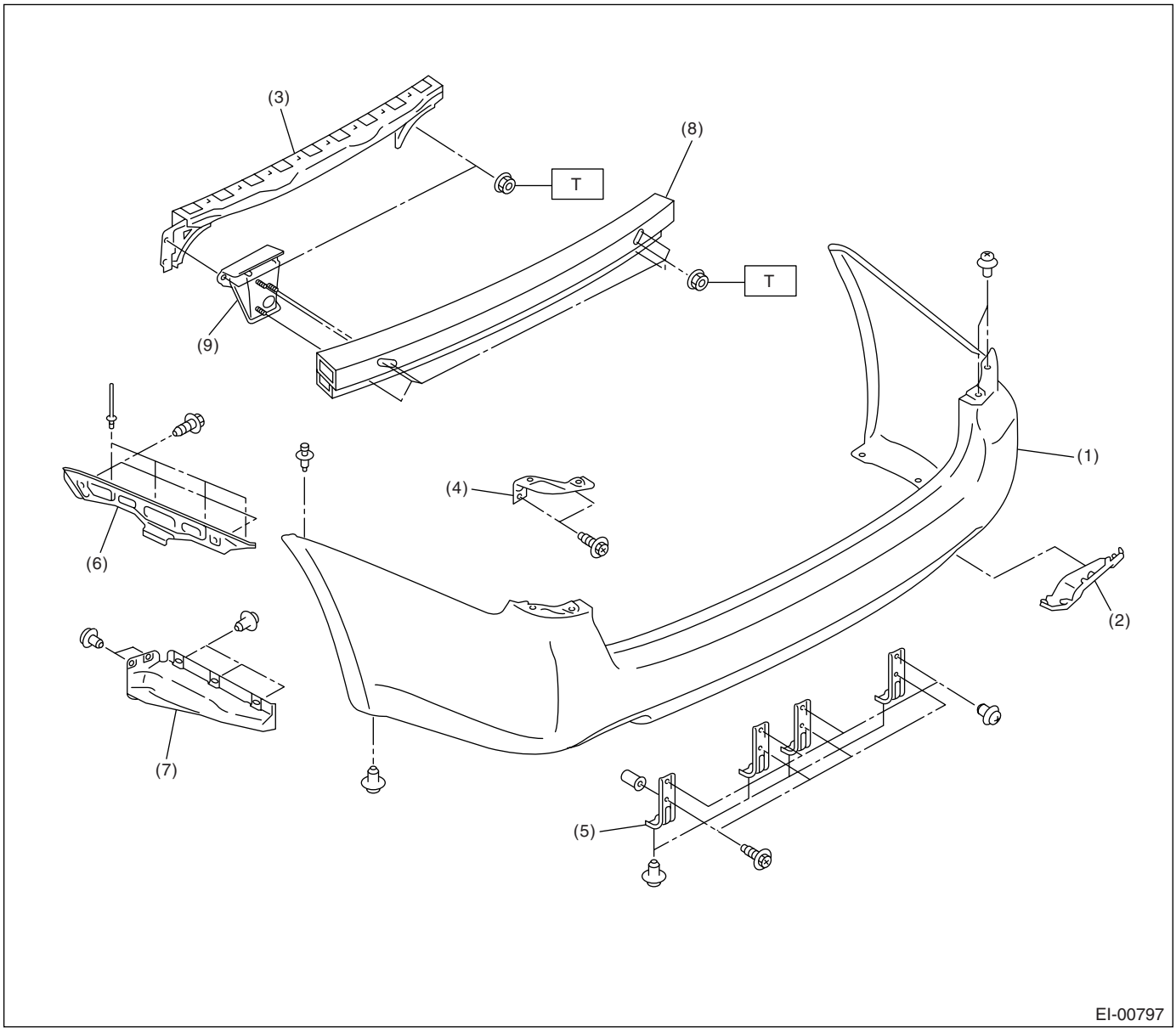
6. REAR BUMPER (SEDAN MODEL)



(1) Bumper face
(2) Exhaust end cover
(3) Beam upper rear
(4) Bracket corner
(5) Lower bracket
(6) Bumper side support upper
(7) Bumper side support lower
(8) Beam main reinforcement
(9) Bumper beam bracket

Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 24)

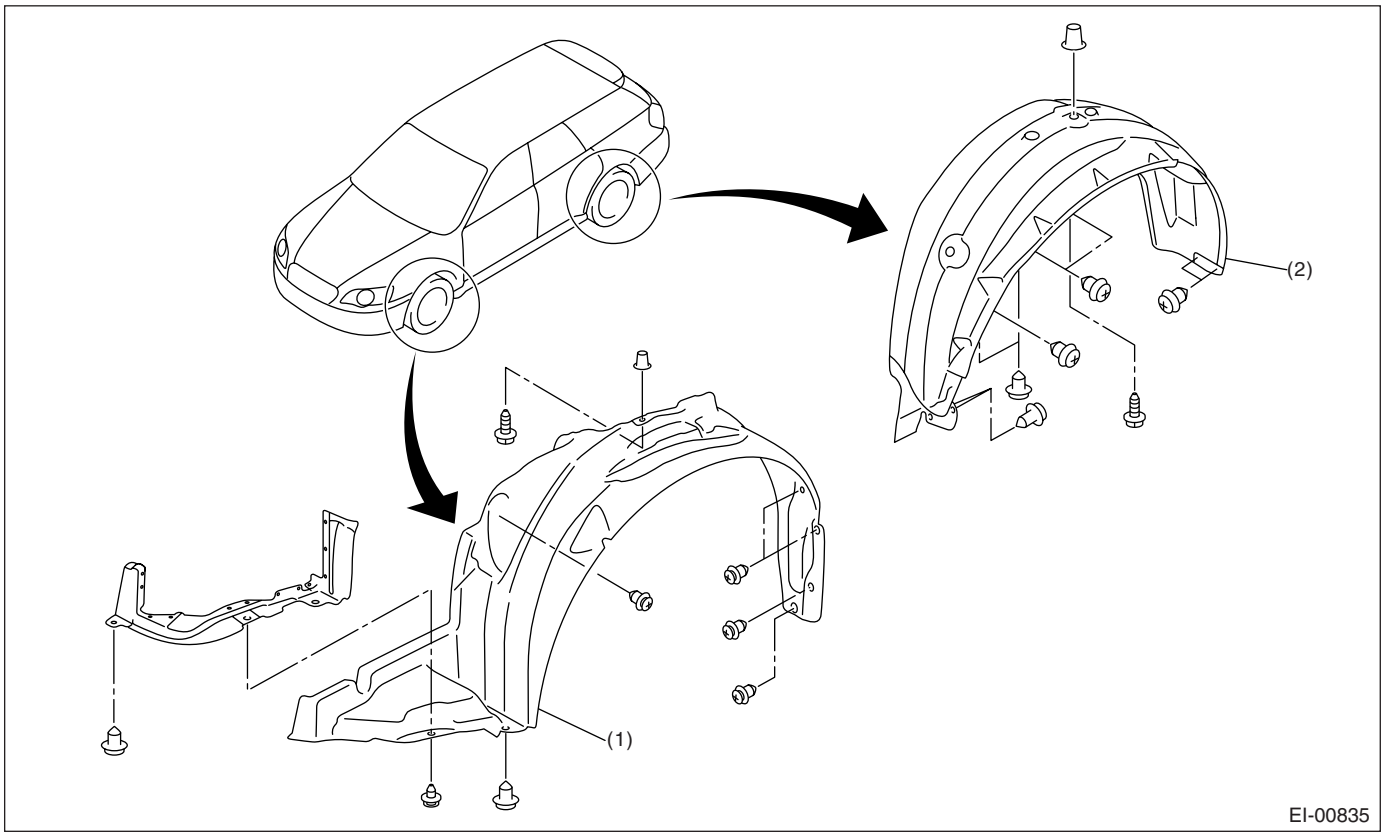
7. REAR BUMPER (WAGON MODEL)



(1) Bumper face
(2) Exhaust end cover
(3) Beam upper rear
(4) Bracket corner
(5) Lower bracket
(6) Bumper side support upper
(7) Bumper side support lower
(8) Beam main reinforcement
(9) Bumper beam bracket

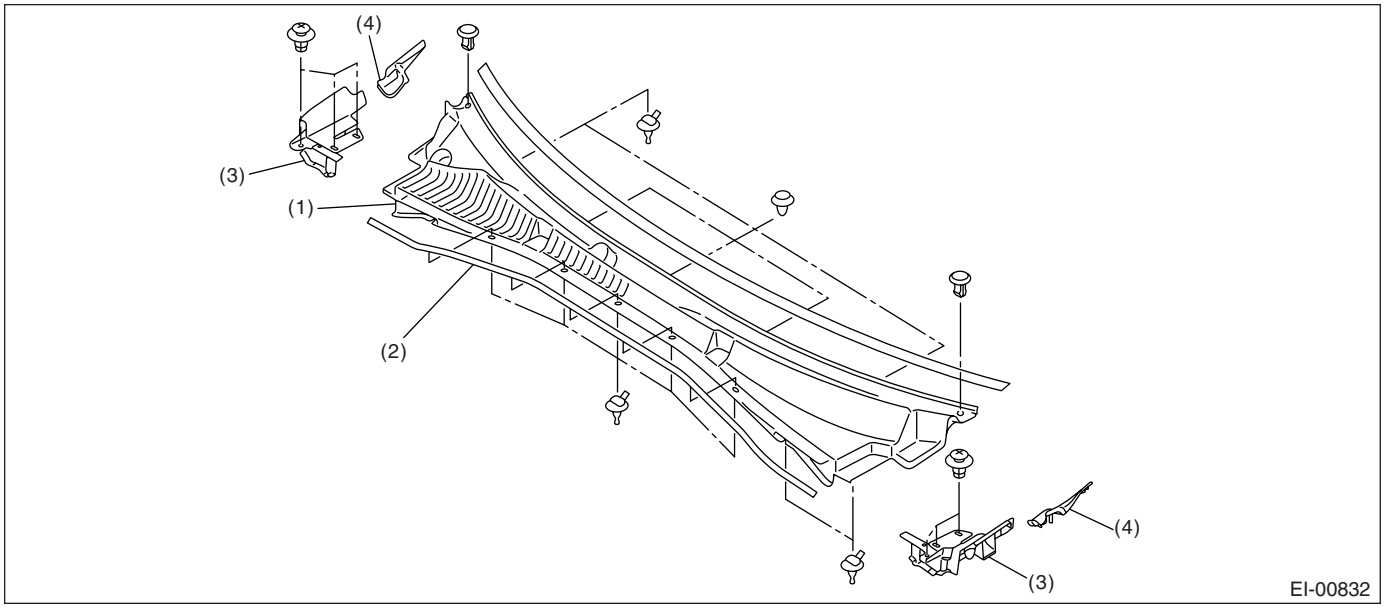
Tightening torque: N·m (kgf-m, ft-lb)
T: 33 (3.4, 24)

8. MUD GUARD



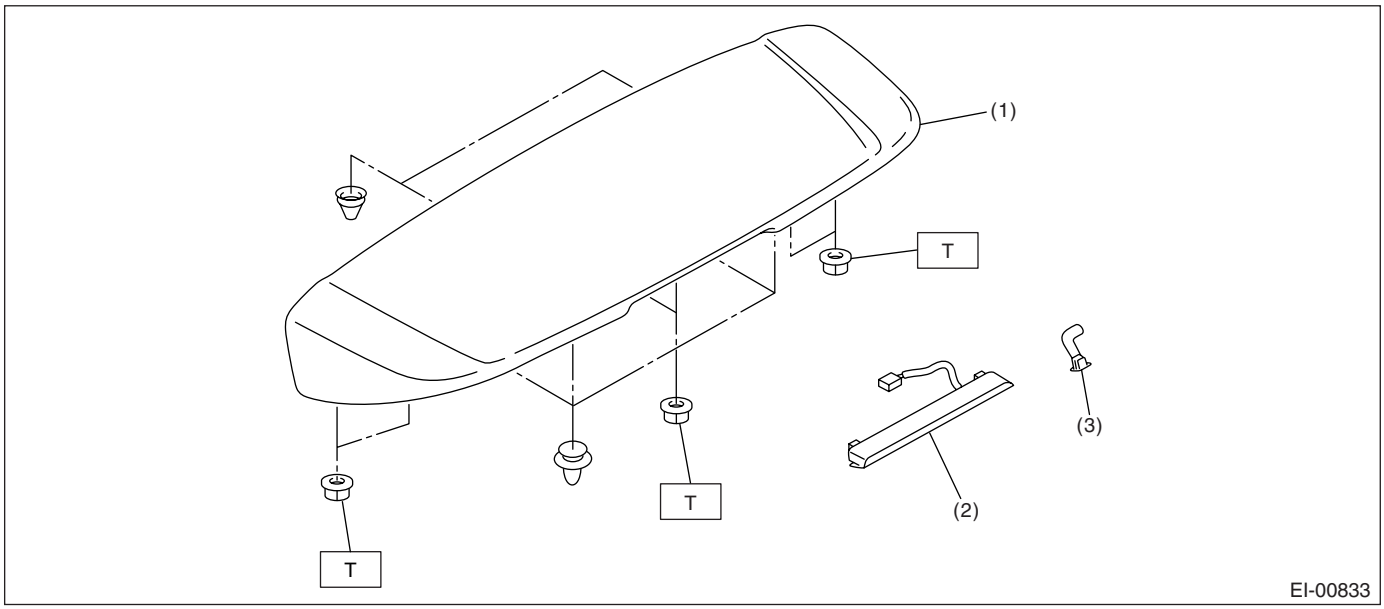
(1) Front mud guard
(2) Rear mud guard

9. COWL PANEL



(1) Cowl panel
(2) Weather strip
(3) Cover cowl panel
(4) Cowl side panel

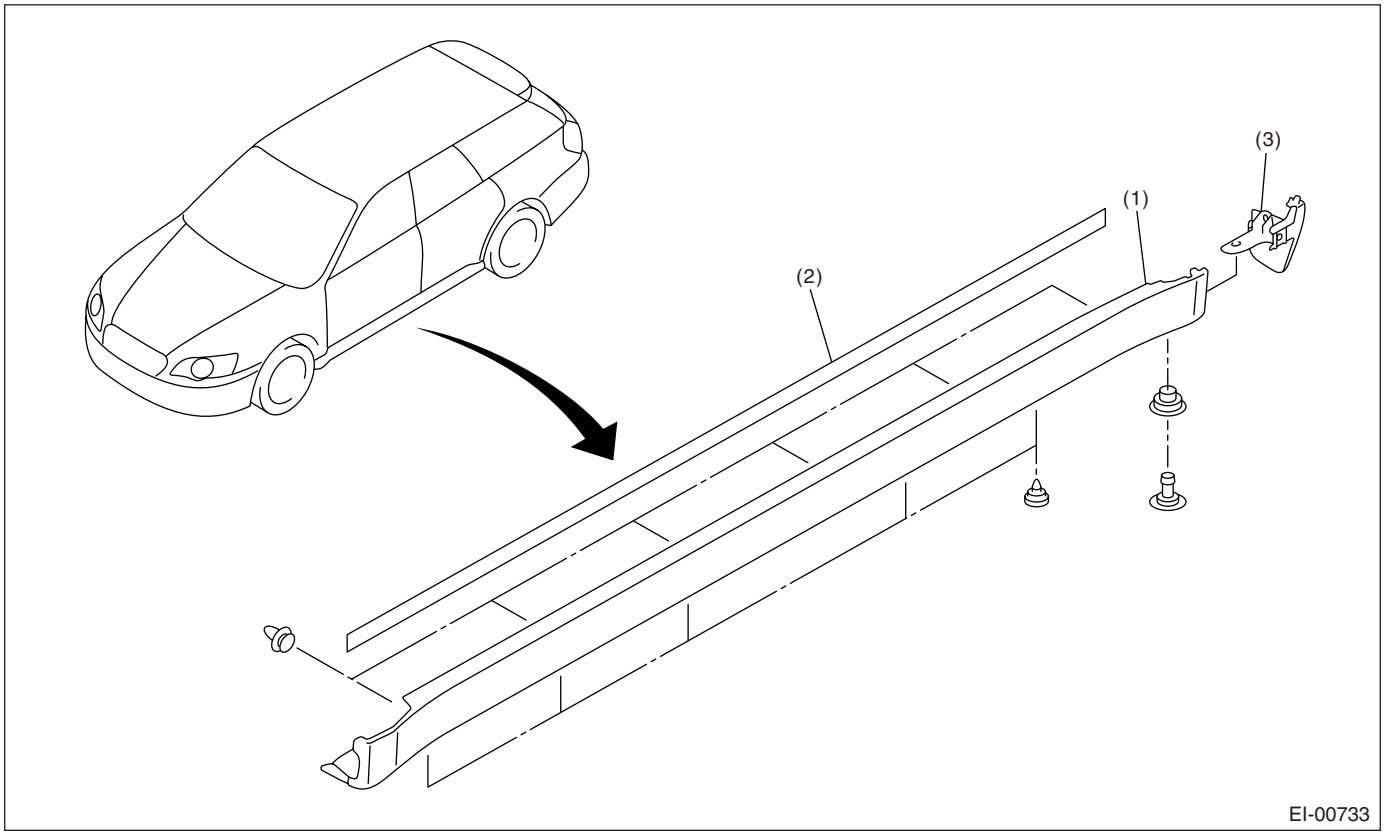
10.ROOF SPOILER



(1) Roof spoiler
(2) High-mounted stop light
(3) Washer nozzle

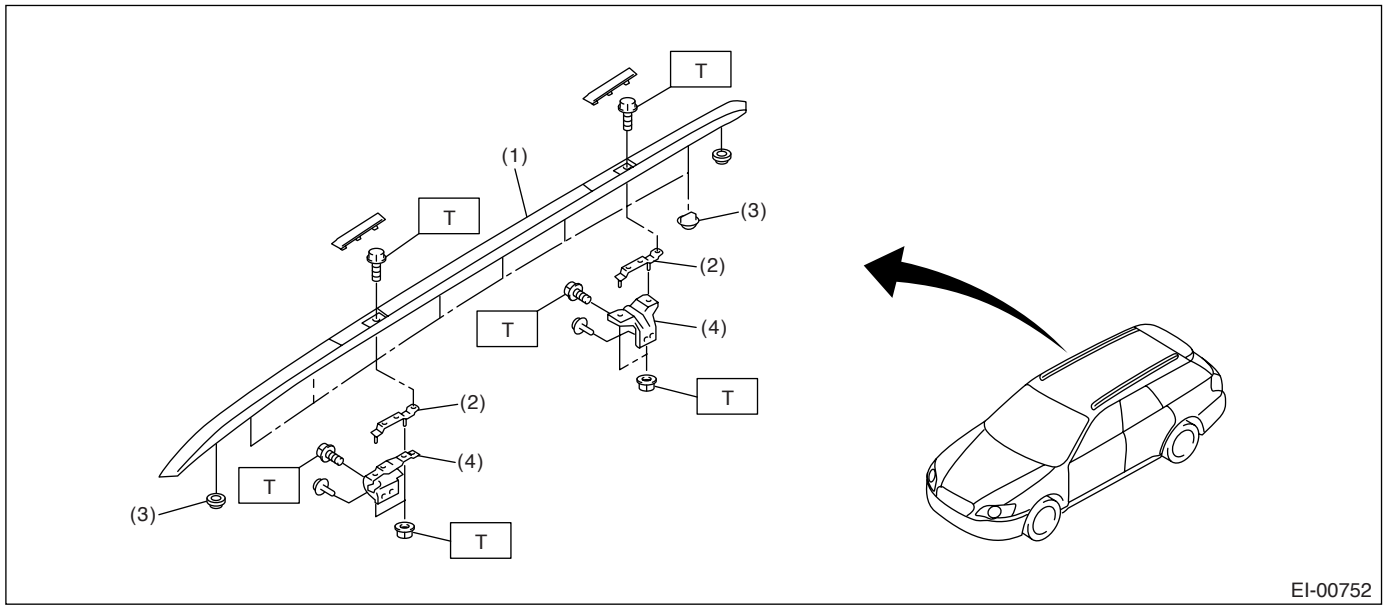
Tightening torque: N·m (kgf-m, ft-lb)
T: 4.5 (0.46, 3.32)

11.SIDE SILL SPOILER



(1) Side sill spoiler
(2) Double-sided tape
(3) Air flap side sill end

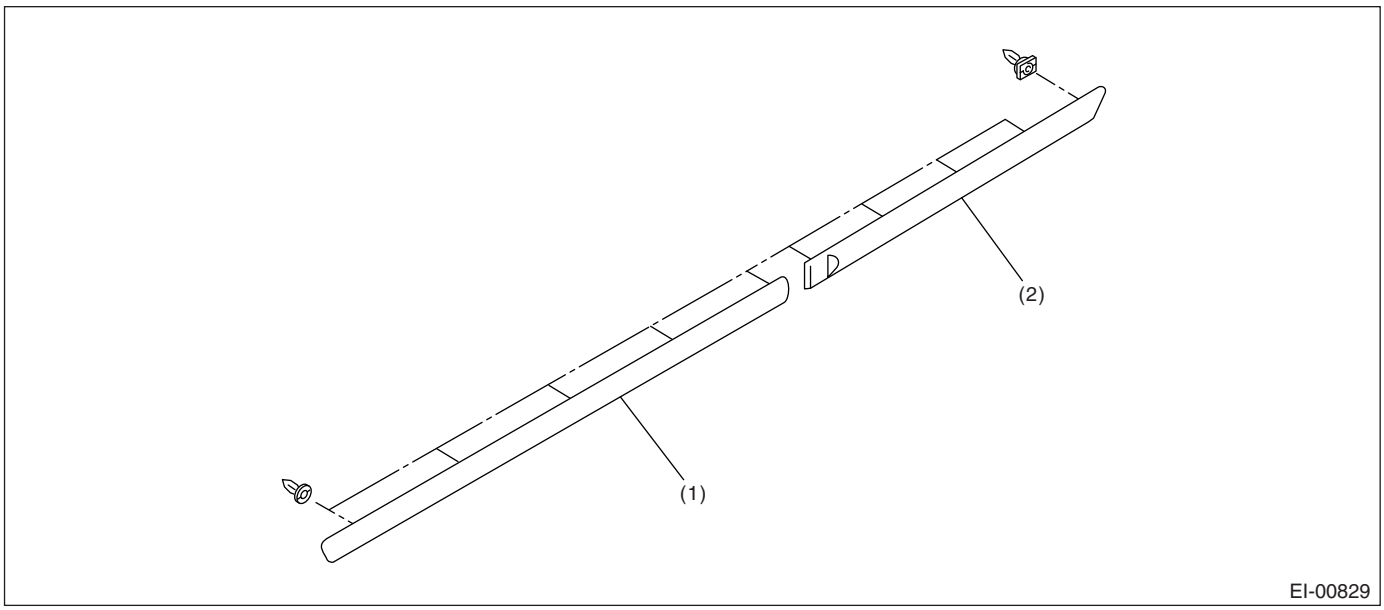
12.ROOF MOLDING



(1) Roof molding
(2) Roof carrier attachment
(3) Clip
(4) Roof carrier attachment bracket

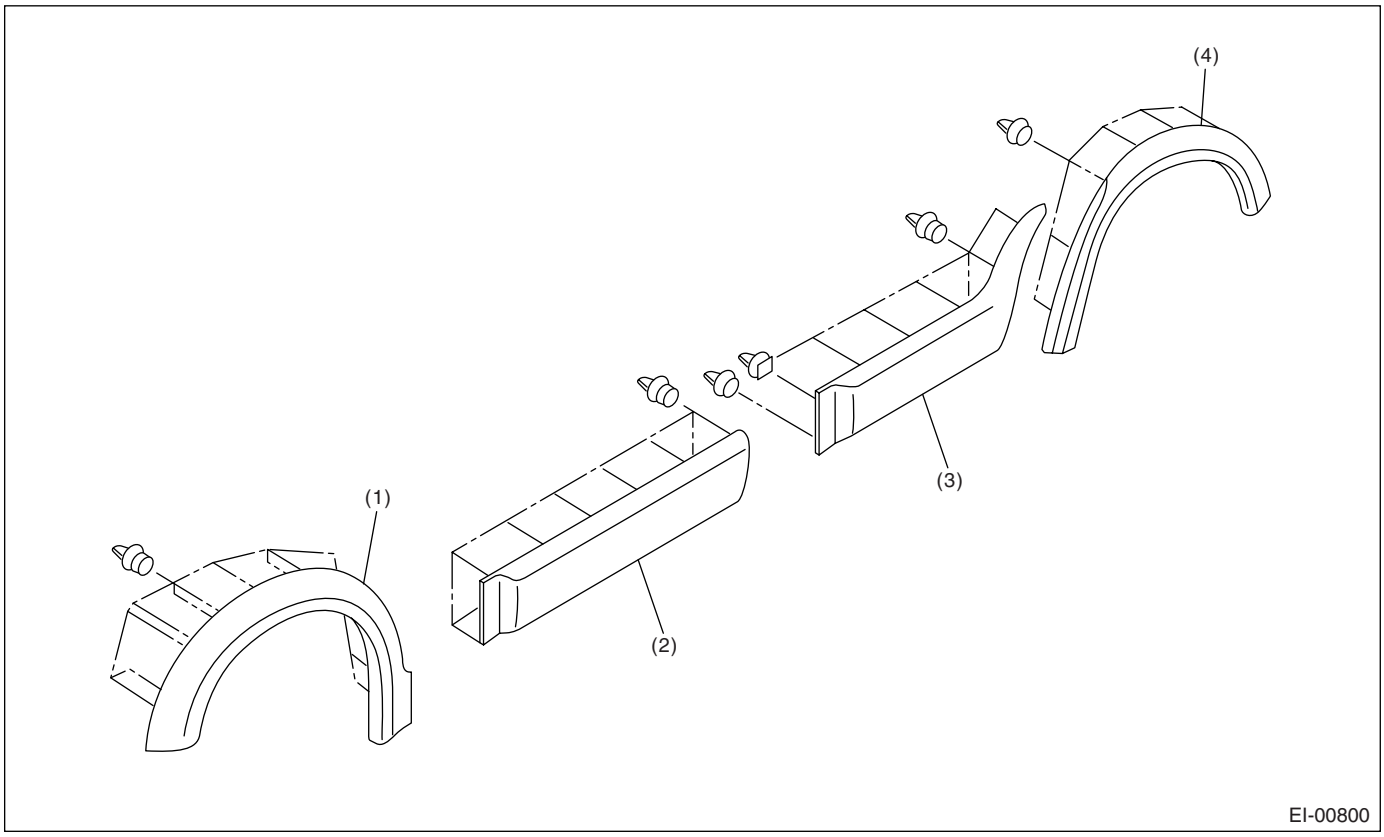
Tightening torque: N·m (kgf-m, ft-lb)
T: 4.5 (0.46, 3.32)

13.SIDE PROTECTOR



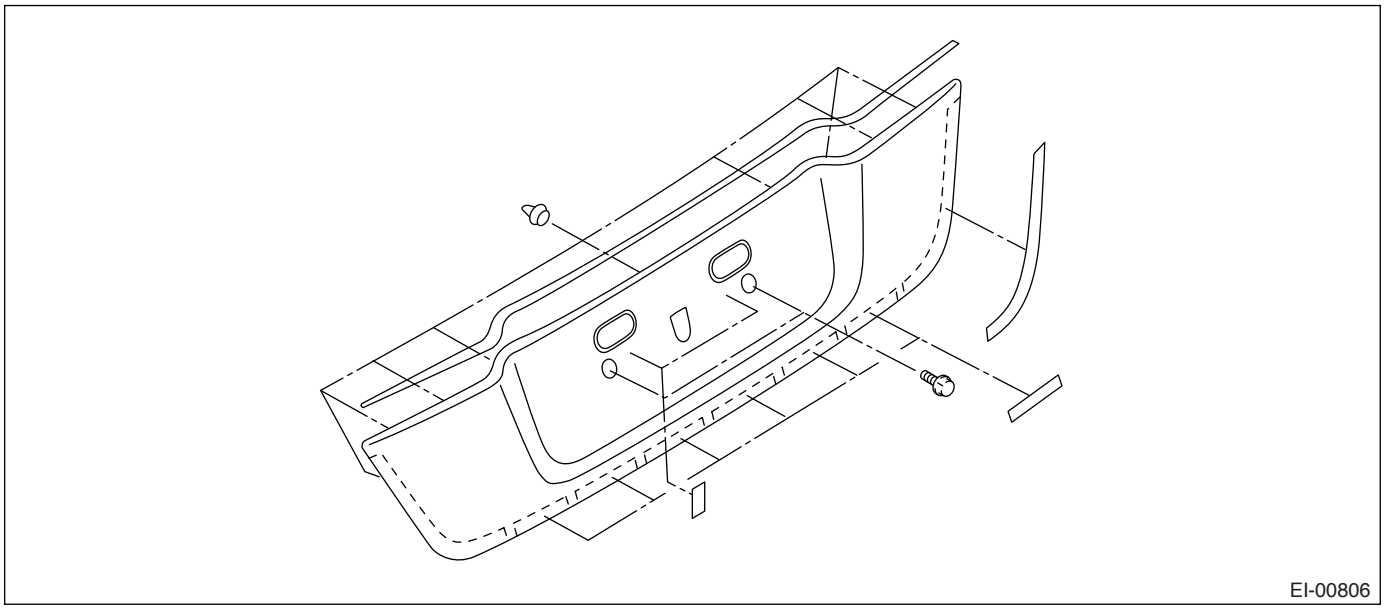
(1) Front door protector
(2) Rear door protector

14.SIDE GARNISH

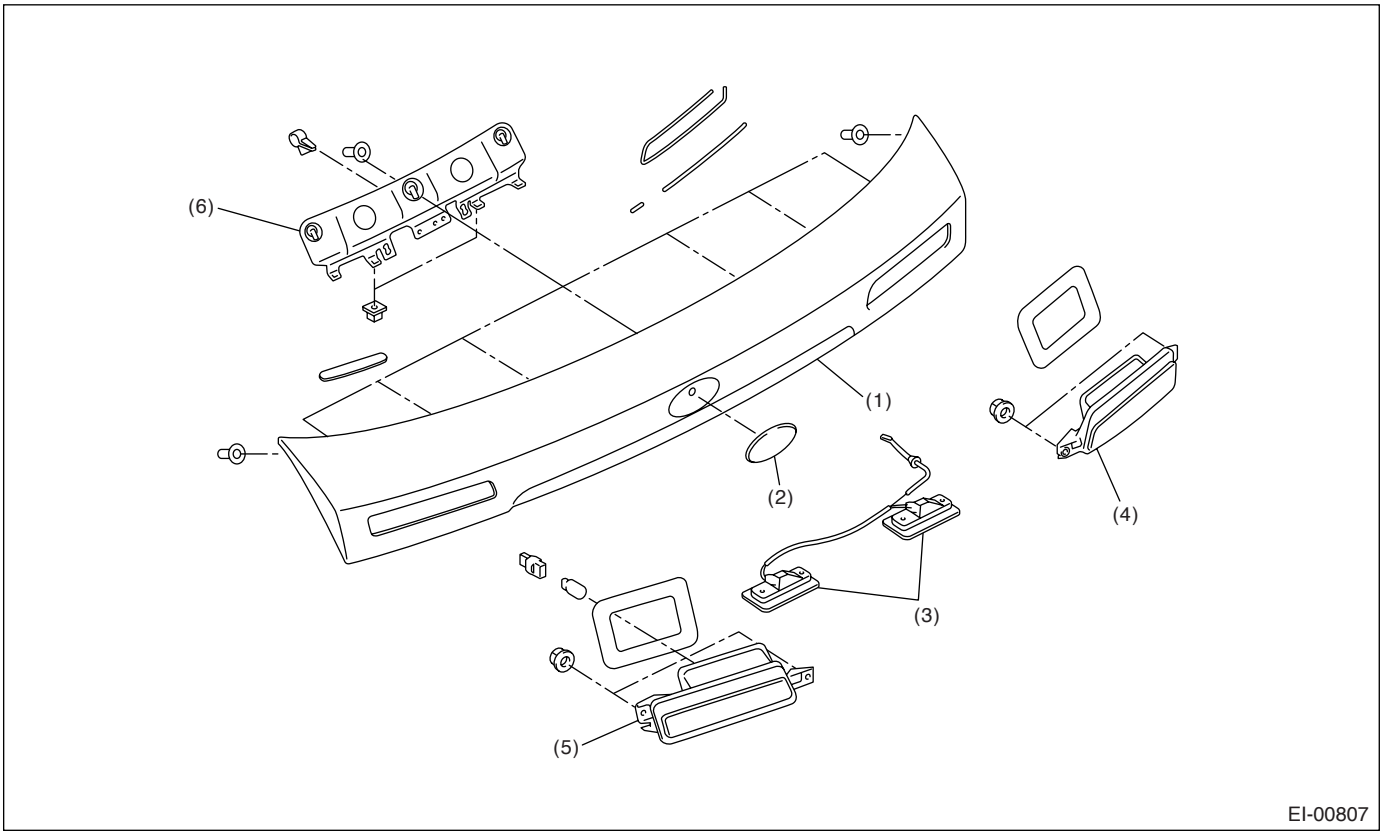


(1) Front fender garnish
(2) Front door garnish
(3) Rear door garnish
(4) Rear quarter garnish

15.TRUNK LID GARNISH

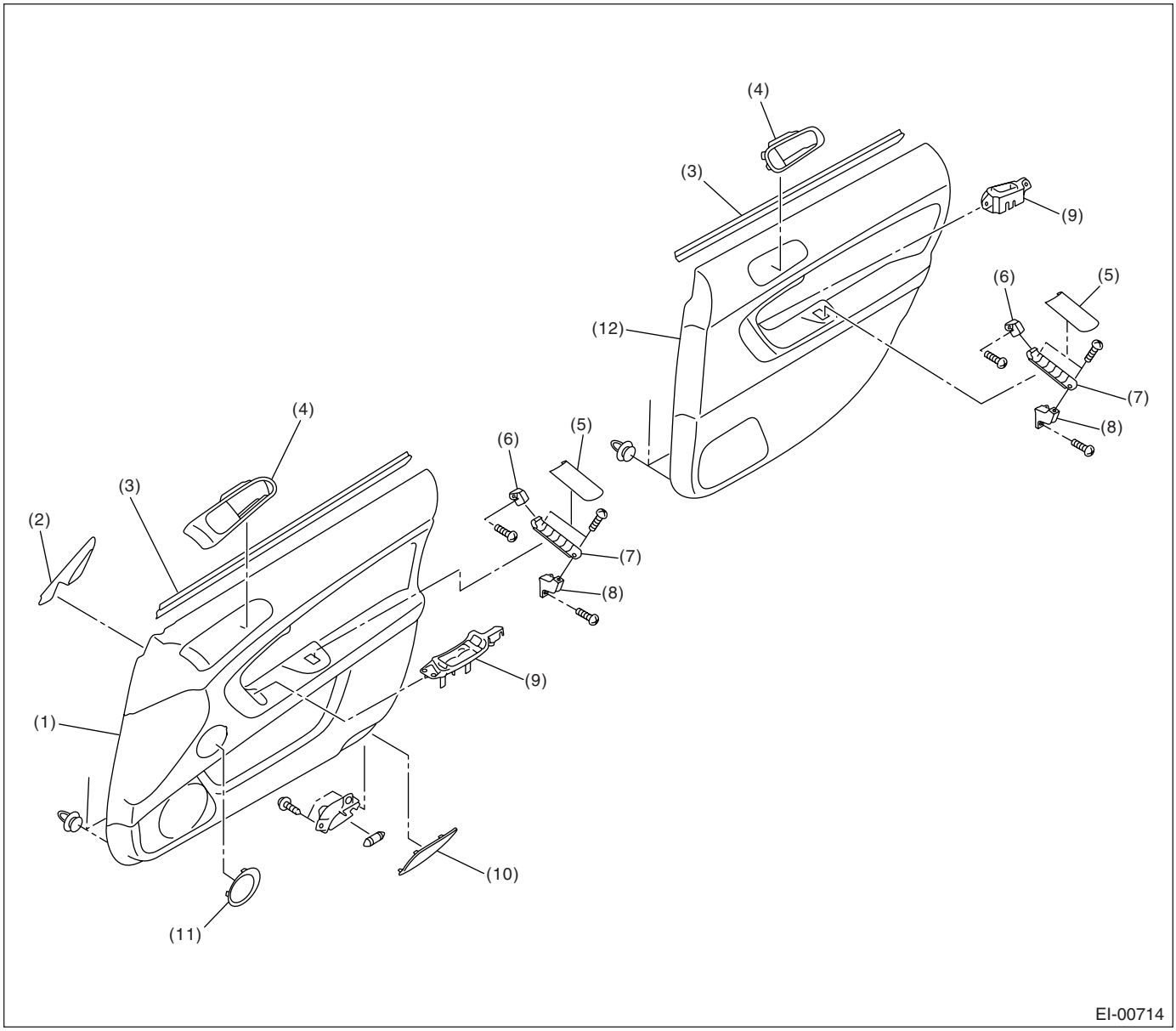


16.REAR GATE GARNISH



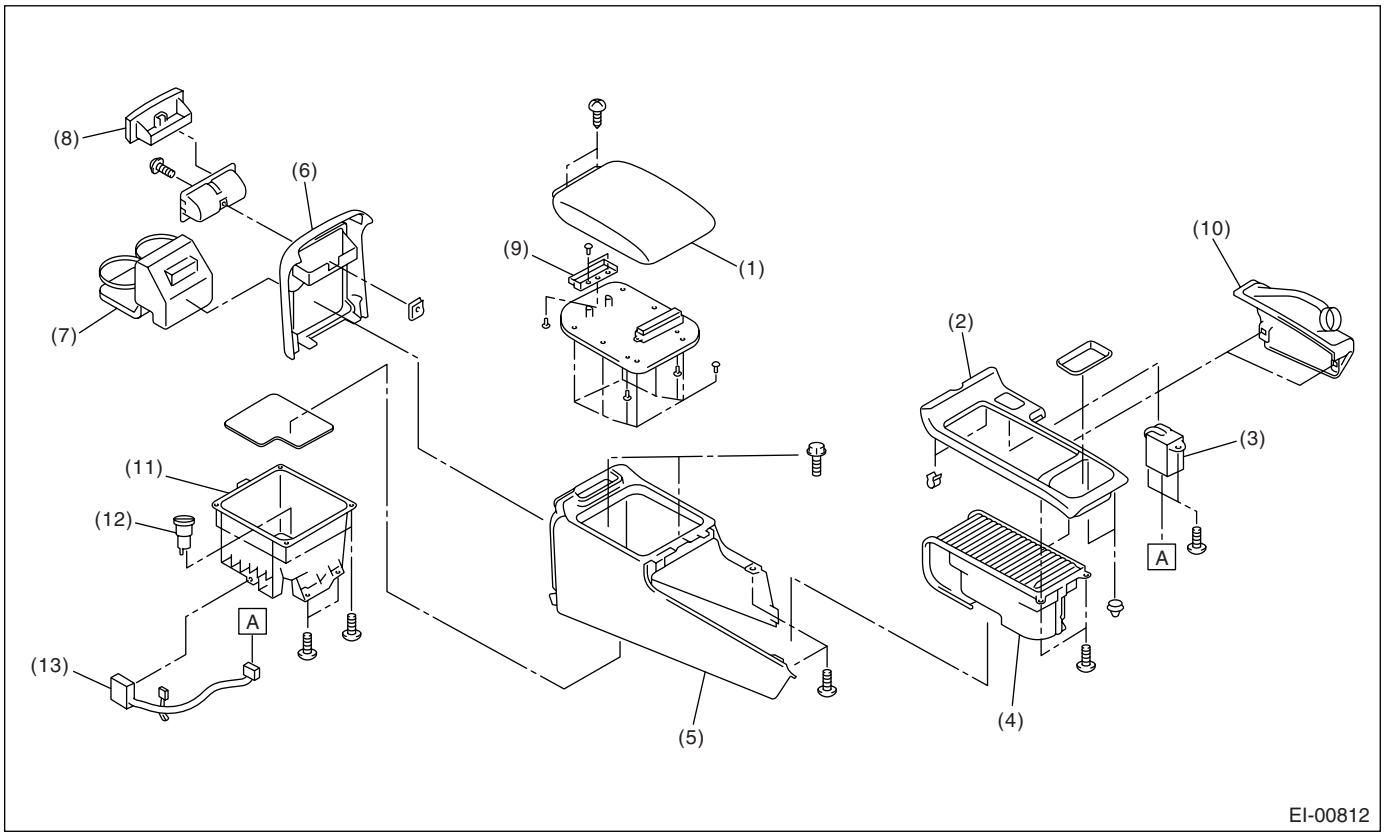
(1) Rear gate garnish
(2) Ornament
(3) License plate light
(4) Rear fog light or back-up light
(5) Back-up light or rear fog light
(6) License plate light bracket

17.DOOR TRIM



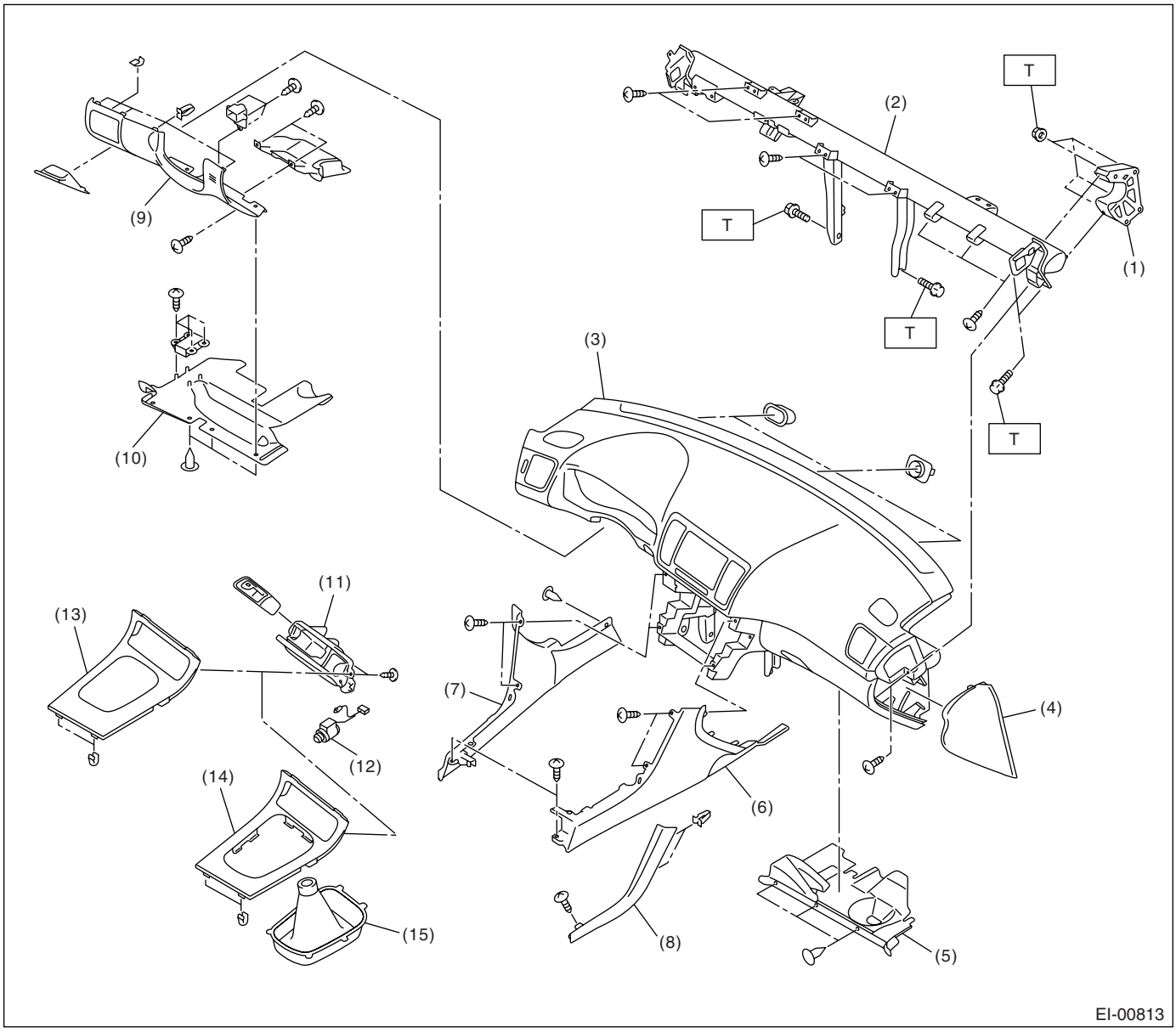
(1)	Front door trim	(5)	Door grip	(9)	Power window switch
(2)	Gusset cover	(6)	Door grip bracket upper	(10)	Step light cover
(3)	Upper weather strip	(7)	Door grip frame	(11)	Speaker cover
(4)	Inner remote cover	(8)	Door grip bracket lower	(12)	Rear door trim

18.CONSOLE BOX



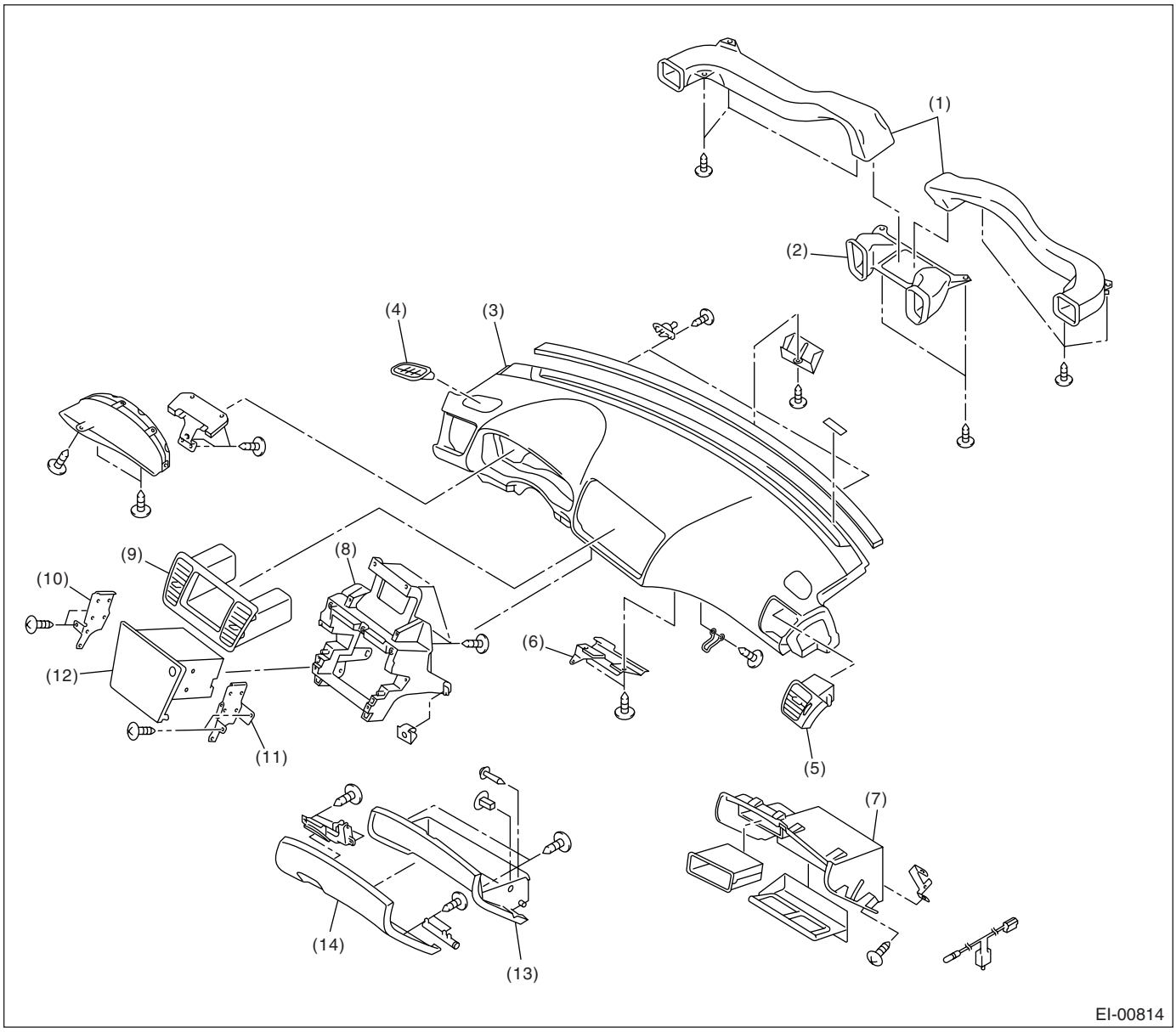
(1) Upper lid
(2) Console cover
(3) Seat heater switch
(4) Front cup holder
(5) Console box outer
(6) Rear lid
(7) Rear cup holder
(8) Ash tray
(9) Lid hinge
(10) Parking brake lever boot
(11) Console pocket
(12) Front accessory power supply socket
(13) Console box harness

19.INSTRUMENT PANEL



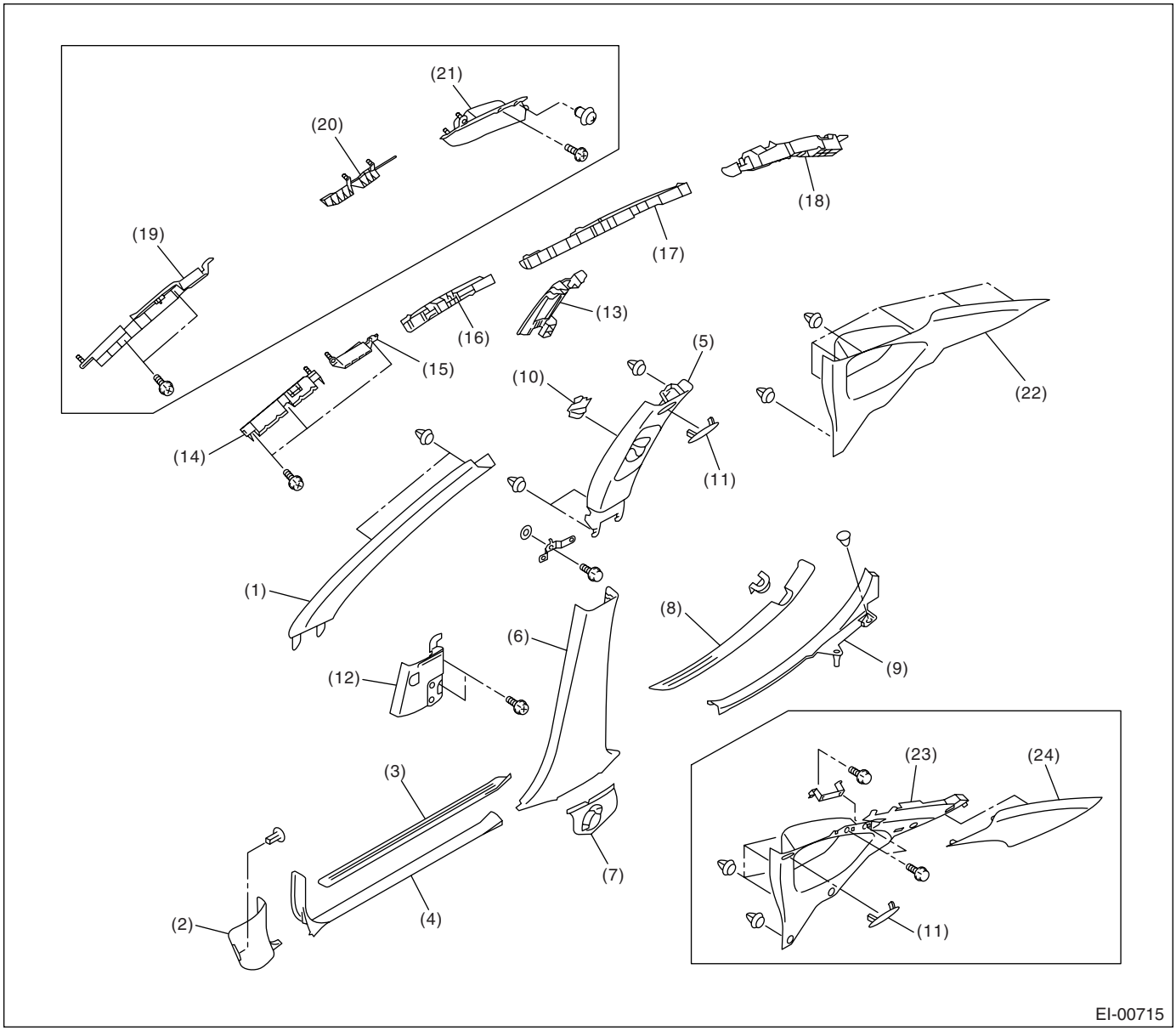
(1) Steering support beam bracket
(2) Steering support beam
(3) Instrument panel pad & frame ASSY
(4) Instrument panel side cover
(5) Glove box lower cover
(6) Console side panel RH
(7) Console side panel LH
(8) Console side garnish
(9) Instrument panel lower cover upper
(10) Instrument panel lower cover under
(11) Ash tray holder
(12) Front accessory power supply socket
(13) Console front panel (AT model)
(14) Console front panel (MT model)
(15) Shift lever boot

Tightening torque: N·m (kgf-m, ft-lb)
T: 25 (25.5, 18.4)



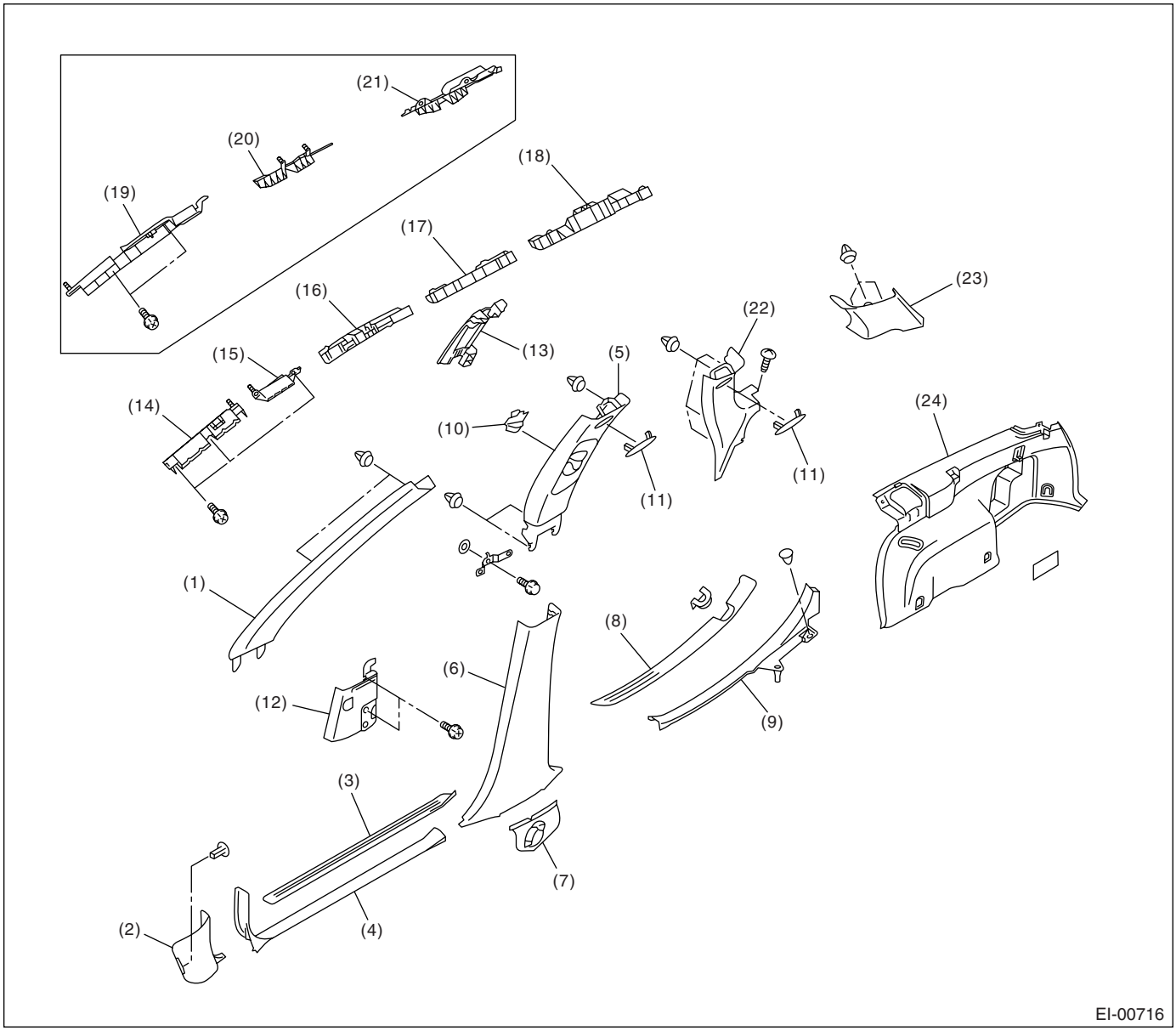
(1) Air vent side duct
(2) Air vent center duct
(3) Instrument panel pad & frame
(4) Air vent defroster grille
(5) Air vent side grille
(6) Navigation unit bracket (Model with navigation system)
(7) Glove box panel
(8) Center console frame
(9) Air vent center grille
(10) Audio bracket (LH)
(11) Audio bracket (RH)
(12) Center panel
(13) Glove box
(14) Glove box lid

20.INNER TRIM (SEDAN MODEL)



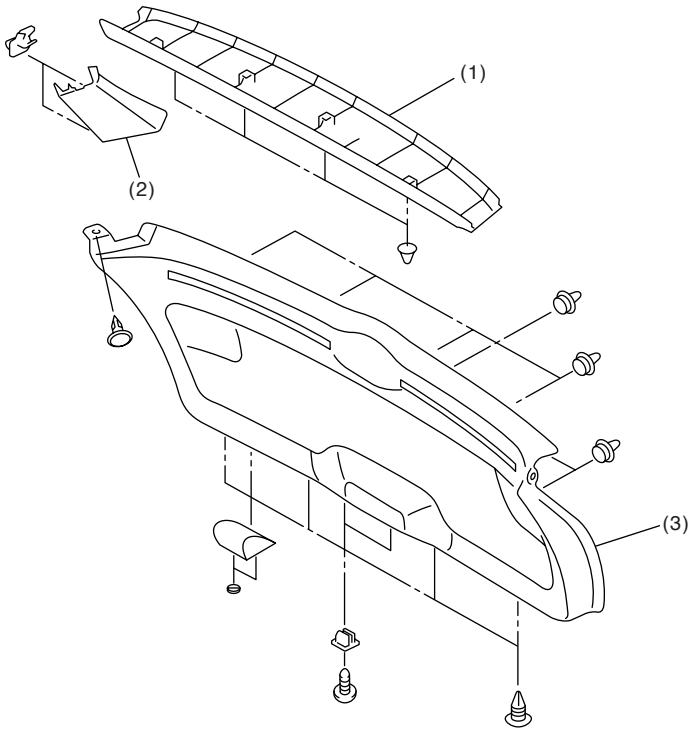
(1) Front pillar upper trim
(2) Front pillar lower trim
(3) Front outside scuff plate
(4) Front inside scuff plate
(5) Center pillar upper trim
(6) Center pillar lower trim
(7) Seat belt lower anchor bolt cover
(8) Rear outside scuff plate
(9) Rear inside scuff plate
(10) Seat belt shoulder anchor adjuster button
(11) Bolt cover (Model with curtain airbag)
(12) Center pillar inner protector lower
(13) Center pillar inner protector upper
(14) Front pillar inner protector lower
(15) Front pillar inner protector upper
(16) Roof side inner protector front
(17) Roof side inner protector center
(18) Roof side inner protector rear
(19) Curtain airbag guide front (Model with curtain airbag)
(20) Curtain airbag guide center (Model with curtain airbag)
(21) Curtain airbag guide rear (Model with curtain airbag)
(22) Rear quarter trim
(23) Rear quarter trim front (Model with curtain airbag)
(24) Rear quarter trim rear (Model with curtain airbag)

21.INNER TRIM (WAGON MODEL)



(1) Front pillar upper trim
(2) Front pillar lower trim
(3) Front outside scuff plate
(4) Front inside scuff plate
(5) Center pillar upper trim
(6) Center pillar lower trim
(7) Seat belt lower anchor bolt cover
(8) Rear outside scuff plate
(9) Rear inside scuff plate
(10) Seat belt shoulder anchor adjuster button
(11) Bolt cover (Model with curtain airbag)
(12) Center pillar inner protector lower
(13) Center pillar inner protector upper
(14) Front pillar inner protector lower
(15) Front pillar inner protector upper
(16) Roof side inner protector front
(17) Roof side inner protector center
(18) Roof side inner protector rear
(19) Curtain airbag guide front (Model with curtain airbag)
(20) Curtain airbag guide center (Model with curtain airbag)
(21) Curtain airbag guide rear (Model with curtain airbag)
(22) Rear quarter front pillar trim
(23) Rear quarter rear pillar trim
(24) Rear quarter lower trim

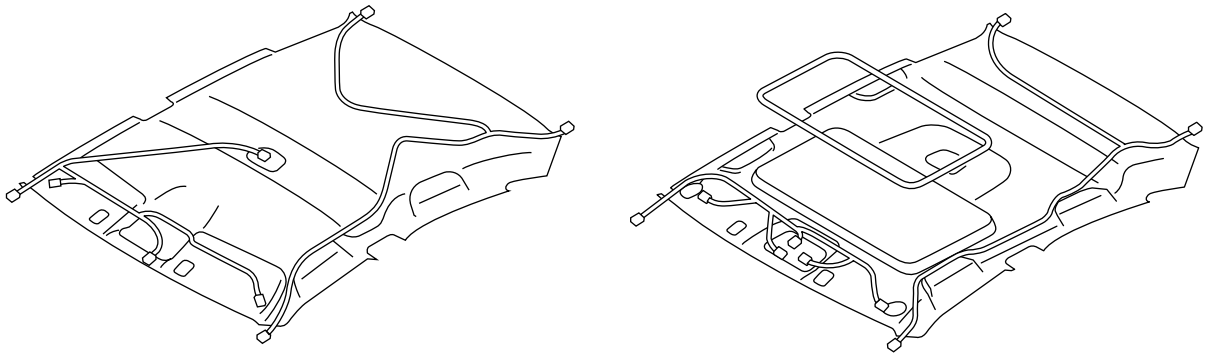
22.REAR GATE TRIM



EI-00808

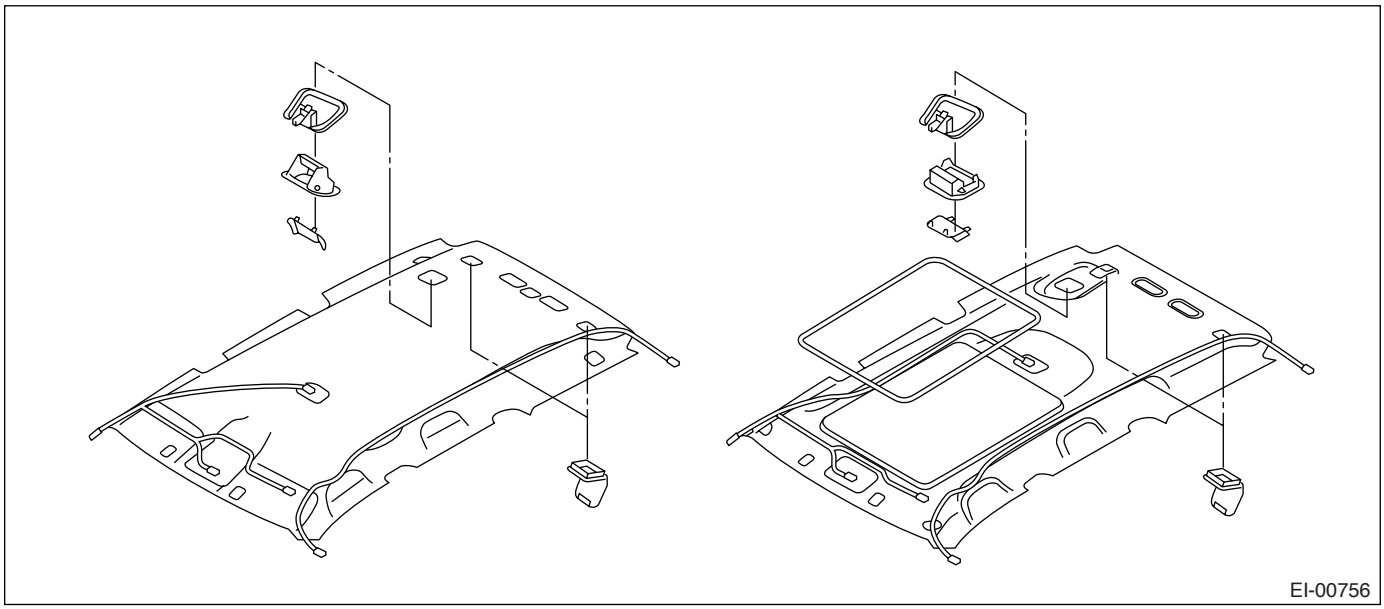
(1) Rear gate panel upper trim (2) Rear gate panel pillar trim (3) Rear gate panel lower trim

23.ROOF TRIM (SEDAN MODEL)

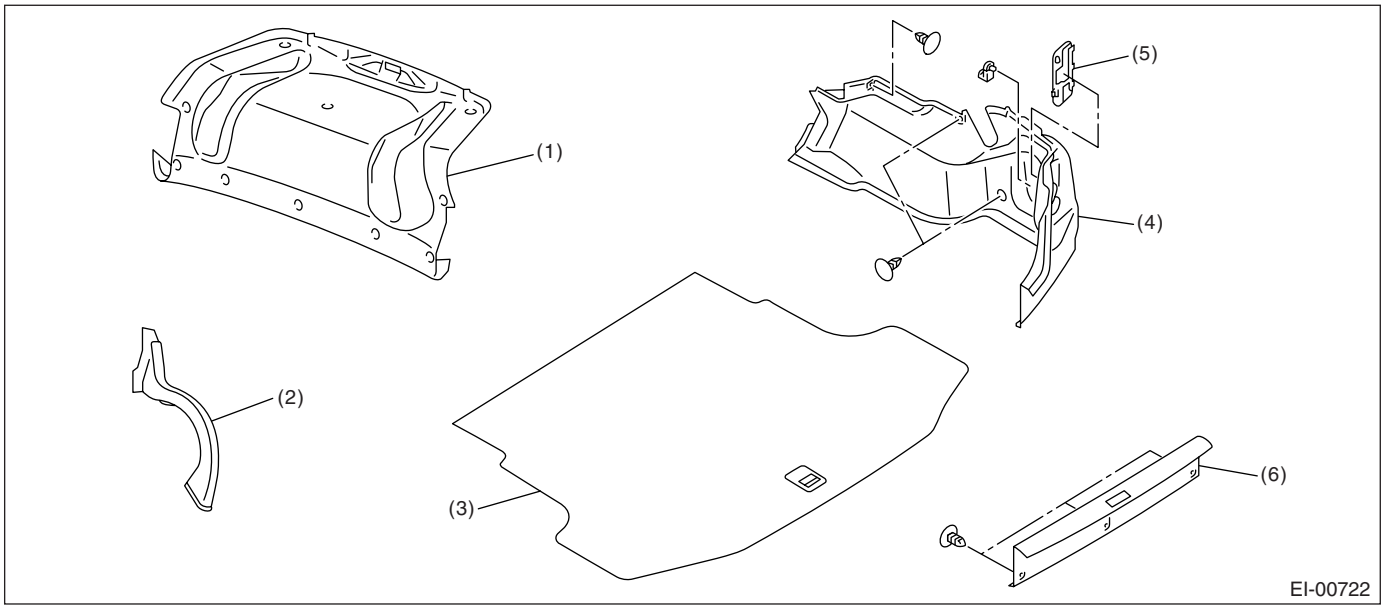


EI-00755

24.ROOF TRIM (WAGON MODEL)

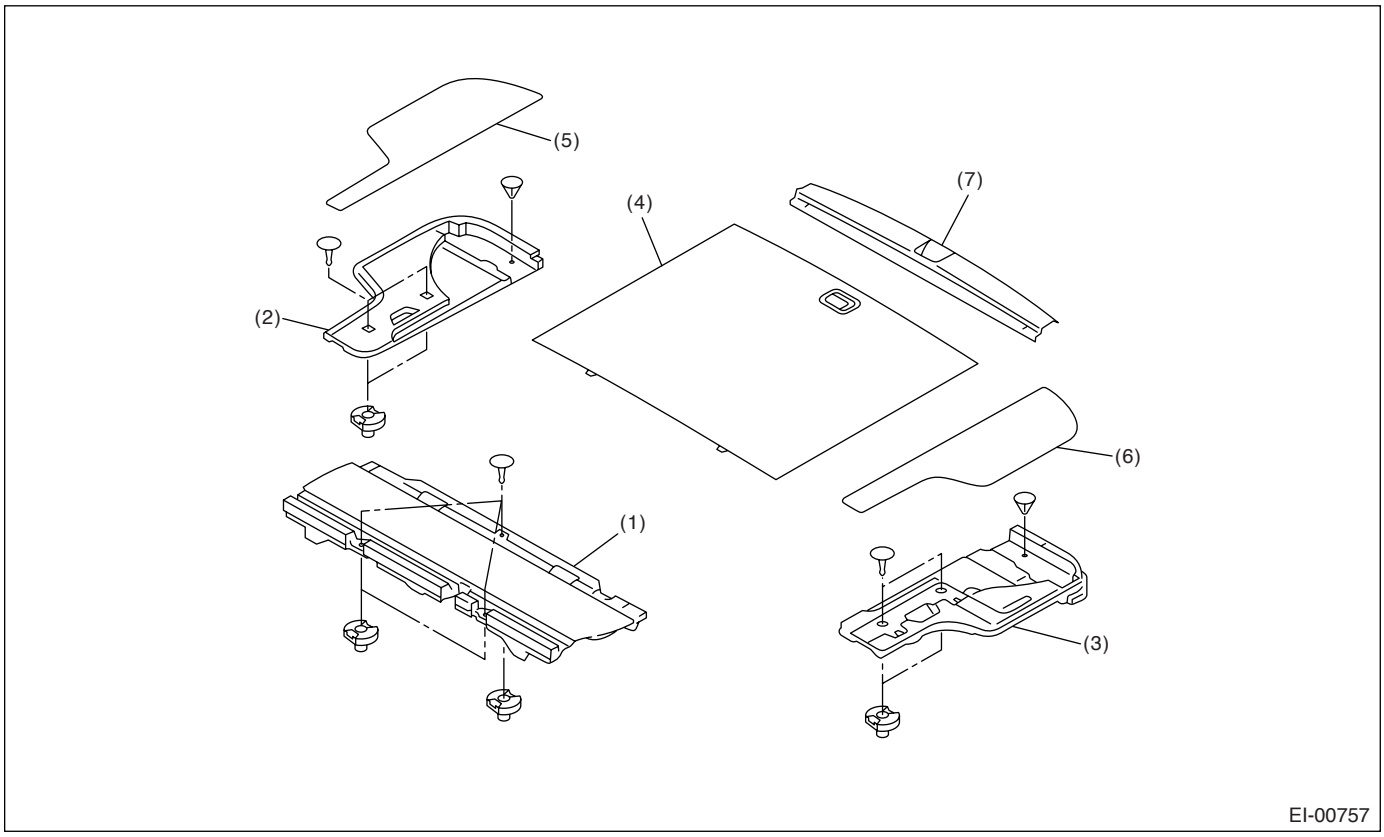


25.TRUNK ROOM TRIM



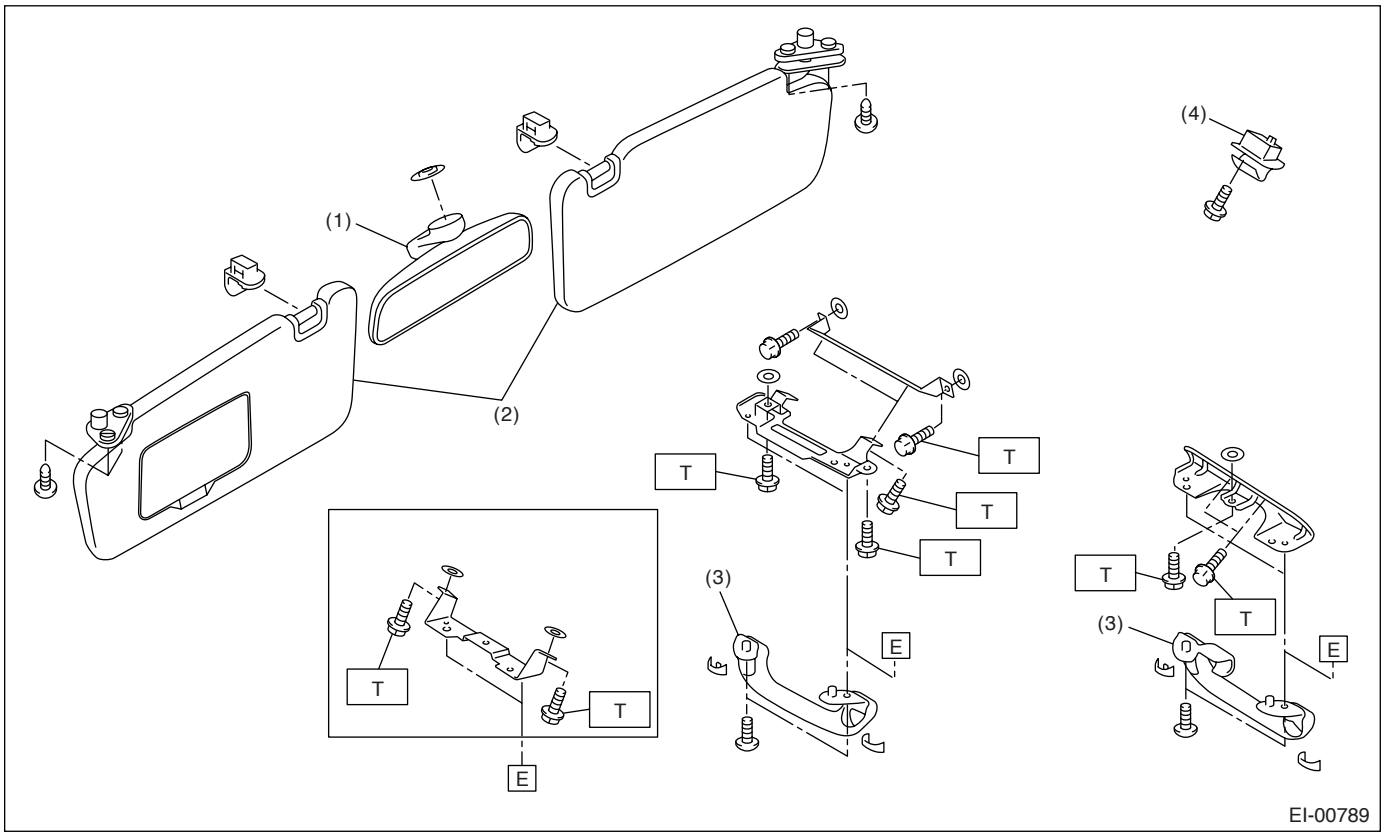
(1) Trunk lid trim
(2) Trunk lid arm cover
(3) Trunk room mat
(4) Trunk side trim
(5) Combination light cover
(6) Trunk room end cover

26.LUGGAGE FLOOR MAT



(1) Front floor mat
(2) Floor box (RH)
(3) Floor box (LH)
(4) Center floor mat
(5) Side floor mat (RH)
(6) Side floor mat (LH)
(7) Luggage floor end cover

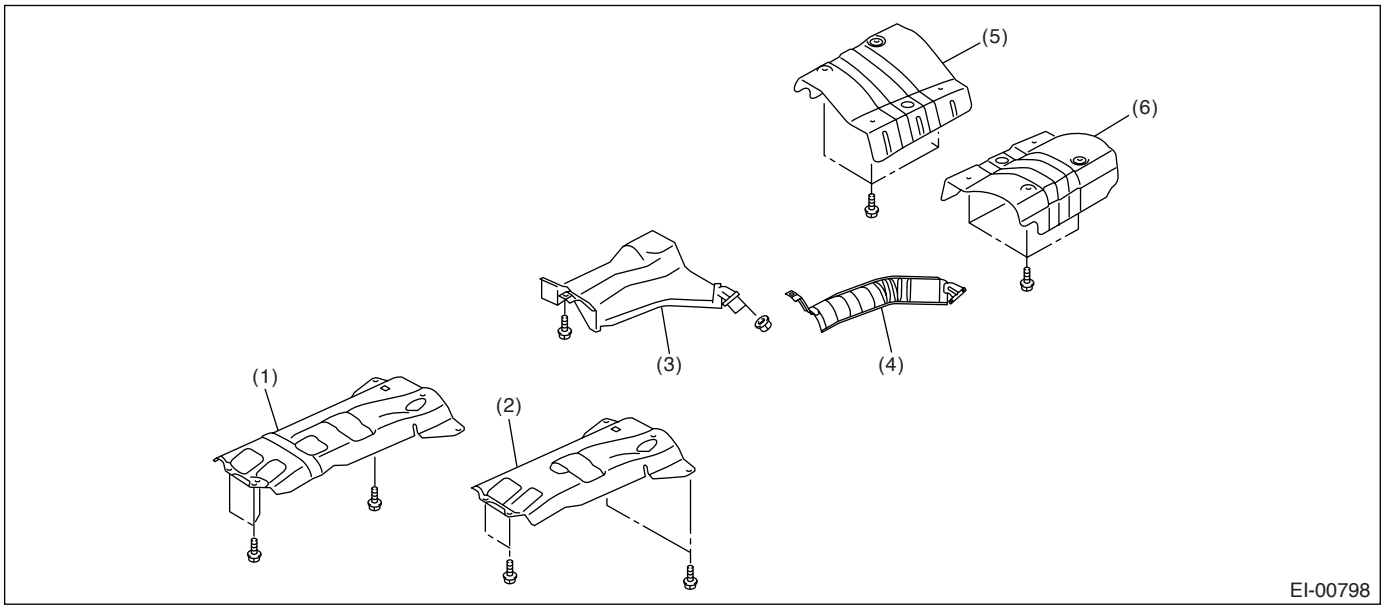
27.ROOM INNER PARTS



(1) Room mirror
(2) Sun visor
(3) Assist grip
(4) Coat hook (Wagon model)

Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.46)

28.HEAT SHIELD COVER



(1) Front heat shield cover (5AT model)
(2) Front heat shield cover (4AT model and MT model)
(3) Center heat shield cover (Turbo model)
(4) Center heat shield cover (Non-turbo model)
(5) Rear heat shield cover RH
(6) Rear heat shield cover LH

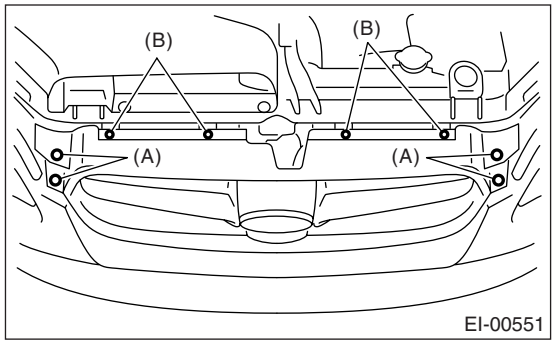
B: PREPARATION TOOL

TOOL NAME	REMARKS
Clip remover	Used for removal of trim.
Clip clamp pliers	Used for removal of various clips and clamps.

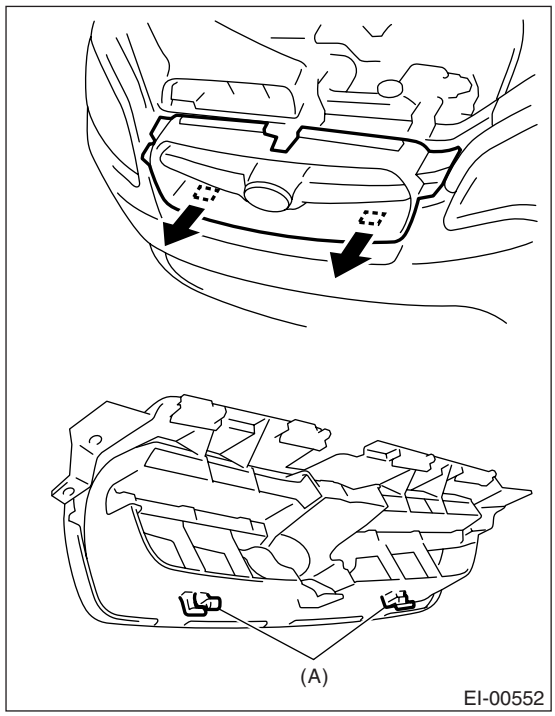
2. Front Grille

A: REMOVAL

1) Open the hood.
2) Remove the push clips (A) and front grille clips (B) from each side of front grille.



3) Remove the clips on the back side of front grille.
4) Pull lower side of the front grille forward, remove hooks (A), and then remove the front grille from vehicle body.



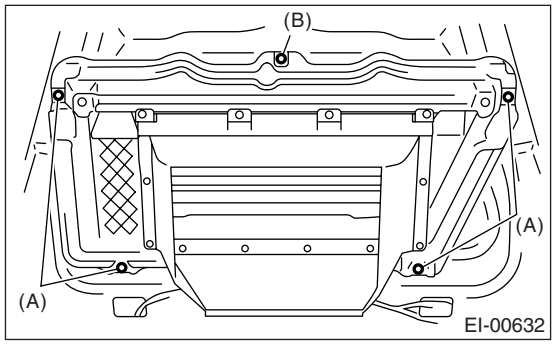
B: INSTALLATION

Install in the reverse order of removal.

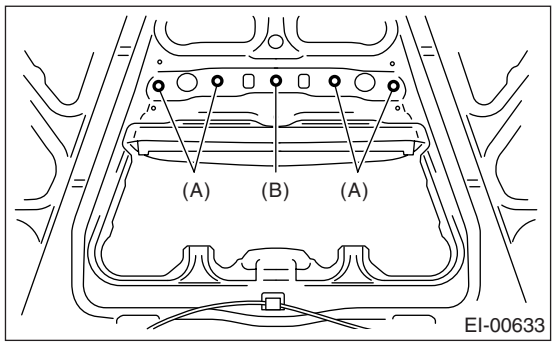
3. Front Hood Grille

A: REMOVAL

1) Open the front hood.
2) Remove the front hood insulator. <Ref. to EB-13, FRONT HOOD INSULATOR, REMOVAL, Front Hood.>
3) Remove the screws (A) and clip (B), and remove the front hood duct.

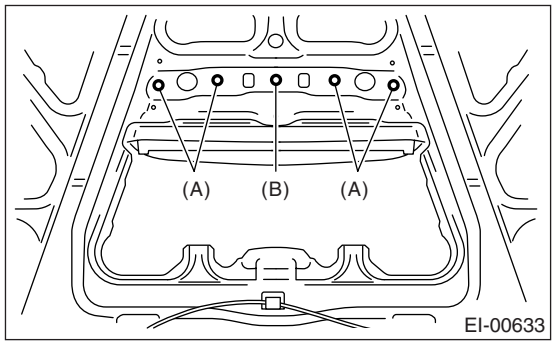


4) Loosen the nuts (A), remove the clip (B), and then remove the front hood grille.



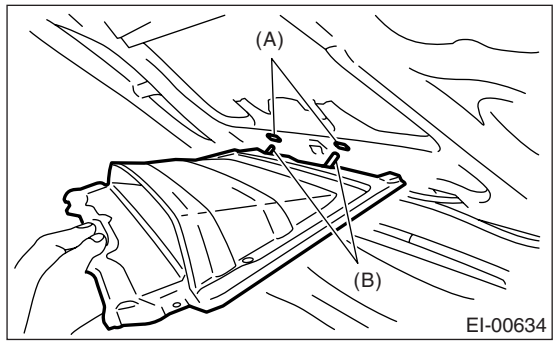
B: INSTALLATION

1) Fit the clip (B) of front hood grille, and install the front hood grille using nuts (A).

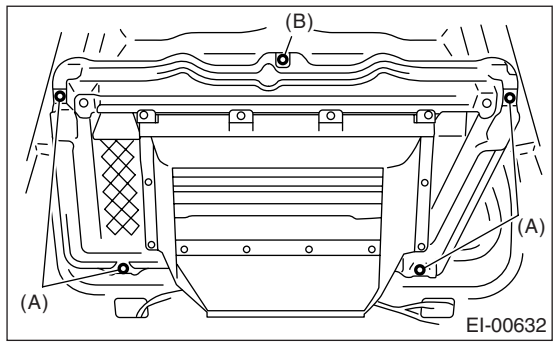


Tightening torque:
4.5 N·m (0.46 kgf-m, 3.32 ft-lb)

2) Insert the hooks (B) of the front hood duct into holes (A) of the front hood.



3) Install the front hood duct with the screws (A) and clip (B).

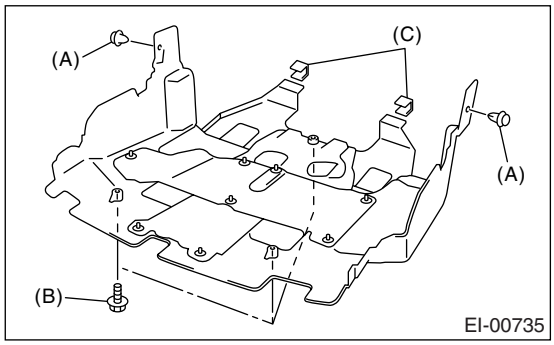


4. Front Under Cover

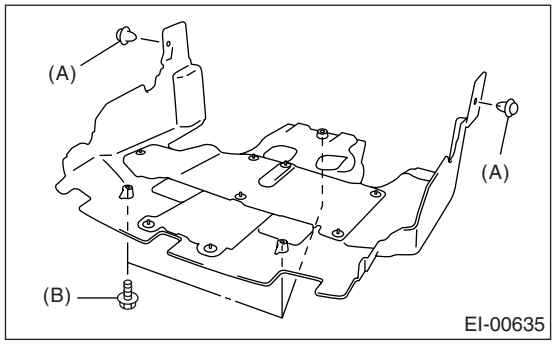
A: REMOVAL

1) Lift-up the vehicle.
2) Remove the clips (A), (C) and bolts (B) in front fender, and then remove the front under cover.

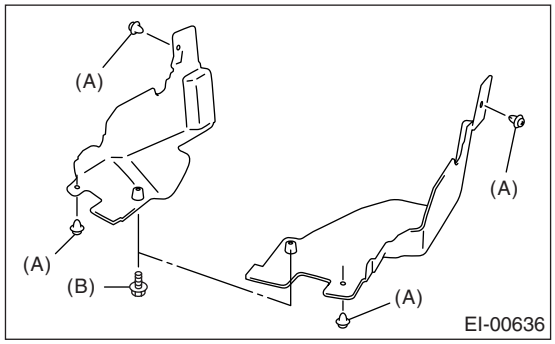
• Large type (Turbo model)



• Large type (DOHC non-turbo model)



• Small type (SOHC non-turbo model)



B: INSTALLATION

Install in the reverse order of removal.

Tightening torque:
14 N·m (1.42 kgf-m, 10.3 ft-lb)

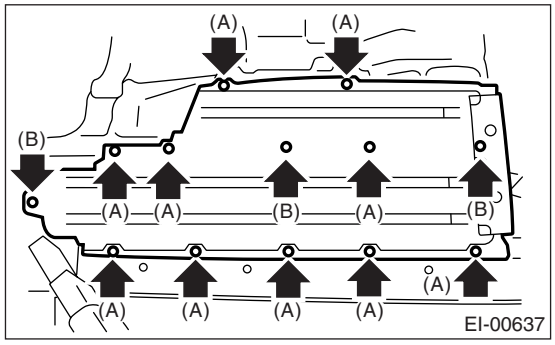
5. Floor Under Protector

A: REMOVAL

1) Lift-up the vehicle.

NOTE:
Plate type lift can not be used.

2) Remove the push turn clips (A) and bolts (B), and remove the floor under protector.



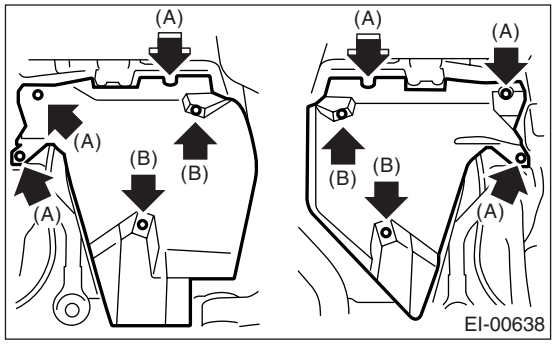
B: INSTALLATION

Install in the reverse order of removal.

6. Fuel Tank Protector

A: REMOVAL

1) Lift-up the vehicle.
2) Remove the bolts (A) and plastic nuts (B), and then remove the fuel tank protector.



B: INSTALLATION

Install in the reverse order of removal.

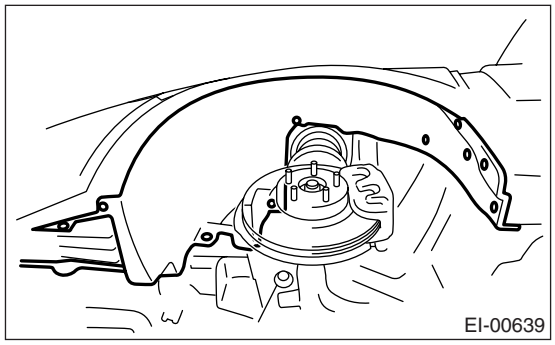
Tightening torque:
Bolt
17.5 N·m (1.78 kgf-m, 12.9 ft-lb)

7. Mud Guard

A: REMOVAL

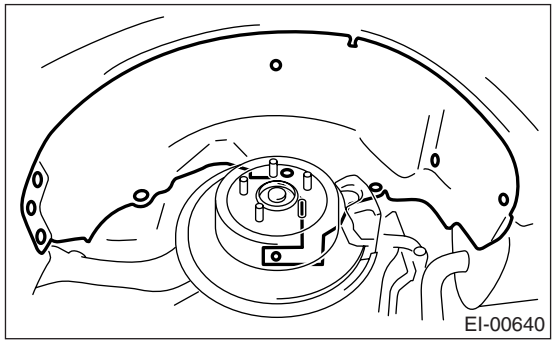
1. FRONT MUD GUARD

1) Jack-up the vehicle.
2) Remove the front wheels.
3) Loosen the screws and clips to remove mud guard.



2. REAR MUD GUARD

1) Jack-up the vehicle.
2) Remove the rear wheels.
3) Loosen the screws and clips to remove mud guard.



B: INSTALLATION

1. FRONT MUD GUARD

Install in the reverse order of removal.

2. REAR MUD GUARD

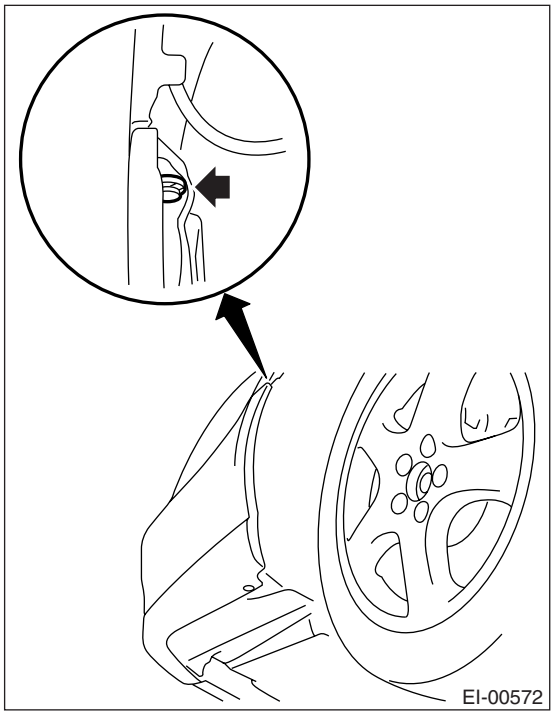
Install in the reverse order of removal.

8. Front Bumper

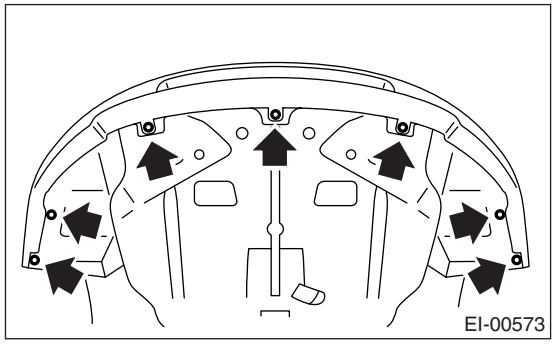
A: REMOVAL

1. FRONT BUMPER FACE

1) Disconnect the ground cable from battery.
2) Remove the front grille. <Ref. to EI-24, REMOVAL, Front Grille.>
3) Turn over the front mud guard, and remove the clips connecting the fender and bumper.



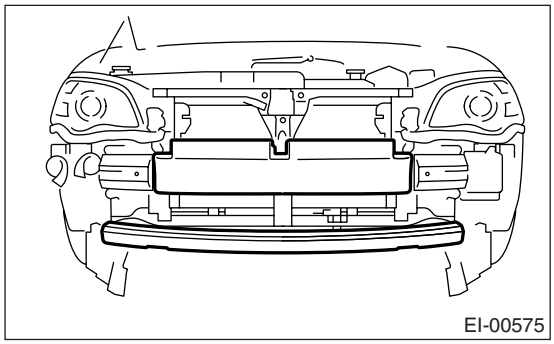
4) Remove the clips at the lower side of bumper.



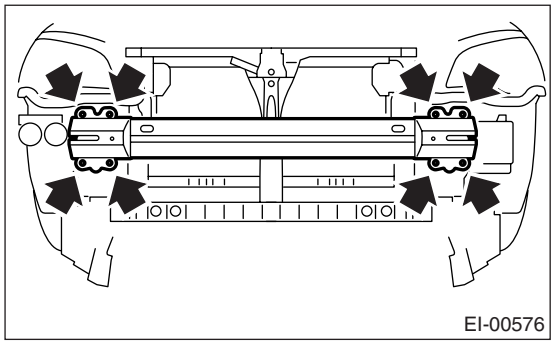
5) Disconnect the fog light connector. (Model with fog light)
6) Remove the bumper from vehicle body.
7) Remove the fog light from bumper face. <Ref. to LI-21, REMOVAL, Front Fog Light Assembly.>

2. FRONT BUMPER BEAM ASSEMBLY

1) Disconnect the ground cable from battery.
2) Remove the front grille. <Ref. to EI-24, REMOVAL, Front Grille.>
3) Remove the front bumper face. <Ref. to EI-30, FRONT BUMPER FACE, REMOVAL, Front Bumper.>
4) Remove the energy absorber foam from bumper beam.

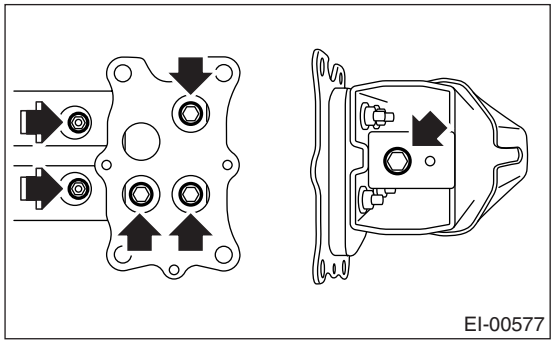


5) Remove the bolts, and remove the bumper beam assembly from vehicle body.

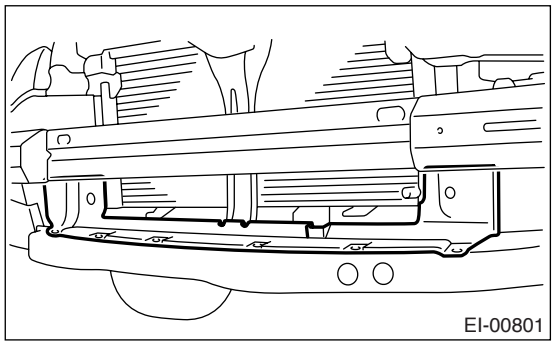


NOTE:
After all bolts are removed, raise the whole bumper beam a little to remove it from vehicle body.

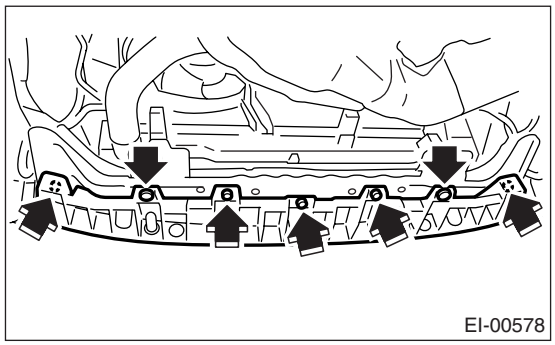
6) Remove the bolts and nuts, and disassemble the bumper beam.



7) Remove the clips, and remove the radiator guide.



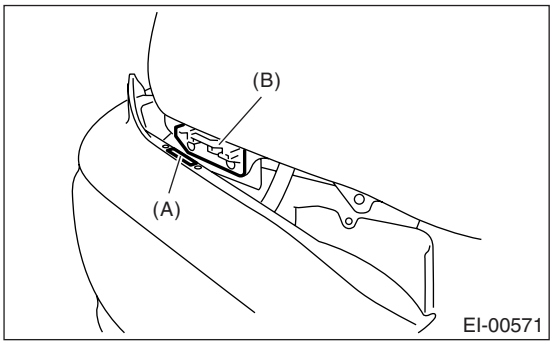
8) Remove the bolts and clips, and remove the bumper lower center bracket.



B: INSTALLATION

1. FRONT BUMPER FACE

1) Install in the reverse order of removal.
2) Fit the slider (A) to the guide plate (B) securely.



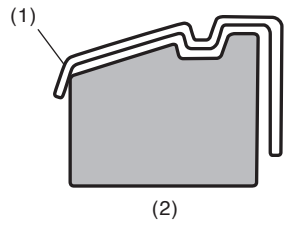
2. FRONT BUMPER BEAM ASSEMBLY

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description". <Ref. to EI-5, FRONT BUMPER, COMPONENT, General Description.>

C: REPAIR

1. COATING METHOD FOR PP BUMPER

Process No.	Process name	Job contents	
1	Bumper installation	Place the bumper on a paint worktable as required. Use the paint worktable conforming to inner shape of bumper when possible.	 EI-00234 (1) Bumper (2) Set bumper section
2	Masking	Mask specified part (black base) with masking tape. Use masking tape for PP (example, Nichiban No. 533, etc.).	
3	Degreasing, cleaning	Clean all parts to be painted with white gasoline, normal alcohol, etc. to remove dirt, oil, fat, etc.	
4	Primer paint	Apply primer to all parts to be painted, using spray gun. Use primer (clear).	
5	Drying	Dry at normal temperature [10 — 15 min. at 20°C (68°F)]. In half-dried condition, PP primer paint is dissolved by solvent, e.g. thinner, etc. Therefore, if dust or dirt must be removed, use ordinary alcohol, etc.	
6	Top coat paint (I)	Non-colored	Metallic paint
		Use section (block) paint for top coat. • Paint to be used (for each color): Solid paint Hardener PB Thinner T-301 • Mixing ratio: Main agent vs. hardener = 4:1 • Viscosity: 10 — 13 sec./20°C (68°F) • Film thickness: 35 — 45 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	Use section (block) paint for top coat. • Paint to be used (for each color): Metallic paint Hardener PB Thinner T-306 • Mixing ratio: Main agent vs. hardener = 10:1 • Viscosity: 10 — 13 sec./20°C (68°F) • Film thickness: 15 — 20 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
7	Drying	Not required.	Dry at normal temperature [more than 10 min. at 20°C (68°F)]. In half-dried condition, avoid dust, dirt.
8	Top coat paint (II)	Not required.	Apply a clear coat to parts with top coat paint (I), three times, at 5 — 7 minutes intervals. • Paint to be used: Metallic paint Hardener PB Thinner T-301 • Mixing ratio: Clear coat vs. hardener = 6:1 • Viscosity: 14 — 16 sec./20°C (68°F) • Film thickness: 25 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
9	Drying	60°C (140°F), 60 min. or 80°C (176°F), 30 min. If higher than 80°C (176°F), PP may be deformed. Keep maximum temperature at 80°C (176°F).	
10	Inspection	Paint check.	
11	Masking removal	Remove masking tape applied in process No. 2.	

2. REPAIR INSTRUCTIONS FOR COLORED PP BUMPER

NOTE:
All PP bumpers are provided with a grained surface, and if the surface is damaged, it cannot normally be restored to its former condition. Damages limited to the shallow scratches that cause only a change in the luster of the base material or coating, can be almost fully restored. Before repairing a damaged area, explain this point to the customer and obtain an understanding about the matter. Repair methods are outlined below, based on a classification of the extent of damage.

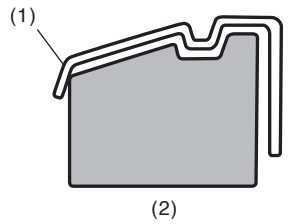
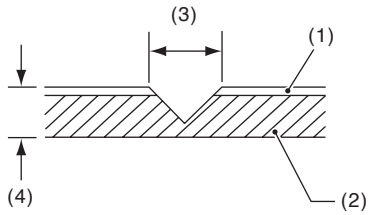
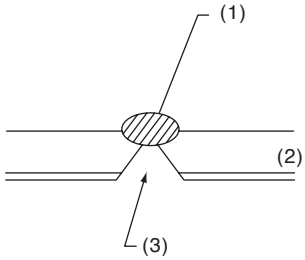
1) Minor damage causing only a change in the lustre of the bumper due to a light touch
Almost restorable.

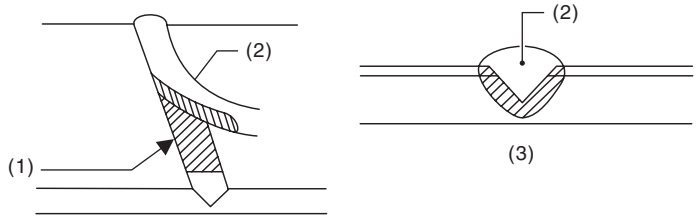
<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean the area to be repaired using water.</td></tr>
<tr><td>2</td><td>Sanding</td><td colspan="2">Grind the repairing area with #500 sand paper in a “feathering” motion.</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Repeatedly apply wax to the affected area using a soft cloth (such as flannel). Recommended wax: NITTO KASEI Soft 99 TIRE WAX BLACK, or equivalent.</td><td rowspan="2">Perform either the same process as for the resin section or process No. 18 and subsequent in the “3)” section, depending on the degree and nature of damage.</td></tr>
<tr><td>Polish the waxed area with a clean cloth after 5 to 10 minutes.</td></tr>
</table>

2) Deep damage caused by scratching with fences, etc.
A dent cannot be repaired but a whitened or swelled part can be removed.

<table>
<tr><th>Process No.</th><th>Process name</th><th colspan="2">Job contents</th></tr>
<tr><td>1</td><td>Cleaning</td><td colspan="2">Clean damaged area with water.</td></tr>
<tr><td>2</td><td>Removal of damaged area</td><td colspan="2">Cut off protruding area, if any, due to collision, using a putty knife.</td></tr>
<tr><td>3</td><td>Sanding</td><td colspan="2">Grind the affected area with #100 to #500 sand paper.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Finish</td><td>Resin section</td><td>Coated section</td></tr>
<tr><td>Same as Process No. 3 in the “1)” section.</td><td>Perform Process No. 12 and subsequent operations in the “3)” section.</td></tr>
</table>

3) Deep damage such as a break or hole that requires filling
Much of the peripheral grained surface must be sacrificed for repair. The degree of restoration is not really worth the expense. (The surface, however, will become almost flush with adjacent areas.)
Recommended repair kit: PP Part Repair Kit (NRM)

Process No.	Process name	Job contents	
1	Bumper removal	Remove the bumper as required.	
2	Removal of parts	Remove the parts built into bumper as required.	
3	Bumper placement	Place the bumper on a paint worktable as required. It is recommended to use the paint worktable conforming to internal shape of bumper.	 EI-00234 (1) Bumper (2) Set bumper section
4	Surface preparation	Remove dust, oil, etc. from areas to be repaired and surrounding areas, using a suitable solvent (NRM No. 900 Precleno, white gasoline, or alcohol, etc.).	
5	Cutting	If nature of damage are cracks or holes, cut a guide slit of 20 to 30 mm (0.79 to 1.18 in) in length along the crack or hole up to the bumper's base surface. Then, bevel or "vee-out" the affected area using a knife or grinder.	 EI-00235 (1) Paint surface (2) PP base surface (3) 20 — 30 mm (0.79 — 1.18 in) (4) 3 mm (0.12 in)
6	Sanding (I)	Grind beveled surface with sand paper (#40 to #60) to smooth finish.	
7	Cleaning	Clean the sanded surface with the same solvent as used in Process No. 4.	
8	Temporary welding	Grind the side just opposite the beveled area with sand paper (#40 to #60) and clean using a solvent. Temporarily spot-weld the side, using a PP welding rod and heater gun.	 EI-00236 (1) Welded point (Use heater gun and PP welding rod) (2) PP base surface (3) Beveled section NOTE: • Do not melt welding rod until it flows out. This results in reduced strength. • Leave the welded spot unattended until it cools completely.

Process No.	Process name	Job contents
9	Welding	Using a heater gun and PP welding rod, weld the beveled spot while melting the rod and damaged area.
		 EI-00237 (1) Welding rod (2) Melt hatched area (3) Section NOTE: • Melt the sections indicated by hatched area. • Do not melt the welding rod until it flows out, in order to provide strength. • Always keep the heater gun 1 to 2 cm (0.4 to 0.8 in) away from the welding spot. • Leave the welded spot unattended until it cools completely.
10	Sanding (II)	Remove excess part of weld with a putty knife. If a drill or disc wheel is used instead of the knife, operate it at a rate lower than 1,500 rpm and grind the excess part little by little. A higher rpm will cause the PP substrate to melt from the heat.
		 EI-00042
		Sand the welded spot smooth with #240 sand paper.
11	Masking	Mask the black substrate section using masking tape. Recommended masking tape: Nichiban No. 533 or equivalent
12	Cleaning/ degreasing	Completely clean the entire coated area, using solvent similar to that used in Process No. 4.
13	Primer coating	Apply a coat of primer to the repaired surface and its surrounding areas. Mask these areas, if necessary. Recommended primer: Mp/ 364 PP Primer NOTE: Be sure to apply coat of primer at a spraying pressure of 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi) with a spray gun.
14	Leave unattended	Leave the repaired area unattended at 20°C (68°F) for 10 to 15 minutes until primer is half-dry. NOTE: If dirt or dust comes in contact with the coated area, wipe it off with a cloth with alcohol. (Do not use thinner since the coated area tends to melt.)
15	Primer surfacer coating	Apply a coat of primer surfacer to the repaired area two or three times at an interval of 3 to 5 minutes. Recommended surfacer: • UPS 300 Flex Primer • No. 303 UPS 300 Exclusive hardener • NPS 725 Exclusive Reducer (thinner) • Mixing ratio: 2 : 1 (UPS 300 : No. 303) • Viscosity: 12 — 14 sec./20°C (68°F) • Coating film thickness: 40 — 50 μ

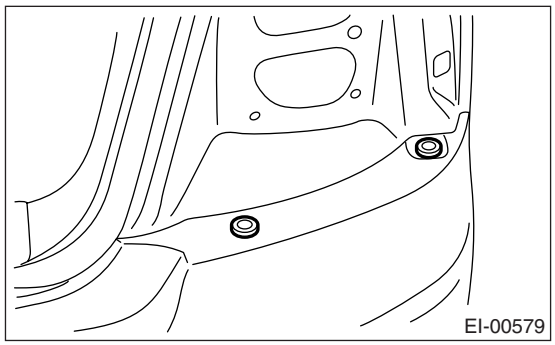
Process No.	Process name	Job contents	
16	Drying	Allow the coated surface to dry for 20 minutes at 20°C (68°F) [or 30 minutes at 60°C (140°F)].	
17	Sanding (III)	Sand the coated surface and its surrounding areas using #400 sand paper and water.	
18	Cleaning/ degreasing	Same as Process No. 12.	
19	Top coat (I)	Non-colored	Metallic paint
		Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 11 — 13 sec./20°C (68°F) • Coating film thickness: 40 — 50 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)	Use a “block” coating method. • Recommended paint: Suncryl (SC) No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 11 — 13 sec./20°C (68°F) • Coating film thickness: 20 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
20	Leave unattended	Not required.	Leave unattended at 20°C (68°F) for at least 10 minutes until the topcoated area is half-dry. NOTE: Be careful to keep dust or dirt from coming in contact with the affected area.
21	Top coat (II)	Not required.	Apply a clear coat three times at an interval of 3 to 5 minutes. • Recommended paint: SC710 Overlay Clear No. 307 Flex Hardener SC Reducer (thinner) • Mixing ratio: Suncryl (SC) vs. No. 307 Flex Hardener = 3 : 1 • Viscosity: 10 — 13 sec./20°C (68°F) • Coating film thickness: 20 — 30 μ • Spraying pressure: 245 — 343 kPa (2.5 — 3.5 kg/cm^2, 36 — 50 psi)
22	Drying	Allow the coated surface to dry for 2 hours at 20°C (68°F) or 30 minutes at 60°C (140°F). NOTE: Do not allow the temperature to exceed 80°C (176°F) since this will deform the PP substrate.	
23	Inspection	Carefully check the condition of the repaired area.	
24	Masking removal	Remove the masking tape applied in Process No. 11 and 13.	
25	Parts installation	Install parts on the bumper in reverse order of removal.	
26	Bumper installation	Install the bumper.	

9. Rear Bumper

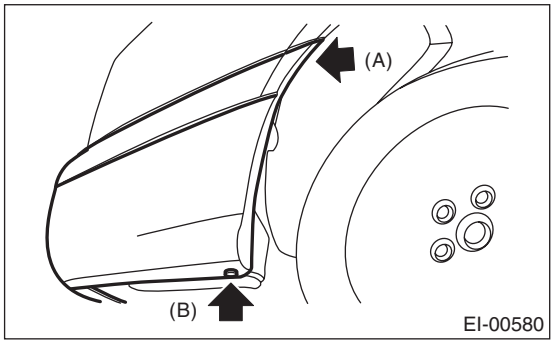
A: REMOVAL

1. REAR BUMPER FACE

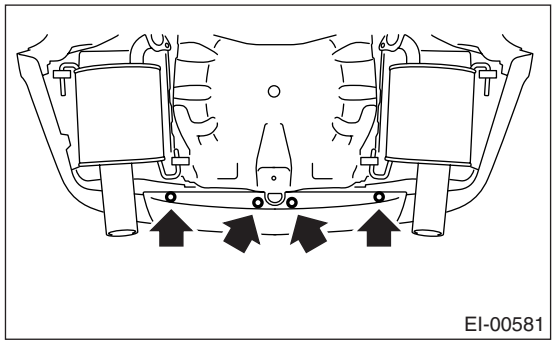
1) Disconnect the ground cable from battery.
2) Remove the rear combination light assembly. <Ref. to LI-25, REMOVAL, Rear Combination Light Assembly.>
3) Remove the two clips.



4) Turn over the mud guard, and remove the bolt (A) inside wheel house, and the clips (B) on the lower side of bumper.

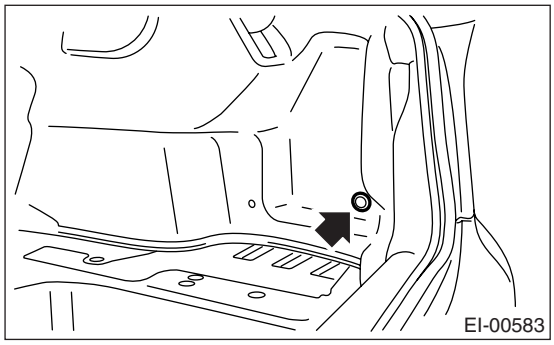


5) Remove the clips on the lower side of rear bumper.

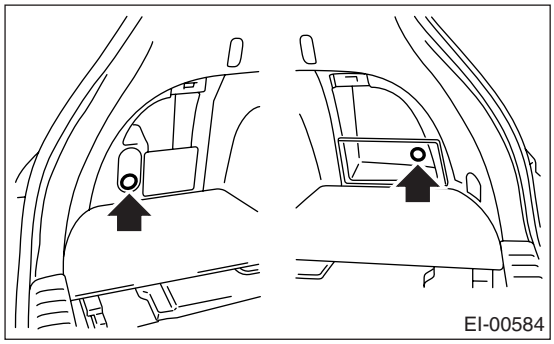


6) Remove the service hole cover, and remove the bolt.

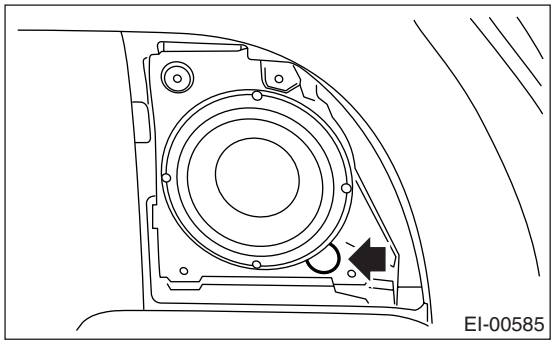
- Sedan model: trunk side trim



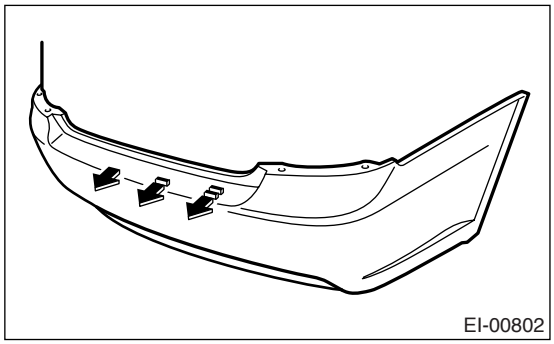
- Wagon model: rear quarter lower trim



NOTE:
For model with McIntosh Audio, remove the woofer cover.



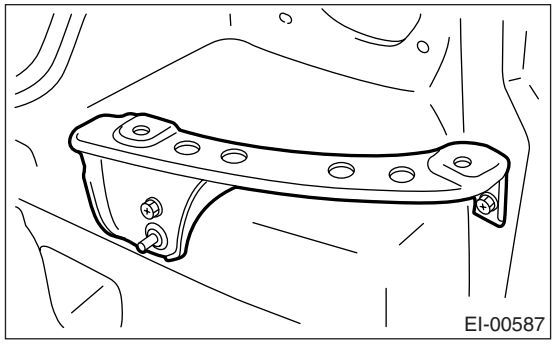
7) Remove the rear bumper from vehicle body.



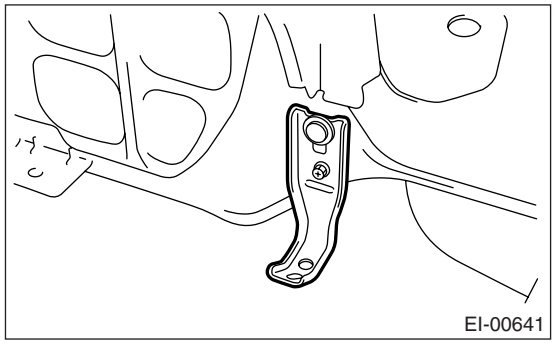
NOTE:
- Do not pull with a excessive force. Otherwise the bracket installation area may be damaged.
- Remove from the end in order.

2. REAR BUMPER BRACKET

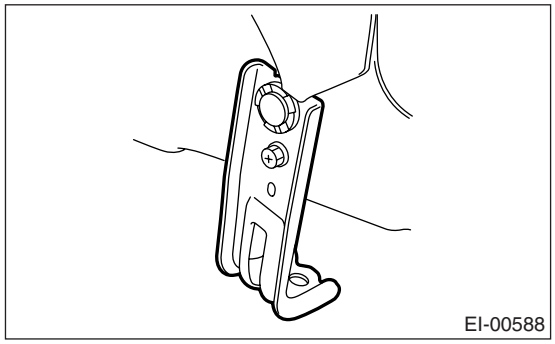
1) Remove the rear bumper face from vehicle body.
2) Remove the rear bumper bracket corner from vehicle body. (both sides)



3) Remove the lower brackets from vehicle body.
- Sedan model: 2 places

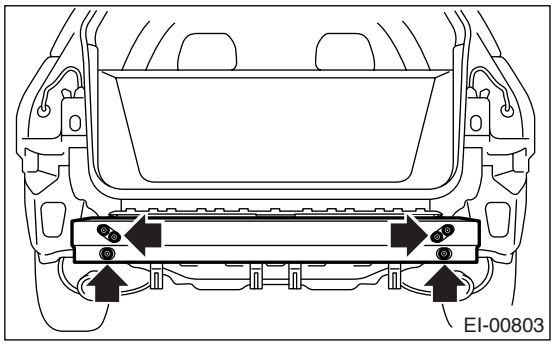


- Wagon model: 4 places

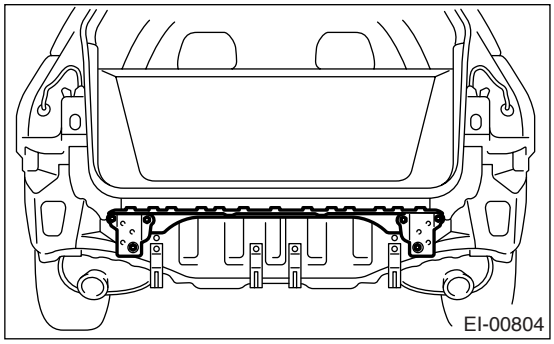


3. REAR BUMPER BEAM ASSEMBLY

1) Disconnect the ground cable from battery.
2) Remove the rear bumper face. <Ref. to EI-37, REAR BUMPER FACE, REMOVAL, Rear Bumper.>
3) Remove the nuts, and remove the beam main reinforcement from vehicle body.



4) Remove the nuts, and remove the bumper beam bracket and beam upper rear from vehicle body.



B: INSTALLATION

1. REAR BUMPER FACE

1) Install the beam upper rear to vehicle body.
2) Install the bumper face to vehicle body.

NOTE:
If the bumper face is easily come off the beam upper rear, adjust the hook area of the bracket side.

3) Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EI-6, REAR BUMPER (SEDAN MODEL), COMPONENT, General Description.>

2. REAR BUMPER BRACKET

Install in the reverse order of removal.

3. REAR BUMPER BEAM ASSEMBLY

Install in the reverse order of removal.

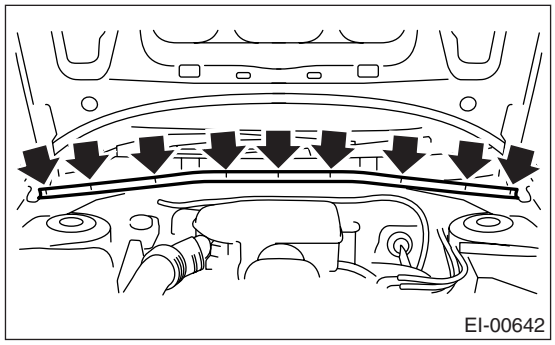
C: REPAIR

Refer to the description for front bumper repair. <Ref. to EI-30, REMOVAL, Front Bumper.>

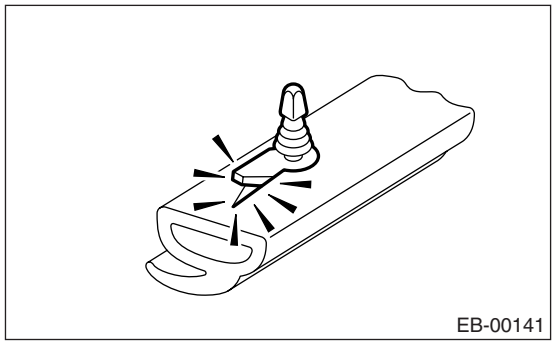
10.Cowl Panel

A: REMOVAL

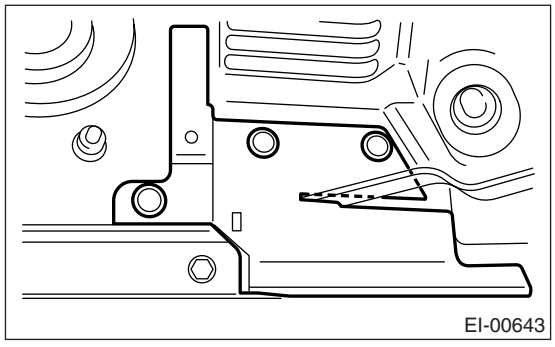
1) Open the hood.
2) Remove the wiper arm. <Ref. to WW-17, REMOVAL, Front Wiper Arm.>
3) Remove the weather strip clip, and remove the weather strip.



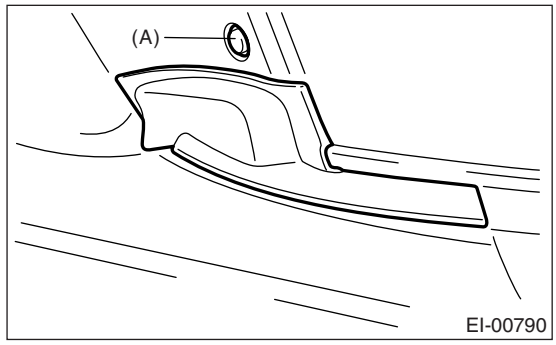
NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use a clip remover to remove.



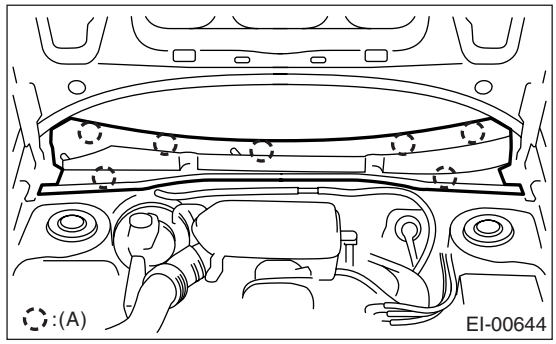
4) Remove the clip, and remove the cover cowl panel.



5) Remove the cowl panel side and clip (A).



6) Remove the clips (A), and remove the cowl panel.



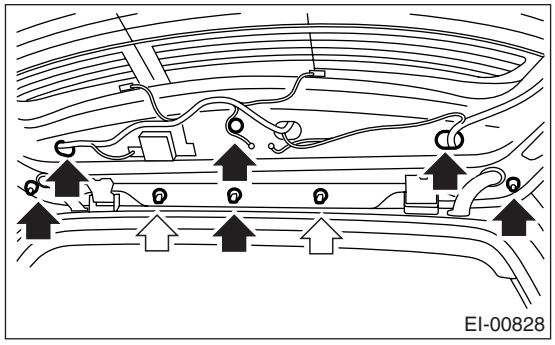
B: INSTALLATION

Install in the reverse order of removal.

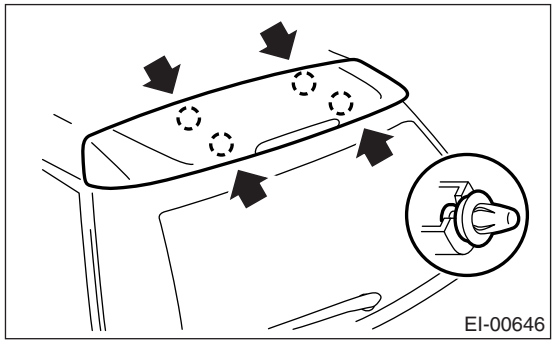
11.Roof Spoiler

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
3) Disconnect the connector of the high mounted stop light and the washer hose of rear washer.
4) Remove the cap nut and plastic caps.



5) Remove the clips, and remove the roof spoiler.



B: INSTALLATION

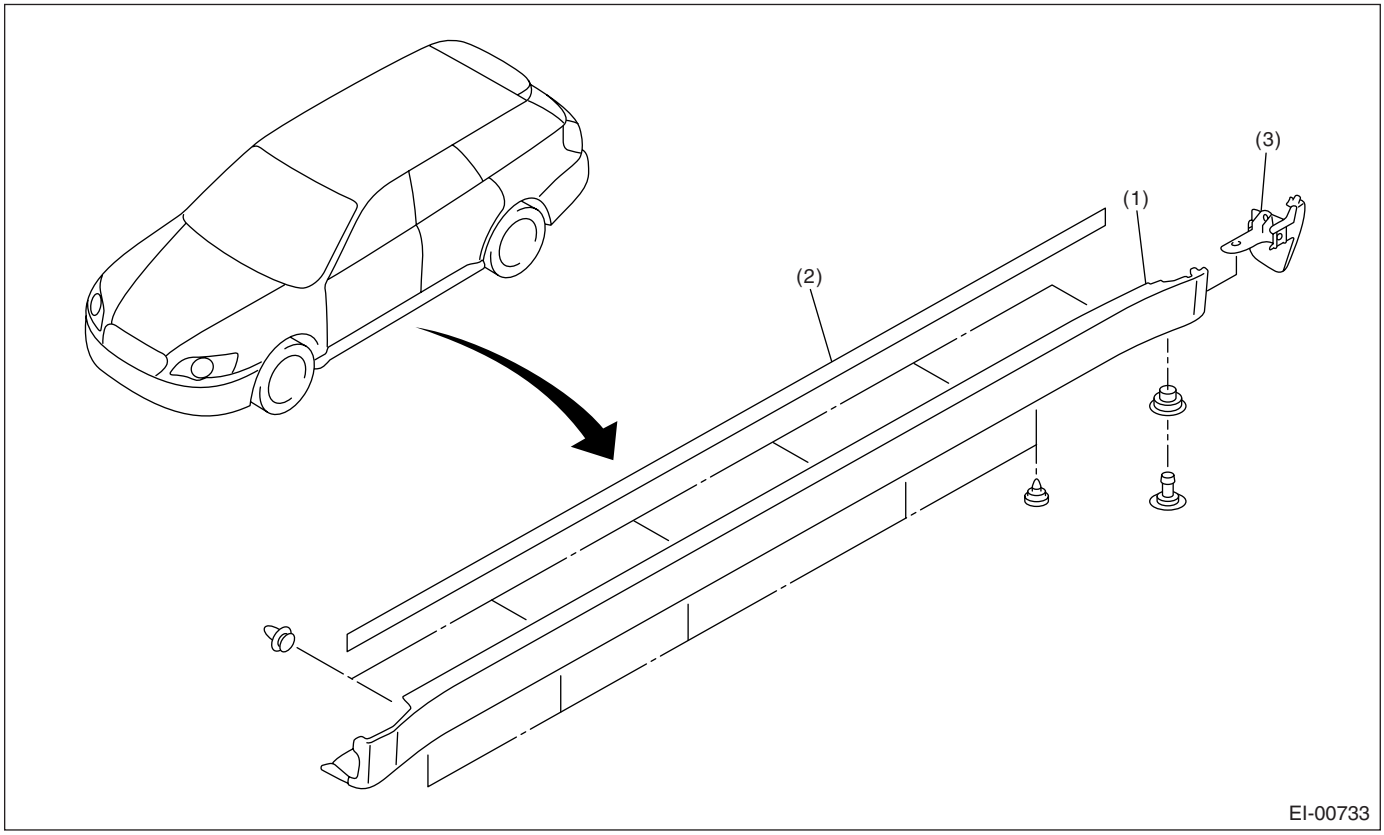
Install in the reverse order of removal.

Tightening torque:
4.5 N·m (0.46 kgf-m, 3.32 ft-lb)

12.Side Sill Spoiler

A: REMOVAL

Remove the clips (two for front fender arch area, six for side sill spoiler lower area), and remove the side spoiler.

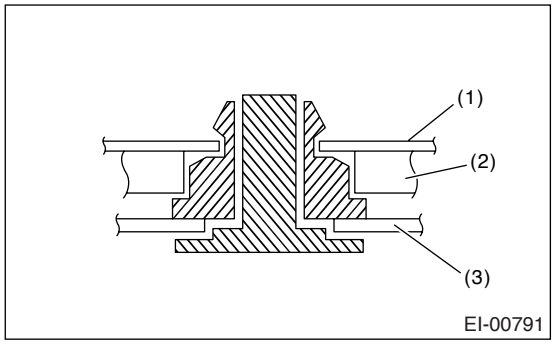


(1) Side sill spoiler (2) Double-sided tape (3) End cover

B: INSTALLATION

Install in the reverse order of removal.

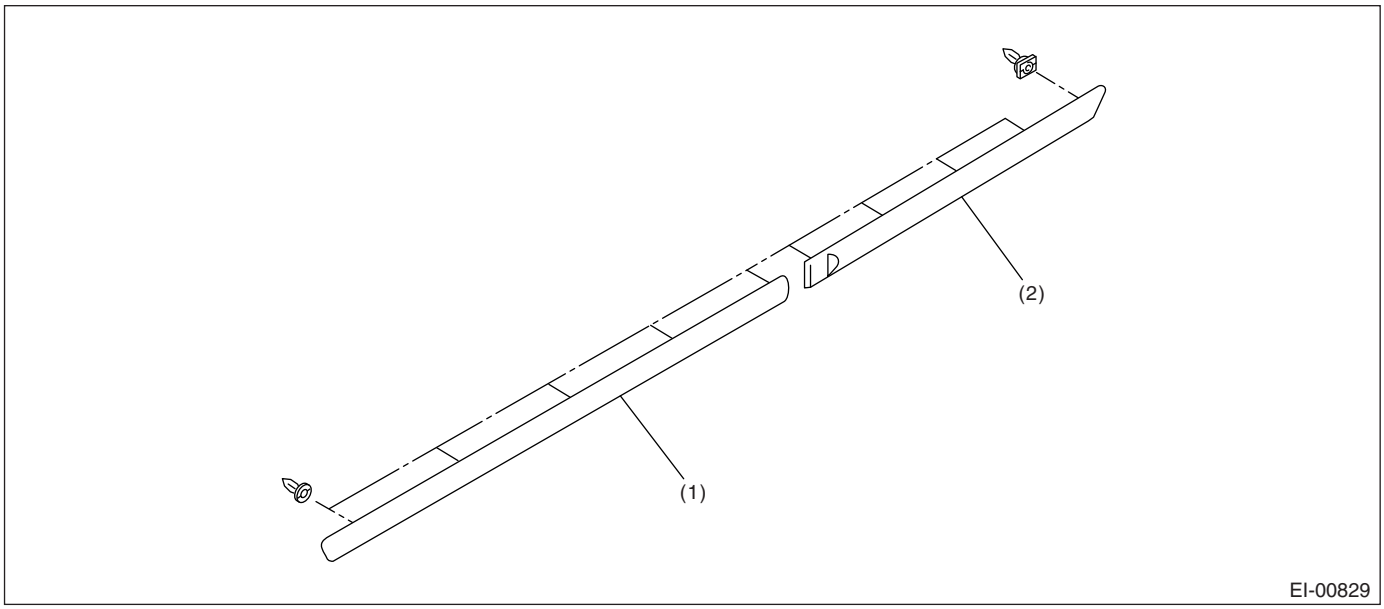
NOTE:
For the rearmost clip securing side sill spoiler, install through the end cover.



(1) Vehicle body
(2) End cover
(3) Side sill spoiler

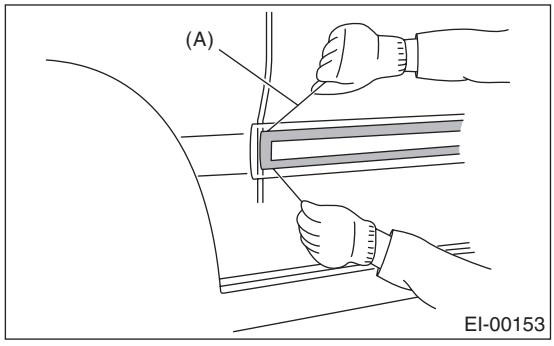
13.Side Protector

A: REMOVAL

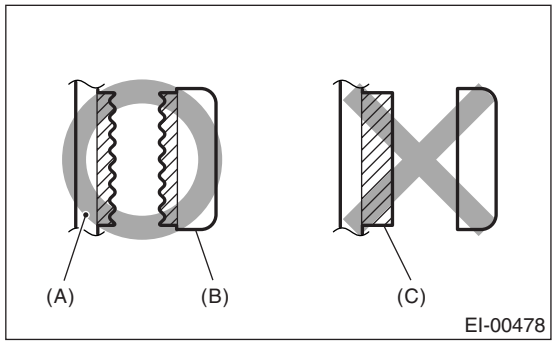


(1) Front door protector (2) Rear door protector

1) Slide in a thin thread (A) of 0.8 mm (0.031 in) diameter or less (fishing line etc.) between body and protector, cut the double-sided tape, and pull the protector toward you, and remove the clip using clip remover.



NOTE:
• To optimize the effect of solvent, slide the thread along body without removing the double-sided tape on the surface of body and spoiler.
• If it is difficult to detach the double-sided tape, warm up to approx. 40°C (104°F).
• If the double-sided tape remains thick on the surface due to interfacial peeling, apply the solvent after slicing off the double-sided tape using a cutter.



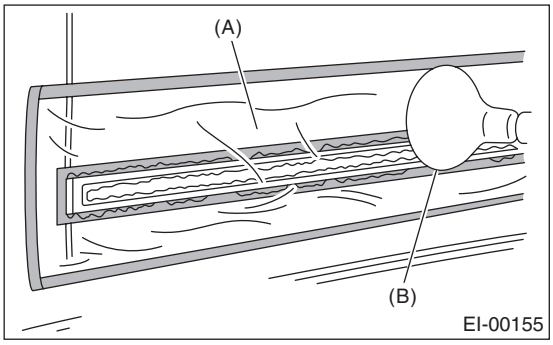
(A) Panel
(B) Side protector
(C) Double-sided tape

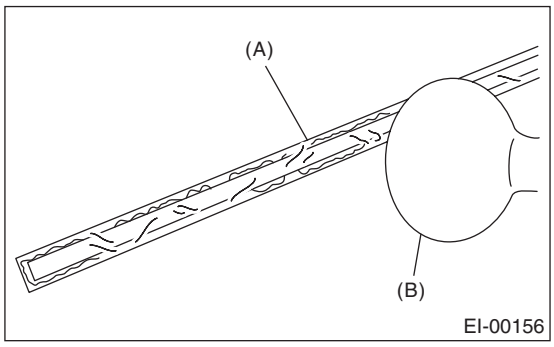
2) Apply masking tape around the double-sided tape remaining on the surface of body or spoiler.
3) Apply solvent uniformly on double-sided tape using a brush.

CAUTION:
• Do not use the solvent to the body which is repaired with lacquer paint.
• Wipe off immediately when the solvent is touched on surface of the body or spoiler.

Solvent:
3M 8907 or equivalent

4) Cover the area where solvent is applied using plastic wrap (A), and then heat the double-sided tape for 5 to 10 minutes in 40 — 60°C (104 — 140°F) using a heat lamp (B).



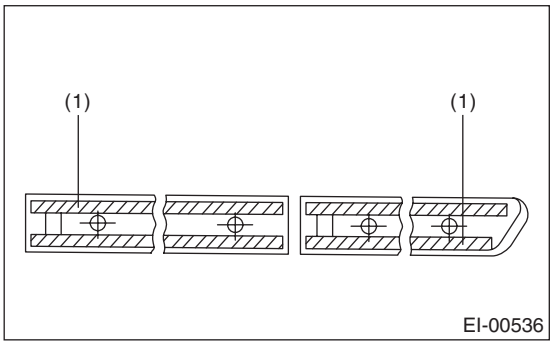


CAUTION:
Do not heat the double-sided tape until the surface becomes white and excessively dried.

5) Remove the double-sided tape using a plastic spatula.
6) After completely removing the double-sided tape, detach the masking tape and clean the surface using a cotton cloth damped with white gasoline.

B: INSTALLATION

1) Apply primer to the protector surface where the double-sided tape to be adhered, and then adhere the double-sided tape as shown in the figure.



(1) Double-sided tape: thickness 1.2 mm (0.047 in), width 5mm (0.197 in)

Primer:
3M K-500 or equivalent

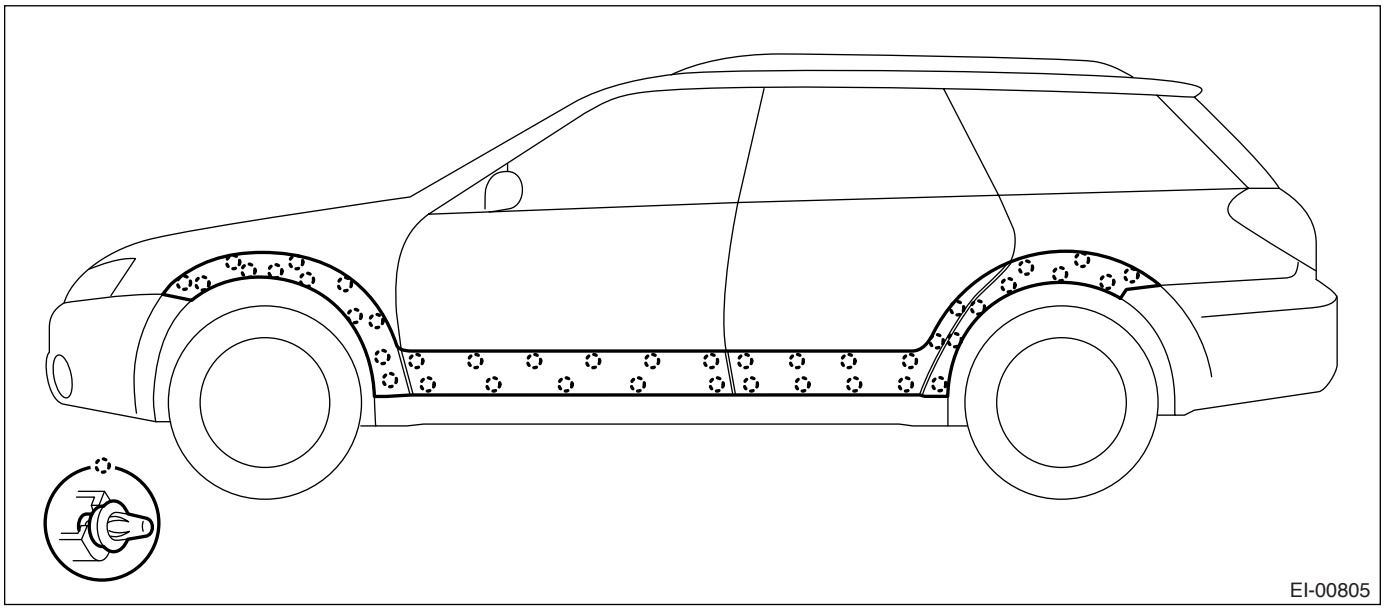
Double-sided tape:
3M 5531-5 or equivalent

2) Heat the adhering part using a heat lamp.
Body side: 40 — 60°C (104 — 140°F)
Protector side: 20 — 30°C (68 — 86°F)
3) Detach the double-sided tape backing sheet, align the clip position, and then adhere to the body using care to avoid air entering.

CAUTION:
To keep the adhesion, do not wash the vehicle within 24 hours from installation.

14.Side Garnish

A: REMOVAL

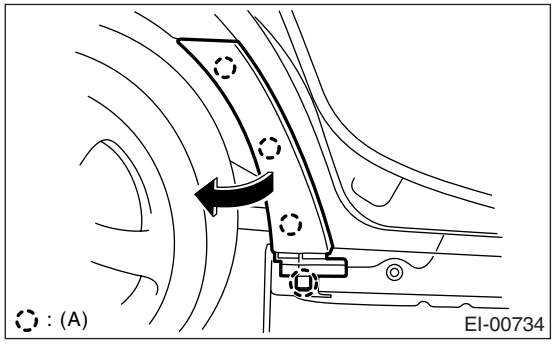


For removal of side garnish, refer to the removal procedure of “Side Protector”. <Ref. to EI-42, REMOVAL, Side Protector.>

15.Rear Quarter Protector

A: REMOVAL

1) Remove the side sill spoilers. <Ref. to EI-41, REMOVAL, Side Sill Spoiler.>
2) Remove the clips (A) with rotating it rearward using the fender arch as a fulcrum, and then remove the rear quarter protector.



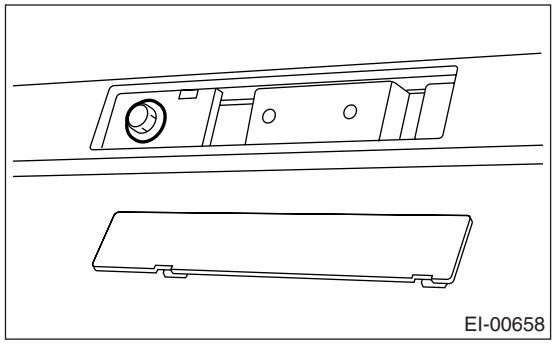
B: INSTALLATION

Install in the reverse order of removal.

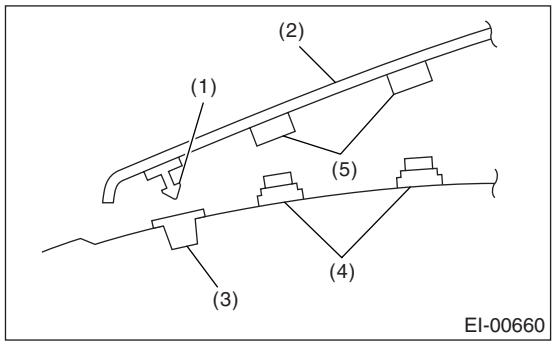
16.Roof Molding

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the roof carrier attachment cover, and remove the bolts. (2 places for each side)

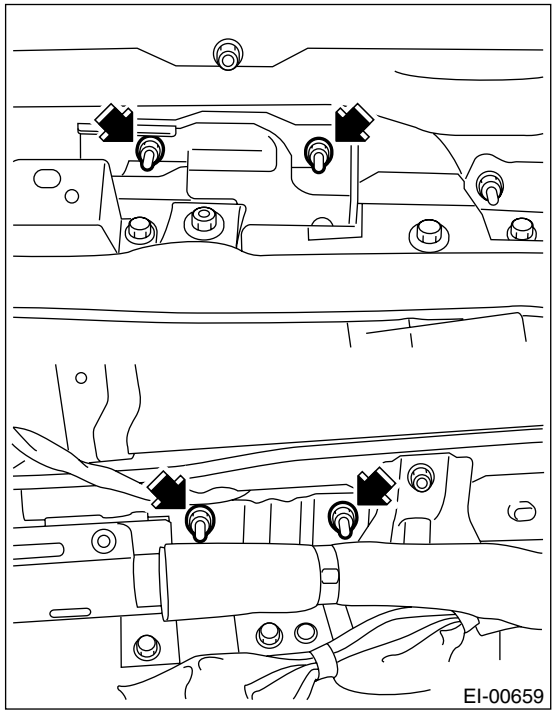


3) Pull the roof molding upward, and remove it from vehicle body.



(1) Locating pin
(2) Roof molding
(3) Cap
(4) Clip
(5) Grommet

4) Remove the roof trim. <Ref. to EI-67, REMOVAL, Roof Trim.>
5) Remove the nuts, and remove the roof carrier attachment.



B: INSTALLATION

Install in the reverse order of removal.

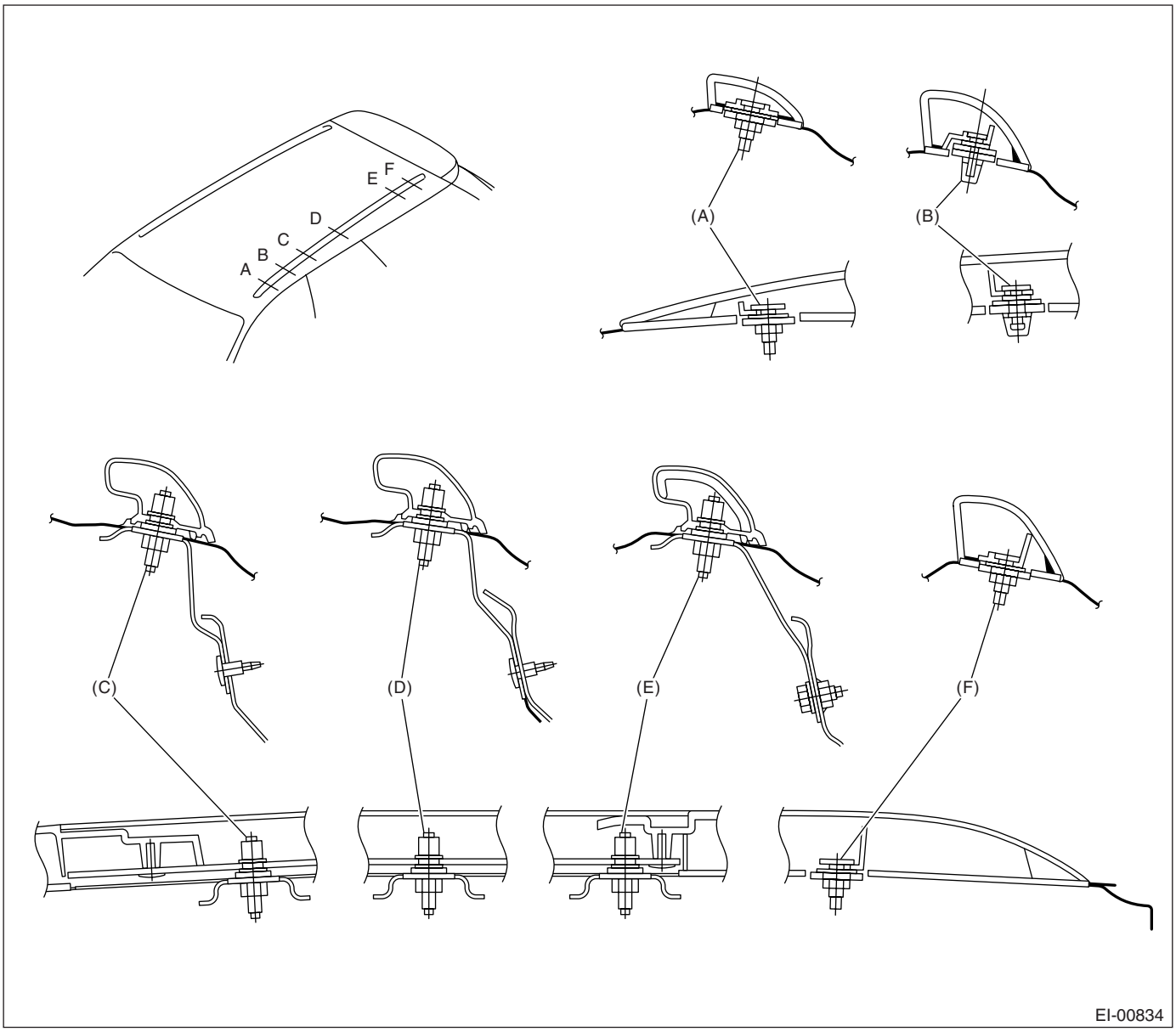
CAUTION:
Replace the clip with new one when the broken pin grommet is found during the removal of roof molding. When the body side cap or clip is damaged, or the roof molding is lifted or peeled from body, be sure to repair them correctly, because those troubles may cause the water leakage.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

17.Roof Rail

A: REMOVAL

1) Remove the roof trim. <Ref. to EI-67, REMOVAL, Roof Trim.>
2) Remove the six nuts.



B: INSTALLATION

Install in the reverse order of removal.

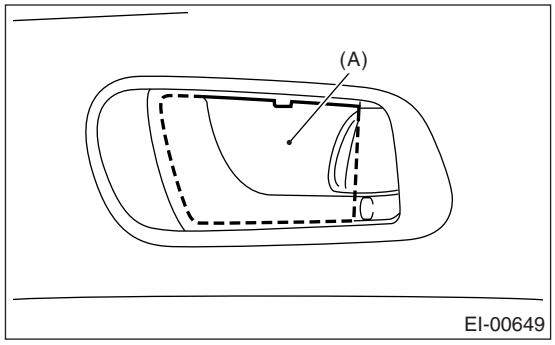
CAUTION:
When removing or installing the roof rail, be careful not to scratch the body panel with the stud bolt of roof rail.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.53 ft-lb)

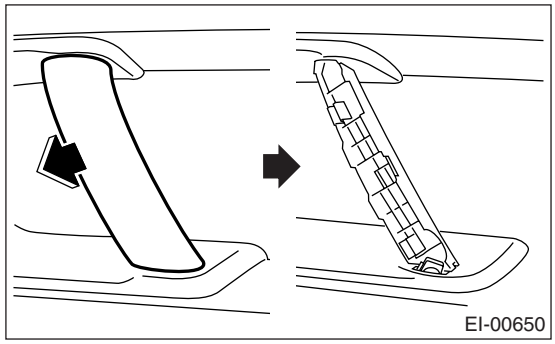
18.Door Trim

A: REMOVAL

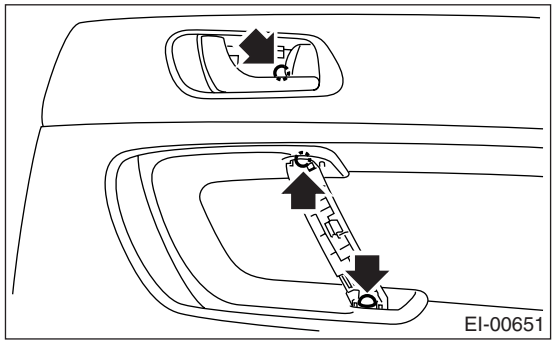
1) Disconnect the ground cable from battery.
2) Remove the cover (A) at inner remote area.



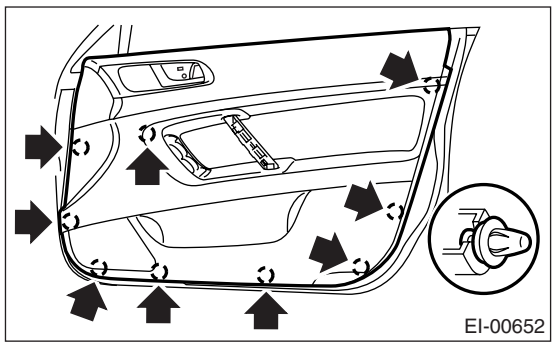
3) Pull the hand grip cover toward you, and remove it.



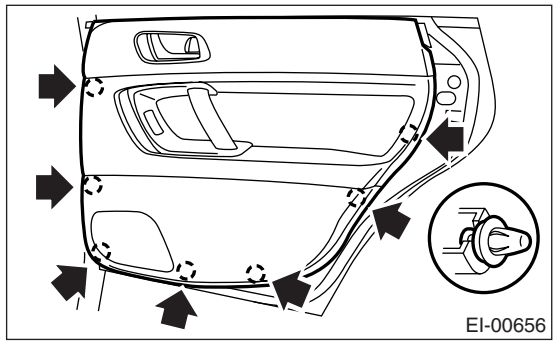
4) Loosen the screws.



5) Remove the clips, and disconnect each connector and wire to remove door trim.
• Front door trim



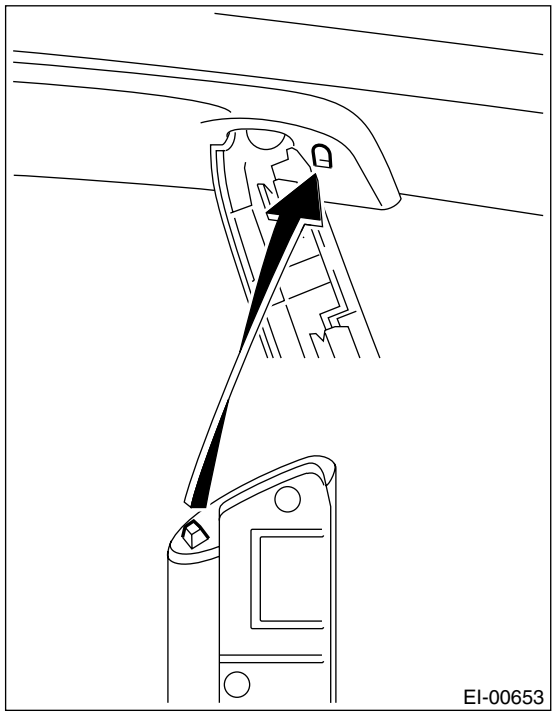
• Rear door trim



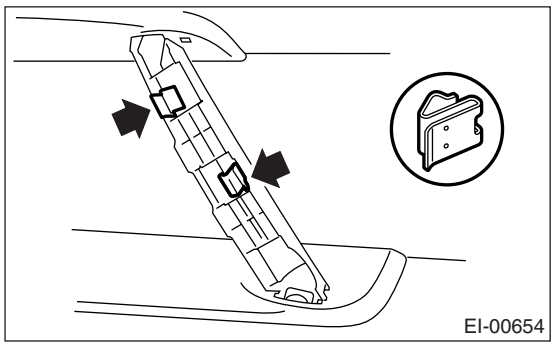
B: INSTALLATION

Install in the reverse order of removal.

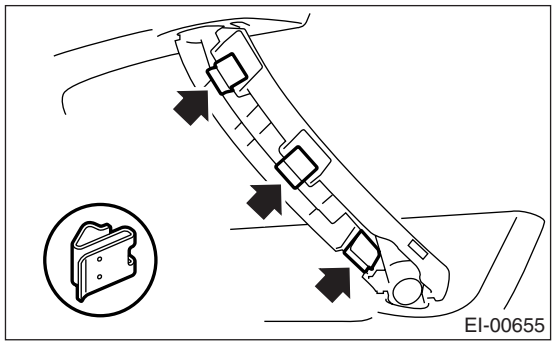
NOTE:
Be careful not to install the hand grip cover and plate clip of hand grip in the wrong direction.
• Hand grip cover (front and rear door)
Convex upward



• Bottom clip of the front door faces the opposite direction



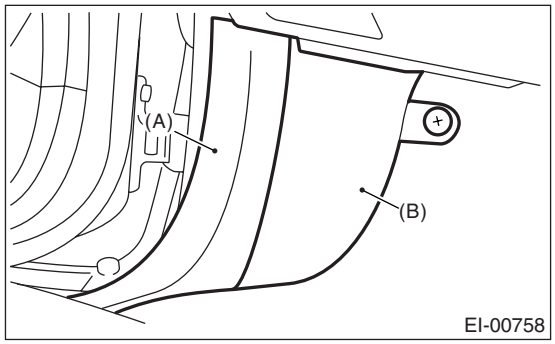
• Lower side of the hand grip cover for front door has pawl part.
• The lowest clip of rear door faces the opposite direction



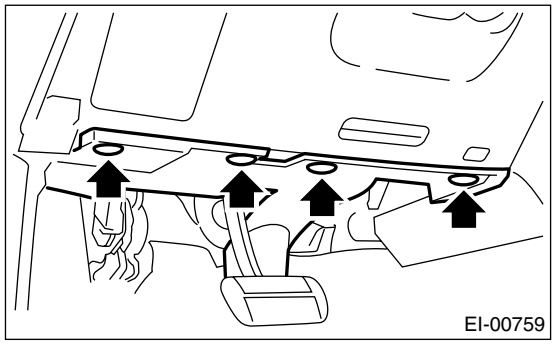
19.Instrument Panel Lower Cover

A: REMOVAL

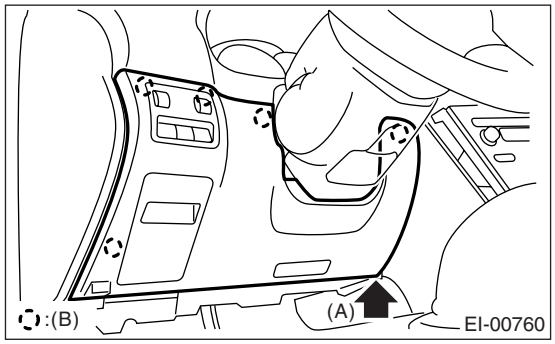
1) Disconnect the ground cable from battery.
2) Remove the front door inside scuff plate (A) and front pillar lower trim (B). <Ref. to EI-60, REMOVAL, Lower Inner Trim.>



3) Remove the clips, and remove the instrument panel lower cover under.



4) Loosen the screw (A), disconnect the connectors, and remove the instrument panel lower cover upper.



(B) Clip

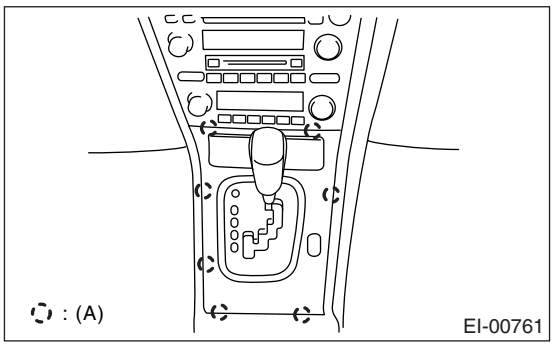
B: INSTALLATION

Install in the reverse order of removal.

20.Glove Box

A: REMOVAL

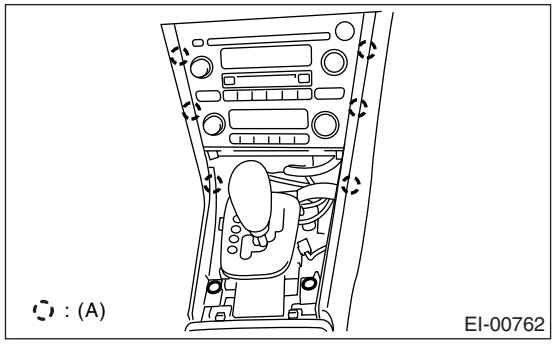
1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
3) Remove the console front panel.



(A) Hook

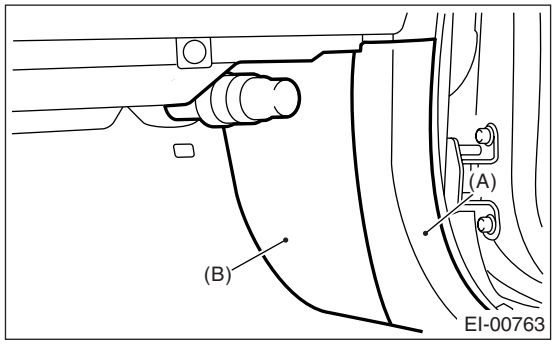
NOTE:
For AT model, remove the ring indicator.
For MT model, remove the shift knob.

4) Remove the console side garnish.

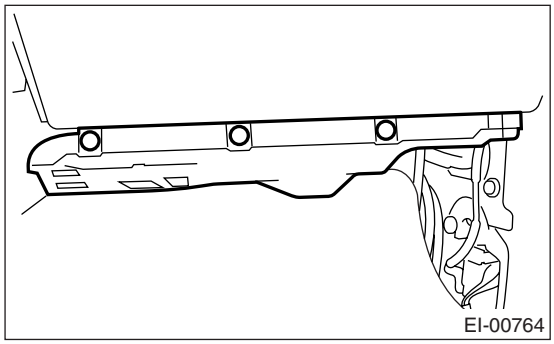


(A) Hook

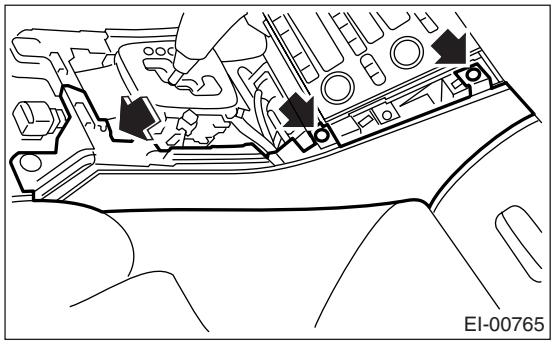
5) Remove the front inside scuff plate (A) and front pillar lower trim (B). <Ref. to EI-60, REMOVAL, Lower Inner Trim.>



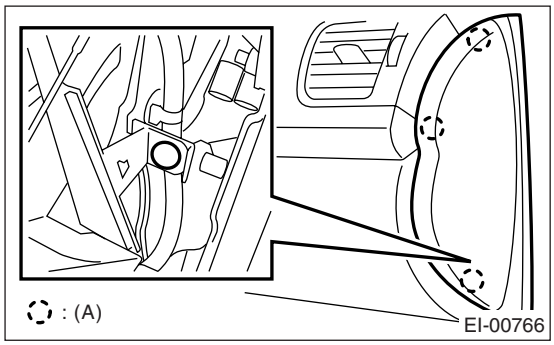
6) Remove the clip, and remove the glove box lower cover.



7) Remove the console side panel.

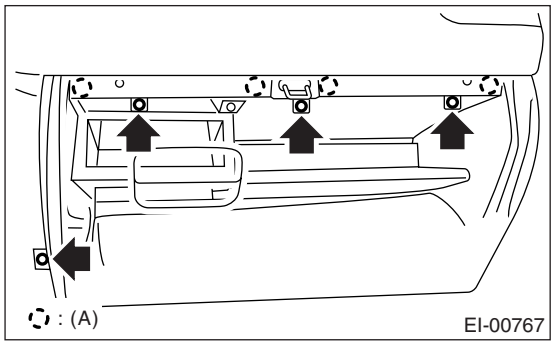


8) Remove the instrument panel side cover, and remove the clip.



(A) Clip

9) Remove the screw, and remove the glove box.



(A) Clip

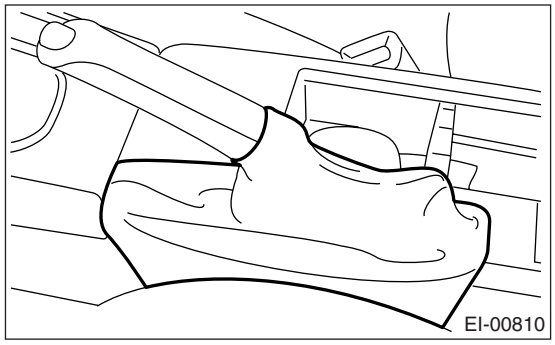
B: INSTALLATION

Install in the reverse order of removal.

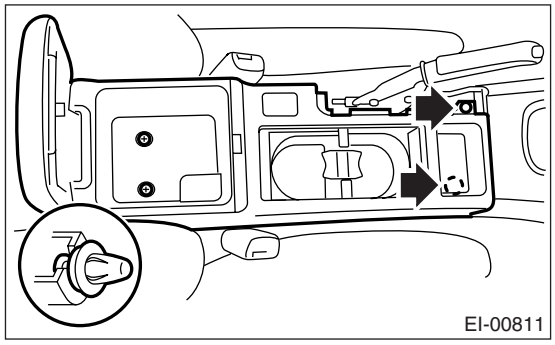
21.Console Box

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the parking brake lever cover.



3) Remove the bolts and clips.



4) Disconnect the connector, and remove the console box.

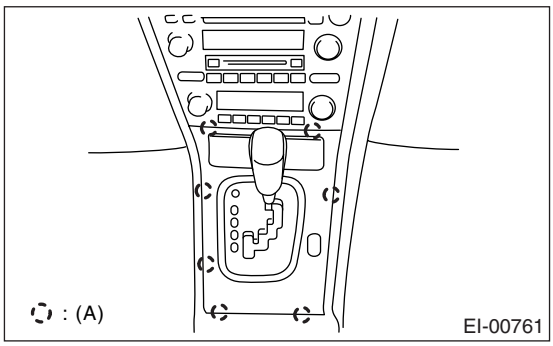
B: INSTALLATION

Install in the reverse order of removal.

22.Center Console

A: REMOVAL

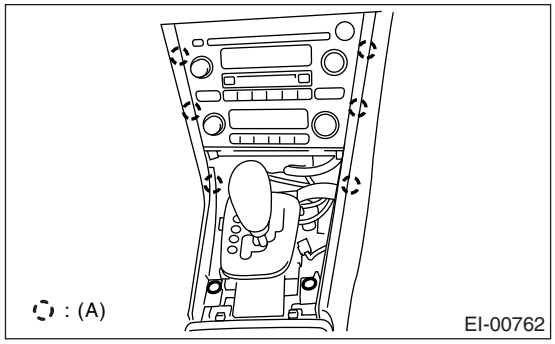
1) Disconnect the ground cable from battery.
2) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
3) Remove the console front panel.



(A) Hook

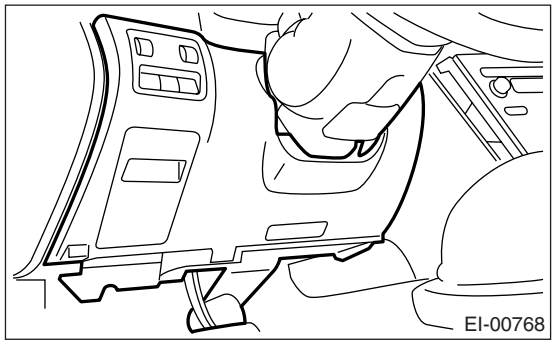
NOTE:
For AT model, remove the ring indicator.
For MT model, remove the shift knob.

4) Loosen the screw, remove the hook, and remove the console side garnish.

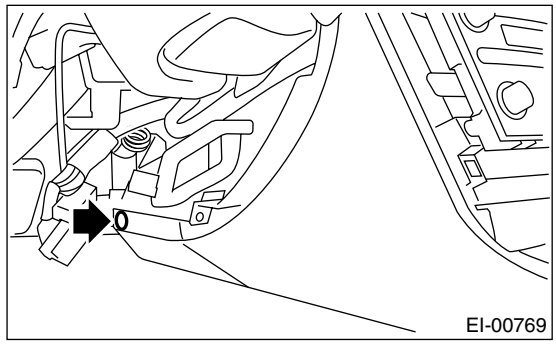


(A) Hook

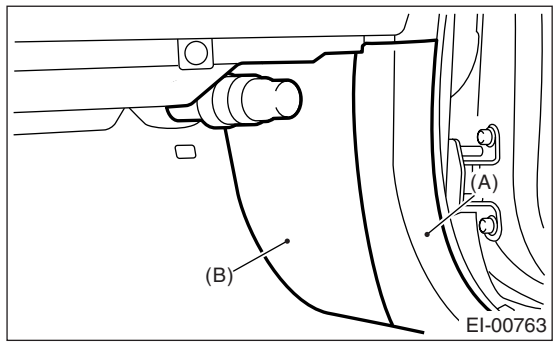
5) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>



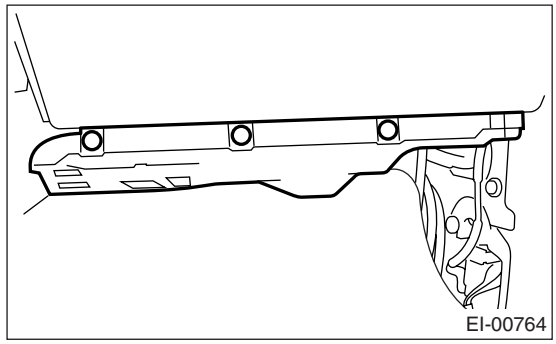
6) Remove the clip at the console side panel tip.



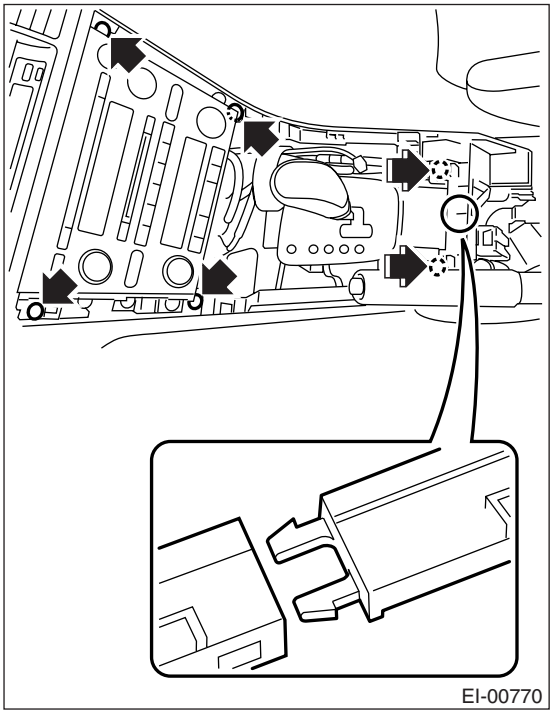
7) Remove the passenger side front inside scuff plate (A) and front pillar lower trim (B). <Ref. to EI-60, REMOVAL, Lower Inner Trim.>



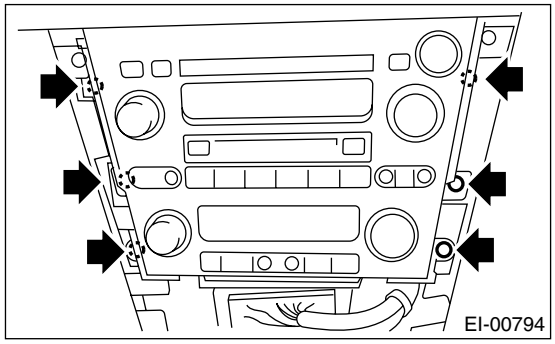
8) Remove the clip, and remove the glove box lower cover.



9) Remove the screws, and remove the console side panel.



10) Loosen the screws to pull out the audio unit assembly, and disconnect the connector to remove audio unit.



NOTE:
Audio unit assembly can be removed without removing the console side panel.

B: INSTALLATION

Install in the reverse order of removal.

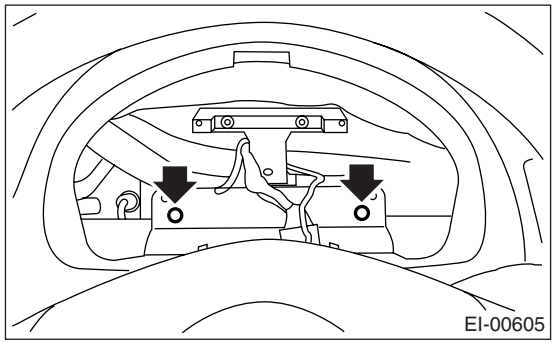
23.Instrument Panel Assembly

A: REMOVAL

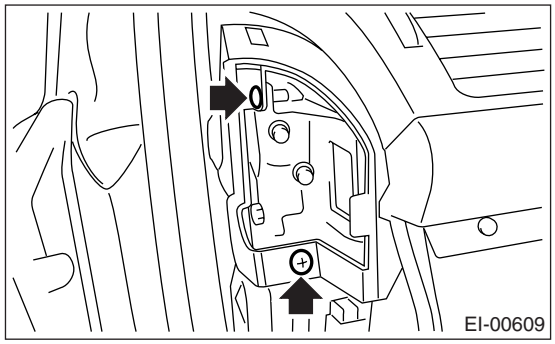
1. INSTRUMENT PANEL (EXCLUDING STEERING SUPPORT BEAM)

CAUTION:
Be careful to the harness of airbag system when servicing the instrument panel. Damage may cause the system malfunction.

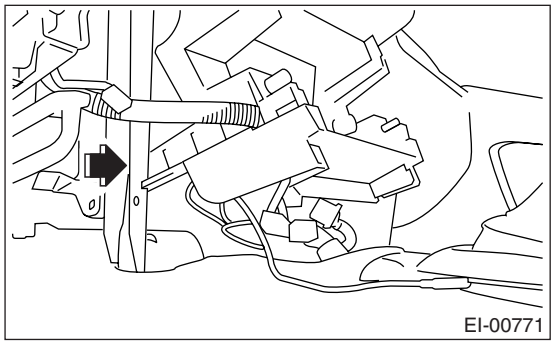
1) Disconnect the ground cable from battery.
2) Remove the front pillar upper trim. <Ref. to EI-62, REMOVAL, Upper Inner Trim.>
3) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
4) Remove the center console. <Ref. to EI-54, REMOVAL, Center Console.>
5) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
6) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
7) Remove the combination meter assembly. <Ref. to IDI-16, REMOVAL, Combination Meter Assembly.>
8) Remove the screws.


EI-00605

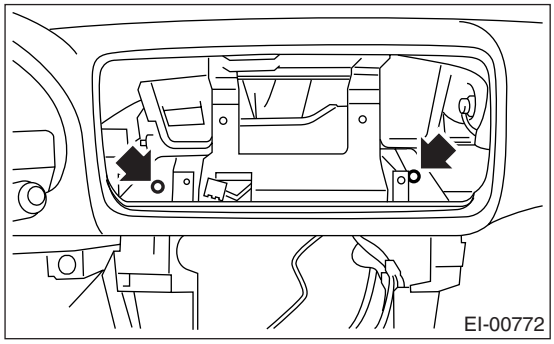
9) Remove the driver side instrument panel side cover, and remove the screws.


EI-00609

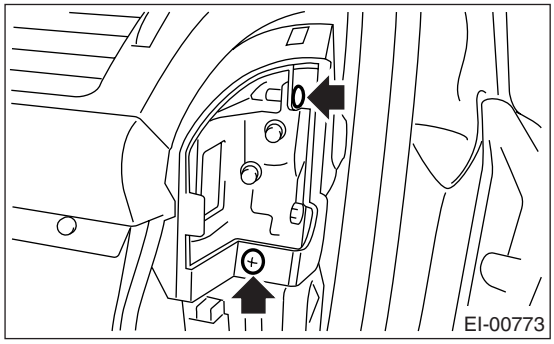
10) Remove the screw at the side of center console.


EI-00771

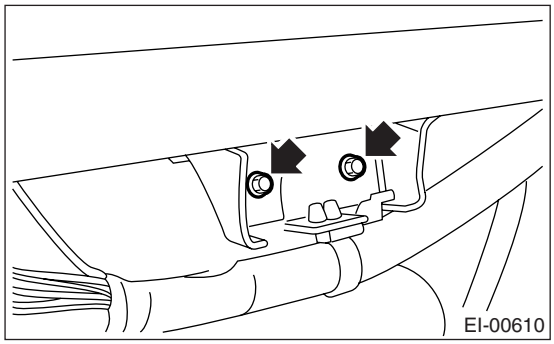
11) Remove the center air vent grille of instrument panel. <Ref. to AC-44, CENTER GRILLE, REMOVAL, Air Vent Grille.>
12) Remove the screws.


EI-00772

13) Remove the screws at side of passenger side instrument panel.


EI-00773

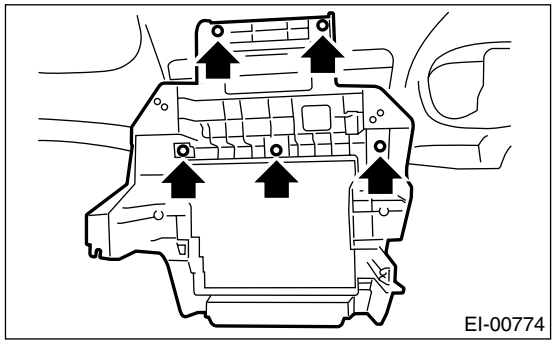
14) Remove the bolts securing passenger side airbag module to the steering support beam.


EI-00610

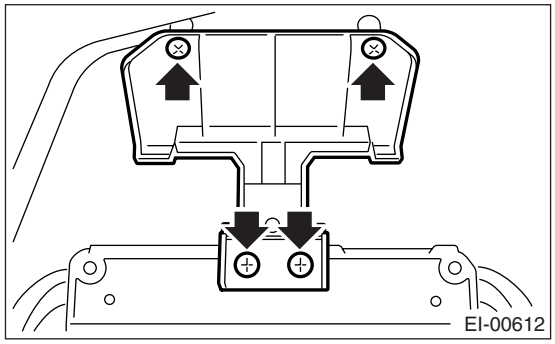
15) Disconnect the connectors, and remove the instrument panel from vehicle body.

NOTE:
• If necessary, make matching marks for easy reassembly.
• When storing the removed instrument panel, be sure to prepare a table or the like to put instrument panel on to prevent damage.

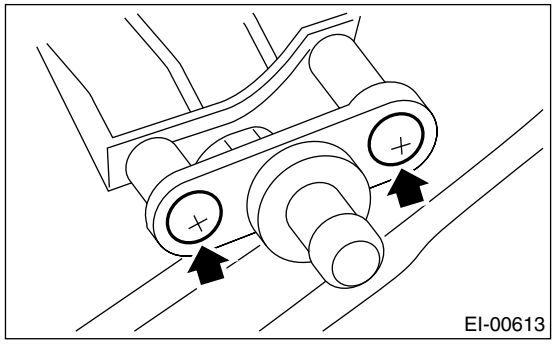
16) Remove the side air vent grille. <Ref. to AC-44, REMOVAL, Air Vent Grille.>
17) Remove the heater vent duct. <Ref. to AC-46, REMOVAL, Heater Vent Duct.>
18) Loosen the screws to remove center console frame.


EI-00774

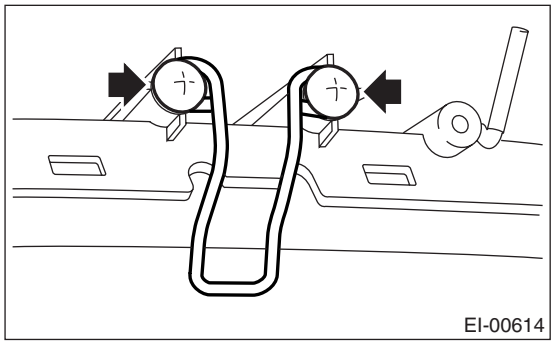
19) Loosen the screws to remove meter bracket.


EI-00612

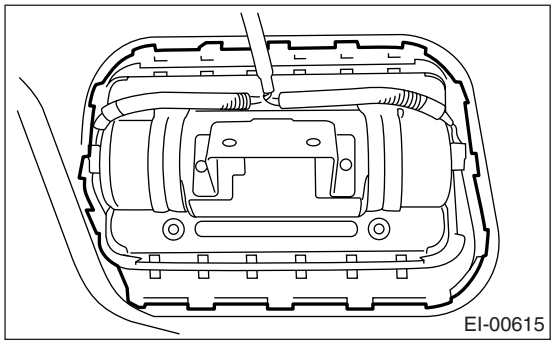
20) Loosen the screws to remove instrument panel matching pins.


EI-00613

21) Loosen the screws to remove glove box striker.


EI-00614

22) Remove the pawl, and remove the passenger's airbag module.

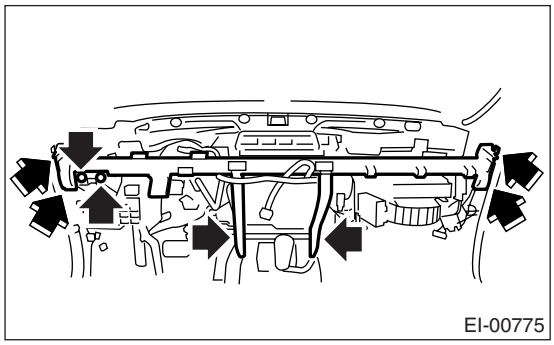

EI-00615

2. STEERING SUPPORT BEAM

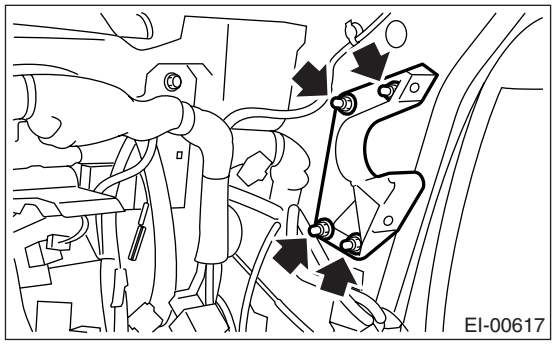
1) Remove the instrument panel. <Ref. to EI-56, INSTRUMENT PANEL (EXCLUDING STEERING SUPPORT BEAM), REMOVAL, Instrument Panel Assembly.>
2) Remove the steering shaft assembly. <Ref. to PS-23, REMOVAL, Tilt Steering Column.>
3) Remove each harness clip, and remove the harness from steering support beam.

NOTE:
If necessary, make matching marks for easy reassembly.

4) Remove the bolt and remove steering support beam.


EI-00775

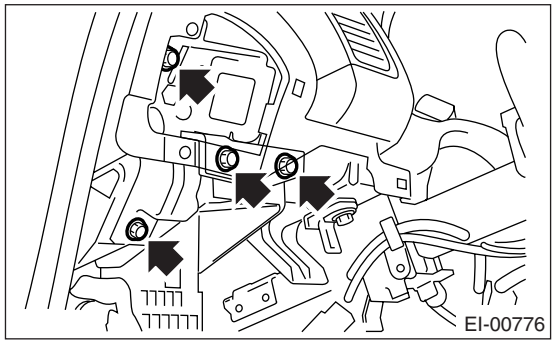
5) Remove the steering support beam bracket.



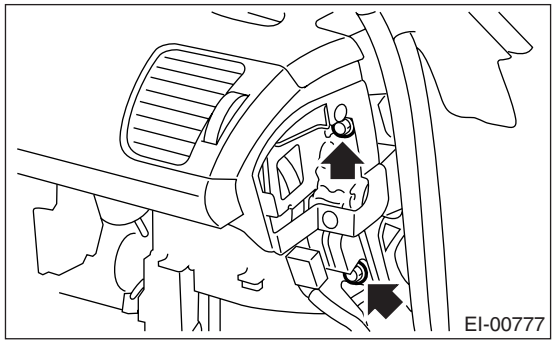
3. INSTRUMENT PANEL ASSEMBLY (INCLUDING STEERING SUPPORT BEAM)

CAUTION:
Be careful to the harness of airbag system when servicing the instrument panel. Damage may cause the system malfunction.

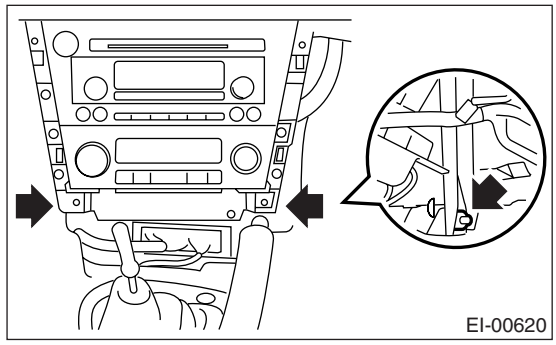
1) Remove the front pillar upper trim. <Ref. to EI-62, REMOVAL, Upper Inner Trim.>
2) Remove the center console. <Ref. to EI-54, REMOVAL, Center Console.>
3) Remove the instrument panel lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.>
4) Remove the glove box. <Ref. to EI-51, REMOVAL, Glove Box.>
5) Remove the steering shaft assembly. <Ref. to PS-23, REMOVAL, Tilt Steering Column.>
6) Remove the driver side instrument panel side cover, and remove the bolts.



7) Remove the bolts at the side of passenger side instrument panel.



8) Loosen the bolts on the center console side.



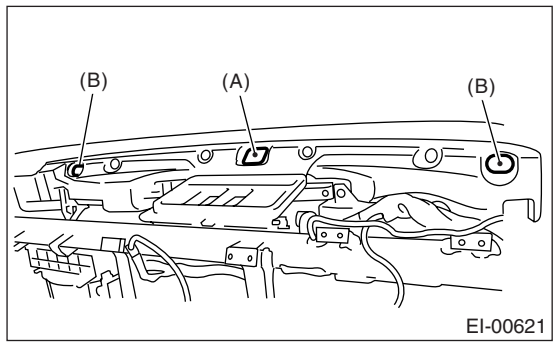
9) Disconnect each connector, and remove the instrument assembly.

NOTE:
If necessary, make matching marks for easy reassembly.

B: INSTALLATION

1. INSTRUMENT PANEL (EXCLUDING STEERING SUPPORT BEAM)

1) Insert the matching pins (3 places) on the instrument panel tip into the grommet (A) and (B) on the body panel side.



2) Check the inserted state of matching pins, and pull the harness around.
3) Tighten the instrument panel with screw, and recheck the installation of instrument panel and the state of pulled harness.
4) Install in the reverse order of removal.

2. STEERING SUPPORT BEAM

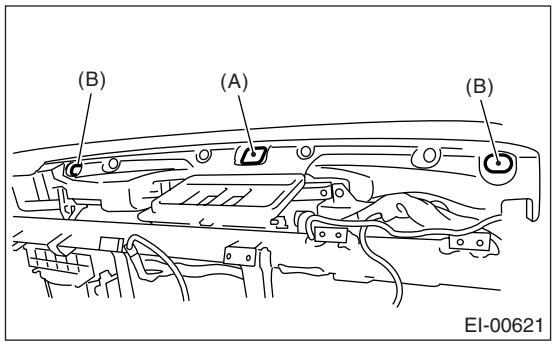
1) Temporarily tighten the steering support beam with bolt, and pull the harness around.
2) Make sure that there is no mutual interference in each pedal, and tighten the each bolt.

Tightening torque:
25 N·m (25.5 kgf-m, 18.4 ft-lb)

3) Install in the reverse order of removal.

3. INSTRUMENT PANEL ASSEMBLY (INCLUDING STEERING SUPPORT BEAM)

1) Insert the matching pins (3 places) on the instrument panel tip into the grommet (A) and (B) on the body panel side.



2) Check the inserted state of matching pins, and pull the harness around.
3) Temporarily tighten the steering support beam with bolt, and pull the harness around.
4) Make sure that there is no mutual interference in each pedal, and tighten the each bolt.

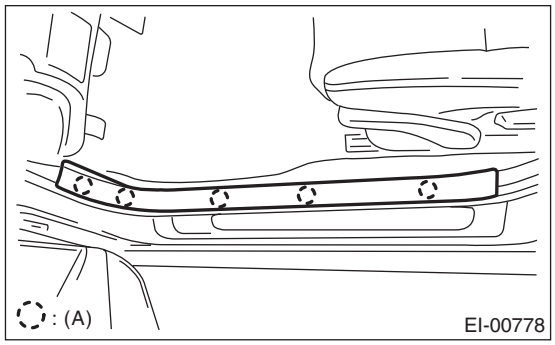
Tightening torque:
25 N·m (25.5 kgf-m, 18.4 ft-lb)

5) Install in the reverse order of removal.

24.Lower Inner Trim

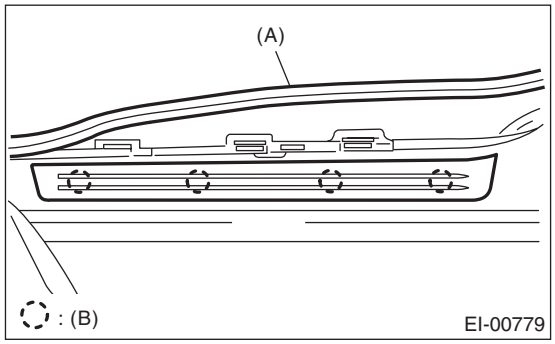
A: REMOVAL

1) Remove the hook, and remove the inside scuff plate.



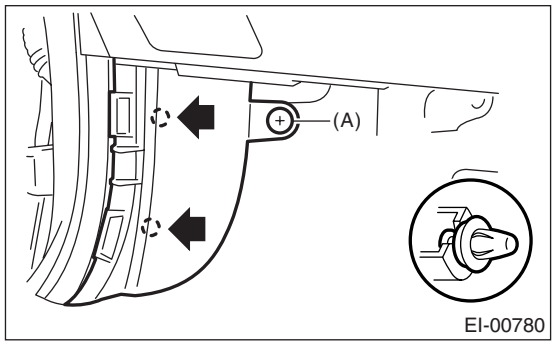
(A) Hook

2) Remove the door molding (A), and remove the outside scuff plate.



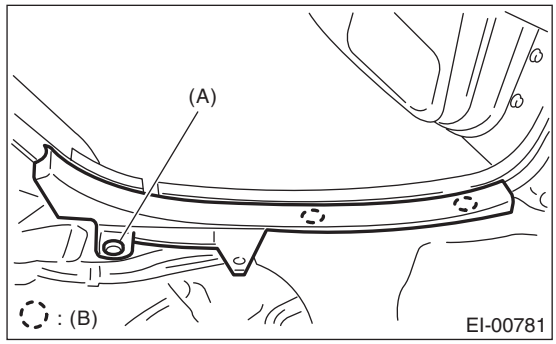
(B) Clip

3) Remove the clip (A), and remove the front pillar lower trim.



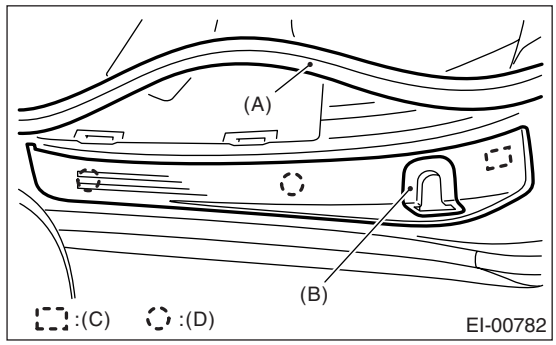
4) Remove the rear seat cushion. <Ref. to SE-14, REMOVAL, Rear Seat.>

5) Remove the clip (A), and remove the inside scuff plate.



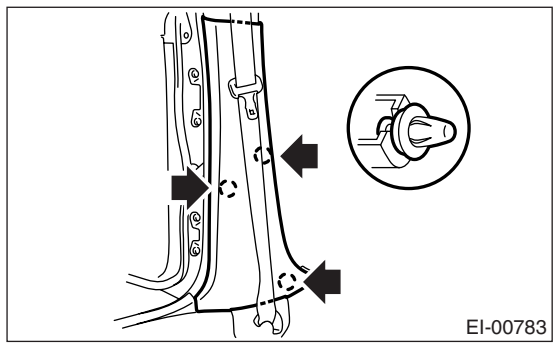
(B) Hook

6) Remove the door molding (A) and door catcher cover (B), and then remove the outside scuff plate.

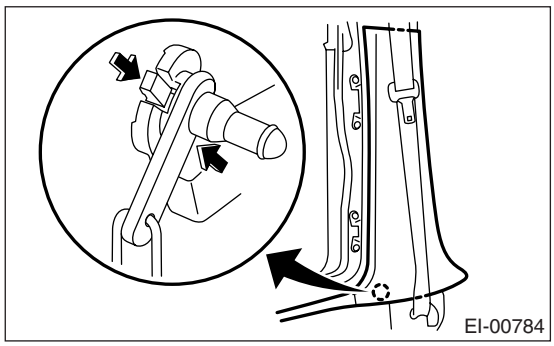


(C) Hook with plate clip
(D) Clip

7) Remove the clips of the center pillar lower trim.



8) Remove the center pillar lower trim while pushing the pawl part on the upper and lower side of dropout prevention clip.



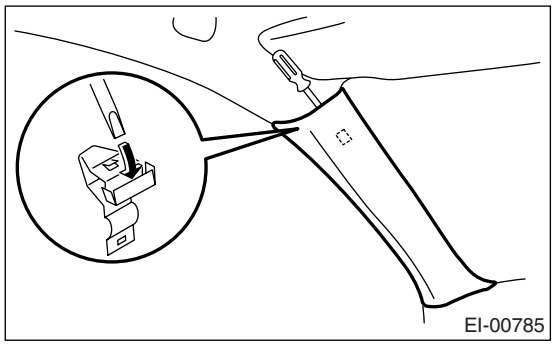
B: INSTALLATION

Install in the reverse order of removal.

25.Upper Inner Trim

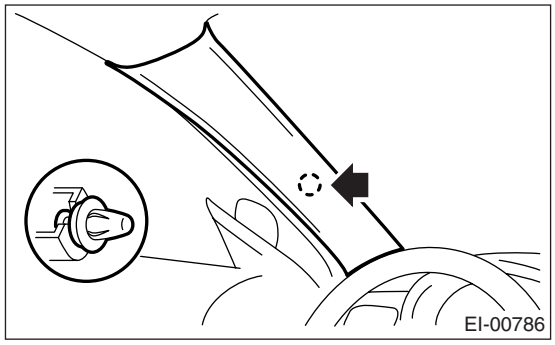
A: REMOVAL

1) From the top side of trim, remove the metal clip using flat tip driver.



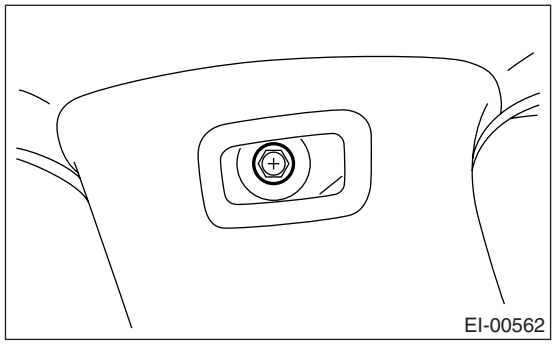
CAUTION:
When metal clip is removed from upper inner trim, replace the both of upper inner trim and metal clip with new ones.

2) Remove the front pillar upper trim.

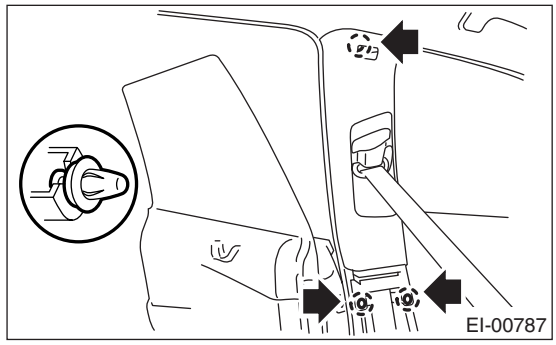


3) Remove the front inside scuff plate, rear inside scuff plate and center pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>

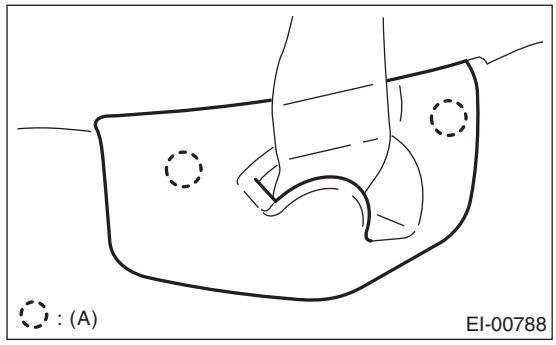
4) Remove the cap on the upper side of pillar trim, and remove the bolt inside. (Model with curtain air-bag)



5) Remove the center pillar upper trim.

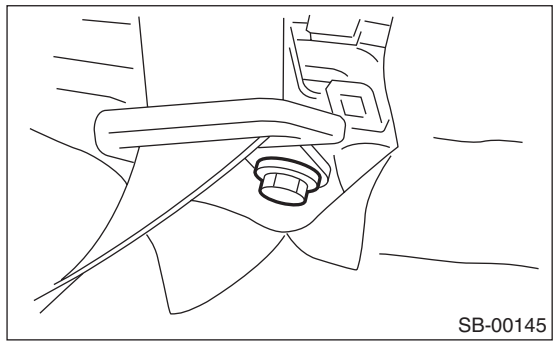


6) Remove the seat belt lower anchor bolt cover.



(A) Clip

7) Remove the seat belt lower anchor bolt, and pull out the seat belt from center pillar upper trim.



B: INSTALLATION

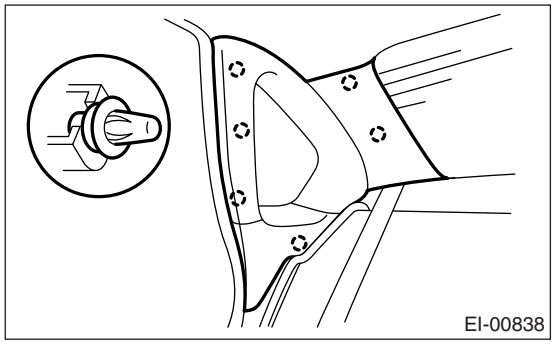
Install in the reverse order of removal.

26.Rear Quarter Trim

A: REMOVAL

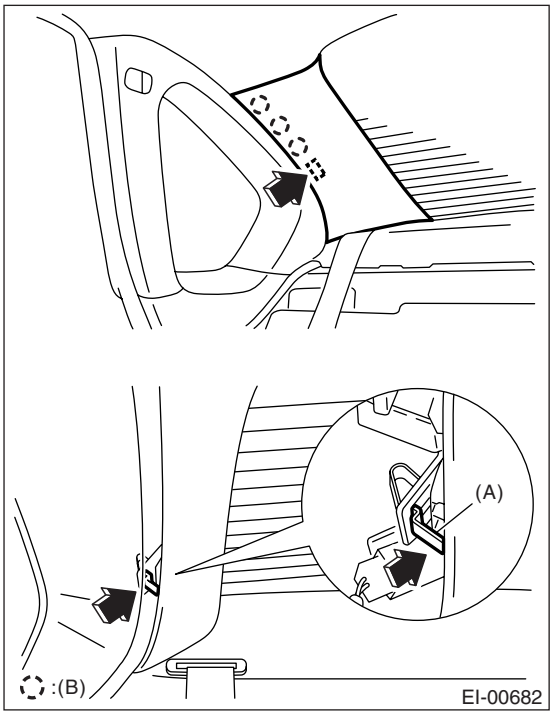
1. SEDAN MODEL (MODEL WITHOUT CURTAIN AIRBAG)

1) Remove the rear seat. <Ref. to SE-14, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove the rear quarter trim.



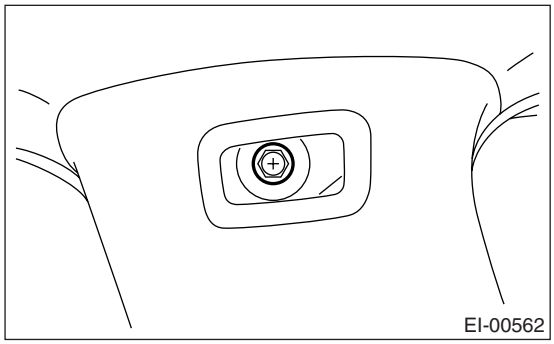
2. SEDAN MODEL (MODEL WITH CURTAIN AIRBAG)

1) Remove the rear seat. <Ref. to SE-14, WAGON MODEL, REMOVAL, Rear Seat.>
2) Turn over the trim, and remove the quarter trim rear by pressing the claw (A) of metal clip using flat tip screwdriver or the like.

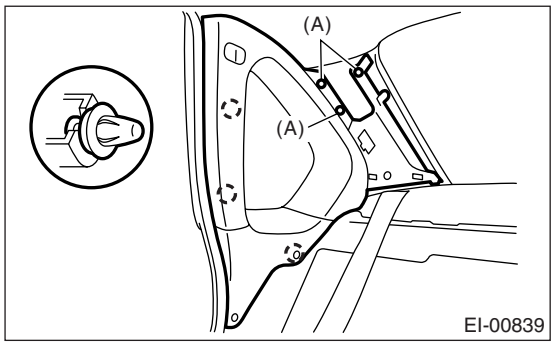


(B) Hook

3) Remove the cap on the upper side of trim, and remove the bolt inside.

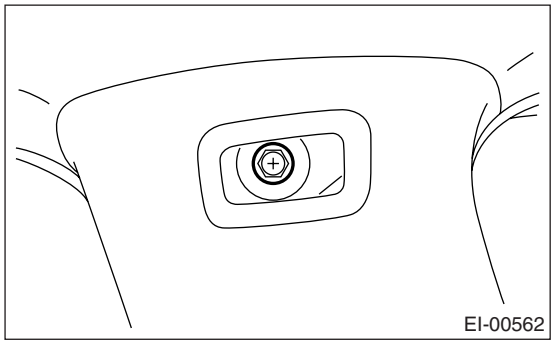


4) Remove the bolts (A), and remove the quarter trim (front).

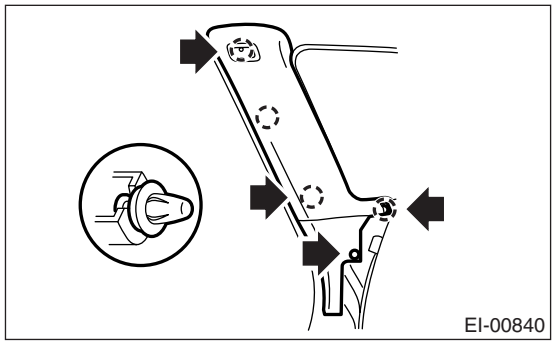


3. WAGON MODEL

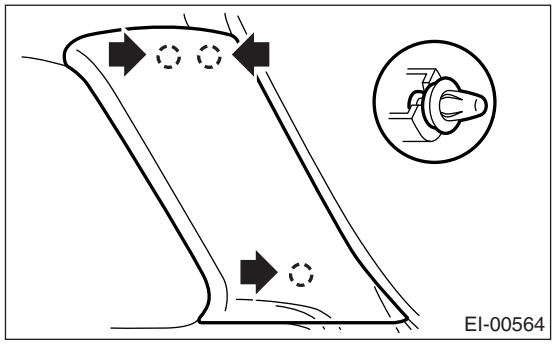
1) Remove the rear seat cushion and backrest shoulder. <Ref. to SE-14, SEDAN MODEL, REMOVAL, Rear Seat.>
2) Remove the cap on the upper side of pillar trim, and remove the bolt inside. (Model with curtain airbag)



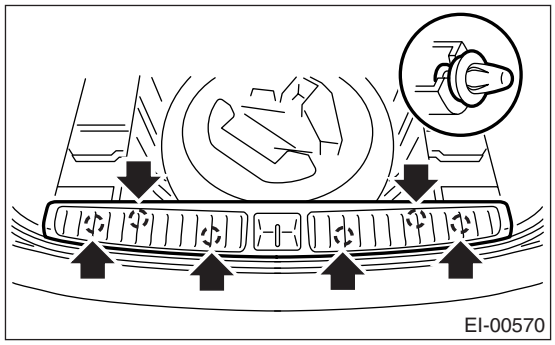
3) Remove the clip, and remove the quarter front pillar trim.



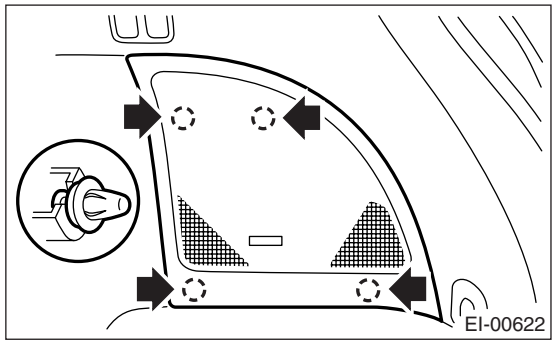
4) Remove the quarter rear pillar trim.



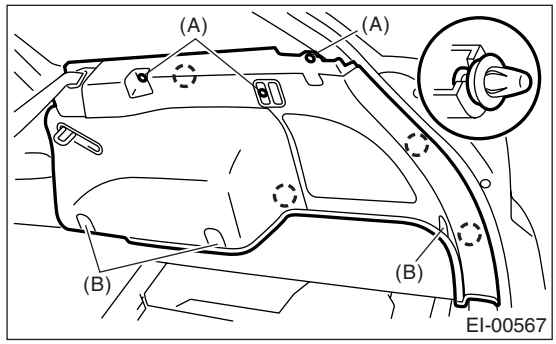
5) Remove the luggage floor box. <Ref. to EI-74, REMOVAL, Luggage Floor Box.>
6) Remove the luggage floor end cover.



7) Remove the woofer cover. (Model with McIntosh Audio)



8) Remove the screws (A) and bolts (B), and remove the quarter lower trim.



NOTE:
• Remove the screw cover on the tonneau cover installing part.
• Pull out the shopping bag hook, remove the screw on back.

B: INSTALLATION

1. SEDAN MODEL

Install in the reverse order of removal.

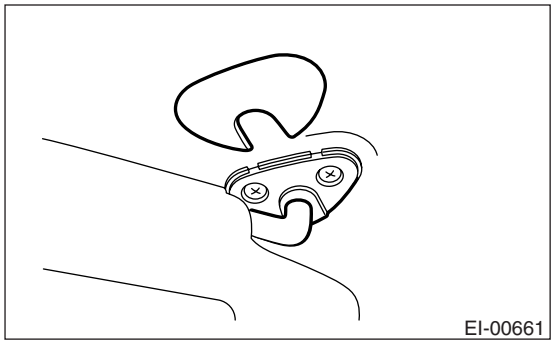
2. WAGON MODEL

Install in the reverse order of removal.

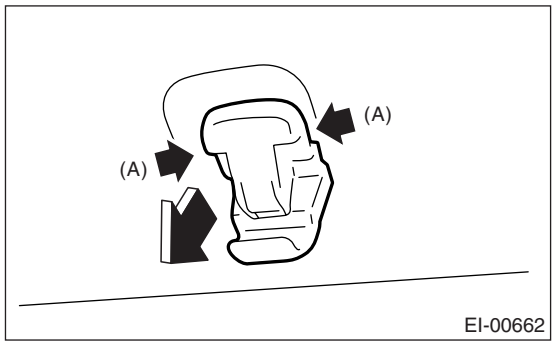
27.Sun Visor

A: REMOVAL

1) Remove the cover, loosen the mounting screws, and remove the sun visor.



2) Disconnect the connector. (Model with vanity mirror light)
3) Press the (A) on both side using flat tip driver, pull the sun visor hook and remove it.



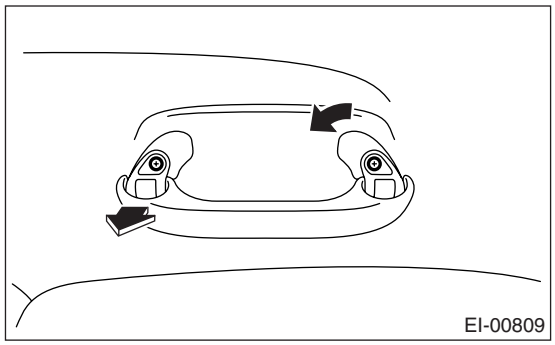
B: INSTALLATION

Install in the reverse order of removal.

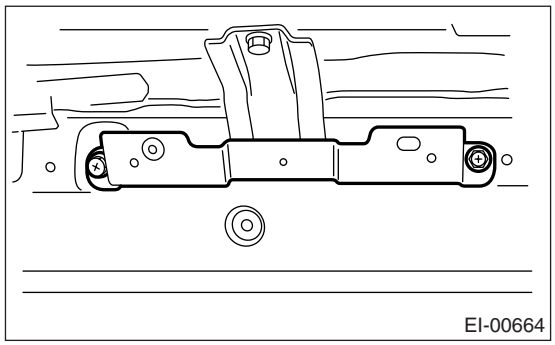
28. Assist Grip

A: REMOVAL

1) Remove the screw cover, and remove the screw inside.
2) Pull the left side of assist grip toward you, and rotate the right side of it counterclockwise to remove.



3) Remove the roof trim. <Ref. to EI-67, REMOVAL, Roof Trim.>
4) Remove the bolts, and remove the assist grip bracket.



B: INSTALLATION

Install in the reverse order of removal.

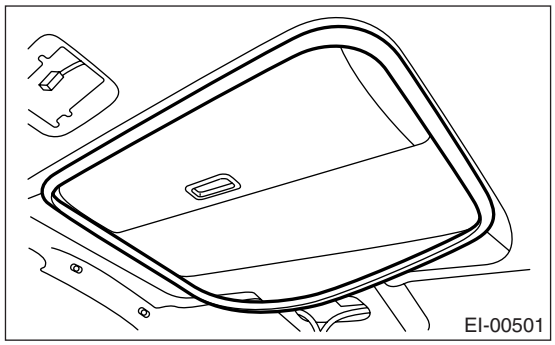
CAUTION:
Be sure to install the grommet to assist grip bracket.
When install the assist grip without grommet, it may cause the faulty returning.

29.Roof Trim

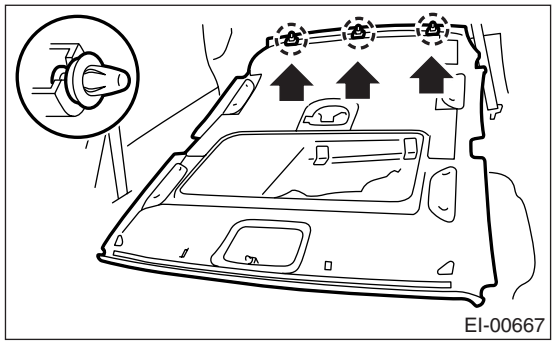
A: REMOVAL

1. SEDAN MODEL

1) Disconnect the ground cable from battery.
2) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
3) Remove the rear seat. <Ref. to SE-14, REMOVAL, Rear Seat.>
4) Remove the console box. <Ref. to EI-53, REMOVAL, Console Box.>
5) Remove the center console. <Ref. to EI-54, REMOVAL, Center Console.>
6) Remove the select lever. (AT model)
<Ref. to CS-7, REMOVAL, Select Lever.>
7) Remove the spot map light. <Ref. to LI-34, REMOVAL, Spot Map Light.>
8) Remove the room light. <Ref. to LI-35, REMOVAL, Room Light.>
9) Remove the sun visor. <Ref. to EI-65, REMOVAL, Sun Visor.>
10) Remove the assist grip. <Ref. to EI-66, REMOVAL, Assist Grip.>
11) Remove the upper inner trim. <Ref. to EI-62, REMOVAL, Upper Inner Trim.>
12) Remove the rear quarter trim. <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIRBAG), REMOVAL, Rear Quarter Trim.>
13) Remove the sunroof opening trim. (Model with sunroof)



14) Remove the clips and each harness, and remove the roof trim.
15) Pull out the roof trim from vehicle.

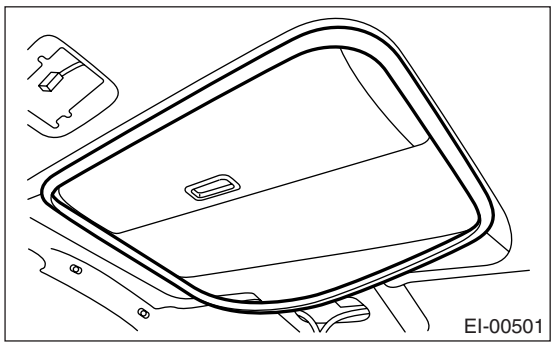


2. WAGON MODEL

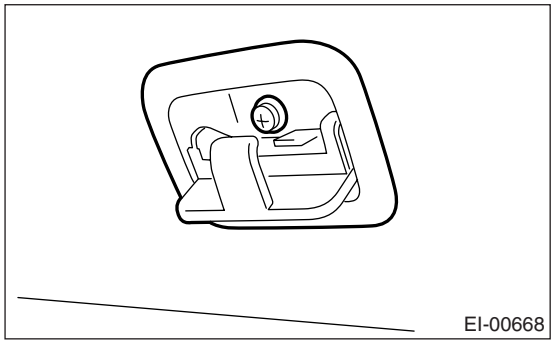
1) Disconnect the ground cable from battery.
2) Remove the spot map light. <Ref. to LI-34, REMOVAL, Spot Map Light.>
3) Remove the room light. <Ref. to LI-35, REMOVAL, Room Light.>
4) Remove the luggage room light. <Ref. to LI-36, REMOVAL, Luggage Room Light.>
5) Remove the sun visor. <Ref. to EI-65, REMOVAL, Sun Visor.>
6) Remove the assist grip. <Ref. to EI-66, REMOVAL, Assist Grip.>
7) Remove the upper inner trim. <Ref. to EI-62, REMOVAL, Upper Inner Trim.>
8) Remove the rear quarter trim. <Ref. to EI-63, WAGON MODEL, REMOVAL, Rear Quarter Trim.>

CAUTION:
Do not remove the roof end trim with excessive force. Otherwise roof trim may be damaged.
Roof trim and roof end trim are fastened by rivets.

9) Remove the sunroof opening trim. (Model with sunroof)

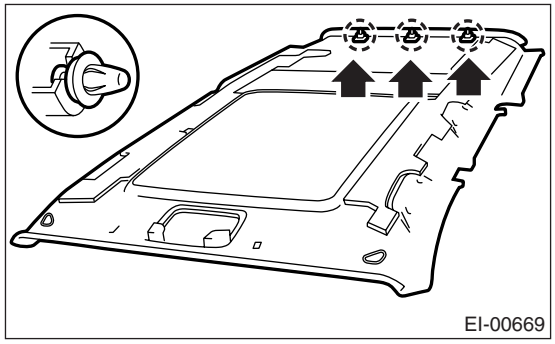


10) Remove the coat hook.



11) Remove the clips and each harness, pull out the rear center seat belt, and remove the roof trim.

CAUTION:
Do not remove the roof end trim with excessive force. Otherwise roof trim may be damaged.



B: INSTALLATION

1. SEDAN MODEL

Install in the reverse order of removal.

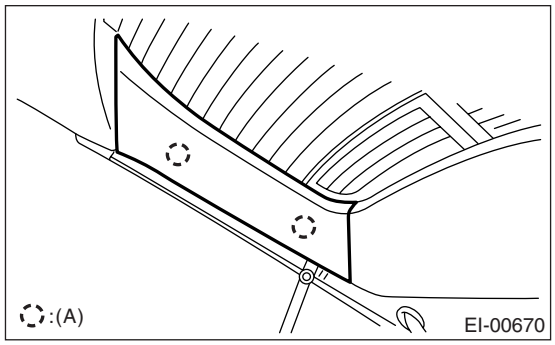
2. WAGON MODEL

Install in the reverse order of removal.

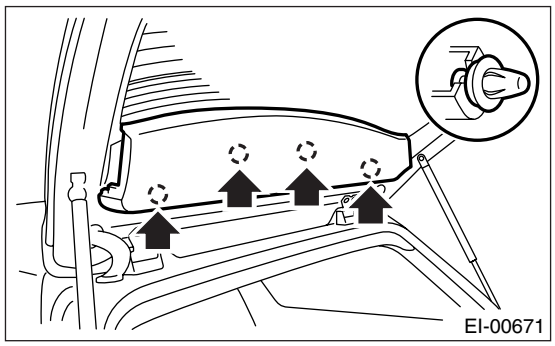
30.Rear Gate Trim

A: REMOVAL

1) Remove the clips (A), and remove the rear gate pillar trim.

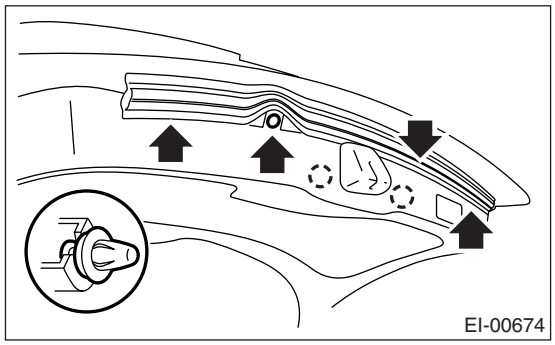


2) Remove the clips, and detach the rear gate upper trim.

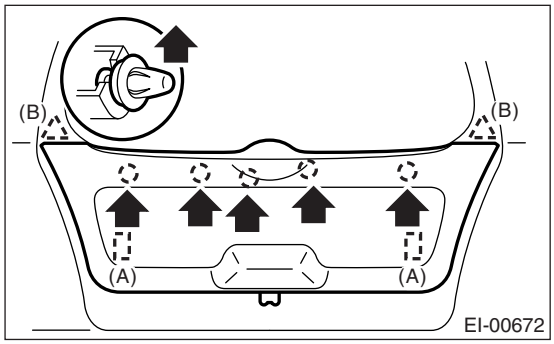


3) Remove the cover in the inner handle, loosen the inside screw.

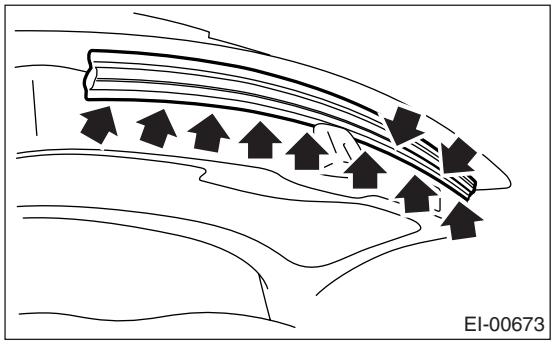
4) Turn over the weather strip, and remove the clips.



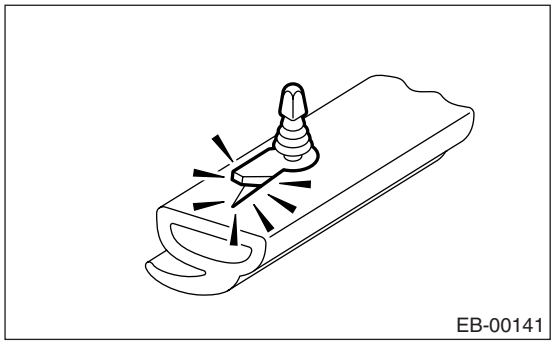
5) Remove the clips (A) and (B), remove the rear gate lower trim.



6) Remove the rear gate weather strip.



NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use a clip remover to remove.



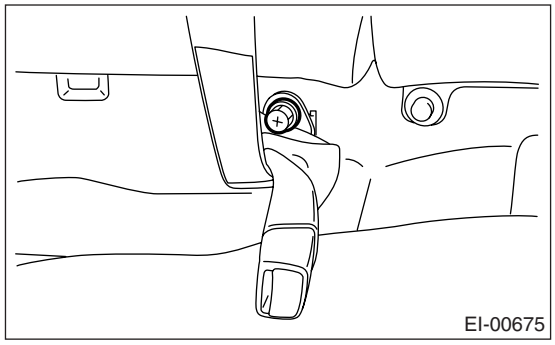
B: INSTALLATION

Install in the reverse order of removal.

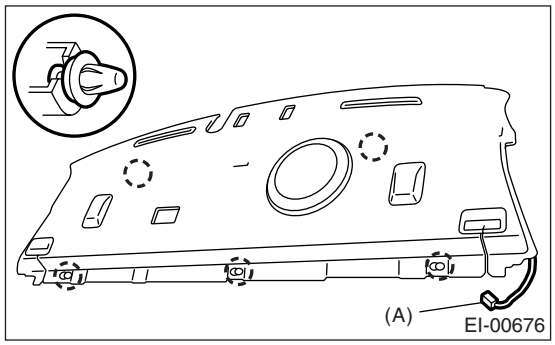
31.Rear Shelf Trim

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear quarter trim. <Ref. to EI-63, SEDAN MODEL (MODEL WITH CURTAIN AIR-BAG), REMOVAL, Rear Quarter Trim.>
3) Remove the high-mounted stop light. <Ref. to LI-33, REMOVAL, High-mounted Stop Light.>
4) Remove the rear seat cushion. <Ref. to SE-14, WAGON MODEL, REMOVAL, Rear Seat.>
5) Remove the lower anchor bolt of rear center seat belt.



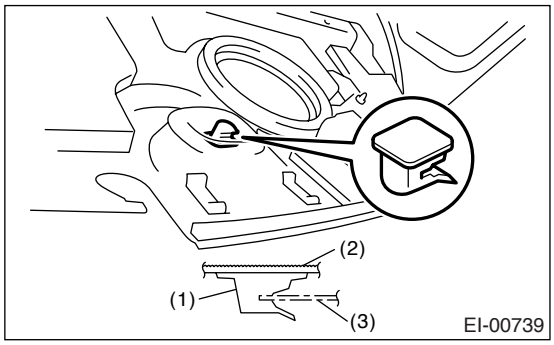
6) After disconnecting the high-mounted stop light harness connector (A) and removing the five clips, remove the rear shelf trim with pulling it frontward.



B: INSTALLATION

Install in the reverse order of removal.

NOTE:
Securely insert the vehicle body panel into the hook of rear shelf trim center, and then install the rear shelf trim.



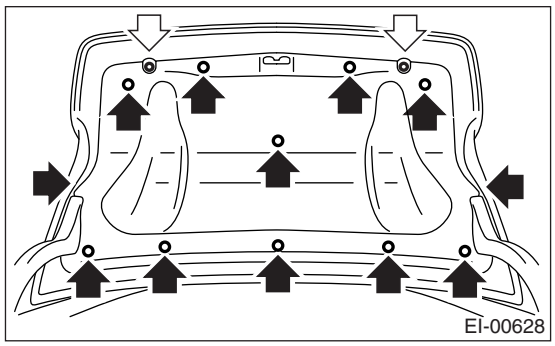
(1) Hook
(2) Rear shelf trim
(3) Vehicle body panel

32. Trunk Room Trim

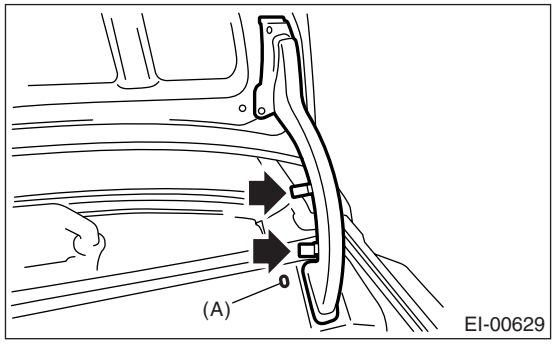
A: REMOVAL

1. TRUNK LID TRIM

1) Remove the trim clips and stopper rubbers, and remove the trunk lid trim.

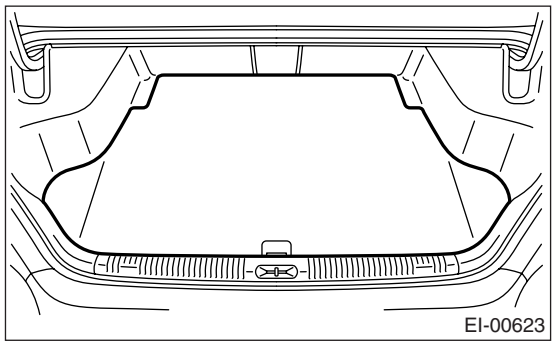


2) Remove the clip (A) of trunk side trim, and then remove the trunk lid arm cover.

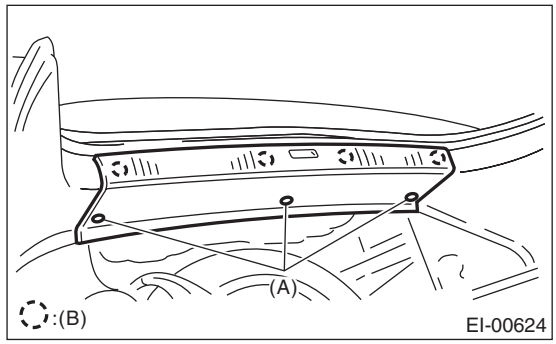


2. TRUNK ROOM TRIM

1) Remove the trunk room mat.

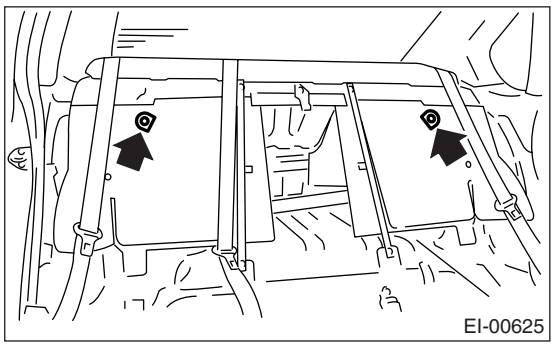


2) Remove the trim clips (A), and remove the trunk room end cover.

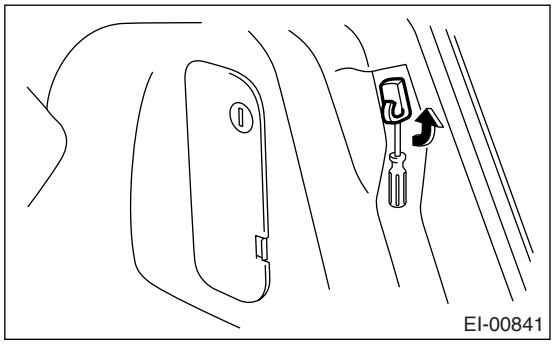


(B) Clip

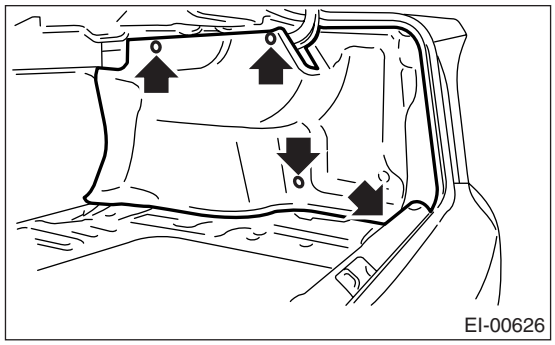
3) Remove the rear seat backrest, and then remove the trim clips at the front side of trunk side trim. <Ref. to SE-14, WAGON MODEL, REMOVAL, Rear Seat.>



4) Insert the flat tip driver from the lower side of trunk hook, and then remove the trunk hook with rotating it 90°.



5) Remove the trim clips, and remove the trunk side trim.



B: INSTALLATION

1. TRUNK LID TRIM

Install in the reverse order of removal.

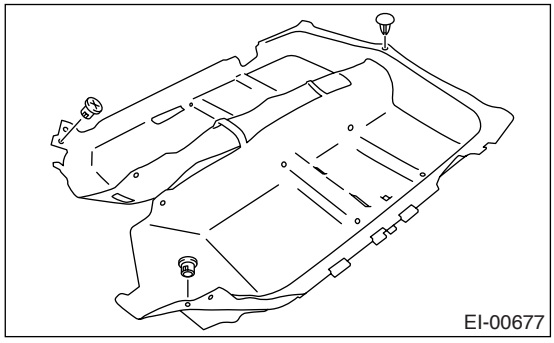
2. TRUNK ROOM TRIM

Install in the reverse order of removal.

33.Floor Mat

A: REMOVAL

1) Remove the front seats. <Ref. to SE-7, REMOVAL, Front Seat.>
2) Remove the rear seat cushion. <Ref. to SE-14, REMOVAL, Rear Seat.>
3) Remove the console box. <Ref. to EI-53, Console Box.>
4) Remove the console side panel. <Ref. to EI-54, REMOVAL, Center Console.>
5) Remove the lower inner trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
6) Remove the footrest. (MT model)
7) Remove the clips from floor mat.
8) Remove the mat hook on both side.
9) Remove the mat from toe board area.
10) Remove the mat from rear heater duct.
11) Roll the mat, and then take it out of opened rear door.



B: INSTALLATION

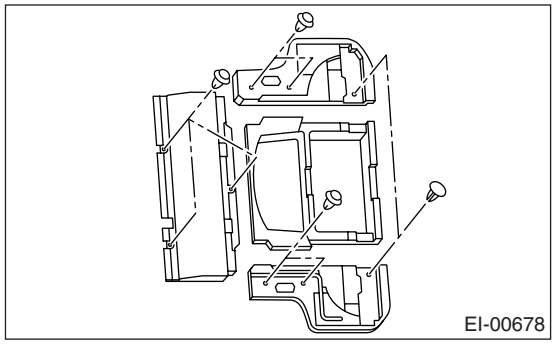
Install in the reverse order of removal.

NOTE:
• Secure the mat firmly with hook and clip.
• Insert the mat edge firmly into the groove of side sill cover.

34.Luggage Floor Box

A: REMOVAL

1) Remove the luggage floor mat.
2) Remove the clips, and remove the luggage floor box.



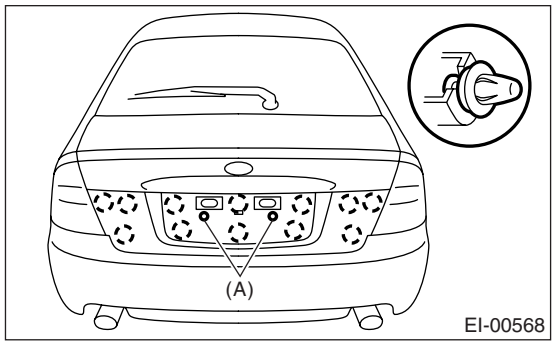
B: INSTALLATION

Install in the reverse order of removal.

35. Trunk Lid Garnish

A: REMOVAL

Remove the license plate, loosen the bolts (A), and remove the trunk lid garnish.



B: INSTALLATION

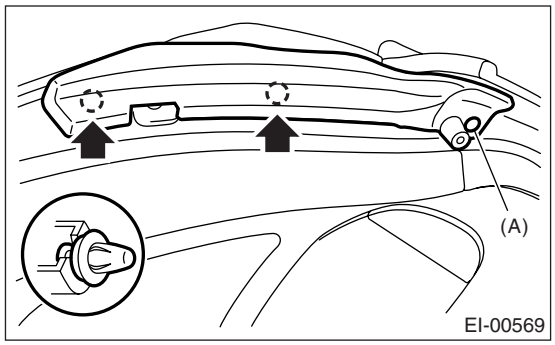
Install in the reverse order of removal.

Tightening torque:
7.5 N·m (0.76 kgf-m, 5.5 ft-lb)

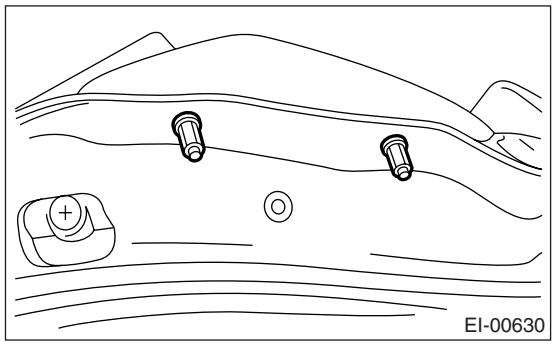
36.Rear Gate Garnish

A: REMOVAL

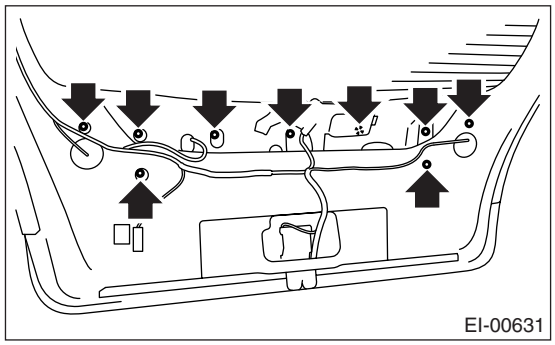
1) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
2) Remove the clip (A), and remove the rear gate panel side cover.



3) Remove the hexagon cap nut.



4) Remove the nuts, disconnect each connector, and remove the rear gate garnish.



B: INSTALLATION

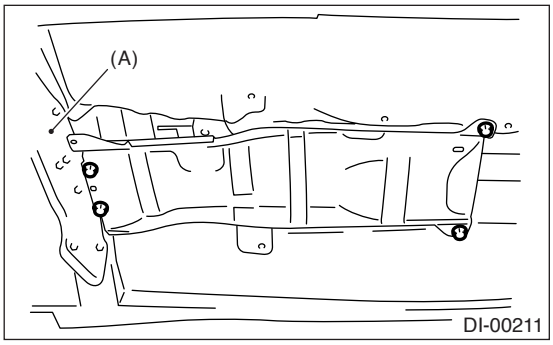
Install in the reverse order of removal.

37.Heat Shield Cover

A: REMOVAL

1. FRONT HEAT SHIELD COVER

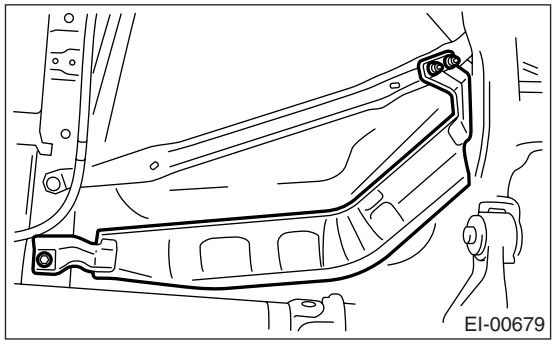
Remove the four bolts to remove front heat shield cover.



(A) Transmission mount

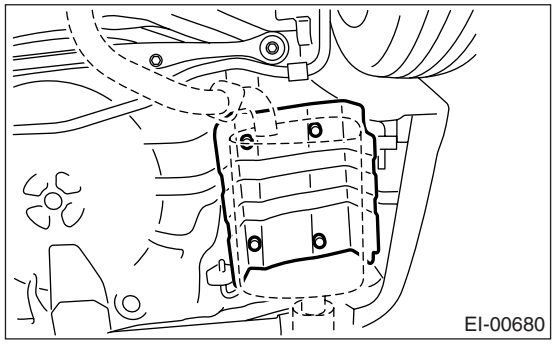
2. CENTER HEAT SHIELD COVER

Remove the nut and bolt to remove center heat shield cover.



3. REAR HEAT SHIELD COVER

1) Remove the muffler. <Ref. to EX(H4SO 2.0)-13, REMOVAL, Muffler.> <Ref. to EX(H4DOTC)-12, REMOVAL, Muffler.>
2) Remove the four bolts to remove rear heat shield cover.



B: INSTALLATION

Install in the reverse order of removal.

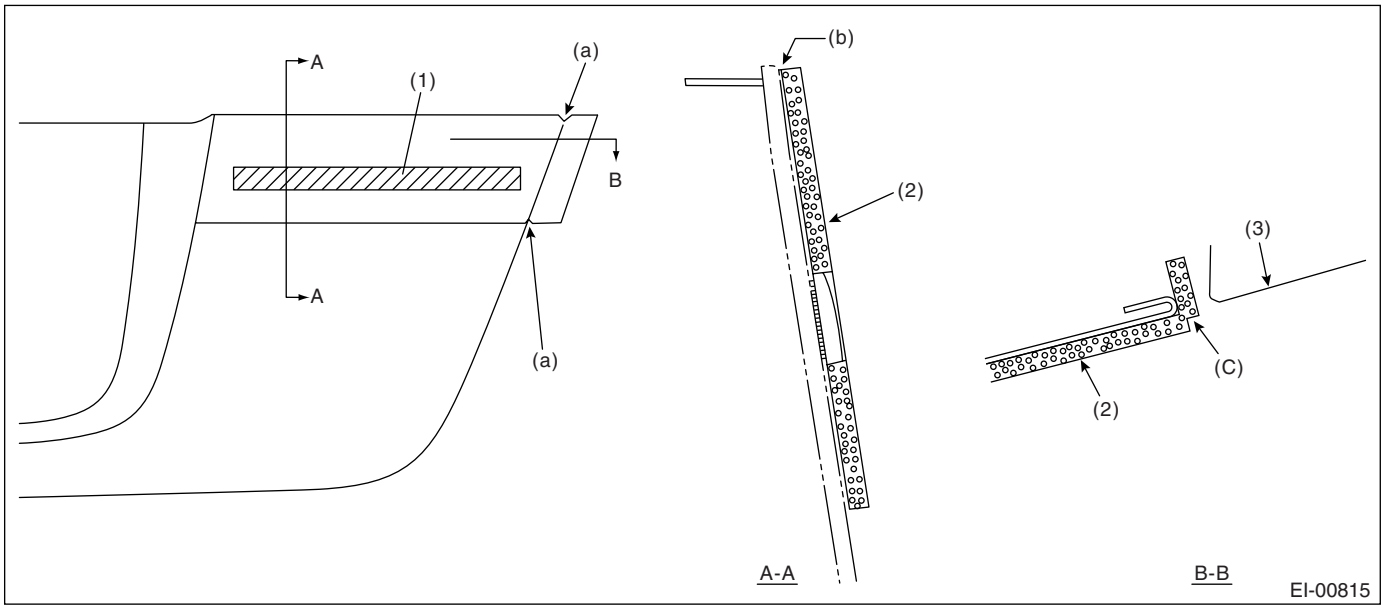
38.Ornament

A: INSTALLATION

1. LETTER MARK

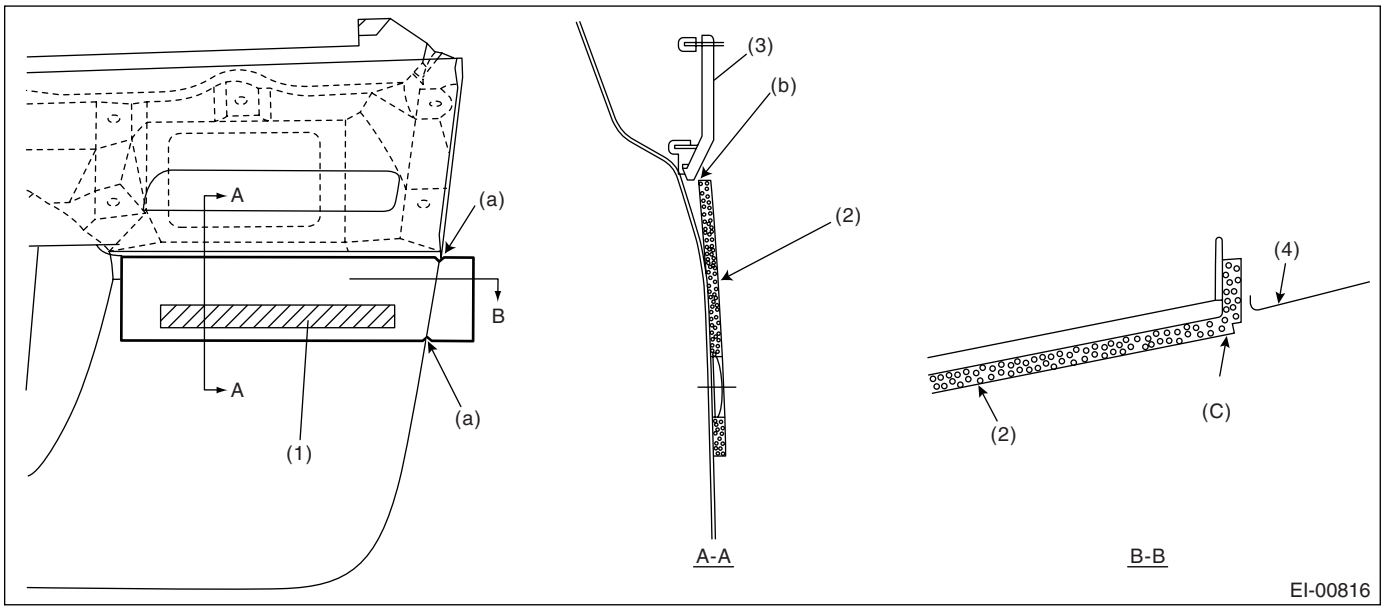
Adhere the letter mark with following dimension.

- Sedan model



(a)	Apply the apply tape with aligning the cut out to the end of trunk lid garnish.	(b)	Apply the apply tape with aligning R stop on the top end of trunk lid garnish.	(c)	Align the slit of apply tape to panel end.
(1)	Letter mark	(2)	Apply tape	(3)	Rear combination light

• Wagon model

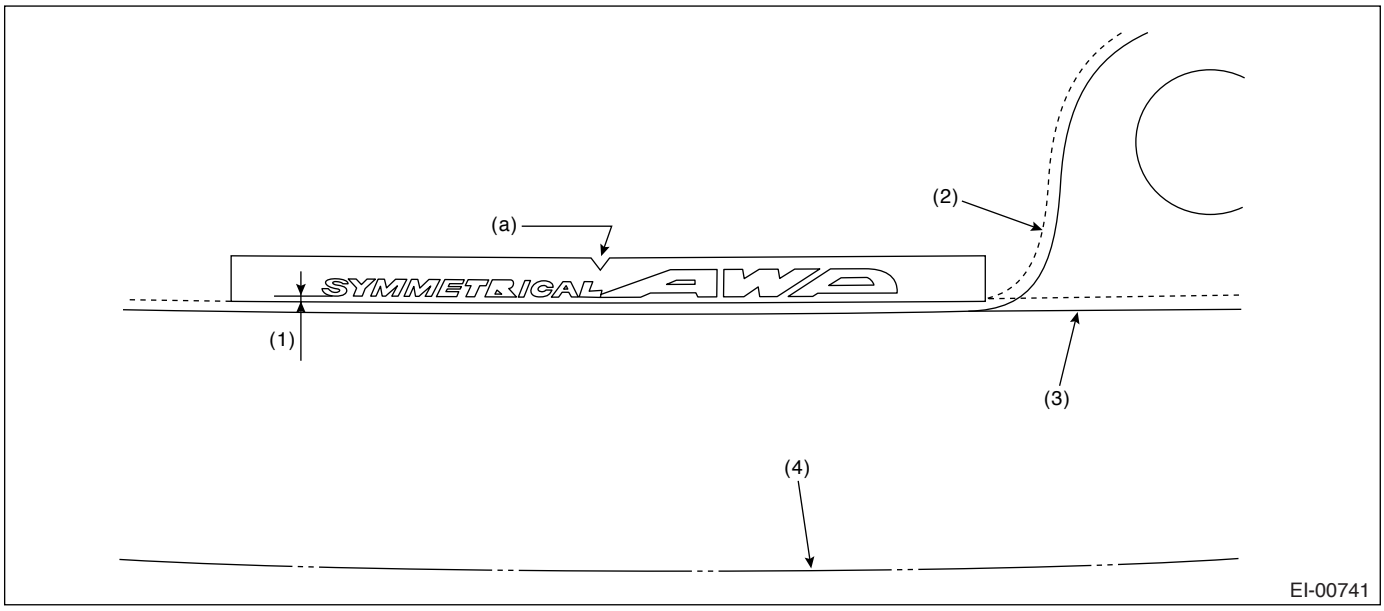


(a) Apply the apply tape with aligning the cut out to the end of rear gate panel.
(b) Apply the apply tape with aligning outer bottom end of rear gate garnish.
(c) Align the slit of apply tape to panel end.
(1) Letter mark
(2) Apply tape
(3) Rear gate garnish
(4) Rear combination light

2. AWD STICKER

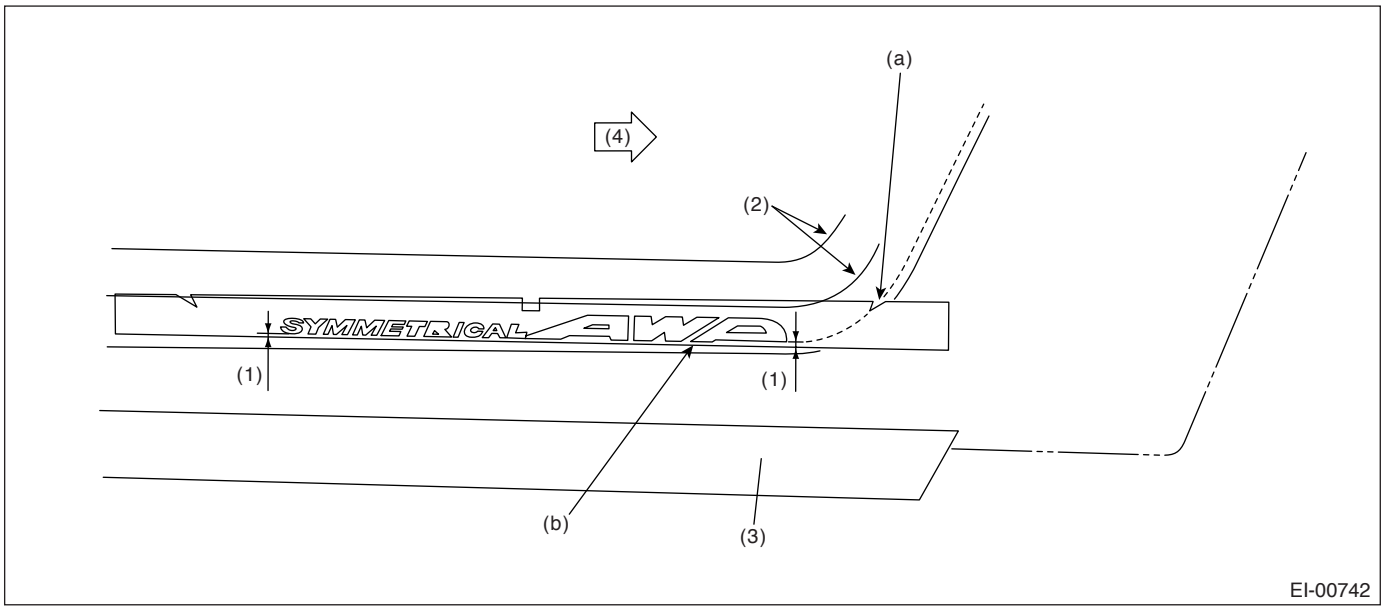
Apply the AWD sticker from inside of glass with following dimension.

• Sedan model

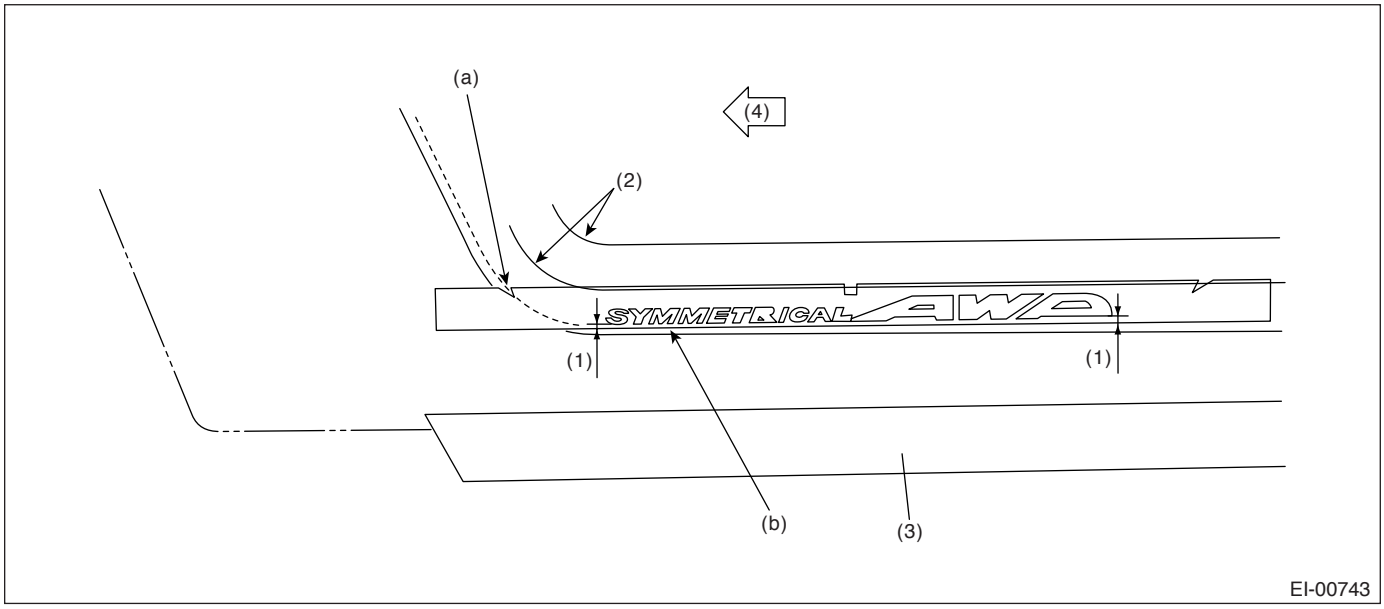


(a) Apply the apply tape with aligning the cut out to the end of rear glass center.
(1) 1 mm (0.04 in)
(2) Gradation end of ceramic print (with rear wiper)
(3) Gradation end of ceramic print (without rear wiper)
(4) End of rear glass

• Wagon model (RH side)



• Wagon model (LH side)



(a) Apply the apply tape with aligning the cut out to the ceramic print.
(b) Gradation end of ceramic print
(1) 1 mm (0.04 in)
(3) Molding
(4) Front side of vehicle
(2) Glass antenna wire

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

EXTERIOR BODY PANELS

EB

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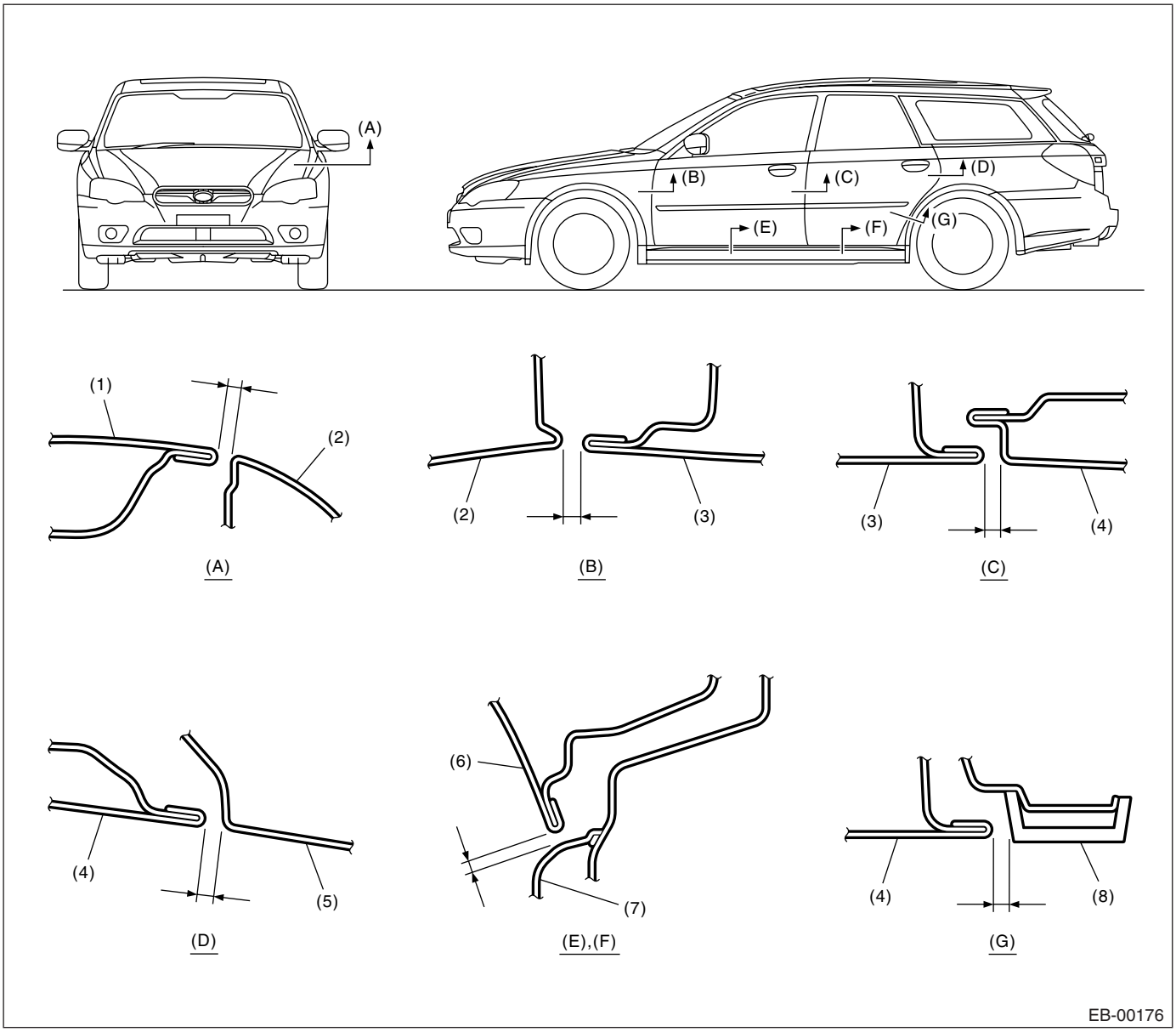
3.	Front Fender Panel	16
4.	Front Door	17
5.	Front Sealing Cover	20
6.	Rear Door	21
7.	Rear Sealing Cover	24
8.	Trunk Lid	25
9.	Rear Gate	27

1. General Description

A: SPECIFICATION

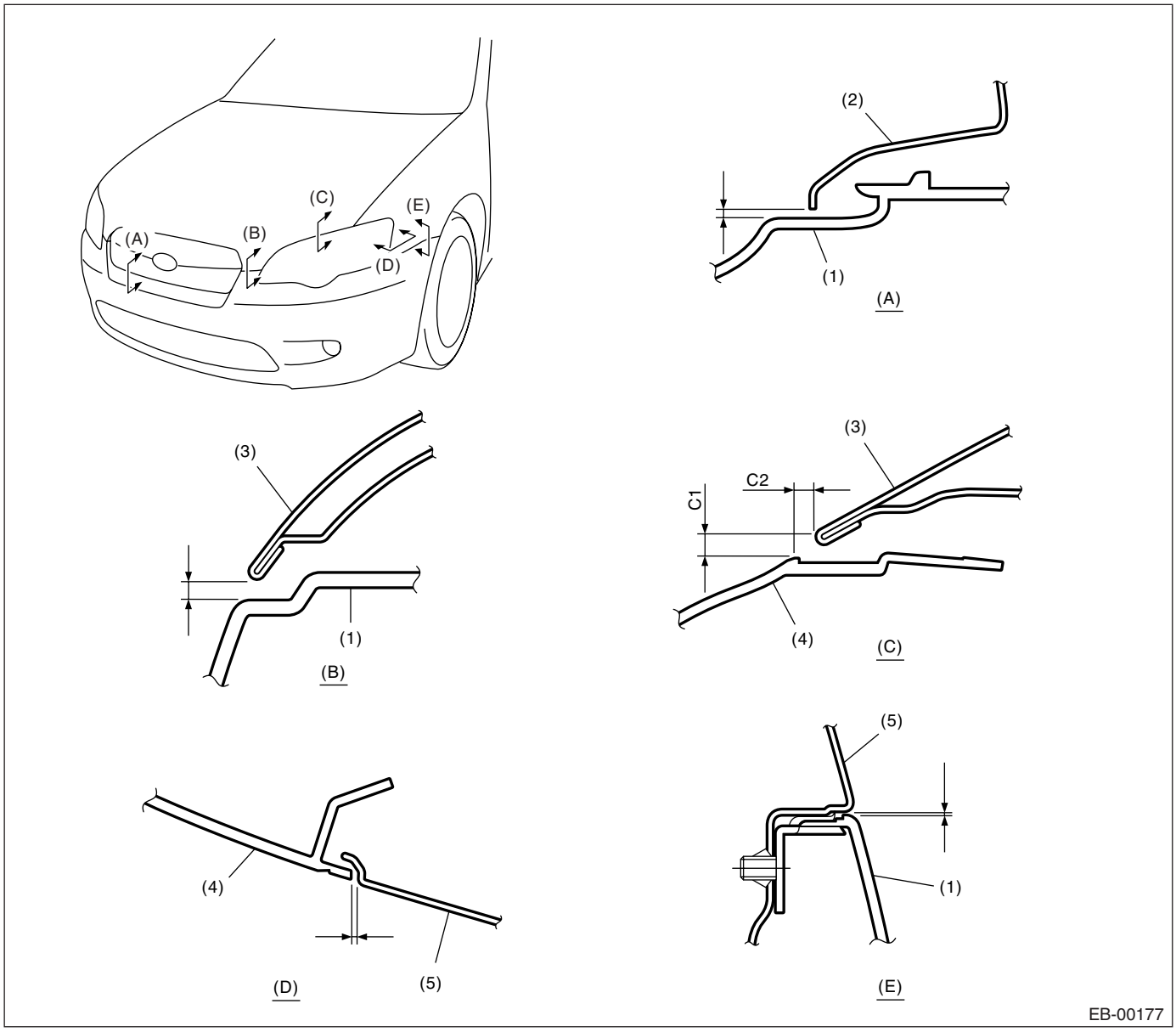
1. SIDE



(1) Front hood panel
(2) Front fender panel
(3) Front door panel
(4) Rear door panel
(5) Rear quarter panel
(6) Door panel
(7) Side sill
(8) Rear quarter lower protector

Section	Part	Standard value
(A)	Front hood panel to Front fender panel	3.5±1.0 mm (0.14±0.04 in)
(B)	Front fender panel to Front door panel	4.65±1.0 mm (0.18±0.04 in)
(C)	Front door panel to Rear door panel	5.1±1.0 mm (0.20±0.04 in)
(D)	Rear door panel to Rear quarter panel	4.6±1.0 mm (0.18±0.04 in)
(E), (F)	Door panel to Side sill	6.0±1.0 mm (0.24±0.04 in)
(G)	Rear door panel to Rear quarter lower protector	5.0±1.0 mm (0.20±0.04 in)

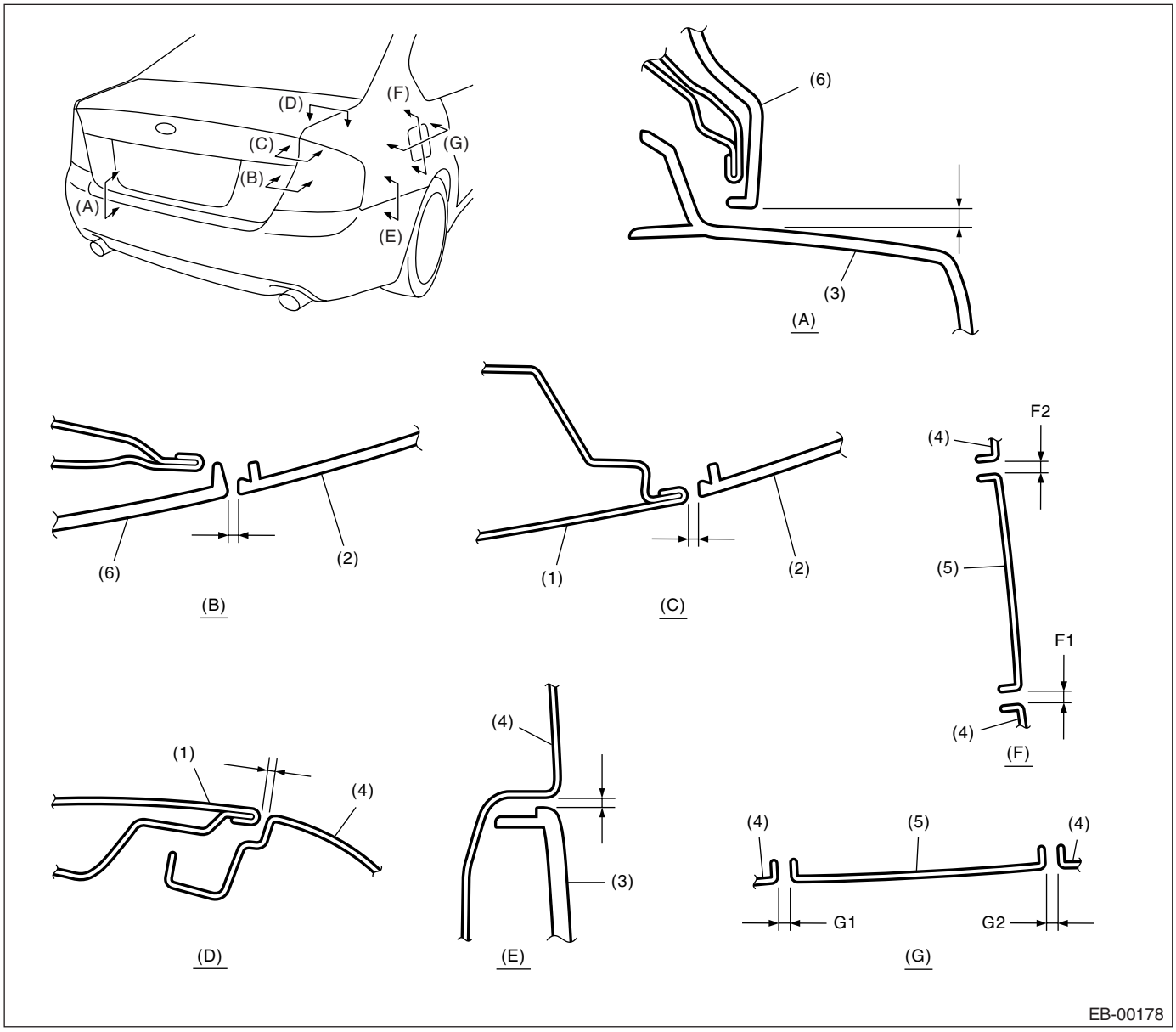
2. FRONT



(1) Front bumper
(2) Front grille
(3) Front hood panel
(4) Headlight
(5) Front fender panel

Section	Part	Standard value
(A)	Front bumper to Front grille (Longitudinal direction)	1.0±0.7 mm (0.04±0.03 in)
(B)	Front hood panel to Front bumper	4.0 — 6.0 mm (0.16 — 0.24 in)
(C)	Front hood panel to Headlight	C1: 6.0±1.0 mm (0.24±0.04 in) C2: 5.0±1.0 mm (0.20±0.04 in)
(D)	Front fender panel to Headlight	2.0±1.0 mm (0.08±0.04 in)
(E)	Front fender panel to Front bumper	1.0±0.7 mm (0.04±0.03 in)

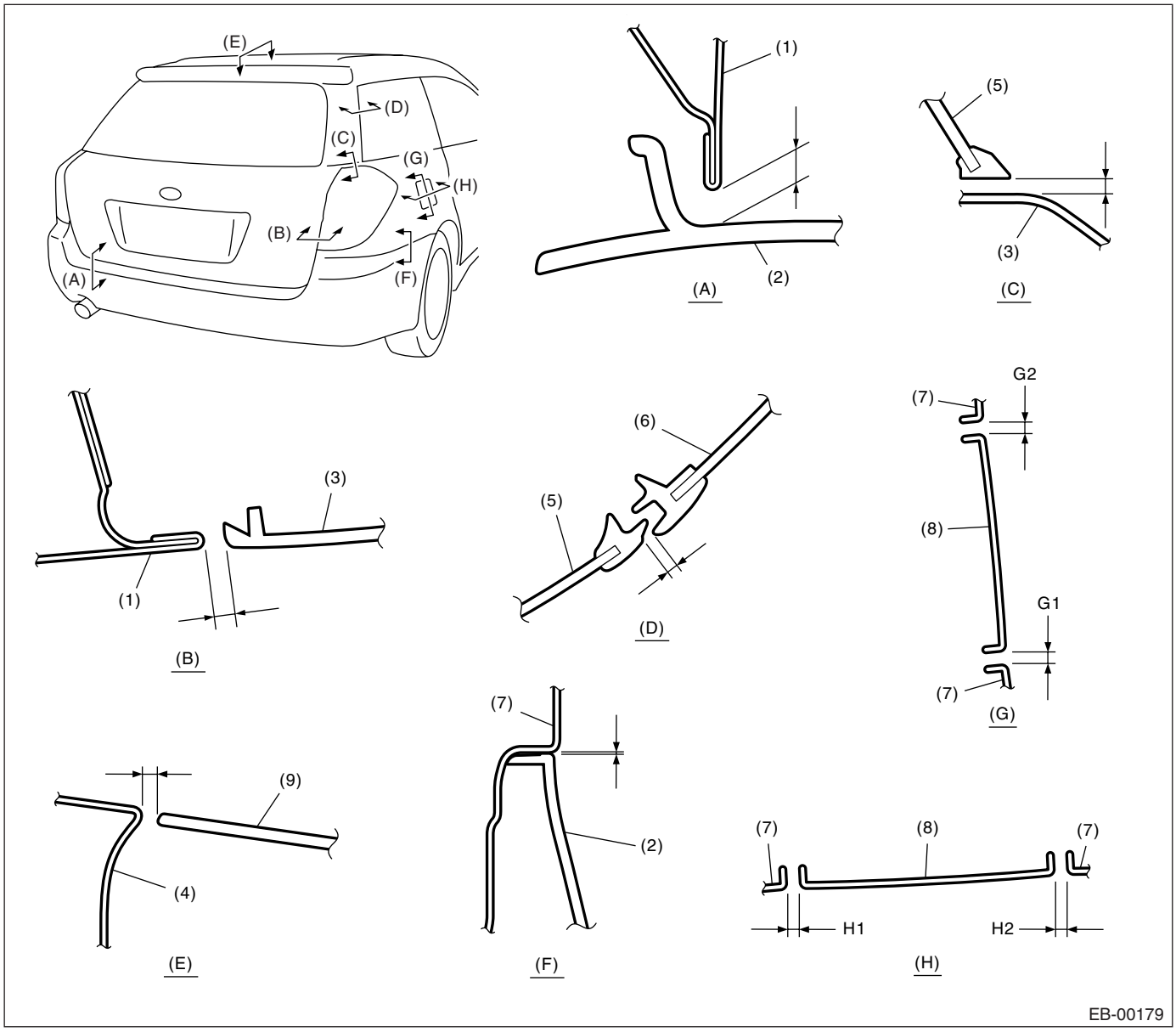
3. REAR (SEDAN MODEL)



(1) Trunk lid panel
(2) Rear combination light
(3) Rear bumper
(4) Rear fender panel
(5) Fuel filler flap lid
(6) Trunk lid garnish

Section	Part	Standard value
(A)	Trunk lid garnish to Rear bumper	7.0±1.5 mm (0.28±0.06 in)
(B)	Trunk lid garnish to Rear combination light	4.0±1.0 mm (0.16±0.04 in)
(C)	Trunk lid panel to Rear combination light	3.5±1.0 mm (0.14±0.04 in)
(D)	Trunk lid panel to Rear fender panel	3.5±1.0 mm (0.14±0.04 in)
(E)	Rear fender panel to Rear bumper	1.0±0.7 mm (0.04±0.03 in)
(F)	Rear fender panel to Fuel filler flap lid (Longitudinal direction)	F1: 3.7±0.5 mm (0.15±0.02 in) F2: 3.4±0.5 mm (0.13±0.02 in)
(G)	Rear fender panel to Fuel filler flap lid (Lateral direction)	G1, G2: 3.5±0.5 mm (0.14±0.02 in)

4. REAR (WAGON MODEL)

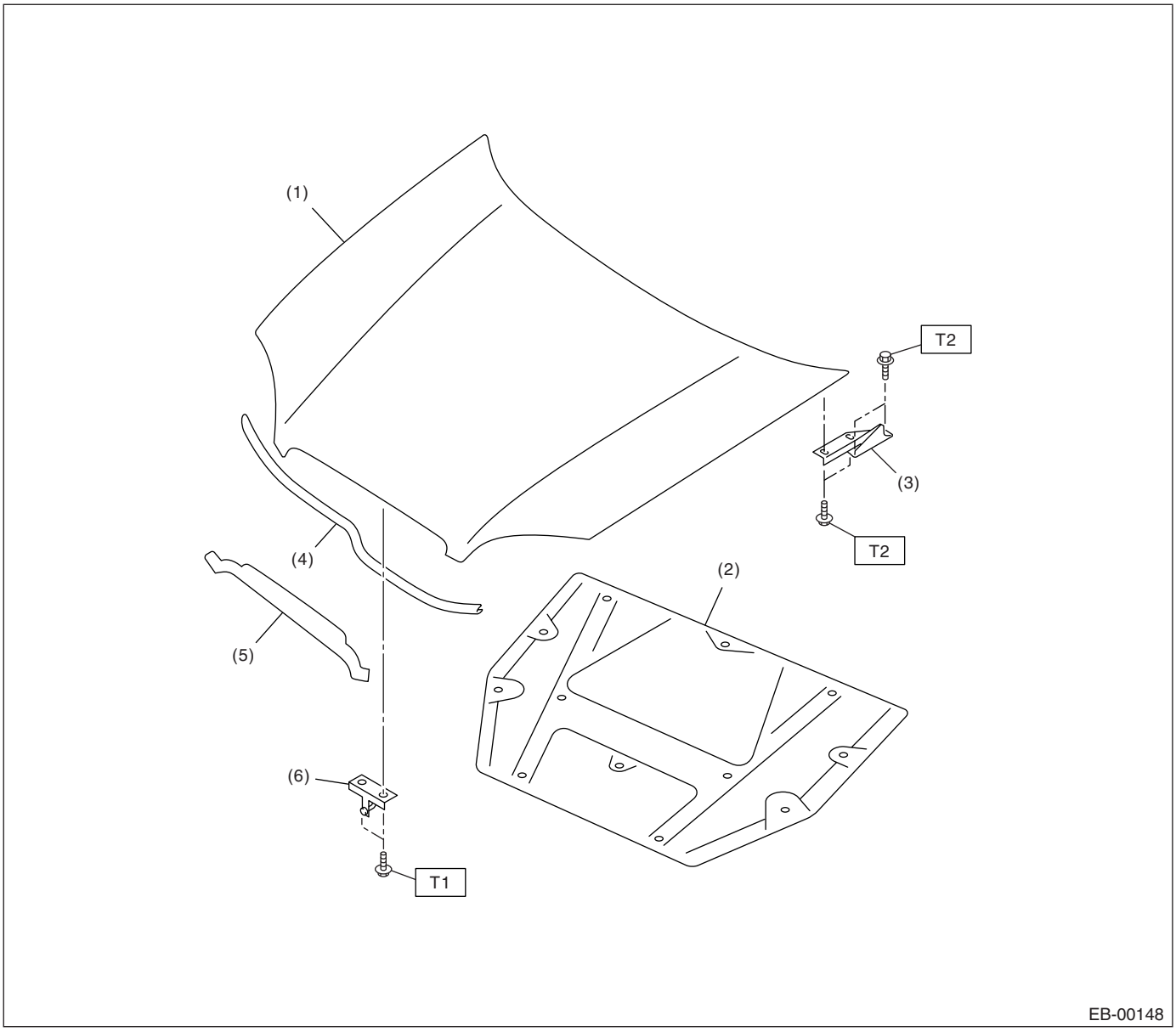


(1) Rear gate panel
(2) Rear bumper
(3) Rear combination light
(4) Roof panel
(5) Rear gate glass
(6) Door quarter glass
(7) Rear fender panel
(8) Fuel filler flap lid
(9) Roof spoiler

Section	Part	Standard value
(A)	Rear gate panel to Rear bumper	8.0±1.5 mm (0.31±0.06 in)
(B)	Rear gate panel to Rear combination light	5.1±1.0 mm (0.20±0.04 in)
(C)	Rear gate glass to Rear combination light	5.5±1.0 mm (0.22±0.04 in)
(D)	Rear gate glass to Rear quarter glass	4.0±1.5 mm (0.16±0.06 in)
(E)	Roof panel to Roof spoiler	5.5±1.0 mm (0.22±0.04 in)
(F)	Rear fender panel to Rear bumper	1.0±0.7 mm (0.04±0.03 in)
(G)	Rear fender panel to Fuel filler flap lid (Longitudinal direction)	G1: 3.7±0.5 mm (0.15±0.02 in) G2: 3.4±0.5 mm (0.13±0.02 in)
(H)	Rear fender panel to Fuel filler flap lid (Lateral direction)	H1, H2: 3.5±0.5 mm (0.14±0.02 in)

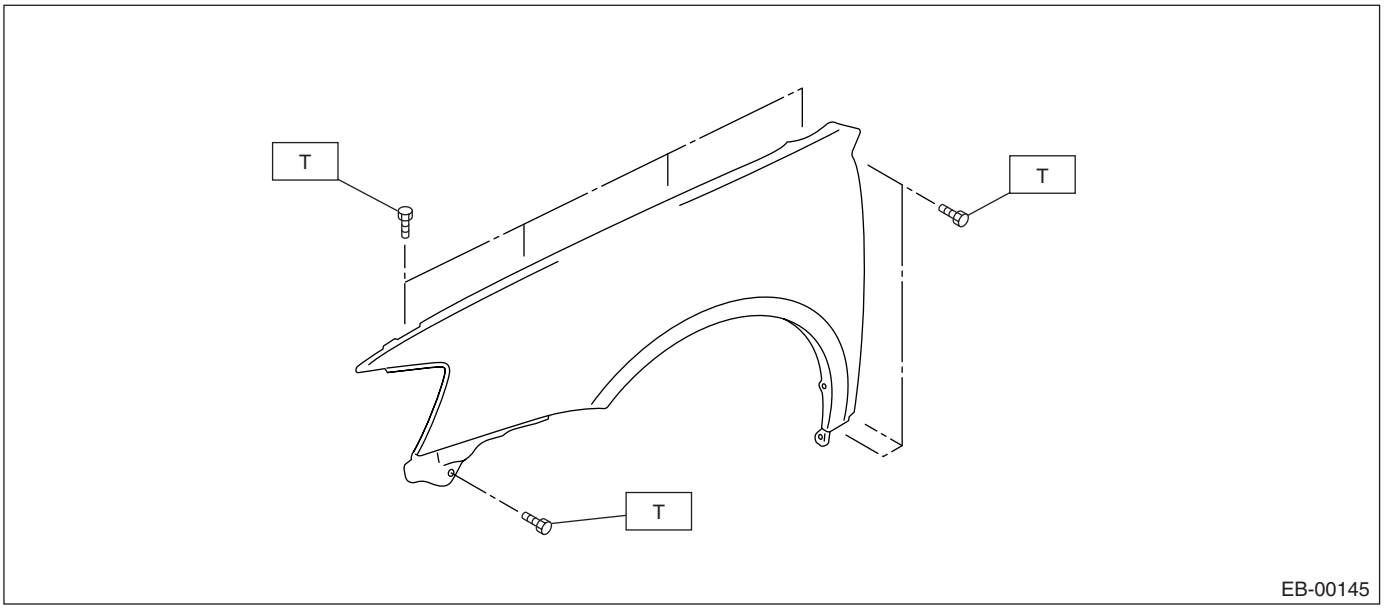
B: COMPONENT

1. FRONT HOOD



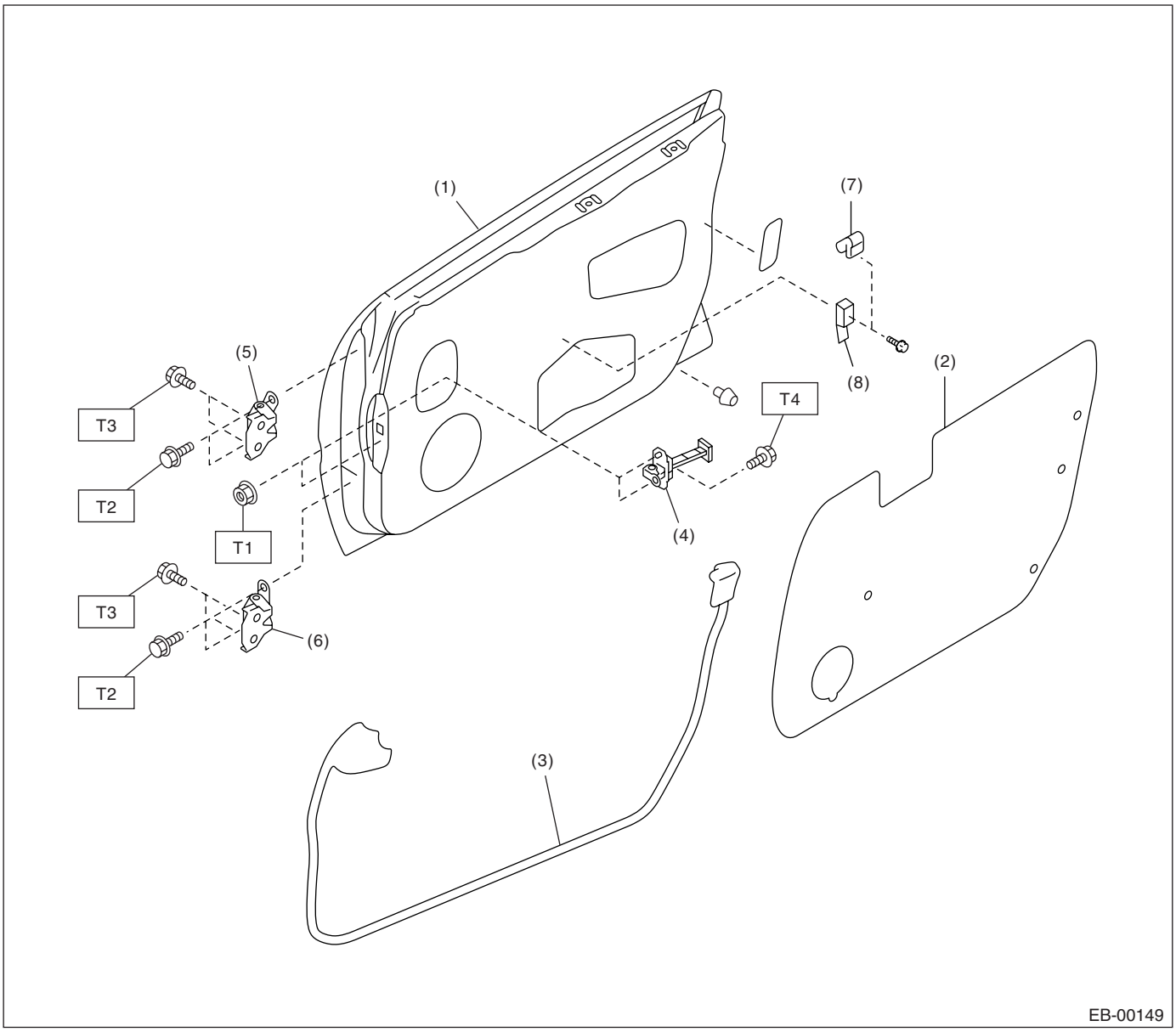
(1)	Front hood panel	(4)	Intake duct weather strip	***Tightening torque: N·m (kgf-m, ft-lb)***
(2)	Front hood insulator	(5)	Front hood weather strip	***T1: 33 (3.4, 24.5)***
(3)	Front hood hinge	(6)	Front hood striker	***T2: 24.5 (2.5, 18.1)***

2. FRONT FENDER PANEL



Tightening torque: N·m (kgf-m, ft-lb)
T: 7.4 (0.75, 5.5)

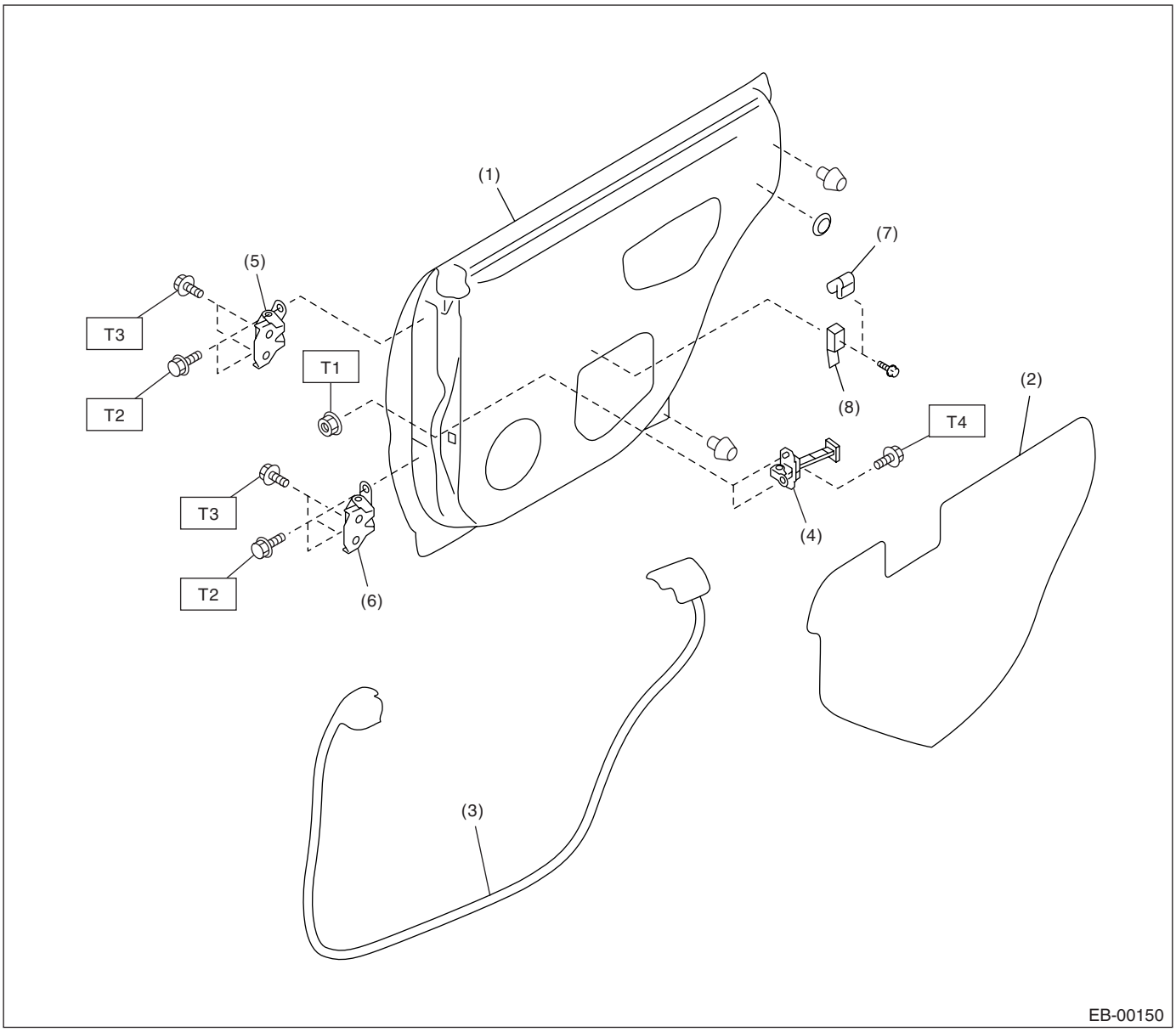
3. FRONT DOOR PANEL



(1)	Front door panel	(6)	Lower hinge
(2)	Sealing cover	(7)	Door trim bracket upper
(3)	Front door weather strip	(8)	Door trim bracket lower
(4)	Checker		
(5)	Upper hinge		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 24.5 (2.5, 18.1)
T3: 29.4 (3.0, 21.7)
T4: 32.3 (3.3, 23.8)

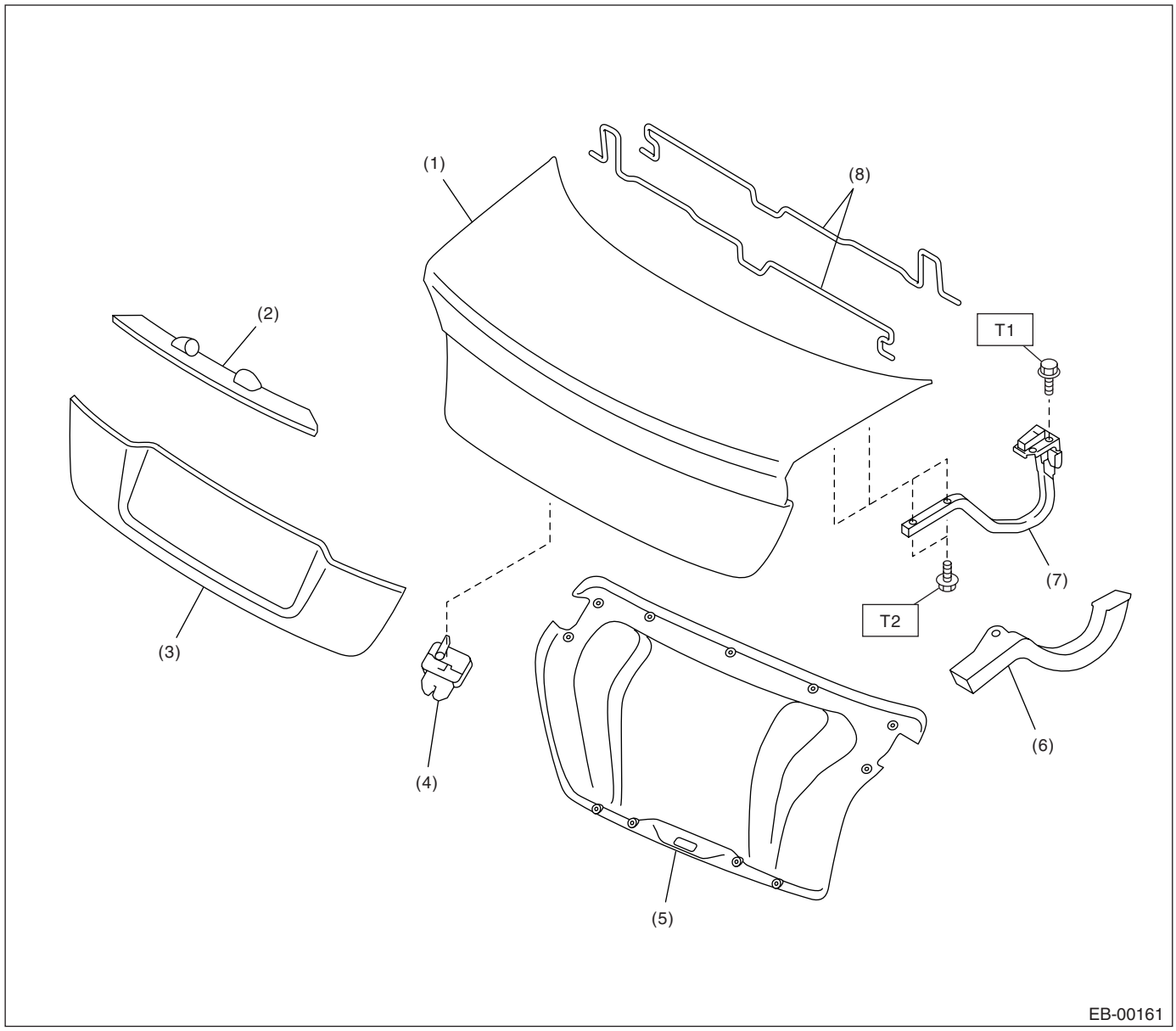
4. REAR DOOR PANEL



(1)	Rear door panel	(6)	Lower hinge
(2)	Sealing cover	(7)	Door trim bracket upper
(3)	Rear door weather strip	(8)	Door trim bracket lower
(4)	Checker		
(5)	Upper hinge		

Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.4 (0.75, 5.5)
T2: 24.5 (2.5, 18.1)
T3: 29.4 (3.0, 21.7)
T4: 32.3 (3.3, 23.8)

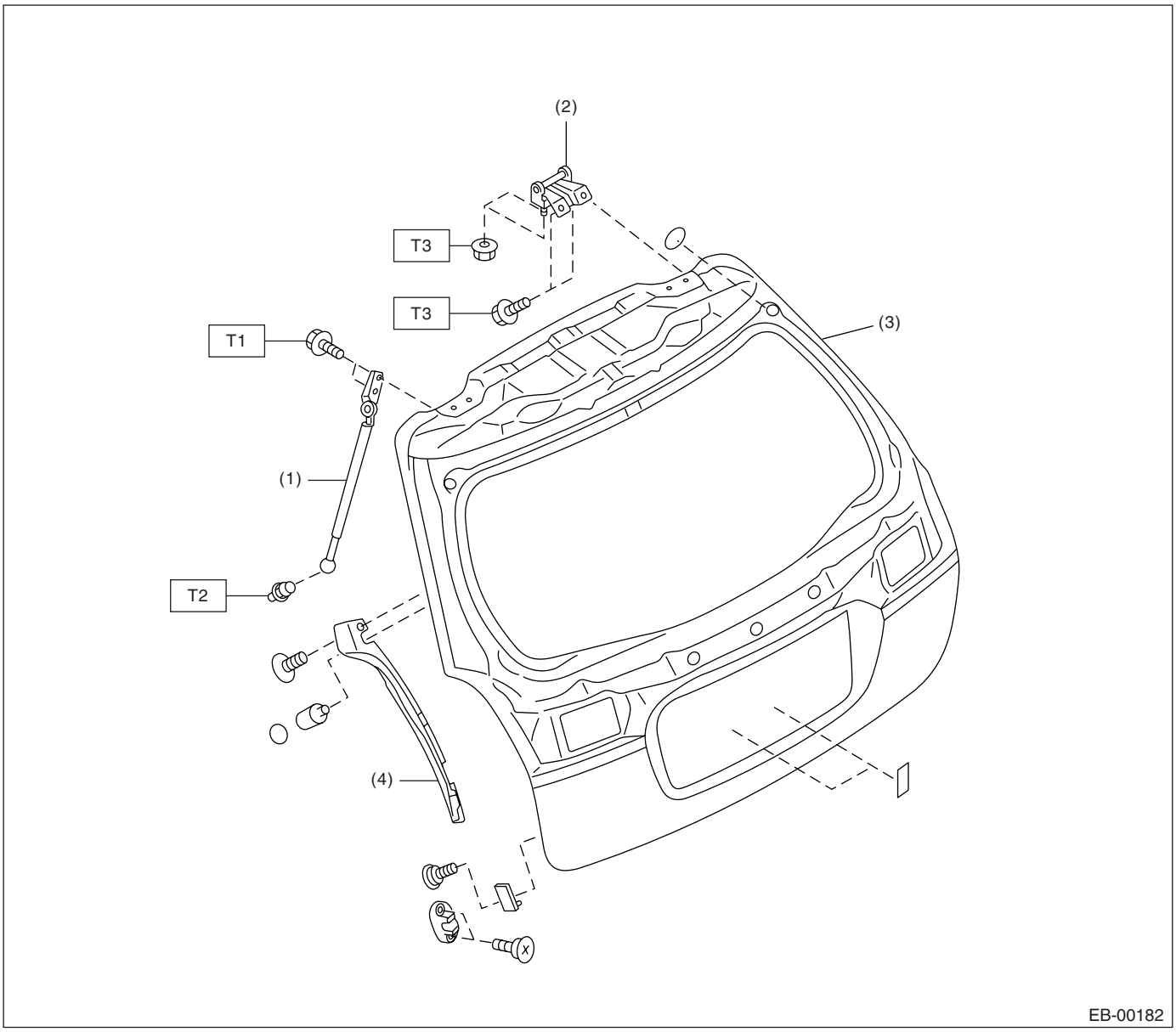
5. TRUNK LID PANEL



(1) Trunk lid panel
(2) License plate light cover
(3) Trunk lid garnish
(4) Trunk lid lock ASSY
(5) Trunk lid trim
(6) Trunk lid arm cover
(7) Trunk lid arm ASSY
(8) Torsion bar

Tightening torque: N·m (kgf-m, ft-lb)
T1: 17.6 (1.8, 12.9)
T2: 14 (1.43, 10.3)

6. REAR GATE PANEL



(1) Rear gate damper stay
(2) Hinge
(3) Rear gate panel
(4) Rear gate side panel cover

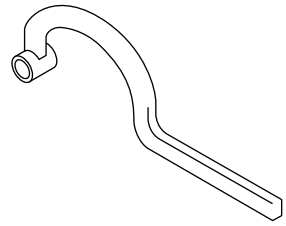
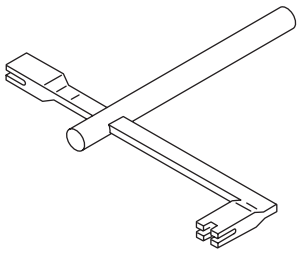
Tightening torque: N·m (kgf-m, ft-lb)
T1: 7.5 (0.76, 5.5)
T2: 14.0 (1.43, 10.3)
T3: 25.0 (2.6, 18.4)

C: CAUTION

• Exterior body panels are heavy. Do not drop and damage the panels. During removal and installation, do not damage the panel painting surface.
• While removing mounting bolts, using assistance devices such as a support jack will help to support the panel.
• Be careful not to lose small parts.

D: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST-925610000	925610000	WRENCH	Used for removing and installing door hinge.
 ST-927780000	927780000	REMOVER	Used for removing and installing trunk torsion bar.

2. GENERAL TOOL

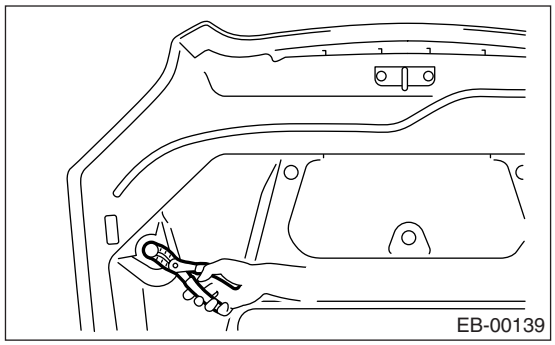
TOOL NAME	REMARKS
Support jack	Used for supporting door panel.
Clip remover	Used for removing various types of clips.

2. Front Hood

A: REMOVAL

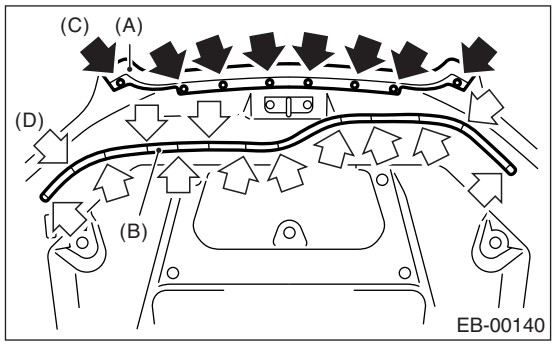
1. FRONT HOOD INSULATOR

1) Open the hood.
2) Release the clips to remove the front hood insulator.



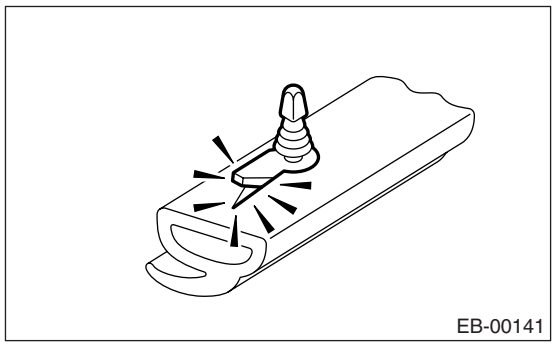
2. FRONT HOOD WEATHER STRIP

1) Open the hood.
2) Remove the clips, and remove the front hood weather strip (A) and intake duct weather strip (B).



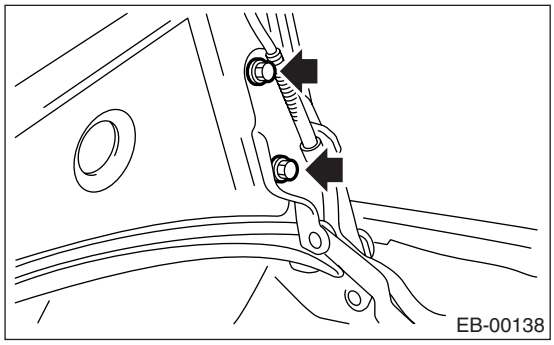
(C) Clip
(D) Weather strip clip

NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.

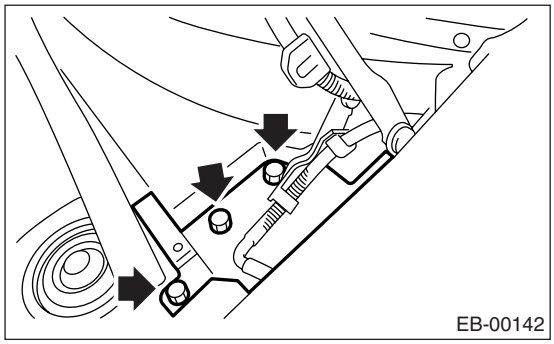


3. FRONT HOOD HINGE

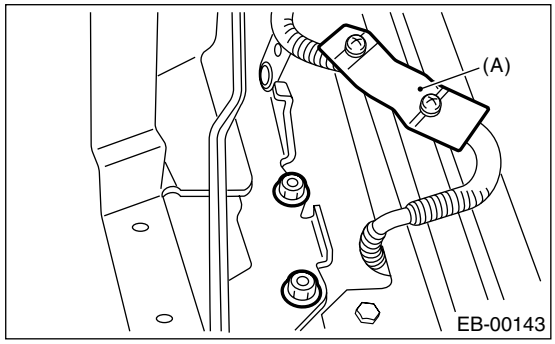
1) Remove the bolts, and remove the front hood panel. <Ref. to EB-14, FRONT HOOD PANEL, REMOVAL, Front Hood.>



2) Remove the clips, and remove the cowl side panel front.

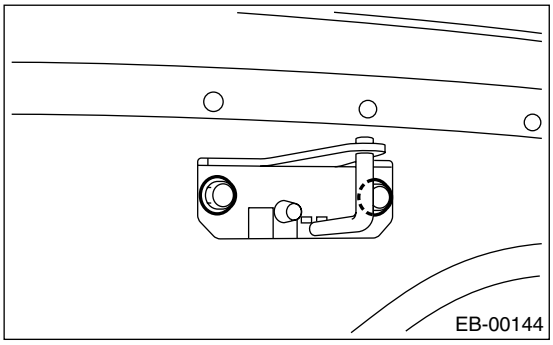


3) Remove the clamp (A) of the window washer hose, and remove bolt of the hinge.



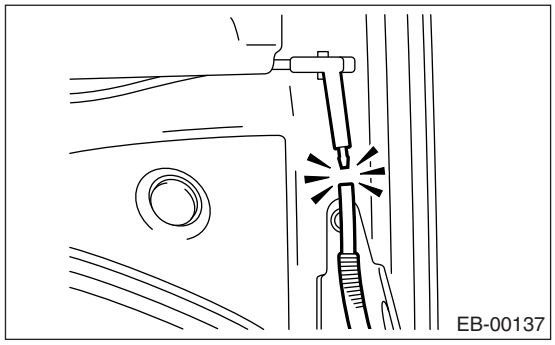
4. FRONT HOOD STRIKER

1) Open the hood.
2) Remove the bolt, and remove the front hood striker.

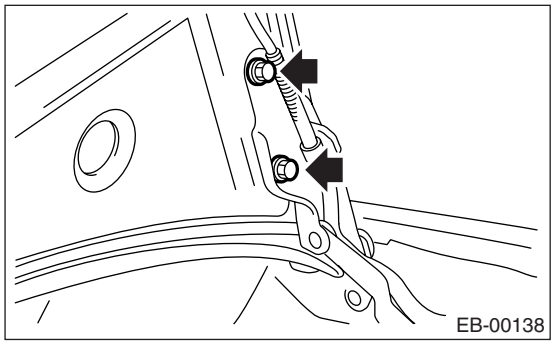


5. FRONT HOOD PANEL

1) Open the front hood to remove the window washer hose.



2) Remove the front hood insulator.
<Ref. to EB-13, FRONT HOOD INSULATOR, REMOVAL, Front Hood.>
3) Remove the front hood weather strip.
<Ref. to EB-13, FRONT HOOD WEATHER STRIP, REMOVAL, Front Hood.>
4) Remove the front hood striker.
<Ref. to EB-14, FRONT HOOD STRIKER, REMOVAL, Front Hood.>
5) Remove the front hood duct. (Turbo model)
<Ref. to EI-25, REMOVAL, Front Hood Grille.>
6) Remove the window washer hose and nozzle.
<Ref. to WW-20, REMOVAL, Front Washer Nozzle.>
7) Remove the bolts, and remove the front hood panel from front hood hinge.



B: INSTALLATION

1. FRONT HOOD INSULATOR

Install in the reverse order of removal.

NOTE:
Be careful not to catch the window washer hose in.

2. FRONT HOOD WEATHER STRIP

Install in the reverse order of removal.

3. FRONT HOOD HINGE

Install in the reverse order of removal.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

4. FRONT HOOD STRIKER

Install in the reverse order of removal.

Tightening torque:
33.0 N·m (3.4 kgf-m, 24.5 ft-lb)

5. FRONT HOOD PANEL

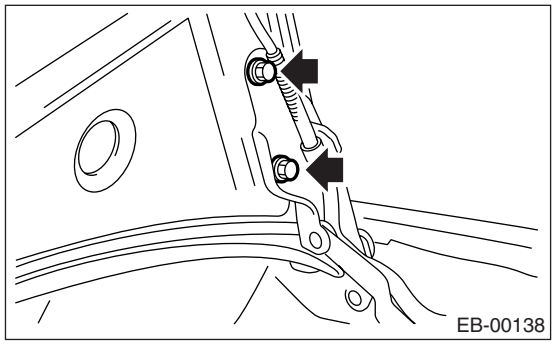
Install in the reverse order of removal.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)

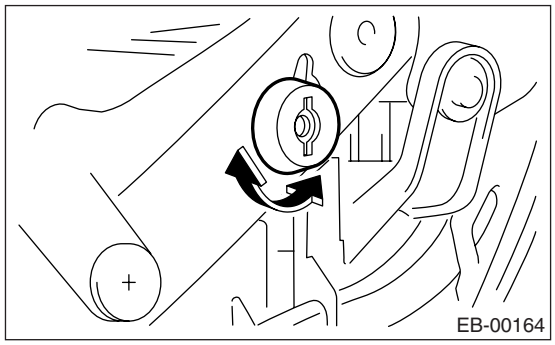
C: ADJUSTMENT

1) Adjust the clearance between front hood panel and front fender panel. Clearance must be equal at both sides. For the dimension of clearance, refer to “SPECIFICATIONS” in “General Description”. <Ref. to EB-2, SPECIFICATION, General Description.>

2) Use a hinge mounting bolts to align the front hood longitudinally and laterally.



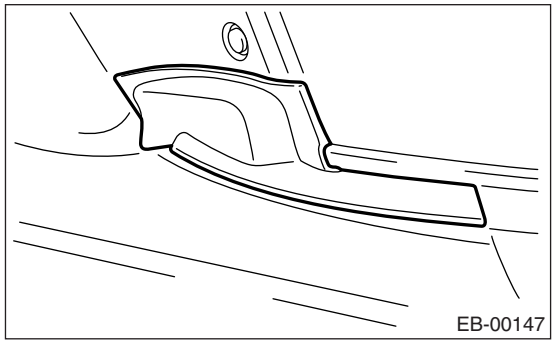
3) Adjust the height at the front end of hood. <Ref. to SL-40, ADJUSTMENT, Front Hood Lock Assembly.>
4) Rotate the hood buffer to adjust lateral height.



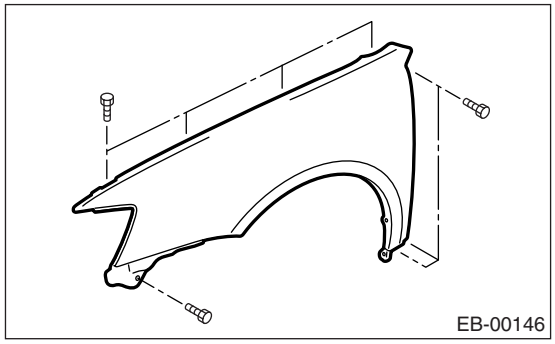
3. Front Fender Panel

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the side sill spoilers. <Ref. to EI-41, REMOVAL, Side Sill Spoiler.>
3) Remove the front grille. <Ref. to EI-24, REMOVAL, Front Grille.>
4) Remove the front bumper face. <Ref. to EI-30, REMOVAL, Front Bumper.>
5) Remove the headlight assembly. **<Ref. to LI-14,** REMOVAL**, Headlight Assembly.>**
6) Remove the mud guard. <Ref. to EI-29, REMOVAL, Mud Guard.>
7) Remove the cowl panel side.



8) Remove the bolt, and remove the front fender panel.



B: INSTALLATION

1) Install in the reverse order of removal.
2) Install with attention to make uniform clearance between front fender panel and front hood panel. For the dimension of clearance, refer to “SPECIFICATIONS” in “General Description”. <Ref. to EB-2, SPECIFICATION, General Description.>

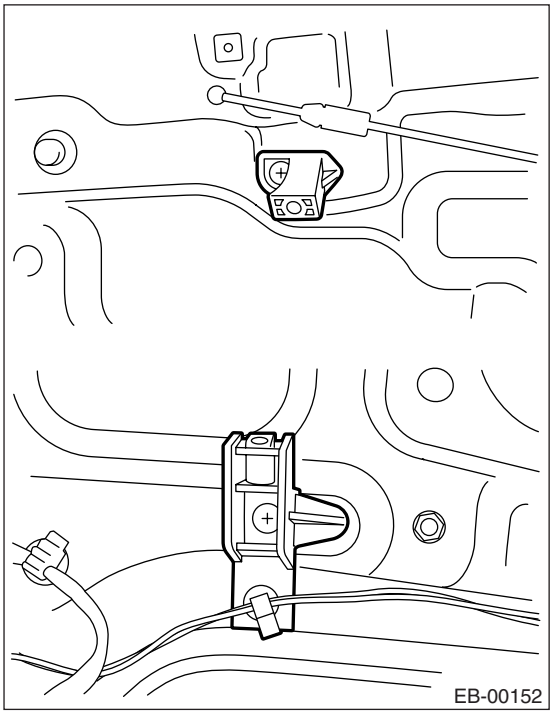
Tightening torque:
7.4 N·m (0.75 kgf-m, 5.5 ft-lb)

4. Front Door

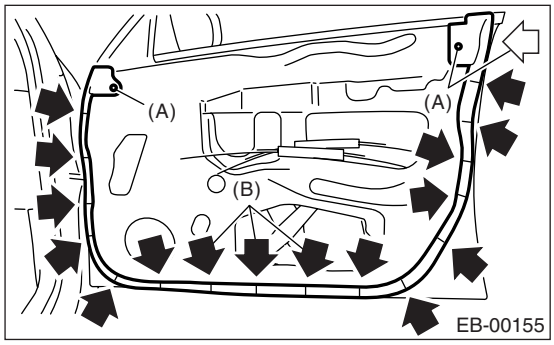
A: REMOVAL

1. FRONT DOOR PANEL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the outer mirror assembly. <Ref. to GW-18, REMOVAL, Outer Mirror Assembly.>
4) Remove the front door speaker. <Ref. to ET-6, REMOVAL, Front Speaker.>
5) Pull back the sealing cover. <Ref. to EB-20, REMOVAL, Front Sealing Cover.>
6) Remove the gusset and front door glass. <Ref. to GW-10, REMOVAL, Front Door Glass.>
7) Remove the door sash and front door regulator and motor. <Ref. to GW-15, REMOVAL, Front Regulator and Motor Assembly.>
8) Remove the front door latch assembly. <Ref. to SL-30, REMOVAL, Front Door Latch and Door Lock Actuator Assembly.>
9) Remove the front outer handle. <Ref. to SL-29, REMOVAL, Front Outer Handle.>
10) Remove the screw to remove the door trim bracket.


EB-00152

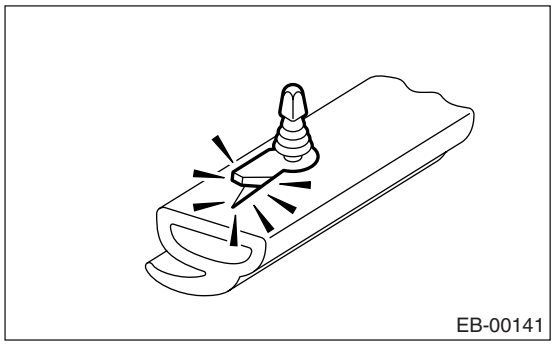
11) Remove the front door weather strip.



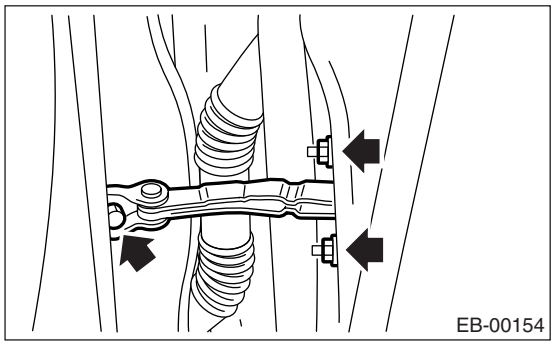
EB-00155

(A) Pin clip
(B) Weather strip clip

NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.


EB-00141

12) Remove the bolts and nuts to remove the door checker.

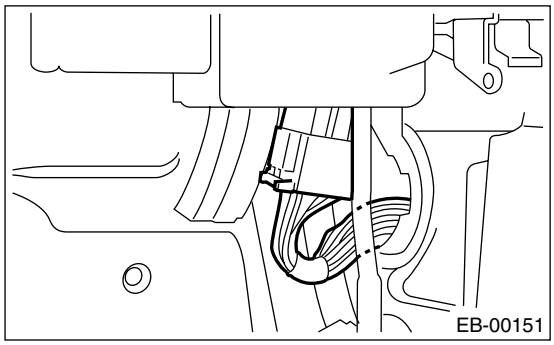

EB-00154

13) Remove the front door. <Ref. to EB-17, FRONT DOOR ASSEMBLY, REMOVAL, Front Door.>

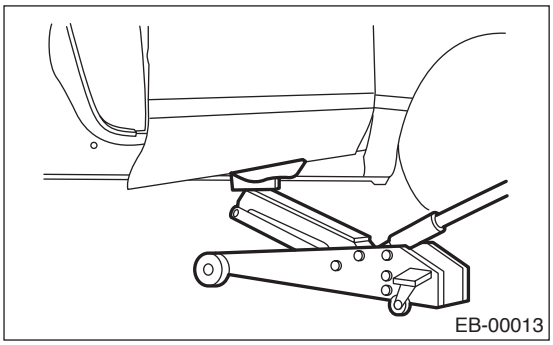
2. FRONT DOOR ASSEMBLY

1) Disconnect the ground cable from battery.
2) Remove the front pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>
3) Remove the instrument panel lower cover or glove box lower cover. <Ref. to EI-50, REMOVAL, Instrument Panel Lower Cover.> or <Ref. to EI-51, REMOVAL, Glove Box.>

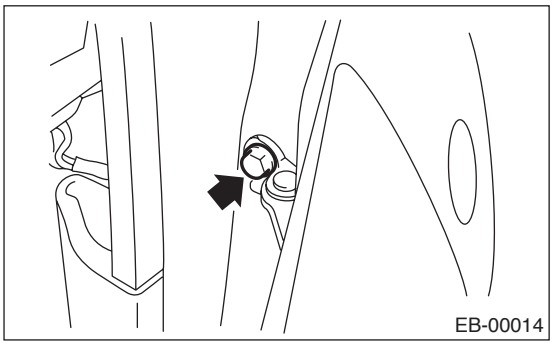
4) Disconnect the connector of door harness from body harness.



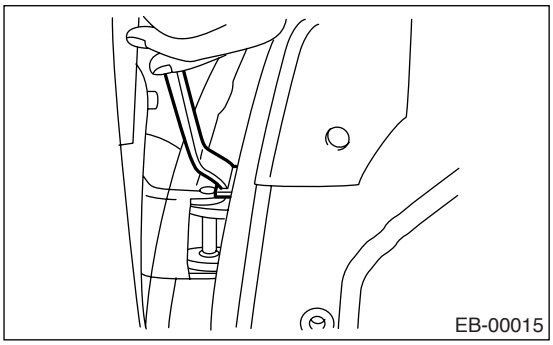
5) Put a wooden block on jack and place jack under the front door. Support the door with a jack to protect it from damage.



6) Remove the bolt from the door checker.



7) Remove the door-side bolts for upper and lower hinges to remove front door panel.



8) Remove the door hinge from vehicle.

B: INSTALLATION

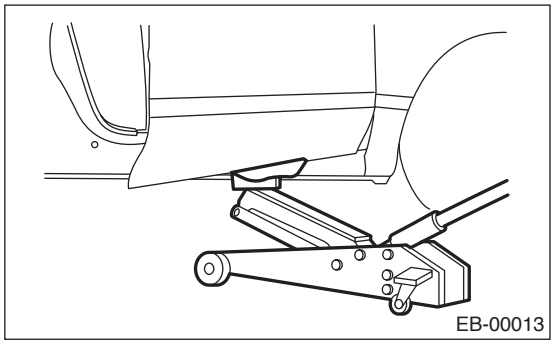
1. FRONT DOOR PANEL

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-8, FRONT DOOR PANEL, COMPONENT, General Description.>

2. FRONT DOOR ASSEMBLY

1) Put a wooden block on jack and place the front door on that.

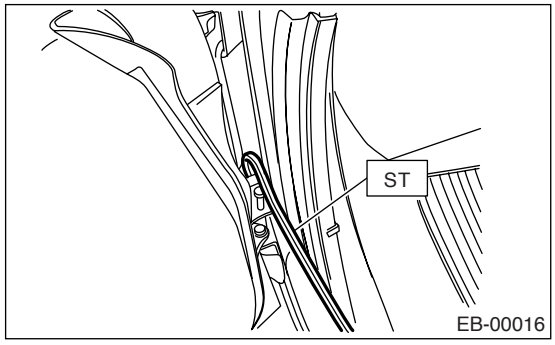


2) Apply grease to the sliding area of door hinges, and install the door hinge to vehicle.
3) Install the front door to upper hinge and lower hinge adjusting by jack.
4) Tighten the bolt of door checker.
5) Connect the door harness connector, and install the instrument panel lower cover.
6) Install the front pillar lower trim.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-8, FRONT DOOR PANEL, COMPONENT, General Description.>

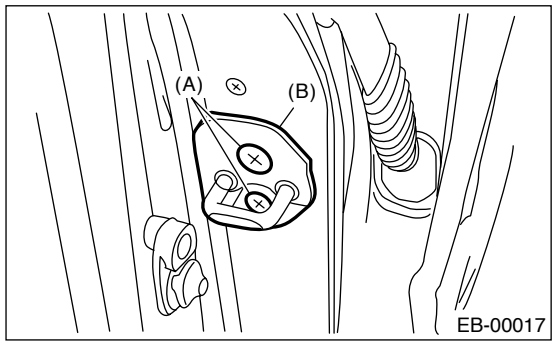
C: ADJUSTMENT

1) Using the ST, loosen the body-side bolts of upper and lower hinges to align the position of front door panel longitudinally and laterally.
ST 925610000 DOOR HINGE WRENCH



2) Loosen the screws (A), and tap the striker (B) using plastic hammer to adjust the gap between rear end surface of front door panel and front end surface of rear door.

CAUTION:
Do not use an impact wrench. Welding area on the striker nut plate is easily broken.

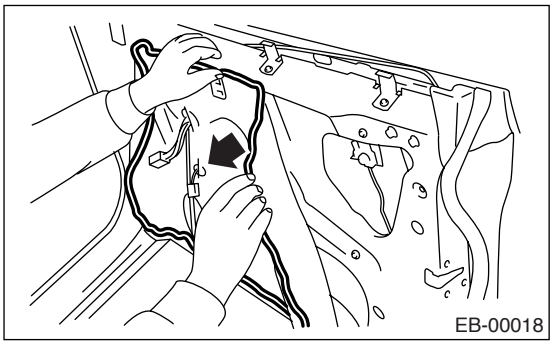


5. Front Sealing Cover

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the front door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the front speaker. <Ref. to ET-6, REMOVAL, Front Speaker.>
4) Pull back the sealing cover.

NOTE:
• Carefully remove the butyl tape. Excessive force will easily break the cover.
• If cover gets broken, replace it with a new one.



B: INSTALLATION

1) Install in the reverse order of removal.
2) When replacing the sealing cover, use the butyl tape.
3) Press the butyl tape-applied area firmly to prevent any floating on surface.

Butyl tape:
3M8626 or equivalent

NOTE:
• Apply a uniform bead of butyl tape.
• Attach the sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

C: INSPECTION

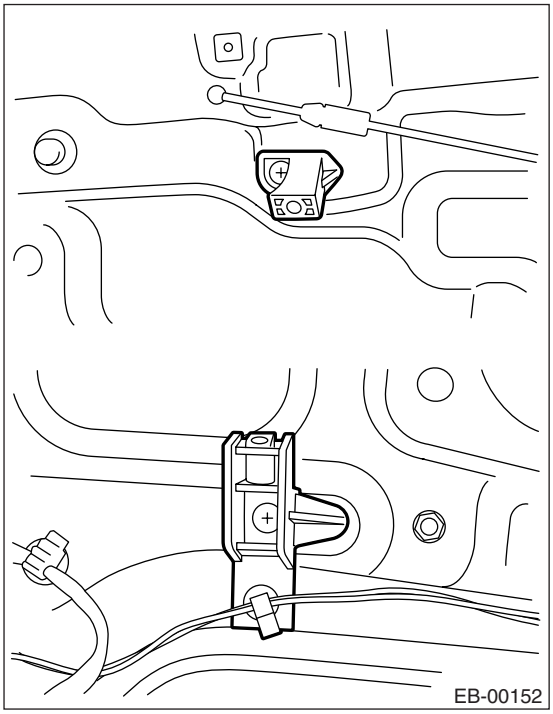
If the sealing cover gets damaged, replace it with a new one.

6. Rear Door

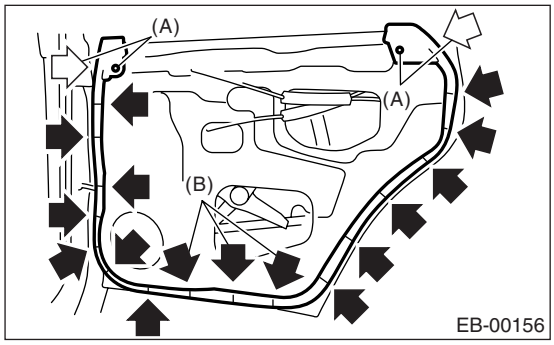
A: REMOVAL

1. REAR DOOR PANEL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Remove the rear speaker. <Ref. to ET-9, REMOVAL, Rear Speaker.>
4) Pull back the sealing cover. <Ref. to EB-24, REMOVAL, Rear Sealing Cover.>
5) Remove the rear door glass. <Ref. to GW-22, REMOVAL, Rear Door Glass.>
6) Remove the door sash and rear door regulator and motor assembly. <Ref. to GW-24, REMOVAL, Rear Regulator and Motor Assembly.>
7) Remove the rear door latch. <Ref. to SL-34, REMOVAL, Rear Door Latch and Door Lock Actuator Assembly.>
8) Remove the rear outer handle. <Ref. to SL-33, REMOVAL, Rear Outer Handle.>
9) Remove the screw to remove the door trim bracket.


EB-00152

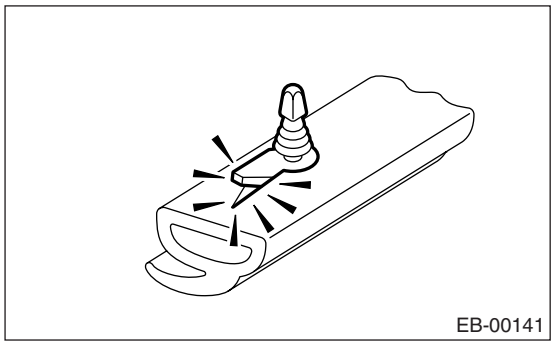
10) Remove the rear door inner weather strip.



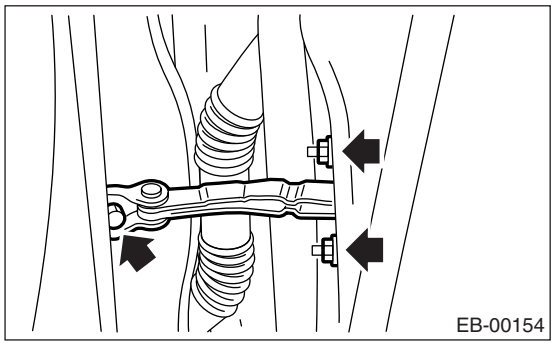
EB-00156

(A) Pin clip
(B) Weather strip clip

NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.


EB-00141

11) Remove the bolts and nuts to remove the door checker.

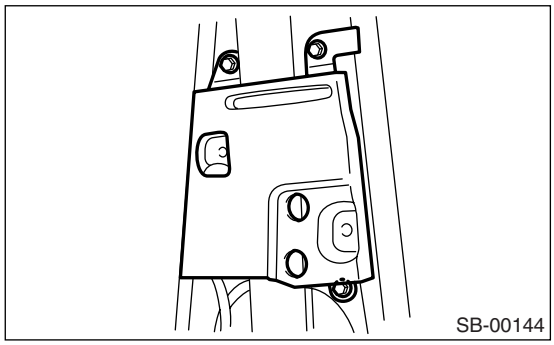

EB-00154

12) Remove the rear door. <Ref. to EB-21, REAR DOOR ASSEMBLY, REMOVAL, Rear Door.>

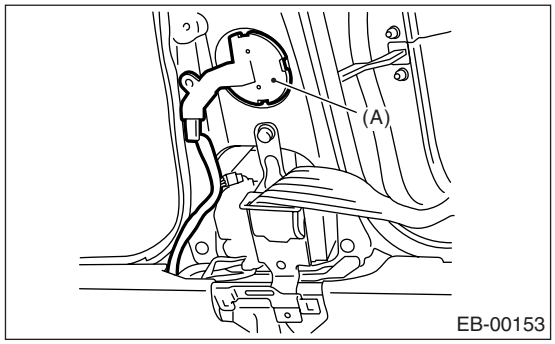
2. REAR DOOR ASSEMBLY

1) Disconnect the ground cable from battery.
2) Remove the center pillar lower trim. <Ref. to EI-60, REMOVAL, Lower Inner Trim.>

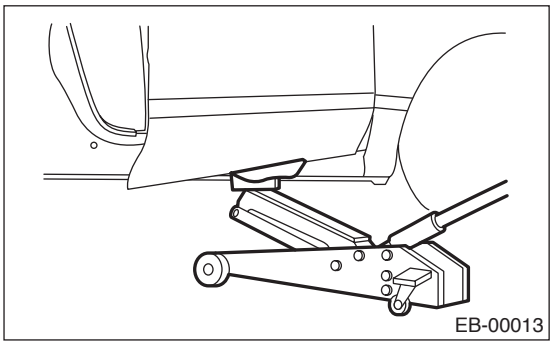
3) Remove the center pillar inner protector lower.



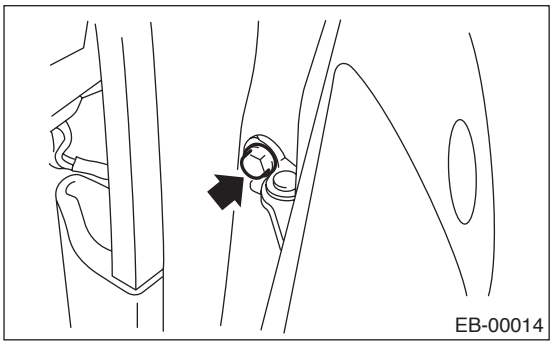
4) Remove the harness holder (A), and disconnect the door harness connector inside pillar.



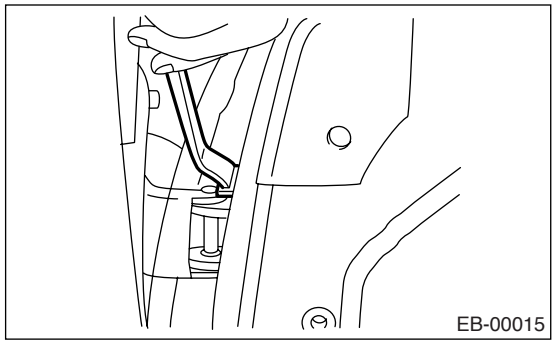
5) Put a wooden block on jack and place jack under the rear door. Support the rear door with the jack to protect it from damage.



6) Remove the bolt from the door checker.



7) Remove the door-side bolts for upper and lower hinges to remove the rear door panel.



8) Remove the door hinge from vehicle.

B: INSTALLATION

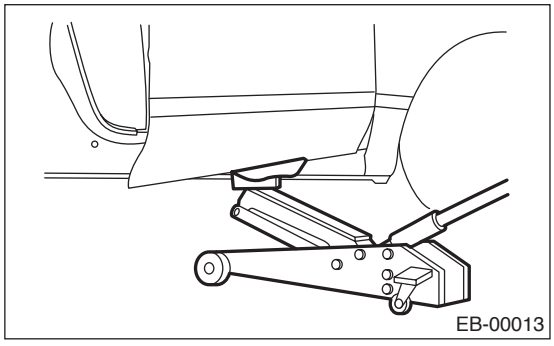
1. REAR DOOR PANEL

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-9, REAR DOOR PANEL, COMPONENT, General Description.>

2. REAR DOOR ASSEMBLY

1) Put a wooden block on jack and place the rear door on that.

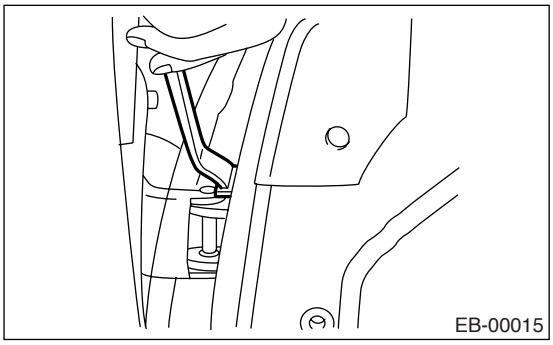


2) Apply grease to sliding area of the door hinges.
3) Install the rear door to upper hinge and lower hinge adjusting by jack.
4) Tighten the bolt of door checker.
5) Connect the door harness connector, and install the center pillar inner protector.
6) Install the center pillar lower trim.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-9, REAR DOOR PANEL, COMPONENT, General Description.>

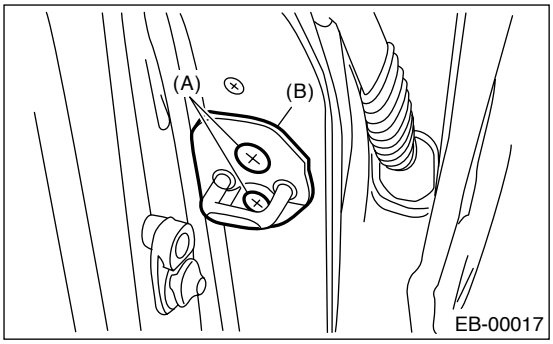
C: ADJUSTMENT

1) Open the rear door, loosen the door-side bolts of upper and lower hinges to align the position of rear door panel longitudinally and laterally.



2) Loosen the screws (A), and tap the striker (B) using plastic hammer to adjust the gap between rear end surface of rear door panel and body surface.

CAUTION:
Do not use an impact wrench. Welding area on the striker nut plate is easily broken.

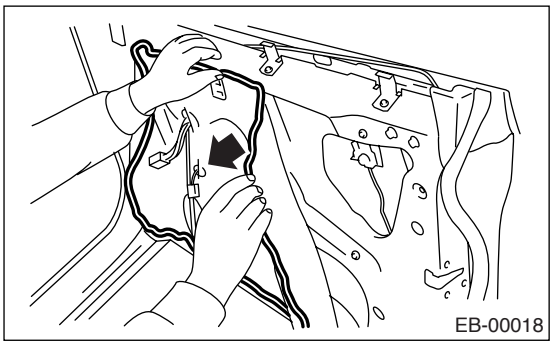


7. Rear Sealing Cover

A: REMOVAL

1) Disconnect the ground cable from battery.
2) Remove the rear door trim. <Ref. to EI-48, REMOVAL, Door Trim.>
3) Pull back the sealing cover.

NOTE:
• Carefully remove the butyl tape. Excessive force will easily break the cover.
• If cover gets broken, replace it with a new one.



B: INSTALLATION

1) Install in the reverse order of removal.
2) When replacing the sealing cover, use the butyl tape.
3) Press the butyl tape-applied area firmly to prevent any floating on surface.

Butyl tape:
3M8626 or equivalent

NOTE:
• Apply a uniform bead of butyl tape.
• Attach the sealing cover, keeping it from becoming wrinkled.
• Breaks in the bead will allow water leakage and contamination.

C: INSPECTION

If the sealing cover gets damaged, replace it with a new one.

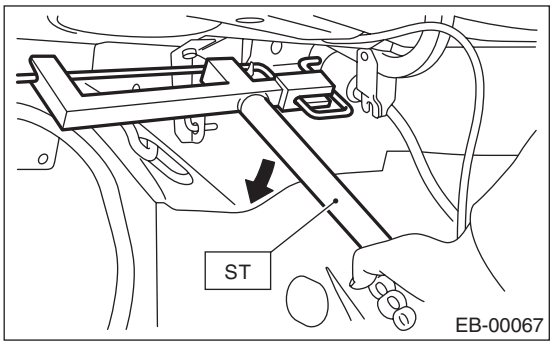
8. Trunk Lid

A: REMOVAL

1. TORSION BAR

1) Open the trunk lid.
2) Using the ST, remove the torsion bar from the hinge link.
ST 927780000 REMOVER

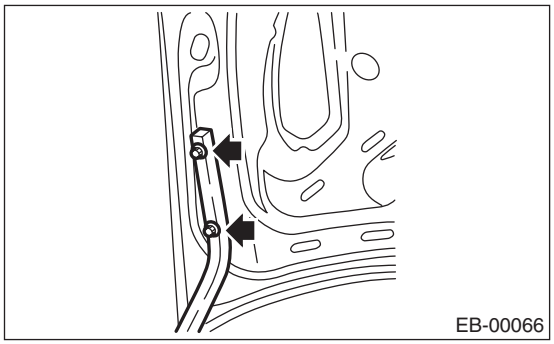
CAUTION:
During removal and installation, carefully handle the torsion bar, because it will generate reactive force.



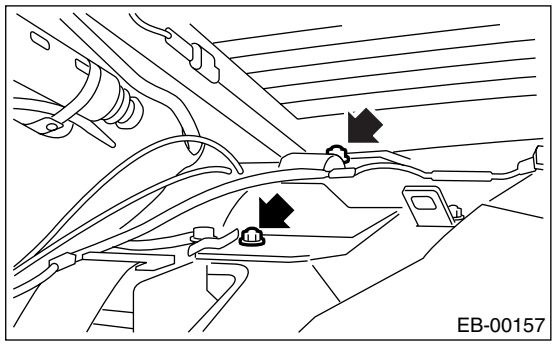
3) Remove the right/left torsion bars.

2. TRUNK LID ARM

1) Disconnect the ground cable from battery.
2) Open the trunk lid to remove the trunk lid trim, trunk lid arm cover and trunk room trim. <Ref. to EI-71, TRUNK ROOM TRIM, REMOVAL, Trunk Room Trim.>
3) Disconnect the trunk lid release cable. <Ref. to SL-39, REMOVAL, Trunk Lid Lock Assembly.>
4) Disconnect each connector, and remove the harness clip.
5) Remove the trunk lid mounting bolts to remove the trunk lid panel from trunk lid arm.

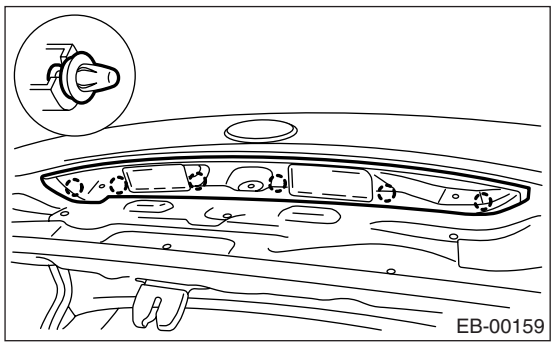


6) Remove the torsion bar from the trunk lid hinge link. <Ref. to EB-25, TORSION BAR, REMOVAL, Trunk Lid.>
7) Remove the rear shelf trim. <Ref. to EI-70, REMOVAL, Rear Shelf Trim.>
8) Remove the bolts to remove the trunk lid arm.

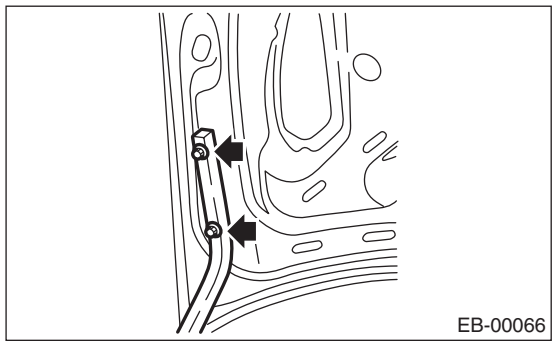


3. TRUNK LID PANEL

1) Disconnect the ground cable from battery.
2) Open the trunk lid to remove the trunk lid trim and trunk lid arm cover. <Ref. to EI-71, TRUNK ROOM TRIM, REMOVAL, Trunk Room Trim.>
3) Disconnect the connector to remove the trunk lid harness.
4) Remove the trunk lid lock assembly. <Ref. to SL-39, REMOVAL, Trunk Lid Lock Assembly.>
5) Remove the trunk lid garnish. <Ref. to EI-75, REMOVAL, Trunk Lid Garnish.>
6) Remove the license plate light cover.



7) Remove the bolts to remove the trunk lid panel from the trunk lid arm.



B: INSTALLATION

1. TORSION BAR

1) Install in the reverse order of removal.
2) Apply grease to the rotating area of hinges and of torsion bar.

2. TRUNK LID ARM

Install in the reverse order of removal.

Tightening torque:
Refer to "COMPONENT" of "General Description".
<Ref. to EB-10, TRUNK LID PANEL, COMPONENT, General Description.>

3. TRUNK LID PANEL

1) Install in the reverse order of removal.
2) Install with attention to make uniform clearance around the trunk lid panel. For the dimension of clearance, refer to "SPECIFICATIONS" in "General Description". <Ref. to EB-2, SPECIFICATION, General Description.>

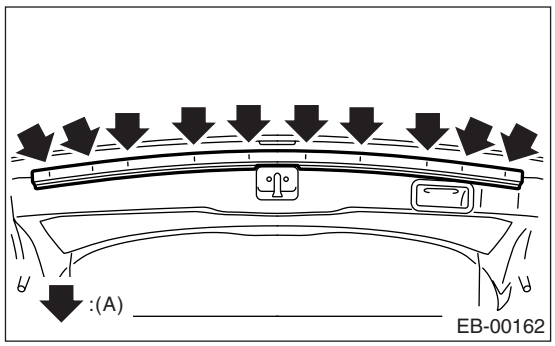
Tightening torque:
14 N·m (1.43 kgf-m, 10.3 ft-lb)

9. Rear Gate

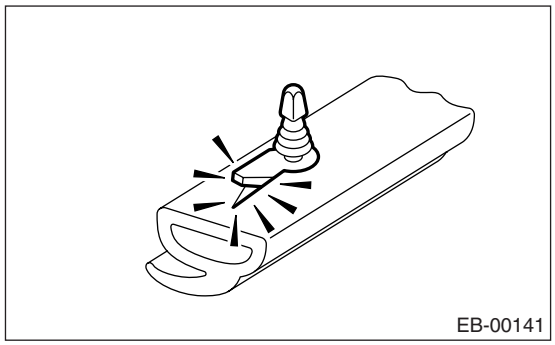
A: REMOVAL

1. REAR GATE PANEL

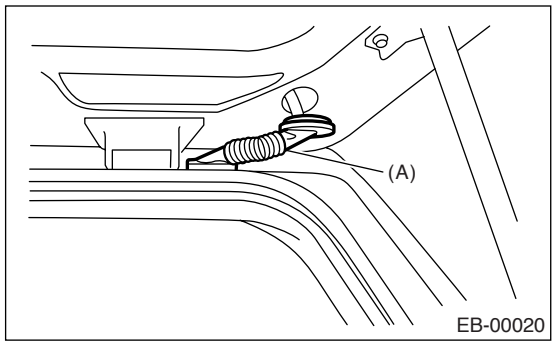
1) Disconnect the ground cable from battery.
2) Open the rear gate.
3) Remove the rear gate trim. <Ref. to EI-69, REMOVAL, Rear Gate Trim.>
4) Remove the rear gate garnish. <Ref. to EI-76, REMOVAL, Rear Gate Garnish.>
5) Remove the rear wiper arm. <Ref. to WW-21, REMOVAL, Rear Wiper Arm.>
6) Remove the rear wiper motor. <Ref. to WW-22, WAGON MODEL, REMOVAL, Rear Wiper Motor.>
7) Remove the rear gate outer handle. <Ref. to SL-36, REMOVAL, Rear Gate Outer Handle.>
8) Remove the rear gate latch assembly. <Ref. to SL-37, REMOVAL, Rear Gate Latch Assembly.>
9) Detach the roof spoiler. <Ref. to EI-40, REMOVAL, Roof Spoiler.>
10) Remove harness clip of each connector from the rear gate panel.
11) Remove the weather strip clips (A), and remove the rear gate panel weather strip.



NOTE:
If the weather strip clip is removed with excessive force, the weather strip may be damaged. Be sure to use clip remover to remove.

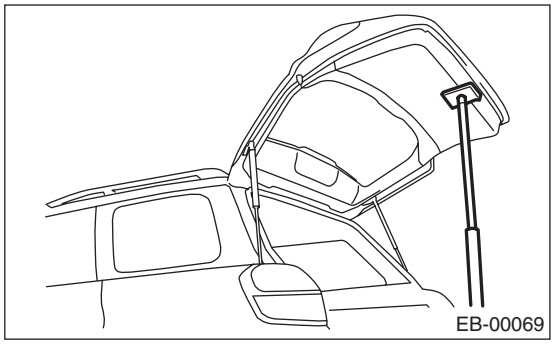


12) Remove the rubber duct (A) connection, and pull out the harness and washer hose from the rear gate.

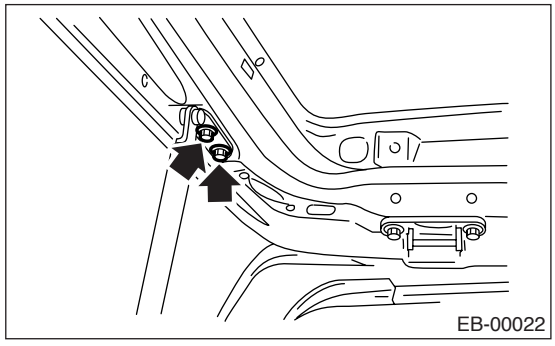


13) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

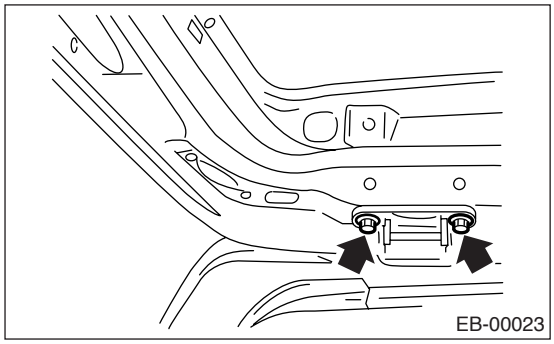
CAUTION:
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.



14) Remove the mounting bolts of rear gate damper stay.



15) Remove the rear gate hinge bolts, and remove the rear gate panel.


EB-00023

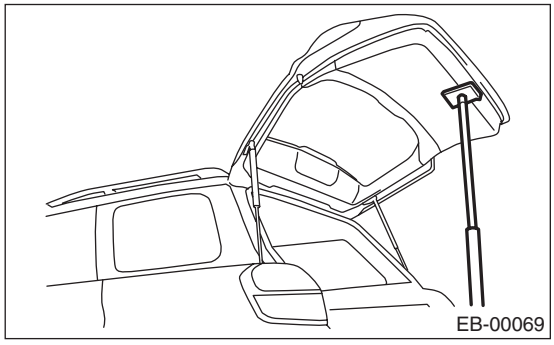
16) Remove the rear gate hinge from vehicle.

2. REAR GATE DAMPER STAY

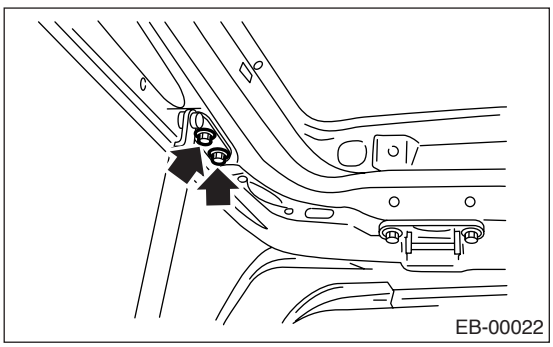
CAUTION:
• Do not damage piston rods and oil seals.
• Never disassemble cylinders: They contain gas.

1) Open the rear gate.
2) Before removing the rear gate damper stay, prevent the rear gate from closing using prop or the like.

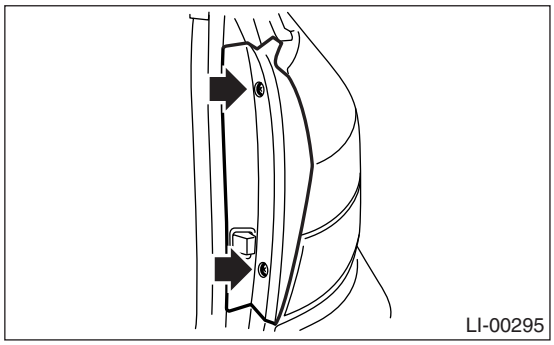
CAUTION:
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.


EB-00069

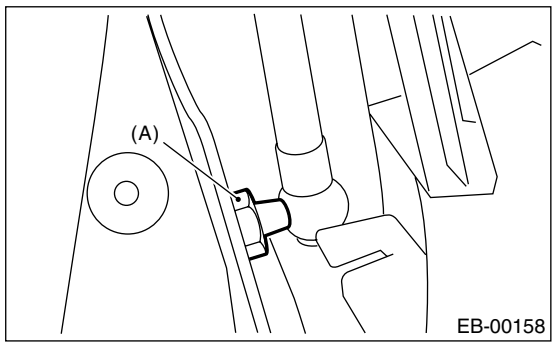
3) Remove the mounting bolts of rear gate damper stay.


EB-00022

4) Remove the clips and then detach the rear combination light covers.


LI-00295

5) Remove the mounting bolt (A), and remove the damper stay.



EB-00158

B: INSTALLATION

1. REAR GATE PANEL

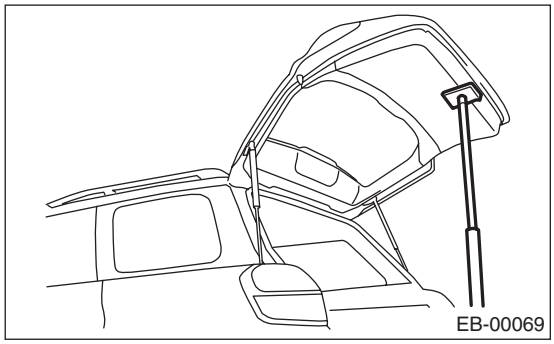
1) Install in the reverse order of removal.
2) Install with attention to make uniform clearance between rear gate panel and body. For the dimension of clearance, refer to “SPECIFICATIONS” in “General Description”. <Ref. to EB-2, SPECIFICATION, General Description.>

Tightening torque:
Refer to “COMPONENT” of “General Description”.
<Ref. to EB-11, REAR GATE PANEL, COMPONENT, General Description.>

2. REAR GATE DAMPER STAY

1) Prevent the rear gate from closing using prop or the like.

CAUTION:
If the prop comes off, operators may get injured and vehicle may get damaged. Make sure to support the rear gate with secure material to prevent injury or damage.



2) Install in the reverse order of removal.

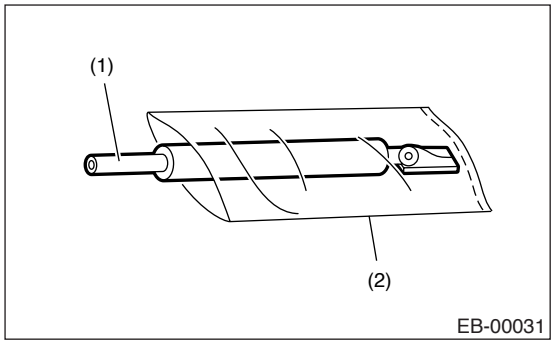
Tightening torque:
19.6 N·m (2.0 kgf-m, 14.5 ft-lb)

C: DISPOSAL

1. REAR GATE DAMPER STAY

CAUTION:
Gas is colorless, odorless and harmless. However, gas pressure may spray cutting powder or oil. Be sure to wear dust-resistant goggles.

1) Cover with a vinyl sack as shown in the figure.

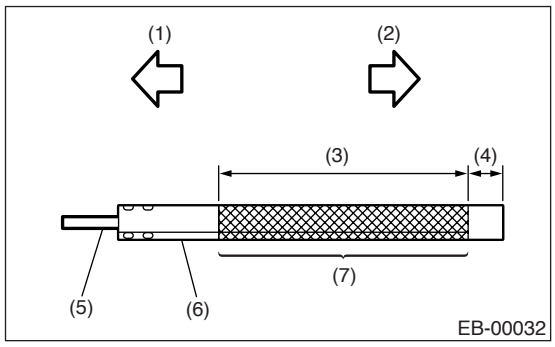


(1) Rear gate damper stay
(2) Vinyl sack

NOTE:
Prevent the vinyl sack from being caught by drill cutting edge.

2) Lift the body side slightly with piston rods fully extended, and secure the body side with vise.

Drill a hole in 2 to 3 mm (0.08 to 0.12 in) diameter at a point 10 to 200 mm (0.39 to 7.87 in) from door side, and bleed rear gate damper stay gas completely.



(1) Body side
(2) Door side
(3) 190 mm (7.48 in)
(4) 10 mm (0.39 in)
(5) Piston rod
(6) Cylinder
(7) Portion to be drilled

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

CRUISE CONTROL SYSTEM

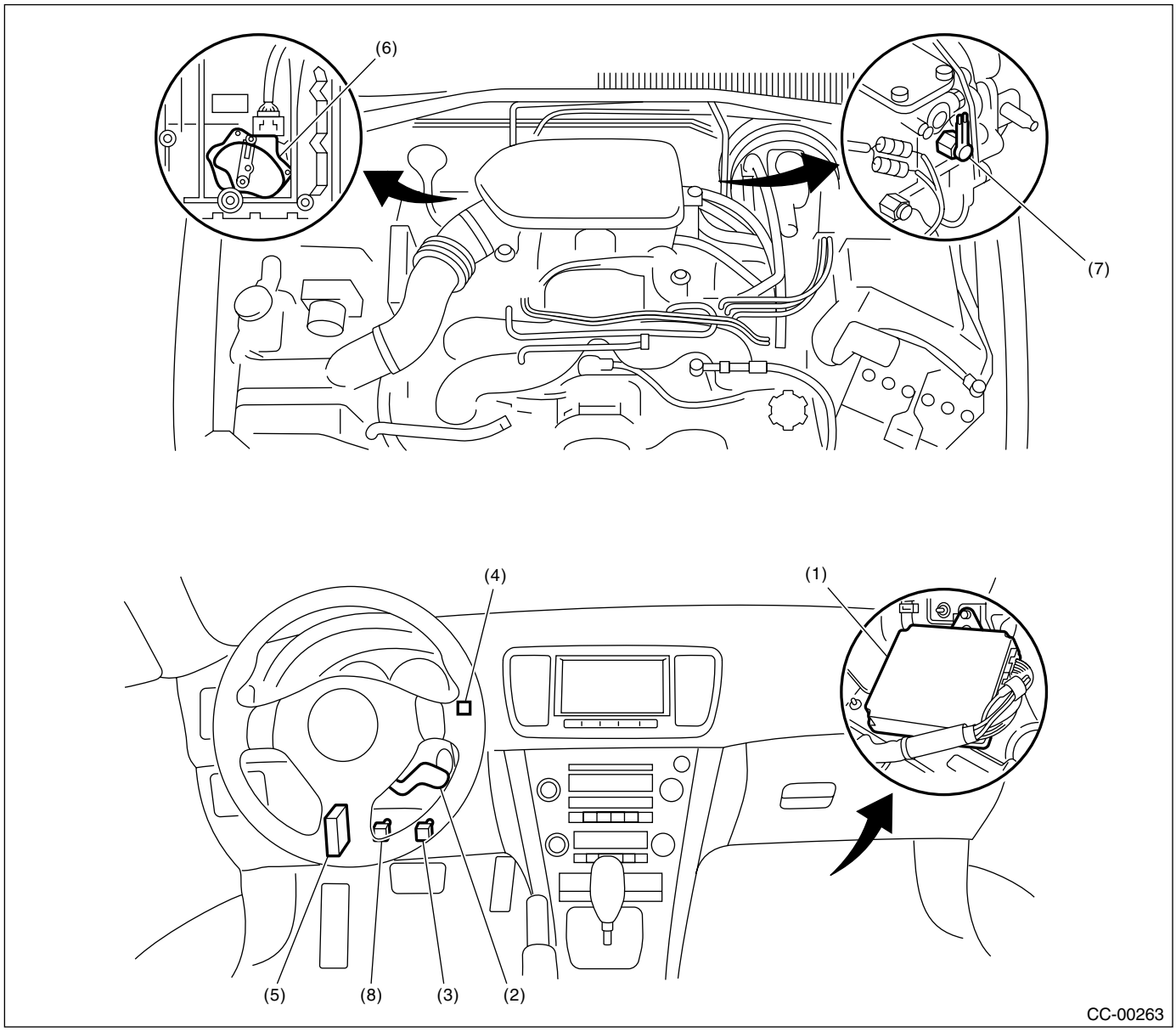
CC

Page

1. General Description 2
2. Cruise Control Unit 4
3. Cruise Control Command Switch 5
4. Stop Light and Brake Switch 6
5. Clutch Switch 7
6. Inhibitor Switch 8
7. Neutral Position Switch 9

1. General Description

A: COMPONENT



(1) Engine control module (ECM)
(2) Cruise control command switch
(3) Stop light & brake switch
(4) Cruise indicator light & cruise set indicator light
(5) Transmission control module (TCM) (AT model)
(6) Inhibitor switch (AT model)
(7) Neutral position switch (MT model)
(8) Clutch switch (MT model)

B: CAUTION

• Before disassembling or reassembling parts, always disconnect the battery ground cable from battery. When repairing the audio, control module, etc. which are provided with memory functions, record the memory contents before disconnecting the ground cable from battery. Otherwise, the memory will be erased.
• Reassemble the parts in the reverse order of disassembly unless otherwise indicated.
• Adjust the parts to specifications specified in this manual.
• Connect the connectors securely during reassembly.
• After reassembly, ensure functional parts operate properly.

C: PREPARATION TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance and voltage.

2. Cruise Control Unit

A: NOTE

The control of cruise control system is carried out in Engine control module (ECM).

B: REMOVAL

<Ref. to FU(H4SO 2.0)-34, REMOVAL, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, REMOVAL, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, REMOVAL, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, REMOVAL, Engine Control Module (ECM).>

C: INSTALLATION

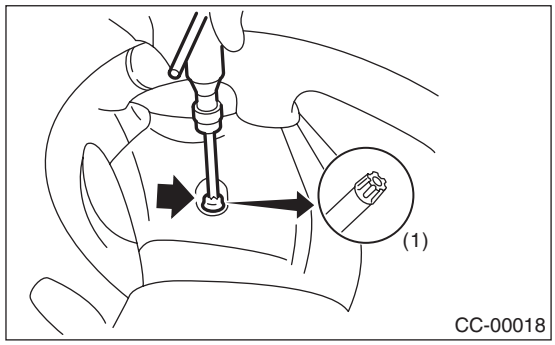
<Ref. to FU(H4SO 2.0)-34, INSTALLATION, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, INSTALLATION, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, INSTALLATION, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, INSTALLATION, Engine Control Module (ECM).>

3. Cruise Control Command Switch

A: REMOVAL

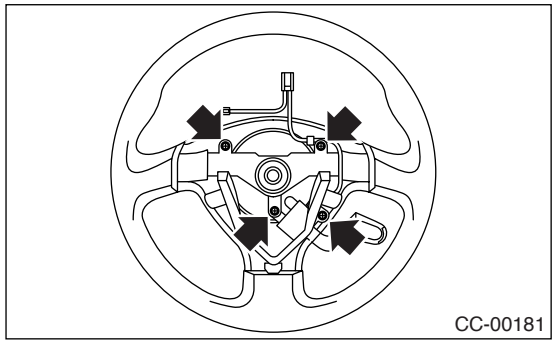
WARNING:
Before servicing, be sure to read the notes in the "AB" section for proper handling of the driver's airbag module. <Ref. to AB-4, CAUTION, General Description.>

1) Set the front wheels in straight ahead position.
2) Turn the ignition switch to OFF.
3) Disconnect the ground cable from battery and wait for at least 20 seconds before starting work.
4) Using TORX® BIT T30 (Tamper resistant type), loosen the two TORX® bolts which secure driver's airbag module.

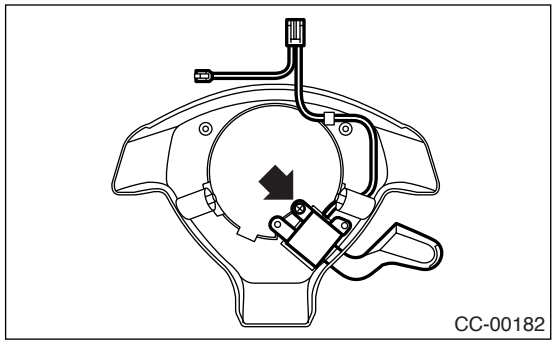


(1) TORX® BIT T30

5) Disconnect the airbag module connector on back of the airbag module.
6) Remove the steering wheel. <Ref. to PS-20, REMOVAL, Steering Wheel.>
7) Remove the four screws to remove the lower cover from steering wheel.



8) Remove one screw to remove the cruise control command switch from lower cover.

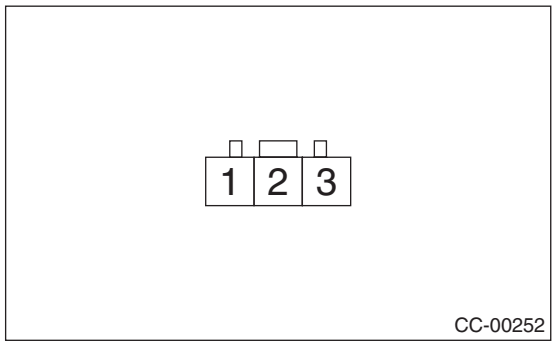


B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the cruise control command switch resistance.



Switch	Area	Terminal No.	Standard
CANCEL SET/COAST RESUME/ ACCEL	ALL OFF	2 and 3	Approx. 4 kΩ
CANCEL	ON	2 and 3	Less than 1 Ω
SET/COAST	ON	2 and 3	Approx. 250 Ω
RESUME/ ACCEL	ON	2 and 3	Approx. 1500 Ω
MAIN	OFF	1 and 2	More than 1 MΩ
	ON	1 and 2	Less than 1 Ω

If NG, replace the cruise control command switch.

4. Stop Light and Brake Switch

A: REMOVAL

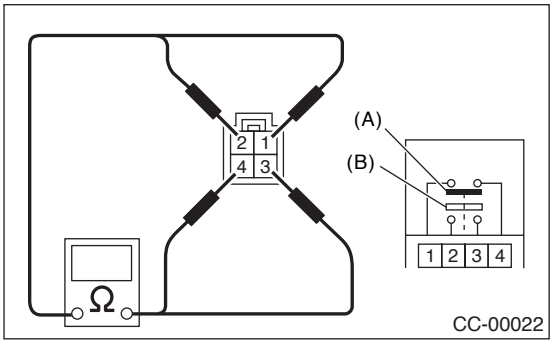
1) Disconnect the ground cable from battery.
2) Disconnect the connector from stop light & brake switch, and then remove the switch. <Ref. to BR-45, REMOVAL, Stop Light Switch.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the resistance of brake switch (A) and stop light switch (B).



Switch	Pedal	Terminal No.	Standard
Brake	Released	1 and 4	Less than 1 Ω
	Depressed	1 and 4	More than 1 MΩ
Stop Light	Released	2 and 3	More than 1 MΩ
	Depressed	2 and 3	Less than 1 Ω

If NG, replace the stop light & brake switch.

5. Clutch Switch

A: REMOVAL

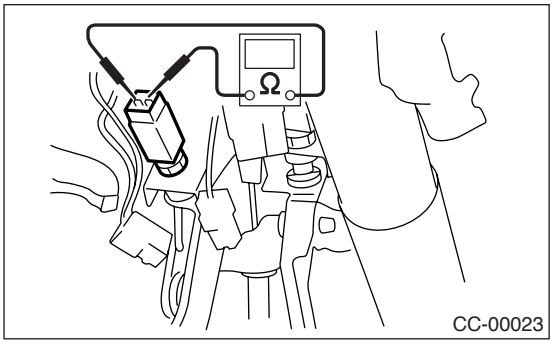
1) Disconnect the ground cable from battery.
2) Disconnect the connector from clutch switch, and then remove the switch. **<Ref. to CL-27,** DISASSEMBLY**, Clutch Pedal.>**

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the clutch switch resistance.



Switch	Pedal	Terminal No.	Standard
Clutch	Released	1 and 2	Less than 1 Ω
	Depressed	1 and 2	More than 1 MΩ

If NG, replace the clutch switch.

6. Inhibitor Switch

A: REMOVAL

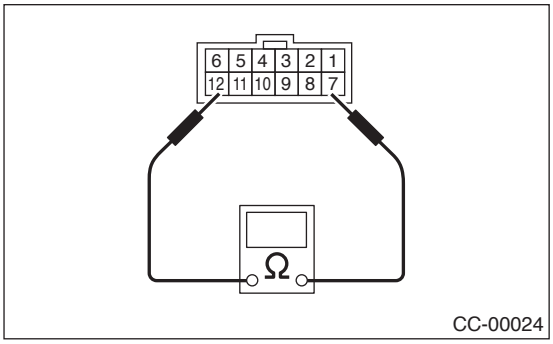
1) Disconnect the ground cable from battery.
2) Disconnect the connector from inhibitor switch, and then remove the switch. **<Ref. to 4AT-52,** REMOVAL**, Inhibitor Switch.>**

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the inhibitor switch resistance.



Selector lever position	Terminal No.	Standard
P	7 and 12	Less than 1 Ω
N		Less than 1 Ω
Except P and N		More than 1 MΩ

If NG, replace the inhibitor switch.

7. Neutral Position Switch

A: REMOVAL

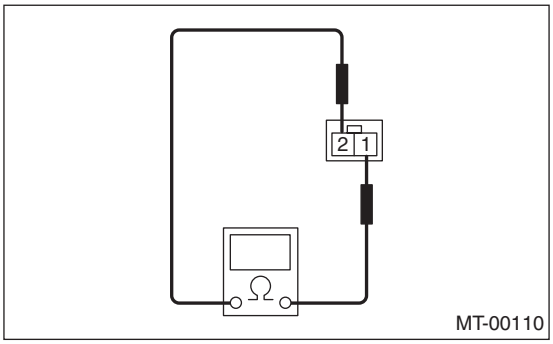
1) Disconnect the ground cable from battery.
2) Disconnect the connector from neutral position switch, and then remove the switch. <Ref. to 5MT-41, BACK-UP LIGHT SWITCH AND NEUTRAL POSITION SWITCH, REMOVAL, Switches and Harness.>

B: INSTALLATION

Install in the reverse order of removal.

C: INSPECTION

Measure the neutral position switch resistance.



Gear shift position	Terminal No.	Standard
Neutral position	1 and 2	Less than 1 Ω
Other positions		More than 1 MΩ

If NG, replace the neutral position switch.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

CRUISE CONTROL SYSTEM (DIAGNOSTICS)

CC(diag)

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2. General Description 4
3. Electrical Component Location 5
4. Engine Control Module (ECM) I/O Signal 6
5. Subaru Select Monitor 8
6. Diagnostics with Phenomenon 10
7. List of Diagnostic Trouble Code (DTC) 12
8. Diagnostic Procedure with Diagnostic Trouble Code (DTC) 15

1. Basic Diagnostic Procedure

A: PROCEDURE

	Step	Check	Yes	No
1	**CHECK MALFUNCTION INDICATOR LIGHT.** Ensure the malfunction indicator light illuminates.	Does the malfunction indicator light illuminate?	Go to step **5.**	Go to step **2.**
2	**CHECK CRUISE INDICATOR LIGHT.** Ensure the cruise indicator light blinks.	Does the cruise indicator light blink?	Go to step **5.**	Go to step **3.**
3	**CHECK CRUISE CONTROL MAIN SWITCH OPERATION.** Check the cruise control main switch operation. (Ensure the cruise indicator light illuminates.)	Is the cruise control main switch turned on? (Does the cruise indicator light illuminate?)	Go to step **4.**	Go to phenomenon 1. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
4	**CHECK CRUISE CONTROL SET OPERATION.** Check the cruise control set operation.	Can the cruise control be set while driving at more than 40 km/h (25 MPH)?	Go to step **6.**	Go to step **5.**
5	**PERFORM CRUISE CANCEL CONDITIONS DIAGNOSIS.** Perform the cruise cancel conditions diagnosis.	Is DTC displayed?	Go to “List of Diagnostic Trouble Code (DTC)”. <Ref. to CC(diag)-12, List of Diagnostic Trouble Code (DTC).>	Go to phenomenon 2. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
6	**CHECK CRUISE SET INDICATOR LIGHT.** Ensure the cruise set indicator light illuminates.	Does the cruise set indicator light illuminate?	Go to step **7.**	Go to phenomenon 3. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
7	**CHECK VEHICLE SPEED IS HELD WITHIN SET SPEED.** Make sure the vehicle speed is held within set speed.	Is vehicle speed held within set speed ±3 km/h (±2 MPH)? (Make an inspection on a level road.)	Go to step **8.**	Go to phenomenon 4. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
8	**CHECK RESUME/ACCEL OPERATION.** Check the RESUME/ACCEL switch operation.	Does the vehicle speed increase or return to set speed after RESUME/ACCEL switch has been pressed?	Go to step **9.**	Go to phenomenon 5. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

	Step	Check	Yes	No
9	**CHECK SET/COAST OPERATION.** Check the SET/COAST switch operation.	Does the vehicle speed decrease after SET/COAST switch has been pressed?	Go to step **10.**	Go to phenomenon 6. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
10	**CHECK CANCEL OPERATION.** Check the CANCEL switch operation.	Is the cruise control released after CANCEL switch has been pressed?	Go to step **11.**	Go to phenomenon 7. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
11	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after brake pedal has been depressed?	Go to step **12.**	Go to phenomenon 8. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
12	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after shifting to the neutral position?	Go to step **13.**	Go to phenomenon 9. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>
13	**CHECK CRUISE CONTROL RELEASE OPERATION.** Check the cruise control release operation.	Is the cruise control released after depressing the clutch pedal?	Finish the diagnosis.	Go to phenomenon 10. <Ref. to CC(diag)-10, DIAGNOSTIC PROCEDURE WITH PHENOMENON, Diagnostics with Phenomenon.>

2. General Description

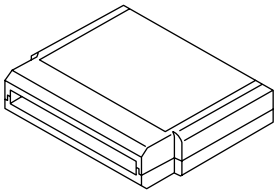
A: CAUTION

Airbag system wiring harness is routed near the cruise control command switch.

CAUTION:
• All airbag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness when servicing the cruise control command switch.

B: PREPARATION TOOL

1. SPECIAL TOOL

ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

C: INSPECTION

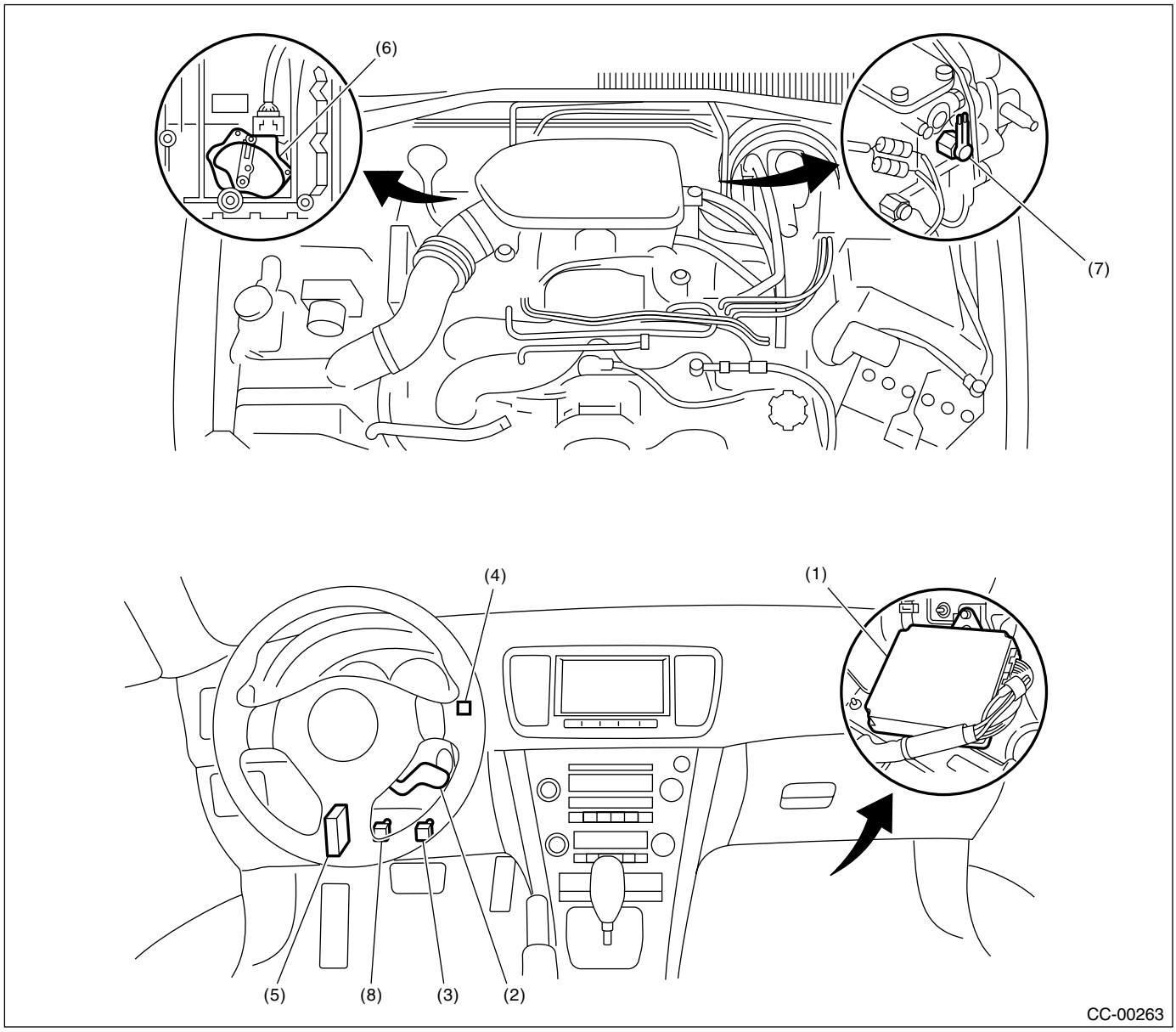
Measure the battery voltage and specific gravity of electrolyte.

Standard voltage:
12 V or more

Specific gravity:
More than 1.260

3. Electrical Component Location

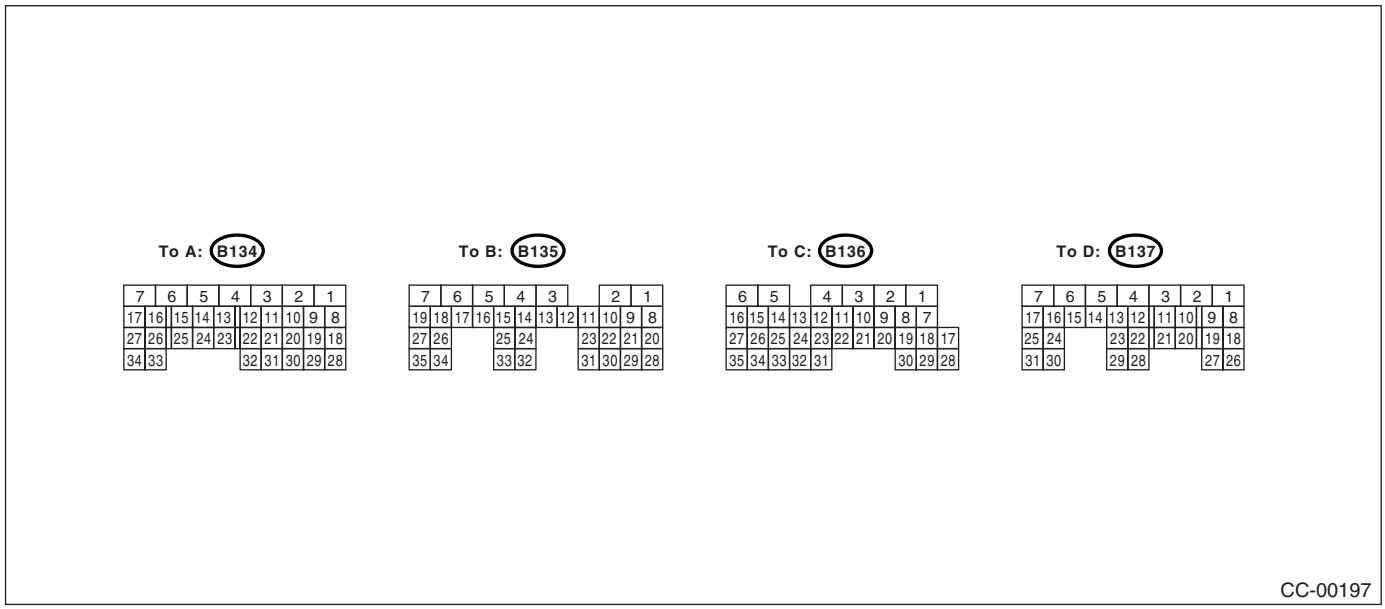
A: LOCATION



(1) Engine control module (ECM)
(2) Cruise control command switch
(3) Stop and brake switch
(4) Cruise indicator light and cruise set indicator light
(5) Transmission control module (TCM) (AT model)
(6) Inhibitor switch (AT model)
(7) Neutral position switch (MT model)
(8) Clutch switch (MT model)

4. Engine Control Module (ECM) I/O Signal

A: ELECTRICAL SPECIFICATION



• 2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model

Content		Terminal No.	Measurement Condition and I/O Signal (Idling with ignition ON: Except cruise set light)
Main power supply	VB (CONTROL 1) VB (CONTROL 2)	B6 B5	• Battery voltage is present when the main power is turned ON. • "0 V" voltage is present when the main power is turned OFF.
Command Switch		C11	• "0 V" voltage is present when the command switch is turned to CANCEL position. • "Approx. 1 V" voltage is present when the command switch is turned to SET/COAST position. • "Approx. 3 V" voltage is present when the command switch is turned to RESUME/ACCEL position. • "Approx. 4 V" voltage is present when the command switch is released.
Brake switch 1 (Brake switch)		C9	• Battery voltage is present when the brake pedal is released. • "0 V" voltage is present when the brake pedal is depressed.
Brake switch 2 (Stop light switch)		C8	• Battery voltage is present when the brake pedal is depressed. • "0 V" voltage is present when the brake pedal is released.
Main switch		C7	• "0 V" voltage is present while the main switch is pressed or turned on. • Battery voltage is present when the main switch is turned OFF.
Ground	GND (CONTROL 1) GND (CONTROL 2)	D2 D1	—
Ignition switch		D14	• Battery voltage is present when the ignition switch is turned ON. • "0 V" voltage is present when the ignition switch is turned OFF.
Clutch switch (MT model)		C10	• "0 V" voltage is present when the clutch pedal is depressed. • Battery voltage is present when the clutch pedal is released.
Neutral position switch (MT model)		D9	• "0 V" voltage is present when the shift lever is set in any position except neutral. • "Approx. 5 V" voltage is present when the shift lever is set in neutral position.
Neutral signal (AT model)		D9	• "Approx. 5 V" voltage (4AT model) or battery voltage (5AT model) is present when the shift lever is set in any position except "P" or "N". • "0 V" voltage is present when the shift lever is set in "P" or "N" position.

• 2.0 L non-turbo model, 2.5 L KS, KA model

Content		Terminal No.	Measurement Condition and I/O Signal (Idling with ignition ON: Except cruise set light)
Main power supply	VB (CONTROL 1) VB (CONTROL 2)	C3 C4	• Battery voltage is present when the main power is turned ON. • "0 V" voltage is present when the main power is turned OFF.
Command Switch		C21	• "0 V" voltage is present when the command switch is turned to CANCEL position. • "Approx. 1 V" voltage is present when the command switch is turned to SET/COAST position. • "Approx. 3 V" voltage is present when the command switch is turned to RESUME/ACCEL position. • "Approx. 4 V" voltage is present when the command switch is released.
Brake switch 1 (Brake switch)		D12	• Battery voltage is present when the brake pedal is released. • "0 V" voltage is present when the brake pedal is depressed.
Brake switch 2 (Stop light switch)		D13	• Battery voltage is present when the brake pedal is depressed. • "0 V" voltage is present when the brake pedal is released.
Main switch		D14	• "0 V" voltage is present while the main switch is pressed or turned on. • Battery voltage is present when the main switch is turned OFF.
Ground	GND (CONTROL 1) GND (CONTROL 2)	C5 C6	—
Ignition switch		B13	• Battery voltage is present when the ignition switch is turned ON. • "0 V" voltage is present when the ignition switch is turned OFF.
Clutch switch (MT model)		D22	• "0 V" voltage is present when the clutch pedal is depressed. • Battery voltage is present when the clutch pedal is released.
Neutral position switch (MT model)		B12	• "0 V" voltage is present when the shift lever is set in any position except neutral. • "Approx. 5 V" voltage is present when the shift lever is set in neutral position.
Neutral signal (AT model)		B12	• "Approx. 5 V" voltage is present when the shift lever is set in any position except "P" or "N". • "0 V" voltage is present when the shift lever is set in "P" or "N" position.

B: WIRING DIAGRAM

<Ref. to WI-134, WIRING DIAGRAM, Cruise Control System.>

5. Subaru Select Monitor

A: OPERATION

1. GENERAL DESCRIPTION

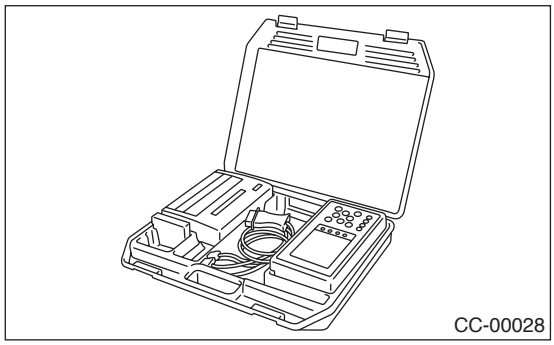
For the on-board diagnosis function of the cruise control system, use Subaru Select Monitor.
The on-board diagnosis function operates under two categories, which are used depending on the type of problems;
1) Cruise Control Cancel Conditions Diagnosis:
(1) This category of diagnosis requires actual vehicle driving in order to determine the cause, as when cruise speed is cancelled during driving although cruise cancel condition is not entered.
(2) Cruise control memory in ECM stores the cancel condition (Code No.) which occurred during driving. When there are plural cancel conditions (Code No.), they are shown on the Subaru Select Monitor.

CAUTION:
• The cruise control memory stores not only the cruise "cancel" which occurred (although "cancel" operation is not entered by the driver), but also the "cancel" condition input by the driver.
• The content of memory is cleared when ignition switch or cruise control main switch is turned OFF.

2) Real-time Diagnosis:
Real-time diagnosis function is used to determine whether or not the input signal system is in good order, according to the signal emitted from switches, sensors, etc.
(1) Vehicle cannot be driven at cruise speed when problem occurs in the cruise control system or its associated circuits.
(2) Monitor the signal conditions from switches and sensors.

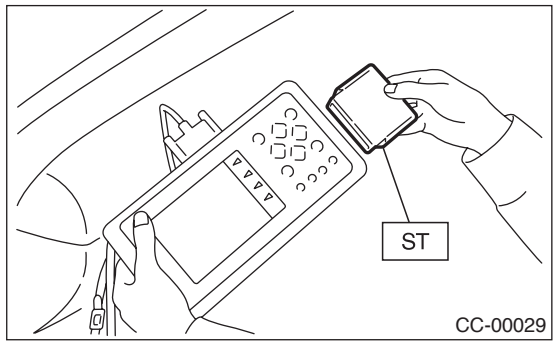
2. CRUISE CANCEL CONDITIONS DIAGNOSIS

1) Prepare the Subaru Select Monitor kit.


CC-00028

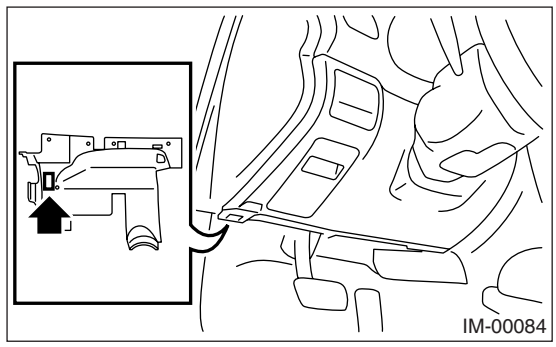
2) Connect the diagnosis cable to Subaru Select Monitor.

3) Insert the cartridge to Subaru Select Monitor. <Ref. to CC(diag)-4, SPECIAL TOOL, PREPARATION TOOL, General Description.>

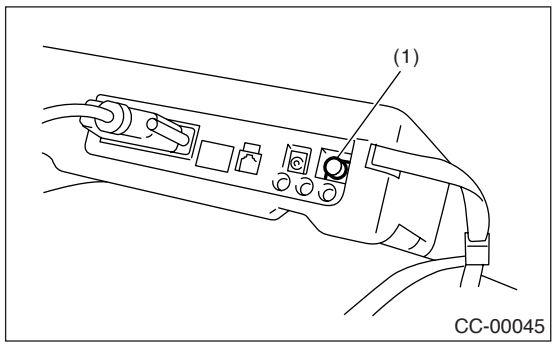


CC-00029

4) Connect the Subaru Select Monitor to data link connector.
(1) Data link connector is located in the lower portion of instrument panel (on the driver's side).


IM-00084

(2) Connect the diagnosis cable to data link connector.
5) Start the engine and turn the cruise control main switch to ON.
6) Turn the Subaru Select Monitor switch to ON.



CC-00045

(1) Power switch

7) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
On the system selection display screen, select the {Engine} and press the [YES] key. Press the [YES] key after the information of engine type is displayed.
8) Drive vehicle at least 40 km/h (25 MPH) with cruise speed set.

9) If the cruise speed is canceled by itself (without doing any cancel operations), DTC will display on the screen when selecting the {Check Cancel Code} and pressing the [YES] key on the engine malfunction diagnosis display screen.

CAUTION:
• When performing diagnostics, observe the legal speed of the road.
• DTC will also displayed when cruise control cancel is effected by driver. Do not confuse.
• Put a co-worker in the vehicle to assist the diagnosis during driving.

NOTE:
DTC will be cleared by turning ignition switch or cruise control main switch to OFF.

3. REAL-TIME DIAGNOSIS

1) Connect the Subaru Select Monitor.
2) Turn the ignition switch and cruise control main switch to ON.
3) Turn the Subaru Select Monitor switch to ON.
4) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
5) On the «System Selection Menu» display screen, select the {Engine} and press the [YES] key.
6) Press the [YES] key after the information of engine type is displayed.
7) On the «Cruise Control Diagnosis» display screen, select the {Current Data Display/Save}, and then press the [YES] key.
8) Make sure that normal indication is displayed when operated as follows:
• Depress/release the brake pedal. (Stop light switch and brake switch turn ON.)
• Turn the main switch to ON.
• Turn the “CANCEL” switch to ON.
• Turn ON the “SET/COAST” switch.
• Turn ON the “RESUME/ACCEL” switch.
• Depress or release the clutch pedal.
• Place the shift lever in any position except neutral.

NOTE:
• For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.
• For DTC, refer to “List of Diagnostic Trouble Code (DTC)”. <Ref. to CC(diag)-12, List of Diagnostic Trouble Code (DTC).>

6. Diagnostics with Phenomenon

A: DIAGNOSTIC PROCEDURE WITH PHENOMENON

Phenomenon		Checking item	Reference
1	Cruise control main switch is not turned to ON. (Cruise indicator light does not illuminate.)	(1) Check the cruise indicator light.	<Ref. to CC(diag)-11, CHECK CRUISE INDICATOR LIGHT & CRUISE SET INDICATOR LIGHT., Diagnostics with Phenomenon.>
		(2) Check the cruise control command switch.	<Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
2	Cruise control cannot be set.	(1) Check the cruise control command switch.	<Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(2) Check the stop light switch and brake switch.	<Ref. to CC(diag)-18, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(3) Check the clutch switch.	<Ref. to CC(diag)-21, DTC 13 CLUTCH SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(4) Check the neutral position switch.	<Ref. to CC(diag)-24, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
		(5) Check the vehicle speed sensor.	<Ref. to CC(diag)-32, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
3	Cruise set indicator light does not illuminate.	Check the cruise set indicator light.	<Ref. to CC(diag)-11, CHECK CRUISE INDICATOR LIGHT & CRUISE SET INDICATOR LIGHT., Diagnostics with Phenomenon.>
4	Vehicle speed is not held within set speed ±3 km/h (±2 MPH).	Inspect the vehicle speed sensor.	<Ref. to CC(diag)-32, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
5	Vehicle speed does not increase or does not return to set speed after RESUME/ ACCEL switch has been pressed.	Check the RESUME/ACCEL switch.	<Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
6	Vehicle speed does not decrease after SET/COAST switch has been pressed.	Check the SET/COAST switch.	<Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
7	Cruise control is not released after CANCEL switch has been pressed.	Check the CANCEL switch.	<Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
8	Cruise control is not released after brake pedal has been depressed.	Check the stop light switch and brake switch.	<Ref. to CC(diag)-18, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
9	Cruise control is not released after shifting to the neutral position.	Check the neutral position switch.	<Ref. to CC(diag)-24, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
10	Cruise control is not released after clutch pedal has been depressed.	Check the clutch switch.	<Ref. to CC(diag)-21, DTC 13 CLUTCH SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

B: CHECK CRUISE INDICATOR LIGHT & CRUISE SET INDICATOR LIGHT.

TROUBLE SYMPTOM:

Cruise control can be set, but the cruise indicator light & cruise set indicator light do not illuminate.

	Step	Check	Yes	No
1	**CHECK CRUISE INDICATOR LIGHT & CRUISE SET INDICATOR LIGHT.** 1) Perform the self-diagnosis for combination meter. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.> 2) Check the cruise indicator light & cruise set indicator light illuminate.	Does the cruise indicator light & cruise set indicator light illuminate?	Go to step **2.**	Replace the meter case assembly. <Ref. to IDI-16, Combination Meter Assembly.>
2	**CHECK LAN COMMUNICATION CIRCUIT ERROR DISPLAY.** 1) Turn the ignition switch to ON again after completing self-diagnosis. 2) Check that communication error is displayed on the odo/trip meter in combination meter.	Is the error code “Er xx” displayed on odo/trip meter?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

7. List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Contents of diagnosis	Reference
11	Main switch	Main switch of cruise control command switch is turned to OFF, and then the cruise control is released.	This DTC is indicated without operating the main switch. <Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
12	Stop and brake switch	Stop light switch or brake switch is turned to ON, and then the cruise control is released.	This DTC is indicated without depressing the brake pedal. <Ref. to CC(diag)-18, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
13	Clutch switch	Clutch switch is turned to ON, and then the cruise control is released.	This DTC is indicated without depressing the brake pedal. <Ref. to CC(diag)-21, DTC 13 CLUTCH SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
14	Neutral switch	Neutral position switch is turned to ON, and then the cruise control is released.	This DTC is indicated without shifting to neutral position. <Ref. to CC(diag)-24, DTC 14 NEUTRAL POSITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
15	Cancel switch	Cancel switch is turned to ON, and then the cruise control is released.	This DTC is indicated without operating the cancel switch. <Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
16	Ignition switch	Ignition switch is turned to OFF, and then the cruise control is released.	This DTC is indicated without operating the ignition switch. <Ref. to CC(diag)-29, DTC 16 IGNITION SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Reference
21	Cruise Control Switch Malfunction When Ignition Switch Is Turned To ON	When the ignition switch is turned to ON, each switch of cruise control command switch is already turned to ON.	This DTC is indicated without operating the main switch. <Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
22	Vehicle Speed Variation Malfunction	Malfunction of vehicle speed signal variation is detected.	<Ref. to CC(diag)-32, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
23	Engine Related Sensor Malfunction	Malfunction related to engine is detected.	<Ref. to EN(H4SO 2.0)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4SO 2.5)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H4DOTC)(diag)-2, Basic Diagnostic Procedure.> <Ref. to EN(H6DO)(diag)-2, Basic Diagnostic Procedure.>
24	Cruise Control Related Switch Malfunction	Command switch malfunction is detected. (When the switch is being pressed ON for an abnormal period of time (about two minutes), open circuit is detected.)	This DTC is indicated with normal operation. <Ref. to CC(diag)-15, DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
25	Brake Switch Input Circuit Malfunction	Malfunction of brake switch input circuit in ECM is detected.	<Ref. to CC(diag)-18, DTC 12 AND 25 STOP LIGHT SWITCH AND BRAKE SWITCH, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
26	Engine speed signal	• Abnormal increase of engine speed is detected. • Gear is placed in Neutral, 1st or Reverse positions.	Cruise in more than 2nd shift position.
32	Out of Vehicle Speed of Cruise Control Operation	• Controlled vehicle speed decreased under the limit during cruising. • Set operation was performed out of vehicle speed available for setting. • Resume operation was performed without memorized vehicle speed.	This DTC is displayed though the vehicle speed is increased to the speed available for cruise set and set operation was performed again. <Ref. to CC(diag)-32, DTC 22 AND 32 VEHICLE SPEED SENSOR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

DTC	Item	Contents of diagnosis	Reference
33	WAIT is prohibited after operating accelerator pedal.	Controlled vehicle speed increased above the limit during cruising.	This DTC is displayed when driving at higher speed than appropriate cruise control speed. In this case, lower the vehicle speed to the speed available for cruise set, and perform cruise set operation again.
34	Prohibited when accelerator pedal position large is continued.	The vehicle has been driven at higher speed than set vehicle speed for an abnormal period of time (about 10 minutes) during cruise driving.	This DTC is displayed when driving for a long period of time at higher speed than appropriate cruise set vehicle speed by operating accelerator pedal. In this case, release the cruise set.
35	Prohibited when vehicle speed feedback unavailable.	Set vehicle speed cannot keep because of some reasons (steep uphill, parking brake, abnormal decrease of engine output, etc.) during cruise driving.	This DTC is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after eliminating the estimated cause.
41	VDC/TCS operation	Vehicle dynamics control (VDC) or TCS is operated during cruise driving or cruise setting.	This DTC is displayed when driving condition is not suitable for cruise control. Perform cruise set operation again after eliminating the estimated cause.
42	High speed CAN communication malfunction	High speed CAN communication malfunction is detected during cruise driving or cruise setting.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
43	ABS/VDC malfunction	ABS or vehicle dynamics control (VDC) system malfunction is detected during cruise driving or cruise setting.	<Ref. to ABS(diag)-2, Basic Diagnostic Procedure.> or <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>
44	Body integrated module malfunction	Body integrated module system malfunction is detected during cruise driving or cruise setting.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
45	Meter malfunction	Combination meter malfunction is detected during cruise driving or cruise setting.	<Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

8. Diagnostic Procedure with Diagnostic Trouble Code (DTC)

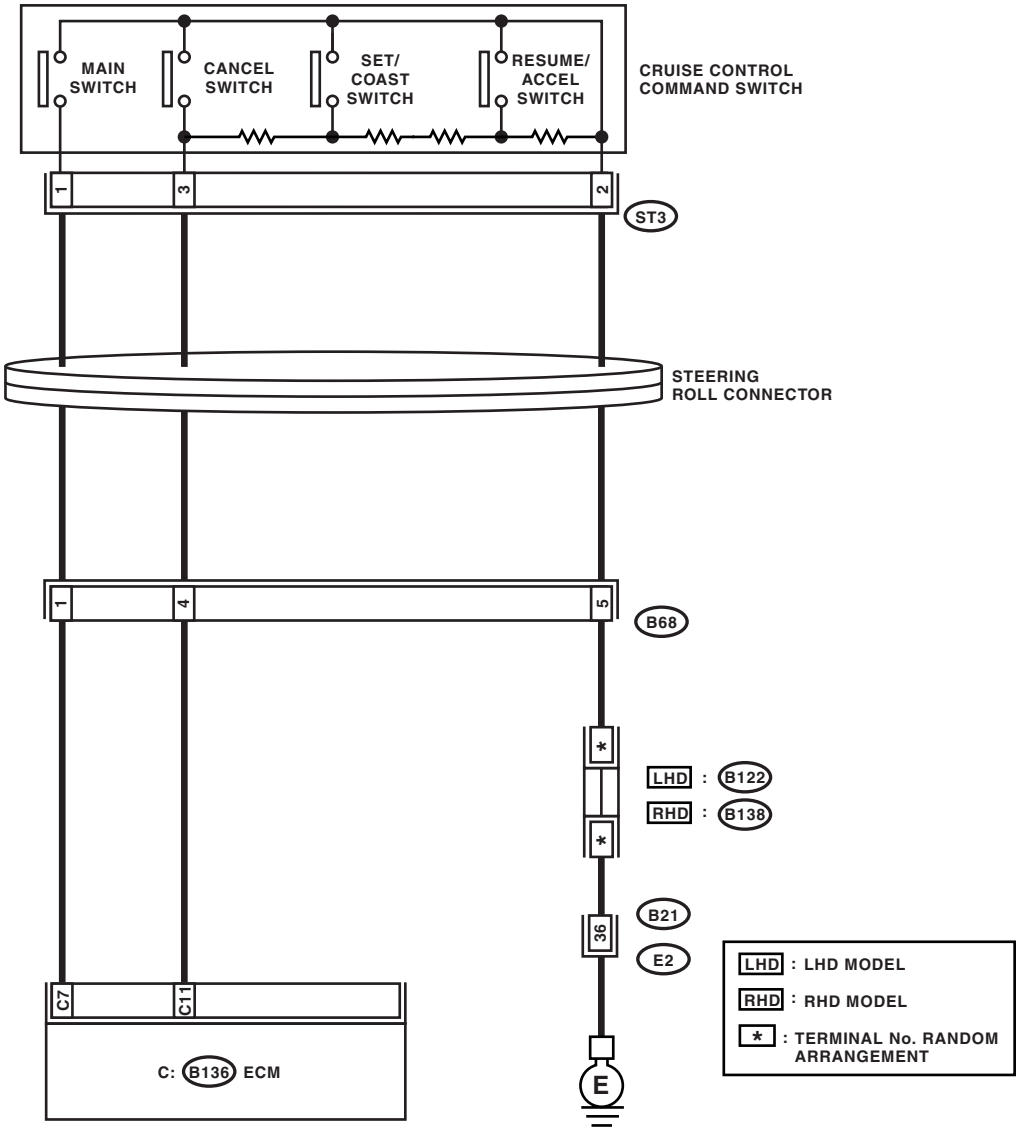
A: DTC 11, 15, 21 AND 24 CRUISE CONTROL COMMAND SWITCH

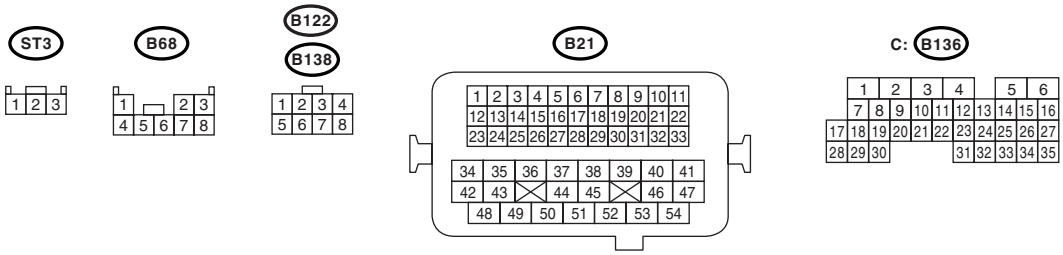
TROUBLE SYMPTOM:

- Cruise control cannot be set. (Cancelled immediately.)
- Cruise control cannot be released.

WIRING DIAGRAM:

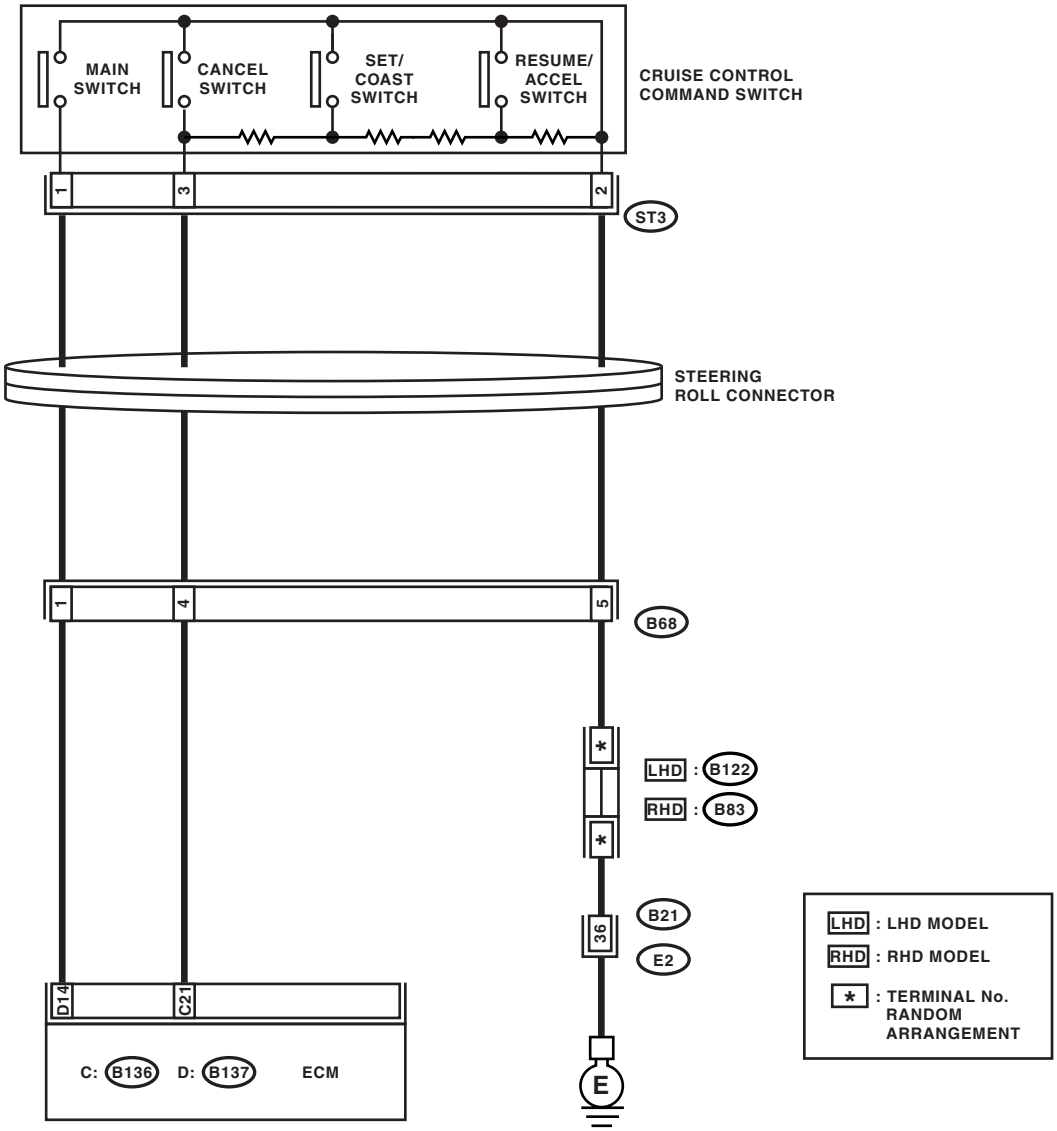
- 2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model

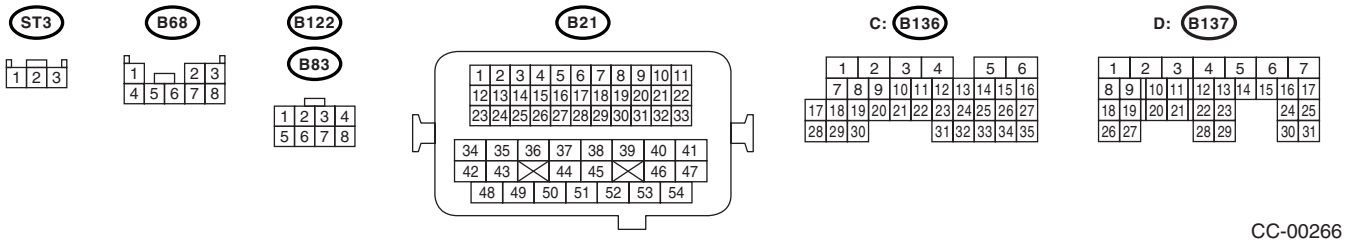




CC-00265

• 2.0 L non-turbo model, 2.5 L KS, KA model





CC-00266

	Step	Check	Yes	No
1	**CHECK CRUISE CONTROL COMMAND SWITCH.** 1) Remove the driver's airbag module. <Ref. to AB-14, REMOVAL, Driver's Airbag Module.> 2) Disconnect the harness connector of cruise control command switch. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(ST3) No. 1 (+) — Chassis ground (–):*** ***(ST3) No. 3 (+) — Chassis ground (–):***	Is the voltage more than 5 V?	Go to step **2.**	Check the harness for open or short circuit between cruise control command switch and ECM.
2	**INSPECTION FOR CANCEL SWITCH.** 1) Turn the ignition switch to OFF. 2) Remove the cruise control command switch. <Ref. to CC-5, REMOVAL, Cruise Control Command Switch.> 3) Measure the resistance between switch terminals when CANCEL switch is pressed and not pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance less than 1 Ω when CANCEL switch is pressed? Is the resistance approx. 4 kΩ when CANCEL switch is not pressed?	Go to step **3.**	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>
3	**CHECK SET/COAST SWITCH.** Measure the resistance between switch terminals when SET/COAST switch is pressed and not pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. 250 Ω when SET/COAST switch is pressed? Is the resistance approx. 4 kΩ when SET/COAST switch is not pressed?	Go to step **4.**	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>
4	**CHECK RESUME/ACCEL SWITCH CIRCUIT.** Measure the resistance between switch terminals when RESUME/ACCEL switch is pressed and not pressed. ***Terminals*** ***No. 2 — No. 3:***	Is the resistance approx. 1500 Ω when RESUME/ACCEL switch is pressed? Is the resistance approx. 4 kΩ when RESUME/ACCEL switch is not pressed?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the cruise control command switch. <Ref. to CC-5, Cruise Control Command Switch.>

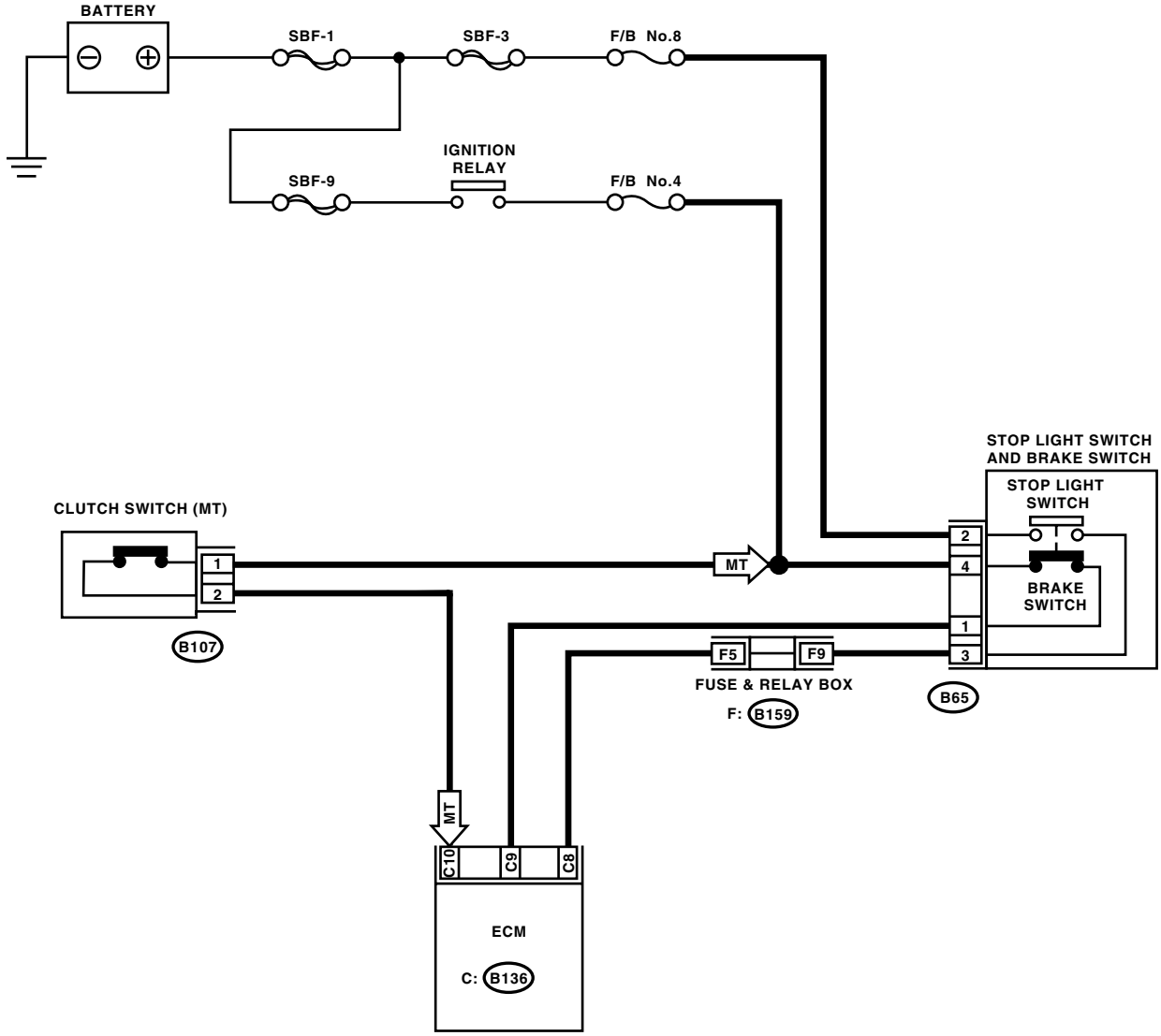
B: DTC 12 and 25 STOP LIGHT SWITCH AND BRAKE SWITCH

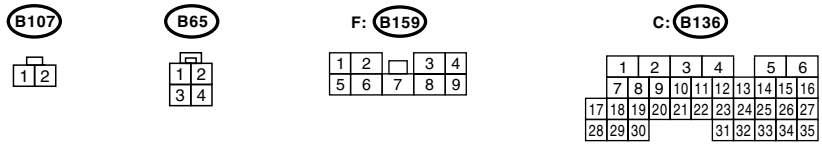
TROUBLE SYMPTOM:

- Cruise control cannot be set.
- Cruise control cannot be released.

WIRING DIAGRAM:

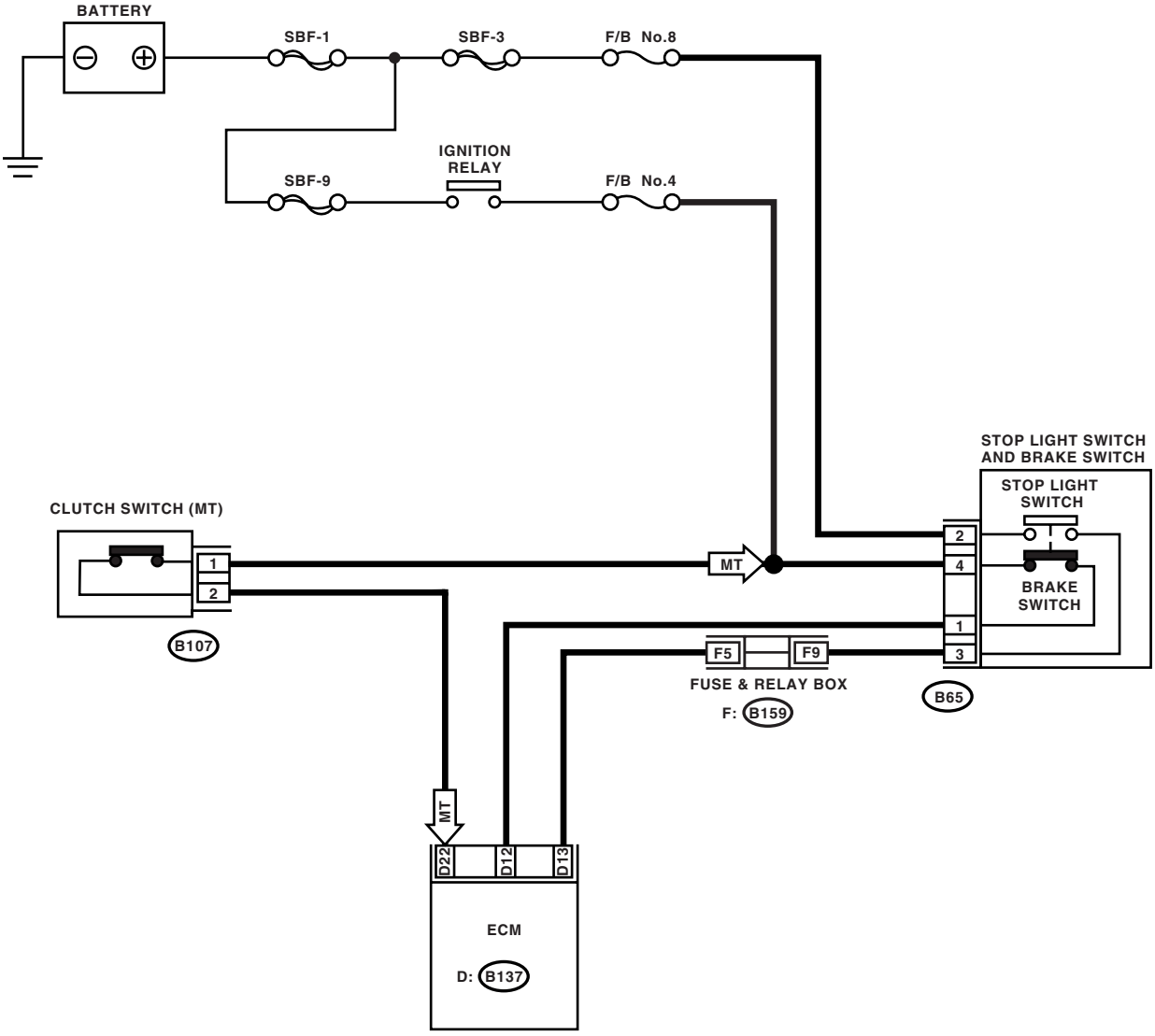
- 2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model

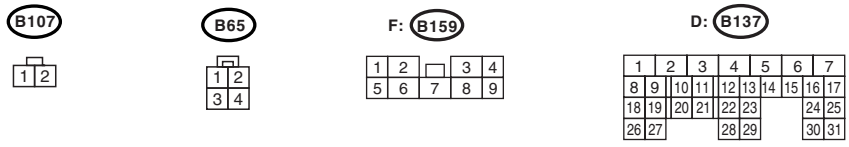




CC-00267

• 2.0 L non-turbo model, 2.5 L for KS, KA model





CC-00268

	Step	Check	Yes	No
1	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the stop light switch and brake switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	• Check fuse No. 8 (in fuse & relay box). • Check the harness for open or short between stop light/brake switch and fuse & relay box.
2	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B65) No. 4 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	• Check fuse No. 4 (in fuse & relay box). • Check the harness for open or short between stop light/brake switch and fuse & relay box.
3	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector of ECM. 3) Measure the resistance between ECM harness connector terminal and stop light switch and brake switch harness connector terminal. ***Connector & terminal*** ***2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model:*** ***(B136) No. 8 — (B65) No. 3:*** ***(B136) No. 9 — (B65) No. 1:*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(B137) No. 13 — (B65) No. 3:*** ***(B137) No. 12 — (B65) No. 1:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the harness.
4	**CHECK STOP LIGHT SWITCH AND BRAKE SWITCH.** Remove and check the stop light switch and brake switch. <Ref. to CC-6, Stop Light and Brake Switch.>	Are the stop light switch and brake switch OK?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Replace the stop light switch and brake switch.

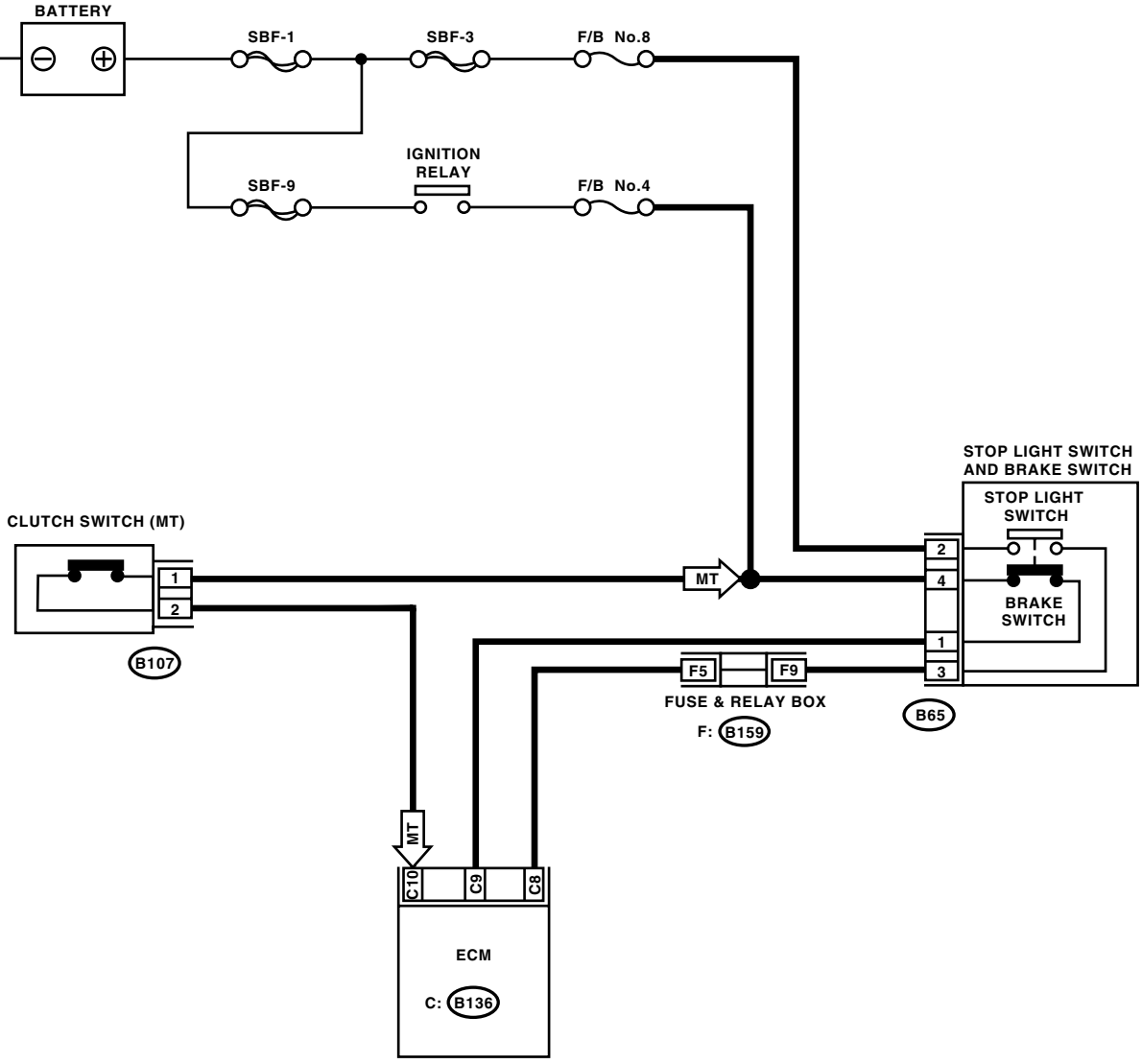
C: DTC 13 CLUTCH SWITCH

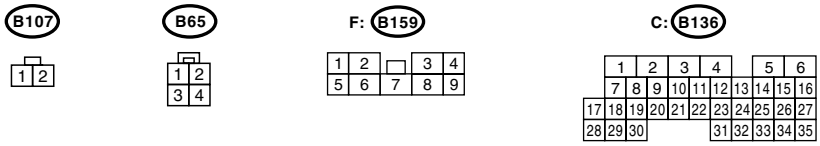
TROUBLE SYMPTOM:

- Cruise control cannot be set.
- Cruise control cannot be released.

WIRING DIAGRAM:

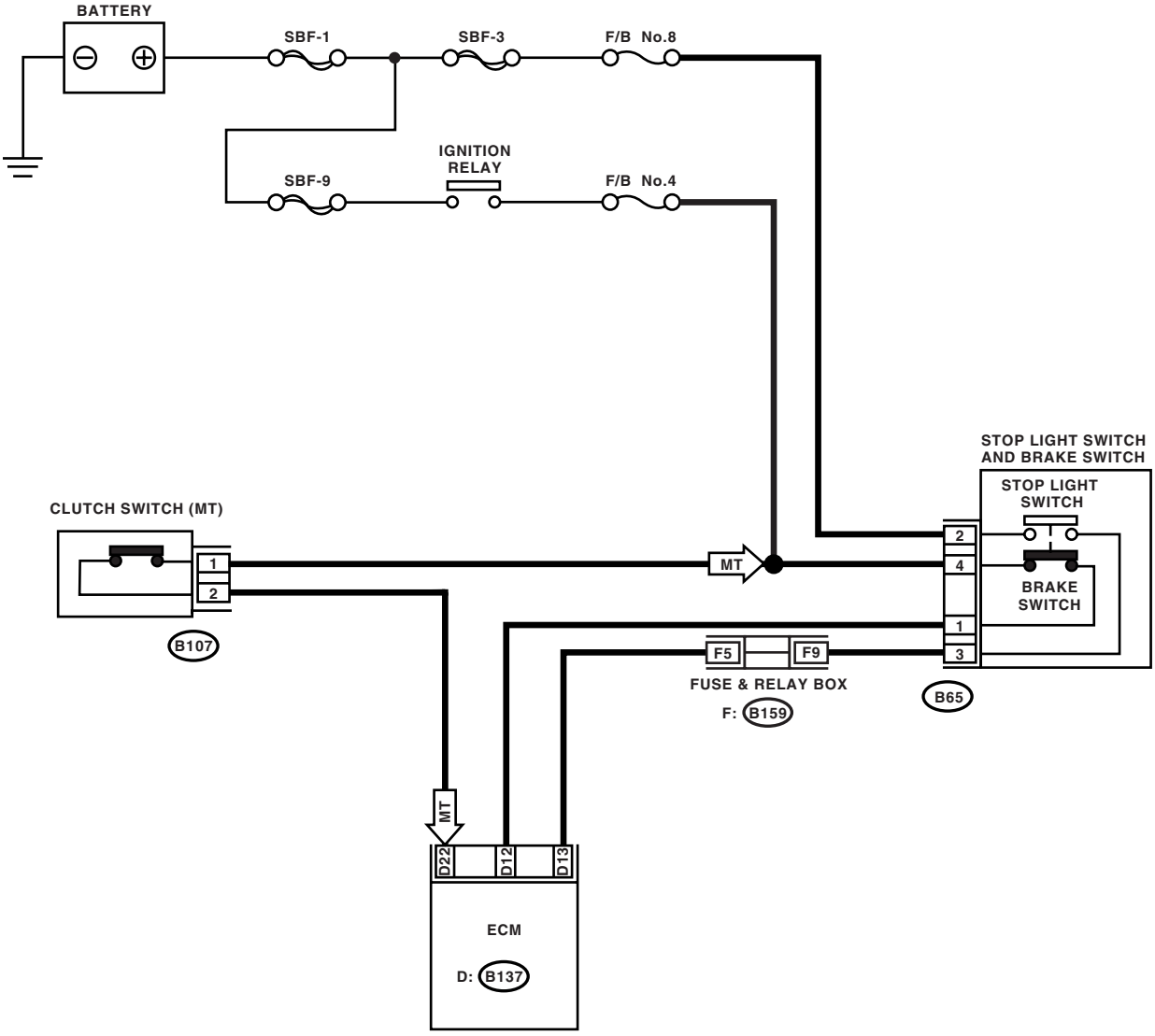
- 2.5 L EC, K4 and EK model

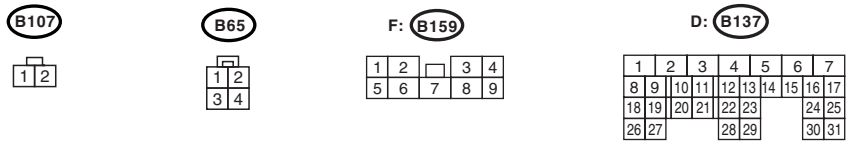




CC-00267

• 2.0 L non-turbo model, 2.5 L KS, KA model





CC-00268

	Step	Check	Yes	No
1	**CHECK CLUTCH SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the clutch switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***(B107) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	• Check fuse No. 4 (in fuse & relay box). • Check the harness for open or short between clutch switch and fuse & relay box.
2	**CHECK CLUTCH SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM harness connector. 3) Measure the resistance between clutch switch harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***2.5 L EC, K4 and EK model:*** ***(B107) No. 2 — (B136) No. 10:*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(B107) No. 2 — (B137) No. 22:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the harness.
3	**CHECK CLUTCH SWITCH.** Remove and check the clutch switch. <Ref. to CC-7, Clutch Switch.>	Is the clutch switch OK?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the clutch switch.

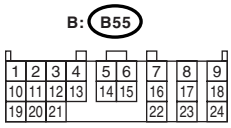
D: DTC 14 NEUTRAL POSITION SWITCH

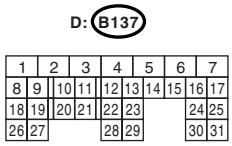
TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:

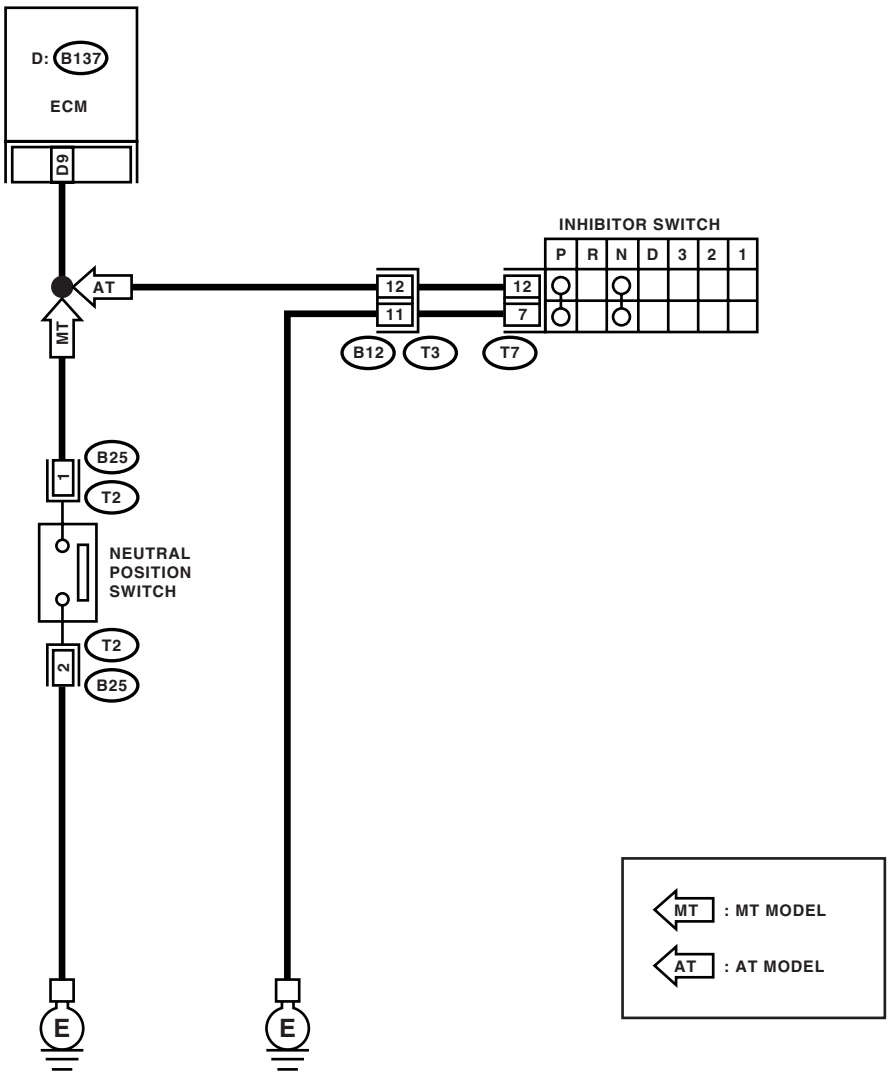
- 2.0 L turbo model, 3.0 L model

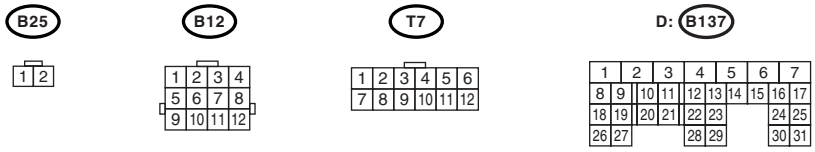




CC-00219

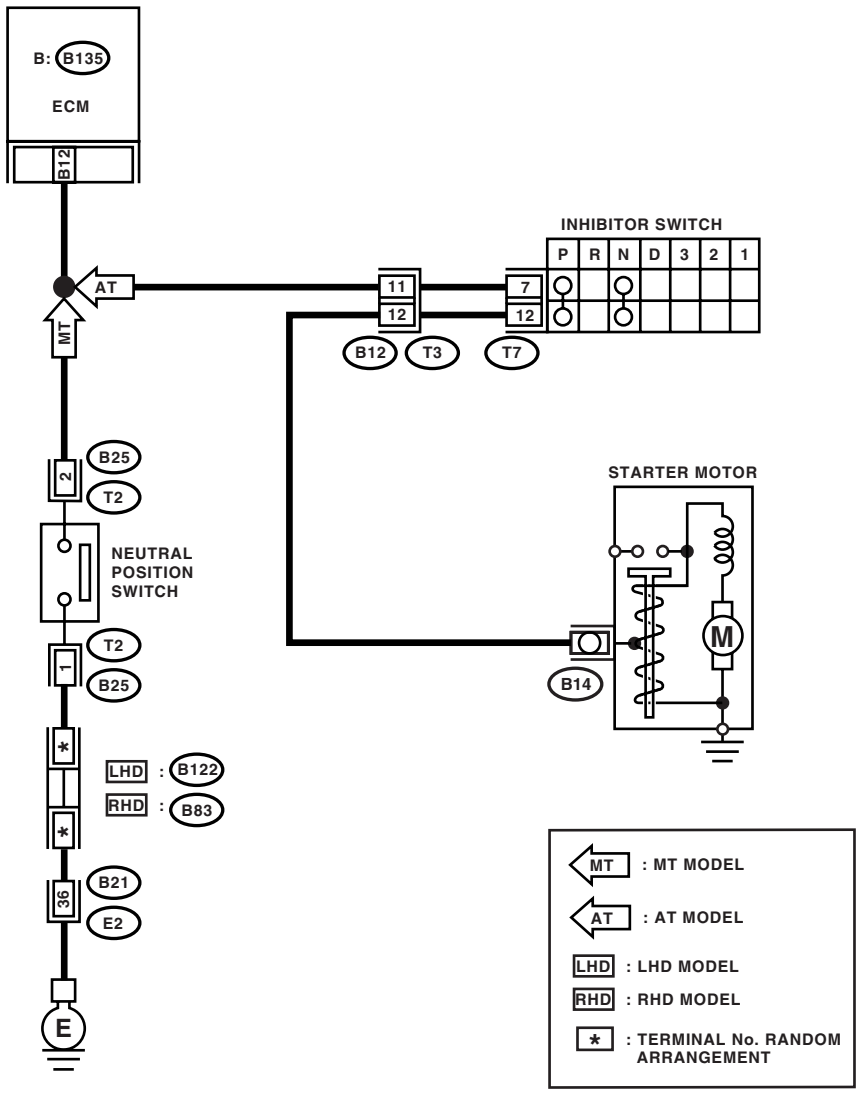
• 2.5 L EC, K4 and EK model

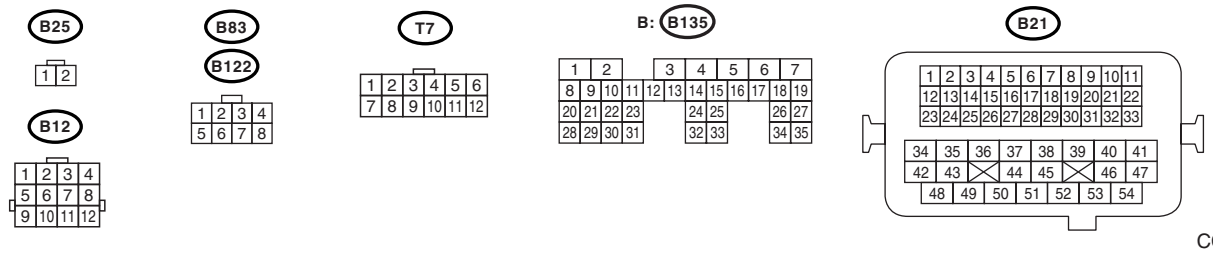




CO-00269

• 2.0 L non-turbo model, 2.5 L KS, KA model





CC-00270

	Step	Check	Yes	No
1	**CHECK VEHICLE FOR SPECIFICATION.** Check the vehicle for destination and specification.	Is the vehicle turbo model or 3.0 L model?	Go to step **2.**	Go to step **5.**
2	**CHECK NEUTRAL POSITION SWITCH.** 1) Connect the Subaru Select Monitor to data link connector. 2) Turn the ignition switch and Subaru Select Monitor switch to ON. 3) Select {Engine} from the main menu. 4) Then, select {Current Data Display & Save}. 5) Check the neutral position switch signal by shifting the select lever to "P" or "N" range.	Is ON displayed in the Subaru Select Monitor when the select lever is in "P" or "N" range? Or is OFF displayed in the Subaru Select Monitor when the select lever is in other than "P" or "N" range?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Go to step **3.**
3	**CHECK TCM OUTPUT VOLTAGE.** 1) Turn the ignition switch to ON. 2) Measure the voltage between TCM harness connector terminal and chassis ground. ***Connector & terminal*** ***(B55) No. 19 (+) — Chassis ground (–):***	Is the voltage more than 10 V when the select lever is in other than "P" or "N" range? Or is the voltage less than 1 V when the select lever is in "P" or "N" range?	Go to step **4.**	Inspect the TCM. <Ref. to 5AT(diag)-2, Basic Diagnostics Procedure.>
4	**CHECK HARNESS BETWEEN TCM AND ECM.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from TCM and ECM. 3) Measure the resistance between TCM harness connector terminal and ECM harness connector terminal. ***Connector & terminal*** ***(B137) No. 9 — (B55) No. 19:***	Is the resistance less than 10 Ω?	Replace the ECM. <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>	Repair the wiring harness.
5	**CHECK TRANSMISSION TYPE.**	Is the transmission type AT?	Go to step **6.**	Go to step **9.**
6	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the inhibitor switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***2.5 L EC, K4 and EK model:*** ***(T7) No. 12 (+) — Chassis ground (–):*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(T7) No. 7 (+) — Chassis ground (–):***	Is the voltage approx. 5 V?	Go to step **7.**	Check the harness for open or short between inhibitor switch and ECM.
7	**CHECK INHIBITOR SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the starter motor harness connector. 3) Measure the resistance between inhibitor switch harness connector terminal and chassis ground. ***Connector & terminal*** ***2.5 L EC, K4 and EK model:*** ***(T7) No. 7 — Chassis ground:*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(T7) No. 12 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair the harness.

	Step	Check	Yes	No
8	**CHECK INHIBITOR SWITCH.** Remove and check the inhibitor switch. <Ref. to CC-8, Inhibitor Switch.>	Is the inhibitor switch OK?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the inhibitor switch.
9	**CHECK NEUTRAL POSITION SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the neutral position switch harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***2.5 L EC, K4 and EK model:*** ***(B25) No. 1 (+) — Chassis ground (−):*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(B25) No. 2 (+) — Chassis ground (−):***	Is the voltage approx. 5 V?	Go to step **10.**	Check the harness for open or short between neutral position switch and ECM.
10	**CHECK NEUTRAL POSITION SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between neutral position switch harness connector terminal and chassis ground. ***Connector & terminal*** ***2.5 L EC, K4 and EK model:*** ***(B25) No. 2 — Chassis ground:*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(B25) No. 1 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **11.**	Repair the harness.
11	**CHECK NEUTRAL POSITION SWITCH.** Remove and check the neutral position switch. <Ref. to CC-9, Neutral Position Switch.>	Is the neutral position switch OK?	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).>	Replace the neutral position switch.

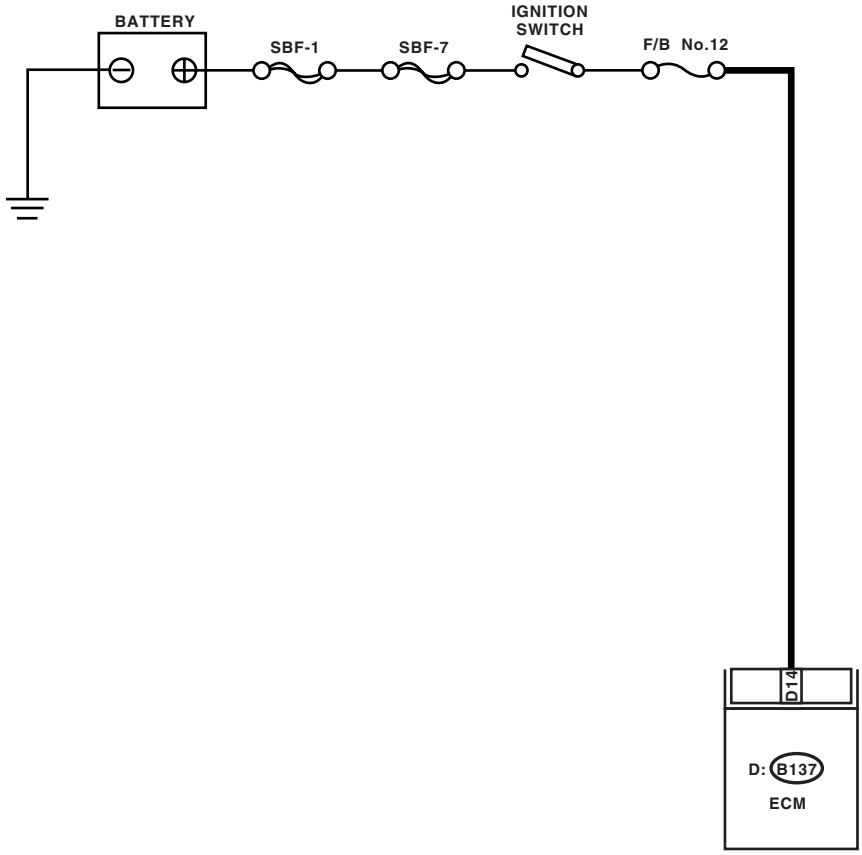
E: DTC 16 IGNITION SWITCH

TROUBLE SYMPTOM:

Cruise control cannot be set.

WIRING DIAGRAM:

- 2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model

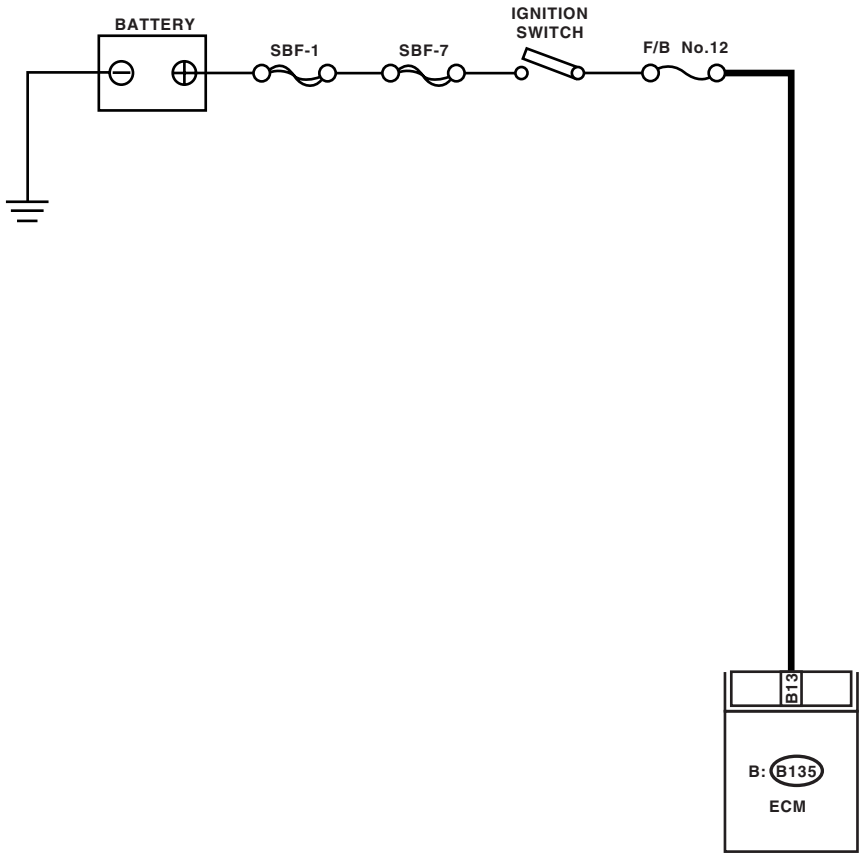


D: B137

1	2	3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23			24	25
26	27			28	29			30	31

CC-00220

• 2.0 L non-turbo model, 2.5 L KS, KA model



B: B135

1	2		3	4	5	6	7			
8	9	10	11	12	13	14	15	16	17	18	19
20	21	22	23			24	25			26	27
28	29	30	31			32	33			34	35

CC-00271

	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the ECM harness connector. 3) Turn the ignition switch to ON. 4) Measure the voltage between harness connector terminal and chassis ground. ***Connector & terminal*** ***2.0 L turbo model, 3.0 L model, 2.5 L EC, K4 and EK model:*** ***(B137) No. 14 (+) — Chassis ground (–):*** ***2.0 L non-turbo model, 2.5 L KS, KA model:*** ***(B135) No. 13 (+) — Chassis ground (–):***	Is the voltage more than 10 V?	Check poor contact in ECM connector.	• Check fuse No. 12 (in fuse & relay box). • Check the harness for open or short circuit between ignition switch and ECM.

F: DTC 22 AND 32 VEHICLE SPEED SENSOR

DIAGNOSIS:
Disconnection or short circuit of vehicle speed sensor system.
TROUBLE SYMPTOM:
Cruise control cannot be set. (Cancelled immediately.)

	Step	Check	Yes	No
1	**CHECK ABS WARNING LIGHT.** 1) Turn the ignition switch to ON. 2) After the combination meter initial operation is completed, confirm that the ABS warning light continues to illuminate.	Does the ABS warning light continue to illuminate?	Check ABSCM or VDCCM <Ref. to ABS(diag)-2, Basic Diagnostic Procedure.> or <Ref. to VDC(diag)-2, Basic Diagnostic Procedure.>	Go to step **2.**
2	**CHECK LAN COMMUNICATION CIRCUIT ERROR DISPLAY.** Check that the communication error is displayed on the odo/trip meter in combination meter.	Is the error code “Er xx” displayed on odo/trip meter?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

IMMOBILIZER (DIAGNOSTICS)

IM(diag)

Page

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2. General Description 4
3. Electrical Component Location 6
4. Immobilizer Control Module I/O Signal 7
5. Subaru Select Monitor 8
6. Read Diagnostic Trouble Code (DTC) 9
7. Clear Memory Mode 10
8. Diagnostics Chart for Immobilizer Indicator Light 11
9. List of Diagnostic Trouble Code (DTC) 15
10. Diagnostic Procedure with Diagnostic Trouble Code (DTC) 17

1. Basic Diagnostic Procedure

A: PROCEDURE

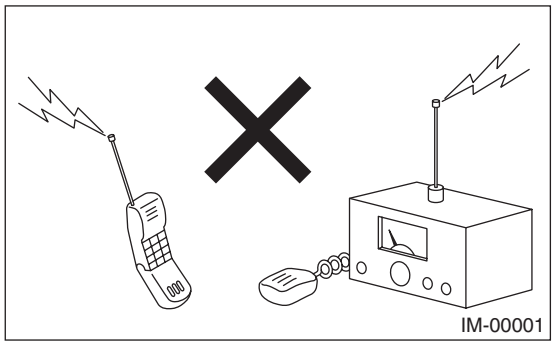
	Step	Check	Yes	No
1	**CHECK IMMOBILIZER WARNING LIGHT.** 1) Turn the ignition switch to “OFF” or “ACC”. 2) Wait for more than 60 seconds.	Does the immobilizer warning light blink?	Go to step **2.**	Check the immobilizer warning light circuit. <Ref. to IM(diag)-11, CHECK IMMOBILIZER INDICATOR CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
2	**CHECK KEY SWITCH.** Remove the key from ignition switch.	Does the immobilizer warning light blink within 1 second after removing ignition key?	Go to step **3.**	Check the key switch circuit. <Ref. to IM(diag)-13, CHECK KEY SWITCH CIRCUIT, INSPECTION, Diagnostics Chart for Immobilizer Indicator Light.>
3	**CHECK IMMOBILIZER WARNING LIGHT.** Turn the ignition switch to ON.	Does the immobilizer warning light off?	Go to step **5.**	Go to step **4.**
4	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the starter operate?	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>	Check the DTC display (body integrated unit). Go to step **7.**
5	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the starter operate?	Go to step **6.**	Check the LAN communication circuit. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>
6	**CHECK ENGINE START.** Turn the ignition switch to START.	Does the engine start?	Immobilizer system is OK.	Check the DTC display (ECM). Go to step **7.**
7	**CHECK INDICATION OF DTC ON DISPLAY.** 1) Turn the ignition switch to OFF. 2) Connect the Subaru Select Monitor to data link connector. <Ref. to IM(diag)-8, Subaru Select Monitor.> 3) Turn the ignition switch and Subaru Select Monitor switch to ON. 4) Read DTC on display.	Is the DTC displayed on screen?	Go to step **8.**	Repair the related parts.

	Step	Check	Yes	No
8	**PERFORM THE DIAGNOSIS.** 1) Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to IM(diag)-17, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> 2) Repair the trouble cause. 3) Perform clear memory mode. 4) Read DTC again.	Is the DTC displayed on screen?	Inspect using the “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. <Ref. to IM(diag)-17, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	Finish the diagnosis.

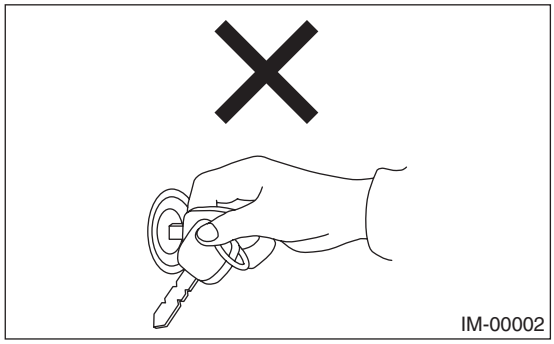
2. General Description

A: CAUTION

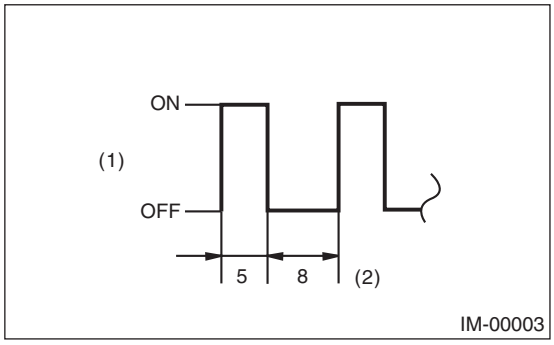
CAUTION:
• All airbag system wiring harnesses and connectors are yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the airbag system wiring harness.
• While diagnostic items are being checked, do not operate radios, portable telephones, etc. which emit electromagnetic waves near or inside the vehicle.



• When turning the ignition switch to ON or OFF while diagnostic items are being checked, do not allow keys with different ID codes close to the ignition switch. If the ignition key is in a key holder, remove it from the holder before carrying out diagnosis.



• When repeatedly turning the ignition switch to ON or OFF while diagnostic items are being checked, it should be switched in cycles of "ON" for at least 5 seconds → "OFF" for at least 8 seconds.

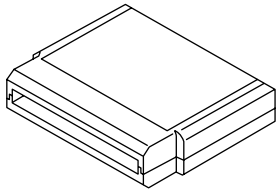


(1) Ignition switch position
(2) Sec.

• If the engine fails to start with a registered ignition key, detach the ignition key from ignition switch and wait for approx. 1 second until immobilizer indicator light begins to flash. And then start the engine again.
• Before checking the diagnostic items, obtain all keys for the vehicle to be checked possessed by owner.

B: PREPARATION TOOL

1. SPECIAL TOOL

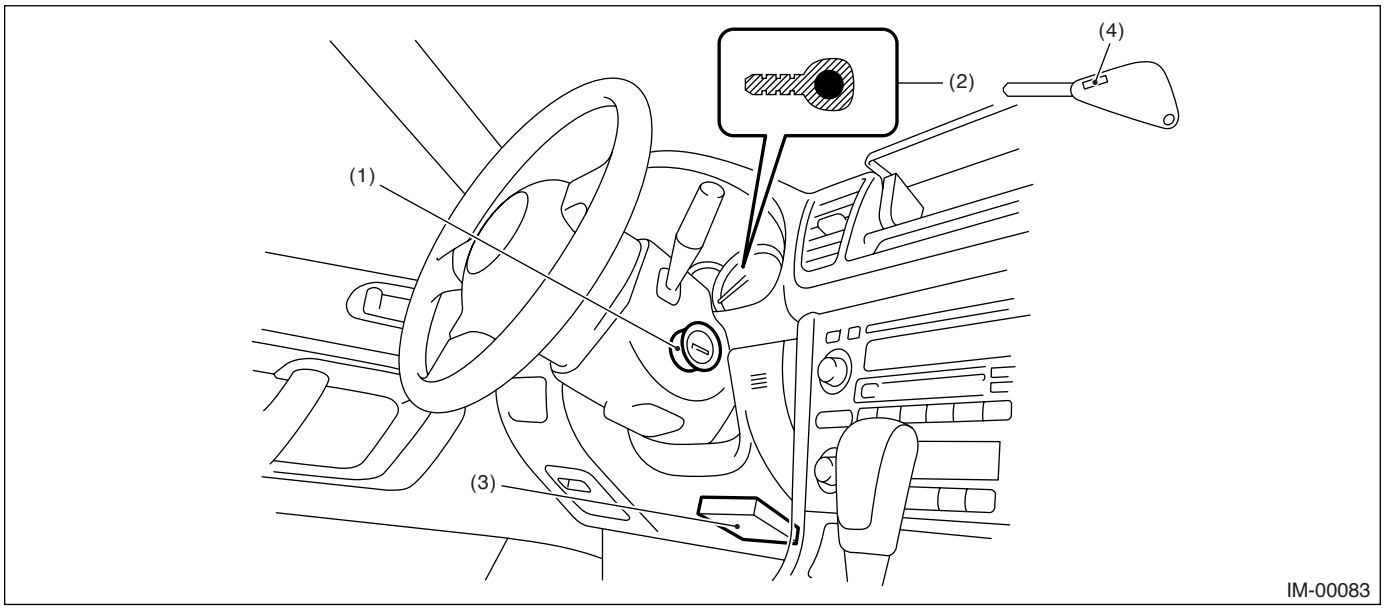
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

3. Electrical Component Location

A: LOCATION



(1) Antenna
(2) Immobilizer indicator light (LED bulb)
(3) Body integrated unit
(4) Transponder

NOTE:
Body integrated unit location for RHD model is symmetrically opposite.

4. Immobilizer Control Module I/O Signal

A: WIRING DIAGRAM

1. IMMOBILIZER

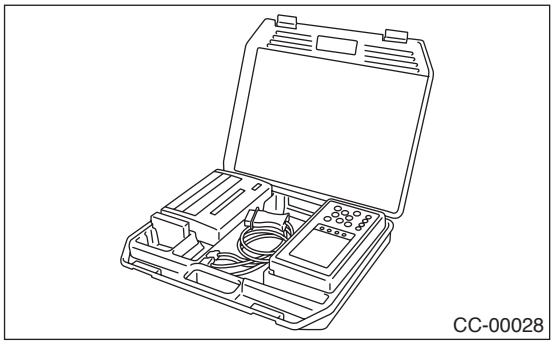
<Ref. to WI-246, WIRING DIAGRAM, Immobilizer System.>

5. Subaru Select Monitor

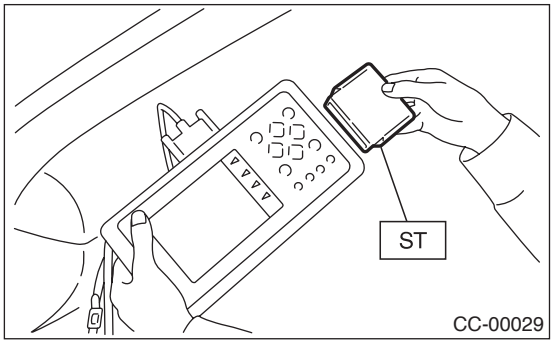
A: OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

1) Prepare the Subaru Select Monitor kit.

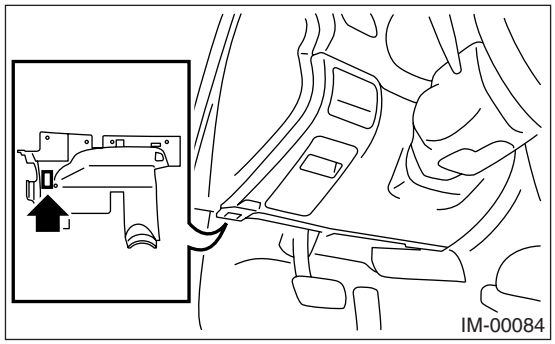


2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor.



4) Connect the Subaru Select Monitor to data link connector.

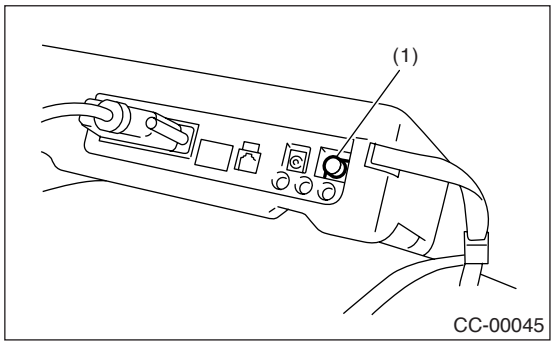
(1) Data link connector is located in the lower portion of the instrument panel (on the driver's side).



(2) Connect the diagnosis cable to data link connector.

CAUTION:
Do not connect the scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF), and the Subaru Select Monitor switch to ON.



(1) Power switch

6) Using the Subaru Select Monitor, call up DTCs and various data, then record them.

2. READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE AND BODY INTEGRATED UNIT

Refer to Read Diagnostic Trouble Code for information about how to indicate DTC. <Ref. to IM(diag)-9, Read Diagnostic Trouble Code (DTC).>

3. COMMUNICATION LINE CHECK

NOTE:
The communication line between ECM and body integrated module can be checked in "System Operation Check Mode". This is referred to as "Communication line check".

1) Connect the Subaru Select Monitor.
2) On the «System operation check mode» display, select the {security system}.
3) Start the communication line check.
4) Is «Communication Line not Shorted» displayed on screen?
If displayed, go to step 5).
If "NO", go to step 6).
5) After diagnostic results, it is determined that the circuit is not shorted. Finish the communication line check.
6) If a problem is detected, repair the trouble cause. <Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

6. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. ECM

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Diagnostic Code(s) Display}, and then press the [YES] key.
5) On the «Diagnostic Code(s) Display» display screen, select the {Current Diagnostic Code(s)} or {History Diagnostic Code(s)}, and then press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTC, refer to the List of DTC. <Ref. to IM(diag)-15, LIST, List of Diagnostic Trouble Code (DTC).>

2. BODY INTEGRATED UNIT

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. unit mode} and press the [YES] key.
3) Press the [YES] key after the {Integ. unit mode} is displayed.
4) On the «Integ. unit mode failure diag» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.
• For detailed concerning DTC, refer to the List of DTC. <Ref. to IM(diag)-15, LIST, List of Diagnostic Trouble Code (DTC).>

7. Clear Memory Mode

A: OPERATION

1. ECM

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Engine Control System} and press the [YES] key.
3) Press the [YES] key after the information of engine type is displayed.
4) On the «Engine Diagnosis» display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

NOTE:
• After the memory has been cleared, the idle air control solenoid valve must be initialized. To execute this procedure, turn the ignition switch to ON. Wait 3 seconds before starting the engine.
• For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

2. BODY INTEGRATED UNIT

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. unit mode} and press the [YES] key.
3) Press the [YES] key after the {Integ. unit mode} is displayed.
4) On the «Integ. unit mode failure diag» display screen, select the {Clear Memory} and press the [YES] key.
5) When the 'Done' are shown on the display screen, turn the Subaru Select Monitor and ignition switch to OFF.

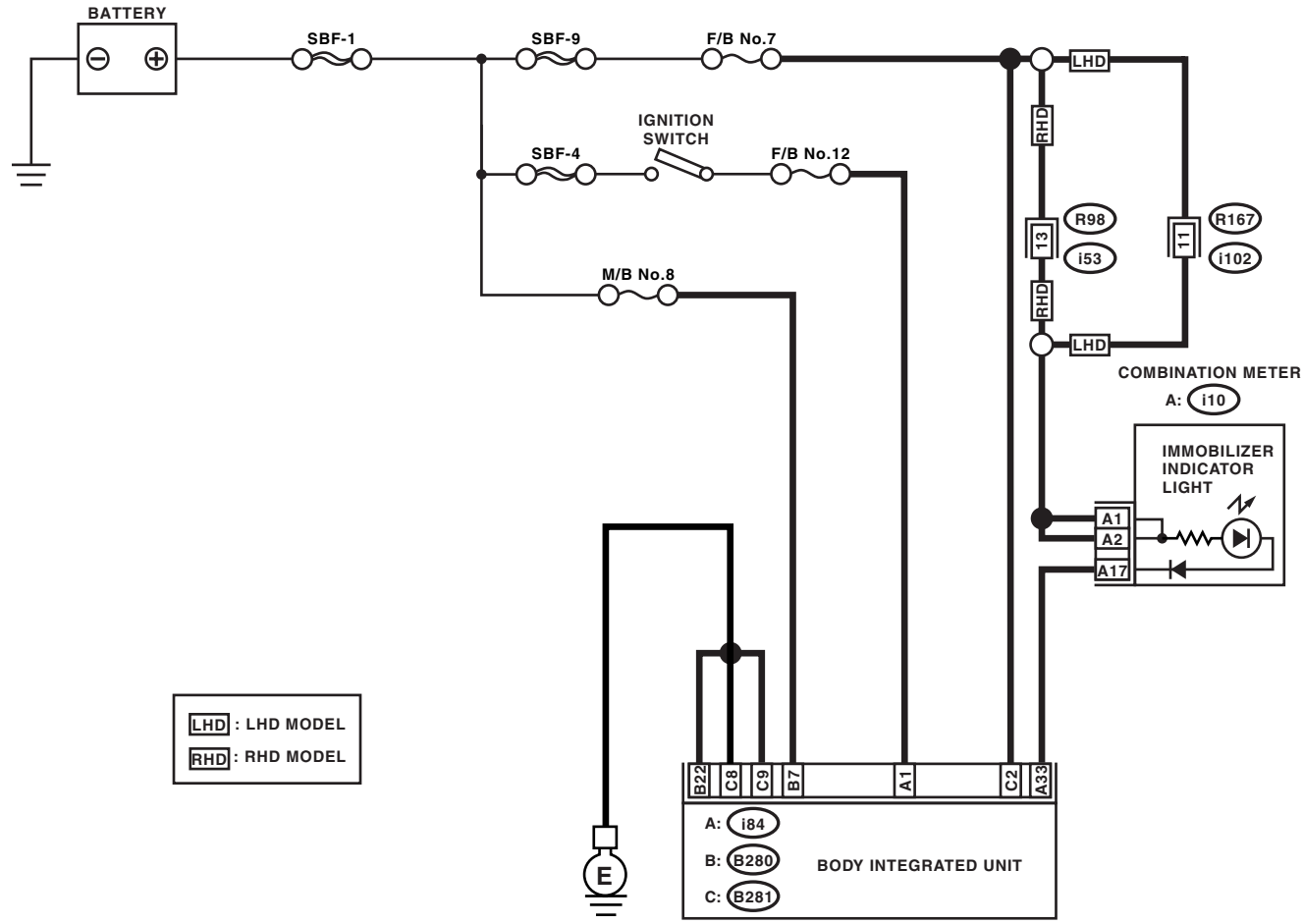
NOTE:
For detailed operation procedure, refer to the SUBARU SELECT MONITOR OPERATION MANUAL.

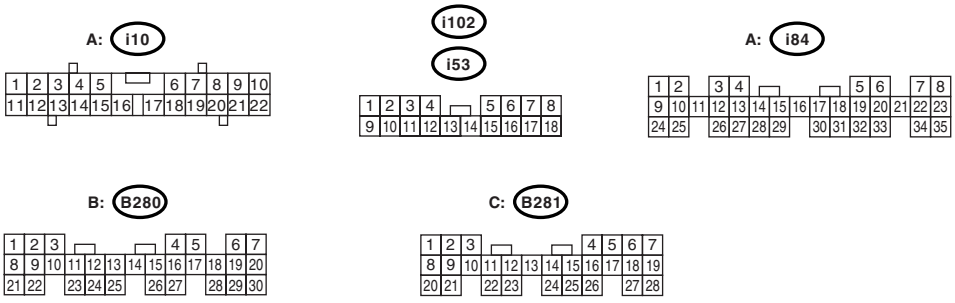
8. Diagnostics Chart for Immobilizer Indicator Light

A: INSPECTION

1. CHECK IMMOBILIZER INDICATOR CIRCUIT

WIRING DIAGRAM:





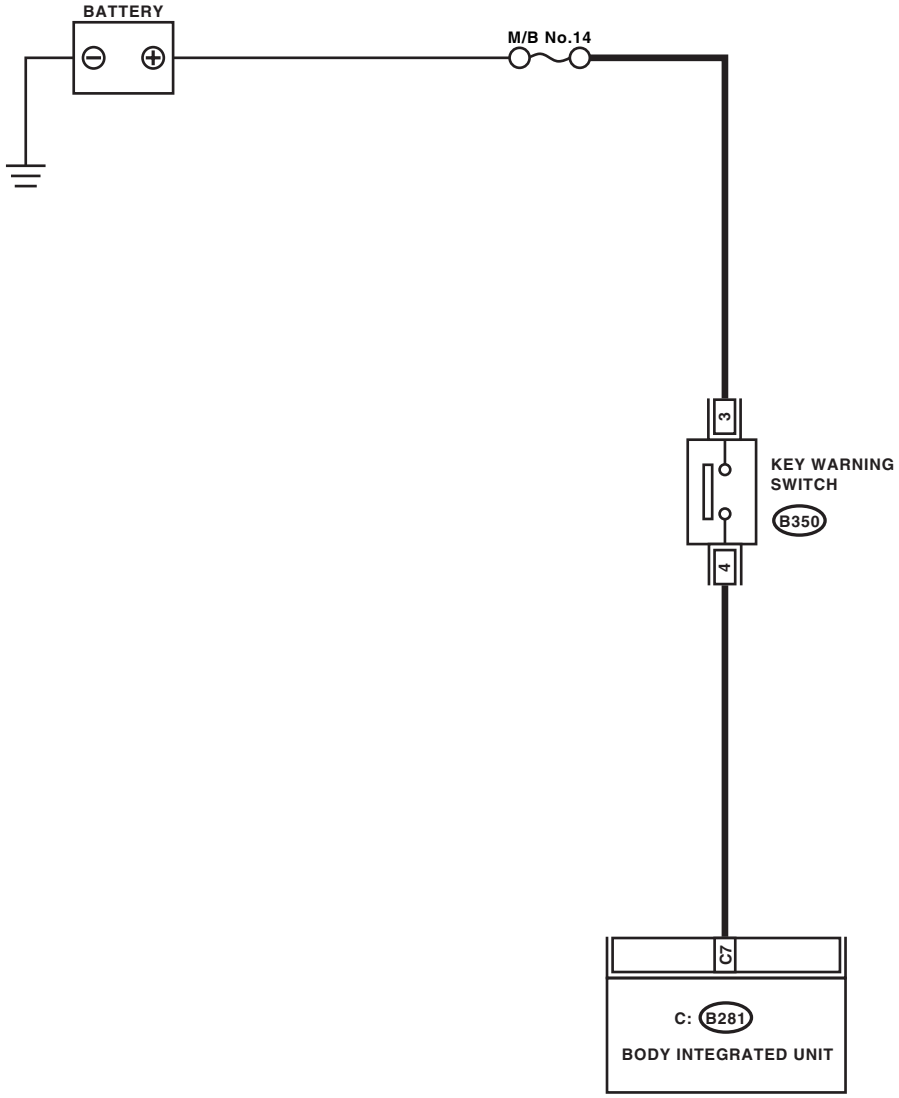
IM-00086

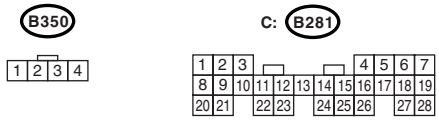
Diagnostics Chart for Immobilizer Indicator Light

	Step	Check	Yes	No
1	**CHECK IMMOBILIZER WARNING LIGHT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit. 3) Connect the resistor (100 Ω) between body integrated unit harness connector terminal (i84) No. 33 and chassis ground.	Does the immobilizer indicator light illuminate?	Go to step **2.**	Go to step **5.**
2	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** Measure the resistance between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair the open circuit of body integrated unit ground circuit.
3	**CHECK BODY INTEGRATED UNIT IGNITION CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **4.**	Check the harness for open or short circuit between body integrated unit and ignition switch.
4	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (−):*** ***(B281) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Check the harness for open or short circuit between body integrated unit and fuse.
5	**CHECK COMBINATION METER CIRCUIT.** 1) Remove the combination meter. <Ref. to IDI-16, Combination Meter Assembly.> 2) Measure the voltage between the combination meter harness connector terminal and chassis ground. ***Connector & terminal*** ***(i10) No. 1, No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **6.**	Check the harness for open or short circuit between combination meter and fuse.
6	**CHECK COMBINATION METER CIRCUIT.** Measure the resistance between body integrated unit harness connector terminal and combination meter harness connector terminal. ***Connector & terminal*** ***(i84) No. 33 — (i10) No. 17:***	Is the resistance less than 10 Ω?	LED bulb malfunction. Replace the combination meter case assembly. <Ref. to IDI-17, DISASSEMBLY, Combination Meter Assembly.>	Repair the harness/connector.

2. CHECK KEY SWITCH CIRCUIT

WIRING DIAGRAM:





IM-00078

Diagnostics Chart for Immobilizer Indicator Light

	Step	Check	Yes	No
1	**CHECK POWER SUPPLY CIRCUIT.** 1) Disconnect the harness connector from key warning switch. 2) Turn the ignition switch to “ACC” or “LOCK” (with key inserted). 3) Measure the voltage between key warning switch harness connector terminal and chassis ground. ***Connector & terminal*** ***(B350) No. 3 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short circuit between key warning switch and fuse.
2	**CHECK KEY WARNING SWITCH.** 1) Insert the ignition key to ignition switch. (OFF or ACC) 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***No. 3 — No. 4:***	Is the resistance less than 1 Ω?	Go to step **3.**	Replace the key warning switch.
3	**CHECK KEY WARNING SWITCH.** 1) Remove the ignition key from ignition switch. 2) Measure the resistance between key warning switch terminals. ***Connector & terminal*** ***No. 3 — No. 4:***	Is the resistance more than 1 MΩ?	Go to step **4.**	Replace the key warning switch.
4	**CHECK HARNESS BETWEEN KEY WARNING SWITCH AND BODY INTEGRATED UNIT.** 1) Disconnect the harness connector from key warning switch. 2) Disconnect the harness connector from body integrated unit. 3) Measure the resistance between key warning switch harness connector terminal and body integrated unit harness connector terminal. ***Connector & terminal*** ***(B350) No. 4 — (B281) No. 7:***	Is the resistance less than 10 Ω?	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Repair the harness between key warning switch and body integrated unit.

9. List of Diagnostic Trouble Code (DTC)

A: LIST

1. ECM

DTC	Item	Contents of diagnosis	Index No.
P0513	Incorrect Immobilizer Key	Incorrect immobilizer key (Use of unregistered key in body integrated unit)	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1570	ANTENNA	Faulty antenna	<Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1571	Reference Code Incompatibility	Reference code incompatibility between body integrated unit and ECM	<Ref. to IM(diag)-21, DTC P1571 REFERENCE CODE INCOMPATIBILITY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1572	EGI — Immobilizer Communication (Except Antenna Circuit)	Communication failure between body integrated unit and ECM	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1574	Key — Immobilizer Communication	Failure of body integrated unit to verify key (transponder) ID code	<Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1576	EGI Control Module EEPROM	ECM malfunctioning	<Ref. to IM(diag)-25, DTC P1576 EGI CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1577	IMM Control Module EEPROM	Body integrated unit malfunctioning	<Ref. to IM(diag)-25, DTC P1577 IMM CONTROL MODULE EEPROM, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
P1578	Meter malfunctioning	Reference code incompatibility between body integrated unit and combination meter	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

NOTE:
Perform the engine DTC when the DTC except for immobilizer DTC is detected.
<Ref. to EN(H4SO 2.0)(diag)-66, List of Diagnostic Trouble Code (DTC).> <Ref. to EN(H4SO 2.5)(diag)-70, List of Diagnostic Trouble Code (DTC).> <Ref. to EN(H4DOTC)(diag)-55, List of Diagnostic Trouble Code (DTC).> <Ref. to EN(H6DO)(diag)-66, List of Diagnostic Trouble Code (DTC).>

2. BODY INTEGRATED UNIT

DTC	Item	Contents of diagnosis	Index No.	Relation between ECM and DTC
B0401	M collation NG	Reference code incompatibility between body integrated unit and combination meter	<Ref. to IM(diag)-26, DTC P1578 METER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	P1578
B0402	Immobilizer Key collation NG	• Incorrect immobilizer key (Use of unregistered key in body integrated unit) • Faulty antenna	<Ref. to IM(diag)-17, DTC P0513 INCORRECT IMMOBILIZER KEY, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> <Ref. to IM(diag)-18, DTC P1570 ANTENNA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> or <Ref. to IM(diag)-25, DTC P1574 KEY COMMUNICATION FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	• P0513 • P1570 • P1574
B0403	E/G request NG	Communication failure between body integrated unit and ECM	<Ref. to IM(diag)-22, DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT), Diagnostic Procedure with Diagnostic Trouble Code (DTC).>	P1572

NOTE:
• Immobilizer system of 2.5 L EC, EK model and 3.0 L model perform the starter relay control. When the body integrated unit detect the inconformity of reference code, immediately out put the starter relay cut signal to ECM, and then ECM stop the starter relay operation. In this case, engine does not start, and DTC is not recorded in ECM. Check that the engine does not start on the DTC of body integrated unit.
• DTC B0402 is recorded as freeze frame data when the ignition switch is turned to OFF. When trying to start the engine with unregistered immobilizer key, DTC is not displayed on Subaru Select Monitor immediately. Turn the ignition switch to OFF once and turn to ON again before checking DTC. At this time (when turning the ignition switch to ON again), be careful that the DTC is displayed as freeze frame data even with the registered immobilizer key.

10.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: DTC P0513 INCORRECT IMMOBILIZER KEY

DTC DETECTING CONDITION:

Incorrect immobilizer key (Use of unregistered key in body integrated unit)

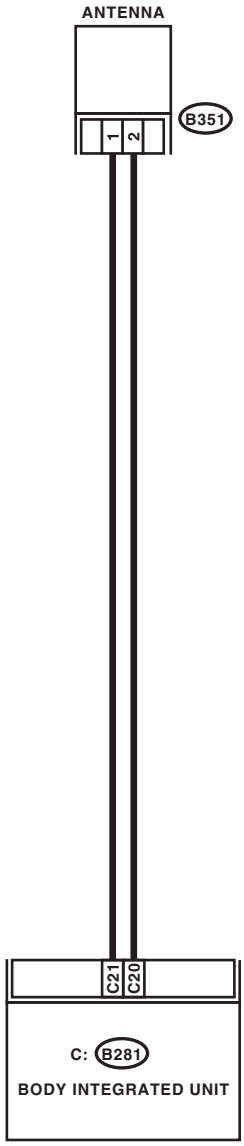
	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	END.	Replace the ignition keys (including transponder) which cannot be registered. Go to step **2.**
2	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	END.	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

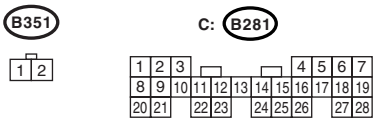
B: DTC P1570 ANTENNA

DTC DETECTING CONDITION:

Faulty antenna

WIRING DIAGRAM:





IM-00079

	Step	Check	Yes	No
1	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from antenna. <Ref. to SL-50, Immobilizer Antenna.> 3) Measure the resistance of antenna circuit. ***Connector & terminal*** ***(B351) No. 1 — No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Replace the antenna. <Ref. to SL-50, Immobilizer Antenna.>
2	**CHECK ANTENNA CIRCUIT.** 1) Disconnect the harness connector from body integrated unit. 2) Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 21 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the harness.	Go to step **3.**
3	**CHECK ANTENNA CIRCUIT.** Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 20 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair the harness.	Go to step **4.**
4	**CHECK ANTENNA CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 21 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **5.**	Repair the harness.
5	**CHECK ANTENNA CIRCUIT.** Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(B281) No. 20 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **6.**	Repair the harness between body integrated unit and antenna, because there is short circuit with battery voltage line or ignition switch “ON” line.
6	**CHECK BODY INTEGRATED UNIT FUNCTION.** 1) Turn the ignition switch to OFF. 2) Connect the harness connector to body integrated unit. 3) Insert the key to ignition switch, and measure the changes in voltage between antenna harness connectors. ***Connector & terminal*** ***(B281) No. 20 (+) — No. 21 (−):***	Is the voltage −30 to 30 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step **7.**	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

	Step	Check	Yes	No
7	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does the engine start?	Replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

C: DTC P1571 REFERENCE CODE INCOMPATIBILITY

DTC DETECTING CONDITION:

Reference code incompatibility between body integrated unit and ECM

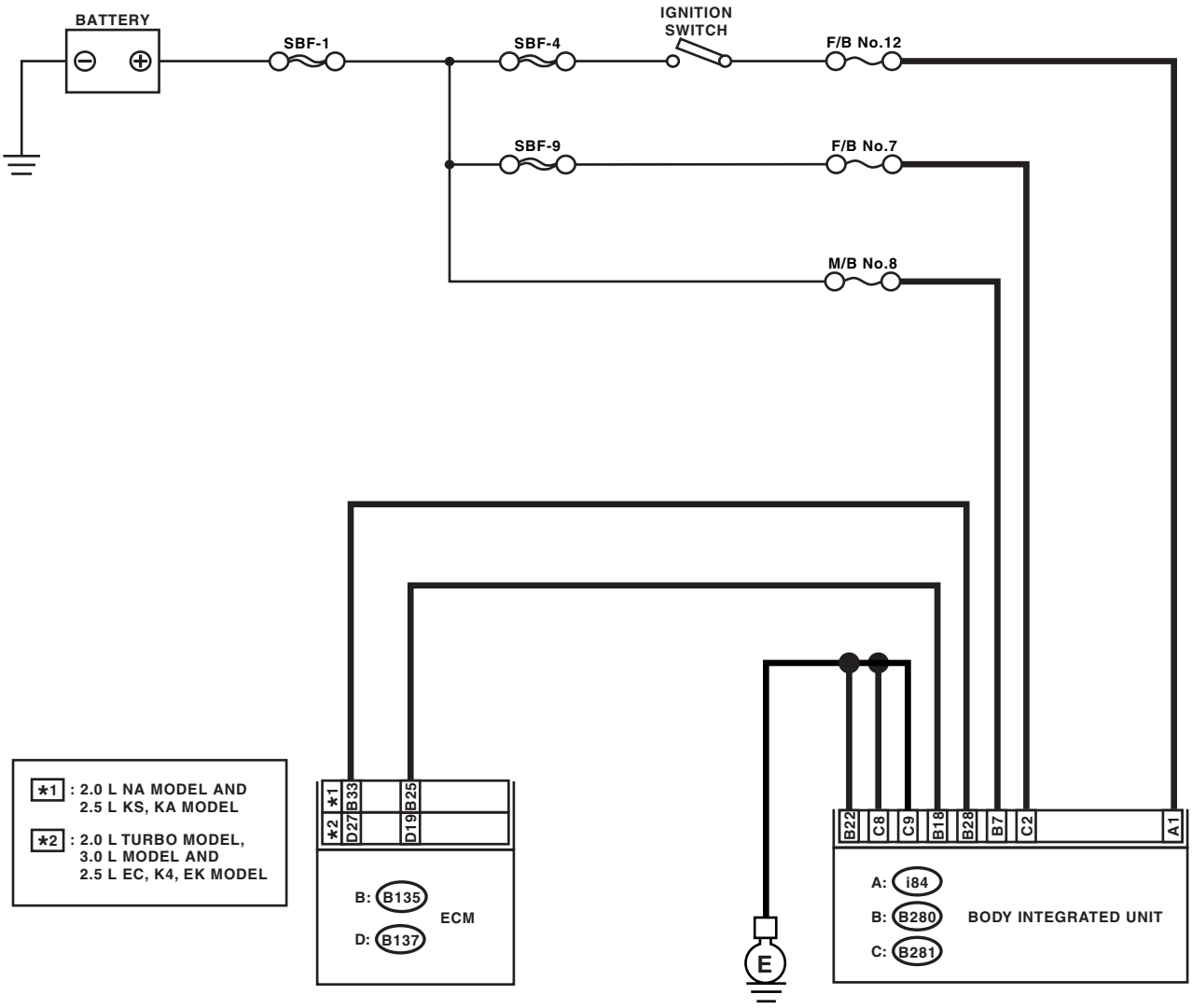
	Step	Check	Yes	No
1	**PERFORM TEACHING OPERATION ON IGNITION KEY.** Perform teaching operation on all keys of the vehicle. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Is the teaching operation for all keys completed?	END.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).> Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

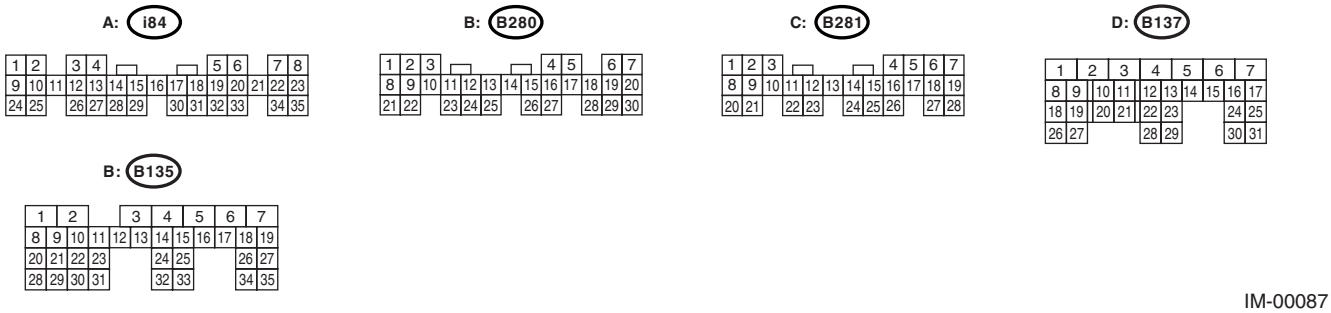
D: DTC P1572 IMM CIRCUIT FAILURE (EXCEPT ANTENNA CIRCUIT)

DTC DETECTING CONDITION:

Communication failure between body integrated unit and ECM

WIRING DIAGRAM:





IM-00087

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Disconnect the harness connector from body integrated unit. 3) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (−):*** ***(B281) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **2.**	Check the harness for open or short circuit between body integrated unit and fuse.
2	**CHECK BODY INTEGRATED UNIT POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Check the harness for open or short circuit between body integrated unit and ignition switch.
3	**CHECK BODY INTEGRATED UNIT GROUND CIRCUIT.** 1) Turn the ignition switch to OFF. 2) Measure the resistance between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 22 — Chassis ground:*** ***(B281) No. 8, No. 9 — Chassis ground:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair the open circuit of body integrated unit ground circuit.
4	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND ECM.** 1) Disconnect the harness connector from body integrated unit and ECM. 2) Measure the resistance between body integrated unit harness connector terminal and ECM connector terminal. ***Connector & terminal*** ***2.0 L non-turbo model, 2.5 L KS, KA model*** ***(B280) No. 18 — (B135) No. 25:*** ***2.0 L turbo model, 3.0 L model, 2.5 L EC, K4, EK model*** ***(B280) No. 18 — (B137) No. 19:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair the open circuit of harness between body integrated unit and ECM.
5	**CHECK HARNESS BETWEEN BODY INTEGRATED UNIT AND ECM.** Measure the resistance between body integrated unit harness connector terminal and ECM connector terminal. ***Connector & terminal*** ***2.0 L non-turbo model, 2.5 L KS, KA model*** ***(B280) No. 28 — (B135) No. 33:*** ***2.0 L turbo model, 3.0 L model, 2.5 L EC, K4, EK model*** ***(B280) No. 28 — (B137) No. 27:***	Is the resistance less than 10 Ω?	Go to step **6.**	Repair the open circuit of harness between body integrated unit and ECM.

	Step	Check	Yes	No
6	**CHECK HARNESS OF COMMUNICATION LINE.** 1) Turn the ignition switch to ON. (engine OFF) 2) Measure the voltage between body integrated unit harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 18, No. 28 (+) — Chassis ground (−):***	Is the voltage 0 V?	Go to step **7.**	Repair the harness between body integrated unit and ECM, because there is short circuit with battery voltage line or ignition switch "ON" line.
7	**CHECK HARNESS OF COMMUNICATION LINE.** Measure the voltage between harness connector terminal and engine ground. ***Connector & terminal*** ***2.0 L non-turbo model, 2.5 L KS, KA model*** ***(B135) No. 25, 33 (+) — Engine ground (−):*** ***2.0 L turbo model, 3.0 L model, 2.5 L EC, K4, EK model*** ***(B137) No. 19, 27 (+) — Engine ground (−):***	Is the voltage 0 V?	Go to step **8.**	Repair the harness between body integrated unit and ECM, because there is short circuit with battery voltage line or ignition switch "ON" line.
8	**CHECK ECM BY COMMUNICATION LINE CHECK.** 1) Connect the harness connector to ECM. 2) Disconnect the harness connector from body integrated unit. 3) Start the communication line check. <Ref. to IM(diag)-8, COMMUNICATION LINE CHECK, OPERATION, Subaru Select Monitor.>	Does "Communication Line not Shorted" appear on the screen?	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to "REGISTRATION MANUAL FOR IMMOBILIZER".	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).> Perform the registration procedure next. Refer to "REGISTRATION MANUAL FOR IMMOBILIZER".

E: DTC P1574 KEY COMMUNICATION FAILURE

DTC DETECTING CONDITION:

Failure of body integrated unit to verify key (transponder) ID code

	Step	Check	Yes	No
1	**CHECK BODY INTEGRATED UNIT FUNCTION.** Insert the key to ignition switch (LOCK position), and measure the changes in voltage between antenna connectors. ***Connector & terminal (B142) No. 1 — No. 2:***	Is the voltage −30 to 30 V? (Approx. 0.1 second after inserting the key) Is the voltage 0 V? (Approx. 1 second after inserting the key)	Go to step **2.**	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.
2	**CHECK IGNITION KEY (TRANSPONDER).** 1) Remove the key from ignition switch. 2) Start the engine using other keys that have undergone the teaching operation, furnished with vehicle.	Does the engine start?	Replace all the ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.	Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

F: DTC P1576 EGI CONTROL MODULE EEPROM

DTC DETECTING CONDITION:

ECM malfunctioning

1. REPLACE ECM

Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
Perform the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

G: DTC P1577 IMM CONTROL MODULE EEPROM

DTC DETECTING CONDITION:

Body integrated unit malfunctioning

1. REPLACE BODY INTEGRATED UNIT

Replace the body integrated unit <Ref. to SL-46, Body Integrated Unit.> and replace the all ignition keys (including transponder). Execute the registration procedure next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

H: DTC P1578 METER FAILURE

DTC DETECTING CONDITION:

Reference code incompatibility between body integrated unit and combination meter

1. CHECK LAN COMMUNICATION SYSTEM

Inspect LAN communication system in the following situation. <Ref. to LAN(diag)-2, Basic Diagnostic Procedure.>

- DTC of body integrated unit B0300, B0301, B0302, B0111 or B0321 is displayed.
- “Er IU” or “Er LC” is displayed in odo/trip meter on combination meter.

2. REPLACE COMBINATION METER

Replace the combination meter. <Ref. to IDI-16, REMOVAL, Combination Meter Assembly.> Execute the registration procedure of all immobilizer part (combination meter and etc.) next. Refer to “REGISTRATION MANUAL FOR IMMOBILIZER”.

NOTE:

- When the combination meter has been replaced, be sure to perform the registration procedure of immobilizer.
- Engine may not start when the combination meter which removed from the model with immobilizer to the model without immobilizer. When installed wrong one, correct with the following procedure.
  (1) Turn the ignition switch to OFF.
  (2) Reinstall the combination meter. (Install the combination meter for the model without immobilizer.)
  (3) Disconnect the ground cable from battery, and reconnect one minute later.
  (4) Turn the ignition switch to START, and check that the engine starts.
- When the combination meter and body integrated unit are replaced at the same time, the registration procedure cannot be performed. In this case, it is necessary to write an ID newly to body integrated unit.

BODY SECTION

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

HVAC SYSTEM (HEATER, VENTILATOR AND A/C)	AC
HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)	AC(diag)
AIRBAG SYSTEM	AB
AIRBAG SYSTEM (DIAGNOSTICS)	AB(diag)
SEAT BELT SYSTEM	SB
LIGHTING SYSTEM	LI
WIPER AND WASHER SYSTEMS	WW
ENTERTAINMENT	ET
COMMUNICATION SYSTEM	COM
GLASS/WINDOWS/MIRRORS	GW
BODY STRUCTURE	BS
INSTRUMENTATION/DRIVER INFO	IDI
SEATS	SE
SECURITY AND LOCKS	SL
SUNROOF/T-TOP/CONVERTIBLE TOP (SUNROOF)	SR
EXTERIOR/INTERIOR TRIM	EI
EXTERIOR BODY PANELS	EB

BODY SECTION

CRUISE CONTROL SYSTEM	CC
CRUISE CONTROL SYSTEM (DIAGNOSTICS)	CC(diag)
IMMOBILIZER (DIAGNOSTICS)	IM(diag)
LAN SYSTEM (DIAGNOSTICS)	LAN(diag)

LAN SYSTEM (DIAGNOSTICS)

LAN(diag)

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1. Basic Diagnostic Procedure

A: PROCEDURE

1. WITH SUBARU SELECT MONITOR

CAUTION:
• Subaru Select Monitor is required for reading DTC, performing diagnosis and reading current data.
• Remove foreign matter (dust, water and oil etc.) from the body integrated unit connector during removal and installation.
• For the model with immobilizer, registration of immobilizer may be needed after the replacement of controller and etc. For detail procedure, refer to "REGISTRATION MANUAL FOR IMMOBILIZER".

NOTE:
• To check harness for broken wires or short circuits, shake it while holding it or the connector.
• Check List for Interview <Ref. to LAN(diag)-3, Check List for Interview.>

	Step	Check	Yes	No
1	**CHECK PRE-INSPECTION.** 1) Ask the customer when and how the trouble occurred using interview check list. <Ref. to LAN(diag)-3, Check List for Interview.> 2) Check the display of freeze frame data. (Combination meter, odo/trip meter)	Is freeze frame data displayed?	Go to step **3.**	Go to step **2.**
2	**BASIC INSPECTION.** Check the components which might affect body control. <Ref. to LAN(diag)-5, INSPECTION, General Description.>	Is the component that might influence the body control problem normal?	Go to step **3.**	Repair or replace each unit.
3	**CHECK INDICATION OF DTC.** 1) Read the DTC. <Ref. to LAN(diag)-14, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> NOTE: If the communication function of the Subaru Select Monitor cannot be executed normally, check the communication circuit. <Ref. to LAN(diag)-30, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).> 2) Record all DTCs and freeze frame data.	Is DTC displayed?	Go to step **5.**	Go to step **4.**
4	**PERFORM THE GENERAL DIAGNOSTICS.** Inspect using "General Diagnostics Table". <Ref. to LAN(diag)-79, General Diagnostic Table.>	Is result of inspection OK?	LAN system is normal.	Go to step **5.**
5	**PERFORM THE DIAGNOSIS.** 1) Fix the wrong part. 2) Perform the clear memory mode. <Ref. to LAN(diag)-20, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read DTC. <Ref. to LAN(diag)-14, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC displayed?	Repeat step 5 until DTC is not shown.	Finish the diagnosis.

2. Check List for Interview

A: CHECK

Inspect the following items about the vehicle's state.

1. DISPLAY OF FREEZE FRAME DATA

Freeze frame data is displayed in odo/trip meter.	When and how often are they displayed? ❑ Always ❑ Sometimes ❑ Only once
	Which freeze frame data is displayed? (Record them all) ❑ Er IU (Fail in the body integrated unit) ❑ Er HC (Fail of high-speed CAN) ❑ Er LC (Fail of low-speed CAN) ❑ Er –– (Fails of both high-speed and low-speed CAN) ❑ Er EG (Fail of EGI communication counter) ❑ Er TC (Fail of TCM communication counter) ❑ Er Ab (Fail of vehicle dynamics control (VDC)/ABS communication counter)
Ignition key position	❑ OFF ❑ ACC ❑ ON (before starting engine) ❑ START ❑ ON (after Engine starting, engine is running) ❑ ON (after Engine starting, engine is at a standstill)
Timing	❑ Immediately after turning the ignition to ON ❑ Immediately after turning the ignition to START

2. DISPLAY IN COMBINATION METER

Display in combination meter	a) Display of temperature gauge	❑ OK / ❑ NG
	b) Display of fuel gauge	❑ OK / ❑ NG
Center display	c) Display of ambient temperature	❑ OK / ❑ NG
Display of other indicators	d) Malfunction indicator light	❑ ON / ❑ OFF
	e) SPORT indicator light (AT warning light)	❑ ON / ❑ OFF
	f) ABS warning light/Vehicle dynamics control (VDC) warning light	❑ ON / ❑ OFF
	g) Immobilizer indicator light	❑ ON / ❑ Blink / ❑ OFF
	h) Seat belt warning light (Driver's seat)	❑ ON / ❑ OFF
	i) Seat belt warning light (Passenger's seat)	❑ ON / ❑ OFF

3. SYMPTOMS

Behavior of vehicle	a) Illumination volume control is not available.	❑ Yes / ❑ No
	b) Rear wiper does not operate.	❑ Yes / ❑ No
	c) Wiper deicer does not operate.	❑ Yes / ❑ No
	d) Rear defogger does not operate.	❑ Yes / ❑ No
	e) Door lock does not operate.	❑ Yes / ❑ No
	f) Trunk/rear gate lock does not operate	❑ Yes / ❑ No
	g) Driver's door lock does not operate.	❑ Yes / ❑ No
	h) Shift lock does not operate.	❑ Yes / ❑ No
	i) Rear fog light does not come on.	❑ Yes / ❑ No
	j) Double lock does not operate. (EK model)	❑ Yes / ❑ No
	k) Heater cock valve does not operate.	❑ Yes / ❑ No
	l) Key illumination blinks.	❑ Yes / ❑ No

4. CONDITIONS UNDER WHICH TROUBLE OCCURS

Driving condition	❑ At standstill (While idling)			
	❑ When the vehicle is running	Vehicle speed	km/h (MPH)	
	❑ When accelerating	Acceleration	km/h (MPH) to	km/h (MPH)
	❑ Decelerating (With braking)	Deceleration	km/h (MPH) to	km/h (MPH)
	❑ Decelerating (Without braking)	Deceleration	km/h (MPH) to	km/h (MPH)
	❑ Flat road ❑ Uphill ❑ Downhill ❑ Gravel road ❑ Bumpy road ❑ Snowy road			
	Does it occur when operating any part? Operated part: Trouble Symptom:			
	Are other troubles occurred? From where: Trouble Symptom:			

3. General Description

A: CAUTION

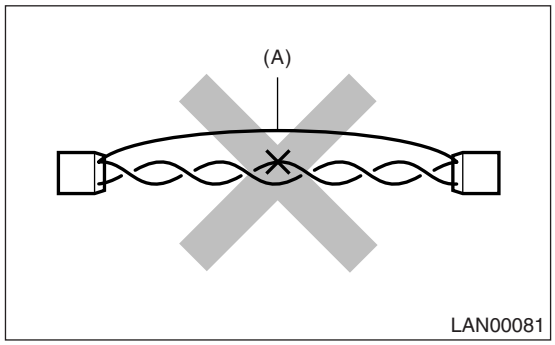
1. SRS AIRBAG SYSTEM

Airbag system wiring harness is routed near the body integrated unit and twisted pair line.

CAUTION:
• All airbag system wiring harness and connectors are colored yellow. Do not use the electrical test equipment on these circuits.
• Be careful not to damage the Airbag system wiring harness when servicing the body integrated unit and LAN system.

2. LAN SYSTEM

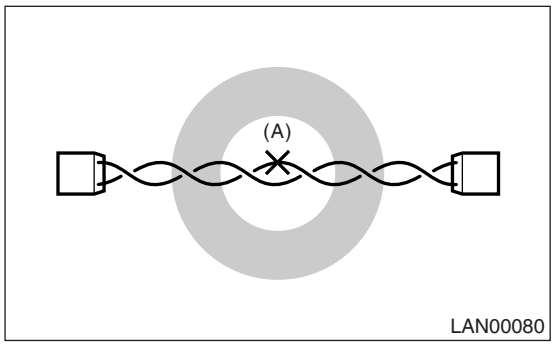
• Bus line of LAN system is twisted pair line. Be careful not to bypass or partly unbind the twisted pair line.
• Do not make clearance between bus lines (CAN High, CAN Low).
• Difference of bus line length should be within 10 cm (3.94 in).
• Fray near the connector should be within 8 cm (3.94 in).



(A) Bypass wire connection

• If the characteristics of the twisted pair line is changed, it may cause extremely weakness to the noise.

• When repairing the harness, connect the wires using soldering and protect it with insulating tape, etc.



(A) Soldering and protection with insulating tape

B: INSPECTION

Before performing diagnostics, check the following items which might affect body integrated unit malfunctions.
1) Measure the battery voltage and check electrolyte.

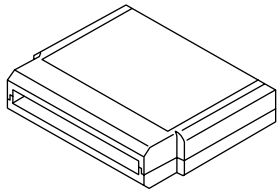
Standard voltage: 12 V, or more

Specific gravity: Above 1.260

2) Check the fuse condition.
Make sure that ampere of the fuse is setting value, and it is not blown out.
3) Check the connecting condition of harness and harness connector.
4) Confirm settings of body integrated unit are corresponded to vehicle equipment. <Ref. to LAN(diag)-18, REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING), OPERATION, Subaru Select Monitor.>
5) Confirm setting are corresponded to vehicle equipment by function setting (ECM customizing) of body integrated unit. <Ref. to LAN(diag)-20, FREEZE FRAME DATA, OPERATION, Subaru Select Monitor.>
6) Confirm “Factory initial setting” of body integrated unit registrations is “Market”.
7) Confirm key illumination does not blink with ignition switch turned to ON.

C: PREPARATION TOOL

1. SPECIAL TOOL

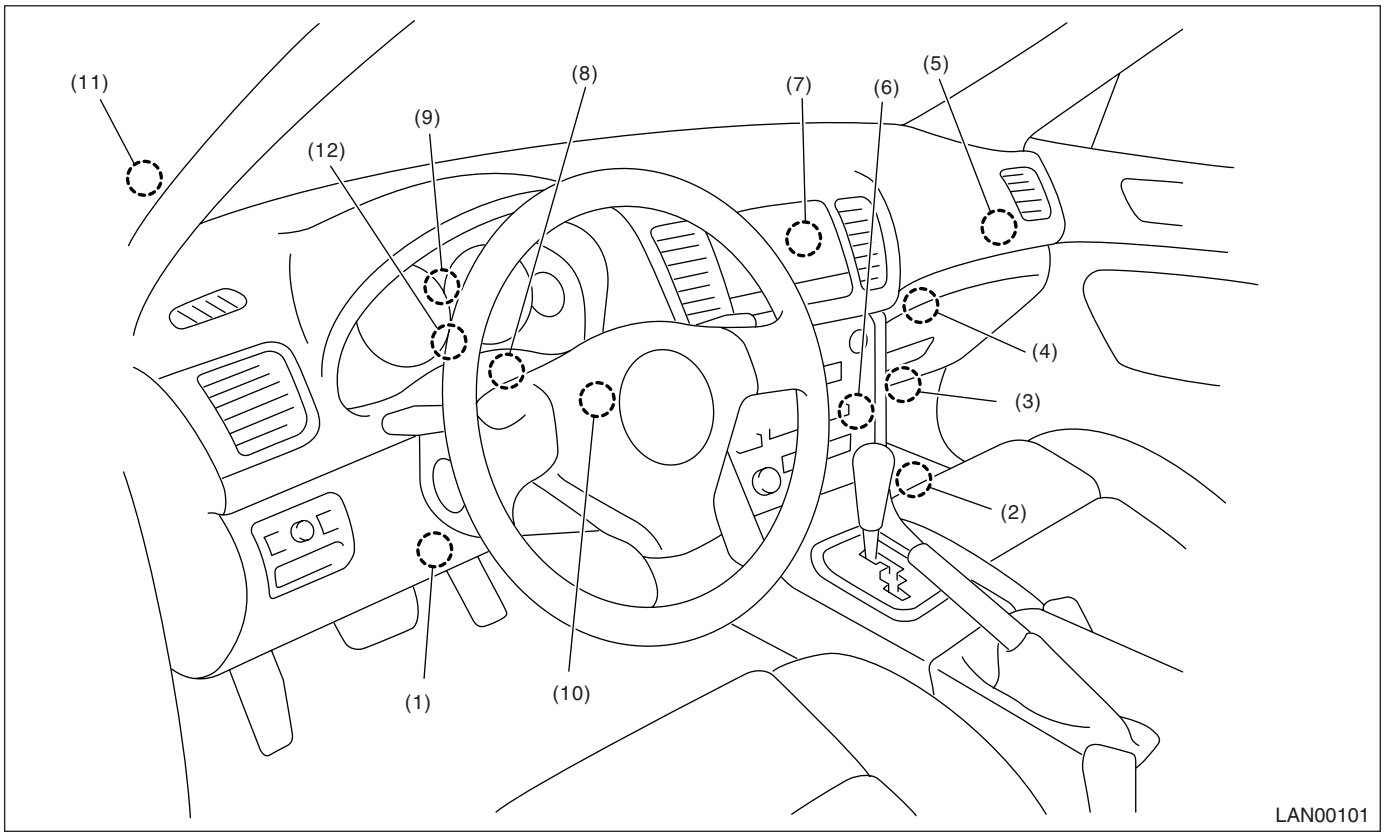
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 ST24082AA230	24082AA230	CARTRIDGE	Troubleshooting for electrical system.
ST22771AA030	22771AA030	SUBARU SELECT MONITOR KIT	Troubleshooting for electrical system. • English: 22771AA030 (Without printer) • German: 22771AA070 (Without printer) • French: 22771AA080 (Without printer) • Spanish: 22771AA090 (Without printer)

2. GENERAL TOOL

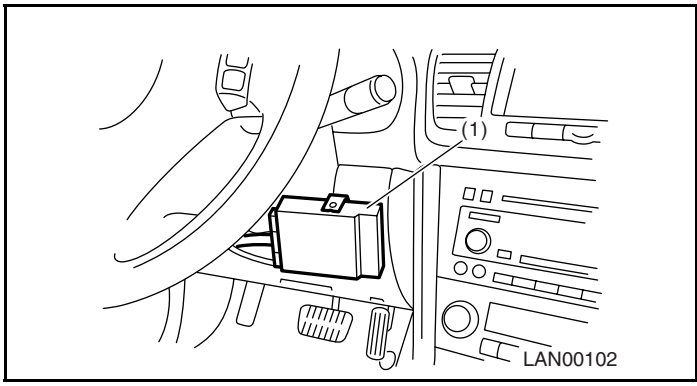
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and ampere.

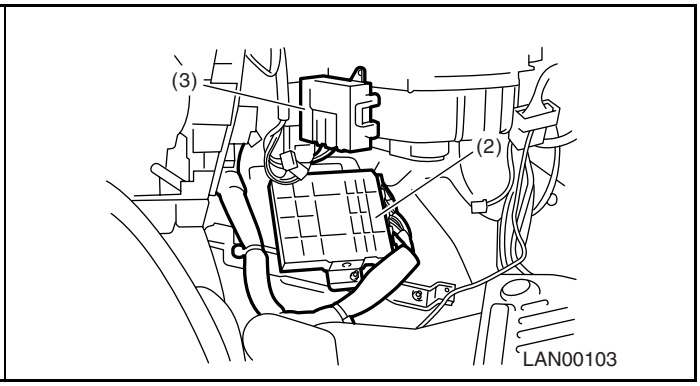
4. Electrical Component Location

A: LOCATION

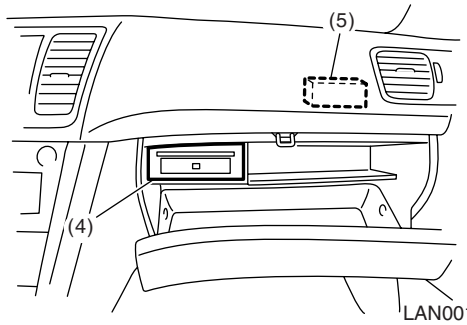


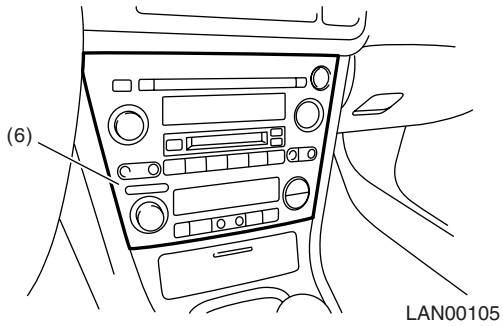
(1) Body integrated unit
(2) Engine control module (ECM)
(3) Auto A/C control unit
(4) Navigation module
(5) Keyless entry control unit (Antenna)
(6) A/C control panel
(7) Center display
(8) Transmission control module (TCM)
(9) Combination meter
(10) Steering angle sensor
(11) ABSCM&H/U or VDCCM&H/U (In engine compartment)
(12) Odo/trip meter

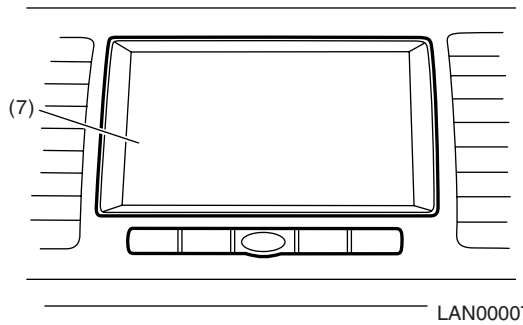


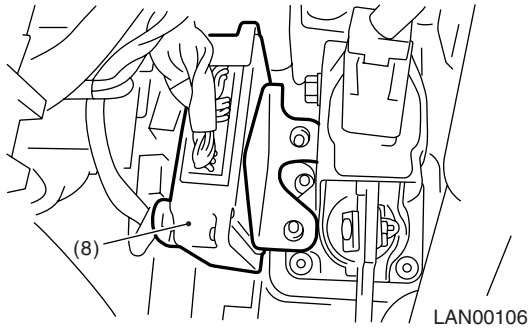


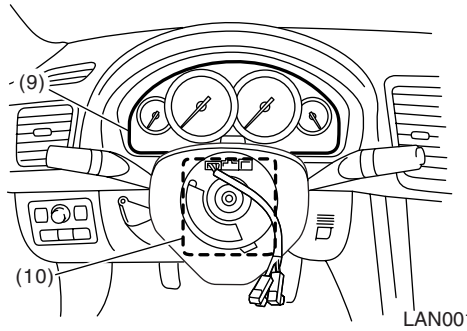
Electrical Component Location

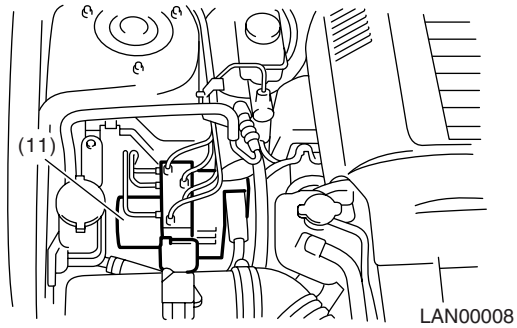


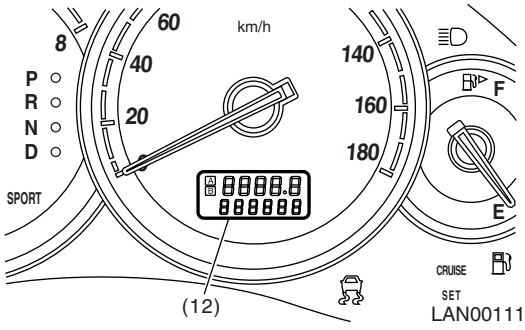








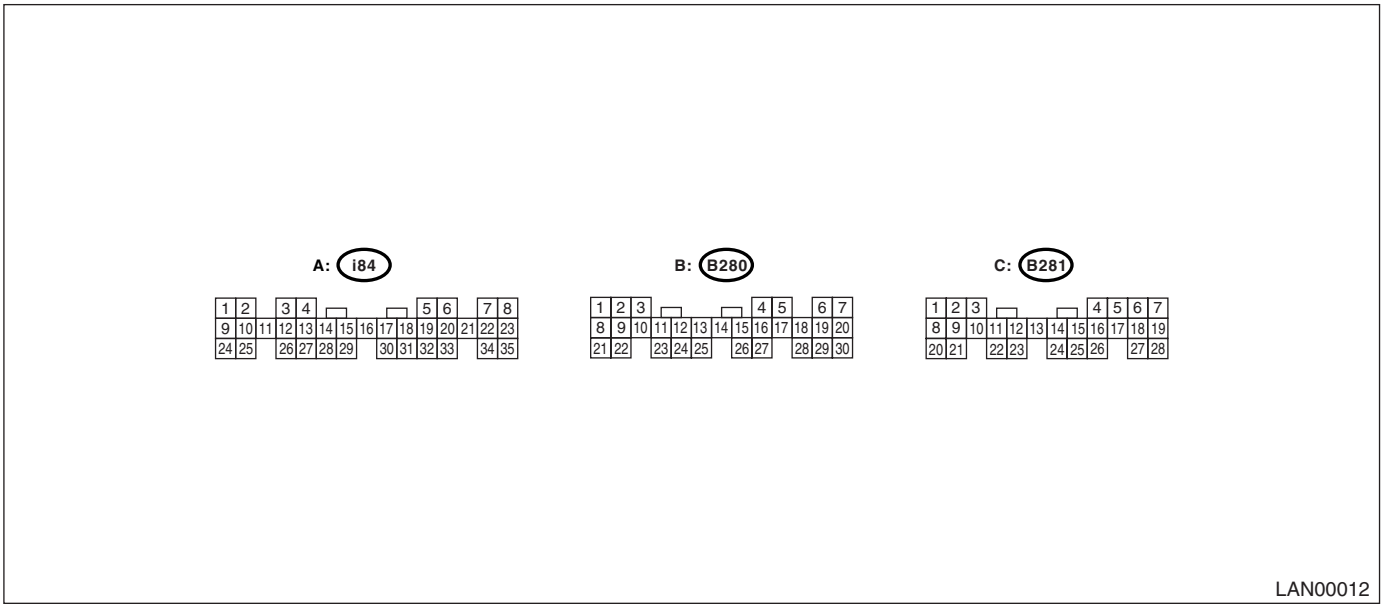




SUBARU.

5. Control Module I/O Signal

A: ELECTRICAL SPECIFICATION



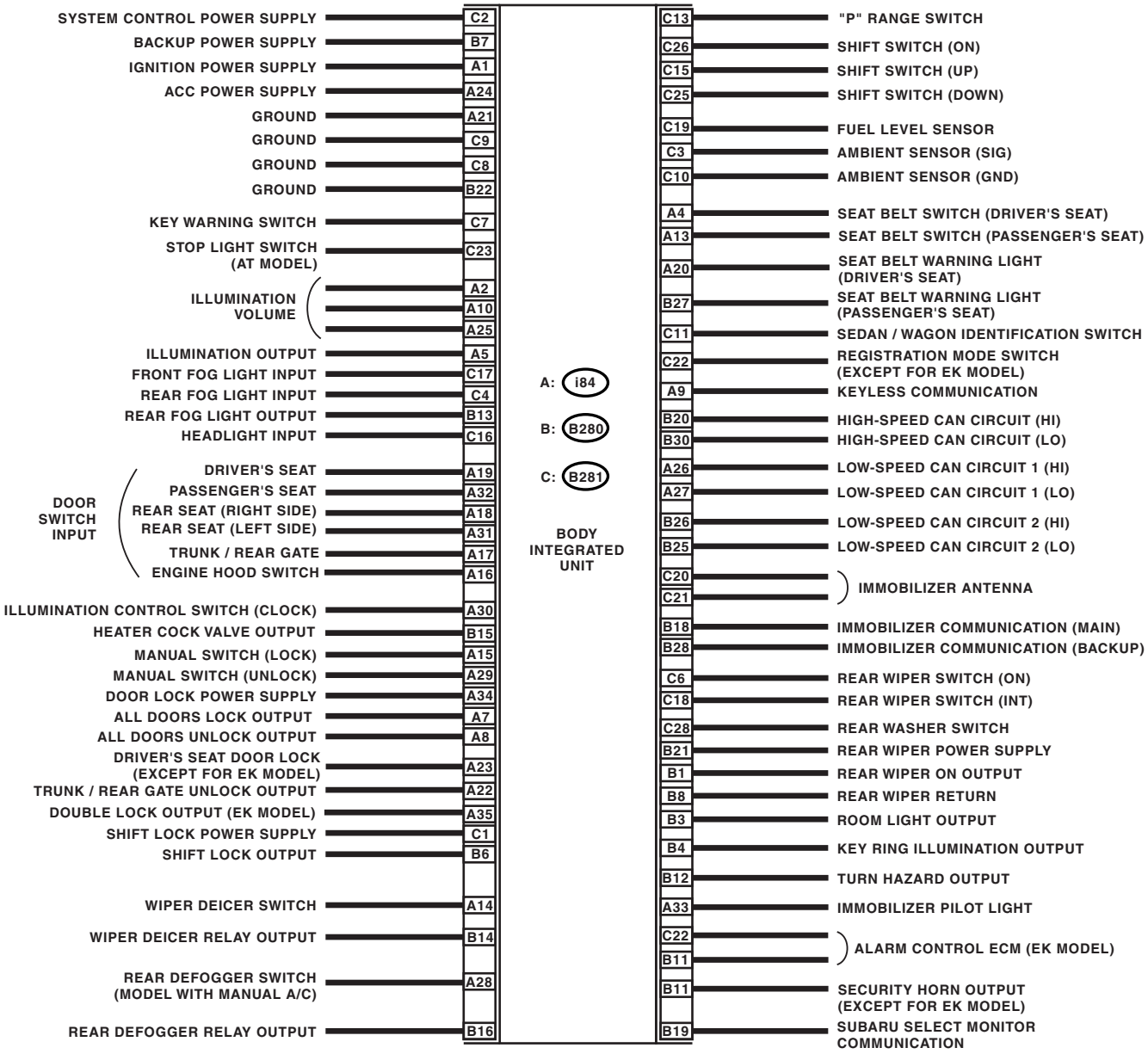
Description	Connector No.	Terminal No.	Signal (V or Ω)	NOTE
			Ignition switch ON (engine OFF)	
System control power supply	B281	C2	10 — 13 V	Always
Backup power supply	B280	B7	10 — 13 V	Always
Ignition power supply	i84	A1	10 — 13 V	Ignition ON
ACC power supply	i84	A24	10 — 13 V	ACC ON
Ground	i84	A21	Less than 1 Ω	Always
	B281	C9		
	B281	C8		
	B280	B22		
Key warning switch	B281	C7	10 — 13 V	When ignition key inserted
Stop light switch	B281	C23	10 — 13 V	When brake pedal depressed
Illumination volume (Vi1)	i84	A10	4.5 — 5.5 V	Small light ON
Illumination volume (Vi 2)	i84	A2	0.5 — 4.5 V	—
Illumination volume (Vi 3)	i84	A25	Less than 1 Ω	Ground circuit
Illumination output	i84	A5	10 — 13 V	Small light ON
Front fog light input	B281	C17	10 — 13 V	Front fog light ON
Rear fog light input	B281	C4	10 — 13 V	Small light ON Front fog light ON Rear fog light ON
Rear fog light output	B280	B13	10 — 13 V	Rear fog light ON
Headlight input	B281	C16	10 — 13 V	Headlight ON (Both of Hi, Lo)
Door switch input Driver's seat	i84	A19	Less than 1 V (10 — 13 V at OFF)	Driver's door open (ON)
Door switch input Passenger's seat	i84	A32	Less than 1 V (10 — 13 V at OFF)	Passenger's door open (ON)
Door switch input Rear RH seat	i84	A18	Less than 1 V (10 — 13 V at OFF)	Rear RH door open (ON)

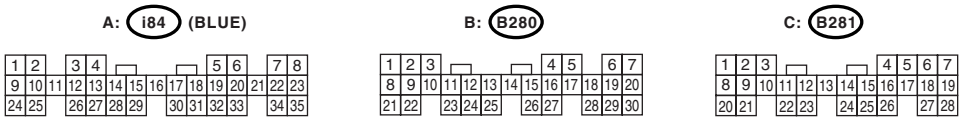
Control Module I/O Signal

Description	Connector No.	Terminal No.	Signal (V or Ω)	NOTE
			Ignition switch ON (engine OFF)	
Door switch input Rear LH seat	i84	A31	Less than 1 V (10 — 13 V at OFF)	Rear LH door open (ON)
Door switch Trunk/Rear gate	i84	A17	Less than 1 V (10 — 13 V at OFF)	Trunk/Rear gate open (ON)
Illumination control switch	i84	A30	10 — 13 V (at dimmer ON)	Extinct the clock and audio illumination
Manual switch (LOCK)	i84	A15	Less than 1 Ω	Door lock switch ON
Manual switch (UNLOCK)	i84	A29	Less than 1 Ω	Door lock switch ON
Door lock power supply	i84	A34	10 — 13 V	
All door LOCK output	i84	A7	10 — 13 V	Manual, door key switch ON
All door UNLOCK output	i84	A8	10 — 13 V	Manual, door key switch ON
Trunk/Rear gate UNLOCK output	i84	A22	10 — 13 V	When the trunk open signal received with keyless entry (Sedan model)
Key/shift lock power supply	B281	C1	10 — 13 V	
Shift lock output	B280	B6	10 — 13 V	Ignition switch ON, at “P” range, foot brake ON
Wiper deicer switch	i84	A14	Less than 1 Ω	Wiper deicer switch ON
Wiper deicer relay output	B280	B14	Less than 1 Ω	Wiper deicer relay ON
Rear defogger switch	i84	A28	Less than 1 Ω	Rear defogger switch ON
Rear defogger relay output	B281	B16	Less than 1 Ω	Rear defogger relay ON
Shift switch (ON)	B281	C26	Less than 1 Ω	At Manual mode
Shift switch (UP)	B281	C15	Less than 1 Ω	At Manual mode UP
Shift switch (DOWN)	B281	C25	Less than 1 Ω	At Manual mode DOWN
“P” range switch	B281	C13	Less than 1 Ω	
Impact sensor	B281	C5	Less than 1 Ω	Impact sensor ON (Model with immobilizer)
Fuel level sensor	B281	C19	0 — 102.3 Ω	
Ambient sensor	B281	C3	0.5 — 4.5 V	SIG
	B281	C10	Less than 1 Ω	GND
Seat belt switch (driver’s seat)	i84	A4	Less than 1 Ω	Driver’s seat belt worn
Seat belt switch (passenger’s seat)	i84	A13	Less than 1 Ω	Passenger’s seat belt worn
Seat belt warning light (driver’s seat)	i84	A20	Less than 1 Ω	Driver’s seat belt worn
Seat belt warning light (passenger’s seat)	B281	C24	Less than 1 Ω	Passenger’s seat belt worn
Sedan/Wagon identification switch	B281	C11	Sedan 10 — 13 V Wagon 0 — 5 V	
Rear wiper switch (ON)	B281	C6	Less than 1 Ω	Rear wiper switch ON
Rear wiper switch (INT)	B281	C18	Less than 1 Ω	Rear wiper switch ON
Rear washer switch	B281	C27	Less than 1 Ω	Rear washer switch ON
Rear wiper power supply	B280	B21	10 — 13 V	
Rear wiper ON output	B280	B1	10 — 13 V	Rear wiper switch ON
Rear wiper return	B280	B8	Less than 1 Ω B1 — B8 1 Ω or less	At wiper reversing

Description	Connector No.	Terminal No.	Signal (V or Ω)	NOTE
			Ignition switch ON (engine OFF)	
Room light output	B280	B3	Less than 1 Ω	When LOCK, UNLOCK with key-less entry
Key ring illumination output	B280	B4	Less than 1 Ω	Ignition key removed, driver door open
Turn hazard output	B280	B12	Less than 1 Ω	When operating keyless entry answer back
Keyless buzzer output	i84	A6	Less than 1 Ω	When operating keyless entry answer back
Immobilizer pilot light	i84	A33	Less than 1 Ω	At ignition key removed, immobilizer operating
Kick down switch	B280	B12	Less than 1 Ω	Kick down switch ON
Keyless communication	i84	A9	2 — 10 V	At keyless entry signal received
High-speed CAN circuit (Hi)	B280	B20	Between B20 — B30 Serial communication	At communicating (sending and receiving)
High-speed CAN circuit (Lo)	B280	B30		
Low-speed CAN circuit 1 (Hi)	i84	A26	Between A25 — A26 Serial communication	At communicating (sending and receiving)
Low-speed CAN circuit 1 (Lo)	i84	A25		
Low-speed CAN circuit 2 (Hi)	B280	B26	Between B25 — B27 Serial communication	At communicating (sending and receiving) (Model with auto A/C)
Low-speed CAN circuit 2 (Lo)	B280	B27		
Immobilizer antenna	B281	C20 — C21	Serial communication	
Immobilizer communication (Main)	B280	B18 (Back-up B28)	Serial communication	
Subaru Select Monitor communication	B280	B19	Serial communication	

B: WIRING DIAGRAM





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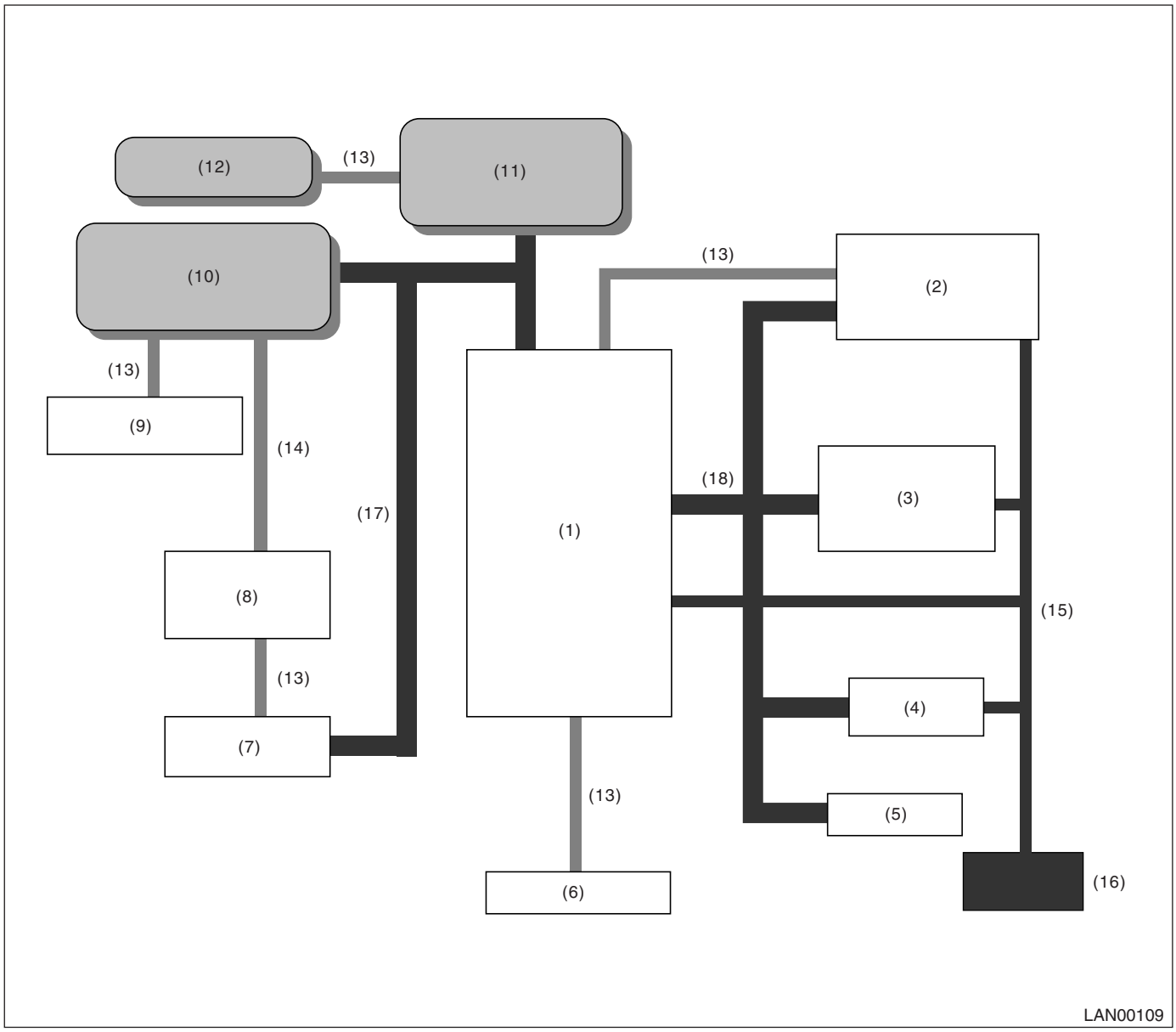
C: LAN SYSTEM



(1) Body integrated unit
(2) ECM
(3) TCM
(4) VDC/ABSCM
(5) Steering angle sensor
(6) Keyless entry receiver
(7) A/C control unit
(8) Audio·A/C control panel
(9) Navigation system
(10) Center display
(11) Combination meter
(12) Clock
(13) Exclusive communication line
(14) IE-Bus (AV)
(15) Subaru Select Monitor communication line
(16) Subaru Select Monitor
(17) Low speed CAN (Body integrated unit)
(18) High speed CAN (Driving control)

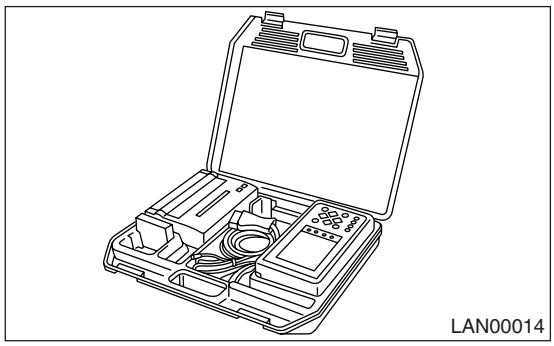
6. Subaru Select Monitor

A: OPERATION

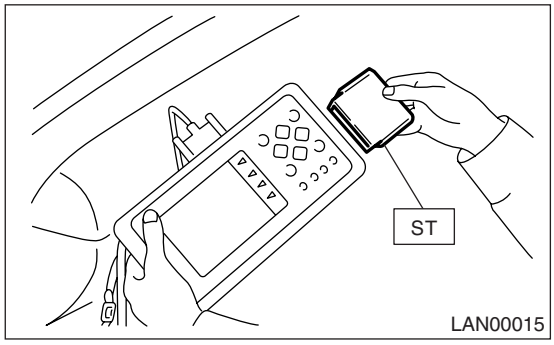
1. READ DIAGNOSTIC TROUBLE CODE (DTC)

NOTE:
• DTC is displayed in the sequence of inputting. (When inputting more than two simultaneously, DTC is displayed in the sequence of priority.)
• When more than two DTCs are displayed, perform the diagnosis of top of them.

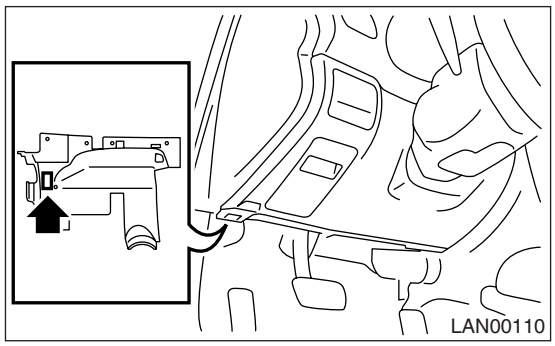
1) Prepare the Subaru Select Monitor kit.



2) Connect the diagnosis cable to Subaru Select Monitor.
3) Insert the cartridge to Subaru Select Monitor. <Ref. to LAN(diag)-6, SPECIAL TOOL, PREPARATION TOOL, General Description.>

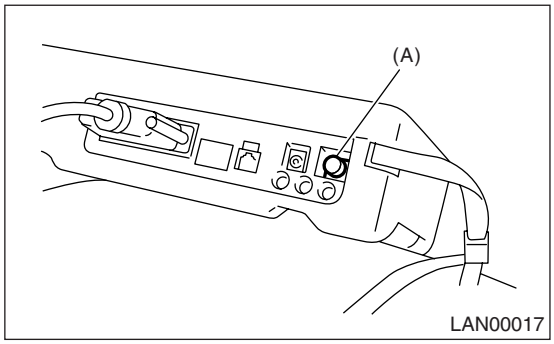


4) Connect the Subaru Select Monitor to data link connector.
Data link connector is located in the lower portion of the instrument panel (on the driver's side).



CAUTION:
Do not connect scan tools except for Subaru Select Monitor.

5) Turn the ignition switch to ON (engine OFF) and turn the Subaru Select Monitor switch to ON.



(A) Power switch

6) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
7) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
8) On the «Integ. Unit mode failuer diag» display screen, select the {Diagnostic Code(s) Display} and press the [YES] key.

NOTE:
• For details concerning operation procedure, refer to "SUBARU SELECT MONITOR OPERATION MANUAL".
• For details concerning DTCs, refer to the List of Diagnostic Trouble Code (DTC). <Ref. to LAN(diag)-28, List of Diagnostic Trouble Code (DTC).>

2. READ CURRENT DATA

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failuer diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Current Data Display & Save» display screen, select the {12 Data Display} and press the [YES] key.
5) Using the scroll key, scroll the display screen up or down until the desired data is shown.
• A support list contains both of analog and digital data, and they are shown in the following table.

3. DISPLAY OF ANALOG DATA

Items to be displayed	Unit of measure	NOTE
BATT Voltage (Control)	10 — 15 V	—
BATT Voltage (BACK UP)	10 — 15 V	—
IG power supply voltage	10 — 15 V	—
ACC voltage	10 — 15 V	—
Illumination VR voltage	0 — 5 V	—
Illumi. output d-ratio	0 — 100%	—
ambient temp sensor V	0 — 5 V	—
Ambient temperature	–40 — 87.5°C	—
Fuel level voltage	0 — 8 V	—
Fuel level resistance	0 — 102.3 Ω	Body integrated unit input value
key-lock solenoid V	6 — 12 V	—
number of regist.	0 — 4	—
Front Wheel Speed	km/h	—
VDC/ABS latest f-code	DTC display (Temporarily)	This is normal when the DTC is not input though the this code is displayed
Blower fan steps	0 — 2 level	0: OFF, 1: Low, 2: More than 2 level
Fuel level resistance2	0 — 102.3 Ω	Body integrated unit output
Fuel consumption	cc/s	—
Coolant Temp.	–40 — 130°C	—
Vehicle lateral G	m/s^2	—
SPORT Shift Stages	0 — 7 levels	(0: light OFF, 6: fail, 7: ATF temperature High/Low)
Shift Position	0 — 7 levels	(8 is no input)
Off delay time	OFF, Short, Normal, Long	—
Auto lock time	20, 30, 40, 50, 60 seconds	—

4. DISPLAY OF ON/OFF DATA

Items to be displayed	Unit of measure
key-lock warning SW	ON/OFF
Stop Light Switch	ON/OFF
Front fog lamp SW input	ON/OFF
Rear fog lamp SW input	ON/OFF
lighting SW input	ON/OFF
Door key-lock SW input	ON/OFF
Door unlock SW input	ON/OFF
Driver's door SW input	ON/OFF
P-door SW input	ON/OFF
Rear right door SW input	ON/OFF
Rear left door SW input	ON/OFF
R Gate SW input	ON/OFF
Manual lock SW input	ON/OFF
Manual unlock SW input	ON/OFF
Lock SW (front hood)	ON/OFF
Bright SW input	ON/OFF
Tiptronic Mode Switch	ON/OFF
TIP UPSW input	ON/OFF
TIP DOWN SW input	ON/OFF
P SW	ON/OFF
R wiper ON SW input	ON/OFF
R wiper INT SW input	ON/OFF
R washer SW input	ON/OFF
wiper deicer SW input	ON/OFF
Rear Defogger SW	ON/OFF
Driver's Seat SW input	ON/OFF
P seatbelt SW input	ON/OFF
Fr wiper input	ON/OFF
Registration SW input	ON/OFF
Identification SW input	ON/OFF
Rr defogger output	ON/OFF
lock actuat. LOCK output	ON/OFF
All seat UNLOCK output	ON/OFF
D-seat UNLOCK output	ON/OFF
R gate/trunk UNLK output	ON/OFF
Double lock output	ON/OFF
R wiper output	ON/OFF
Shift Lock Solenoid	ON/OFF
Key locking output	ON/OFF
wiper deicer SW input	ON/OFF
Starter cutting output	ON/OFF
Hazard Output	ON/OFF
Keyless Buzzer Output	ON/OFF
Horn Output	ON/OFF
Siren Output	ON/OFF
D-belt warning light O/P	ON/OFF
P-belt warning light O/P	ON/OFF
Illumination lamp O/P	ON/OFF
Room lamp output	ON/OFF
key illumi. lamp o/p	ON/OFF

Items to be displayed	Unit of measure
R fog lamp output	ON/OFF
R fog lamp monitor	ON/OFF
Immobilizer lamp output	ON/OFF
Keyless operation 1	Registration/Normal
Keyless operation 2	Clear/Normal
CC Main Lamp	On/Off
CC Set Lamp	On/Off
SPORT Lamp	On/Off
SPORT Blink	Blink/Off
ATF Temperature Lamp	On/Off
ATF Blink	Blink/Off
Tire diameter abnormal 1	On/Off
Tire diameter abnormal 2	Blink/Off
SPORT Shift (UP)	UP/OFF
SPORT Shift (DOWN)	DOWN/OFF
SPORT Shift (buzzer 1)	ON/OFF
SPORT Shift (buzzer 2)	ON/OFF
ABS/VDC Judging	ABS/VDC
ADA Existence Judging	Yes/No
Small lamp SW	ON/OFF
Headlamp	ON/OFF
Headlight HI	ON/OFF
Turn signal LH	ON/OFF
Turn signal RH	ON/OFF
Rr Defogger SW	ON/OFF
Australia Judging Flag	Australia/Others
Tire 18inch flag	18 in/others
Number of cylinders	4 cylinders/6 cylinders
Cam shaft specification	SOHC/DOHC
Turbo	Turbo/Non-turbo
E/G displacement (2.5L)	2.5 L/ OFF
E/G displacement (3.0L)	3.0 L/ OFF
AT/MT identification terminal	AT model/MT model
E/G cooling fan	ON/OFF
Heater cock valve	ON/OFF
Power window (Up)	ON/OFF
Power window (Down)	ON/OFF
Keyless buzzer	ON/OFF
Bright Request	ON/OFF
P/W ECM Failure	NG/OK
Keyless Hook SW	ON/OFF
Door lock SW (Open)	ON/OFF
Door lock SW (Close)	ON/OFF
Door Key SW (Open)	ON/OFF
Door Key SW (Close)	ON/OFF
Under hook registration	ON/OFF
Hook registration end	ON/OFF
Unlock request	ON/OFF
Center display failure	OK/NG
NAVI Failure	OK/NG
IE Bus failure	Can not use

Items to be displayed	Unit of measure
Auto A/C failure	OK/NG
EBD Warning Light	OK/OFF
ABS Warning Light	OK/OFF
VDC OFF flag	ON/OFF
VDC/ABS OK B	OK/NG
VDC/ABS condition	0 — 4
Destinat.	0 — 16
Touch SW	0 — 64

NOTE:
For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

5. CONFIRMATION OF CURRENT SETTING

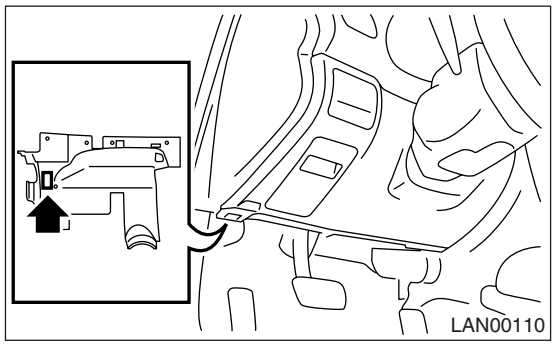
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failuer diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Current Data Display & Save» display screen, select the {12 Data Display} and press the [YES] key.
5) Using the scroll key, scroll the display screen up or down until the desired data is shown.
6) Display the following items and record the settings.
Required items for new registration (Except for system not equipped)

Item	Item to confirm				Remarks
Key No. to register	1	2	3	4	Registered ID type
Off delay	OFF	Long	Normal	Short	Setting for lighting off time
Auto-lock	60, 50, 40, 30, 20		OFF		(Unit sec.)
Rr defogger op. mode	Normal		Continuous		
Wiper deicer op. mode	Normal		Continuous		Optional setting
Security Alarm Setup	ON		OFF		
Impact Sensor Setup	ON		OFF		Optional setting
Alarm monitor delay setting	ON		OFF		
Lockout prevention	ON		OFF		
Impact Sensor	Yes		No		Optional setting
Siren setting	Yes		No		Optional setting
Answer-back buzzer setup	ON		OFF		Not equipped
Hazard answer-back setup	ON		OFF		
Automatic locking setup	ON		OFF		
Ans.-back Buzzer	Yes		No		Not equipped
Auto locking	Yes		No		
Door open warning (prevention of battery run-out)	Yes		No		
A/C ECM setting	Yes		No		Model with auto A/C
P/W ECM setting	Yes		No		Not equipped
Center display failure	Yes		No		Model with center display
Wiper deicer	Yes		No		Optional setting
Rear fog light setting	Yes		No		Optional setting
Factory initial setting	Manufacture		Market		Not change to Manufacture mode
Security setting (Specified security set-ting)	Yes		No		Operate the selected security set. (EK model)

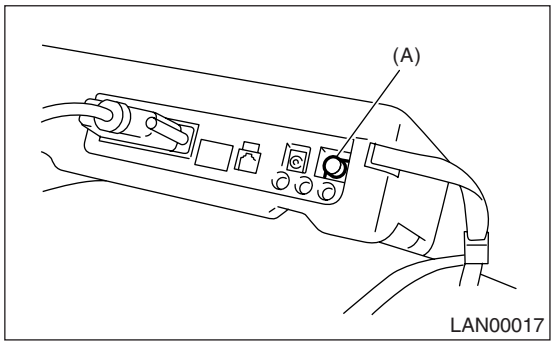
6. REGISTRATION BODY INTEGRATED UNIT (EQUIPMENT SETTING)

CAUTION:
Body integrated unit is core of LAN system, and also can select the function of all vehicle system control. It is possible to control the original functions of vehicle when registrations of body integrated unit and function setting are corresponded to vehicle equipment.
If registrations and function setting are different from vehicle equipment, vehicle system does not operate normally and diagnosis cannot be performed correctly. Pay attention to items below.
• Be sure to correspond registrations and function settings to vehicle equipment.
• Do not change the settings of vehicle improperly.
• Confirm key illumination does not blink or "Factory initial setting" of body integrated unit registrations is "Market". If "Factory initial setting" is set to "Factory", key illumination blinks with ignition key turned to ON to give warning of unconfirmed settings.
• Key illumination does not blink with ignition switch turned to ON and go off with door closed.
• Be sure to register immobilizer if body integrated unit is replaced with a new one. (Model with immobilizer)
• Make a registration of immobilizer when the parts replaced related to immobilizer. Refer to "REGISTRATION MANUAL FOR IMMOBILIZER".

1) Turn the ignition switch to OFF.
2) Connect the Subaru Select Monitor to data link connector.



3) Turn the ignition switch to ON and Subaru Select Monitor to ON.



(A) Power switch

4) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
5) On the «Each System Check» display screen, select the {Integ. Unit mode} and then select the "ECM customizing".

6) Change the setting with UP/DOWN key and press the [YES] key.
• List of body integrated unit registration item

NOTE:
Setting is different depending on grade of vehicle.

Data		Initial setting	Registration	Remarks
21	A/C ECM setting	OFF	ON	Illumination control does not operate if A/C ECM setting is set to “OFF” in case of model with auto A/C.
			OFF	If A/C ECM setting is set to “ON” in case of model without auto A/C, illumination change to night illumination and it is difficult to be recognized.
22	P/W ECM setting	OFF	ON	Be sure to set P/W ECM setting to “OFF”. Auto-reverse function
			OFF	
23	Center display failure (OP)	OFF	ON	Information may not be displayed on center display if Center display failure is set to “OFF” in case of model with center display.
			OFF	
24	Wiperdeicer (OP)	OFF	ON	ON signal does not output with operation of wiper deicer switch if Wiperdeicer is set to “OFF” in model with wiper deicer.
			OFF	
25	Rear fog light setting (OP)	OFF	ON	Vehicle is controlled in rear fog light equipped mode.
			OFF	Vehicle is controlled in rear fog light no-equipped mode. (Be sure to set to “OFF” in model without rear fog light.
26	Factory initial setting (Reset of body integrated unit)	Factory	Factory (Reset)	If Factory initial setting is set to “Factory”, registrations of items above is changed to “OFF”. Be sure to set to “Market”.
			Market (Settlement)	

CAUTION:
• It is possible to control the original functions of vehicle when registrations of body integrated unit and function setting are corresponded to vehicle equipment.
• When body integrated unit is new one or “Factory” mode, key illumination blinks to show equipment settings does not completed.
• Be sure not to change Factory initial setting except installation of new body integrated unit.

NOTE:
• “Factory” mode:
  • Body integrated unit has been not set yet. It can be recognized by key illumination blinking with ignition switch turned to ON.
  • All body integrated units as part for repair are set to “Factory” mode. When replacing a body integrated unit, be sure to perform the registration operation.
• “Market” mode:
  Each settings have been set. It can be recognized by key illumination coming on in concocting with room light and going off with ignition switch turned to ON.

7) Perform the Factory setting. On the «ECM customizing» display screen of Subaru Select Monitor, select the {Factory initial setting} and press the [YES] key.
8) Change the mode from Factory into Market.
9) Replace the immobilizer cartridge, and register the immobilizer key. (Model with immobilizer)
10) Perform the registration according to the procedures of “IMMOBILIZER REGISTRATION MANUAL”.
11) When key registration is completed, “Do you want to register remote engine start?” is displayed. Perform the registration only if equipped.
12) Perform the function setting (ECM customizing).
<Ref. to LAN(diag)-21, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

NOTE:
For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

7. CLEAR MEMORY MODE

1) On the «Main Menu» display screen, select the {2. Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) Press [YES] key after displayed the information of body integrated unit type.
4) On the «Integ. Unit mode failuer diag» display screen, select the {Clear Memory} and press the [YES] key.

Display	Contents to be monitored
Clear memory?	Clear function of DTC and freeze frame data

5) When the “Done” are shown on the display screen, turn the ignition switch to OFF.

NOTE:
For detailed operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

8. FREEZE FRAME DATA

NOTE:
• Data stored at the time of trouble occurrence is shown on display.
• Freeze frame data will be memorized maximum to 20.
• If freeze frame data is not stored in memory correctly (caused by low power supply of body integrated unit), DTC will be displayed with “?” on the head of it in the Subaru Select Monitor display. This shows it may be an unreliable reading.

9. FUNCTION SETTING (ECM CUSTOMIZING)

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failuer diag» display screen, select the {ECM customizing} and press the [YES] key.
4) Change the setting with UP/DOWN key and press the [YES] key.

• List of function setting item (ECM customizing)

No.	Data	Initial setting value	Customize setting	Remarks	
1	Off delay time	Normal		Delay time below can be selected by setting.	
			Setting	After door closed	After key unlock
			OFF	0 sec.	0 sec.
			Short	3 sec.	10 sec.
			Normal	5 sec.	20 sec.
			Long	8 sec.	30 sec.
2	Auto-lock time	30 sec.	0 — 60 seconds	Workable when Auto locking is set to “ON” and Automatic locking setup is “ON” Time can be changed by 10 seconds: 0 (OFF) — 60 (maximum).	
3	Rr defogger op. mode	15 min.	15 min.	Rear defogger stops in 15 minutes automatically after switch is turned to ON.	
			Continuation	Rear defogger repeats active condition for 15 minutes and inactive condition for 2 minutes until switch is turned to OFF.	
4	Wiper deicer op. mode	15 min.	15 min.	Wiper deicer stops in 15 minutes automatically after switch is turned to ON.	
			Continuation	Wiper deicer repeats active condition for 15 minutes and inactive condition for 2 minutes until switch is turned to OFF.	
5	Security Alarm Setup	OFF	ON	Security alarm (horn or siren) in active condition	
			OFF	Security alarm in inactive condition	
6	Impact Sensor Setup	OFF	ON	Workable when Impact Sensor Setup is set to “ON” Impact sensor in active condition	
			OFF	Impact sensor in inactive condition (Set Impact Sensor Setup of model without impact sensor to “OFF”.)	
7	Alarm monitor delay setting	ON		After doors are locked by keyless entry system operated, Alarm monitor starts in following time.	
			ON	Delay time is 30 seconds.	
			OFF	Delay time is 0 second.	
8	Lockout prevention	ON	ON	Lockout prevention in active condition (Lockout prevention does not operate if safety knob is locked by hand.)	
			OFF	Lockout prevention in inactive condition	
9	Impact sensor (OP)	OFF	ON	Vehicle is controlled in impact sensor equipped mode. (Set Impact sensor to “OFF” in model without impact sensor. If Impact sensor is set to “ON”, hazard, horn or siren operate after doors are locked by keyless entry system operated (Alarm monitor starting).	
			OFF	Vehicle is controlled in impact sensor no-equipped mode.	
10	Siren setting	OFF	ON	Siren sounds when alarm operates. (Set Siren setting to “OFF” in model without siren. Horn does not sound if Siren setting is set to “ON”.)	
			OFF	Horn sounds when alarm operates.	

No.	Data	Initial setting value	Customize setting	Remarks
11	Answer-back buzzer setup	ON	ON	Workable when Answer-back buzzer setup is set to “ON” When lock/unlock is selected by keyless entry system operated, answer-back buzzer sounds.
			OFF	When lock/unlock is selected by keyless entry system operated, answer-back buzzer does not sound.
12	Hazard answer-back setup	ON	ON	Workable when Hazard answer-back setup is set to “ON” When lock/unlock is selected by keyless entry system operated, hazard answer-back operates.
			OFF	When lock/unlock is selected by keyless entry system operated, hazard answer-back does not operate.
13	Automatic locking setup	ON	ON	Workable when Automatic locking setup is set to “ON” When lock/unlock is selected by keyless entry system operated, automatic locking operates.
			OFF	When lock/unlock is selected by keyless entry system operated, automatic locking does not operate.
14	Ans.-back Buzzer	ON	ON	Vehicle is controlled in answer-back buzzer equipped mode.
			OFF	Vehicle is controlled in answer-back buzzer non-equipped mode. (Set Ans.-back Buzzer to “OFF” in model without answer back buzzer.)
15	Auto locking	ON	ON	Vehicle is controlled in auto locking equipped mode.
			OFF	Vehicle is controlled in auto locking non-equipped mode. (Set Auto locking to “OFF” in model without answer-back buzzer.)
16	Initial Keyless Setting	—	—	—
			Execution	Settings of keyless entry system are initialized. (No. 2: 30 sec., No.11: ON, No.12: ON, No.13: ON, No.14: ON)
17	Initial button setting	—	—	—
			Execution	Settings of each function are initialized. (No. 1: Normal, No. 3: 15 min., No. 4: 15 min., No. 8: ON)
18	Initial Security setting	—	—	—
			Execution	Settings of security system are initialized. (No. 5: OFF, No. 6: OFF, No. 7: ON, No.10: OFF)
19	Passive Alarm (Not used)	OFF	ON	Applicable to North America model (If Passive Alarm is set to “ON”, nothing operates and there is no negative effect.)
			OFF	
20	Door open warning (prevention of battery run-out)	OFF	ON	If detecting door open for 30 minutes, room light, key illumination and door warning light are turned off to prevent battery run-out.
			OFF	Room light, key illumination and door warning light is not turned off.
21	(Specification) Security setup	OFF	ON	Selected security settings in active condition (EK model)
			OFF	Normally in active condition

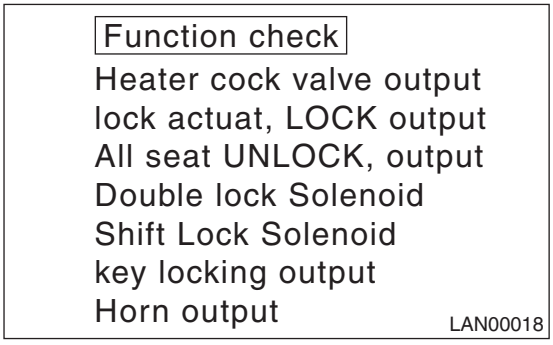
5) After setting, make sure that vehicle equipment is same as the setting changed in the {Current Data Display & Save}.

CAUTION:
• It is possible to control the original functions of vehicle when settings above are corresponded to vehicle equipment.
• Do not change the settings except for setting above during operation of equipment setting.
• Be sure not to change “Factory” initial setting except in installation of new body integrated unit.

NOTE:
For details concerning operation procedure, refer to “SUBARU SELECT MONITOR OPERATION MANUAL”.

10.FUNCTION CHECK

In order to check the body integrated unit function, inspect the body integrated unit and actuator using Subaru Select Monitor without operating switches.
1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failuer diag» display screen, select the {System Operation Check Mode} and press the [YES] key.
4) Select item to operate on the «System Operation Check Mode» display screen with “UP/Down key”, and press the [YES] key.



5) Pressing [YES] starts, [NO] cancels the operation and [YES] returns to the System Operation Check Mode display screen.

NOTE:
If not equipped (based on area or condition), process will not go on.

7. Read Diagnostic Trouble Code (DTC)

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

NOTE:
Use the Subaru Select Monitor, because DTCs can not be read out.

2. WITH SUBARU SELECT MONITOR

For details concerning DTC reading procedure, refer to “Subaru Select Monitor”. <Ref. to LAN(diag)-14, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>

8. Clear Memory Mode

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

NOTE:
Use the Subaru Select Monitor for Clear Memory Mode.

2. WITH SUBARU SELECT MONITOR

For detailed procedures of clearing DTC, refer to “SUBARU SELECT MONITOR”. <Ref. to LAN(diag)-20, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.>

9. Read Current Data

A: OPERATION

1) On the «Main Menu» display screen, select the {Each System Check} and press the [YES] key.
2) On the «System Selection Menu» display screen, select the {Integ. Unit mode} and press the [YES] key.
3) On the «Integ. Unit mode failuer diag» display screen, select the {Current Data Display & Save} and press the [YES] key.
4) On the «Data Display Menu» screen, select the {12 Data Display} and press the [YES] key.
5) Using the scroll key, scroll the display screen up or down until the desired data is shown.
<Ref. to LAN(diag)-15, DISPLAY OF ANALOG DATA, OPERATION, Subaru Select Monitor.> <Ref. to LAN(diag)-16, DISPLAY OF ON/OFF DATA, OPERATION, Subaru Select Monitor.> <Ref. to LAN(diag)-17, CONFIRMATION OF CURRENT SETTING, OPERATION, Subaru Select Monitor.>

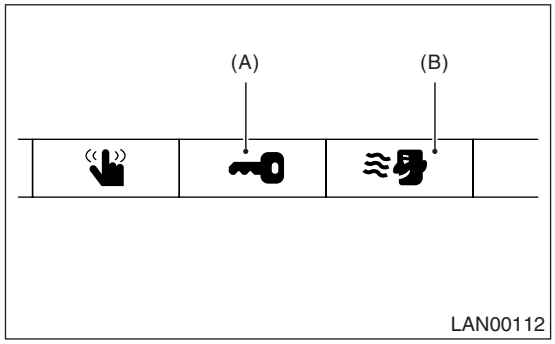
10.Function Setting (Customize)

A: OPERATION

1. WITHOUT SUBARU SELECT MONITOR

NOTE:
Applied to the Model with center display.

1) Display the information screen with pressing the “INFO” switch of center display.
2) Select “SET” on the touch panel at the right top of center display screen.
3) Select the item from “A: Keyless entry” or “B: Various setup” on the touch panel.



4) Change the setting on the touch panel which contains item to be changed.
5) Return to the information display screen and complete it.
Function setting item list

Item	Setting
Keyless	Auto lock
	Auto lock time setting
	Answerback hazard
Each function	Room light delay time
	Anti-lock out
	Rear defogger
	Wiper deicer

2. WITH SUBARU SELECT MONITOR

For detailed procedures of function setting (ECM customizing), refer to “SUBARU SELECT MONITOR”. <Ref. to LAN(diag)-21, FUNCTION SETTING (ECM CUSTOMIZING), OPERATION, Subaru Select Monitor.>

11.List of Diagnostic Trouble Code (DTC)

A: LIST

DTC	Item	Content of diagnosis	NOTE
None	Communication for initializing impossible	Open or short in Subaru Select Monitor communication line.	<Ref. to LAN(diag)-30, COMMUNICATION FOR INITIALIZING IMPOSSIBLE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
None	DTC is not stored.	Internal error of combination meter.	<Ref. to LAN(diag)-33, DIAGNOSTIC TROUBLE CODE (DTC) IS NOT STORED, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0100	Integ. unit system error	Body integrated unit internal error	<Ref. to LAN(diag)-33, DTC B0100 INTEG. UNIT SYSTEM ERROR, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0101	BATT power supply (Control) error	Open or short in battery power supply control circuit	<Ref. to LAN(diag)-34, DTC B0101 BATT P/SUPPLY MALFUNCTION CONT., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0102	BATT p/supply malfunction cont.	Open or short in BATT power backup circuit	<Ref. to LAN(diag)-36, DTC B0102 BATT P/SUPPLY MALFUNCTION CONT., Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0103	IGN power failure	Open or short in IGN power supply circuit	<Ref. to LAN(diag)-38, DTC B0103 IGNITION POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0104	ACC power failure	Open or short in ACC power supply circuit	<Ref. to LAN(diag)-40, DTC B0104 ACC POWER FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0106	shift lock circuit Failure	Ground short of shift lock circuit	<Ref. to LAN(diag)-42, DTC B0106 SHIFT LOCK CIRCUIT FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0107	R Fog lamp circuit Failure	Ground short of rear fog circuit	<Ref. to LAN(diag)-44, DTC B0107 R FOG LAMP CIRCUIT FAILURE, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0201	High speed CAN fail · error counter abnormal	Malfunction of high-speed CAN communication	<Ref. to LAN(diag)-46, DTC B0201 CAN-HS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0202	CAN-HS bus off	Any unit is cut communication.	<Ref. to LAN(diag)-47, DTC B0202 CAN-HS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0211	CAN-HS (EGI) data abnormal	Received error data from ECM.	<Ref. to LAN(diag)-51, DTC B0211 CAN-HS ECM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0212	CAN-HS (TCM) data abnormal	Received error data from TCM.	<Ref. to LAN(diag)-53, DTC B0212 CAN-HS TCM DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0213	CAN-HS VDC/ABS data abnormal	Received error data from VDC/ABS unit.	<Ref. to LAN(diag)-54, DTC B0213 CAN-HS VDC/ABS DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0221	CAN-HS ECM no-receive data	Not received error data from ECM.	<Ref. to LAN(diag)-56, DTC B0221 CAN-HS ECM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0222	CAN-HS TCM no-receive data	Not received error data from TCM	<Ref. to LAN(diag)-60, DTC B0222 CAN-HS TCM NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

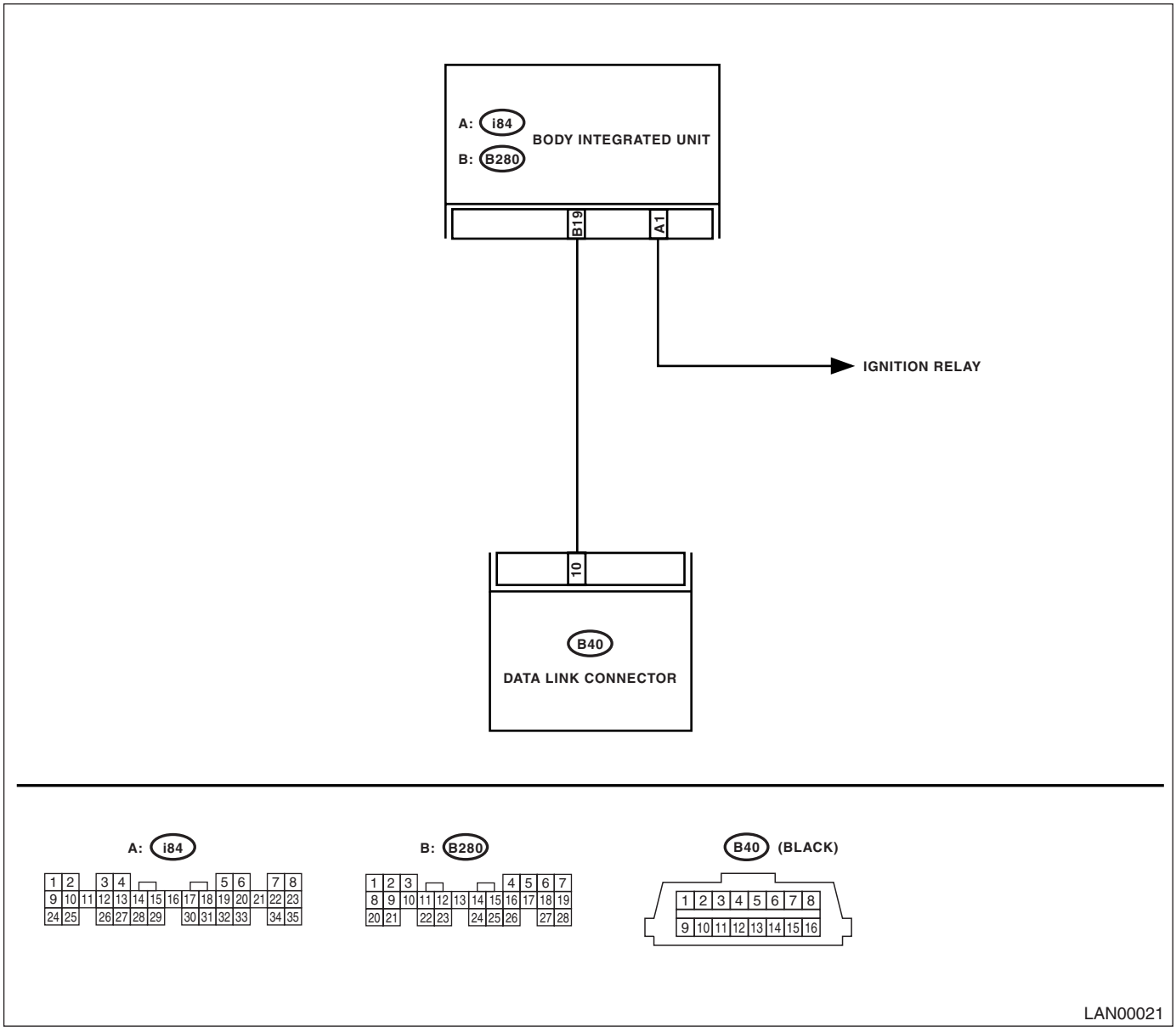
DTC	Item	Content of diagnosis	NOTE
B0223	CAN-HS VDC/ABS no-receive data	Not received error data from VDC/ABS unit.	<Ref. to LAN(diag)-62, DTC B0223 CAN-HS VDC/ABS NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0300	CAN-LS malfunction	Open or short in low-speed CAN circuit, on each side or both sides.	<Ref. to LAN(diag)-65, DTC B0300 CAN-LS MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0301	CAN-LS fail / error counter abnormal	Malfunction of low-speed CAN communication	<Ref. to LAN(diag)-68, DTC B0301 CAN-LS COUNTER ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0302	CAN-LS bus off	Any unit is cut communication.	<Ref. to LAN(diag)-70, DTC B0302 CAN-LS BUS OFF, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0311	CAN-LS meter unit data abnormal	Received error data from meter.	<Ref. to LAN(diag)-73, DTC B0311 CAN-LS METER UNIT DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0313	CAN-LS monitor data abnormal	Received error data from monitor unit.	<Ref. to LAN(diag)-74, DTC B0313 CAN-LS MONITOR DATA ABNORMAL, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0321	CAN-LS meter no-receive data	Not received error data from meter	<Ref. to LAN(diag)-75, DTC B0321 CAN-LS METER NO-RECEIVE DATA, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>
B0401	M collation NG	Malfunction related immobilizer	<Ref. to IM(diag)-15, List of Diagnostic Trouble Code (DTC).>
B0402	Immobilizer Key collation NG	Malfunction related immobilizer	<Ref. to IM(diag)-15, List of Diagnostic Trouble Code (DTC).>
B0403	E/G request NG	Malfunction related immobilizer	<Ref. to IM(diag)-15, List of Diagnostic Trouble Code (DTC).>
B0500	Keyless UART com. Malfunction	Open or short circuit in keyless UART circuit	<Ref. to LAN(diag)-77, DTC B0500 KEYLESS UART COM. MALFUNCTION, Diagnostic Procedure with Diagnostic Trouble Code (DTC).>

12.Diagnostic Procedure with Diagnostic Trouble Code (DTC)

A: COMMUNICATION FOR INITIALIZING IMPOSSIBLE

NOTE:
- DTC is displayed in the sequence of the amount of counter numbers.
- When more than two DTCs are displayed, perform the diagnosis of top of them.

DIAGNOSIS:
Subaru Select Monitor communication line is open or shorted.
TROUBLE SYMPTOM:
Not communicable with Subaru Select Monitor.
WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK IGNITION SWITCH.**	Is the ignition switch ON?	Go to step **2.**	Turn the ignition switch to ON, and select Integ. Unit mode using Subaru Select Monitor.
2	**CHECK BATTERY.** 1) Turn the ignition switch to OFF. 2) Measure the battery voltage.	Is the voltage more than 11 V?	Go to step **3.**	Charge or replace the battery.
3	**CHECK BATTERY TERMINAL.**	Is there poor contact at battery terminal?	Repair or tighten the battery terminal.	Go to step **4.**
4	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Using the Subaru Select Monitor, check whether communication to other systems can be executed normally.	Are system and model year displayed?	Go to step **7.**	Go to step **5.**
5	**CHECK COMMUNICATION OF SUBARU SELECT MONITOR.** 1) Turn the ignition switch to OFF. 2) Disconnect the body integrated unit connector. 3) Turn the ignition switch to ON. 4) Check whether communication to other systems can be executed normally.	Are system and model year displayed?	Go to step **7.**	Go to step **6.**
6	**CHECK HARNESS CONNECTOR BETWEEN EACH CONTROL UNIT AND SUBARU SELECT MONITOR.** 1) Turn the ignition switch to ON. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between data link connector and chassis ground. ***Connector & terminal*** ***(B40) No. 10 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **7.**	Repair the harness and connector between each control unit and Subaru Select Monitor.
7	**CHECK OUTPUT SIGNAL TO BODY INTEGRATED UNIT.** 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit and chassis ground. ***Connector & terminal*** ***(B40) No. 10 (+) — Chassis ground (−):***	Is the voltage less than 1 V?	Go to step **8.**	Repair the harness and connector between each control unit and Subaru Select Monitor.
8	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND DATA LINK CONNECTOR.** Measure the resistance between body integrated unit and data link connector. ***Connector & terminal*** ***(B40) No. 10 — (B280) No. 19:***	Is the resistance less than 1 Ω?	Go to step **9.**	Repair the harness and connector between body integrated unit and Subaru Select Monitor.
9	**CHECK INSTALLATION OF BODY INTEGRATED UNIT CONNECTOR.** Turn the ignition switch to OFF.	Is the body integrated unit connector inserted into body integrated unit until the clamp locks onto it?	Go to step **10.**	Insert the body integrated unit connector into body integrated unit.

	Step	Check	Yes	No
10	**CHECK POWER SUPPLY CIRCUIT.** 1) Turn the ignition switch to ON (engine OFF). 2) Measure the ignition voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **11.**	Repair the open circuit of harness between the body integrated unit and battery.
11	**CHECK HARNESS CONNECTOR BETWEEN BODY INTEGRATED UNIT AND CHASSIS GROUND.** 1) Turn the ignition switch to OFF. 2) Disconnect the connector from body integrated unit. 3) Measure the harness resistance between the body integrated unit and chassis ground. ***Connector & terminal*** ***(B280) No. 19 — Chassis ground:***	Is the resistance more than 1 MΩ?	Go to step **12.**	Repair the poor contact of harness between the body integrated unit and ground.
12	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact at control unit ground and Subaru Select Monitor?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Repair the poor contact connector.

CAUTION:
When replacing body integrated unit on the model with immobilizer system, refer to "REGISTRATION MANUAL FOR IMMOBILIZER".

B: DIAGNOSTIC TROUBLE CODE (DTC) IS NOT STORED

DTC DETECTING CONDITION:

Defective combination meter

DIAGNOSIS:

- Freeze frame data in odo/trip meter is not cleared.
- "No trouble code" is displayed on Subaru Select Monitor.

NOTE:
If DTC is not displayed on Subaru Select Monitor, LAN communication System should be OK.

	Step	Check	Yes	No
1	**CHECK FREEZE FRAME DATA WITH COMBINATION METER.** Turn the ignition switch to ON.	Is the freeze frame data displayed?	Perform the diagnosis according to freeze frame data.	Go to step **2.**
2	**CHECK COMBINATION METER.** Perform the self-diagnosis of combination meter.	Is combination meter OK?	Go to step **3.**	Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>
3	**CHECK BODY INTEGRATED UNIT.** 1) Display the current data of ECM using Subaru Select Monitor. 2) Check data of "body integrated unit data received".	Is the "Yes" displayed?	Go to step **4.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
4	**CHECK BODY INTEGRATED UNIT.** 1) Display the current data of ECM using Subaru Select Monitor. 2) Check data of "body integrated unit counter update".	Is the "Yes" displayed?	Repair the poor contact connector.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

C: DTC B0100 INTEG. UNIT SYSTEM ERROR

DTC DETECTING CONDITION:

System error in body integrated unit

TROUBLE SYMPTOM:

- Check light comes on in the combination meter, and displays freeze frame data "Er IU".
- LAN communication immobilizer function may not be executed normally.

	Step	Check	Yes	No
1	**CHECK ALL DTCS.**	Is DTC concerning ECM displayed?	Go to step **2.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
2	**CHECK DTC CONCERNING ECM.**	Is output DTC on ECM concerning CAN communication error?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Perform the diagnosis according to DTC concerning ECM.

D: DTC B0101 BATT P/SUPPLY MALFUNCTION CONT.

DTC DETECTING CONDITION:

BATT power supply control circuit is open or shorted.

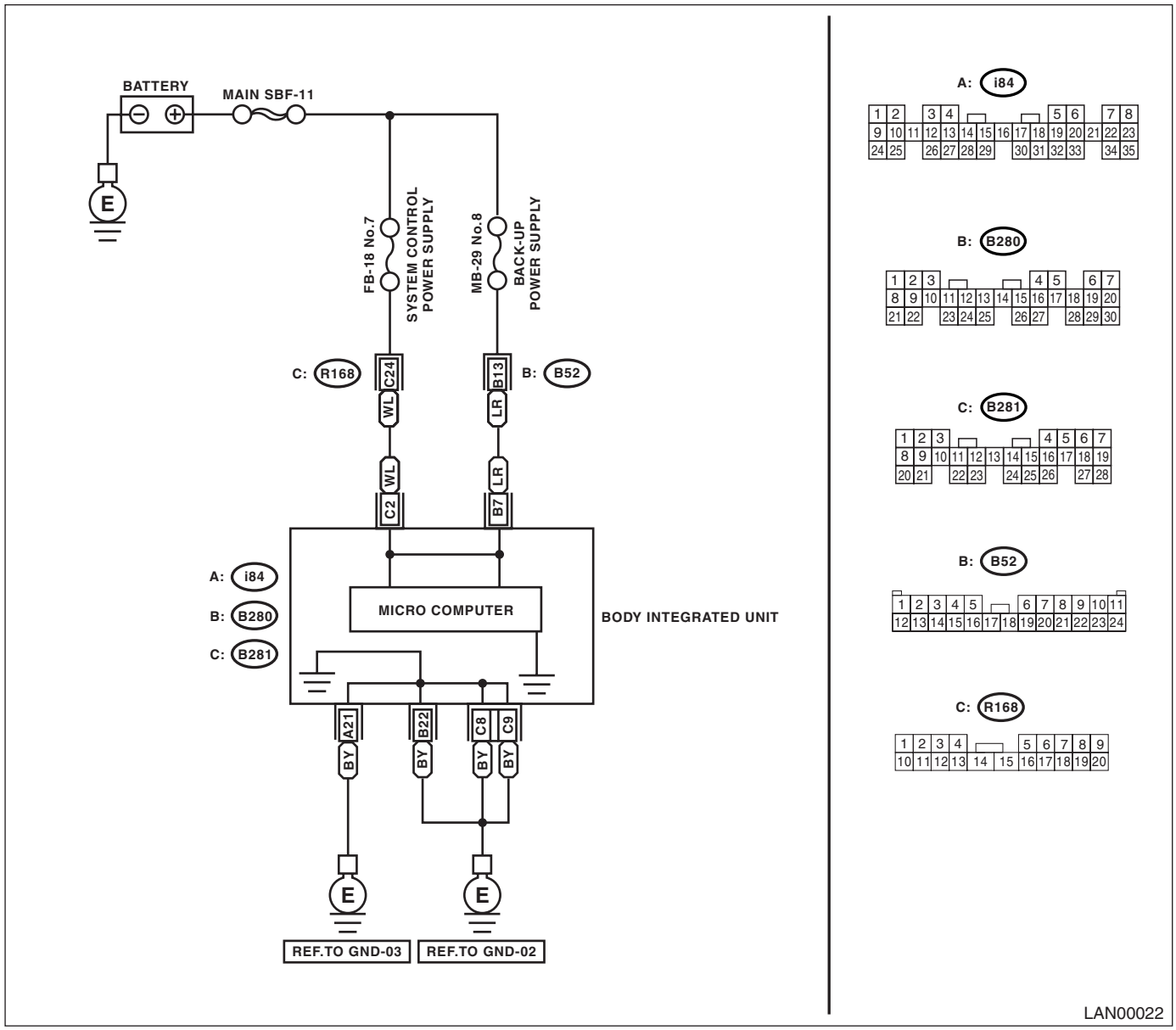
TROUBLE SYMPTOM:

No malfunction occurs with back-up power supply function.

NOTE:

When some B0102 BATT p/supply malfunction backup are output at the same time, all function of body integrated unit may not function.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 7).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 7).	Is the fuse blown out?	Replace the fuse (No. 7). If the replaced fuse has blown out easily, repair the short circuit in harness between fuse (No. 7) and body integrated unit.	Go to step **2.**
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (B281) from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B281) No. 2 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in body integrated unit connector?	Repair the poor contact connector.	Go to step **4.**
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Temporary poor contact occurs.

E: DTC B0102 BATT P/SUPPLY MALFUNCTION CONT.

DTC DETECTING CONDITION:

BATT power backup circuit is open or shorted.

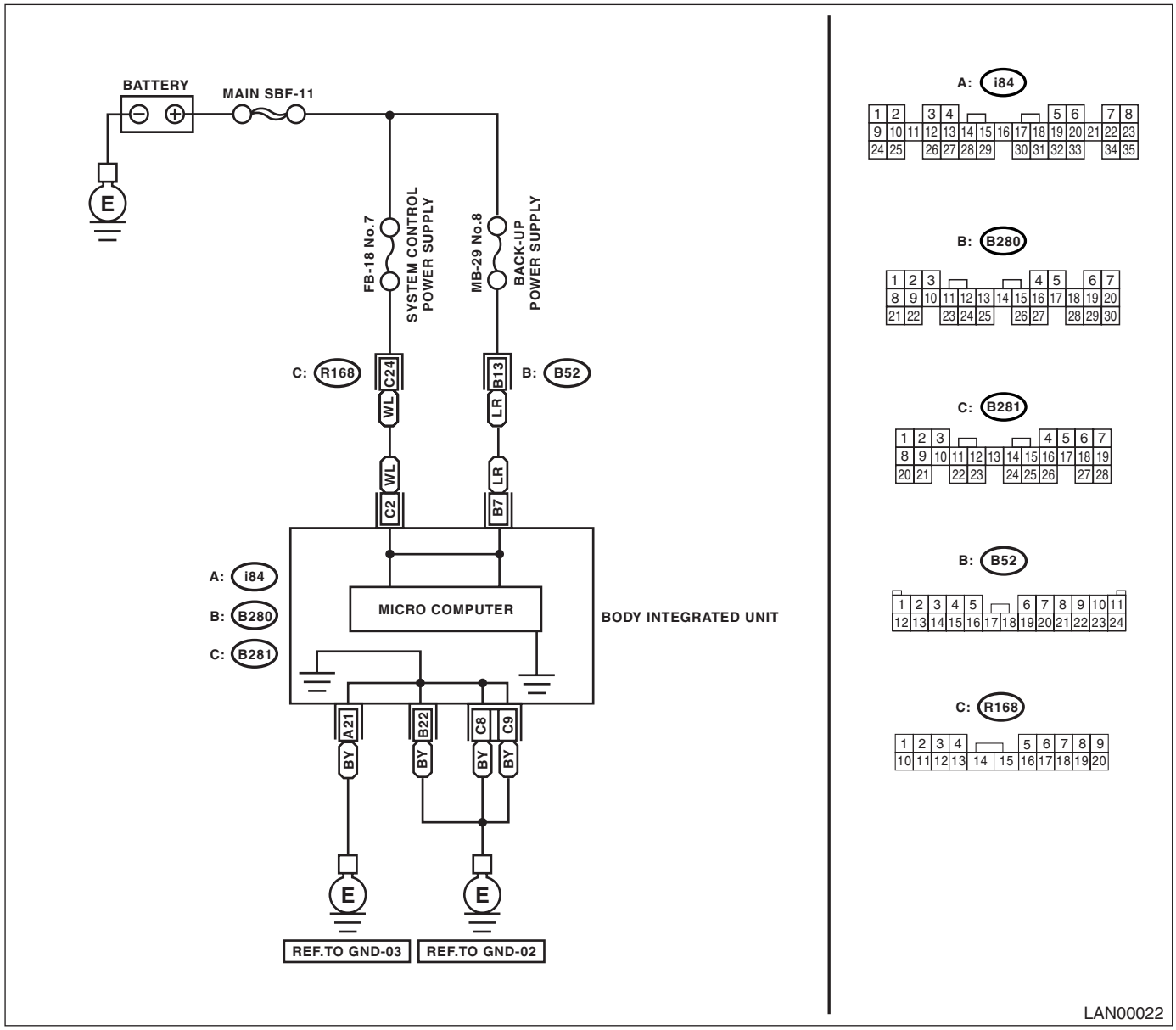
TROUBLE SYMPTOM:

- Engine malfunction indicator light may be illuminates.
- Keyless entry, room light, key illumination does not operate.
- “En IU” may display in combination meter.

NOTE:

When some B0101 BATT p/supply malfunction cont. are output at the same time, all function of body integrated unit may not function.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 8).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 8).	Is the fuse blown out?	Replace the fuse (No. 8). If the replaced fuse has blown out easily, repair the short circuit in harness between fuse (No. 8) and body integrated unit.	Go to step **2.**
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (B280) from body integrated unit. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 7 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT IN CONNECTORS.**	Is there poor contact in body integrated unit connector?	Repair the poor contact connector.	Go to step **4.**
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Temporary poor contact occurs.

F: DTC B0103 IGNITION POWER FAILURE

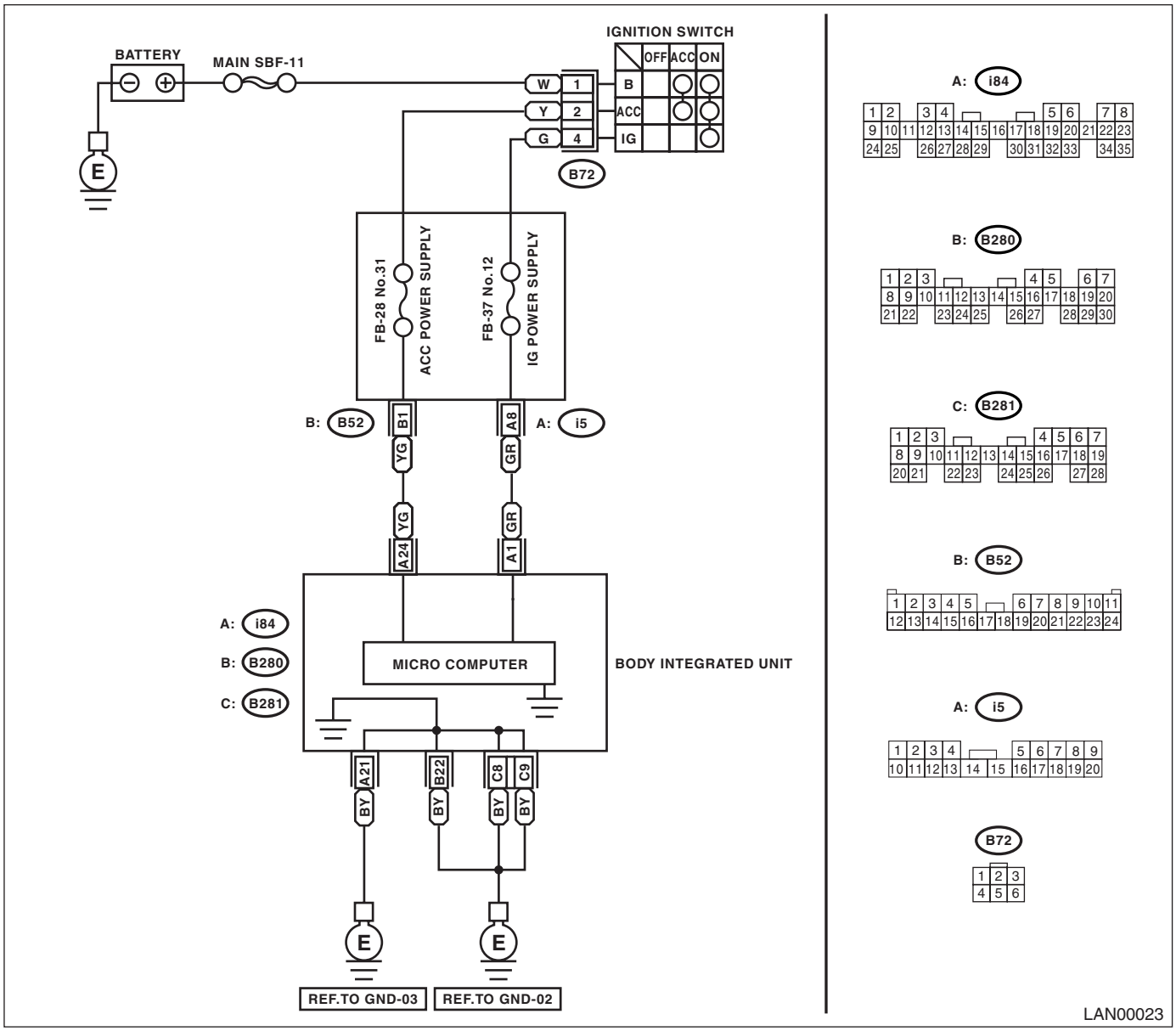
DTC DETECTING CONDITION:

IGN power supply circuit is open or shorted.

TROUBLE SYMPTOM:

Symptom that illuminating engine malfunction indicator light, “Er HC” high speed CAN error display may be occurred.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 12).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 12).	Is the fuse blown out?	Replace the fuse (No. 12). If the replaced fuse has blown out easily, repair the short circuit in harness between fuse (No. 12) and body integrated unit.	Go to step **2.**
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (i84) from body integrated unit. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 1 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in body integrated unit connector?	Repair the poor contact connector.	Go to step **4.**
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is the same DTC displayed?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Temporary poor contact occurs.

G: DTC B0104 ACC POWER FAILURE

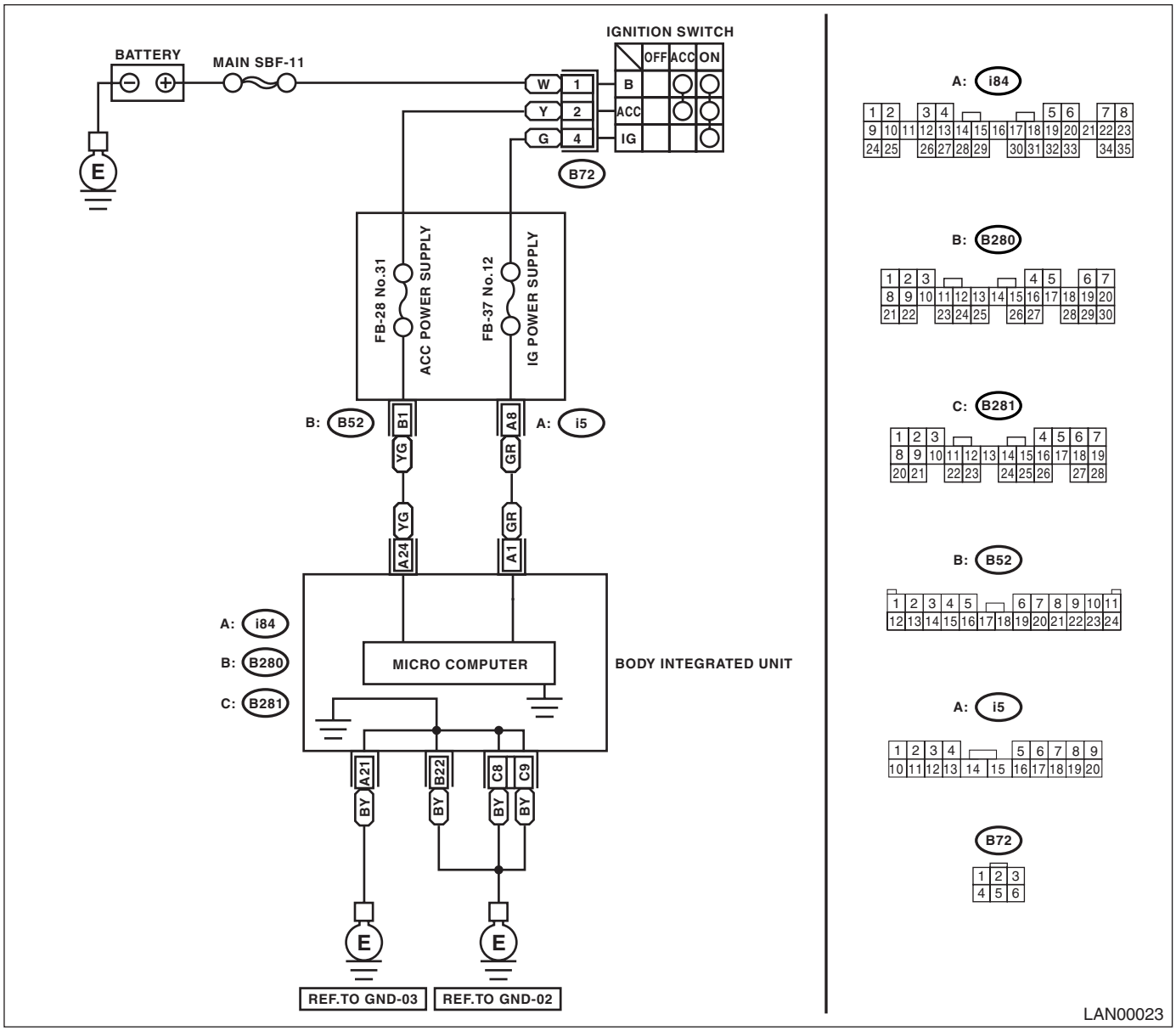
DTC DETECTING CONDITION:

ACC power supply circuit is open or shorted.

TROUBLE SYMPTOM:

Rear wiper may not operate on ACC.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK FUSE (No. 31).** 1) Turn the ignition switch to OFF. 2) Remove the fuse (No. 31).	Is the fuse blown out?	Replace the fuse (No. 31). If the replaced fuse has blown out easily, repair the short circuit in harness between fuse (No. 31) and body integrated unit.	Go to step **2.**
2	**CONTINUITY CHECK OF WIRING HARNESS.** 1) Disconnect the connector (i84) from body integrated unit. 2) Turn the ignition switch to ON. 3) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(i84) No. 24 (+) — Chassis ground (−):***	Is the voltage more than 10 V?	Go to step **3.**	Repair the harness for open or shorted circuit between body integrated unit and fuse.
3	**CHECK POOR CONTACT IN CONNECTOR.**	Is there poor contact in body integrated unit connector?	Repair the poor contact connector.	Go to step **4.**
4	**CHECK BODY INTEGRATED UNIT HARNESS.** 1) Connect all the connectors. 2) Perform the clear memory mode. 3) Read DTC.	Is DTC displayed?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Temporary poor contact occurs.

H: DTC B0106 SHIFT LOCK CIRCUIT FAILURE

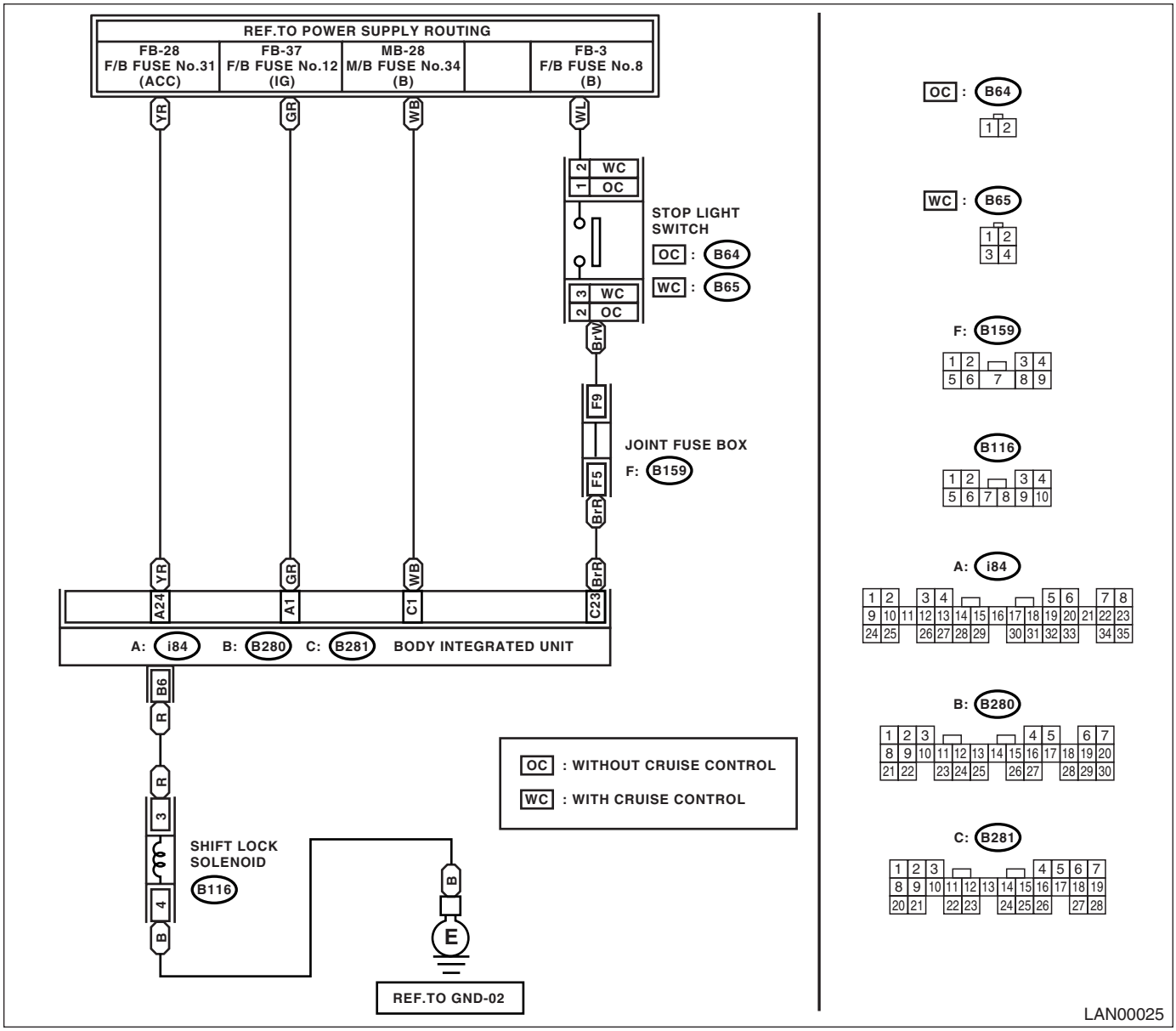
DTC DETECTING CONDITION:

Shift lock circuit is ground shorted.

TROUBLE SYMPTOM:

Key interlock does not unlock or lock.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance 10 — 30 Ω?	Go to step **5.**	Go to step **2.**
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Disconnect the shift lock solenoid connector. 3) Measure the resistance between body integrated unit connector and shift lock solenoid connector. ***Connector & terminal*** ***(B280) No. 6 — (B116) No. 3:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair or replace the open or short circuit of harness.
3	**CHECK SHIFT LOCK SOLENOID.** 1) Disconnect the shift lock solenoid connector. 2) Measure the internal resistance of shift lock solenoid. ***Connector & terminal*** ***(B116) No. 3 — No. 4:***	Is the resistance 10 — 30 Ω?	Go to step **4.**	Replace the shift lock solenoid.
4	**CHECK GROUND CIRCUIT.** 1) Disconnect the shift lock solenoid connector. 2) Measure the resistance between shift lock solenoid connector and chassis ground. ***Connector & terminal*** ***(B116) No. 4 — Chassis ground:***	Is the resistance less than 10 Ω?	Temporary poor contact occurs. Check the connection of each terminals, and then repair them if necessary.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
5	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector (B280) and chassis ground. ***Connector & terminal*** ***(B280) No. 6 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Repair or replace the short circuit of harness.

I: DTC B0107 R FOG LAMP CIRCUIT FAILURE

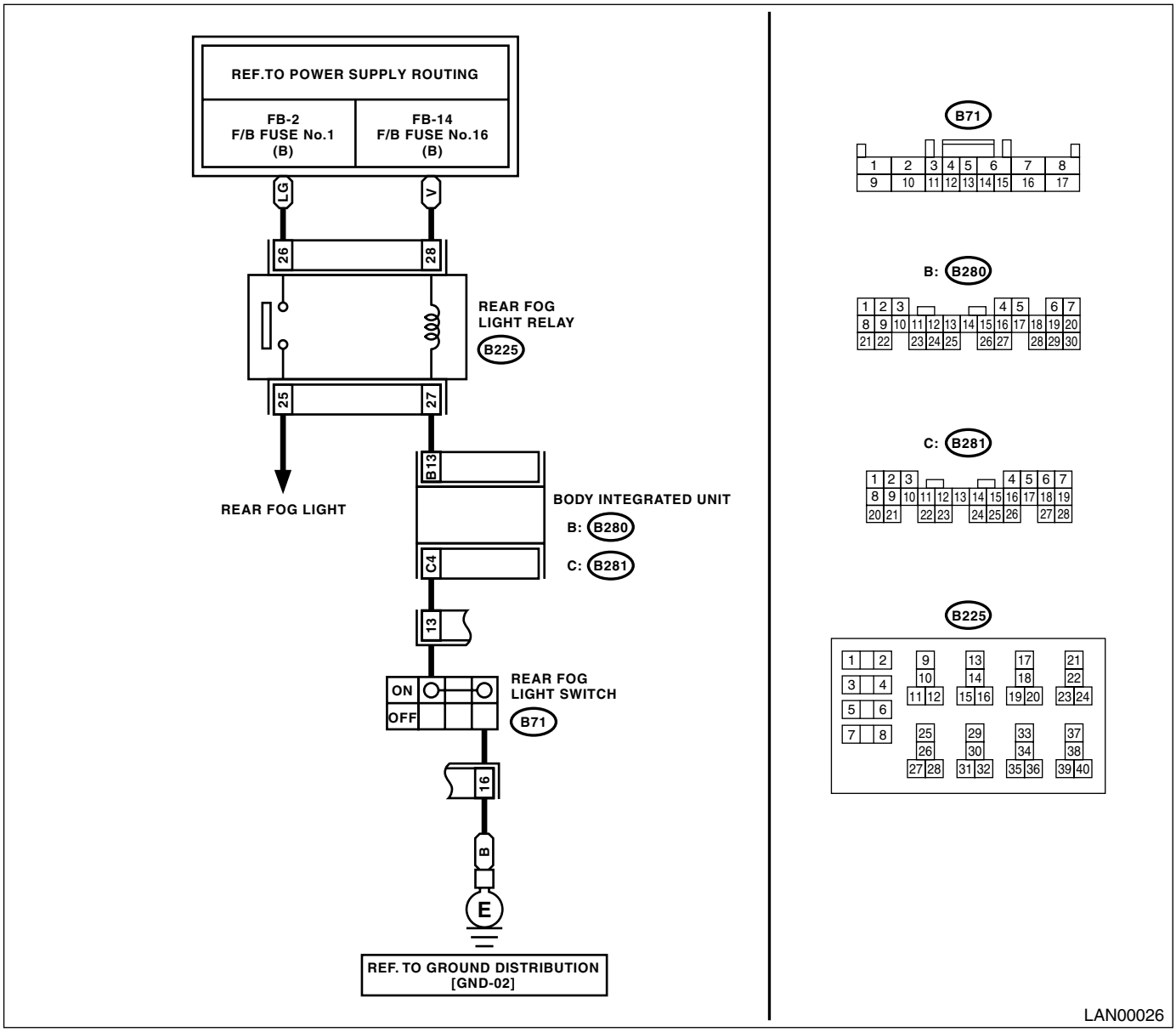
DTC DETECTING CONDITION:

Rear fog input/output circuits are ground shorted.

TROUBLE SYMPTOM:

- Rear fog light does not come on or go off.
- Indicator in the combination meter may not be goes off.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 13 (+) — Chassis ground (−):***	Is the voltage 10 — 13 V?	Temporary poor contact.	Go to step **2.**
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Disconnect the rear fog light relay. 3) Measure the resistance between body integrated unit connector and rear fog light relay connector. ***Connector & terminal*** ***(B280) No. 13 — (B225) No. 27:***	Is the resistance less than 1 Ω?	Go to step **3.**	Repair the open or short circuit of harness.
3	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Disconnect the rear fog light relay. 3) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 13 — Chassis ground:***	Is the resistance more than 1 MΩ?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Repair or replace the short circuit of harness.

J: DTC B0201 CAN-HS COUNTER ABNORMAL

DTC DETECTING CONDITION:

High speed CAN communication of body integrated unit which monitoring the error data and non-received data are faulty.

TROUBLE SYMPTOM:

- "Er HC" is displayed in odo/trip meter.
- Engine malfunction indicator light illuminates.

	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 55 — 65 Ω?	Temporary poor contact occurs.	Go to step **2.**
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance more than 30 MΩ?	Repair or replace the open circuit of harness.	Go to step **3.**
3	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the input voltage between harness connector and chassis ground while turning the ignition switch to ON. ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (−):*** ***(B280) No. 30 (+) — Chassis ground (−):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Go to step **4.**
4	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair or replace the short circuit of harness.	Go to step **5.**
5	**CHECK BODY INTEGRATED UNIT.** Read the data of "body integrated unit data received" on ECM data display using Subaru Select Monitor.	Is the "Yes" displayed?	Go to step **6.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
6	**CHECK BODY INTEGRATED UNIT.** Read the data of "body integrated unit counter update" on ECM data display using Subaru Select Monitor.	Is the "Yes" displayed?	Temporary poor contact occurs. Check the connected condition of connector, read the DTC again to make sure that the DTC is not output.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

K: DTC B0202 CAN-HS BUS OFF

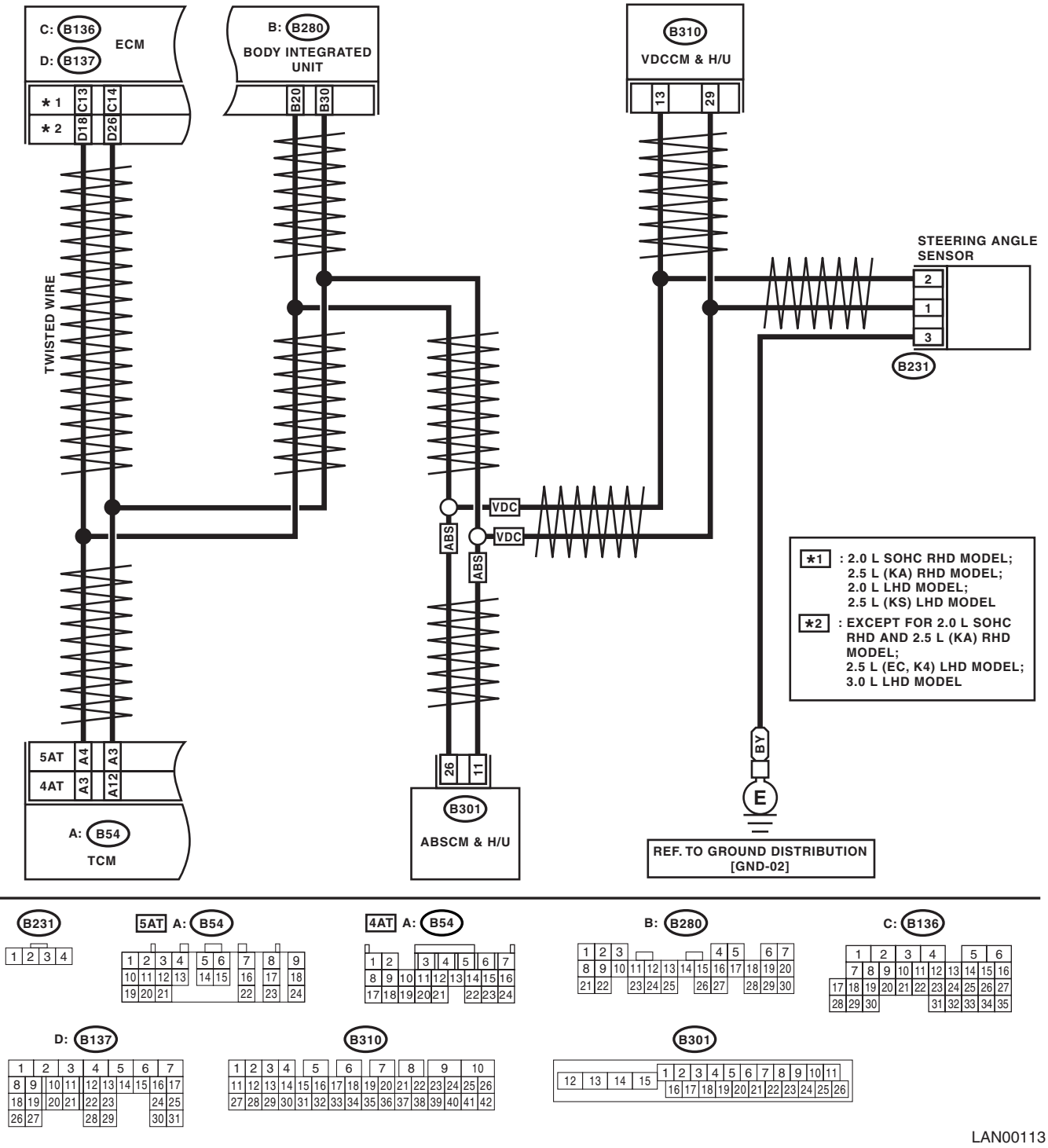
DTC DETECTING CONDITION:

- Locate the unit or CAN line which trouble occurs, and repair and replace it.
- Not received data and error data may be detected at the same time.

TROUBLE SYMPTOM:

"Er HC" is displayed in odo/trip meter.

WIRING DIAGRAM:



LAN00113

	Step	Check	Yes	No
1	**CHECK TCM.** 1) Disconnect the TCM connector (B54). 2) Perform the clear memory of body integrated unit. <Ref. to LAN(diag)-20, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read DTC of body integrated unit.	Is DTC (B0202) displayed?	Go to step **2.**	Replace the TCM. <Ref. to 4AT-140, Transmission Control Device.> <Ref. to 5AT-61, Transmission Control Module (TCM).>
2	**CHECK STEERING ANGLE SENSOR.** 1) Disconnect the steering angle sensor connector (B231). 2) Perform the clear memory mode of body integrated unit. <Ref. to LAN(diag)-20, CLEAR MEMORY MODE, OPERATION, Subaru Select Monitor.> 3) Read DTC of body integrated unit.	Is DTC (B0202) displayed?	Go to step **3.**	Replace the steering angle sensor. <Ref. to VDC-16, REPLACEMENT, Steering Angle Sensor.>
3	**CHECK BODY INTEGRATED UNIT.** 1) Disconnect the body integrated unit connector (B280). 2) Read the data between VDC/ABSCM and ECM. Check item: • Engine speed • Average front wheel speed (value on constant driving)	Engine speed, front wheel speed is correctly communicated. (Appears same value)	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Go to step **4.**
4	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 55 — 65 Ω?	Go to step **10.**	Go to step **5.**
5	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 115 — 125 Ω?	Go to step **7.**	Go to step **6.**
6	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance more than 30 MΩ?	Open harness on related line of body integrated unit. Repair or replace the open circuit of harness.	Go to step **7.**
7	**CHECK HARNESS.** 1) Disconnect the VDC/ABSCM connector (ABS:B301, VDC:310). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***ABS*** ***(B301) No. 11 — No. 26:*** ***VDC*** ***(B310) No. 13 — No. 29:***	Is the resistance 115 — 125 Ω?	Go to step **8.**	Go to step **9.**

	Step	Check	Yes	No
8	**CHECK VDC/ABSCM.** 1) Disconnect the VDC/ABSCM connector (ABS:B301, VDC:310). 2) Measure the resistance between VDC/ABSCM terminals. ***Connector & terminal*** ***ABS*** ***(B301) No. 11 — No. 26:*** ***VDC*** ***(B310) No. 13 — No. 29:***	Is the resistance 115 — 125 Ω?	Go to step **9.**	Open harness in end resistance of VDC/ABSCM. Replace the VDC/ABSCM. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
9	**CHECK ECM.** 1) Disconnect the ECM connector (*1: B136, *2: B137). 2) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ****1: 2.0 L SOHC RHD model, 2.5 L (KA) RHD model, 2.0 L LHD model, 2.5 L (KS) LHD model*** ***(B136) No. 13 — No. 14:*** ****2: Except for 2.0 L SOHC RHD and 2.5 L (KA) RHD model, 2.5 L (EC, K4) LHD model, 3.0 L LHD model*** ***(B137) No. 18 — No. 26:***	Is the resistance 115 — 125 Ω?	Repair or replace the open circuit of harness connector.	Open harness in end resistance of ECM. Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>
10	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance less than 10 Ω? (Ground)	Repair or replace the ground short circuit of the harness.	Go to step **11.**
11	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (−):*** ***(B280) No. 30 (+) — Chassis ground (−):***	Is the voltage more than 6 V? (Power)	Repair or replace the short circuit of harness.	Go to step **12.**
12	**CHECK DTC.** Read the DTC of ECM using Subaru Select Monitor. <Ref. to EN(H4SO 2.0)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4DOTC)(diag)-21, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Go to step **13.**

Step		Check	Yes	No
13	**CHECK DTC.** Read the DTC of VDC/ABSCM using Subaru Select Monitor. <Ref. to ABS(diag)-15, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> <Ref. to VDC(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Go to step **14.**
14	**CHECK DTC.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> <Ref. to 5AT(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

L: DTC B0211 CAN-HS ECM DATA ABNORMAL

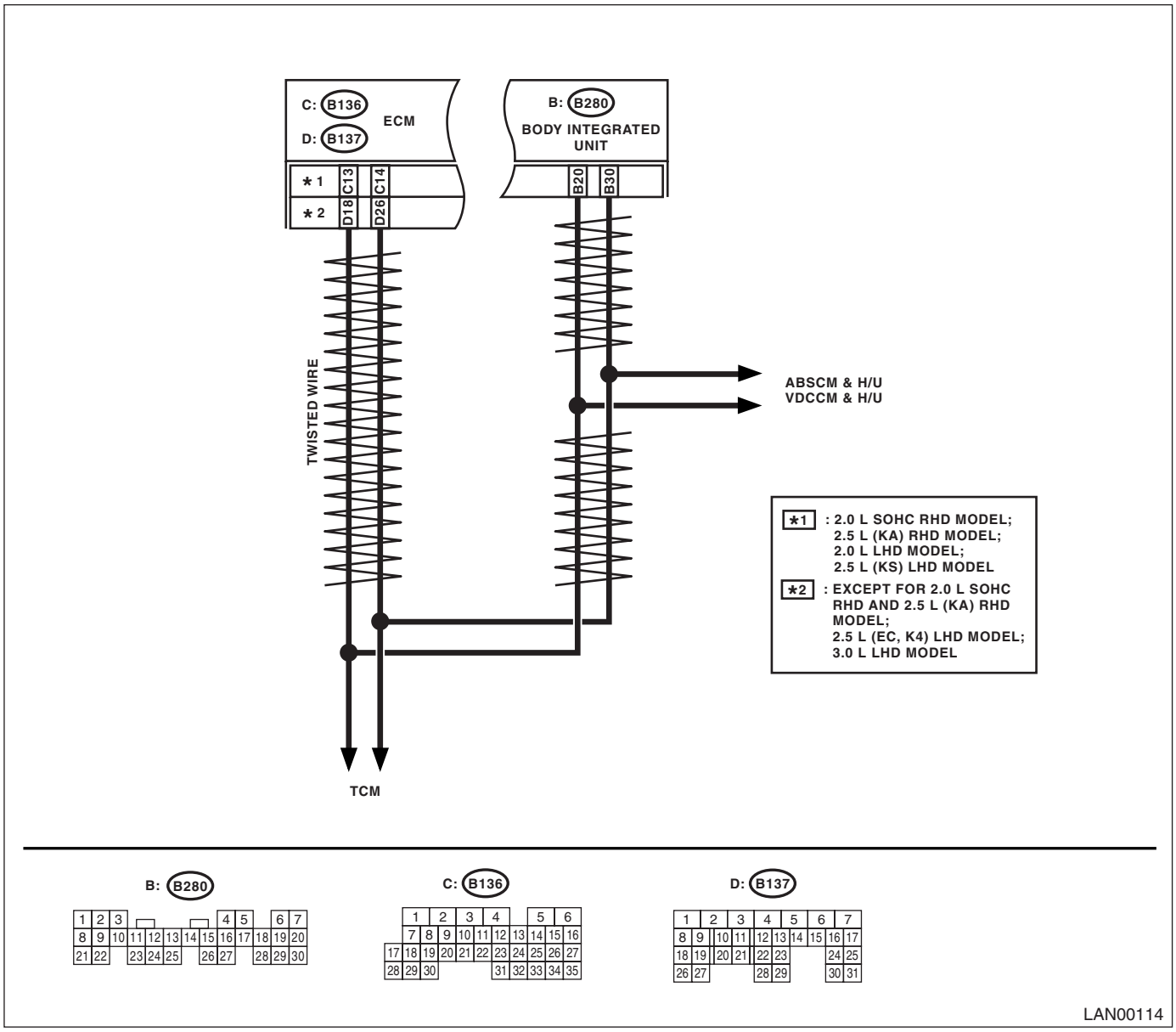
DTC DETECTING CONDITION:

Defective data from ECM.

TROUBLE SYMPTOM:

"Er HC" or "Er EG" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK ECM.** Read the DTC of ECM using Subaru Select Monitor.	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

M: DTC B0212 CAN-HS TCM DATA ABNORMAL

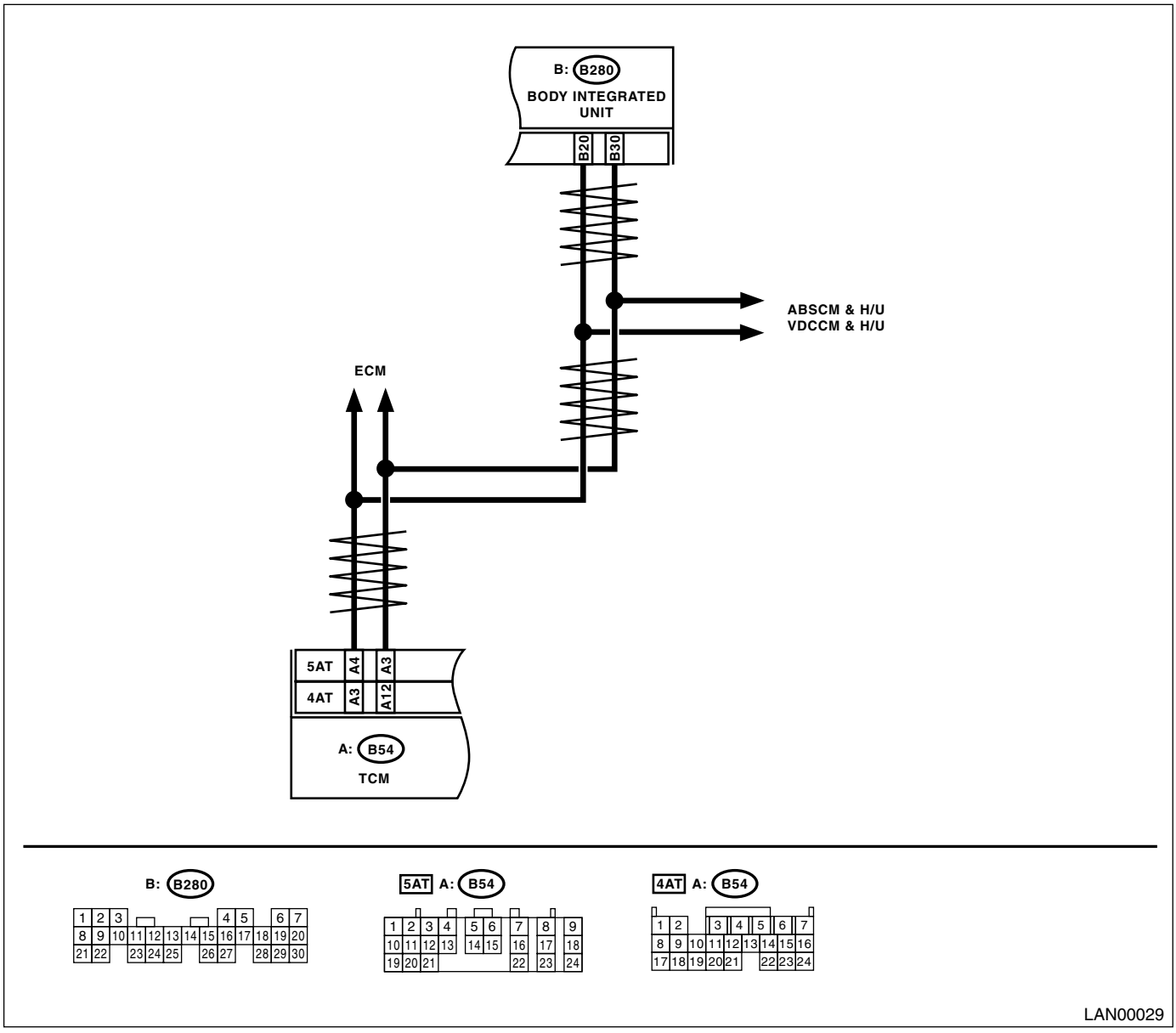
DTC DETECTING CONDITION:

TCM error, or harness between the main harness splice and TCM is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

- SPORT indicator light blinks.
- "Er HC" or "Er tC" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK TCM.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> <Ref. to 5AT(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC other than "CAN communication" displayed?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).> <Ref. to 5AT-61, Transmission Control Module (TCM).>

N: DTC B0213 CAN-HS VDC/ABS DATA ABNORMAL

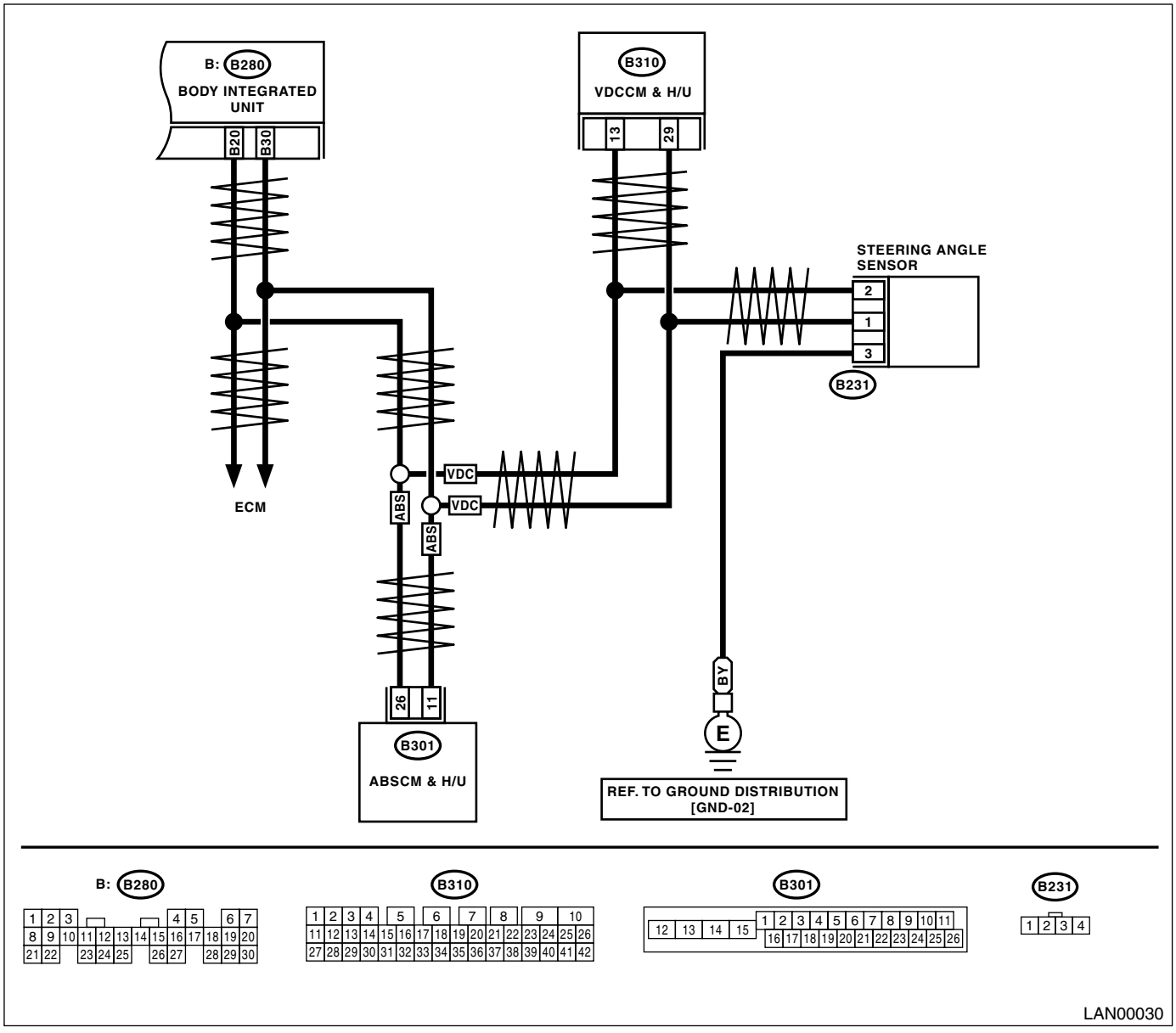
DTC DETECTING CONDITION:

VDC/ABSCM body error, or harness between the main harness splice and TCM is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

- ABS warning light and VDC warning light come on.
- “Er HC” or “Er Ab” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK VDC/ABSCM.** Read the DTC of VDC/ABSCM using Subaru Select Monitor.	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the VDC/ABSCM. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>

O: DTC B0221 CAN-HS ECM NO-RECEIVE DATA

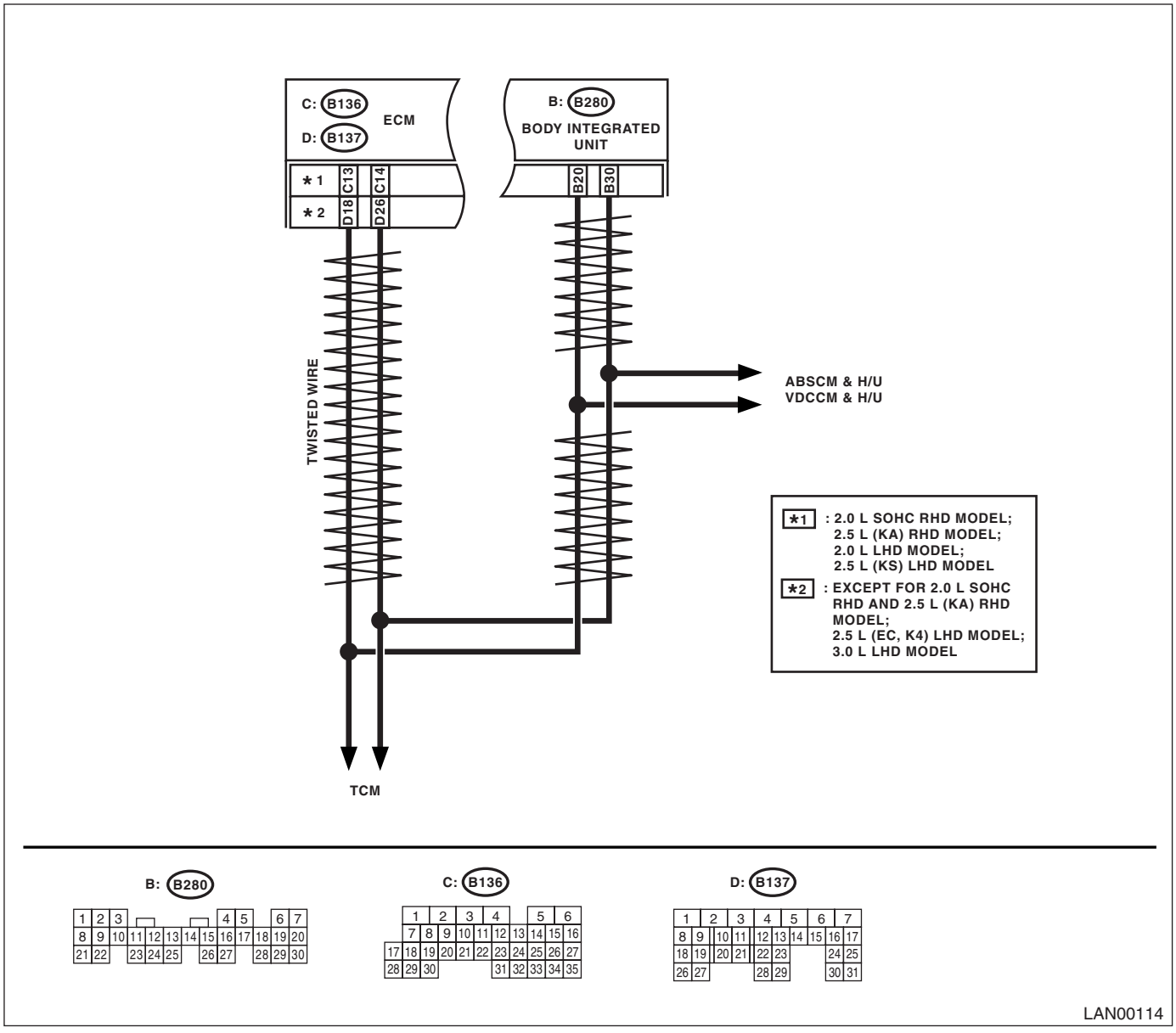
DTC DETECTING CONDITION:

Defective ECM. (If error is in the main harness, Diagnostic Trouble Code (DTC) P0600 High-speed CAN circuit is input simultaneously.)

TROUBLE SYMPTOM:

- Engine malfunction indicator light illuminates.
- “Er HC” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 55 — 65 Ω? (Standard 60 Ω)	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H4SO 2.0)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4SO 2.5)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4DOTC)(diag)-21, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H6DO)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>	Go to step **2.**
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280). 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 115 — 125 Ω? (End resistance or main line is open)	Go to step **3.**	Related line of body integrated unit is open when ∞ Ω. Repair or replace the open circuit of harness.

	Step	Check	Yes	No
3	**CHECK HARNESS.** 1) Disconnect the ECM connector (*1: B136, *2: B137). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ****1: 2.0 L SOHC RHD model, 2.5 L (KA) RHD model, 2.0 L LHD model, 2.5 L (KS) LHD model*** ***(B136) No. 13 — No. 14:*** ****2: Except for 2.0 L SOHC RHD and 2.5 L (KA) RHD model, 2.5 L (EC, K4) LHD model, 3.0 L LHD model*** ***(B137) No. 18 — No. 26:***	Is the resistance 115 — 125 Ω? (End resistance standard 120 Ω)	Go to step **4.**	Go to step **5.**
4	**CHECK ECM.** 1) Disconnect the ECM connector (*1: B136, *2: B137). 2) Measure the resistance between ECM connector terminals. ***Connector & terminal*** ****1: 2.0 L SOHC RHD model, 2.5 L (KA) RHD model, 2.0 L LHD model, 2.5 L (KS) LHD model*** ***(B136) No. 13 — No. 14:*** ****2: Except for 2.0 L SOHC RHD and 2.5 L (KA) RHD model, 2.5 L (EC, K4) LHD model, 3.0 L LHD model*** ***(B137) No. 18 — No. 26:***	Is the resistance 115 — 125 Ω?	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H4SO 2.0)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4SO 2.5)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4DOTC)(diag)-21, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H6DO)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>	End resistance is open. Replace the ECM. <Ref. to FU(H4SO 2.0)-34, Engine Control Module (ECM).> <Ref. to FU(H4SO 2.5)-36, Engine Control Module (ECM).> <Ref. to FU(H4DOTC)-35, Engine Control Module (ECM).> <Ref. to FU(H6DO)-34, Engine Control Module (ECM).>

	Step	Check	Yes	No
5	**CHECK HARNESS.** 1) Disconnect the ECM connector (*1: B136, *2: B137). 2) Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ****1: 2.0 L SOHC RHD model, 2.5 L (KA) RHD model, 2.0 L LHD model, 2.5 L (KS) LHD model*** ***(B136) No. 13 — Chassis ground:*** ***(B136) No. 14 — Chassis ground:*** ****2: Except for 2.0 L SOHC RHD and 2.5 L (KA) RHD model, 2.5 L (EC, K4) LHD model, 3.0 L LHD model*** ***(B137) No. 18 — Chassis ground:*** ***(B137) No. 26 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair or replace the short circuit of harness.	Go to step **6.**
6	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280), ECM connector (*1: B136, *2: B137), TCM connector (B54), ABS (B301)/ VDC (B310) CM connector. 2) Measure the input voltage between harness connector and chassis ground while turning the ignition switch to ON. ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (−):*** ***(B280) No. 30 (+) — Chassis ground (−):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Read the DTC of ECM. Perform the diagnosis according to DTC. <Ref. to EN(H4SO 2.0)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4SO 2.5)(diag)-26, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H4DOTC)(diag)-21, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.> <Ref. to EN(H6DO)(diag)-25, READ DIAGNOSTIC TROUBLE CODE (DTC) FOR ENGINE (NORMAL MODE), OPERATION, Subaru Select Monitor.>

P: DTC B0222 CAN-HS TCM NO-RECEIVE DATA

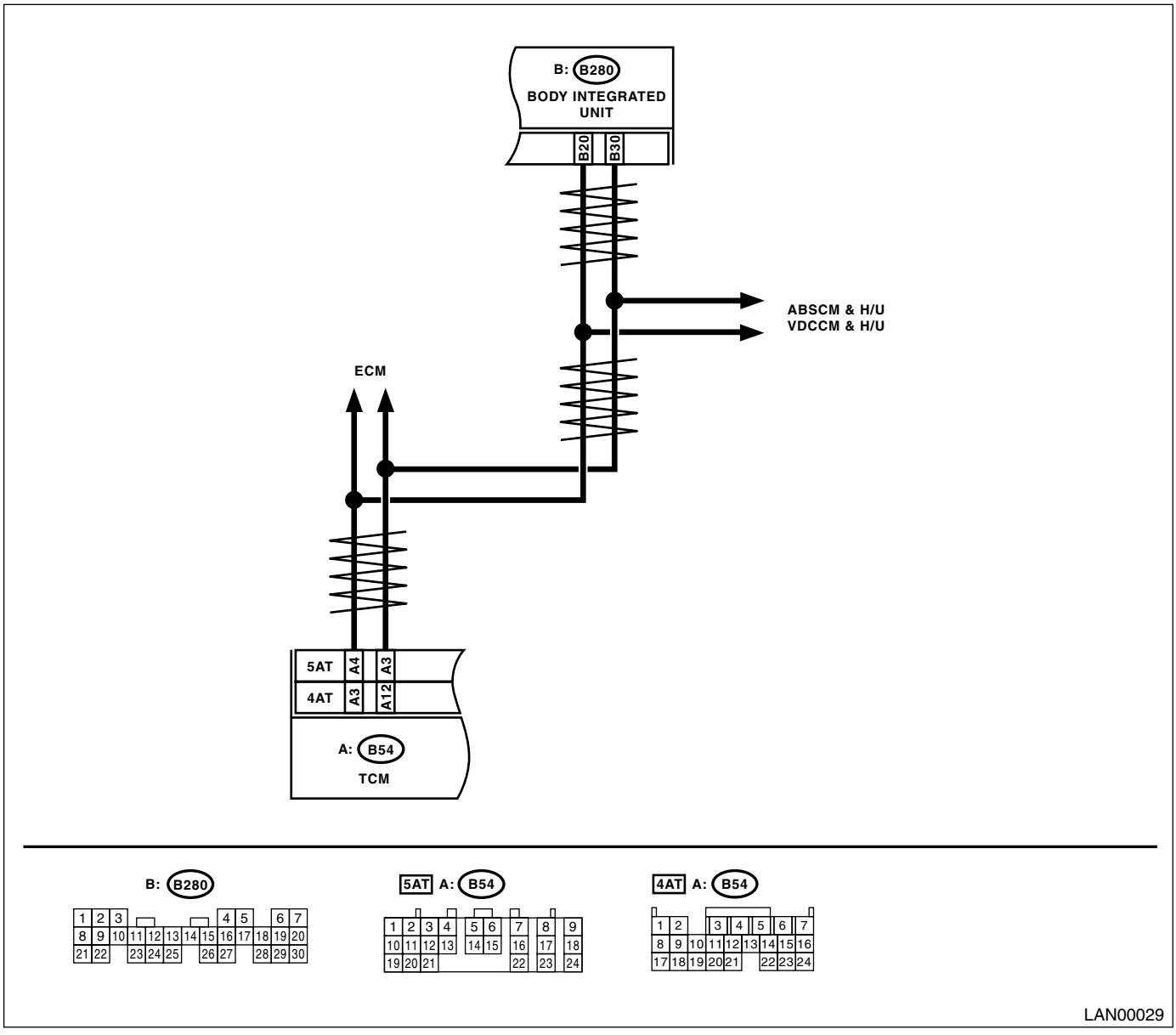
DTC DETECTING CONDITION:

TCM error, or harness between the main harness splice and TCM is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

- Engine malfunction indicator light illuminates.
- “Er HC” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the TCM connector (B54) 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***4AT MODEL*** ***(B54) No. 3 — No. 12:*** ***5AT MODEL*** ***(B54) No. 3 — No. 4:***	Is the resistance ∞ Ω?	Open harness in related lines of TCM. Repair or replace the open circuit of harness.	Go to step **2.**
2	**CHECK TCM.** Read the DTC of TCM using Subaru Select Monitor. <Ref. to 4AT(diag)-17, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.> <Ref. to 5AT(diag)-16, READ DIAGNOSTIC TROUBLE CODE (DTC), OPERATION, Subaru Select Monitor.>	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC.	Replace the TCM. <Ref. to 4AT-65, Transmission Control Module (TCM).> <Ref. to 5AT-61, Transmission Control Module (TCM).>

Q: DTC B0223 CAN-HS VDC/ABS NO-RECEIVE DATA

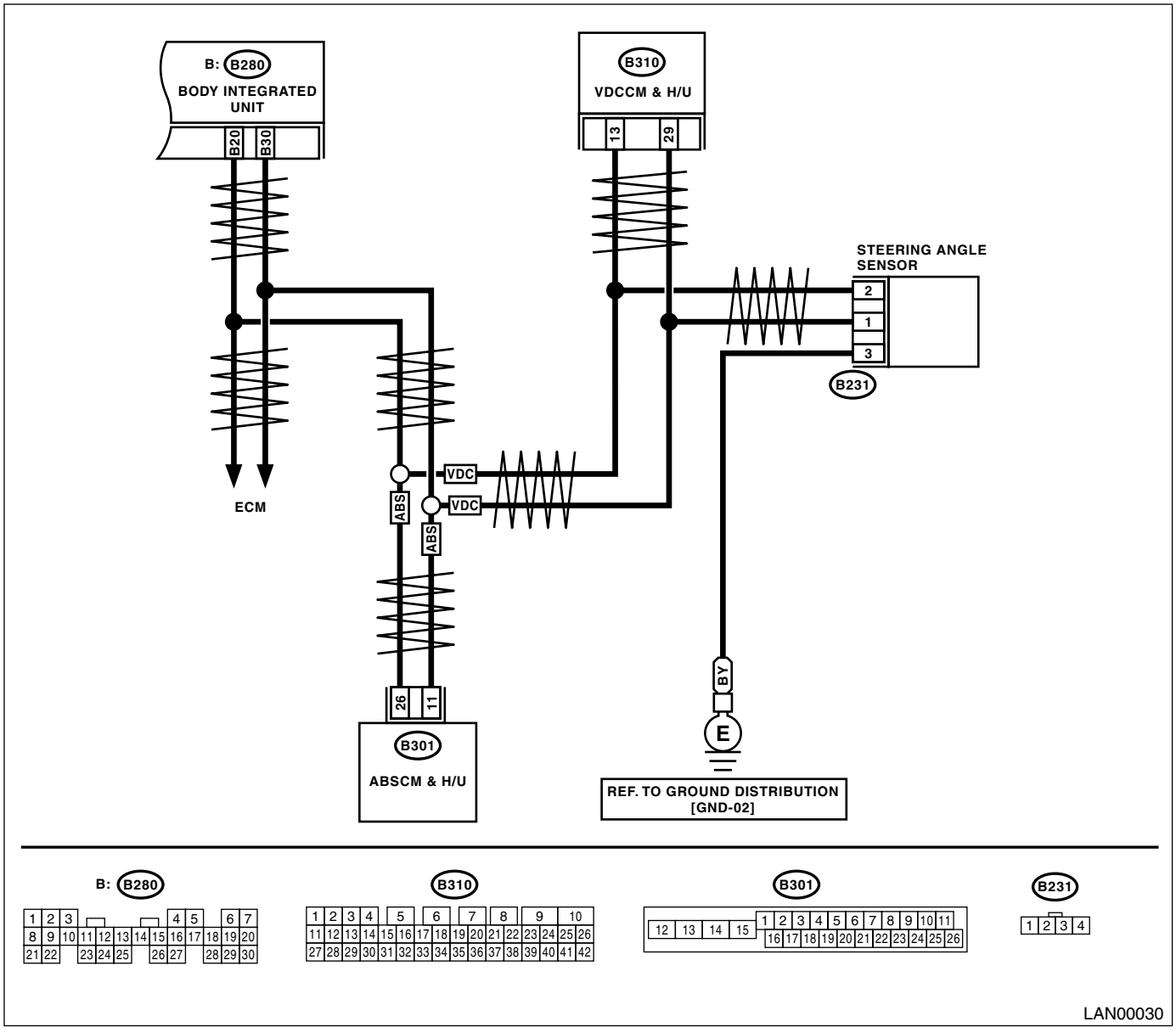
DTC DETECTING CONDITION:

Defective VDC/ABSCM. (If error is in the main harness, DTC P0600 High-speed CAN circuit is input at the same time.)

TROUBLE SYMPTOM:

- ABS warning light and VDC warning light come on.
- “Er HC” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 55 — 65 Ω?	Read the DTC of VDC/ABSCM, and perform the diagnosis according to DTC.	Go to step **2.**
2	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***(B280) No. 20 — No. 30:***	Is the resistance 115 — 125 Ω?	Go to step **5.**	Go to step **3.**
3	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the resistance between the harness connector terminal and chassis ground. ***Connector & terminal*** ***(B280) No. 20 — Chassis ground:*** ***(B280) No. 30 — Chassis ground:***	Is the resistance ∞ Ω?	Open harness on related line of body integrated unit. Repair or replace the open circuit of harness.	Go to step **4.**
4	**CHECK HARNESS.** 1) Disconnect the harness connector of body integrated unit. 2) Measure the voltage between the harness connector terminal and chassis ground. (Ignition switch ON) ***Connector & terminal*** ***(B280) No. 20 (+) — Chassis ground (−):*** ***(B280) No. 30 (+) — Chassis ground (−):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Go to step **5.**
5	**CHECK END RESISTANCE.** 1) Disconnect the VDC/ABSCM harness connector. 2) Measure the resistance between VDC/ABSCM connector terminals. ***Connector & terminal*** ***ABS*** ***(B301) No. 11 — No. 26:*** ***VDC*** ***(B310) No. 13 — No. 29:***	Is the resistance between 115 — 125 Ω?	Go to step **6.**	End resistance is opened. Replace the VDC/ABSCM. <Ref. to ABS-6, ABS Control Module and Hydraulic Control Unit (ABSCM&H/U).> <Ref. to VDC-7, VDC Control Module & Hydraulic Control Unit (VDCCM&H/U).>
6	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280) and VDC/ABSCM connector (ABS:B301, VDC:310). 2) Measure the resistance between harness connector terminals. ***Connector & terminal*** ***ABS*** ***(B301) No. 11 — (B280) No. 30:*** ***(B301) No. 26 — (B280) No. 20:*** ***VDC*** ***(B310) No. 13 — (B280) No. 20:*** ***(B310) No. 29 — (B280) No. 30:***	Is the resistance less than 10 Ω?	Go to step **7.**	Main wiring harness opened. Repair or replace the open circuit of harness.

	Step	Check	Yes	No
7	**CHECK VDC/ABSCM.** 1) Connect all the connectors. 2) Read the DTC of VDC/ABSCM using Subaru Select Monitor.	Is DTC other than “CAN communication” displayed?	Perform the diagnosis according to DTC concerning VDC/ABSCM.	Temporary poor contact occurs. Check the connecting condition of connector and terminals.

R: DTC B0300 CAN-LS MALFUNCTION

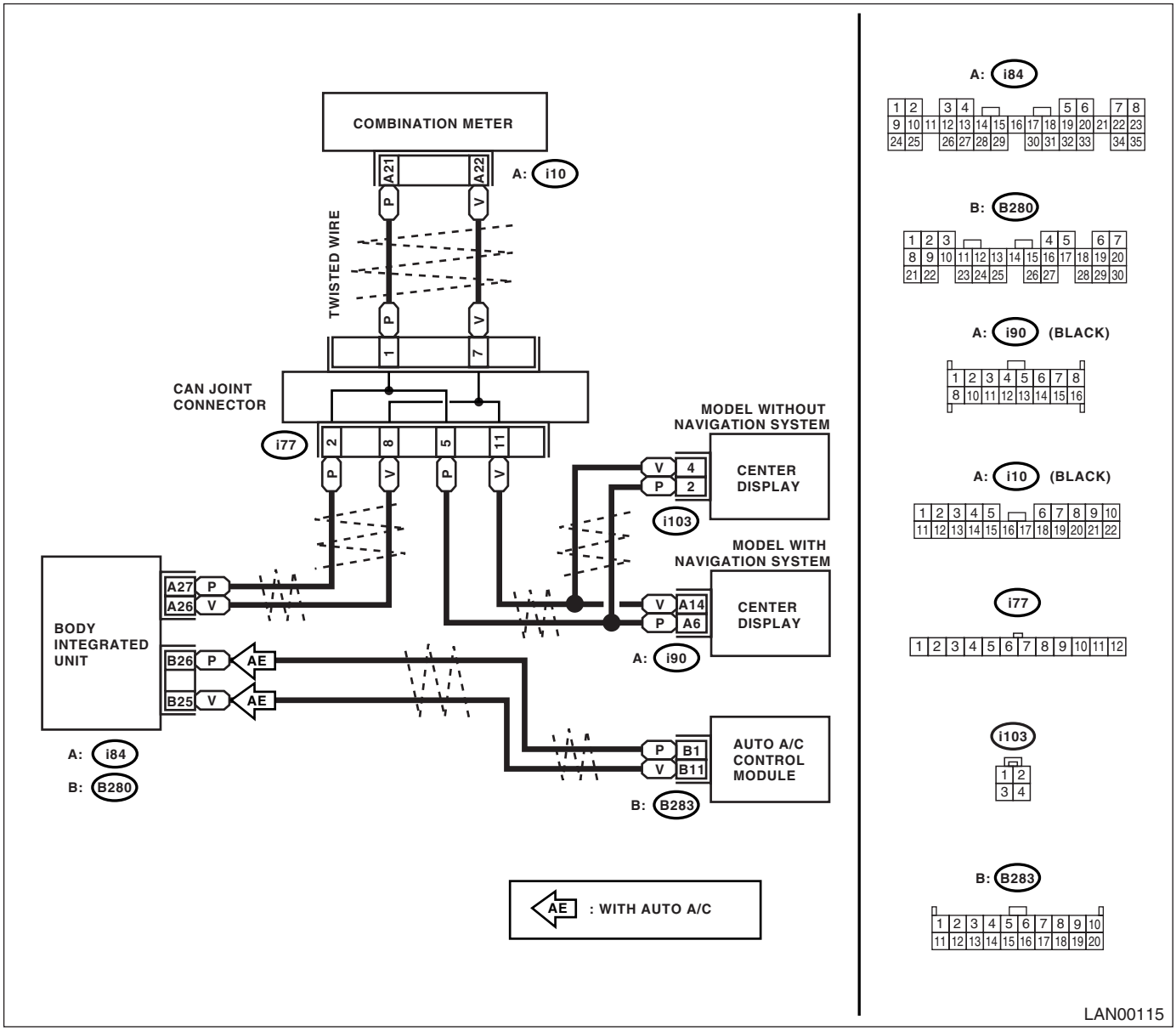
DTC DETECTING CONDITION:

Each side of low-speed CAN communication line is open or shorted, connector is not connected securely, the terminal has poor caulking.

TROUBLE SYMPTOM:

“Er LC” is displayed in odo/trip meter, but no interfere on communication.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the CAN junction connector (i77) and body integrated unit connector (i84). 2) Measure the resistance between connector terminals. ***Connector & terminal*** ***(i84) No. 26 — (i77) No. 8:*** ***(i84) No. 27 — (i77) No. 2:***	Is the resistance less than 10 Ω?	Go to step **2.**	Repair or replace the short circuit of harness.
2	**CHECK HARNESS.** 1) Disconnect the combination meter connector. 2) Measure the resistance between junction connector and combination meter connector. ***Connector & terminal*** ***(i10) No. 21 — (i77) No. 1:*** ***(i10) No. 22 — (i77) No. 7:***	Is the resistance less than 10 Ω?	Go to step **3.**	Repair or replace the open circuit of harness.
3	**CHECK HARNESS.** 1) Disconnect the center display connector (i90). 2) Measure the resistance between junction connector and center display connector. ***Connector & terminal*** ***Model with navigation*** ***(i90) No. 6 — (i77) No. 5:*** ***(i90) No. 14 — (i77) No. 11:*** ***Model without navigation*** ***(i103) No. 2 — (i77) No. 5:*** ***(i103) No. 4 — (i77) No. 11:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair or replace the open circuit of harness.
4	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (B280) and auto A/C control unit connector (B238). 2) Measure the resistance between body integrated unit connector and auto A/C control unit connector. ***Connector & terminal*** ***(B238) No. 1 — (B280) No. 26:*** ***(B238) No. 11 — (B280) No. 25:***	Is the resistance less than 10 Ω?	Go to step **5.**	Repair or replace the open circuit of harness.
5	**CHECK HARNESS.** 1) Connect the junction connector. 2) Measure the resistance between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 25 — Chassis ground:*** ***(B280) No. 26 — Chassis ground:*** ***(i84) No. 26 — Chassis ground:*** ***(i84) No. 27 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair or replace the short circuit of harness.	Go to step **6.**
6	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between body integrated unit connector and chassis ground. ***Connector & terminal*** ***(B280) No. 25 (+) — Chassis ground (–):*** ***(B280) No. 26 (+) — Chassis ground (–):*** ***(i84) No. 26 (+) — Chassis ground (–):*** ***(i84) No. 27 (+) — Chassis ground (–):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Go to step **7.**
7	**CHECK CENTER DISPLAY FAIL.** Read the current data of body integrated unit.	Is center display fail OK?	Go to step **8.**	Replace the center display.

	Step	Check	Yes	No
8	**CHECK AUTO A/C.** Perform the auto A/C self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Is the self-diagnosis OK?	Go to step **9.**	Replace the auto A/C control unit. <Ref. to AC-32, Control Unit (Auto A/C Model).>
9	**CHECK COMBINATION METER.** 1) Connect all the connectors. 2) Turn the ignition switch to ON. 3) Check the display of combination meter, odo/trip.	Is “Er SS” and “Er SP” displayed?	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>	Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>

S: DTC B0301 CAN-LS COUNTER ABNORMAL

DTC DETECTING CONDITION:

Locate the unit which trouble occurs, open or short in CAN line, and repair and replace it.
(Free running counter error may be detected at the same time from the unit which the malfunction occurs.)

TROUBLE SYMPTOM:

"Er LC" is displayed in odo/trip meter.

	Step	Check	Yes	No
1	**CHECK CENTER DISPLAY.** 1) Display the accelerator opening angle in the meter on "Information" of center display menu. 2) Read the display when the accelerator opening angle is fully opened from fully closed.	Does the value changed from 0 to 100?	Go to step **2.**	Go to step **7.**
2	**CHECK AUTO A/C CONTROL UNIT.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the number of blower fan level in the analog data. 3) Read the data display when the blower fan level is changed on air conditioner control part.	Does the data display change?	Go to step **3.**	Go to step **5.**
3	**CHECK COMBINATION METER.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the door switch in analog data. 3) Read the display of data and combination meter when each door is opened/closed.	Does the indicator of data and combination meter on body integrated unit change according to operation?	Go to step **4.**	Go to step **6.**
4	**CHECK CENTER DISPLAY HARNESS.** 1) Disconnect the center display harness connector and CAN joint connector. 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i90) No. 14 — (i77) No. 1:*** ***(i90) No. 6 — (i77) No. 5:***	Is the resistance less than 10 Ω?	Go to step **7.**	Repair or replace the open circuit of harness.
5	**CHECK AUTO A/C CONTROL UNIT HARNESS.** 1) Disconnect the auto A/C control module connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance of harness between body integrated unit and auto A/C control unit. ***Connector & terminal*** ***(B280) No. 26 — (B283) No. 1:*** ***(B280) No. 25 — (B283) No. 11:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair or replace the open circuit of harness.
6	**CHECK COMBINATION METER HARNESS.** 1) Disconnect the combination meter connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between body integrated unit and combination meter connector. ***Connector & terminal*** ***(i84) No. 26 — (i10) No. 22:*** ***(i84) No. 27 — (i10) No. 21:***	Is the resistance less than 10 Ω?	Go to step **9.**	Repair or replace the open circuit of harness.

	Step	Check	Yes	No
7	**CHECK CENTER DISPLAY.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Read the fail display of center display.	Is center display fail OK?	Go to step **8.**	Replace the center display.
8	**CHECK AUTO A/C CONTROL UNIT.** Perform the auto A/C control unit self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Is the self-diagnosis OK?	Go to step **9.**	Replace the auto A/C control unit. <Ref. to AC-32, Control Unit (Auto A/C Model).>
9	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter system. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Go to step **10.**	Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>
10	**CHECK BODY INTEGRATED UNIT.** Read the data of “body integrated unit data received” on ECM data display using Subaru Select Monitor.	Is the “Yes” displayed?	Go to step **11.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
11	**CHECK BODY INTEGRATED UNIT.** Read the data of “body integrated unit counter update” on ECM data display using Subaru Select Monitor.	Is the “Yes” displayed?	Temporary poor contact occurs. Check the connection of connector.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

T: DTC B0302 CAN-LS BUS OFF

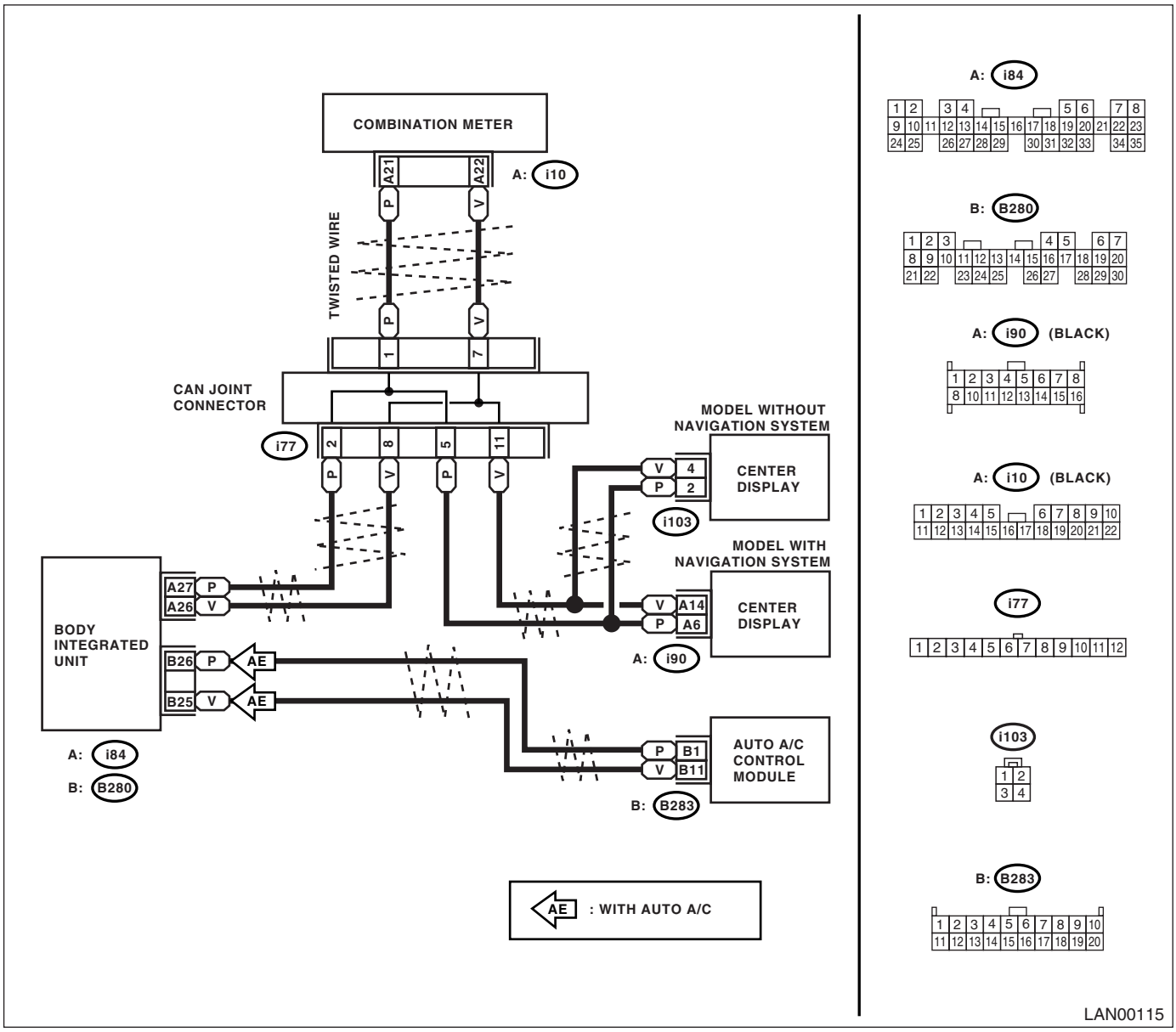
DTC DETECTING CONDITION:

Because of occurring a lot of error data, some units are disconnected not to affect other units.
Communication error from the unit which error is occurred is input at the same time.

TROUBLE SYMPTOM:

“Er LC” is displayed in odo/trip meter.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK CENTER DISPLAY.** 1) Display the accelerator opening angle in the meter on “Information” of center display menu. 2) Read the display when the accelerator opening angle is fully opened from fully closed.	Is the value changes from 0 to 100?	Go to step **2.**	Go to step **7.**
2	**CHECK AUTO A/C CONTROL UNIT. (FOR MANUAL A/C, GO TO STEP 3.)** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the number of blower fan level in the analog data. 3) Read the data display when the number of blower fan level is changed on air conditioner control part.	Does the data display change?	Go to step **3.**	Go to step **5.**
3	**CHECK COMBINATION METER.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Display the door switch in analog data. 3) Read the display of data and combination meter when each door is opened/closed.	Does the indicator of data and combination meter on body integrated unit change according to operation?	Go to step **4.**	Go to step **6.**
4	**CHECK CENTER DISPLAY HARNESS.** 1) Disconnect the center display harness connector and CAN joint connector. 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i90) No. 14 — (i77) No. 11:*** ***(i90) No. 6 — (i77) No. 5:***	Is the resistance less than 10 Ω?	Go to step **7.**	Repair or replace the open circuit of harness.
5	**CHECK AUTO A/C CONTROL UNIT HARNESS.** 1) Disconnect the auto A/C control module connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance of harness between body integrated unit and auto A/C control unit. ***Connector & terminal*** ***(B280) No. 26 — (D283) No. 1:*** ***(B280) No. 25 — (D283) No. 11:***	Is the resistance less than 10 Ω?	Go to step **8.**	Repair or replace the open circuit of harness.
6	**CHECK COMBINATION METER HARNESS.** 1) Disconnect the combination meter connector. 2) Disconnect the body integrated unit connector. 3) Measure the resistance between body integrated unit and combination meter connector. ***Connector & terminal*** ***(i84) No. 26 — (i10) No. 22:*** ***(i84) No. 27 — (i10) No. 21:***	Is the resistance less than 10 Ω?	Go to step **9.**	Repair or replace the open circuit of harness.
7	**CHECK CENTER DISPLAY.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Read the fail display of center display.	Is center display fail OK?	Go to step **8.**	Replace the center display.
8	**CHECK AUTO A/C CONTROL UNIT.** Perform the auto A/C control unit self-diagnosis. <Ref. to AC(diag)-13, A/C CONTROL SYSTEM SELF-DIAGNOSIS, OPERATION, Diagnostic Chart for Self-Diagnosis.>	Is the self-diagnosis OK?	Go to step **9.**	Replace the auto A/C control unit. <Ref. to AC-32, Control Unit (Auto A/C Model).>

	Step	Check	Yes	No
9	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter system. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Go to step **10.**	Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>
10	**CHECK BODY INTEGRATED UNIT.** Read the data of “body integrated unit data received” on ECM data display using Subaru Select Monitor.	Is the “Yes” displayed?	Go to step **11.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
11	**CHECK BODY INTEGRATED UNIT.** Read the data of “body integrated unit counter update” on ECM data display using Subaru Select Monitor.	Is the “Yes” displayed?	Connect all the connector, and make sure same DTC is not displayed.	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>

U: DTC B0311 CAN-LS METER UNIT DATA ABNORMAL

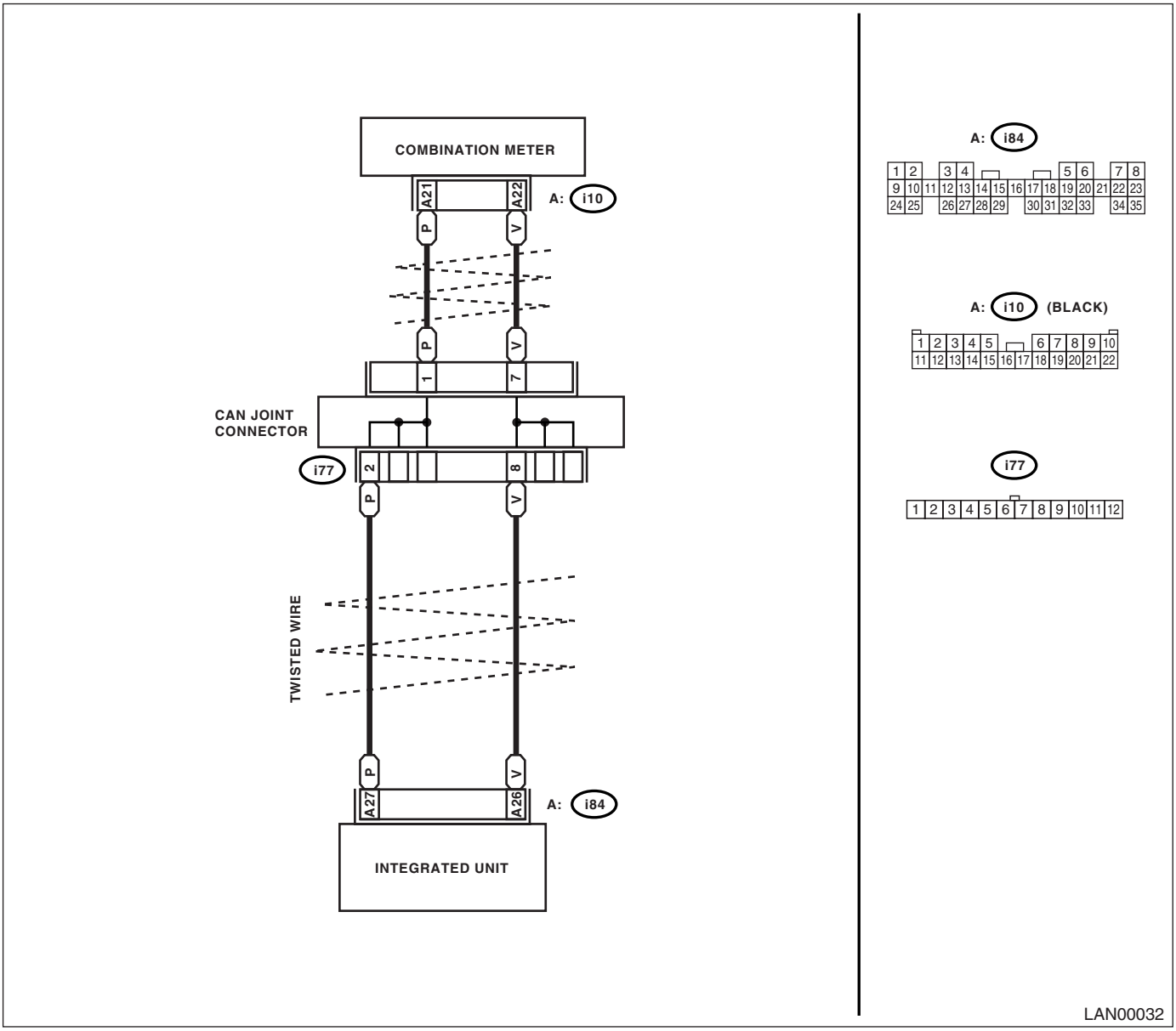
DTC DETECTING CONDITION:

Combination meter error, or harness between the main harness splice and combination meter is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

"Er Lc" is displayed in odo/trip meter.

WIRING DIAGRAM:



Step		Check	Yes	No
1	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Read the DTC again, and then perform the diagnosis according to DTC displayed on the top.	Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>

V: DTC B0313 CAN-LS MONITOR DATA ABNORMAL

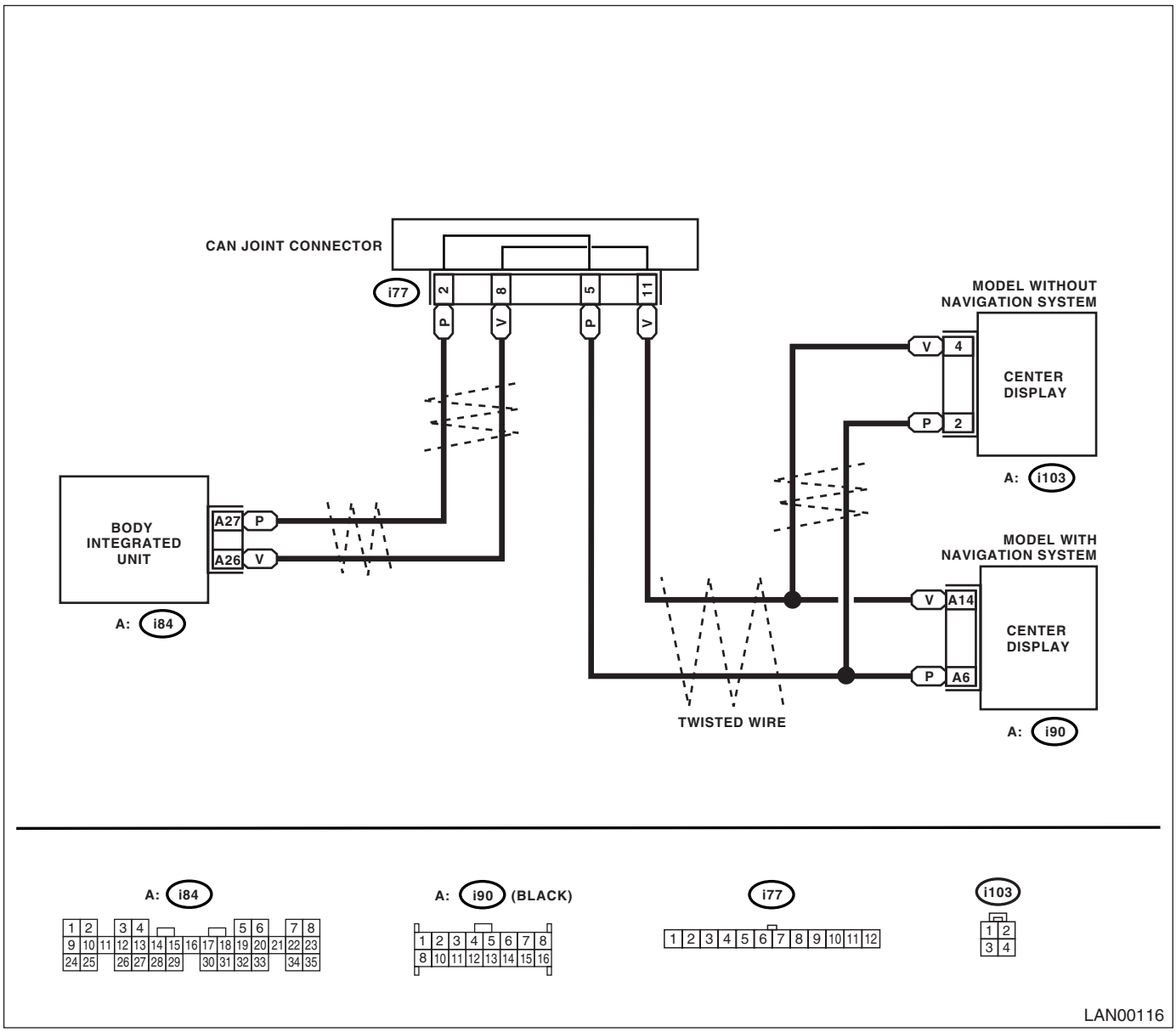
DTC DETECTING CONDITION:

Center display unit error, or harness between the center display unit and combination meter is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

"Er LC" is displayed in odo/trip meter.

WIRING DIAGRAM:



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Step		Check	Yes	No
1	**CHECK CENTER DISPLAY.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Read the fail display of center display.	Is center display fail OK?	Go to step **2.**	Replace the center display.
2	**CHECK NAVIGATION.** 1) Display the current data of body integrated unit using Subaru Select Monitor. 2) Read the display of NAVI fail.	Is NAVI fail OK?	Replace the center display.	Send the navigation unit to repair center.

W: DTC B0321 CAN-LS METER NO-RECEIVE DATA

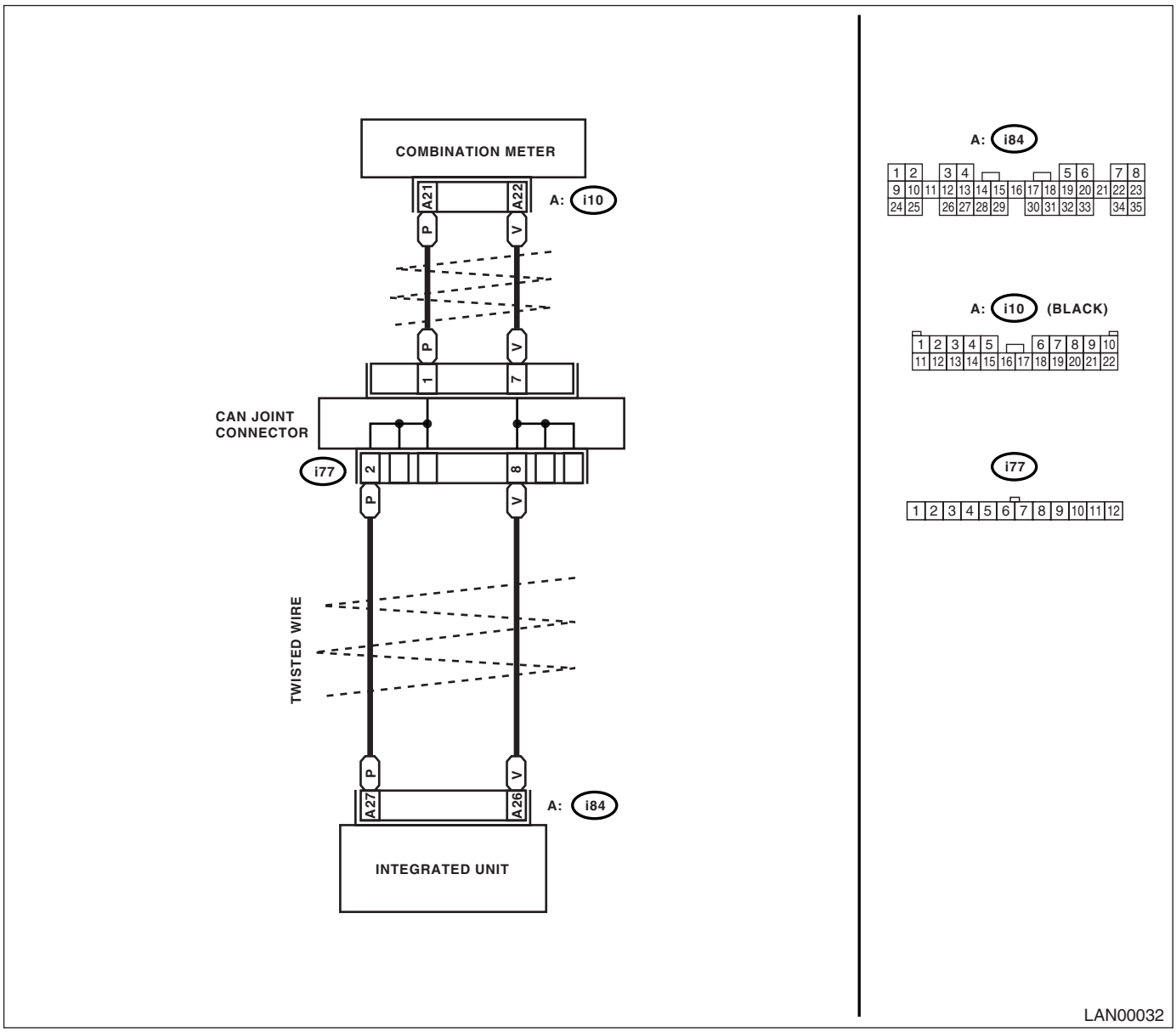
DTC DETECTING CONDITION:

Combination meter unit error, or harness between the main harness splice and combination meter unit is open or short, the connector is not connected securely and the terminal has poor caulking.

TROUBLE SYMPTOM:

Fail mode occurs because the data is not received from combination meter unit.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK COMMUNICATION LINE.** 1) Warm up the engine. 2) Compare the data of body integrated unit and combination meter using Subaru Select Monitor. Check item: • Engine speed • Each door switch • P switch	Is the data displayed same?	Go to step **2.**	Perform the self-diagnosis for combination meter. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>
2	**CHECK HARNESS.** 1) Disconnect the body integrated unit, combination meter connector. 2) Measure the resistance between harness connectors. ***Connector & terminal*** ***(i10) No. 21 — (i84) No. 27:*** ***(i10) No. 26 — (i84) No. 26:***	Is the resistance less than 10 Ω?	Go to step **4.**	Go to step **3.**
3	**CHECK HARNESS.** 1) Disconnect the CAN joint connector (i77) with connector of unit is disconnected. 2) Measure the resistance between harness connector. ***Connector & terminal*** ***(i10) No. 21 — (i77) No. 1:*** ***(i10) No. 26 — (i77) No. 7:*** ***(i84) No. 27 — (i77) No. 2:*** ***(i84) No. 26 — (i77) No. 8:***	Is the resistance less than 10 Ω?	Go to step **4.**	Repair or replace the open circuit of harness.
4	**CHECK HARNESS.** Measure the resistance between harness connector (i77) and chassis ground. ***Connector & terminal*** ***(i77) No. 1 — Chassis ground:*** ***(i77) No. 7 — Chassis ground:*** ***(i77) No. 2 — Chassis ground:*** ***(i77) No. 8 — Chassis ground:***	Is the resistance less than 10 Ω?	Repair or replace the short circuit of harness.	Go to step **5.**
5	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between harness connector (i77) and chassis ground. ***Connector & terminal*** ***(i77) No. 1 (+) — Chassis ground (−):*** ***(i77) No. 7 (+) — Chassis ground (−):*** ***(i77) No. 2 (+) — Chassis ground (−):*** ***(i77) No. 8 (+) — Chassis ground (−):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Go to step **6.**
6	**CHECK COMBINATION METER.** Perform the self-diagnosis for combination meter. <Ref. to IDI-3, SELF-DIAGNOSIS, INSPECTION, Combination Meter System.>	Is the self-diagnosis OK?	Temporary poor contact occurs.	Check the connection of connector. Replace the combination meter. <Ref. to IDI-16, Combination Meter Assembly.>

X: DTC B0500 KEYLESS UART COM. MALFUNCTION

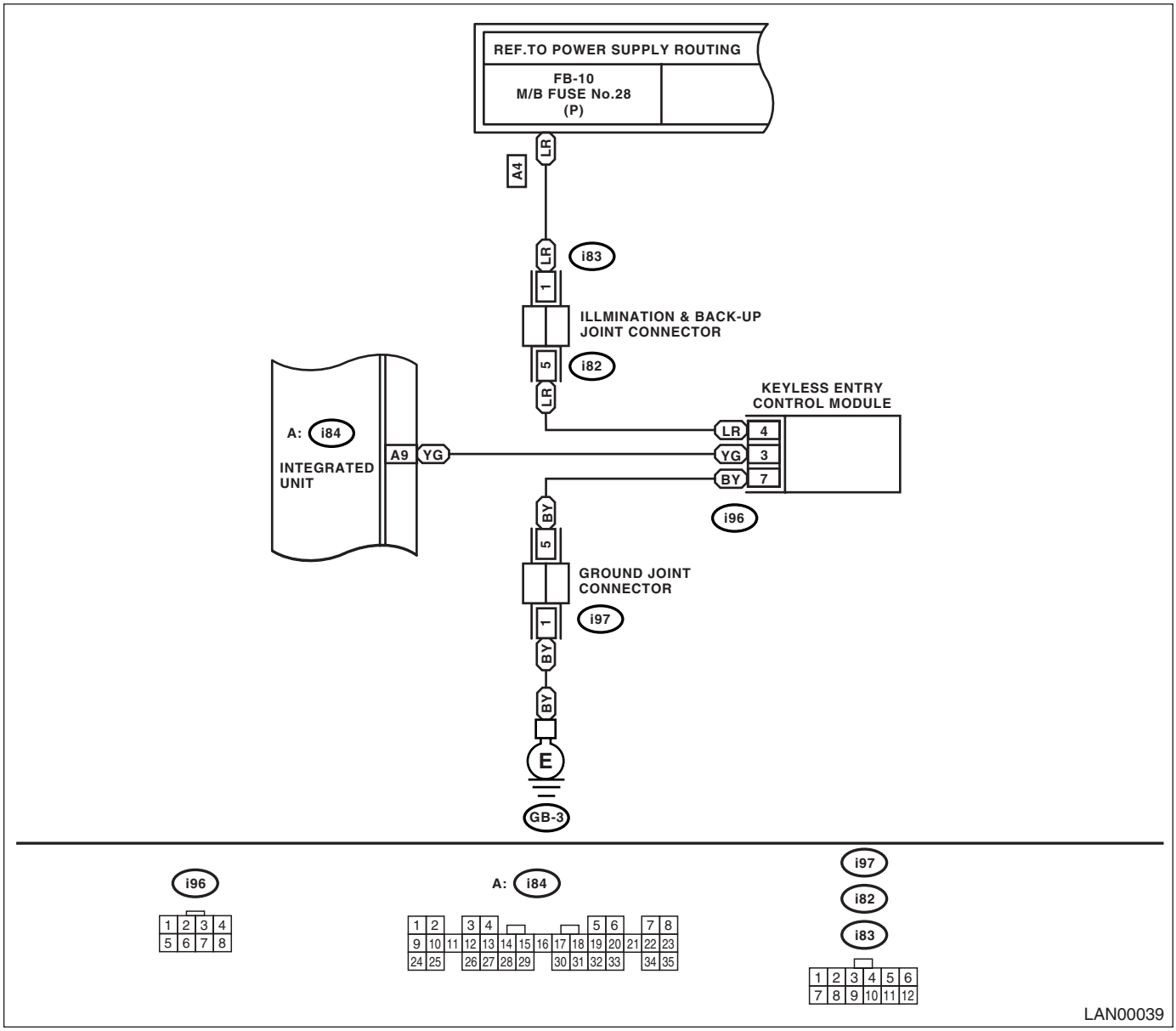
DTC DETECTING CONDITION:

UART between keyless control unit and body integrated unit is open or shorted, connector is not connected securely, the terminal has poor caulking.

TROUBLE SYMPTOM:

Door lock does not operate with keyless.

WIRING DIAGRAM:



	Step	Check	Yes	No
1	**CHECK HARNESS.** 1) Disconnect the body integrated unit connector (i84) and keyless entry control unit connector (i96). 2) Measure the resistance between harness. ***Connector & terminal*** ***(i84) No. 9 — (i96) No. 3:***	Is the resistance less than 10 Ω?	Go to step **2.**	Repair or replace the open circuit of harness.
2	**CHECK HARNESS.** Measure the resistance between harness connector and chassis ground. ***Connector & terminal*** ***(i84) No. 9 — Chassis ground:***	Is the resistance less than 1 MΩ?	Repair or replace the short circuit of harness.	Go to step **3.**
3	**CHECK HARNESS.** 1) Turn the ignition switch to ON. 2) Measure the voltage between harness connector and chassis ground. ***Connector & terminal*** ***(i84) No. 9 (+) — Chassis ground (−):***	Is the voltage more than 6 V?	Repair or replace the short circuit of harness.	Go to step **4.**
4	**OPERATION CHECK.** Check the door lock operation when the doors LOCK/UNLOCK using manual LOCK switch.	Does it operate on switch operation?	Go to step **5.**	Replace the body integrated unit. <Ref. to SL-46, Body Integrated Unit.>
5	**OPERATION CHECK.** 1) Disconnect the key warning switch connector (B350). 2) Close all the door, and then perform the LOCK/UNLOCK operation on keyless entry operation.	Does it operate?	Check key warning switch.	Replace the keyless entry control module. <Ref. to SL-45, Keyless Entry Control Unit.>

13.General Diagnostic Table

A: INSPECTION

Read the DTC or inspect and diagnose the following data in the current data display using Subaru Select Monitor.

1. LAN SYSTEM

Item	Operation	Specifications		NOTE
		YES	NO	
Diagnostic code	DTC is not displayed when inspecting all DTCs.	DTC is not displayed.	Perform the diagnosis according to DTC.	—
Engine coolant temperature	Check the current data display of ECM, TCM and body integrated unit, and make sure all data have same values.	Same values	Inspect LAN system.	If engine coolant temperature sensor is not OK, inspect the sensor circuit.
R defogger SW	It turns to ON when pressing switch. (Low-speed CAN is OK)	Turns to ON.	Inspect rear defogger switch.	Rear defogger switch is connected with Low-speed CAN.
R defogger output	When switch input, it is output.	Output	Replace the body integrated unit.	If not operate with output, check the rear defogger relay.
Door lock SW	When locked with door lock switch, it turns to ON.	Turns to ON.	Inspect door lock switch.	Door lock switch is connected with Low-speed CAN.
Door lock actuator	When locked with door lock switch, it is output.	Output	Replace the body integrated unit.	—

2. BODY INTEGRATED UNIT

Item	Operation	Specifications		NOTE
		YES	NO	
Illumination VR power supply	Operate the illumination volume, illumination light is controlled with changing of data display voltage.	Illumination light is controlled with changing of data.	Inspect the illumination volume.	—
Fuel level resistance	Check the fuel level resistance and fuel level resistance 2. Both resistances are same.	Same values	Inspect body integrated unit.	Compare the input and output values of body integrated unit.
R fog light input	When turned rear fog light switch to ON, data display turns to ON.	Turns to ON.	Inspect rear fog light switch.	—
R fog light output	When turned rear fog light switch to ON, output turns to ON.	Turns to ON.	Inspect body integrated unit.	If not operate with output turned to ON, check the rear fog light relay.
R wiper SW input	When rear wiper SW to ON, data display turns to ON.	Turns to ON.	Inspect rear wiper switch.	—
R wiper output	When rear wiper switch to ON, output signal turns to ON.	Turns to ON.	Replace the body integrated unit.	If not operate with output turned to ON, check the rear wiper motor.
Keyless Entry	Keyless entry LOCK/UNLOCK the doors.	Operate	Inspect the keyless antenna.	If the antenna is OK, replace the body integrated unit.
Brake SW	When brake pedal is depressed, it turns to ON.	Turns to ON.	Inspect brake switch.	—
Shift lock solenoid	The shift lock releases when depressing the brake pedal.	Released	Inspect the shift lock.	—

General Diagnostic Table

Item	Operation	Specifications		NOTE
		YES	NO	
Body integrated unit registration function setting	Does Vehicle equipment correspond to setting values?	Correspondence	Reconfigure the values according to vehicle equipment.	—
Customize	When changing customize setting, the registration completes correctly.	Registered	Inspect body integrated unit.	—
Manual mode	Switch the shift (UP/DOWN) on Manual mode. Indicator is changed in 1 — 2.	Change	Inspect the shift lever.	—
Function check	Each checking item operate correctly. (Except for not equipped)	Operate	Inspect for non-functional actuator.	—
Security	After looking with keyless entry system and open the door, security system is armed and the horn sounds.	Horn sounds. (Security system operates.)	Inspect the security system.	—

WIRING SYSTEM SECTION

WIRING SYSTEM WI

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE8

WIRING SYSTEM

WI

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1. Basic Diagnostic Procedure

A: BASIC PROCEDURES

1. GENERAL DESCRIPTION

The most important purpose of diagnostics is to determine which part is malfunctioning quickly, to save time and labor.

2. IDENTIFICATION OF TROUBLE SYMPTOM

Determine what the problem is based on the symptom.

3. PROBABLE CAUSE OF TROUBLE

Look at the wiring diagram and check the system's circuit. Then check the switch, relay, fuse, ground, etc.

4. LOCATION AND REPAIR OF TROUBLE

1) Using the diagnostics, narrow down the causes.
2) If necessary, use a voltmeter, ohmmeter, etc.
3) Before replacing certain component parts (switch, relay, etc.), check the power supply, ground, for open wiring harness, poor connectors, etc. If no problem is encountered, check the component parts.

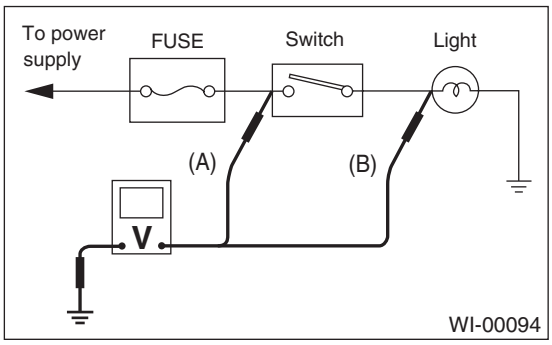
5. SYSTEM OPERATION CHECK

After repairing, ensure that the system operates properly.

B: BASIC INSPECTION

1. VOLTAGE MEASUREMENT

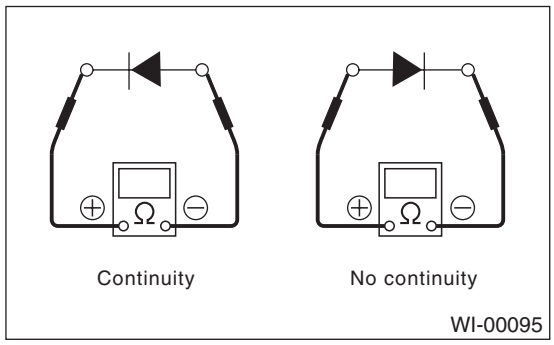
1) Using a voltmeter, connect the negative lead to a good ground point or negative battery terminal and the positive lead to the connector or component terminal.
2) Contact the positive lead of the voltmeter on connector (A). The voltmeter will indicate a voltage.
3) Shift the positive lead to connector (B). The voltmeter will indicate no voltage.



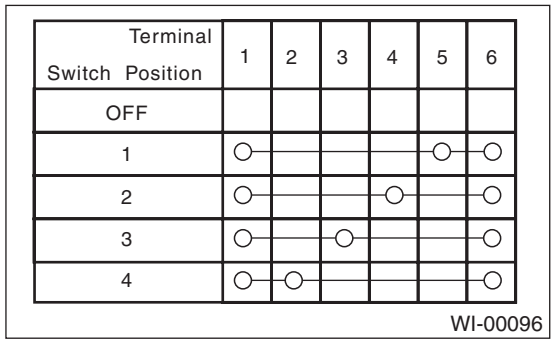
4) With the test set-up held as it is, turn the switch ON. The voltmeter will indicate a voltage and, at the same time, the light will come on.
5) The circuit is in good order. If a problem such as a light failing to illuminate occurs, use the procedures outlined above to track down the malfunction.

2. CIRCUIT CONTINUITY CHECKS

1) Disconnect the battery terminal or connector so there is no voltage between the check points.
Contact the two leads of an ohmmeter to each of the check points.
If the circuit has diodes, reverse the two leads and check again.
2) Use an ohmmeter to check for diode continuity.
When contacting the negative lead to the diode positive side and the positive lead to the negative side, there should be continuity.
When contacting the two leads in reverse, there should be no continuity.



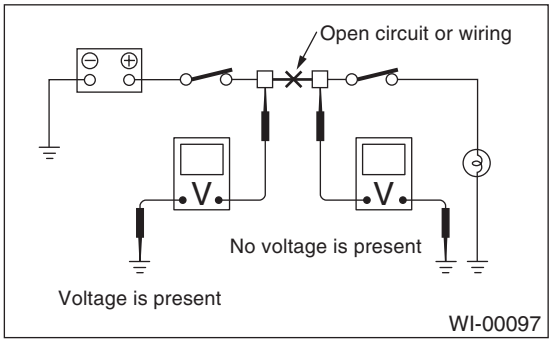
3) Symbol "❍ — ❍" indicates that continuity exists between two points or terminals. For example, when a switch position is at "3", continuity exists among terminals 1, 3 and 6, as shown in the table below.



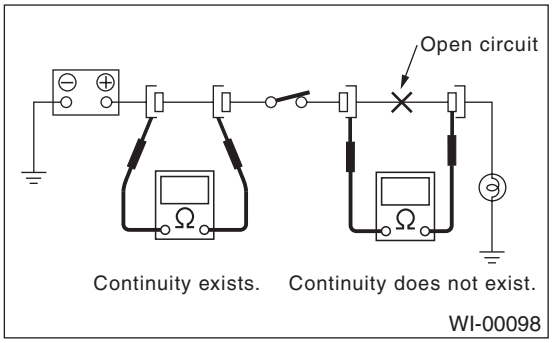
Terminal / Switch Position	1	2	3	4	5	6
OFF						
1	○				○	○
2	○			○		○
3	○		○			○
4	○	○				○

3. HOW TO DETERMINE AN OPEN CIRCUIT

1) WITH VOLTMETER:
An open circuit is determined by measuring the voltage between respective connectors and ground using a voltmeter, starting with the connector closest to the power supply. The power supply must be turned ON so that current flows in the circuit. If voltage is not present between a particular connector and ground, the circuit between that connector and the previous connector is open.

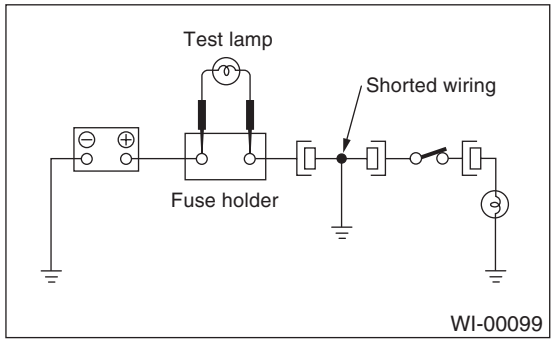


2) WITH OHMMETER:
Disconnect all connectors affected, and check continuity in the wiring between adjacent connectors. When the ohmmeter indicates “infinite”, the wiring is open.

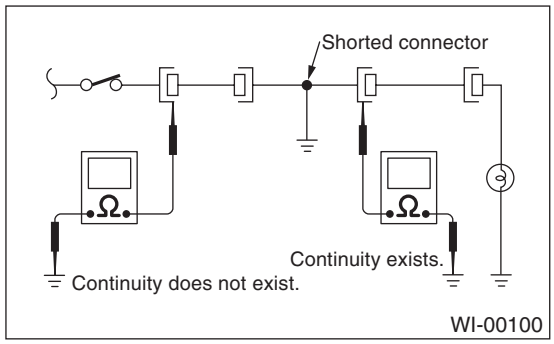


4. HOW TO DETERMINE A SHORT CIRCUIT

1) WITH TEST LIGHT:
Connect a test light (rated at approx. 3 watts) in place of the blown fuse and allow current to flow through the circuit. Disconnect one connector at a time from the circuit. Starting with the one located farthest from the power supply. If the test light goes out when a connector is disconnected, the wiring between that connector and the next connector (farther from the power supply) is shorted.



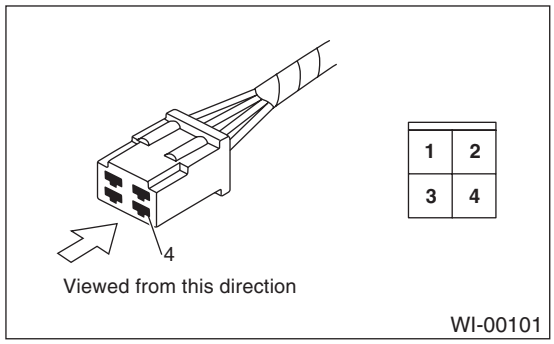
2) WITH OHMMETER:
Disconnect all affected connectors, and check continuity between each connector and ground. When the ohmmeter indicates continuity between a particular connector and a ground, that connector is shorted.



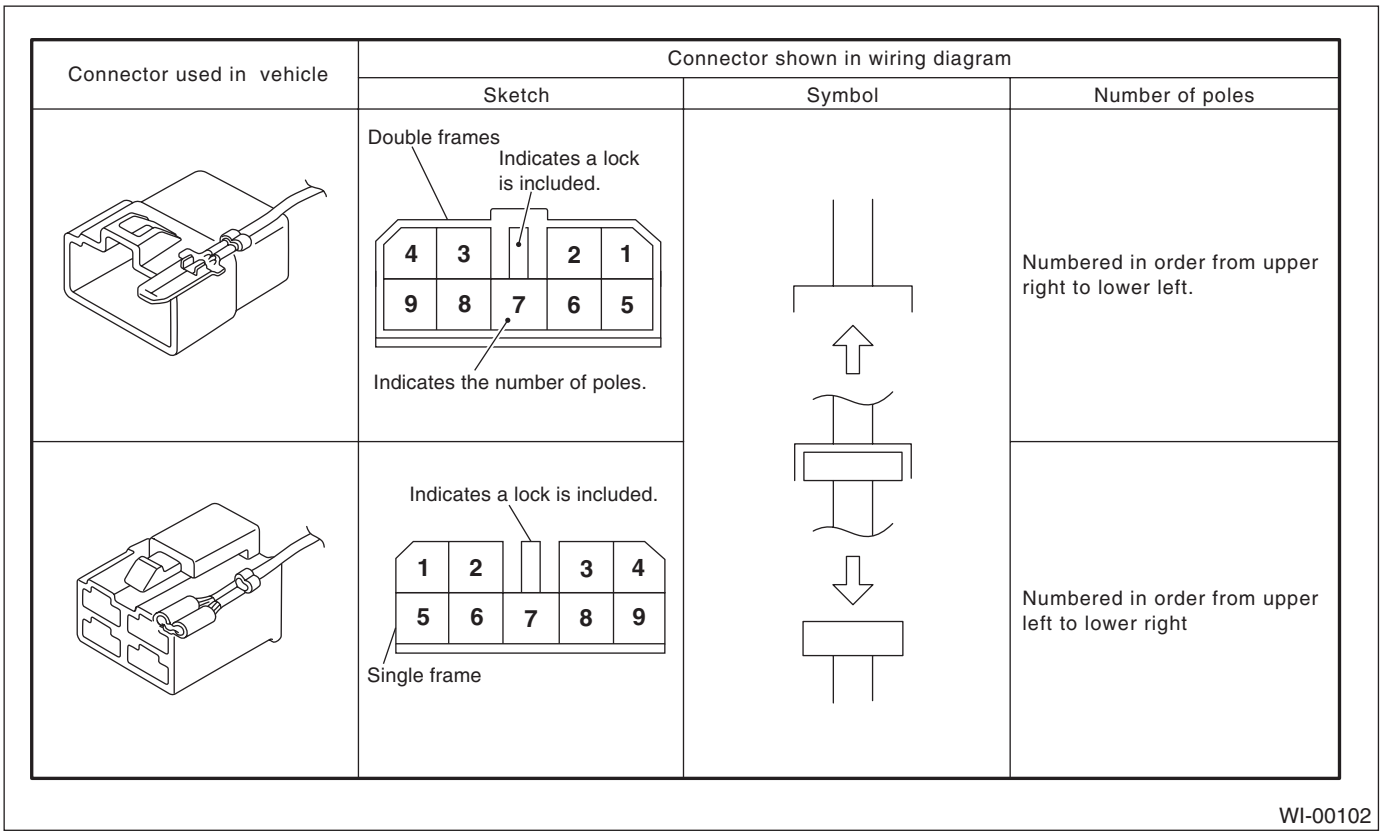
C: HOW TO READ WIRING DIAGRAMS

1. WIRING DIAGRAM

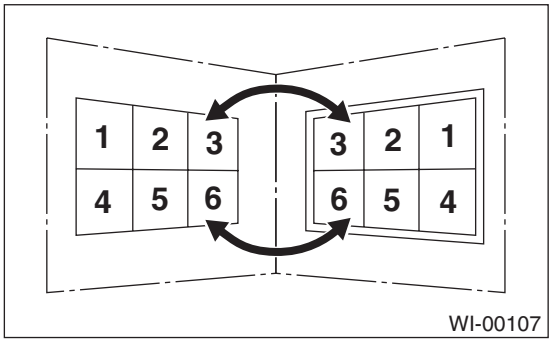
The wiring diagram of each system is illustrated so that you can understand the path through which the electric current flows from the battery.
Sketches and codes are used in the diagrams. They should read as follows:
• Each connector and its terminal position are indicated by a sketch of the connector in a disconnected state which is viewed from the front.



• The number of poles or pins, presence of a lock are indicated in the sketch of each connector. In the sketch, the highest pole number refers to the number of poles which the connector has. For example, the sketch of the connector shown in figure indicates the connector has 9 poles.



• When one set of connectors is viewed from the front side, the pole numbers of one connector are symmetrical to those of the other. When these two connectors are connected as a unit, the poles which have the same number are joined.



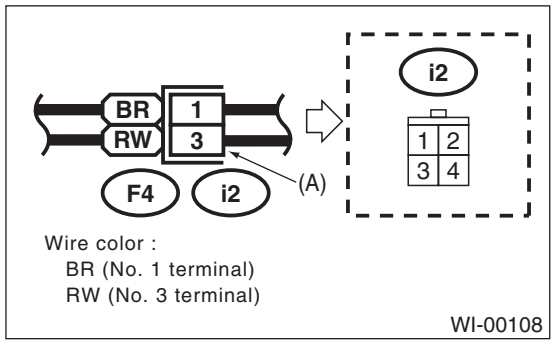
• WIRING DIAGRAM:

The connectors are numbered along with the number of poles, external colors, and mating connections in the accompanying list.

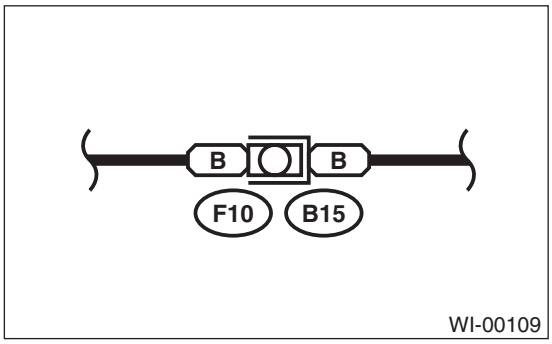
• The sketch of each connector in the wiring diagram usually shows the (A) side of the connector. The relationship between the wire color, terminal number and connector is described in the figure.

NOTE:

A wire which runs in one direction from a connector terminal sometimes may have a different color from that which runs in the other direction from that terminal.

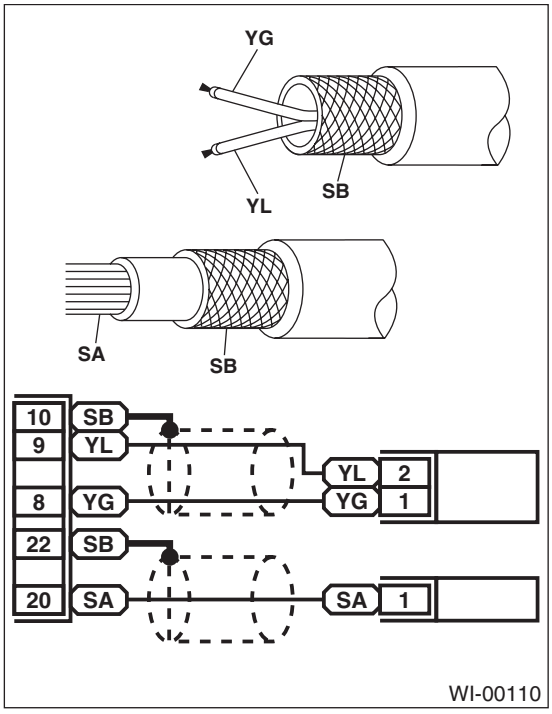


• In the wiring diagram, connectors which have no terminal number refer to one-pole types. Sketches of these connectors are omitted intentionally.

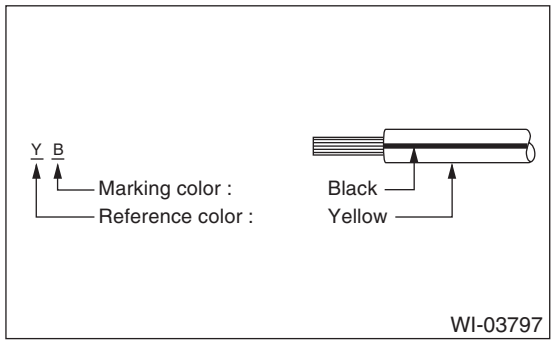


• The following color codes are used to indicate the colors of the wires.

Color code	Color
L	Blue
B	Black
Y	Yellow
G	Green
R	Red
W	White
Br	Brown
Lg	Light green
Gr	Gray
P	Pink
Or	Orange
Sb	Light blue
V	Purple
SA	Sealed (Inner)
SB	Sealed (Outer)



• The wire color code, which consists of two letters (or three letters including Br or Lg), indicates the standard color (base color of the wire covering) by its first letter and the stripe marking by its second letter.



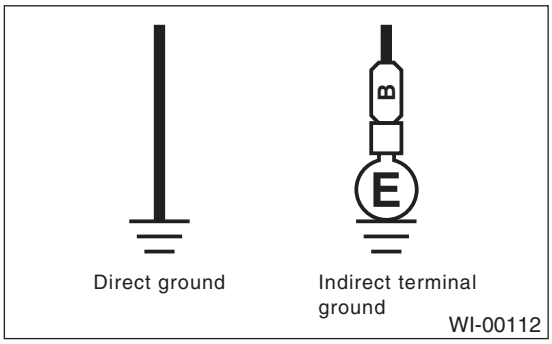
• The table lists the nominal sectional areas and allowable currents of the wires.

CAUTION:
When replacing or repairing a wire, be sure to use the same size and type of the wire which was originally used.

NOTE:
• The allowable current in the table indicates the tolerable amperage of each wire at an ambient temperature of 40°C (104°F).
• The allowable current changes with ambient temperature. Also, it changes if a bundle of more than two wires is used.

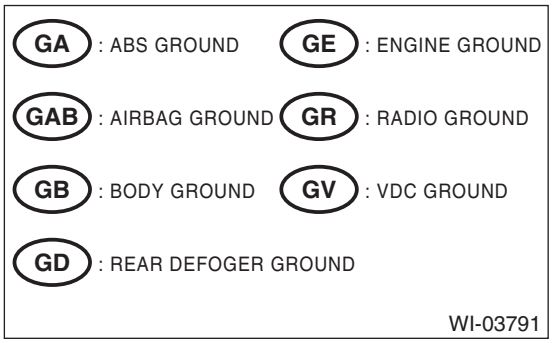
Nominal sectional area mm^2	No. of strands/ strand diameter	Outside diameter of wiring mm	Allowable current Amps/ 40°C (104°F)
0.3	7/0.26	1.8	7
0.5	7/0.32	2.2 (or 2.0)	12
0.75	30/0.18	2.6 (or 2.4)	16
0.85	11/0.32	2.4 (or 2.2)	16
1.25	16/0.32	2.7 (or 2.5)	21
2	26/0.32	3.1 (or 2.9)	28
3	41/0.32	3.8 (or 3.6)	38
5	65/0.32	4.6 (or 4.4)	51
8	50/0.45	5.5	67

• Each unit is either directly grounded to the body or indirectly grounds through a harness ground terminal. Different symbols are used in the wiring diagram to identify the two grounding systems.



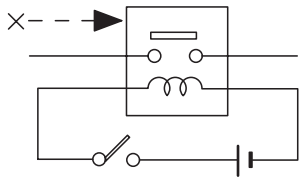
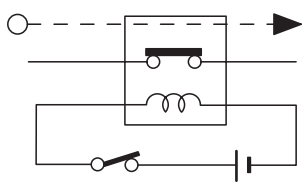
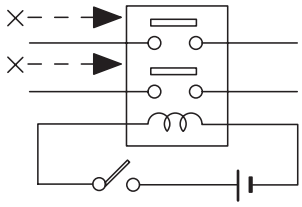
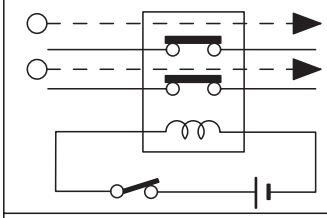
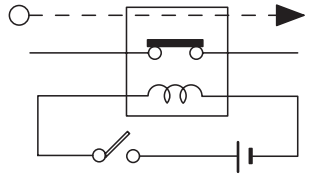
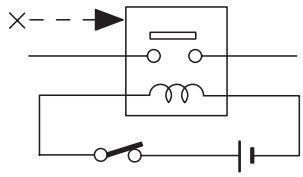
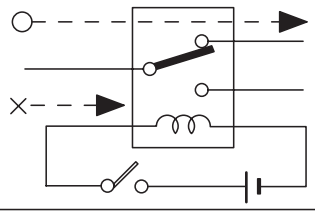
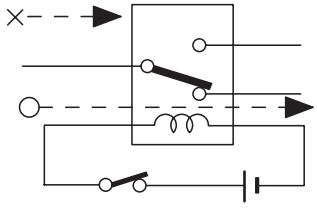
• The ground points shown in the wiring diagram refer to the following:

NOTE:
All wiring harnesses are provided with a ground point which should be securely connected.



• Relays are classified as normally-open or normally-closed.

The normally-closed relay has one or more contacts. The wiring diagram shows the relay mode when the energizing circuit is OFF.

Relay type		Energizing circuit OFF	Energizing circuit ON
Normally-open type	4-pole		
	6-pole		
Normally-closed type	4-pole		
Mixed type	6-pole		

Key to symbols:

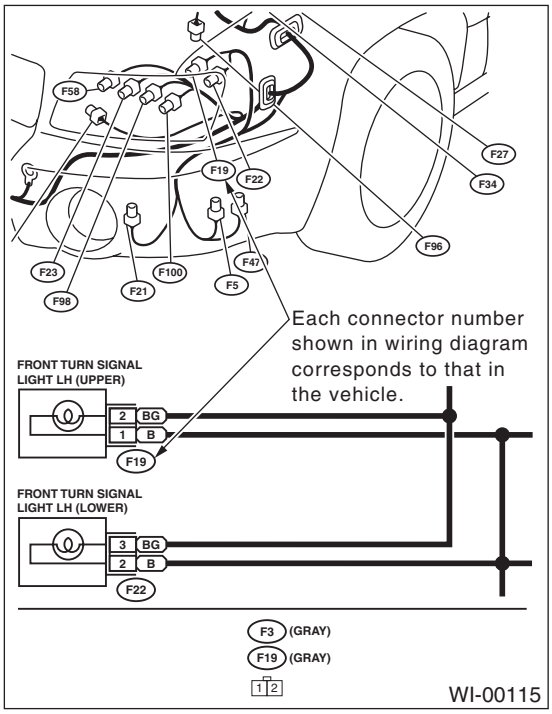
○ ⟶ : Current flows.

× ⟶ : Current does not flow.

WI-00114

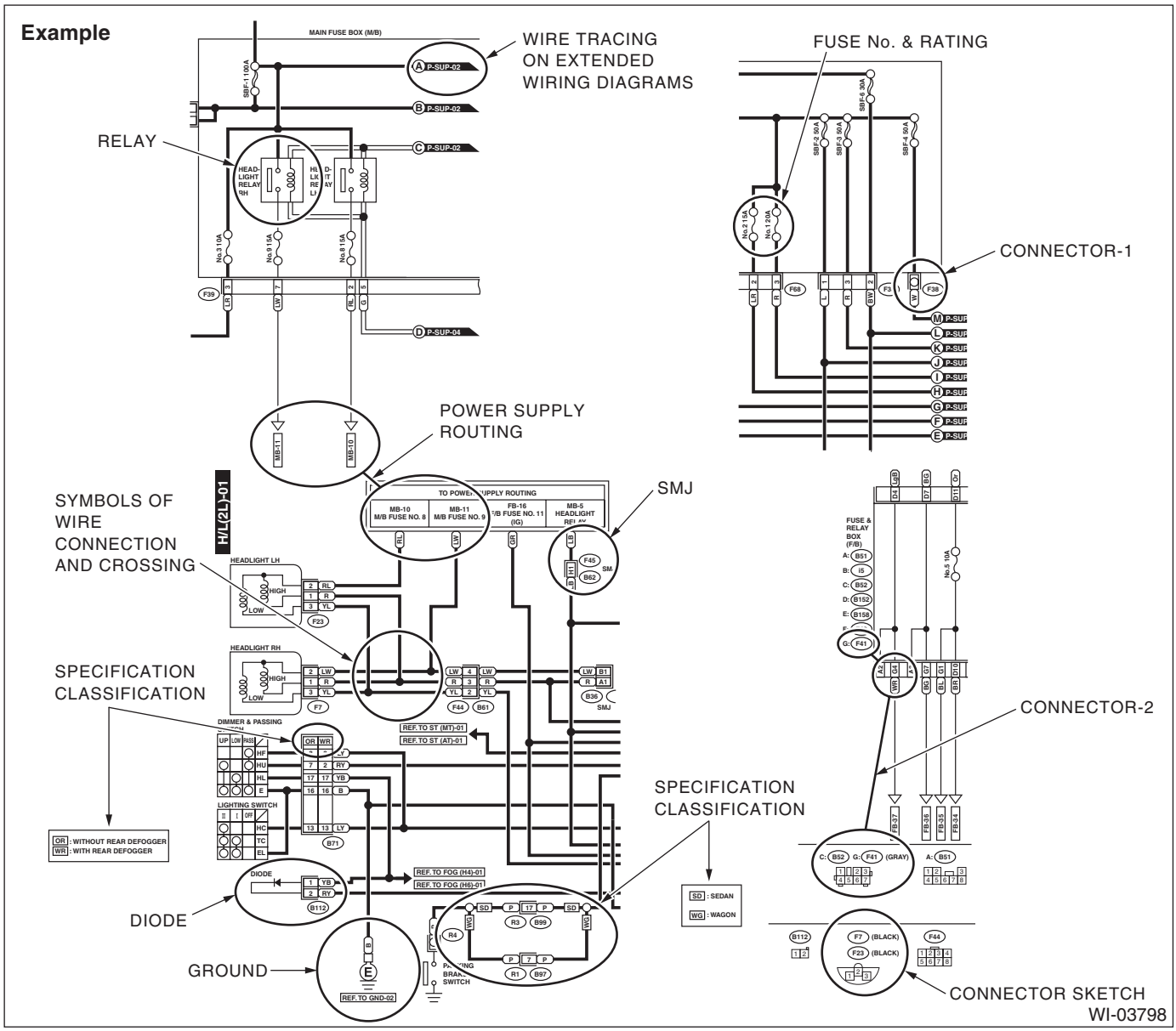
• Each connector number shown in the wiring diagram corresponds to that in the wiring harness. The location of each connector in the actual vehicle is determined by reading the first character of the connector (for example, a “F” for F8, “i” for i16, etc.) and the type of wiring harness. The first character of each connector number corresponds to the area or system of the vehicle.

Symbol	Wiring harness and cord
F	Front wiring harness
B	Bulkhead wiring harness
E	Engine wiring harness
T	Transmission cord
D	Door cord LH & RH, Rear gate cord Rear door cord LH & RH, Rear defogger cord
i	Instrument panel wiring harness
R	Rear wiring harness, Fuel tank cord, Roof cord, Rear gate cord, Rear defogger ground cord (Sedan model)
AB	Airbag wiring harness



D: SYMBOLS IN WIRING DIAGRAMS

A number of symbols are used in each wiring diagram to easily identify parts or circuits.



1. RELAY

A symbol used to indicate a relay.

2. CONNECTOR 1

The sketch of the connector indicates the one-pole types.

3. WIRING CONNECTION

Some wiring diagrams are indicated in foldouts for convenience. Wiring destinations are indicated where necessary by corresponding symbols. (When two pages are needed for clear indication)

4. FUSE No. & RATING

The “FUSE No. & RATING” corresponds with that used in the fuse box (main fuse box, fuse and joint box).

5. CONNECTOR 2

- Each connector is indicated by a symbol.
- Each terminal number is indicated in the corresponding wiring diagram in an abbreviated form.
- For example, terminal number “G4” refers to No. 4 terminal of connector (G: F41) shown in the connector sketch.

6. CONNECTOR SKETCH

• Each connector sketch clearly identifies the shape and color of a connector as well as terminal locations. Non-colored connectors are indicated in natural color.
• When more than two types of connector number are indicated in a connector sketch, it means that the same type connectors are used.

7. GROUND

Each grounding point can be located easily by referring to the corresponding wiring harness.

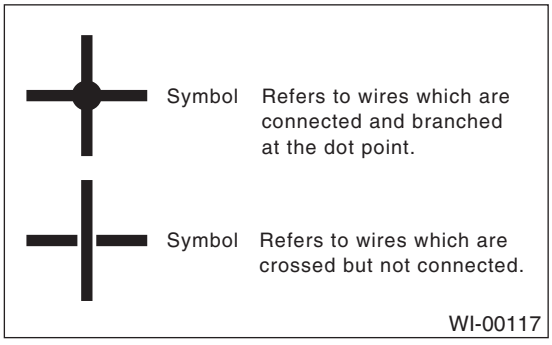
8. DIODE

A symbol is used to indicate a diode.

9. WIRE TRACING ON EXTENDED WIRING DIAGRAMS

For a wiring diagram extending over at least two pages, a symbol (consisting of the same characters with arrows), facilitates wire tracing from one page to the next.
A ←→ A, B ←→ B

10.SYMBOLS OF WIRE CONNECTION AND CROSSING



11.DC POWER SUPPLY CIRCUIT

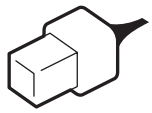
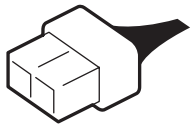
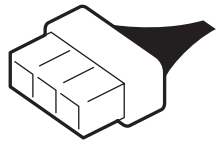
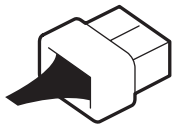
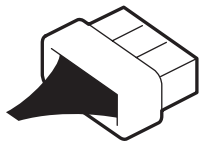
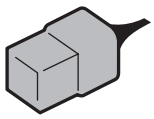
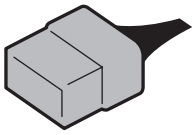
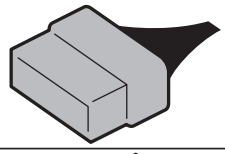
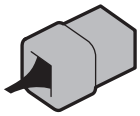
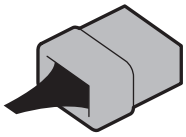
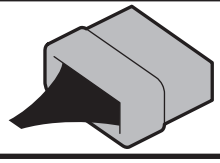
A symbol is used to indicate the power supply in each wiring diagram.
“MB-5”, “MB-6”, etc., which are used as power-supply symbols throughout the text, correspond with those shown in the “DC POWER SUPPLY CIRCUIT” in the wiring diagram.
Accordingly, using the “DC POWER SUPPLY CIRCUIT” and wiring diagrams permits service personnel to understand the entire electrical arrangement of a system.

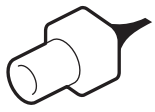
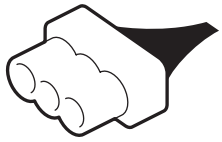
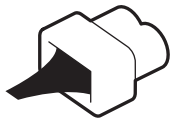
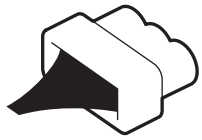
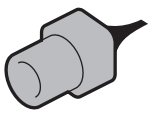
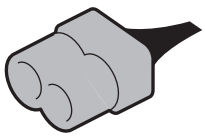
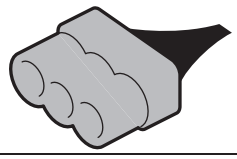
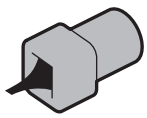
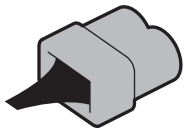
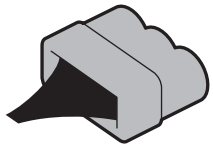
12.CLASSIFICATION BY SPECIFICATION

When the wiring diagram differ according to vehicle specifications, the specification difference is described by using abbreviations.

E: CONNECTOR SYMBOL IN WIRING HARNESS

A number of connector symbols are used in each wiring diagram to easily identify the wiring harness connectors.

Standard type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Standard type: Male		
		
		

Water proof type: Female		
Pole: From 1 to 8	Pole: From 9 to 20	Pole: More than 21
		
		
Water proof type: Male		
		
		

WI-02445

F: ABBREVIATION IN WIRING DIAGRAMS

Abbr.	Full name
ABS	Antilock Brake System
ACC	Accessory
A/C	Air conditioner
AD	Auto Down
AT	Automatic transmission
AU	Auto Up
A/B	Airbag
A/F	Air/Fuel (Air fuel ratio sensor)
ATF	Automatic transmission fluid
AWD	All Wheel Drive
B, BAT	Battery
CPC	Canister Purge Control
D	Drive Range
DN	Down
E	Ground
ELR	Emergency Locking Retractor
F/B	Fuse & Relay box
FL1.5	Fusible Link 1.5 mm^2
H/L	Headlight
I/F	Interface
IG	Ignition
Illumi.	Illumination
INT	Intermittent
LH	Left Hand
Lo	Low
M	Motor
M/B	Main fuse box
MG	Magnet
Mi	Middle
MT	Manual transmission
N	Neutral Range
OCV	Oil flow control solenoid valve
OP	Optional Parts or Open
P	Parking Range
PASS	Passing
R	Reverse Range
RH	Right Hand
SBF	Slow Blow Fuse
ST	Starter
SW	Switch
TGV	Tumble generated valve
U, UP	Up
VDC	Vehicle Dynamics Control
VVL	Variable Valve Lift
WASH	Washer

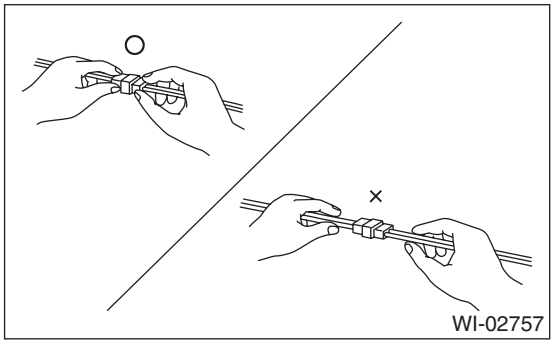
2. Working Precautions

A: PRECAUTIONS WHEN WORKING WITH THE PARTS MOUNTED ON THE VEHICLE

1) When working under a vehicle which is jacked-up, always be sure to use rigid rack.
2) The parking brake must always be applied during working. Also, in automatic transmission vehicles, keep the select lever set to the P (Parking) range.
3) Be sure the workshop is properly ventilated when running the engine. Further, be careful not to touch the belt or fan while the engine is operating.
4) Be careful not to touch hot metal parts, especially the radiator and exhaust system immediately after the engine has been turned off.

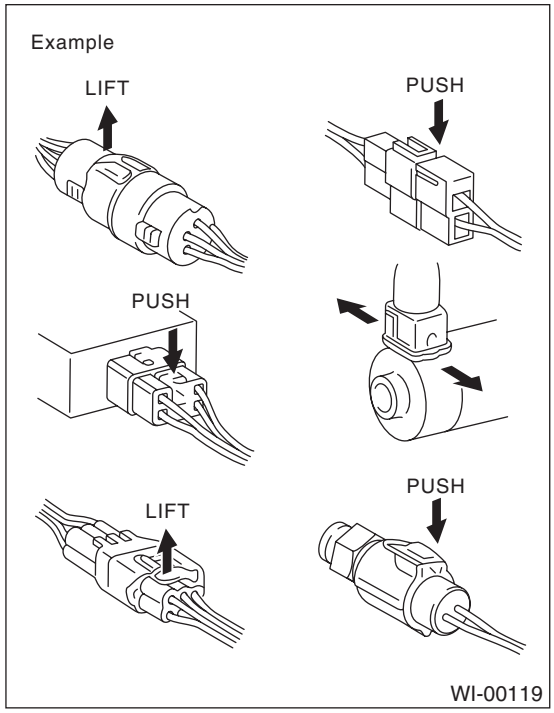
B: PRECAUTIONS IN TROUBLE DIAGNOSIS AND REPAIR OF ELECTRIC PARTS

1) The battery cable must be disconnected from the battery's (–) terminal, and the ignition switch must be set to the OFF position, unless otherwise required by the diagnostics.
2) Securely fasten the wiring harness with clamps and slips so that the harness does not interfere with the body end parts or edges and bolts or screws.
3) When installing parts, be careful not to catch them on the wiring harness.
4) When disconnecting a connector, do not pull the wires, but pull while holding the connector body.

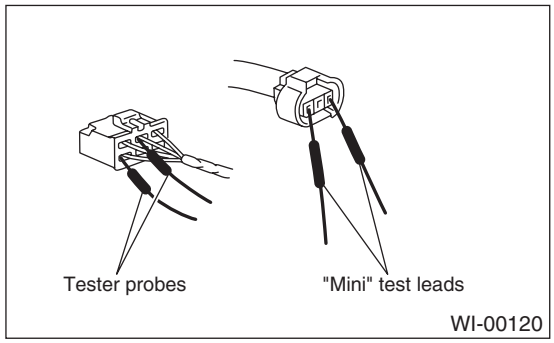


5) Some connectors are provided with a lock. One type of such a connector is disconnected by pushing the lock, and the other, by moving the lock up. In either type the lock shape must be identified before attempting to disconnect the connector.

To connect, insert the connector until it snaps and confirm that it is tightly connected.



6) When checking continuity between connector terminals, or measuring voltage across the terminal and ground, always contact tester probe(s) on terminals from the wiring connection side. If the probe is too thick to gain access to the terminal, use "mini" test leads.
To check water-proof connectors (which are not measurable from the wiring side), contact test probes on the terminal side. Be careful not to bend or damage the terminals.



7) Sensors, relays, electrical unit, etc., are sensitive to strong impacts.
Handle them with care so that they are not dropped or mishandled.

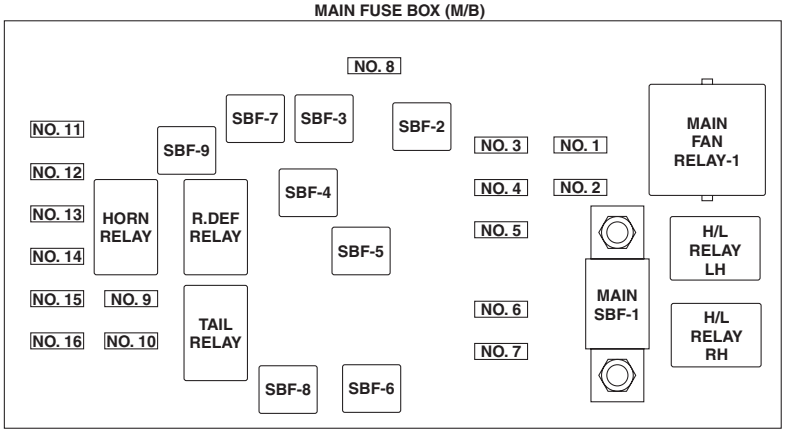
3. Power Supply Circuit

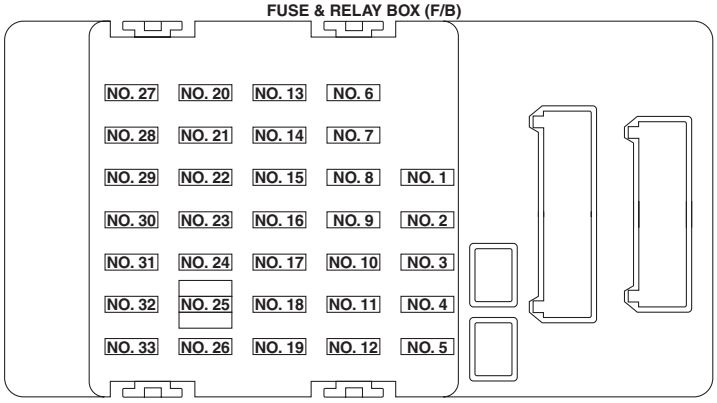
A: WIRING DIAGRAM

1. LHD MODEL

P-SUP(L)-01

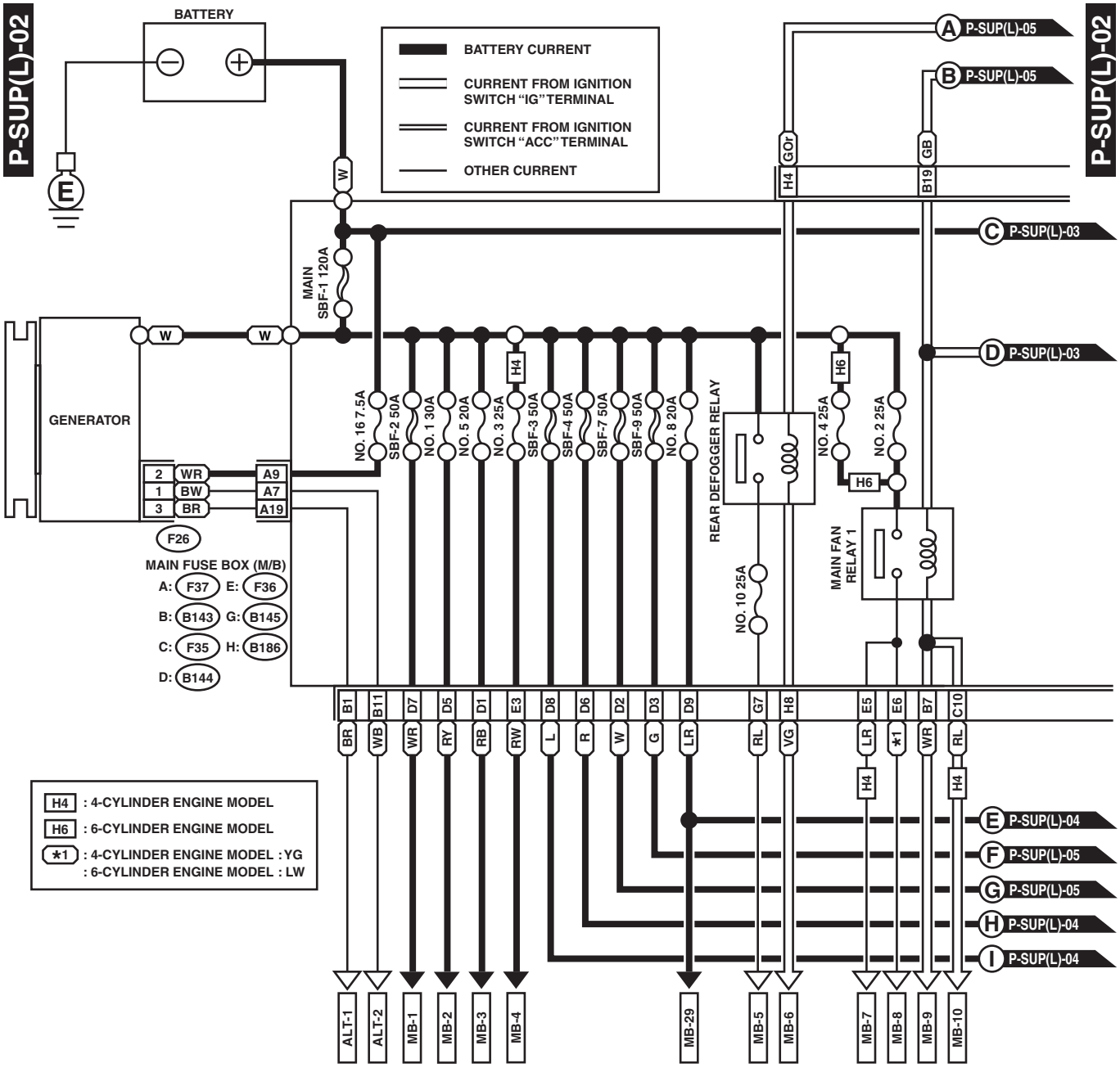
P-SUP(L)-01





WI-03895

Power Supply Circuit

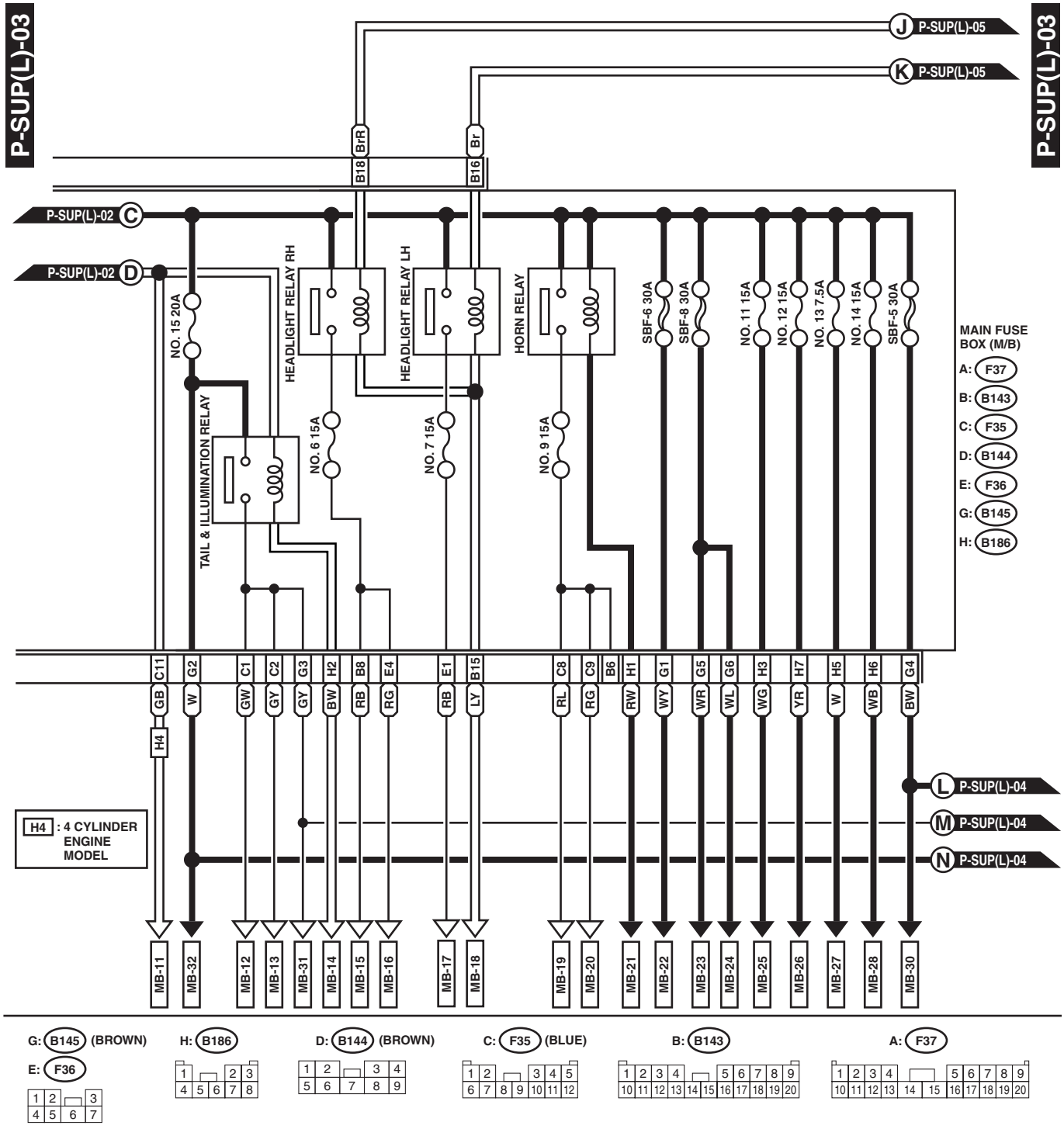


F26 G: B145 (BROWN) H: B186 D: B144 (BROWN) C: F35 (BLUE) B: B143 A: F37

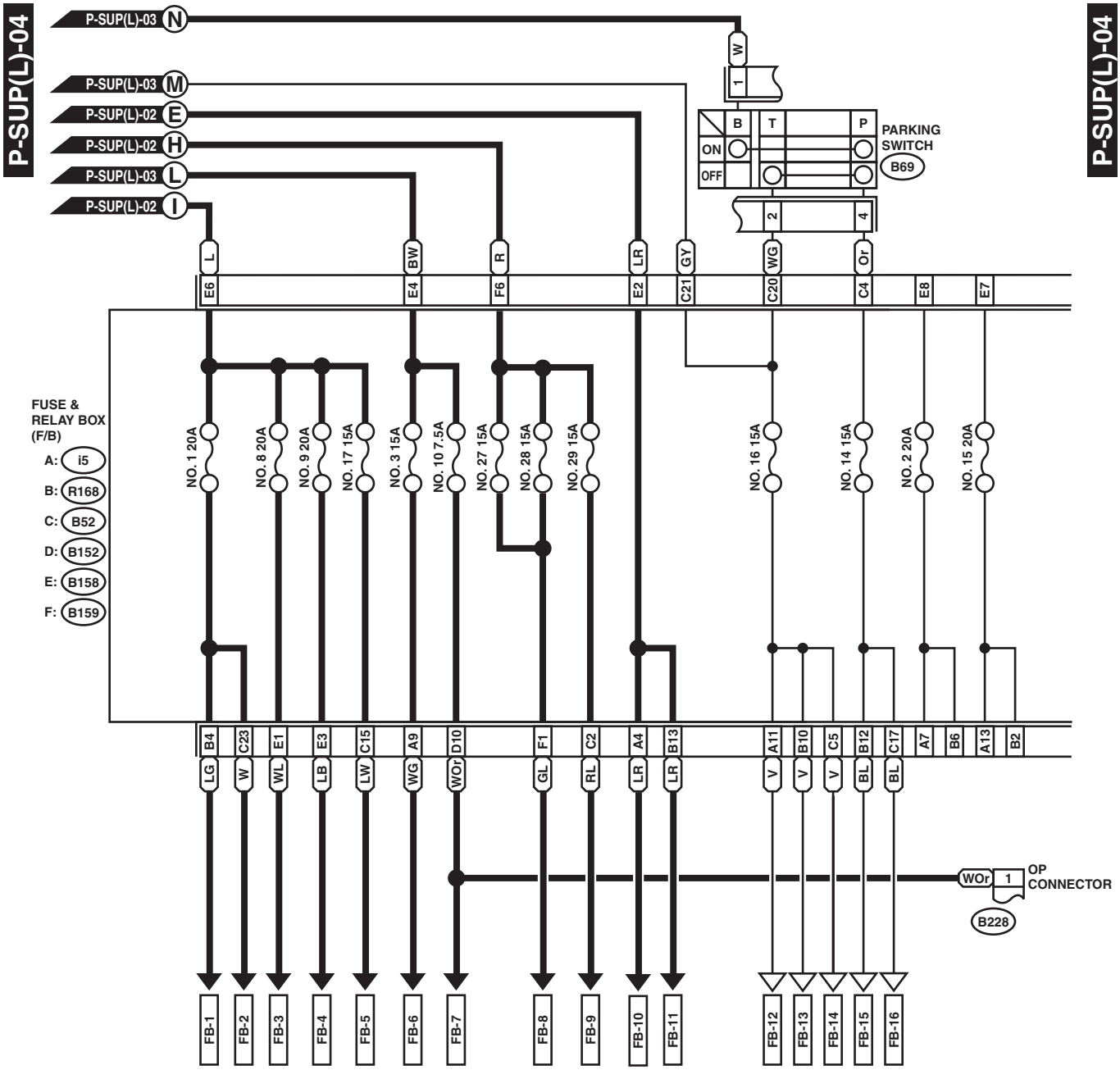
E: F36

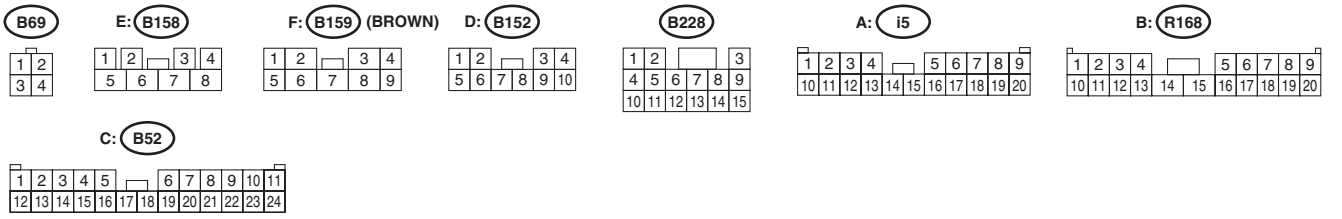
WI-03896

Power Supply Circuit



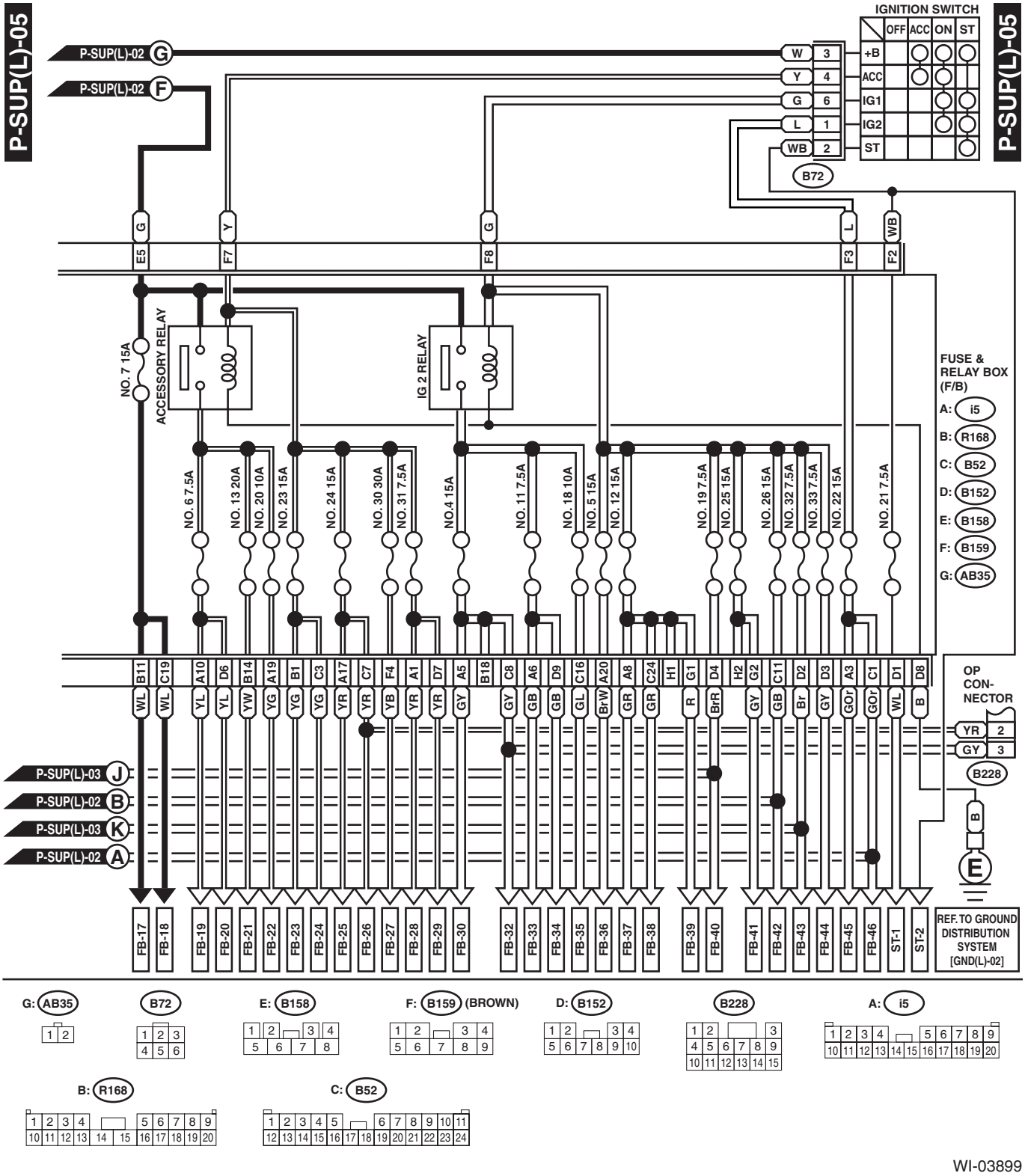
WI-03897


P-SUP(L)-04
P-SUP(L)-03 N
P-SUP(L)-03 M
P-SUP(L)-02 E
P-SUP(L)-02 H
P-SUP(L)-03 L
P-SUP(L)-02 I
W
1
B T P
ON
OFF
PARKING SWITCH
B69
2 4
L BW R LR GY WG Or
E6 E4 F6 E2 C21 C20 C4 E8 E7
FUSE & RELAY BOX (F/B)
A: i5
B: R168
C: B52
D: B152
E: B158
F: B159
NO. 1 20A
NO. 8 20A
NO. 9 20A
NO. 17 15A
NO. 3 15A
NO. 10 7.5A
NO. 27 15A
NO. 28 15A
NO. 29 15A
NO. 16 15A
NO. 14 15A
NO. 2 20A
NO. 15 20A
B4 C23 E1 E3 C15 A9 D10 F1 C2 A4 B13 A11 B10 C5 B12 C17 A7 B6 A13 B2
LG W WL LB LW WG WOr GL RL LR LR V V V BL BL
WOr 1
OP CONNECTOR
B228
FB-1 FB-2 FB-3 FB-4 FB-5 FB-6 FB-7 FB-8 FB-9 FB-10 FB-11 FB-12 FB-13 FB-14 FB-15 FB-16
P-SUP(L)-04


B69
E: B158
F: B159 (BROWN)
D: B152
B228
A: i5
B: R168
C: B52

WI-03898

Power Supply Circuit



WI-03899

No.	Load
MB-1	ABS control module VDC control module
MB-2	ABS control module VDC control module
MB-4	Sub fan relay
MB-5	Mirror heater relay Rear defogger
MB-6	Body integrated unit
MB-7	Main fan relay 2
MB-8	Main fan motor PWM controller
MB-9	ECM
MB-10	Main fan relay 2
MB-11	Main fan relay 2
MB-12	Headlight leveler LH
MB-13	Headlight leveler RH
MB-14	Lighting switch OP connector
MB-15	Body integrated unit Combination meter
MB-16	Headlight LH
MB-17	Headlight RH
MB-18	Dimmer/Passing switch Lighting diode OP connector
MB-19	Horn (HI)
MB-20	Horn (LO)
MB-21	Body integrated unit Horn switch
MB-22	Oxygen (A/F) sensor relay Main relay
MB-23	Oxygen (A/F) sensor relay Main relay Main relay 2
MB-24	Electronic throttle control relay
MB-25	Fuel pump relay
MB-26	TCM
MB-27	Data link connector ECM
MB-28	Body integrated unit Key switch illumination Key warning switch Turn signal and hazard unit
MB-29	Auto A/C control unit Body integrated unit Interior light Spot map light
MB-30	Power window circuit breaker
MB-31	F/B fuse No. 16 Headlight leveler switch Parking light switch
MB-32	Parking light switch
ALT-1	ECM
ALT-2	Combination meter OP connector

No.	Load
ST-1	ECM (AT) Starter relay
ST-2	Starter relay
FB-2	Rear fog light relay
FB-3	Stop light switch
FB-4	Mirror heater relay Wiper deicer relay
FB-5	Seat heater relay
FB-6	Body integrated unit
FB-8	Blower fan relay
FB-9	Front fog light relay
FB-10	Audio Clock Keyless entry control module Navigation unit Step light LH Step light RH TV monitor
FB-11	Luggage room light (Wagon model) Trunk room light (Sedan model)
FB-12	Clock
FB-13	Seat heater switch
FB-14	Front fog light relay Rear fog light relay OP connector
FB-17	Combination meter
FB-18	Body integrated unit LAN unit
FB-19	Remote controlled mirror switch
FB-20	Seat heater relay Vanity mirror illumination LH Vanity mirror illumination RH
FB-21	Luggage room power socket Seat heater switch
FB-22	Front accessory power supply socket
FB-23	Rear wiper motor
FB-24	Body integrated unit Rear washer motor
FB-25	Audio Clock Distributor Navigation unit TV monitor Front washer motor
FB-26	OP connector
FB-27	Front wiper motor Front wiper switch Front washer motor
FB-28	Body integrated unit A/C control panel
FB-29	Auto A/C control unit TCM
FB-30	TV monitor

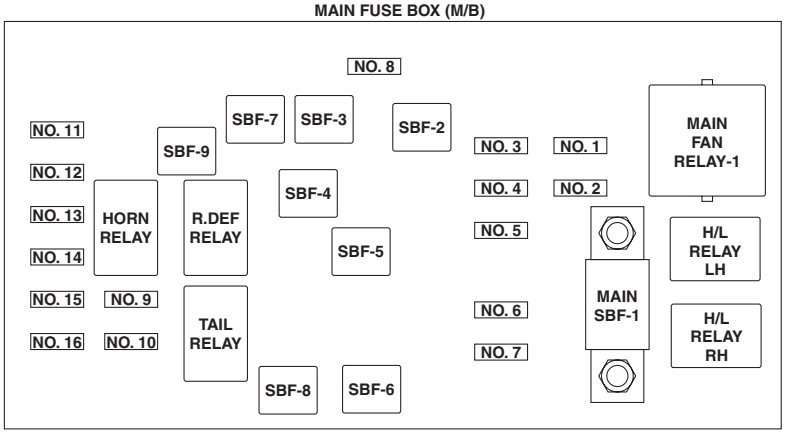
No.	Load
FB-32	Brake switch Clutch switch (MT/Cruise) ECM OP connector Line end check connector Seat belt warning light Sunroof control unit Sunroof switch Wiper deicer relay
FB-33	Clock
FB-34	Turn signal and hazard unit
FB-35	Back-up light relay (5-speed AT model) Back-up light switch (MT model) Inhibitor switch (4-speed AT model)
FB-36	Combination meter
FB-37	Body integrated unit
FB-38	ECM Fuel pump relay Ignition coil & ignitor P-VIGN relay Rear vehicle speed sensor (4-speed AT model) TCM
FB-39	Airbag control module
FB-41	Airbag control module
FB-42	Power window relay
FB-44	ABS control module VDC control module
FB-45	A/C control panel
FB-46	A/C relay Auto A/C control module Blower fan relay FRESH/RECIRC actuator Mode actuator Pressure switch Sub fan relay Heater cock solenoid

2. RHD MODEL

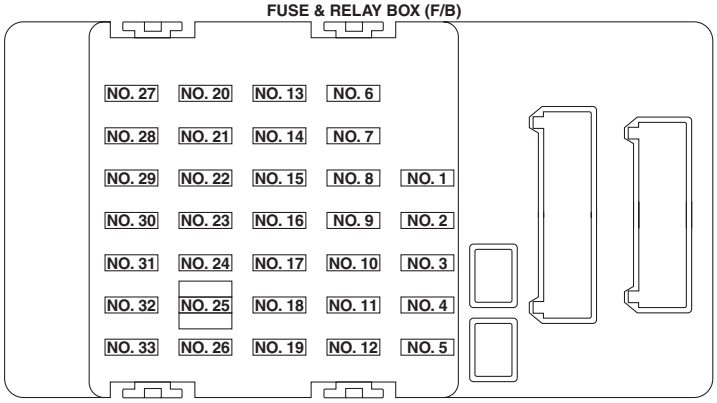
P-SUP(R)-01

P-SUP(R)-01

MAIN FUSE BOX (M/B)

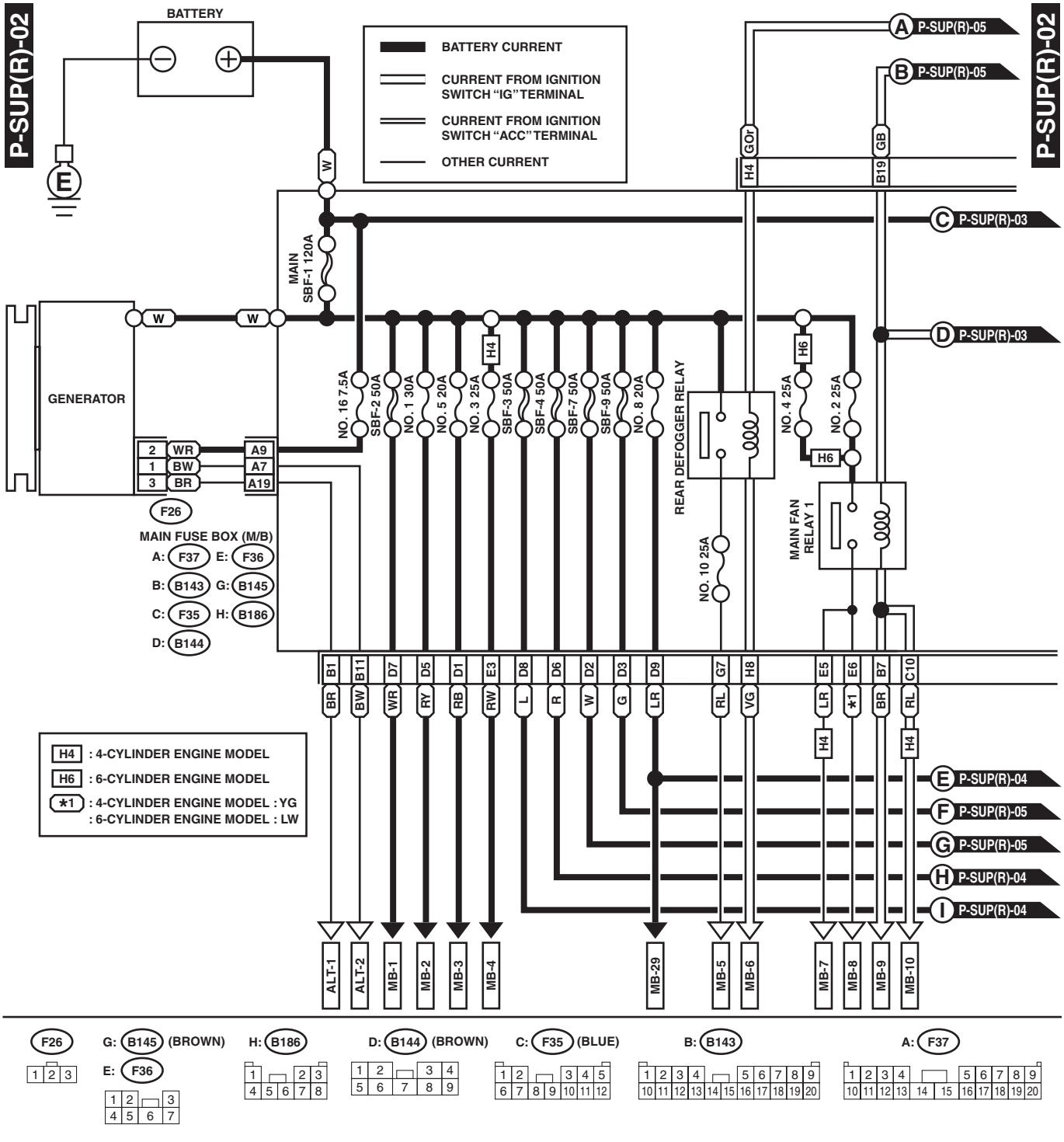


FUSE & RELAY BOX (F/B)

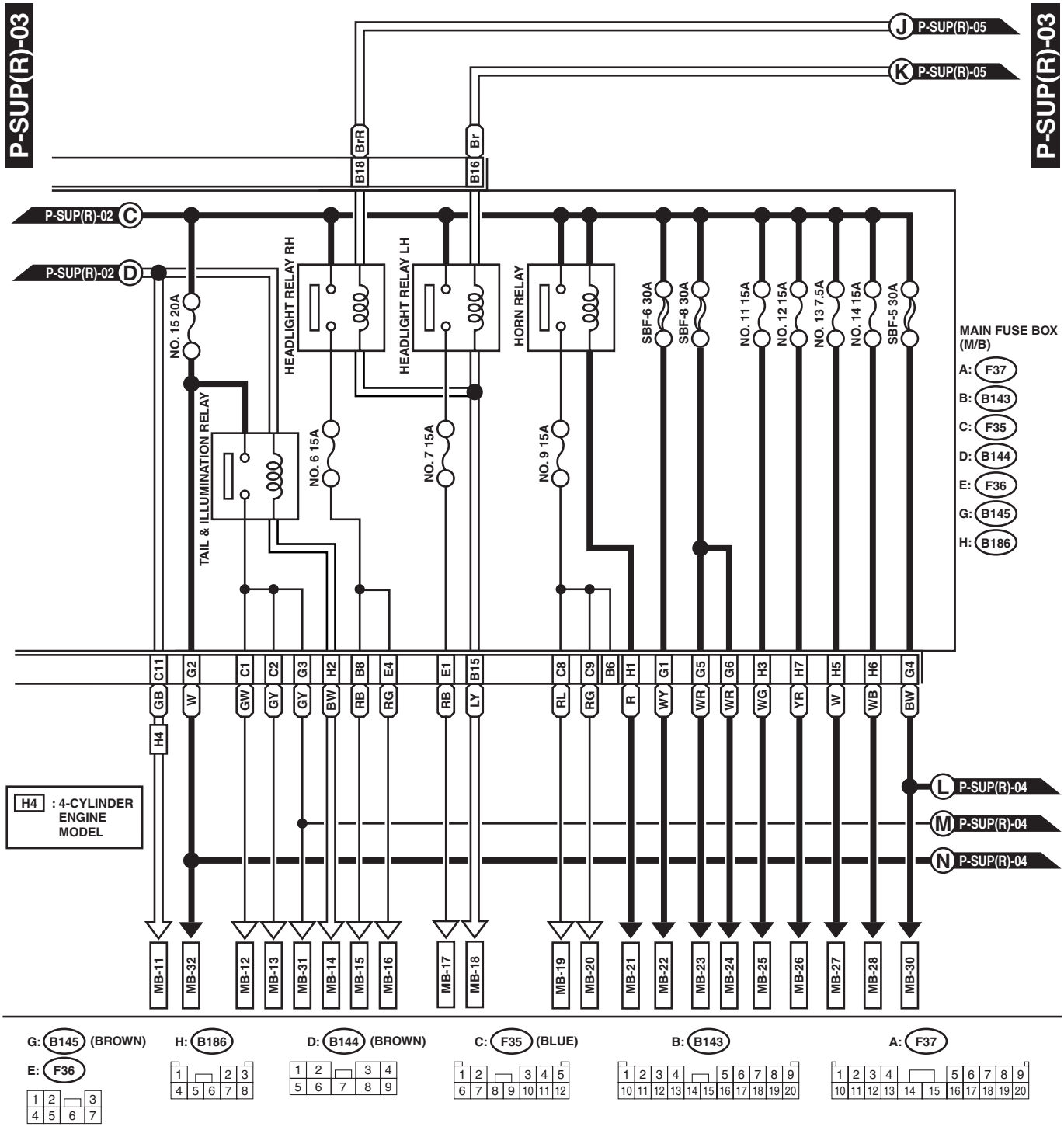


WI-03900

Power Supply Circuit

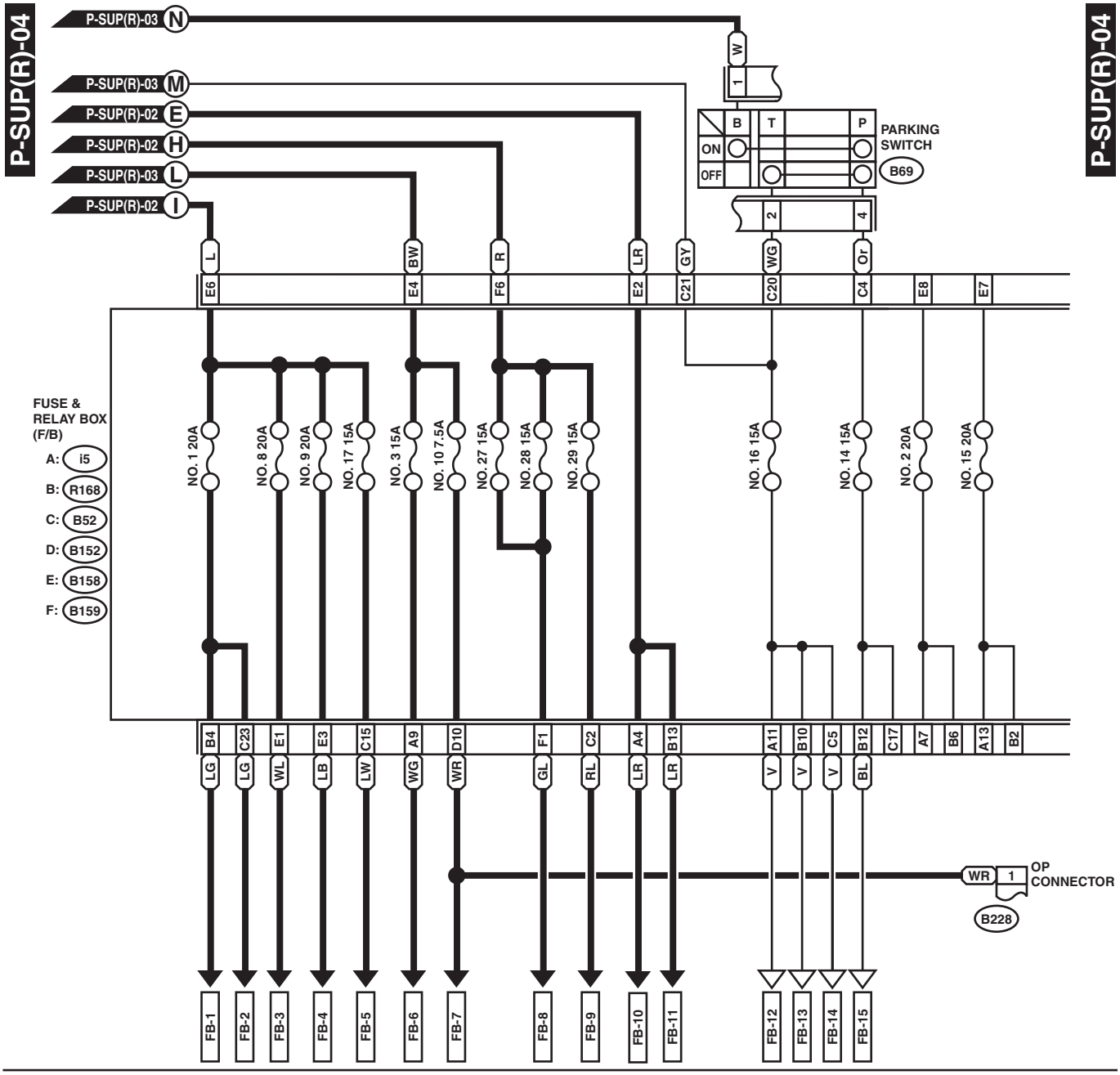


WI-03901

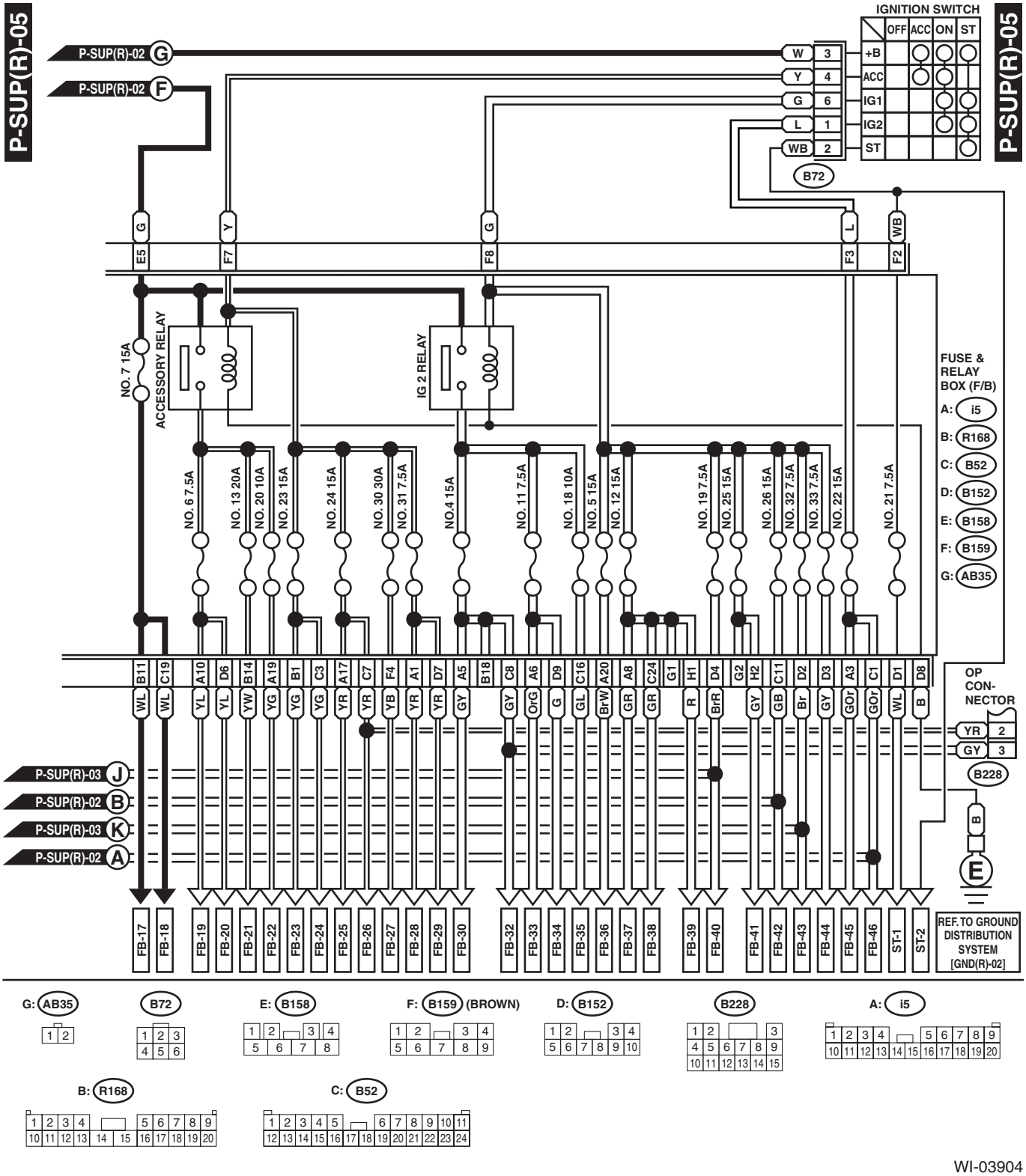

P-SUP(R)-03
P-SUP(R)-03
J P-SUP(R)-05
K P-SUP(R)-05
BrR
Br
B18
B16
P-SUP(R)-02 C
P-SUP(R)-02 D
NO. 15 20A
HEADLIGHT RELAY RH
HEADLIGHT RELAY LH
HORN RELAY
SBF-6 30A
SBF-8 30A
NO. 11 15A
NO. 12 15A
NO. 13 7.5A
NO. 14 15A
SBF-5 30A
TAIL & ILLUMINATION RELAY
NO. 6 15A
NO. 7 15A
NO. 9 15A
MAIN FUSE BOX (M/B)
A: F37
B: B143
C: F35
D: B144
E: F36
G: B145
H: B186
C11 G2 C1 C2 G3 H2 B8 E4 E1 B15 C8 C9 B6 H1 G1 G5 G6 H3 H7 H5 H6 G4
GB W GW GY GY BW RB RG RB LY RL RG R WY WR WR WG YR W WB BW
H4
H4 : 4-CYLINDER ENGINE MODEL
L P-SUP(R)-04
M P-SUP(R)-04
N P-SUP(R)-04
MB-11 MB-32 MB-12 MB-13 MB-31 MB-14 MB-15 MB-16 MB-17 MB-18 MB-19 MB-20 MB-21 MB-22 MB-23 MB-24 MB-25 MB-26 MB-27 MB-28 MB-30
G: B145 (BROWN)
E: F36
H: B186
D: B144 (BROWN)
C: F35 (BLUE)
B: B143
A: F37

WI-03902

Power Supply Circuit



WI-03903


P-SUP(R)-05
P-SUP(R)-02 G
P-SUP(R)-02 F
IGNITION SWITCH
OFF ACC ON ST
+B ACC IG1 IG2 ST
W 3
Y 4
G 6
L 1
WB 2
B72
E5 F7 F8 F3 F2
NO. 7 15A
ACCESSORY RELAY
IG 2 RELAY
NO. 6 7.5A
NO. 13 20A
NO. 20 10A
NO. 23 15A
NO. 24 15A
NO. 30 30A
NO. 31 7.5A
NO.4 15A
NO. 11 7.5A
NO. 18 10A
NO. 5 15A
NO. 12 15A
NO. 19 7.5A
NO. 25 15A
NO. 26 15A
NO. 32 7.5A
NO. 33 7.5A
NO. 22 15A
NO. 21 7.5A
FUSE & RELAY BOX (F/B)
A: i5
B: R168
C: B52
D: B152
E: B158
F: B159
G: AB35
B11 C19 A10 D6 B14 A19 B1 C3 A17 C7 F4 A1 D7 A5 B18 C8 A6 D9 C16 A20 A8 C24 G1 H1 D4 G2 H2 C11 D2 D3 A3 C1 D1 D8
WL WL YL YL YW YG YG YG YR YR YB YR YR GY GY OrG G GL BrW GR GR R BrR GY GB Br GY GOr GOr WL B
OP CON-NECTOR
YR 2
GY 3
B228
P-SUP(R)-03 J
P-SUP(R)-02 B
P-SUP(R)-03 K
P-SUP(R)-02 A
B
E
FB-17 FB-18 FB-19 FB-20 FB-21 FB-22 FB-23 FB-24 FB-25 FB-26 FB-27 FB-28 FB-29 FB-30 FB-32 FB-33 FB-34 FB-35 FB-36 FB-37 FB-38 FB-39 FB-40 FB-41 FB-42 FB-43 FB-44 FB-45 FB-46 ST-1 ST-2
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
G: AB35
B72
E: B158
F: B159 (BROWN)
D: B152
B228
A: i5
B: R168
C: B52

WI-03904

No.	Load
MB-1	ABS control module VDC control module
MB-2	ABS control module VDC control module
MB-3	Audio amplifier (Model with McIntosh)
MB-4	Sub fan relay
MB-5	Mirror heater relay Rear defogger
MB-6	Body integrated unit
MB-7	Main fan relay 2
MB-8	Main fan motor PWM controller
MB-9	ECM
MB-10	Main fan relay 2
MB-11	Main fan relay 2
MB-12	Headlight leveler LH
MB-13	Headlight leveler RH
MB-14	Lighting switch OP connector
MB-15	Body integrated unit Combination meter
MB-16	Headlight LH
MB-17	Headlight RH
MB-18	Dimmer/passing switch Lighting diode OP connector
MB-19	Horn (HI)
MB-20	Horn (LO)
MB-21	Body integrated unit Horn switch
MB-22	Oxygen (A/F) sensor relay Main relay
MB-23	Oxygen (A/F) sensor relay Main relay Main relay 2
MB-24	Electronic throttle control relay
MB-25	Fuel pump relay
MB-26	TCM
MB-27	Data link connector ECM
MB-28	Alarm control module Body integrated unit Key switch illumination Key warning switch Turn signal and hazard unit
MB-29	Alarm control module Auto A/C control module Body integrated unit Interior light Spot map light
MB-30	Power window circuit breaker
MB-31	F/B fuse No. 16 Headlight leveler switch Parking light switch
MB-32	Parking light switch

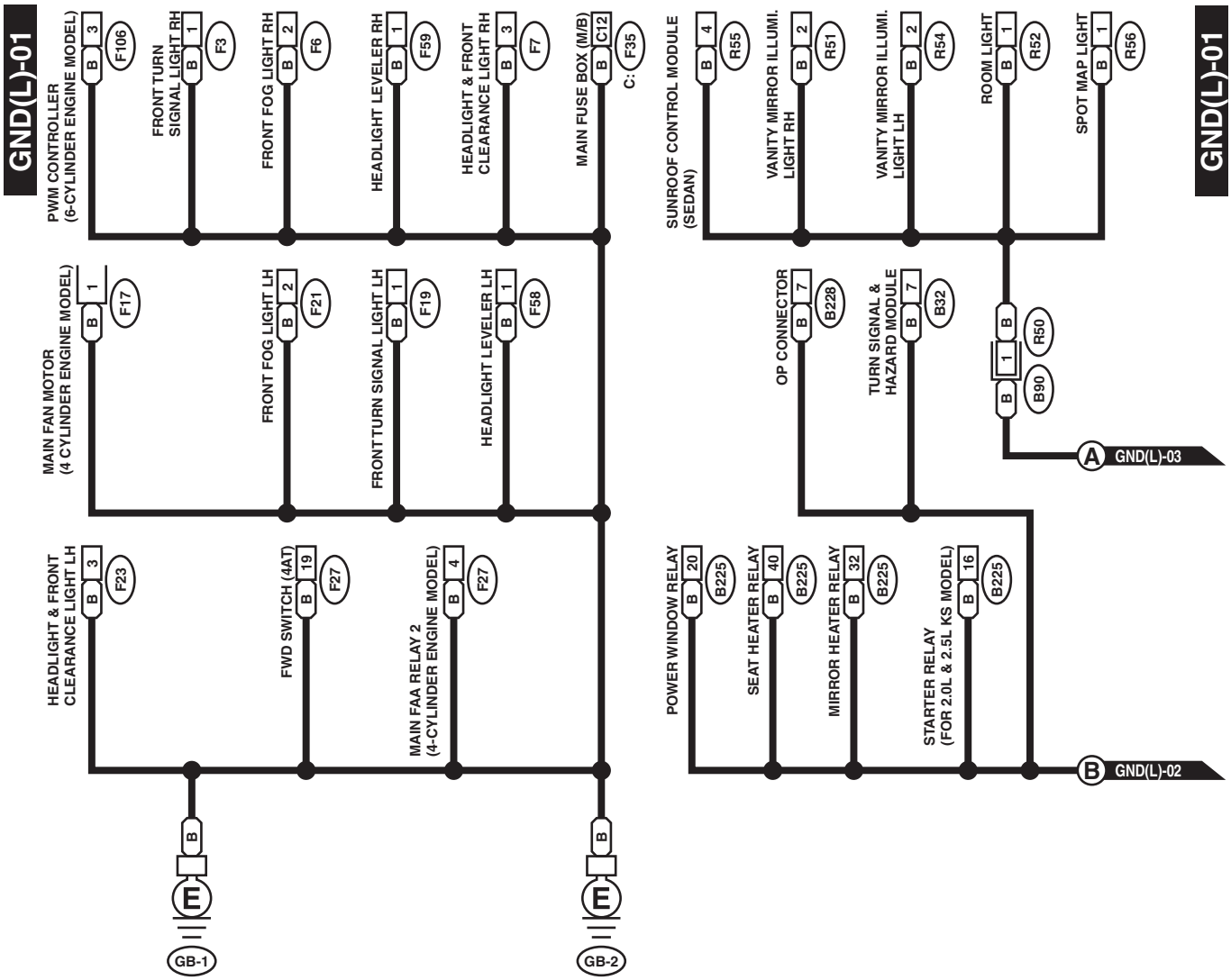
No.	Load
ALT-1	ECM
ALT-2	Combination meter OP connector
ST-1	ECM (AT) Starter relay
ST-2	Starter relay
FB-2	Rear fog light relay
FB-3	Stop light switch
FB-4	Mirror heater relay Wiper deicer relay
FB-5	Seat heater relay
FB-6	Body integrated unit
FB-8	Blower fan relay
FB-9	Front fog light relay
FB-10	Audio Clock Keyless entry control module Navigation unit Step light LH Step light RH TV monitor
FB-11	Luggage room light (Wagon model) Trunk room light (Sedan model) Seat belt buzzer
FB-12	Clock
FB-13	Seat heater switch
FB-14	Front fog light relay Rear fog light relay OP connector
FB-17	Combination meter
FB-18	Body integrated unit LAN unit
FB-19	Remote controlled mirror switch
FB-20	Seat heater relay Vanity mirror illumination LH Vanity mirror illumination RH
FB-21	Luggage room power socket Seat heater switch
FB-22	Front accessory power supply socket
FB-23	Rear wiper motor
FB-24	Body integrated unit Rear washer motor
FB-25	Audio Clock Distributor Navigation unit TV monitor Front washer motor
FB-26	OP connector
FB-27	Front wiper motor Front wiper switch Front washer motor
FB-28	Body integrated unit A/C control panel
FB-29	Auto A/C control module TCM

No.	Load
FB-30	TV monitor
FB-32	Alarm control module Brake switch Clutch switch (MT/Cruise) ECM OP connector Line end check connector Seat belt warning light Sunroof control unit Sunroof switch Wiper deicer relay
FB-33	Clock
FB-34	Turn signal and hazard unit
FB-35	Back-up light relay (5-speed AT model) Back-up light switch (MT model) Inhibitor switch (4-speed AT model)
FB-36	Combination meter
FB-37	Body integrated unit
FB-38	ECM Fuel pump relay Ignition coil No. 1 Ignition coil No. 2 Ignition coil No. 3 Ignition coil No. 4 Ignition coil & ignitor P-VIGN relay Rear vehicle speed sensor (4-speed AT model) TCM
FB-39	Airbag control module
FB-41	Airbag control module
FB-42	Power window relay
FB-44	ABS control module VDC control module
FB-45	A/C control panel
FB-46	A/C relay Auto A/C control module Blower fan relay FRESH/RECIRC actuator Mode actuator Pressure switch Sub fan relay Heater cock solenoid

4. Ground Distribution Circuit

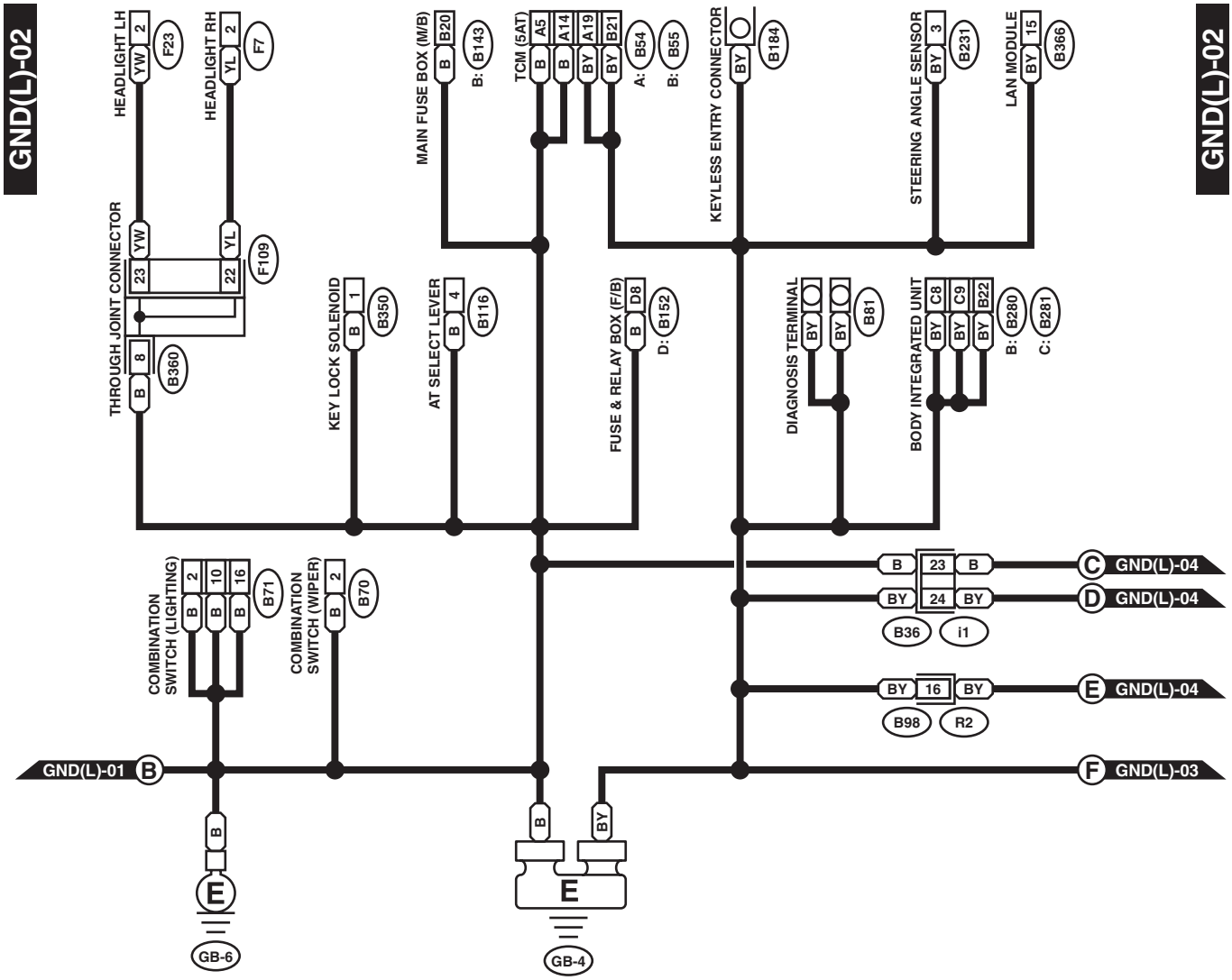
A: WIRING DIAGRAM

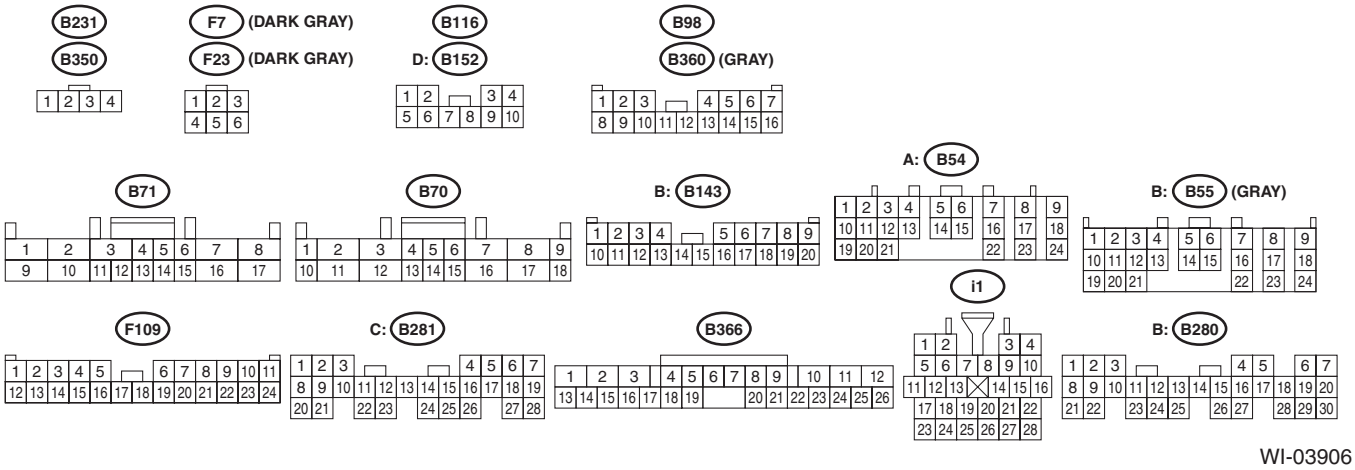
1. LHD CHASSIS GROUND



WI-03905

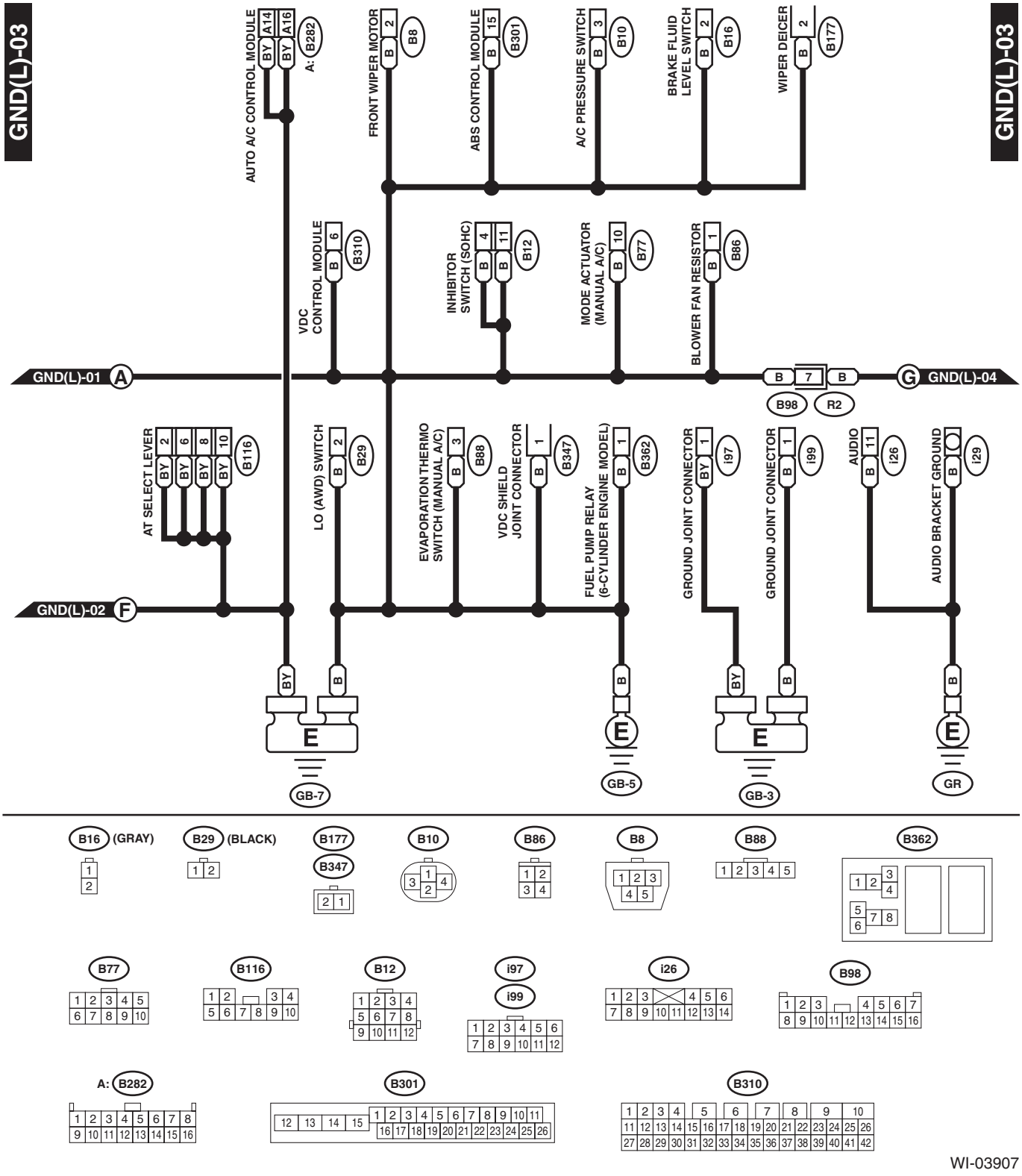
Ground Distribution Circuit





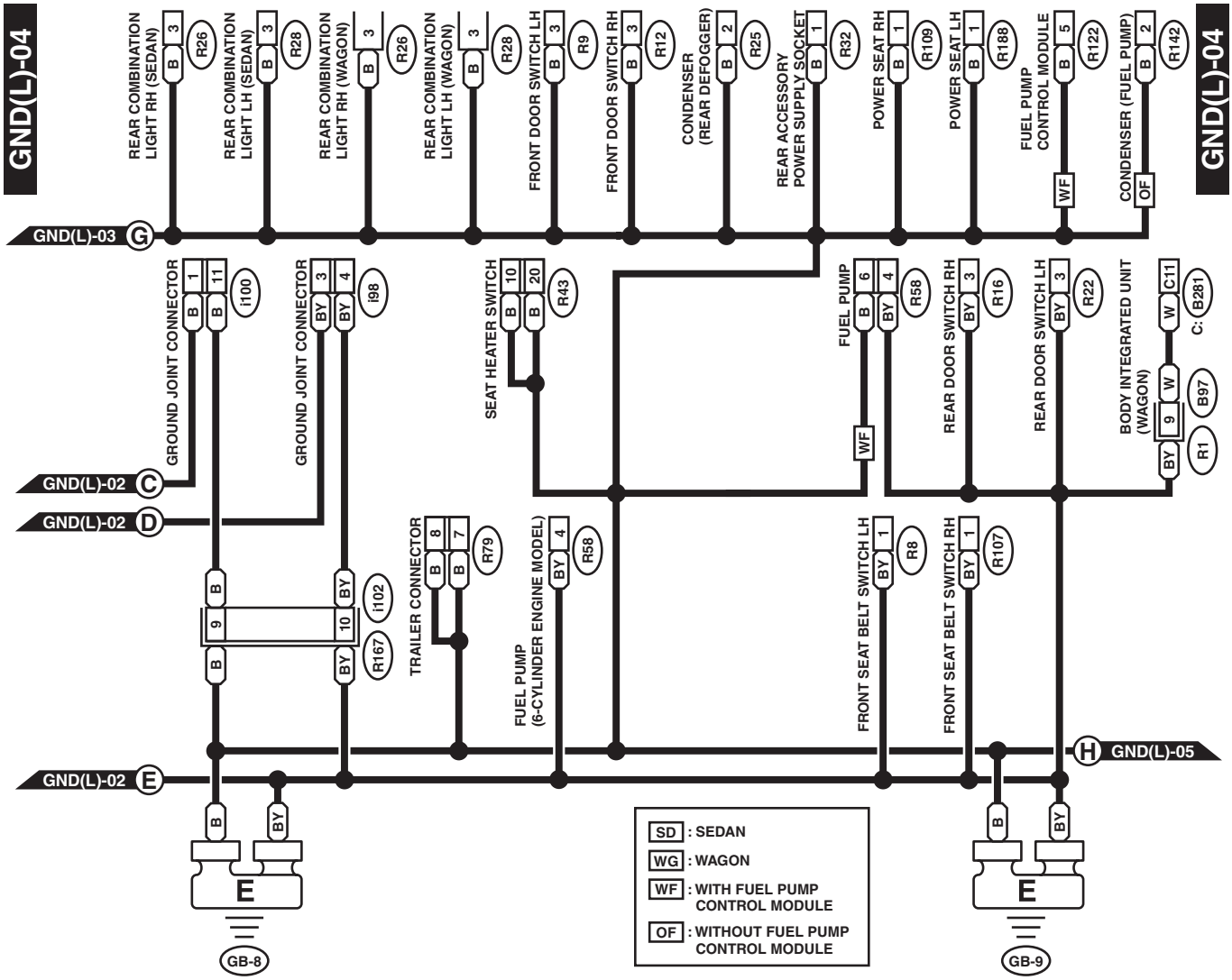
WI-03906

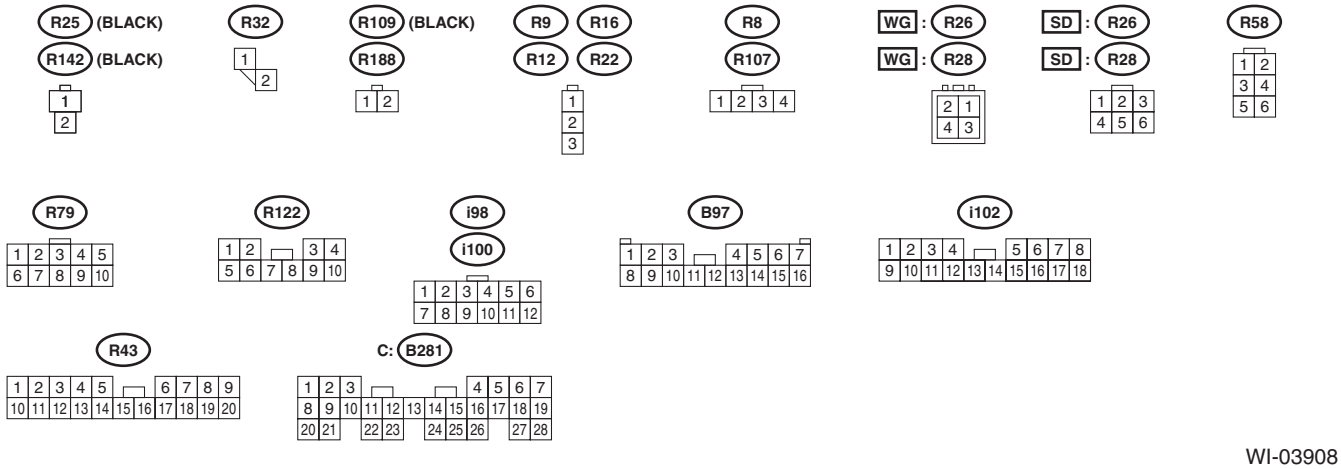
Ground Distribution Circuit



WI-03907

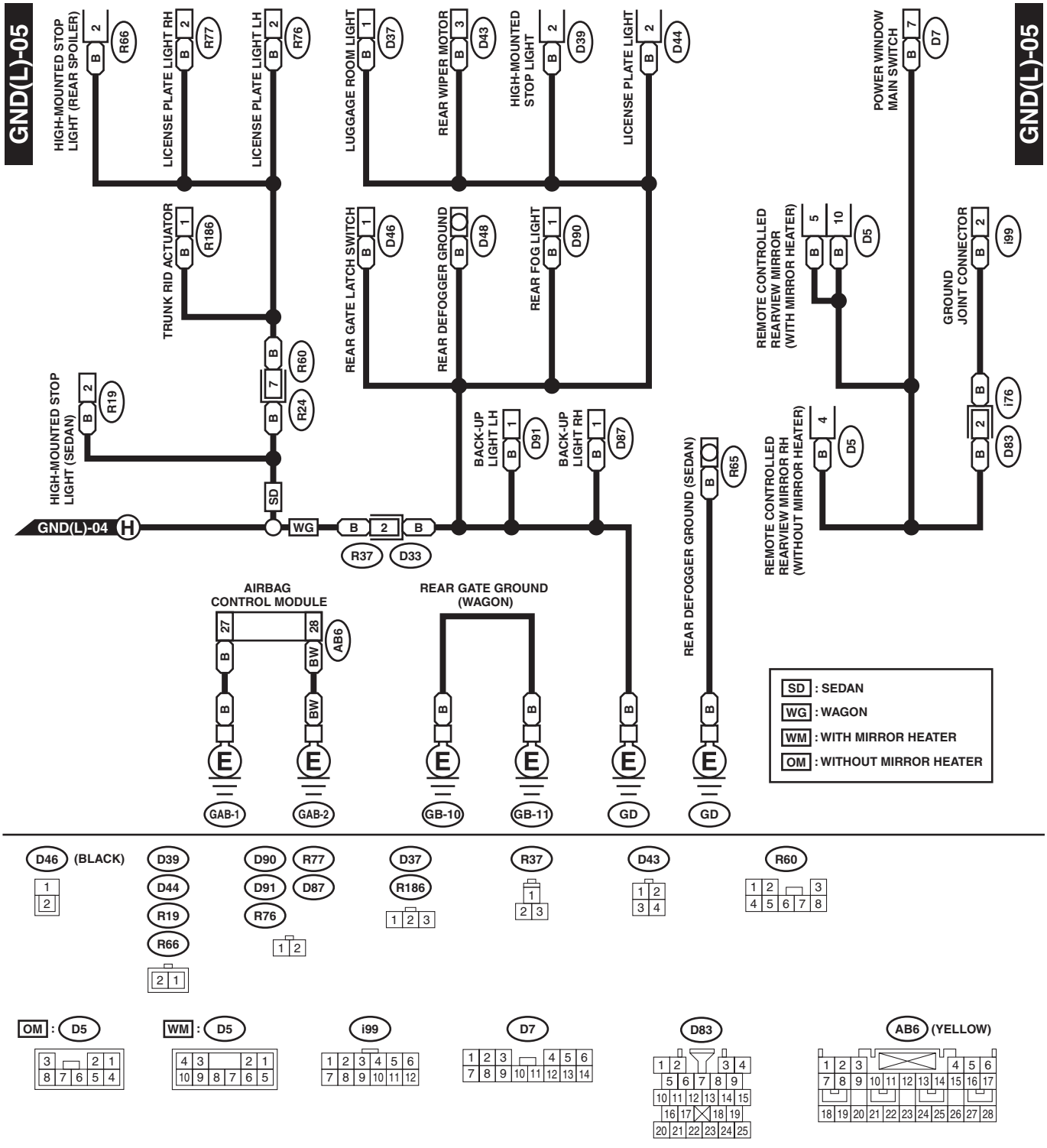
Ground Distribution Circuit





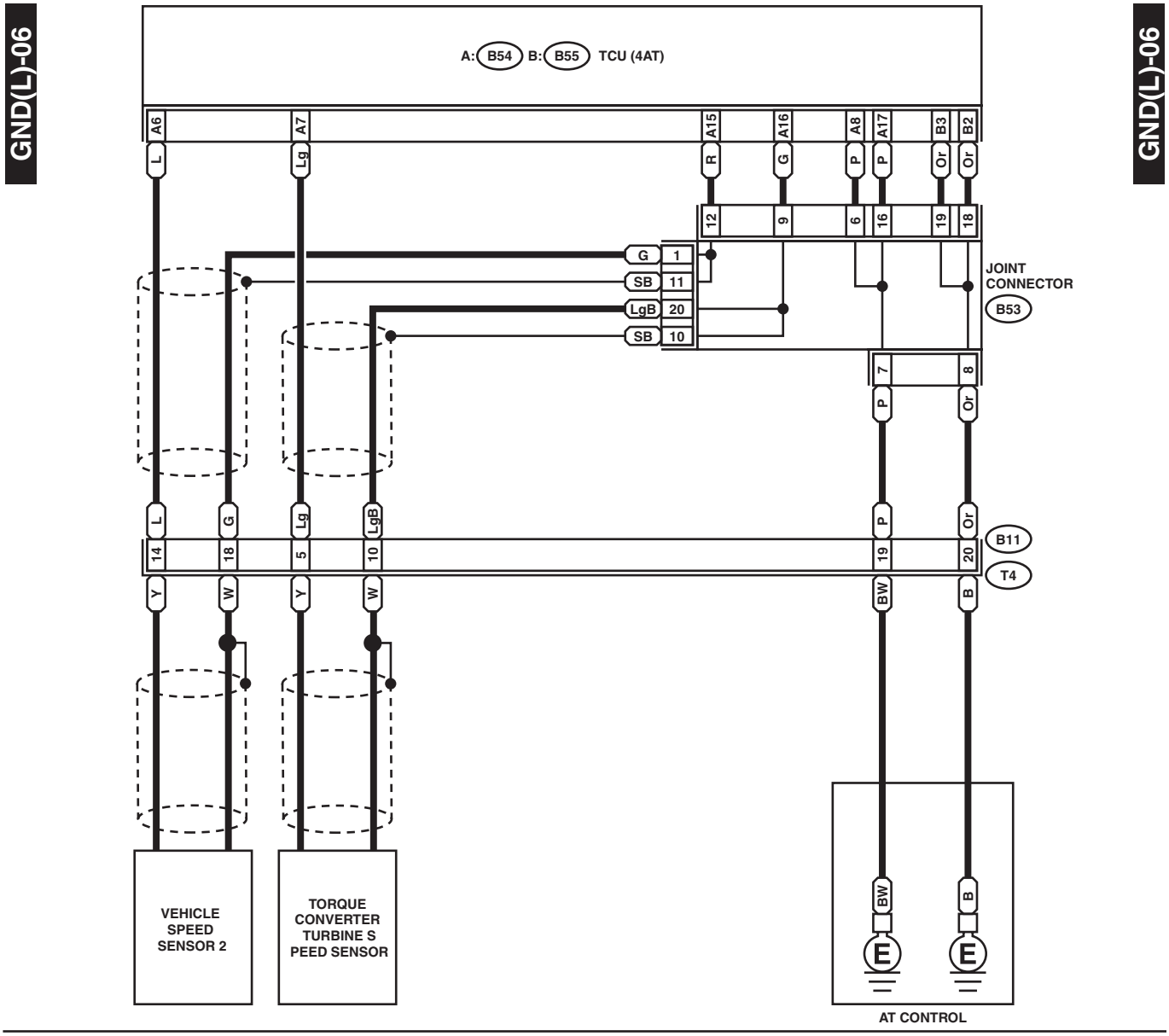
WI-03908

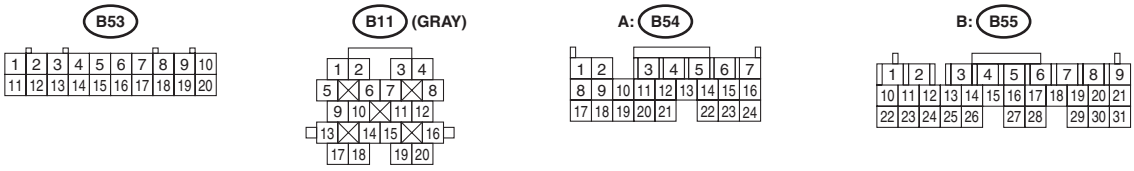
Ground Distribution Circuit



WI-03909

2. LHD AT TRANSMISSION GROUND (4AT MODEL)

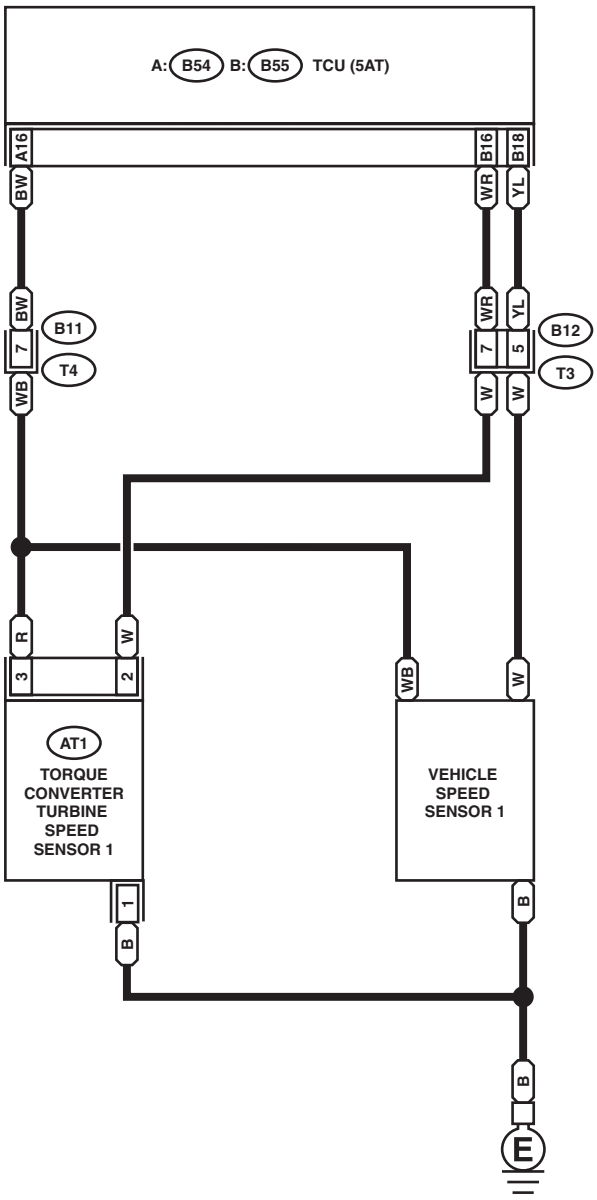




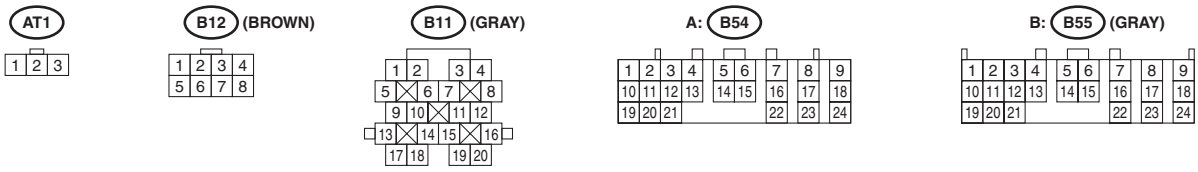
WI-03910

3. LHD AT TRANSMISSION GROUND (5AT MODEL)

GND(L)-07

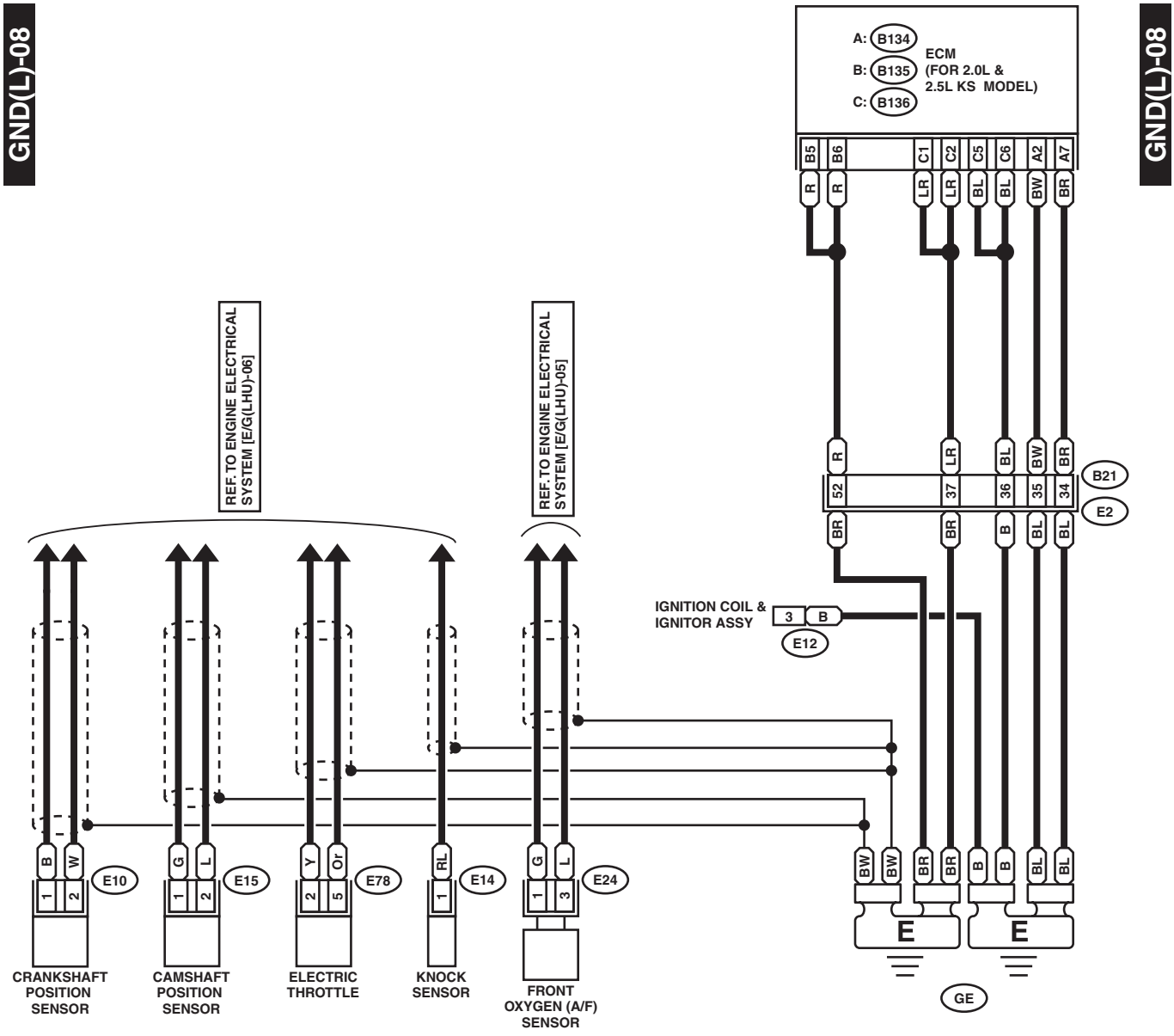


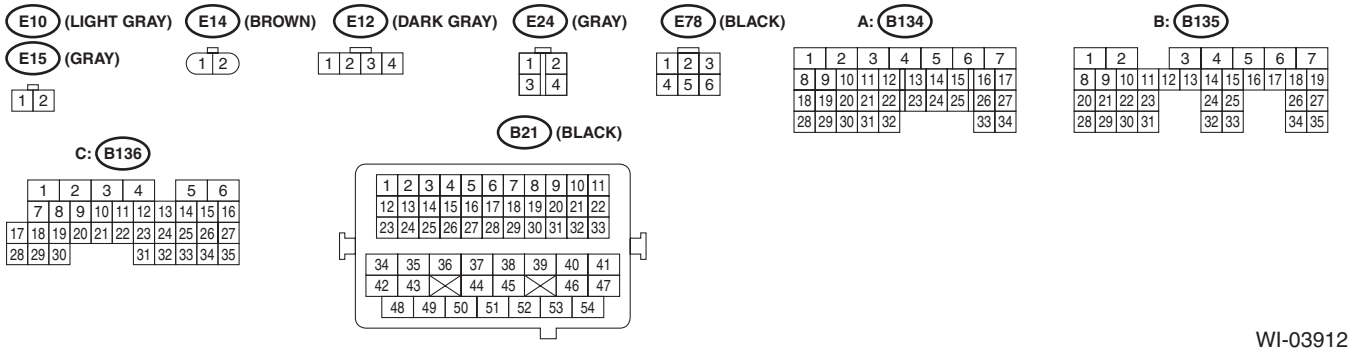
GND(L)-07



WI-03911

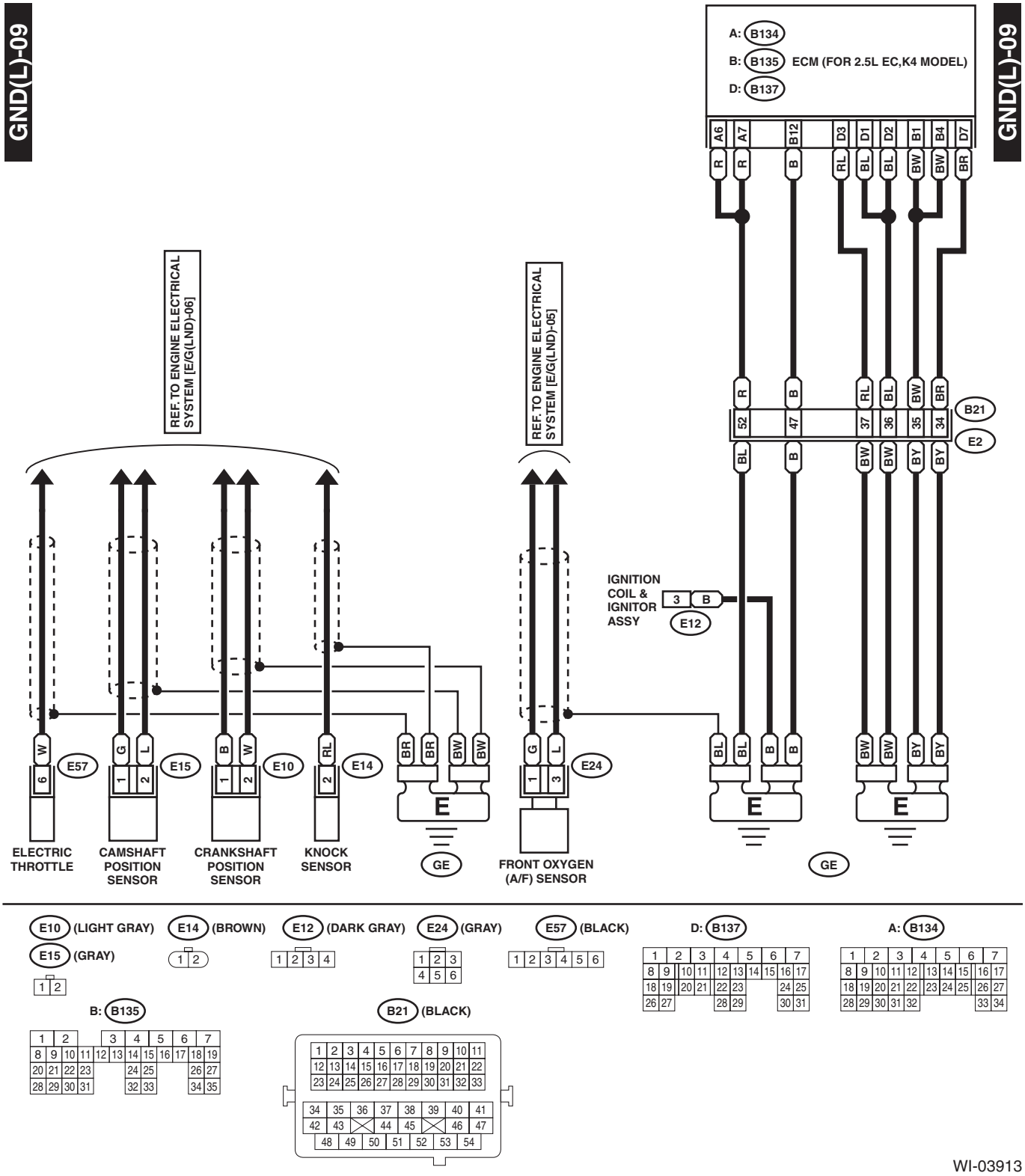
4. LHD ENGINE GROUND (2.0 L MODEL AND 2.5 L KS MODEL)





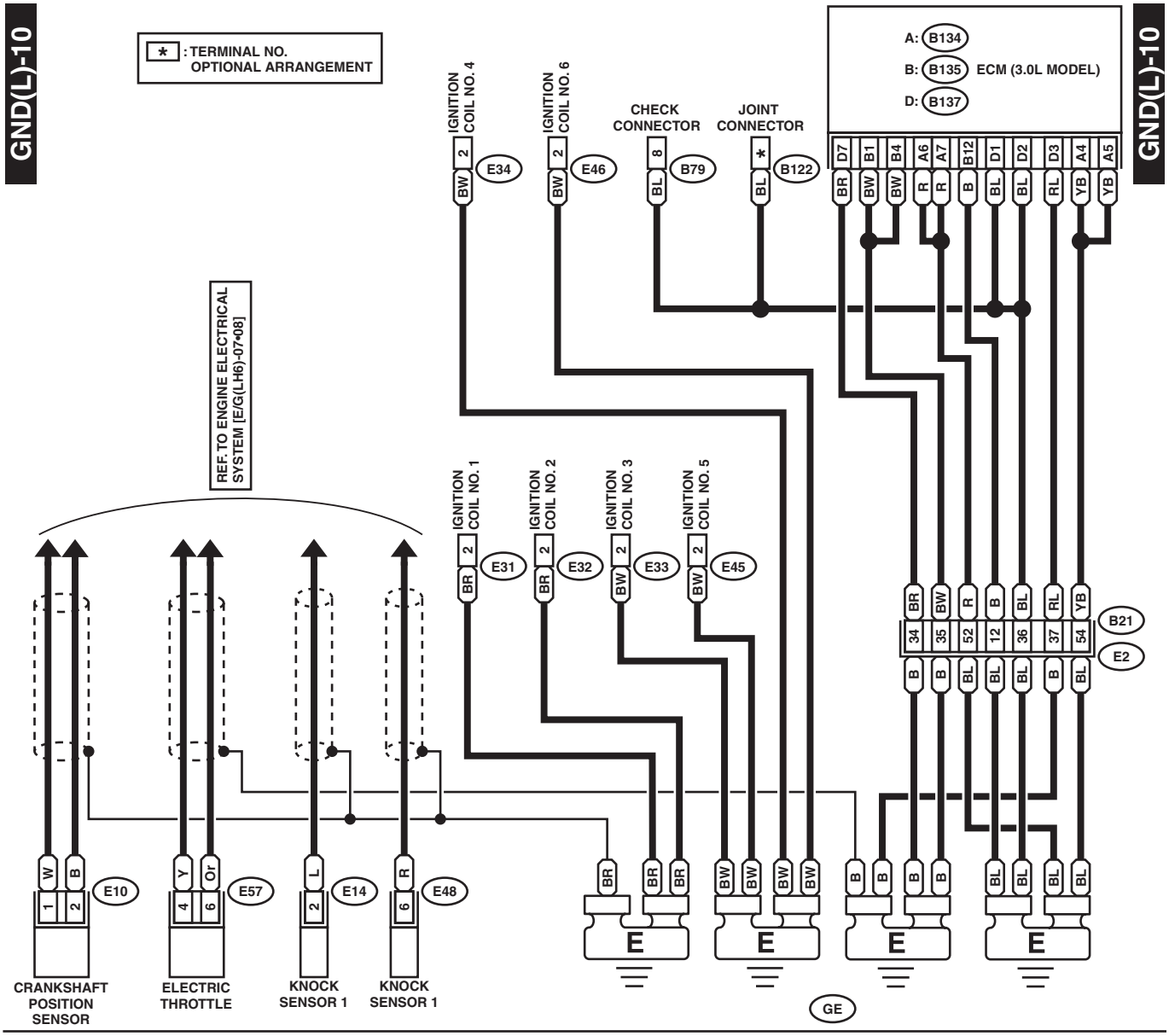
WI-03912

5. LHD ENGINE GROUND (2.5 L EC, K4 MODEL)



WI-03913

6. LHD ENGINE GROUND (3.0 L MODEL)



E10 (LIGHT GRAY) E14 (GREEN) E48 (GREEN)

(BLACK) E31 E34
(BLACK) E32 E45 (BLACK)
E33 E46 (BLACK)

E57 (BLACK)

B122

B79 (GRAY)

B21 (BLACK)

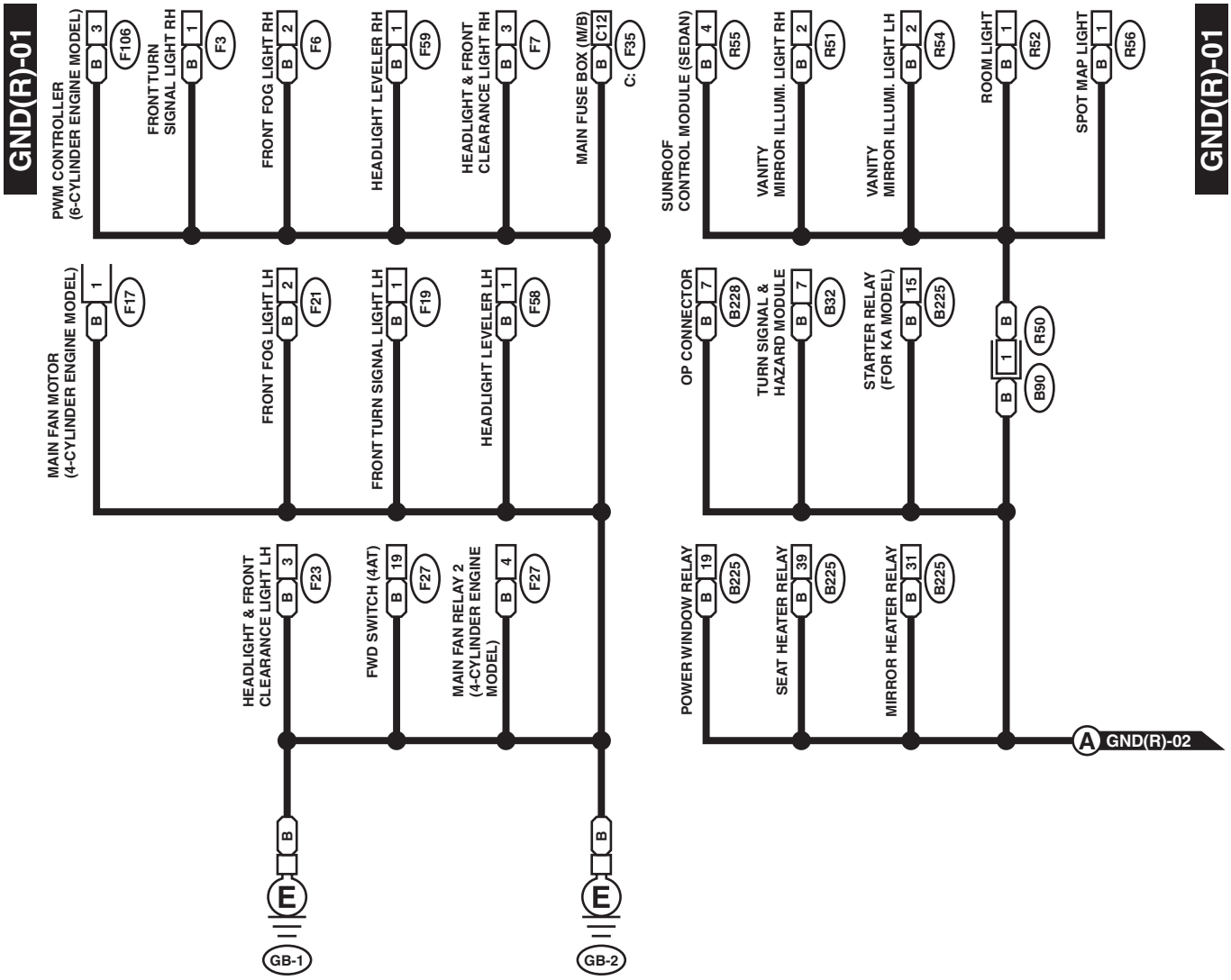
D: B137

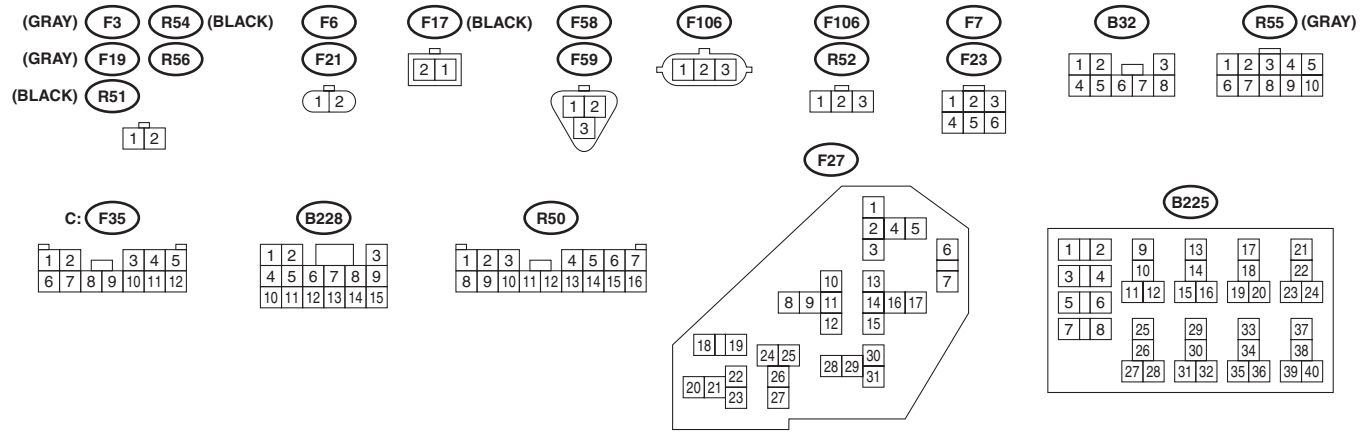
A: B134

B: B135

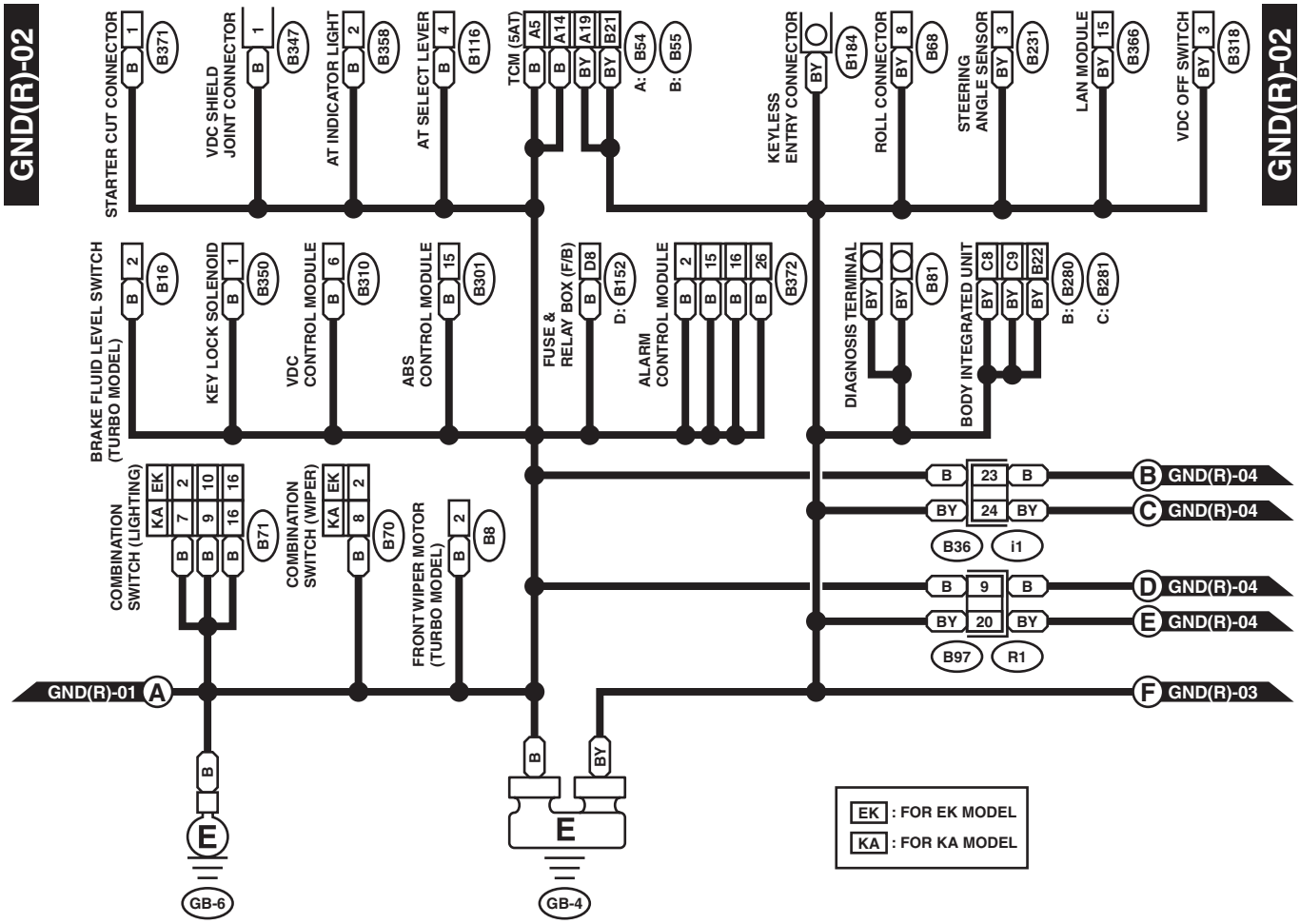
WI-03914

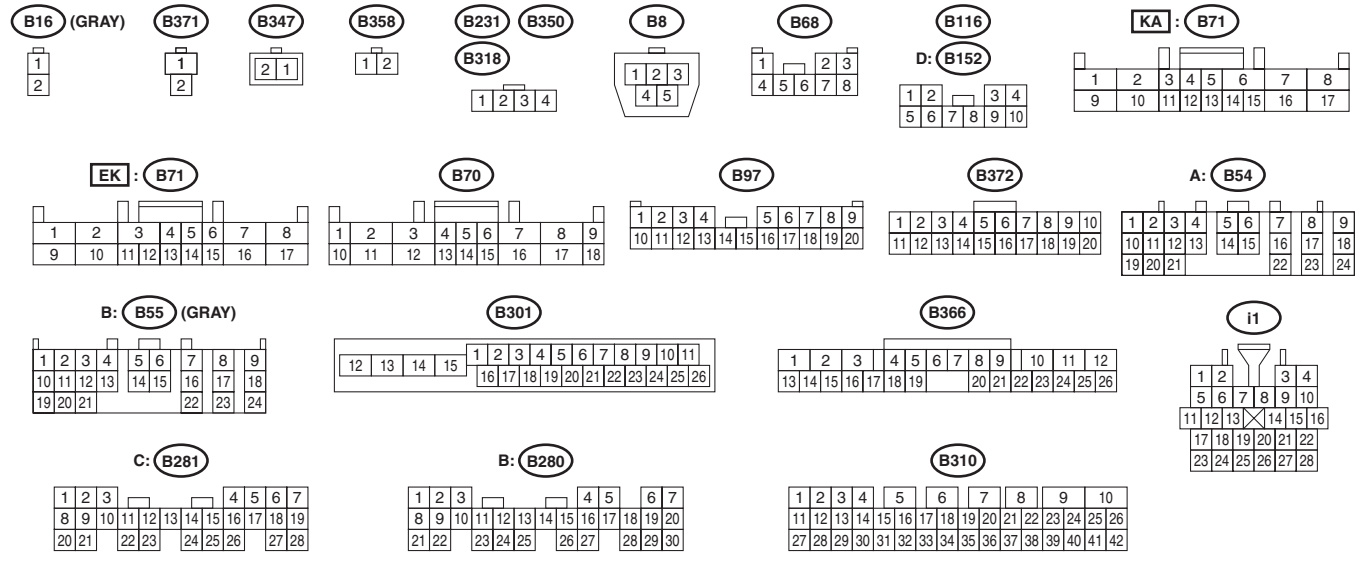
7. RHD CHASSIS GROUND





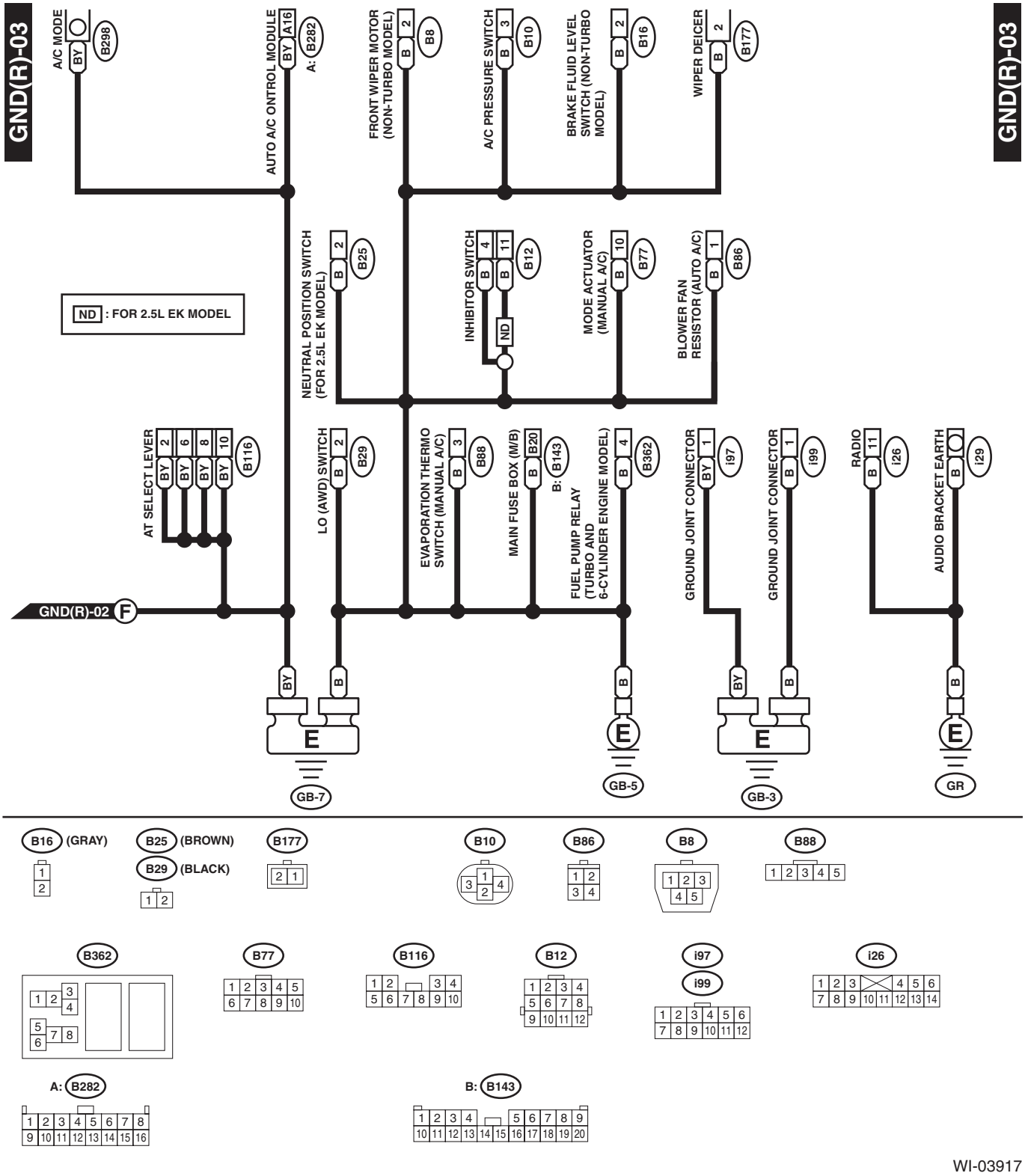
WI-03915


GND(R)-02
GND(R)-02
STARTER CUT CONNECTOR
VDC SHIELD JOINT CONNECTOR
AT INDICATOR LIGHT
AT SELECT LEVER
TCM (5AT)
A:
B:
KEYLESS ENTRY CONNECTOR
ROLL CONNECTOR
STEERING ANGLE SENSOR
LAN MODULE
VDC OFF SWITCH
BRAKE FLUID LEVEL SWITCH (TURBO MODEL)
KEY LOCK SOLENOID
VDC CONTROL MODULE
ABS CONTROL MODULE
FUSE & RELAY BOX (F/B)
D:
ALARM CONTROL MODULE
DIAGNOSIS TERMINAL
BODY INTEGRATED UNIT
B:
C:
COMBINATION SWITCH (LIGHTING)
COMBINATION SWITCH (WIPER)
FRONT WIPER MOTOR (TURBO MODEL)
GND(R)-04
GND(R)-04
GND(R)-04
GND(R)-04
GND(R)-01
GND(R)-03
GB-6
GB-4
EK : FOR EK MODEL
KA : FOR KA MODEL

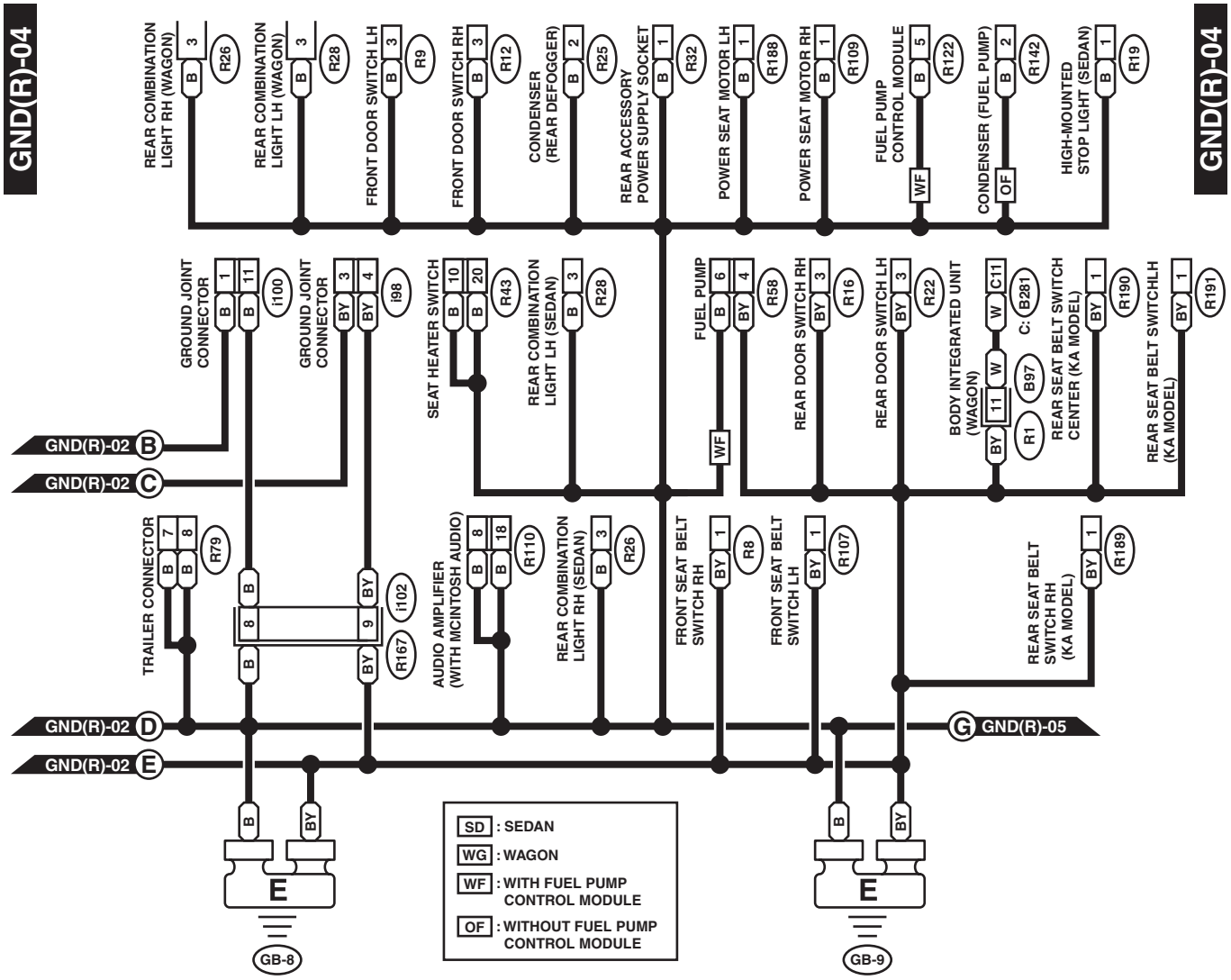

B16 (GRAY)
B371
B347
B358
B231
B350
B318
B8
B68
B116
D: B152
KA : B71
EK : B71
B70
B97
B372
A: B54
B: B55 (GRAY)
B301
B366
i1
C: B281
B: B280
B310

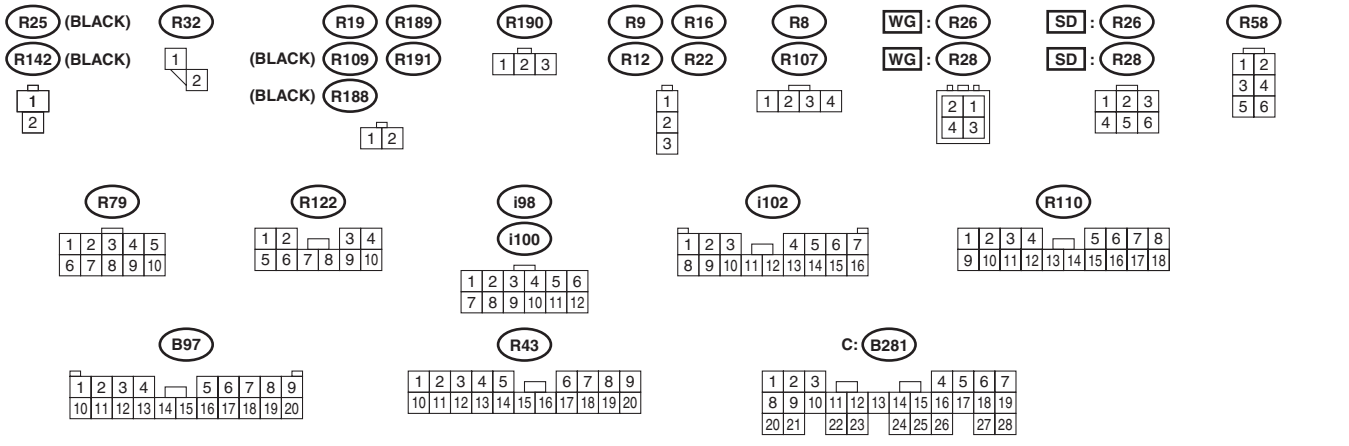
WI-03916

Ground Distribution Circuit



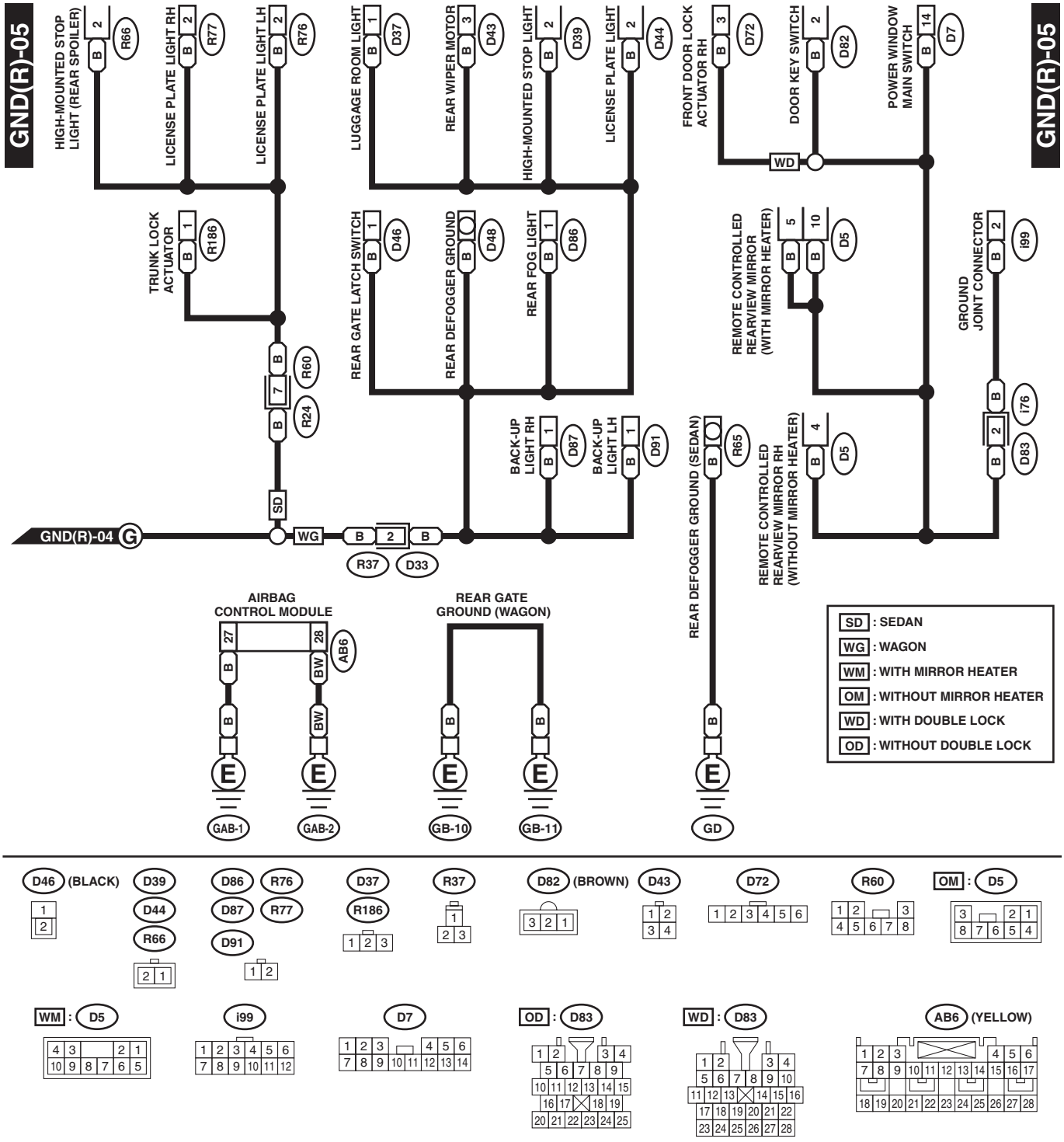
WI-03917


GND(R)-04
GND(R)-04
REAR COMBINATION LIGHT RH (WAGON)
REAR COMBINATION LIGHT LH (WAGON)
FRONT DOOR SWITCH LH
FRONT DOOR SWITCH RH
CONDENSER (REAR DEFOGGER)
REAR ACCESSORY POWER SUPPLY SOCKET
POWER SEAT MOTOR LH
POWER SEAT MOTOR RH
FUEL PUMP CONTROL MODULE
CONDENSER (FUEL PUMP)
HIGH-MOUNTED STOP LIGHT (SEDAN)
GROUND JOINT CONNECTOR
GROUND JOINT CONNECTOR
SEAT HEATER SWITCH
REAR COMBINATION LIGHT LH (SEDAN)
FUEL PUMP
REAR DOOR SWITCH RH
REAR DOOR SWITCH LH
BODY INTEGRATED UNIT (WAGON)
REAR SEAT BELT SWITCH CENTER (KA MODEL)
REAR SEAT BELT SWITCHLH (KA MODEL)
GND(R)-02 B
GND(R)-02 C
TRAILER CONNECTOR
AUDIO AMPLIFIER (WITH MCINTOSH AUDIO)
REAR COMBINATION LIGHT RH (SEDAN)
FRONT SEAT BELT SWITCH RH
FRONT SEAT BELT SWITCH LH
REAR SEAT BELT SWITCH RH (KA MODEL)
GND(R)-02 D
GND(R)-02 E
G GND(R)-05
SD : SEDAN
WG : WAGON
WF : WITH FUEL PUMP CONTROL MODULE
OF : WITHOUT FUEL PUMP CONTROL MODULE
GB-8
GB-9


R25 (BLACK)
R142 (BLACK)
R32
R19
R189
(BLACK) R109
R191
(BLACK) R188
R190
R9
R16
R12
R22
R8
R107
WG : R26
WG : R28
SD : R26
SD : R28
R58
R79
R122
i98
i100
i102
R110
B97
R43
C: B281

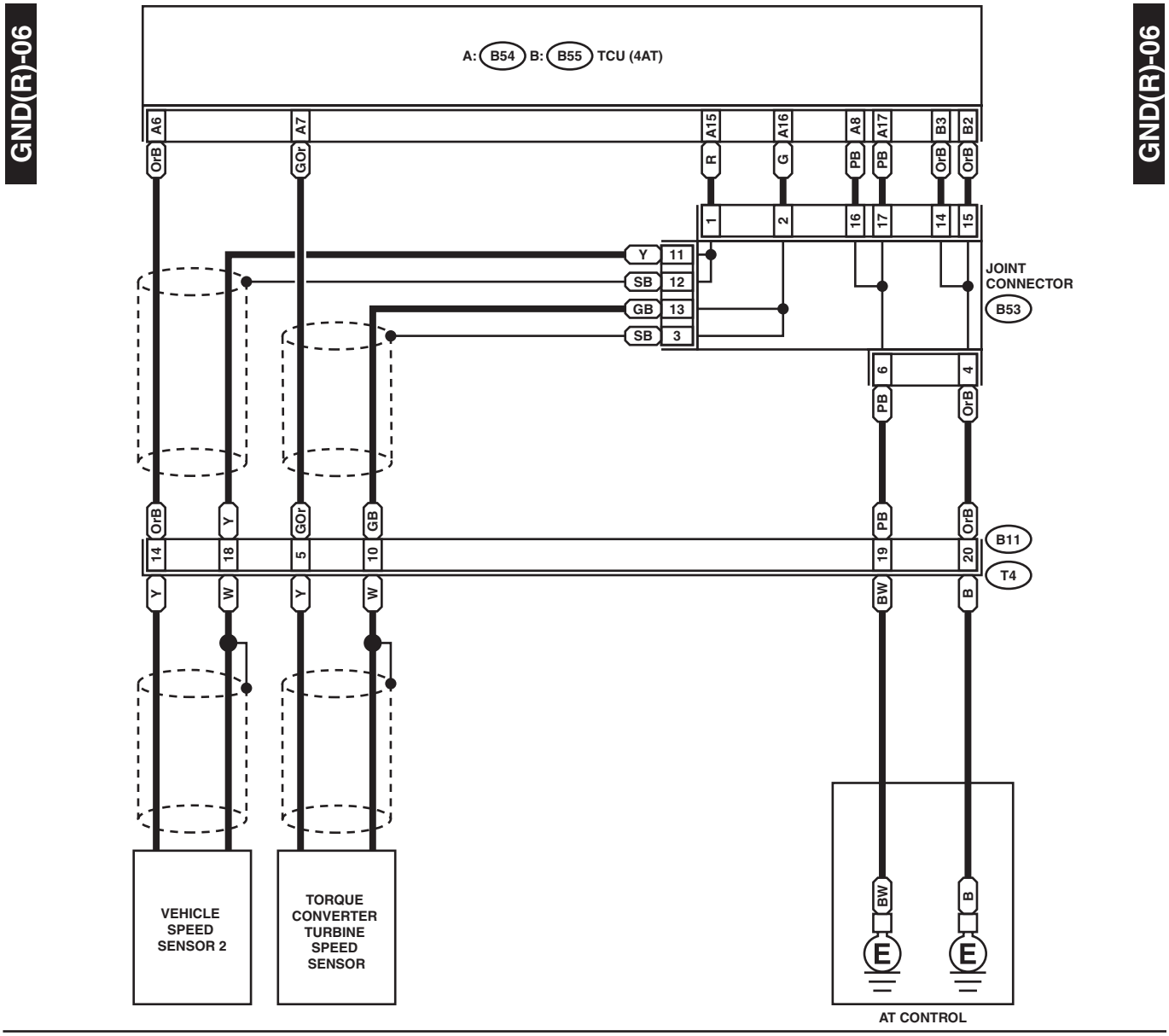
WI-03918

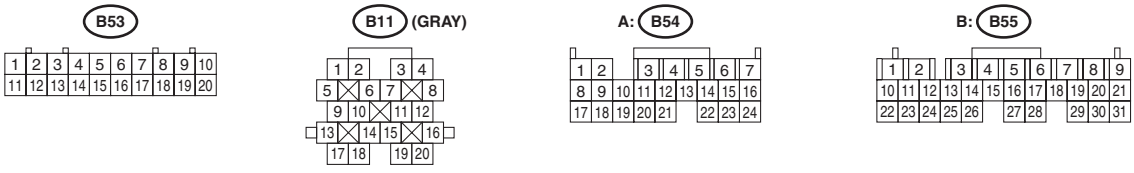
Ground Distribution Circuit



WI-03919

8. RHD AT TRANSMISSION GROUND (4AT MODEL)

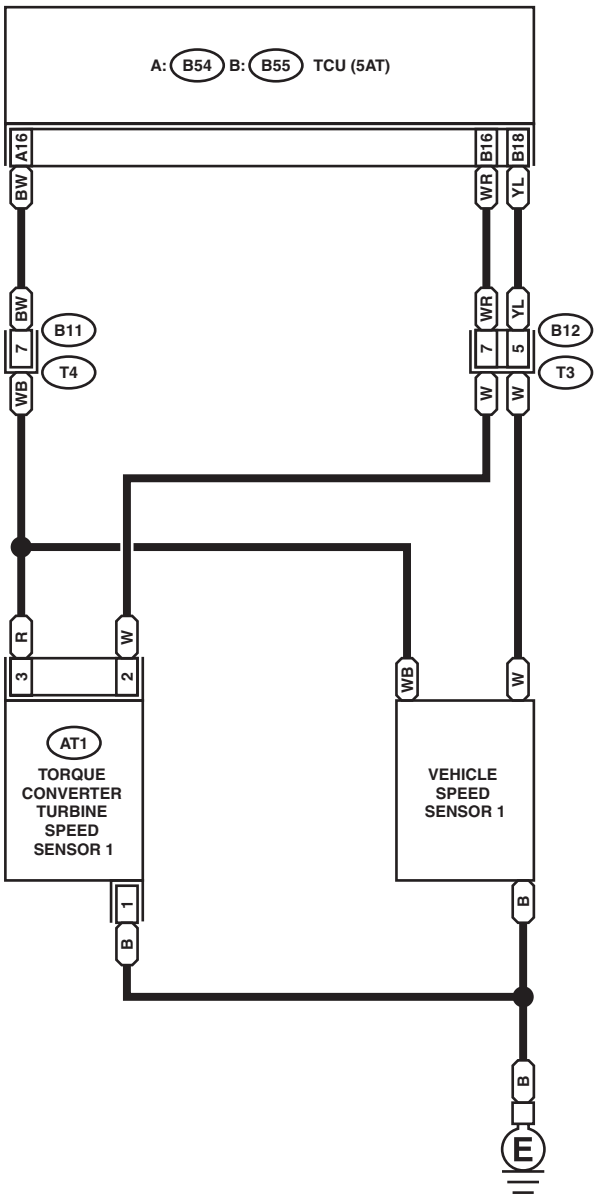




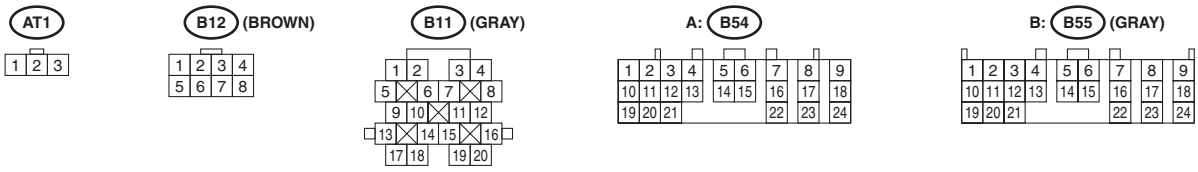
WI-03920

9. RHD AT TRANSMISSION GROUND (5AT MODEL)

GND(R)-07

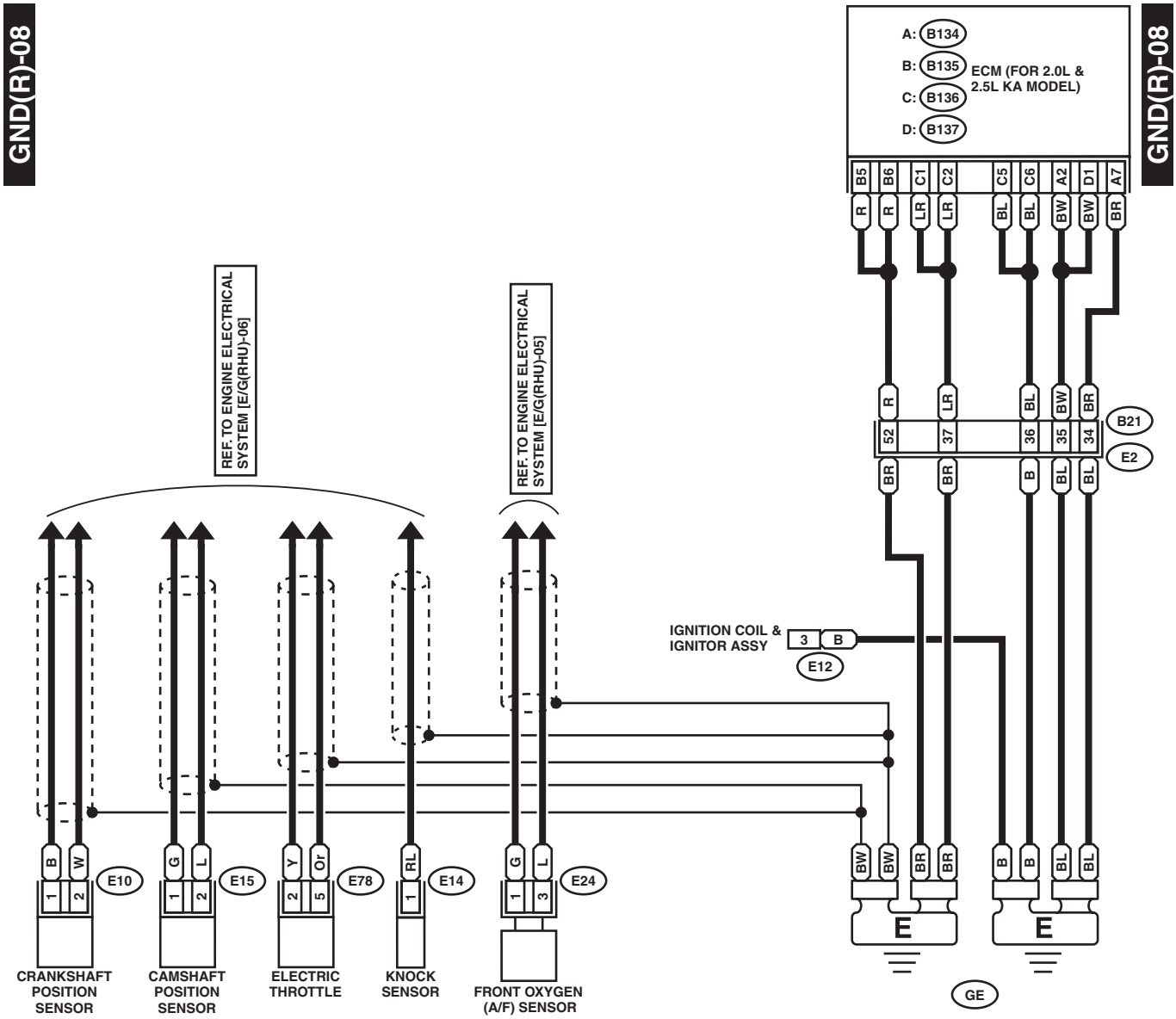


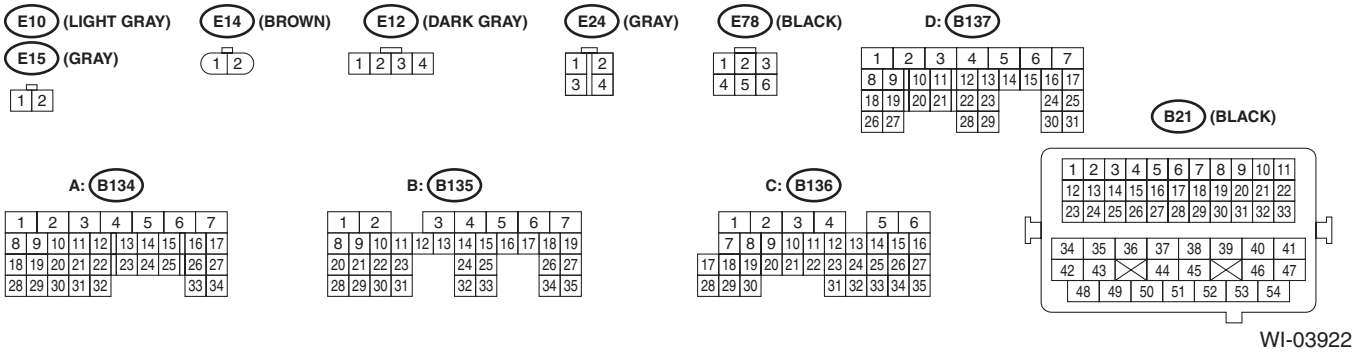
GND(R)-07



WI-03921

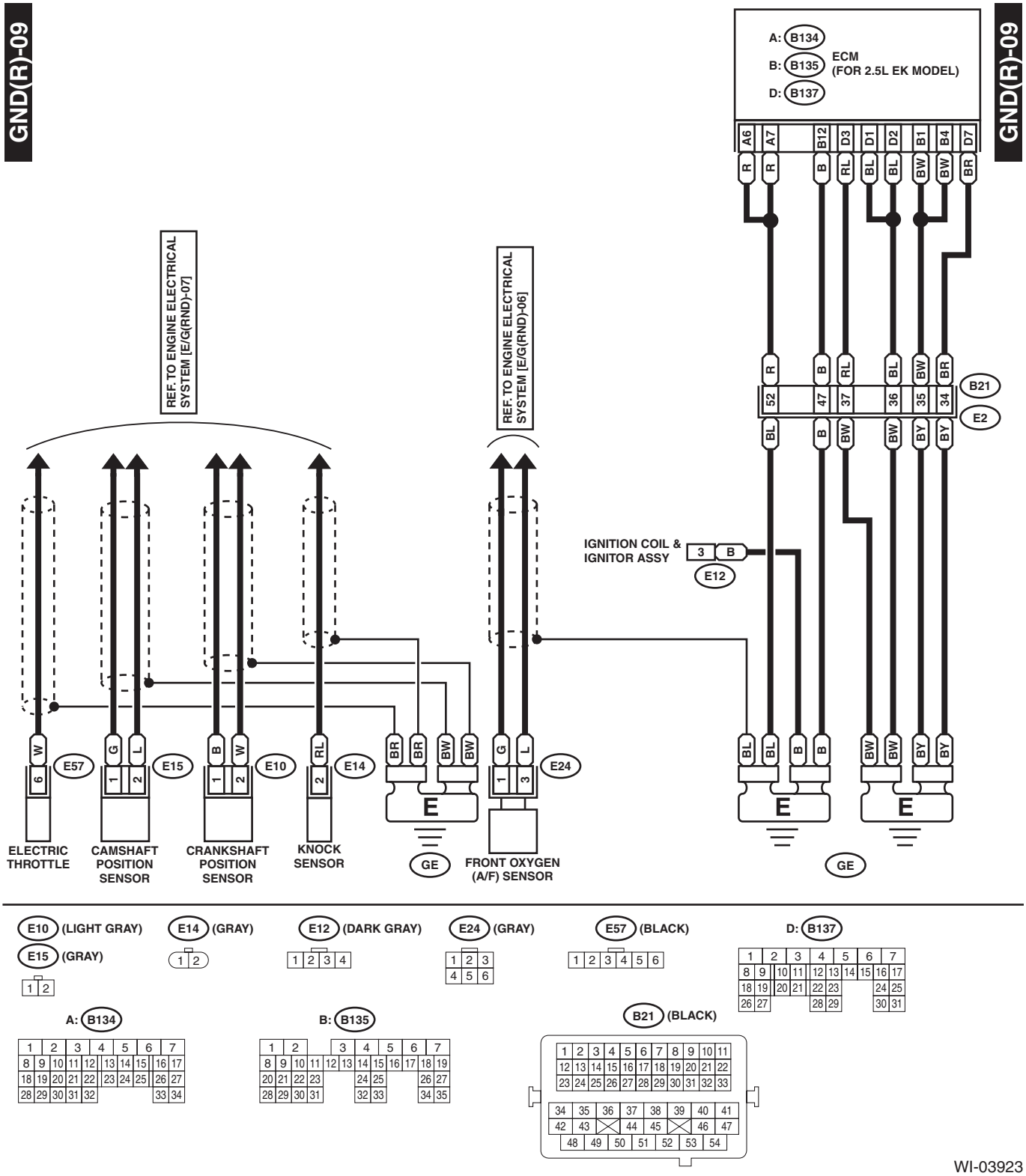
10.RHD ENGINE GROUND (2.0 L NON-TURBO MODEL AND 2.5 L KA MODEL)





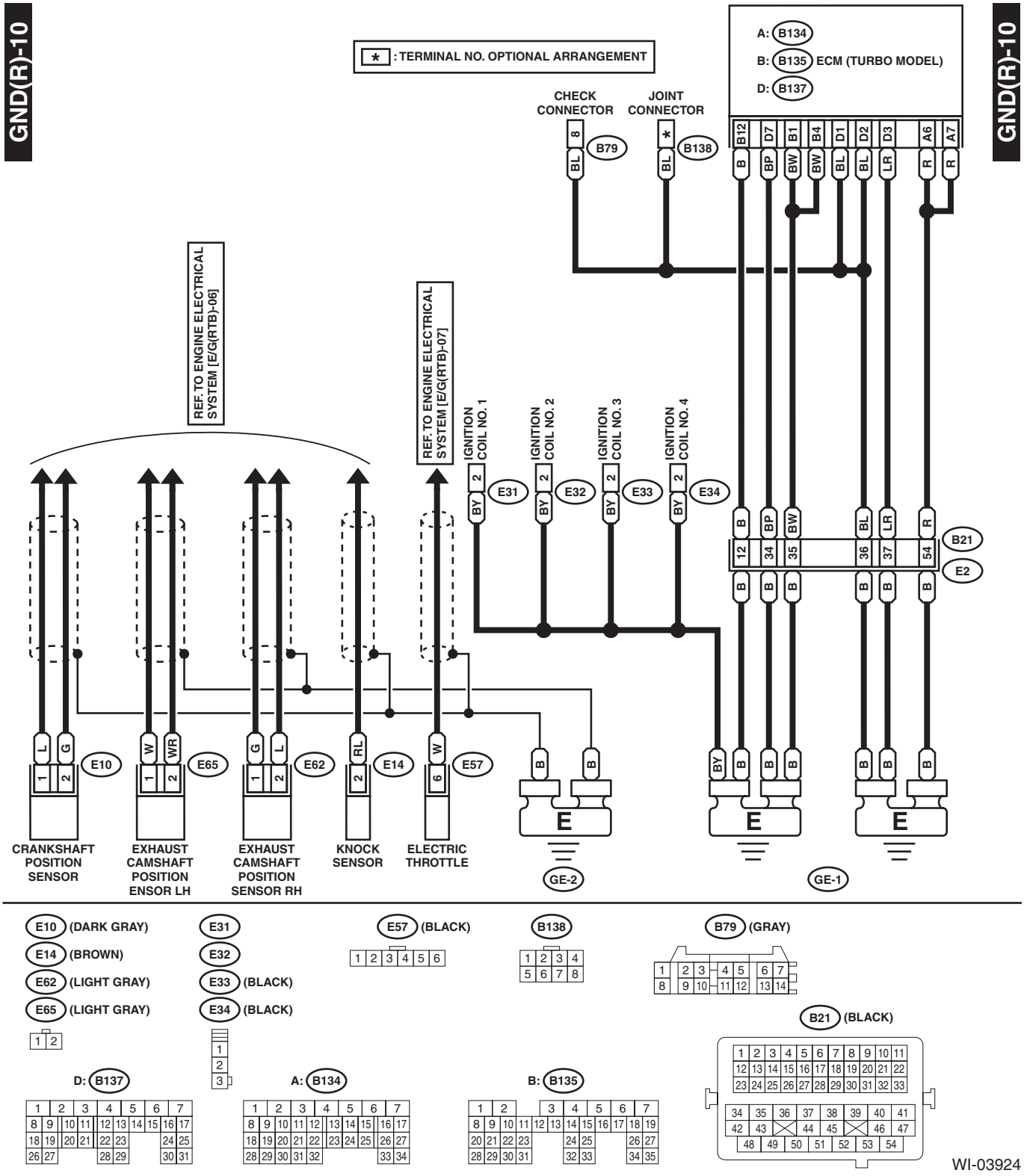
WI-03922

11.RHD ENGINE GROUND (3.0 L EK MODEL)



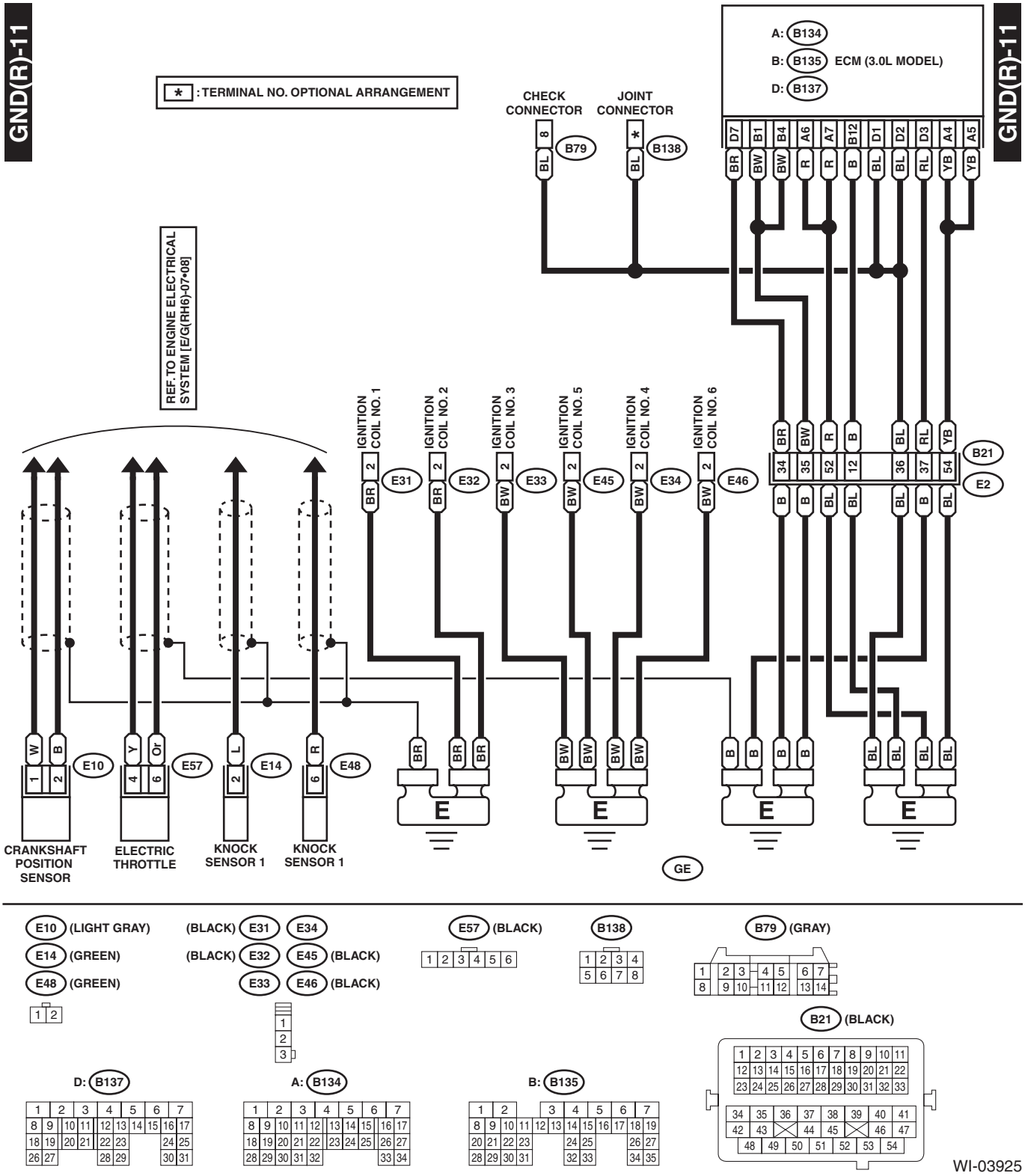
WI-03923

12.RHD ENGINE GROUND (TURBO MODEL)



WI-03924

13.RHD ENGINE GROUND (3.0 L MODEL)

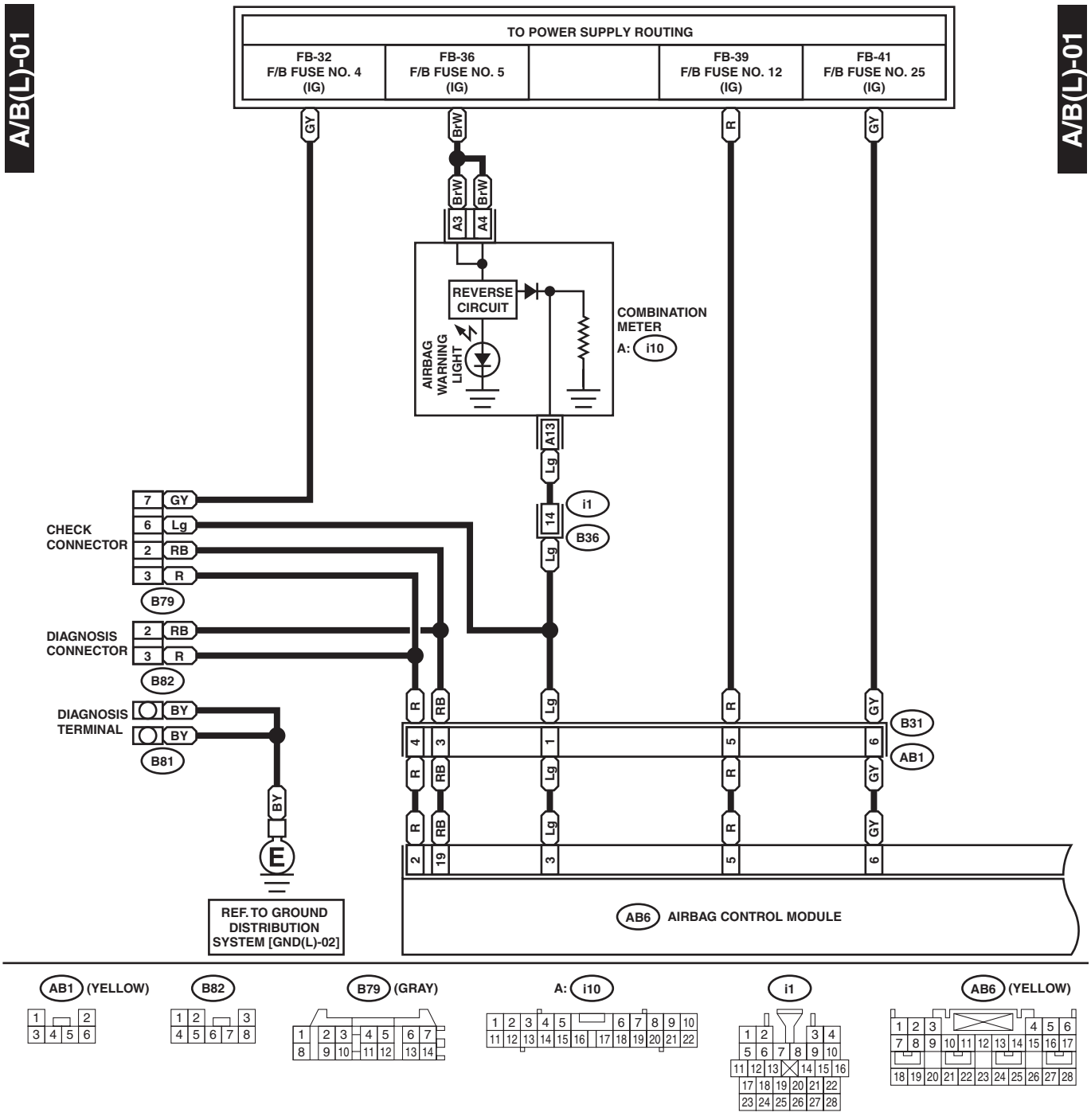


WI-03925

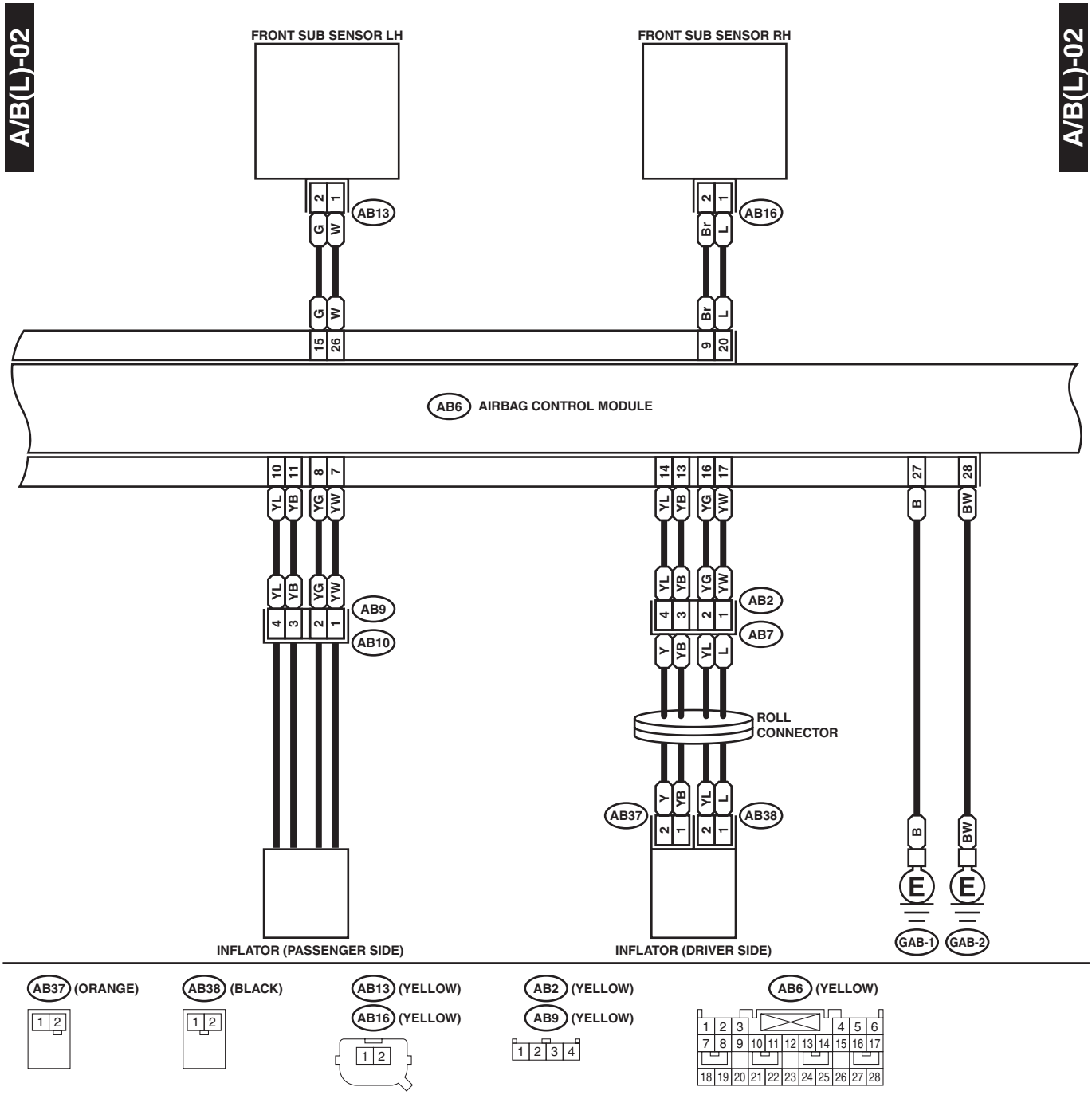
5. Airbag System

A: WIRING DIAGRAM

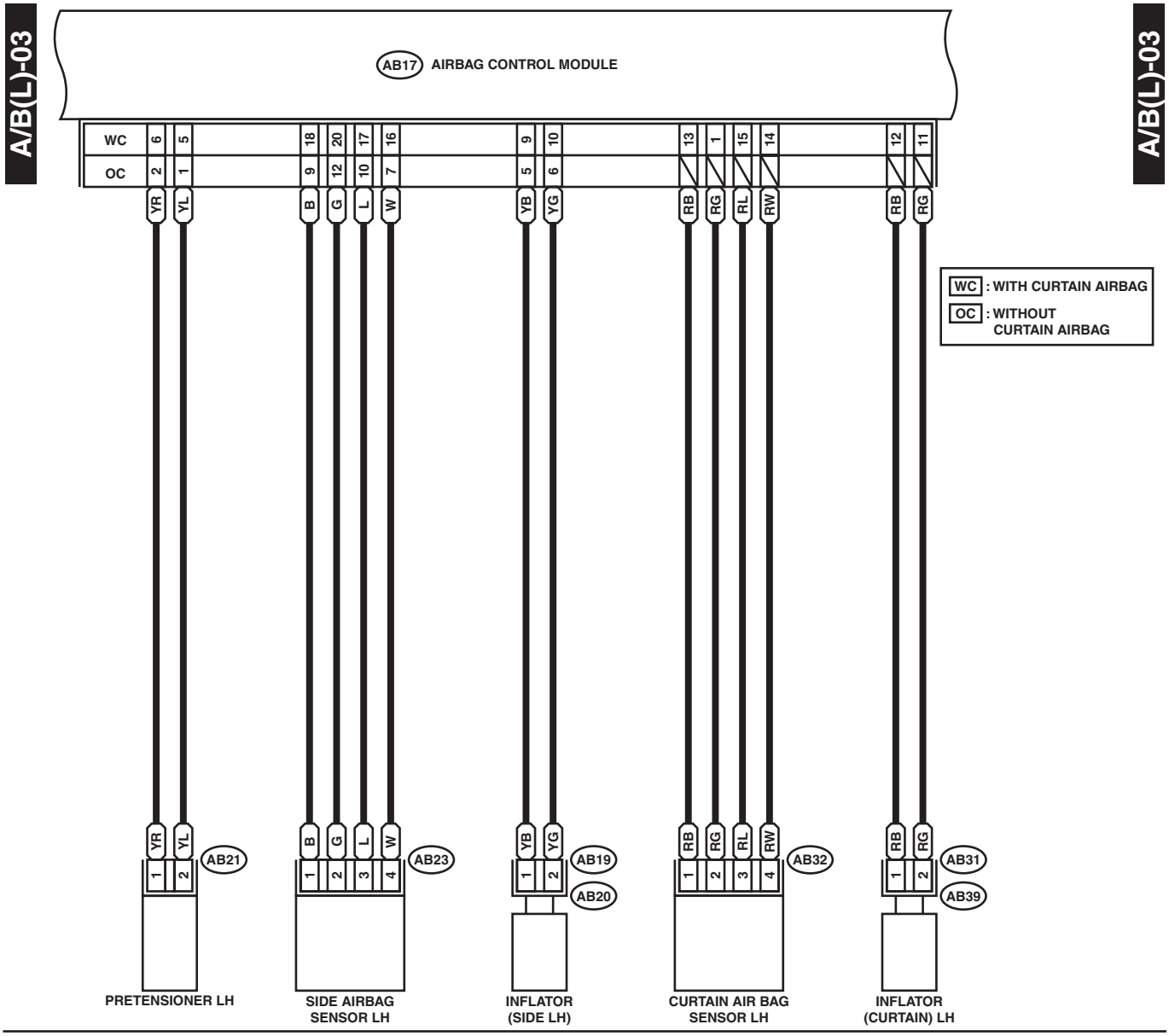
1. LHD MODEL



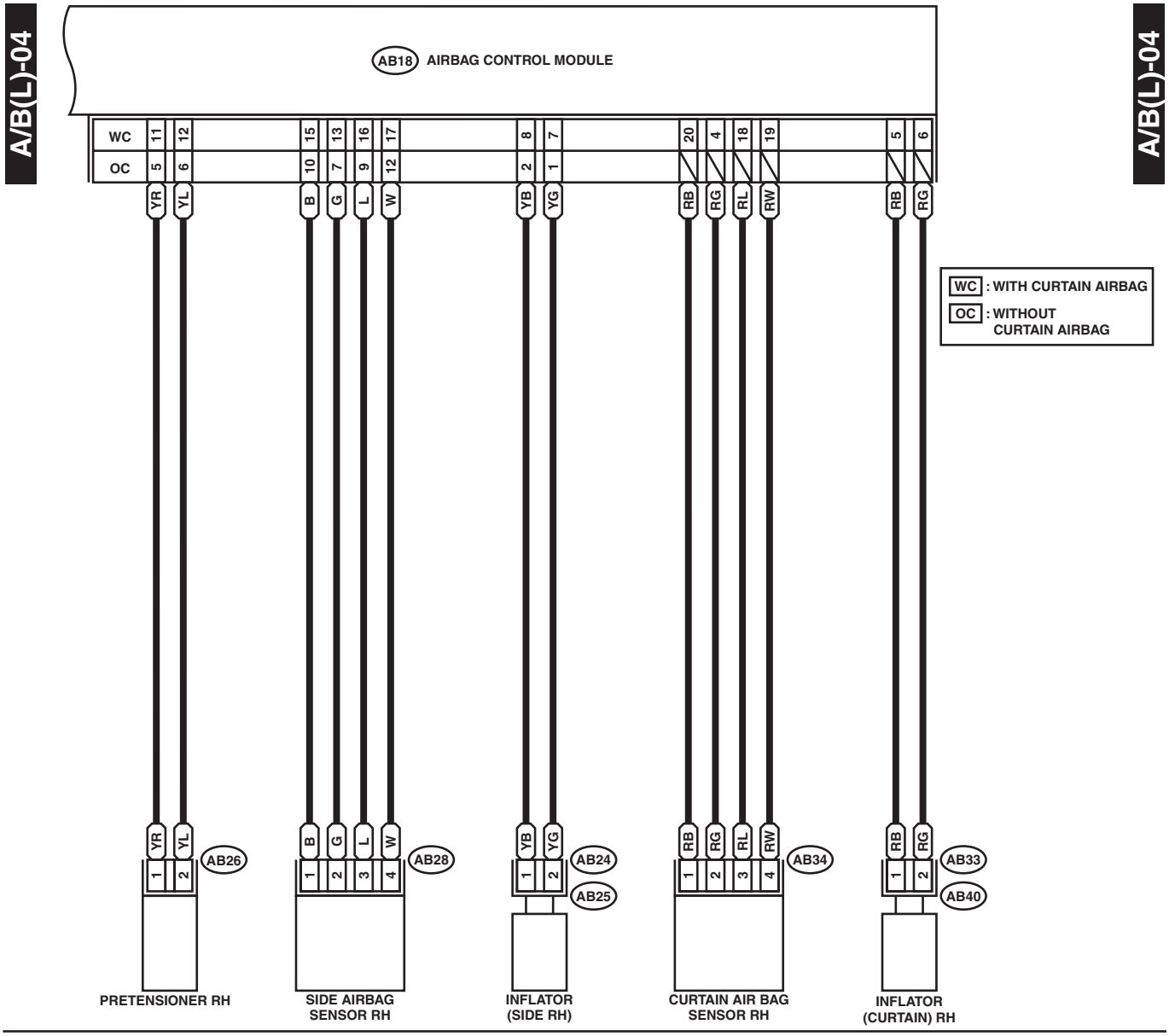
WI-03926


A/B(L)-02
A/B(L)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB13
AB16
AB6 AIRBAG CONTROL MODULE
AB9
AB10
AB2
AB7
ROLL CONNECTOR
AB37
AB38
INFLATOR (PASSENGER SIDE)
INFLATOR (DRIVER SIDE)
GAB-1
GAB-2
AB37 (ORANGE)
AB38 (BLACK)
AB13 (YELLOW)
AB16 (YELLOW)
AB2 (YELLOW)
AB9 (YELLOW)
AB6 (YELLOW)

WI-03927

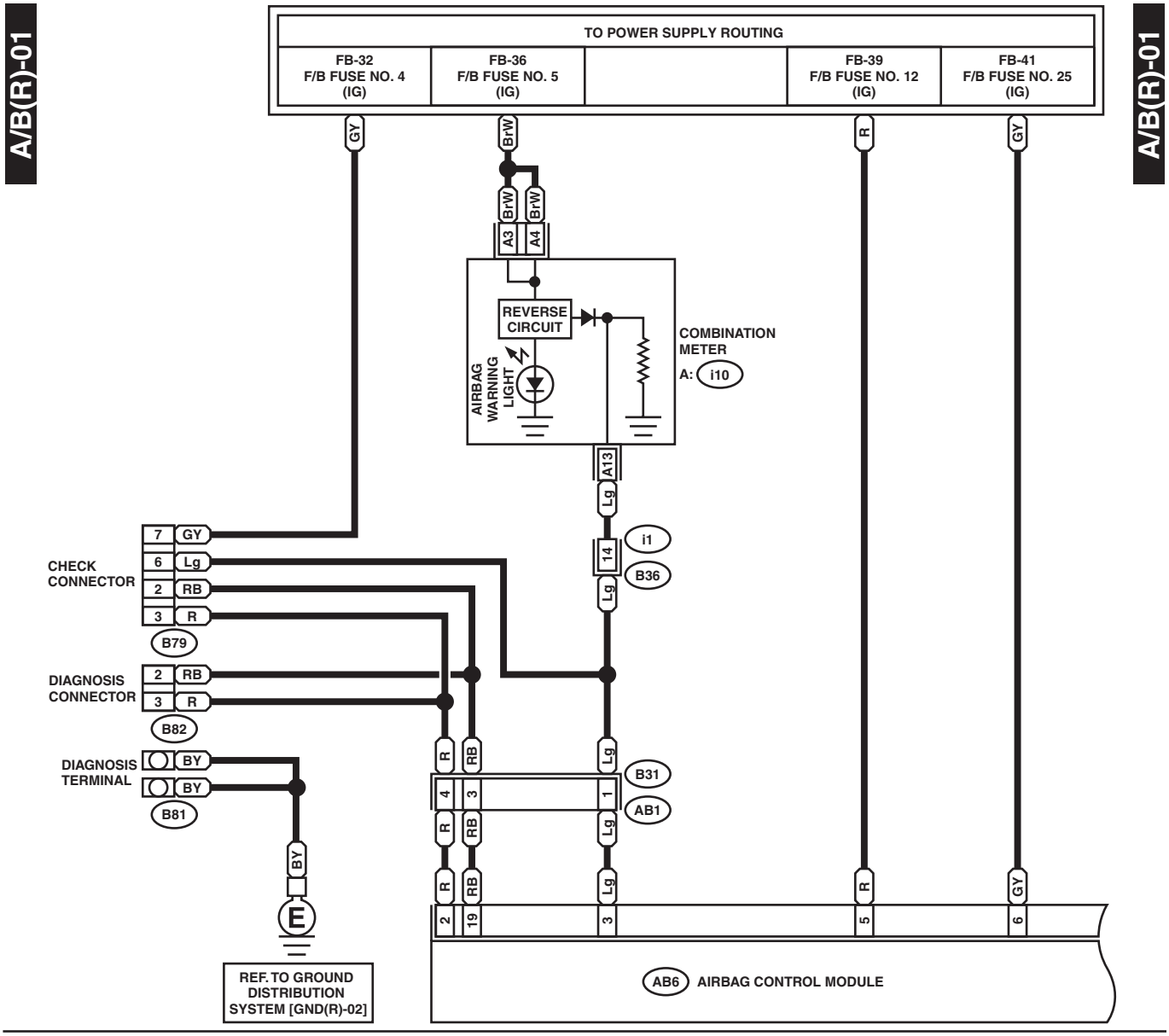

A/B(L)-03
A/B(L)-03
AB17 AIRBAG CONTROL MODULE
WC
OC
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
YR
YL
B
G
L
W
YB
YG
RB
RG
RL
RW
AB21
AB23
AB19
AB20
AB32
AB31
AB39
PRETENSIONER LH
SIDE AIRBAG SENSOR LH
INFLATOR (SIDE LH)
CURTAIN AIR BAG SENSOR LH
INFLATOR (CURTAIN) LH
AB19 (YELLOW)
AB31 (YELLOW)
AB21 (BLACK)
AB23 (YELLOW)
AB32 (YELLOW)
OC : AB17 (YELLOW)
WC : AB17 (YELLOW)

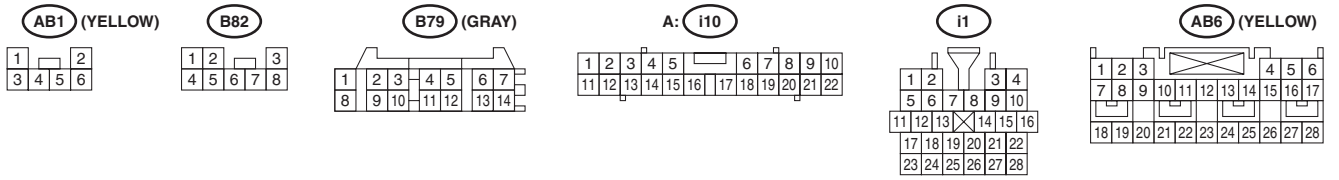
WI-03928


A/B(L)-04
A/B(L)-04
AB18 AIRBAG CONTROL MODULE
WC
OC
11 12 15 13 16 17 8 7 20 4 18 19 5 6
5 6 10 7 9 12 2 1
YR YL B G L W YB YG RB RG RL RW RB RG
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
AB26
AB28
AB24
AB25
AB34
AB33
AB40
PRETENSIONER RH
SIDE AIRBAG SENSOR RH
INFLATOR (SIDE RH)
CURTAIN AIR BAG SENSOR RH
INFLATOR (CURTAIN) RH
AB24 (YELLOW)
AB33 (YELLOW)
AB26 (BLACK)
AB28 (YELLOW)
AB34 (YELLOW)
OC : AB18 (YELLOW)
WC : AB18 (YELLOW)

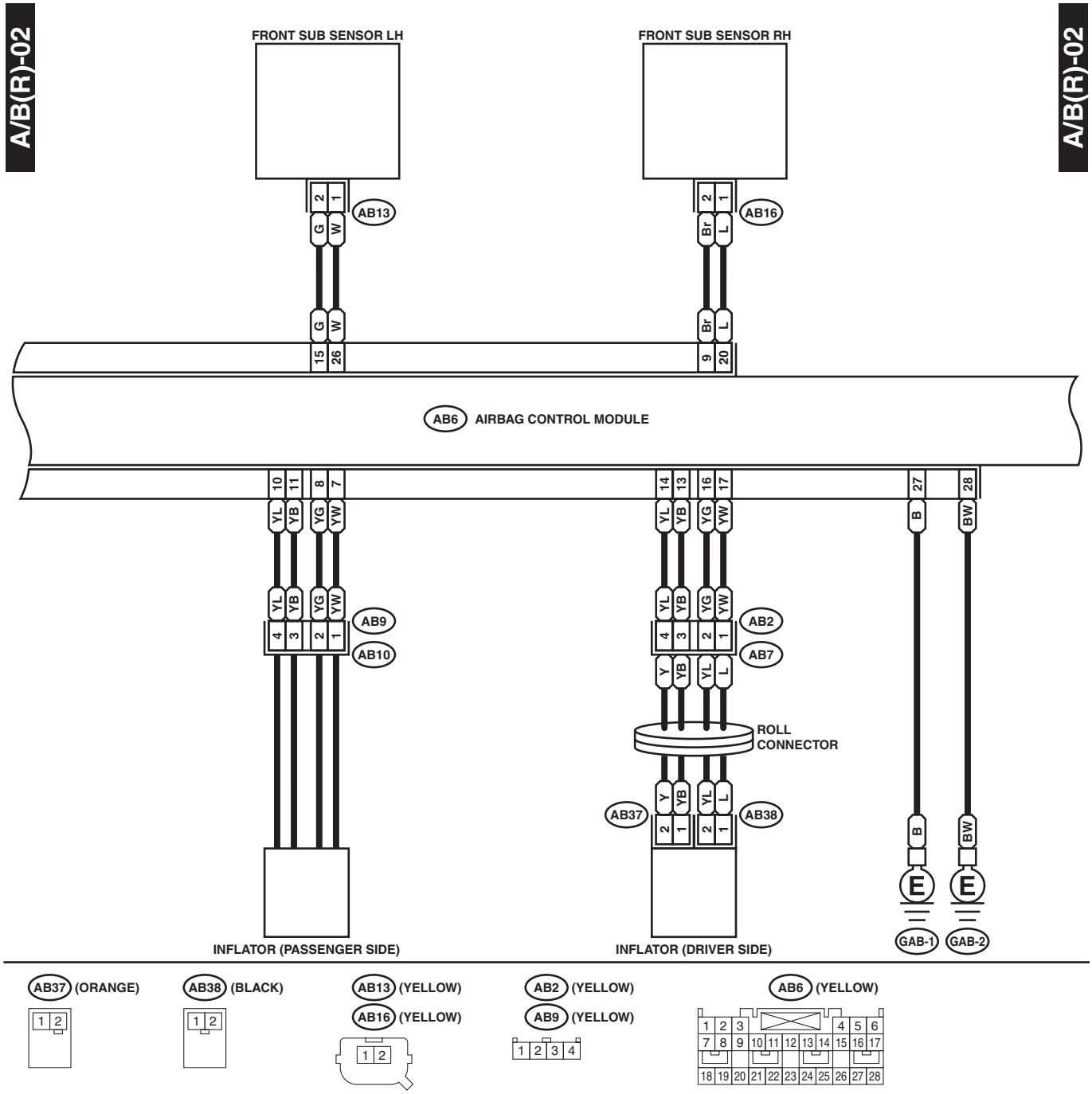
WI-03929

2. RHD MODEL

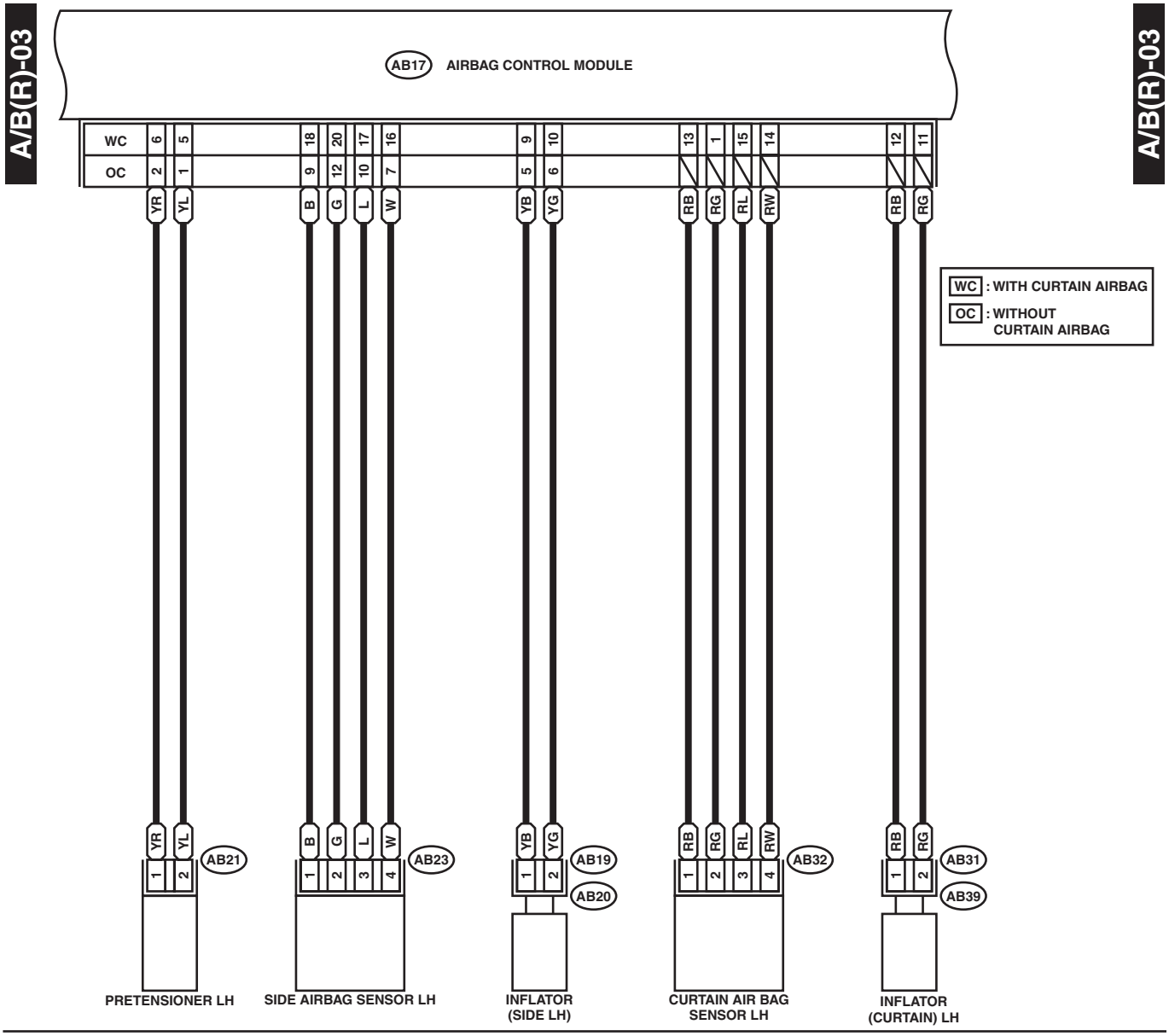




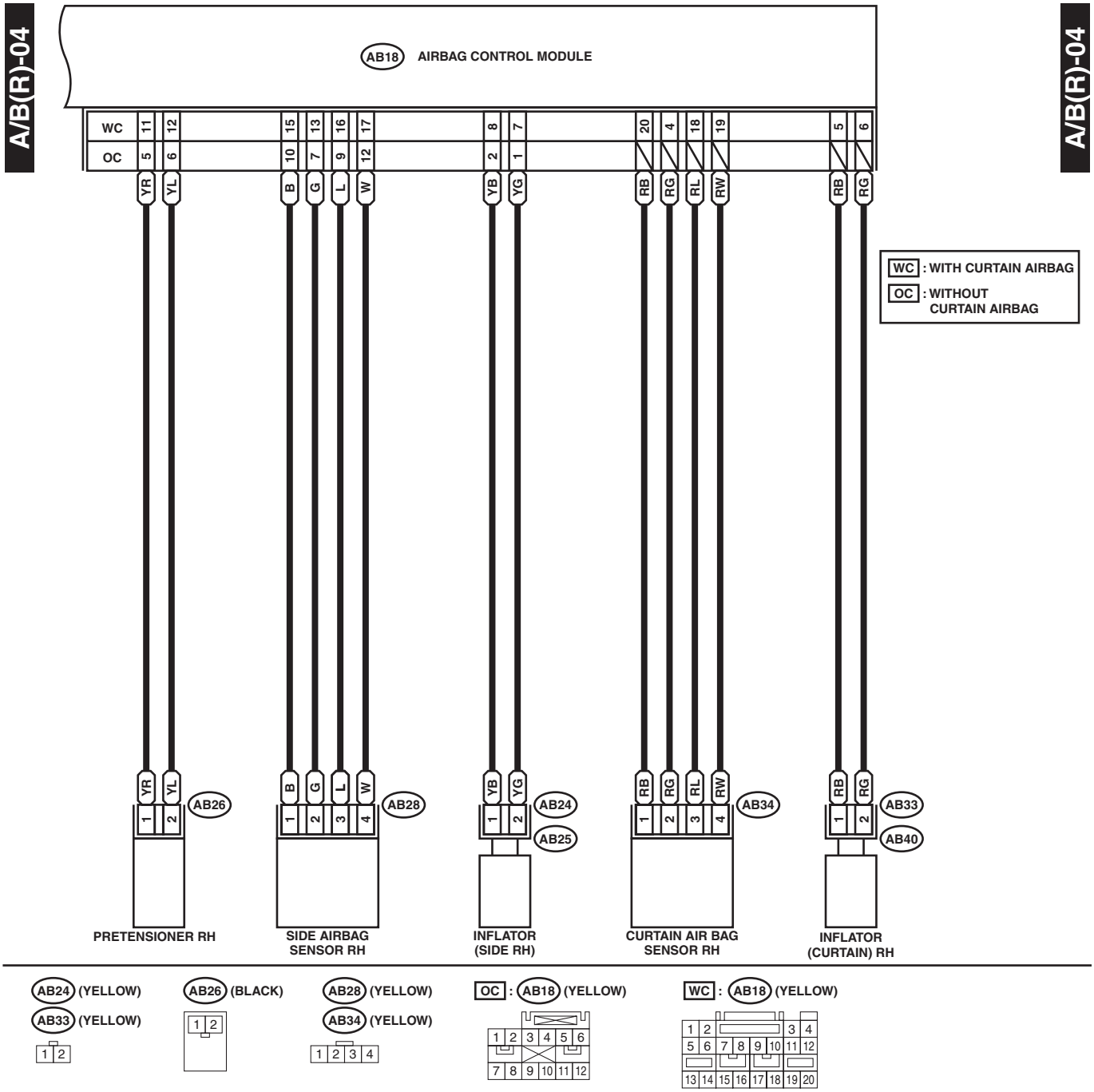
WI-03930


A/B(R)-02
A/B(R)-02
FRONT SUB SENSOR LH
FRONT SUB SENSOR RH
AB13
AB16
AB6 AIRBAG CONTROL MODULE
AB9
AB10
AB2
AB7
ROLL CONNECTOR
AB37
AB38
GAB-1
GAB-2
INFLATOR (PASSENGER SIDE)
INFLATOR (DRIVER SIDE)
AB37 (ORANGE)
AB38 (BLACK)
AB13 (YELLOW)
AB16 (YELLOW)
AB2 (YELLOW)
AB9 (YELLOW)
AB6 (YELLOW)

WI-03931


A/B(R)-03
A/B(R)-03
AB17 AIRBAG CONTROL MODULE
WC
OC
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
AB21
AB23
AB19
AB20
AB32
AB31
AB39
PRETENSIONER LH
SIDE AIRBAG SENSOR LH
INFLATOR (SIDE LH)
CURTAIN AIR BAG SENSOR LH
INFLATOR (CURTAIN) LH
AB19 (YELLOW)
AB31 (YELLOW)
AB21 (BLACK)
AB23 (YELLOW)
AB32 (YELLOW)
OC : AB17 (YELLOW)
WC : AB17 (YELLOW)

WI-03932

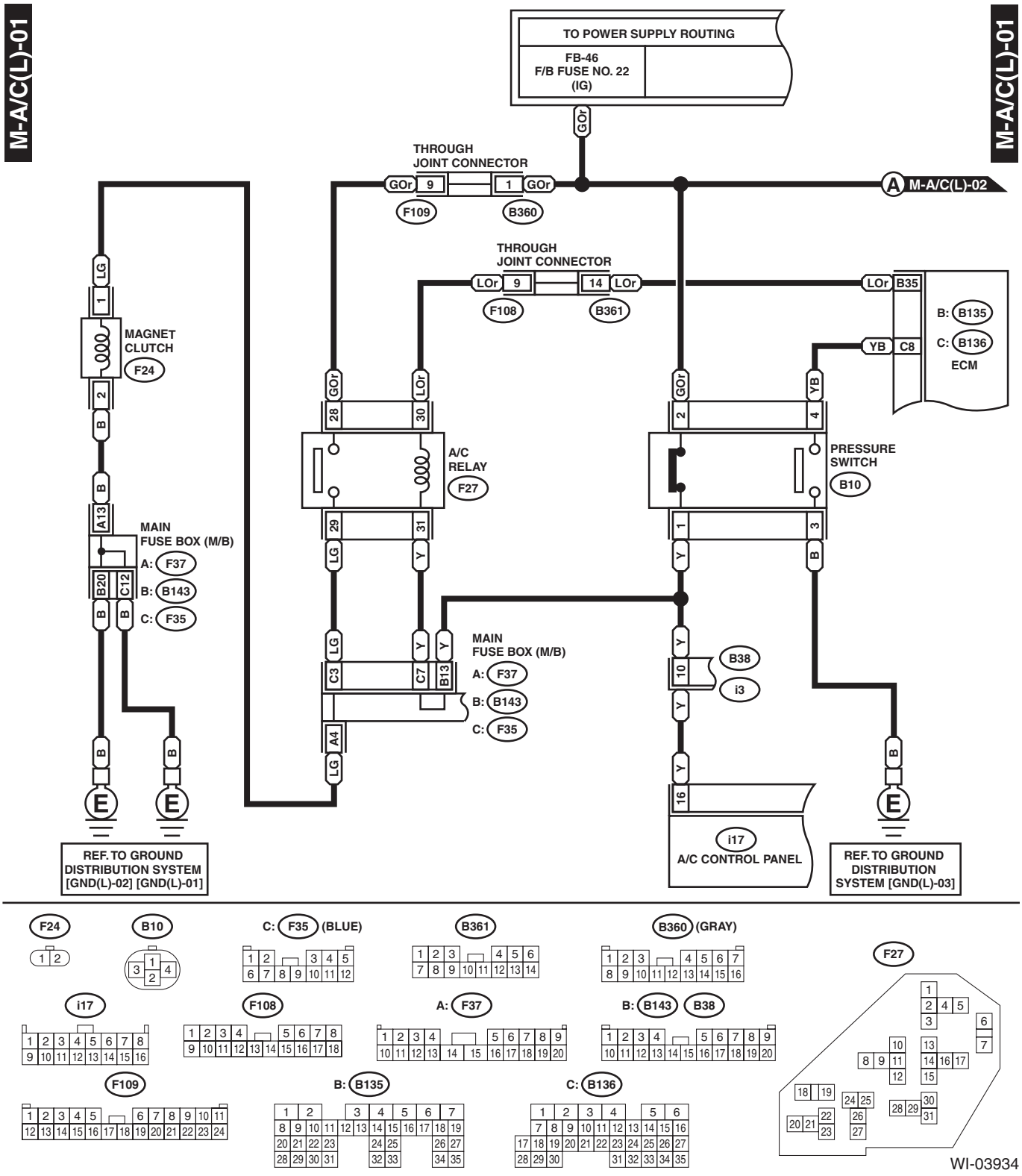

A/B(R)-04
A/B(R)-04
AB18 AIRBAG CONTROL MODULE
WC
OC
11 12 15 13 16 17 8 7 20 4 18 19 5 6
5 6 10 7 9 12 2 1
YR YL B G L W YB YG RB RG RL RW RB RG
WC : WITH CURTAIN AIRBAG
OC : WITHOUT CURTAIN AIRBAG
AB26
AB28
AB24
AB25
AB34
AB33
AB40
PRETENSIONER RH
SIDE AIRBAG SENSOR RH
INFLATOR (SIDE RH)
CURTAIN AIR BAG SENSOR RH
INFLATOR (CURTAIN) RH
AB24 (YELLOW)
AB33 (YELLOW)
AB26 (BLACK)
AB28 (YELLOW)
AB34 (YELLOW)
OC : AB18 (YELLOW)
WC : AB18 (YELLOW)

WI-03933

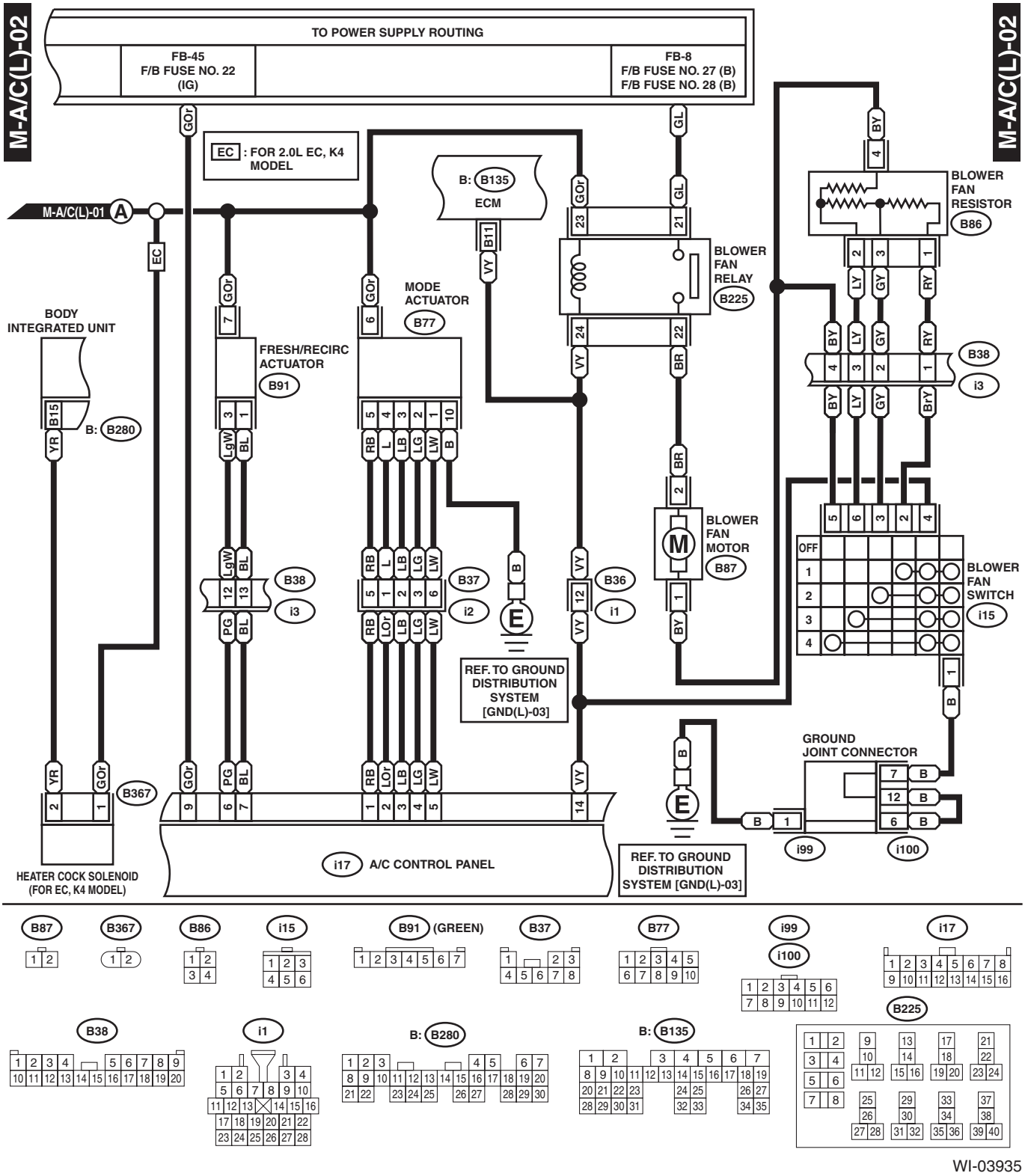
6. Air Conditioning System

A: WIRING DIAGRAM

1. MANUAL A/C LHD MODEL



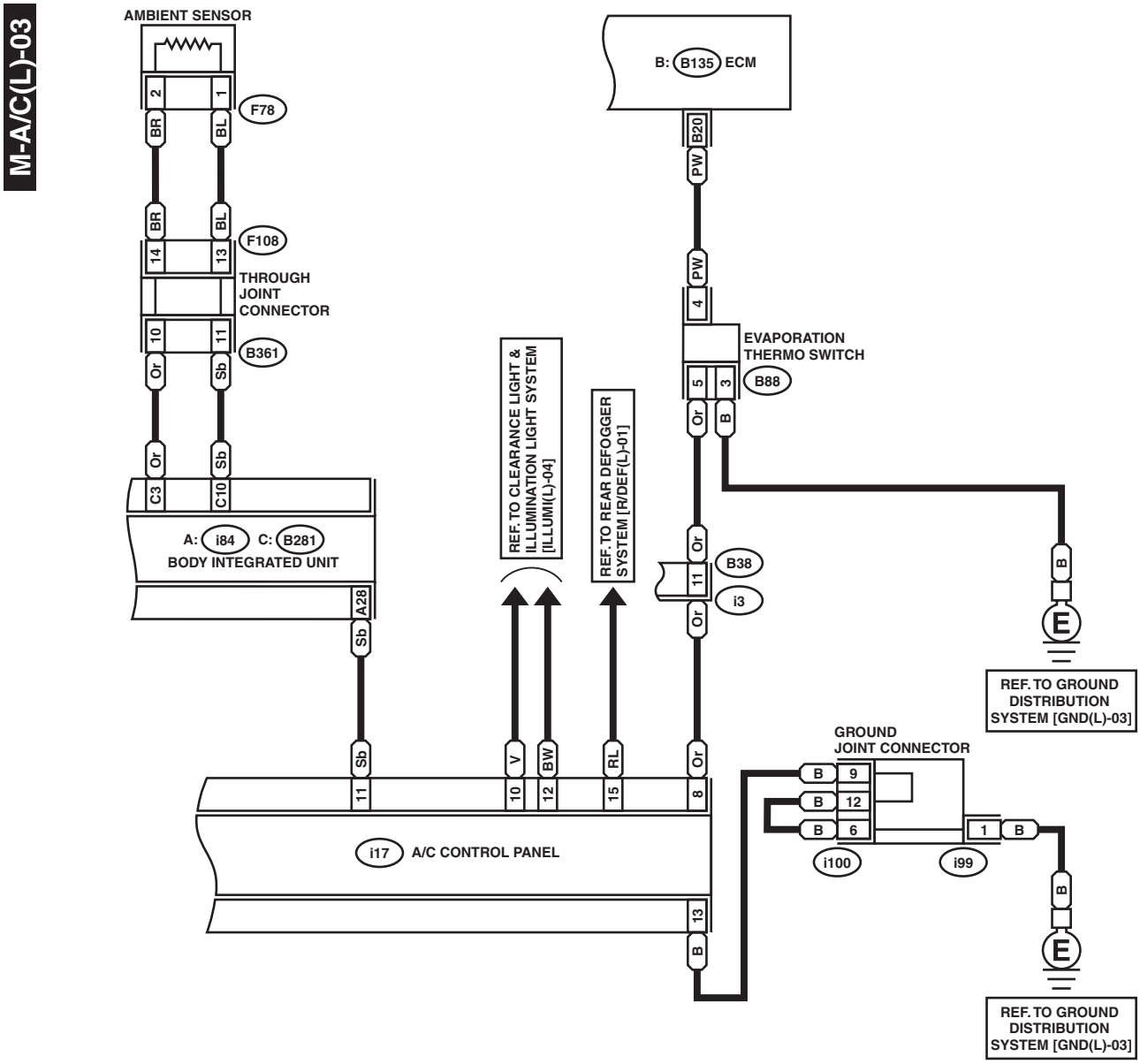
WI-03934

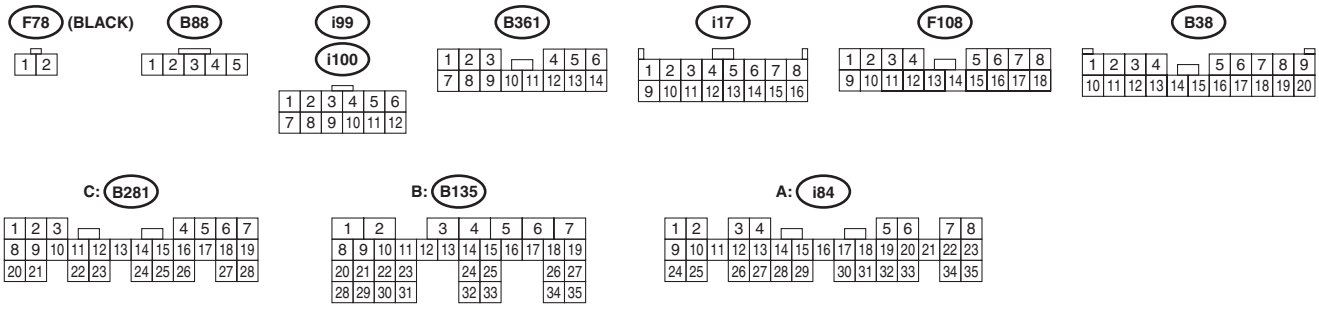

M-A/C(L)-02
TO POWER SUPPLY ROUTING
FB-45
F/B FUSE NO. 22
(IG)
FB-8
F/B FUSE NO. 27 (B)
F/B FUSE NO. 28 (B)
EC : FOR 2.0L EC, K4 MODEL
M-A/C(L)-01
B: B135
ECM
MODE ACTUATOR
B77
BLOWER FAN RESISTOR
B86
BLOWER FAN RELAY
B225
BODY INTEGRATED UNIT
B: B280
FRESH/RECIRC ACTUATOR
B91
B38
i3
B37
i2
B36
i1
BLOWER FAN MOTOR
B87
BLOWER FAN SWITCH
i15
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
GROUND JOINT CONNECTOR
B367
HEATER COCK SOLENOID (FOR EC, K4 MODEL)
i17 A/C CONTROL PANEL
i99
i100
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

B87
B367
B86
i15
B91 (GREEN)
B37
B77
i99
i100
i17
B38
i1
B: B280
B: B135
B225

WI-03935

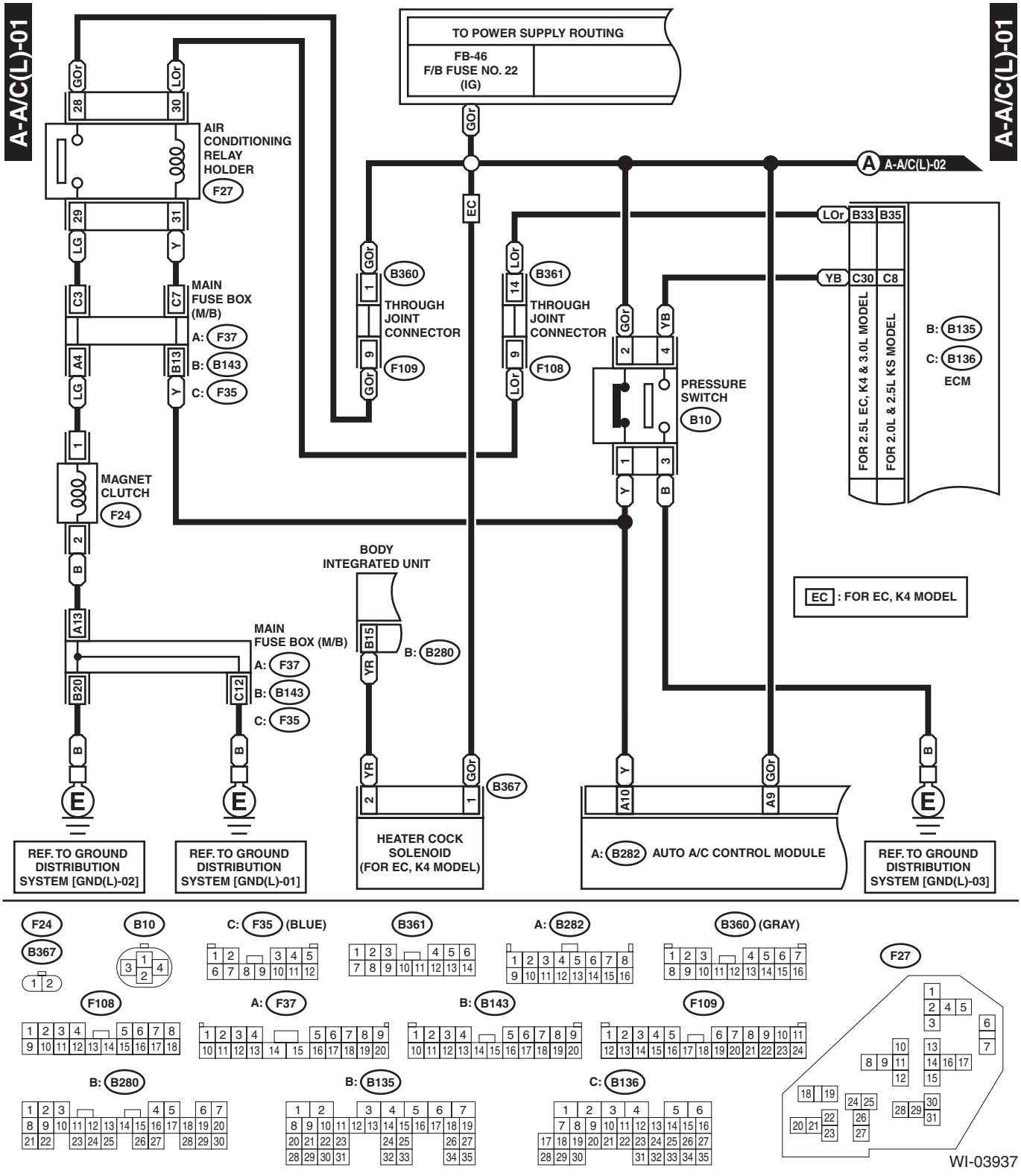
M-A/C(L)-03

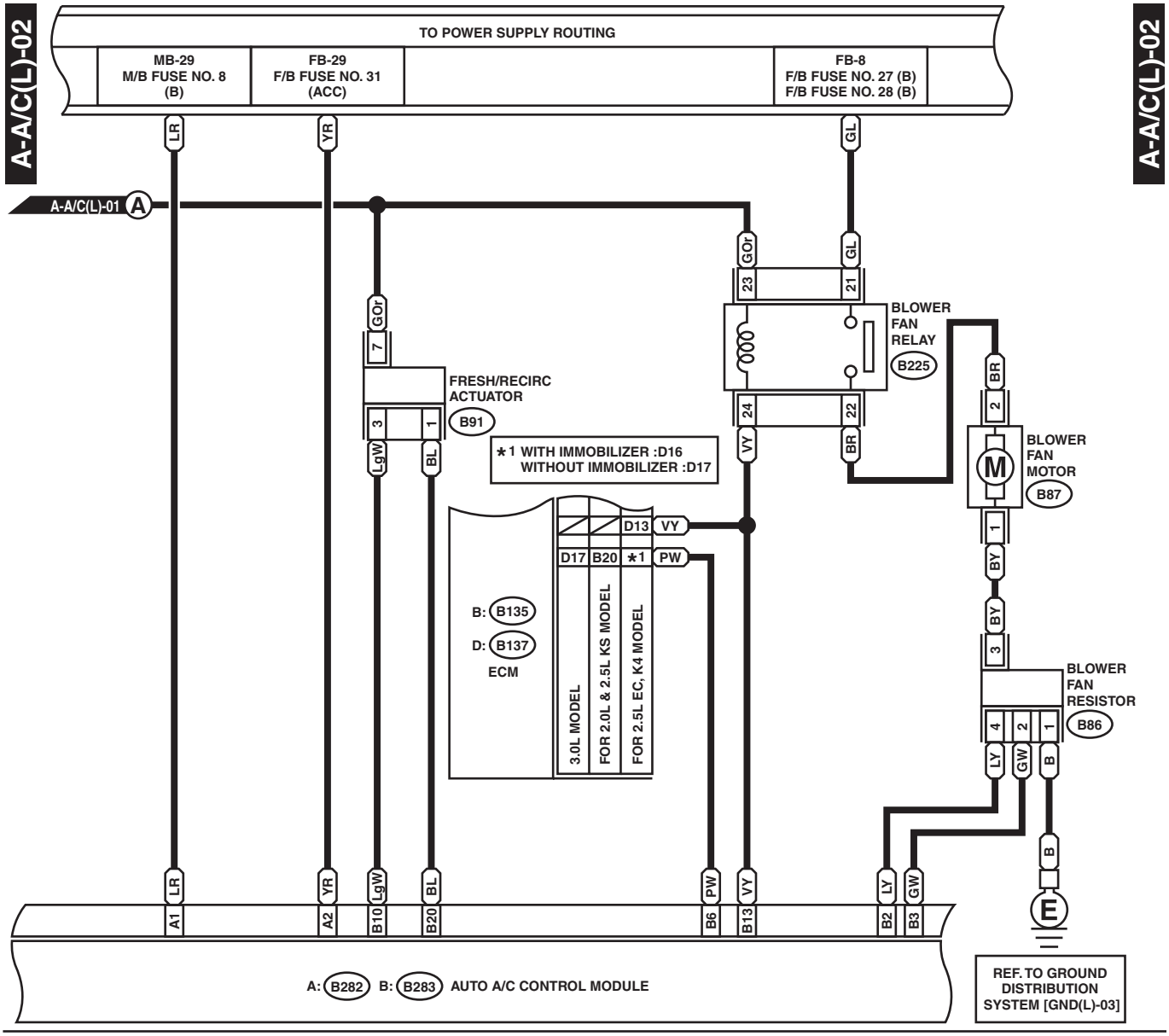


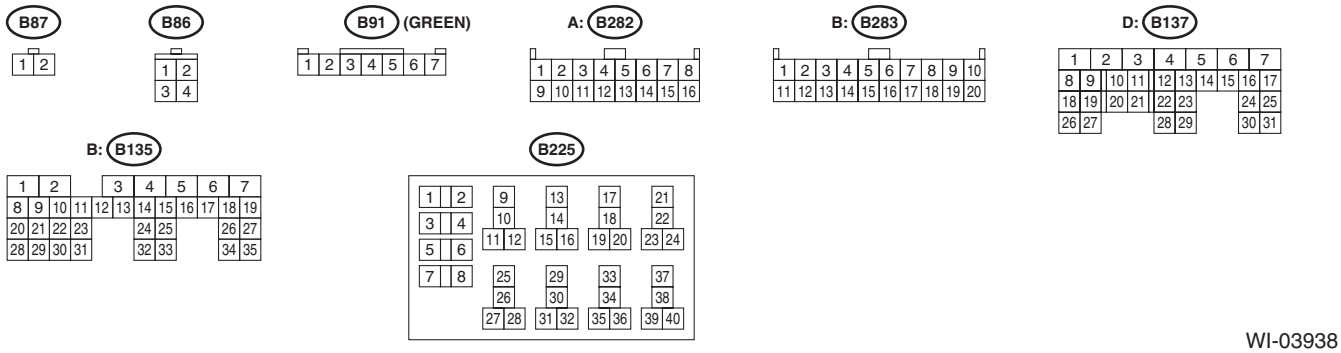


WI-03936

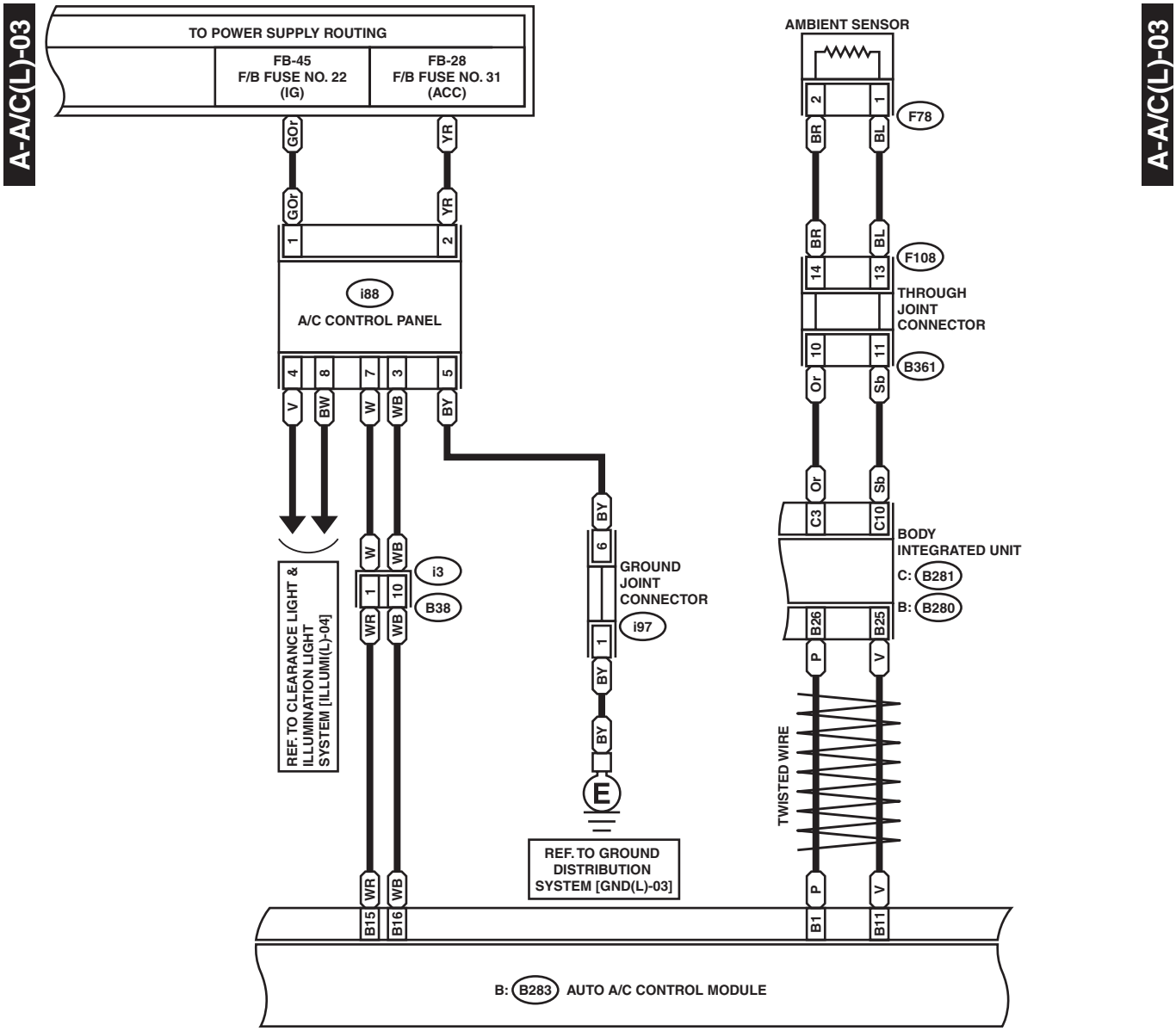
2. AUTO A/C LHD MODEL

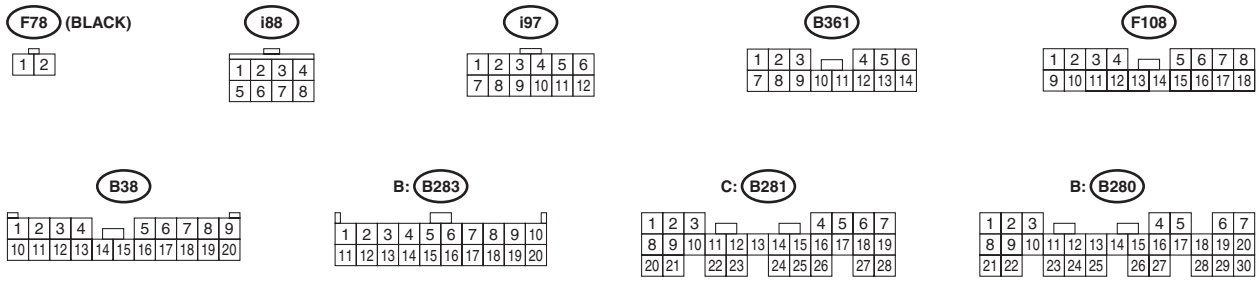



A-A/C(L)-02
A-A/C(L)-02
TO POWER SUPPLY ROUTING
MB-29
M/B FUSE NO. 8
(B)
FB-29
F/B FUSE NO. 31
(ACC)
FB-8
F/B FUSE NO. 27 (B)
F/B FUSE NO. 28 (B)
A-A/C(L)-01 A
BLOWER FAN RELAY
B225
FRESH/RECIRC ACTUATOR
B91
BLOWER FAN MOTOR
B87
BLOWER FAN RESISTOR
B86
∗1 WITH IMMOBILIZER :D16
WITHOUT IMMOBILIZER :D17
B: B135
D: B137
ECM
3.0L MODEL
FOR 2.0L & 2.5L KS MODEL
FOR 2.5L EC, K4 MODEL
A: B282 B: B283 AUTO A/C CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

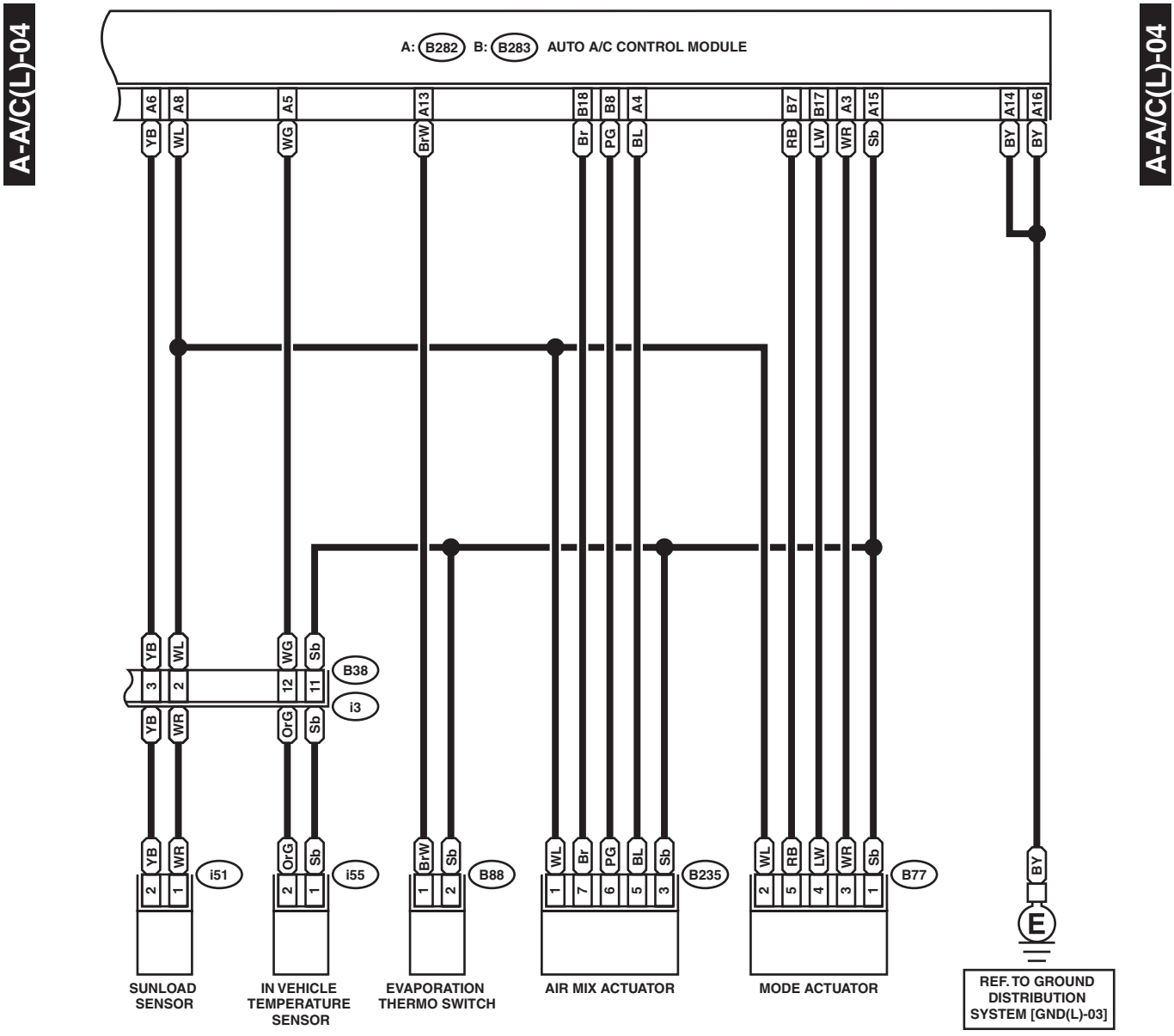

B87
B86
B91 (GREEN)
A: B282
B: B283
D: B137
B: B135
B225

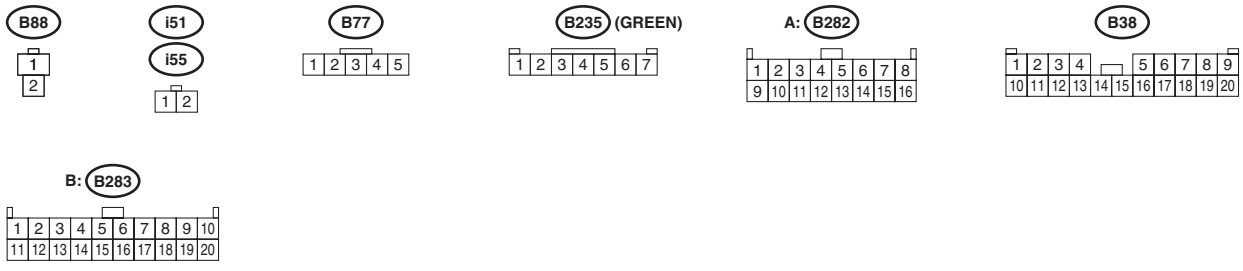
WI-03938


A-A/C(L)-03
TO POWER SUPPLY ROUTING
FB-45
F/B FUSE NO. 22
(IG)
FB-28
F/B FUSE NO. 31
(ACC)
GOr
YR
i88
A/C CONTROL PANEL
V
BW
W
WB
BY
REF. TO CLEARANCE LIGHT & ILLUMINATION LIGHT SYSTEM [ILLUMI(L)-04]
i3
B38
WR
GROUND JOINT CONNECTOR
i97
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
B15
B16
AMBIENT SENSOR
F78
BR
BL
F108
THROUGH JOINT CONNECTOR
B361
Or
Sb
C3
C10
BODY INTEGRATED UNIT
C: B281
B: B280
B26
B25
P
V
TWISTED WIRE
B1
B11
B: B283 AUTO A/C CONTROL MODULE
A-A/C(L)-03


F78 (BLACK)
i88
i97
B361
F108
B38
B: B283
C: B281
B: B280

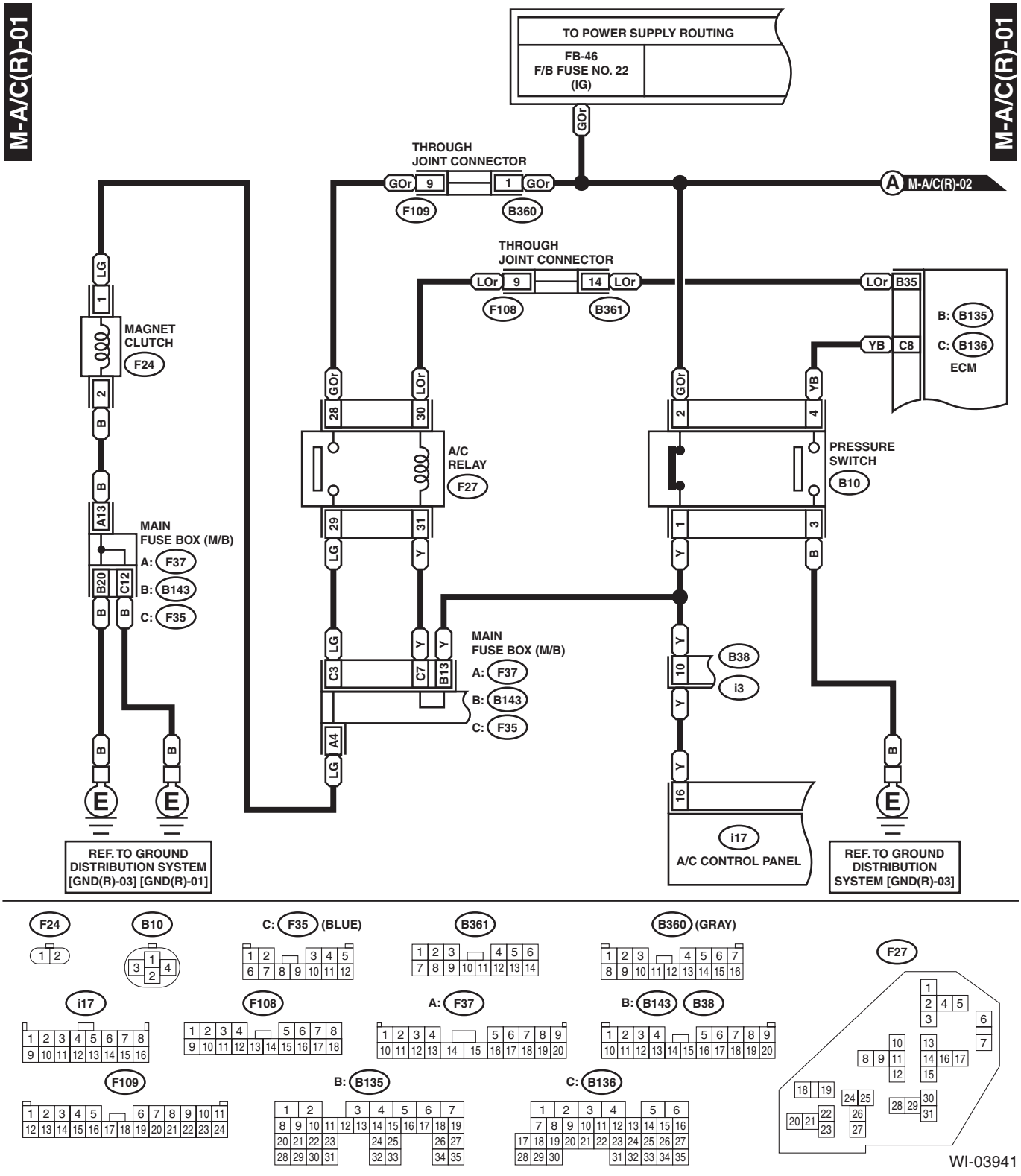
WI-03939


A-A/C(L)-04
A-A/C(L)-04
A: B282 B: B283 AUTO A/C CONTROL MODULE
A6 A8 A5 A13 B18 B8 A4 B7 B17 A3 A15 A14 A16
YB WL WG BrW Br PG BL RB LW WR Sb BY BY
B38
i3
i51
i55
B88
B235
B77
SUNLOAD SENSOR
IN VEHICLE TEMPERATURE SENSOR
EVAPORATION THERMO SWITCH
AIR MIX ACTUATOR
MODE ACTUATOR
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

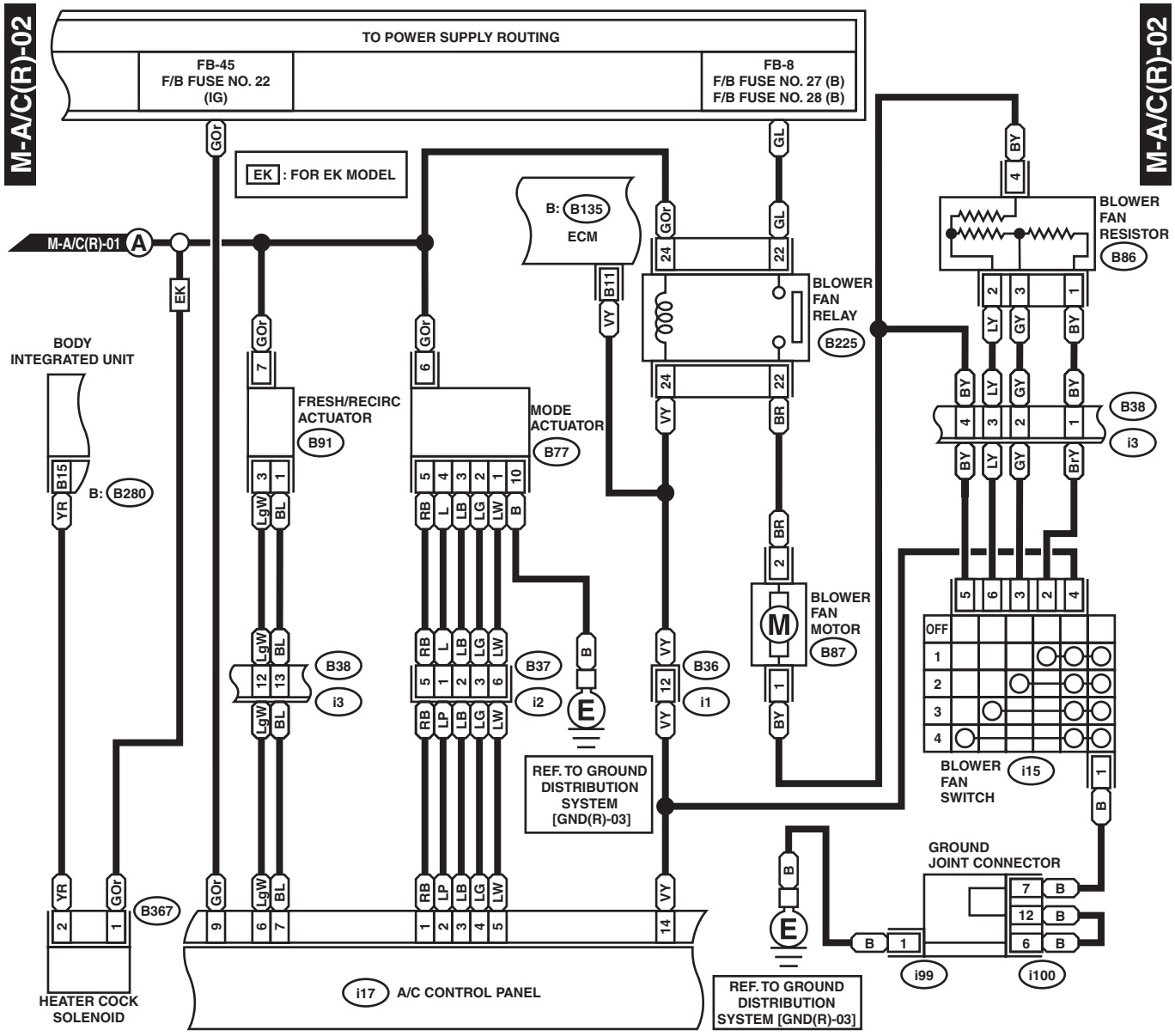

B88
i51
i55
B77
B235 (GREEN)
A: B282
B38
B: B283

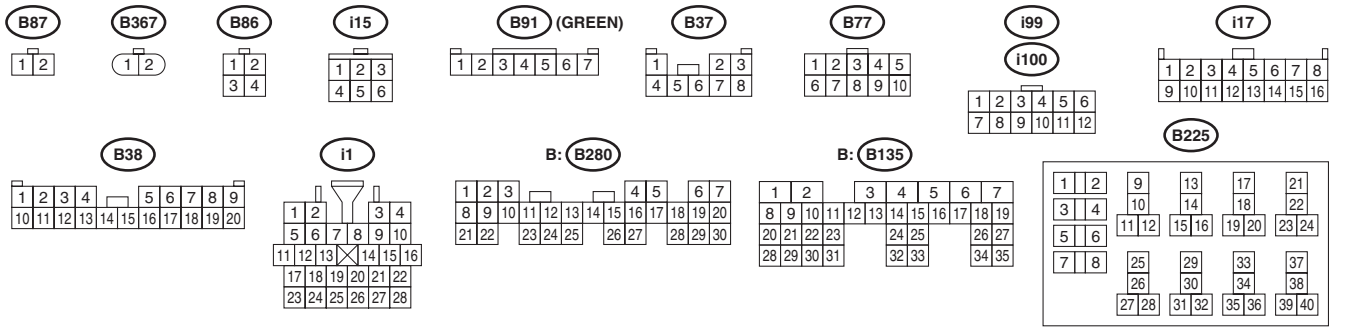
WI-03940

3. MANUAL A/C RHD MODEL



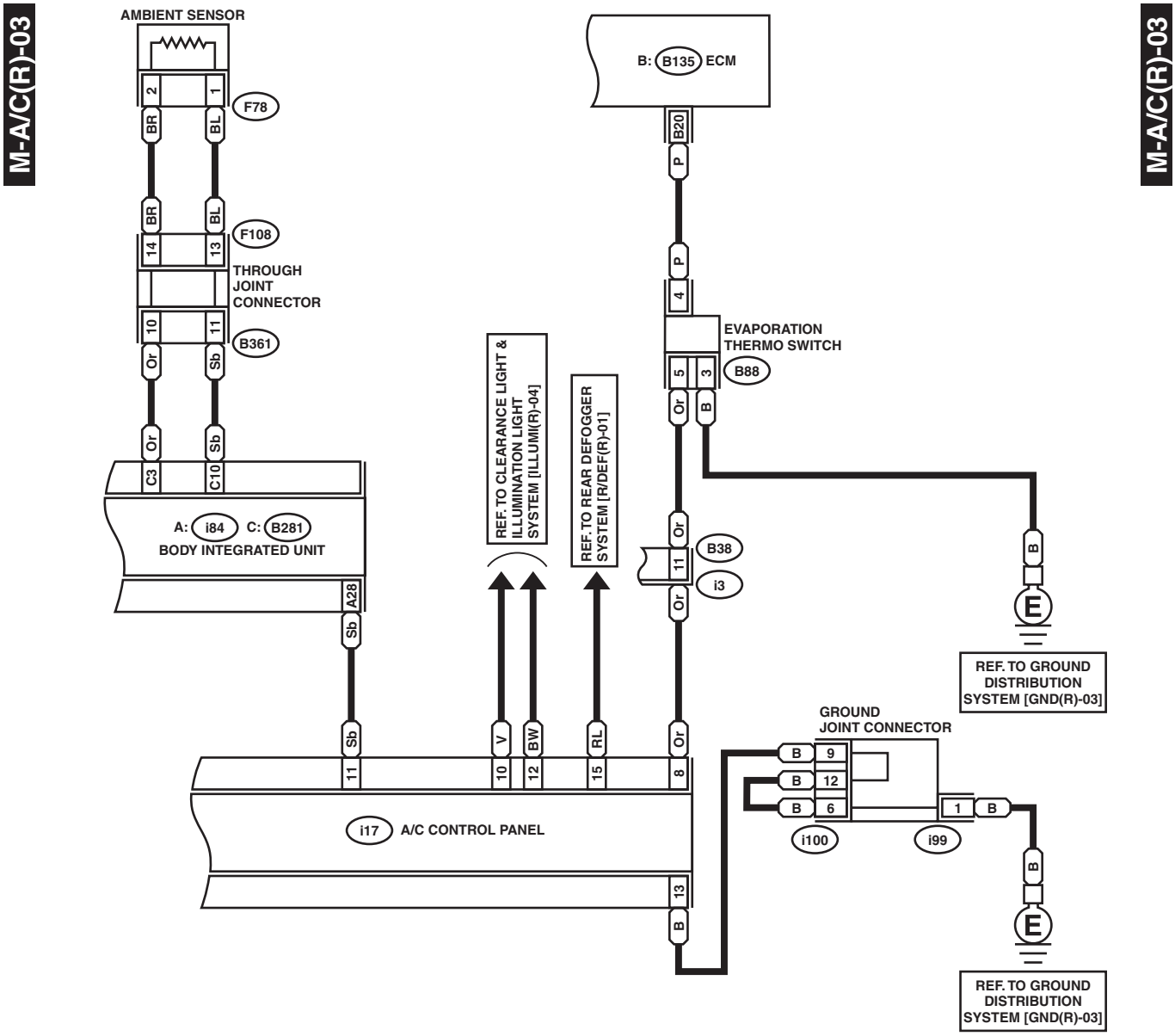
WI-03941

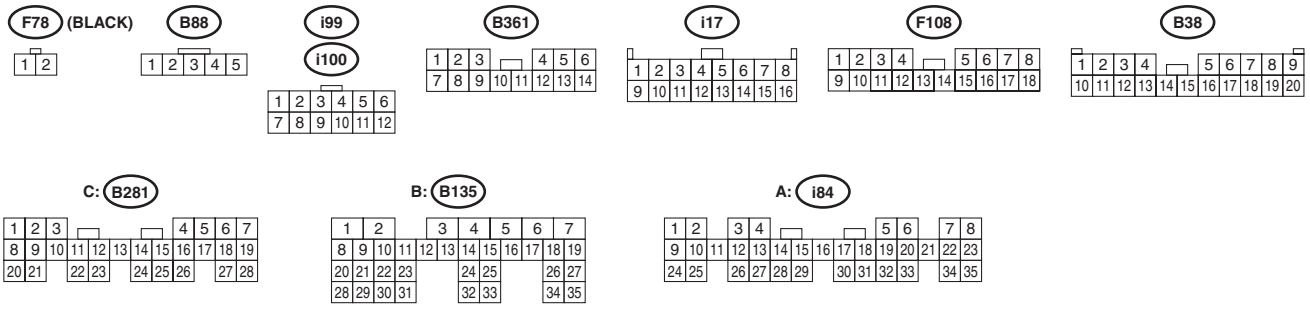

M-A/C(R)-02
TO POWER SUPPLY ROUTING
FB-45
F/B FUSE NO. 22
(IG)
FB-8
F/B FUSE NO. 27 (B)
F/B FUSE NO. 28 (B)
EK : FOR EK MODEL
M-A/C(R)-01
A
B: B135
ECM
BLOWER FAN RESISTOR
B86
BLOWER FAN RELAY
B225
BODY INTEGRATED UNIT
B: B280
FRESH/RECIRC ACTUATOR
B91
MODE ACTUATOR
B77
B38
i3
B37
i2
B36
i1
BLOWER FAN MOTOR
B87
BLOWER FAN SWITCH
i15
OFF
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
GROUND JOINT CONNECTOR
B367
HEATER COCK SOLENOID
i17
A/C CONTROL PANEL
i99
i100
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]


B87
B367
B86
i15
B91 (GREEN)
B37
B77
i99
i100
i17
B38
i1
B: B280
B: B135
B225

WI-03942

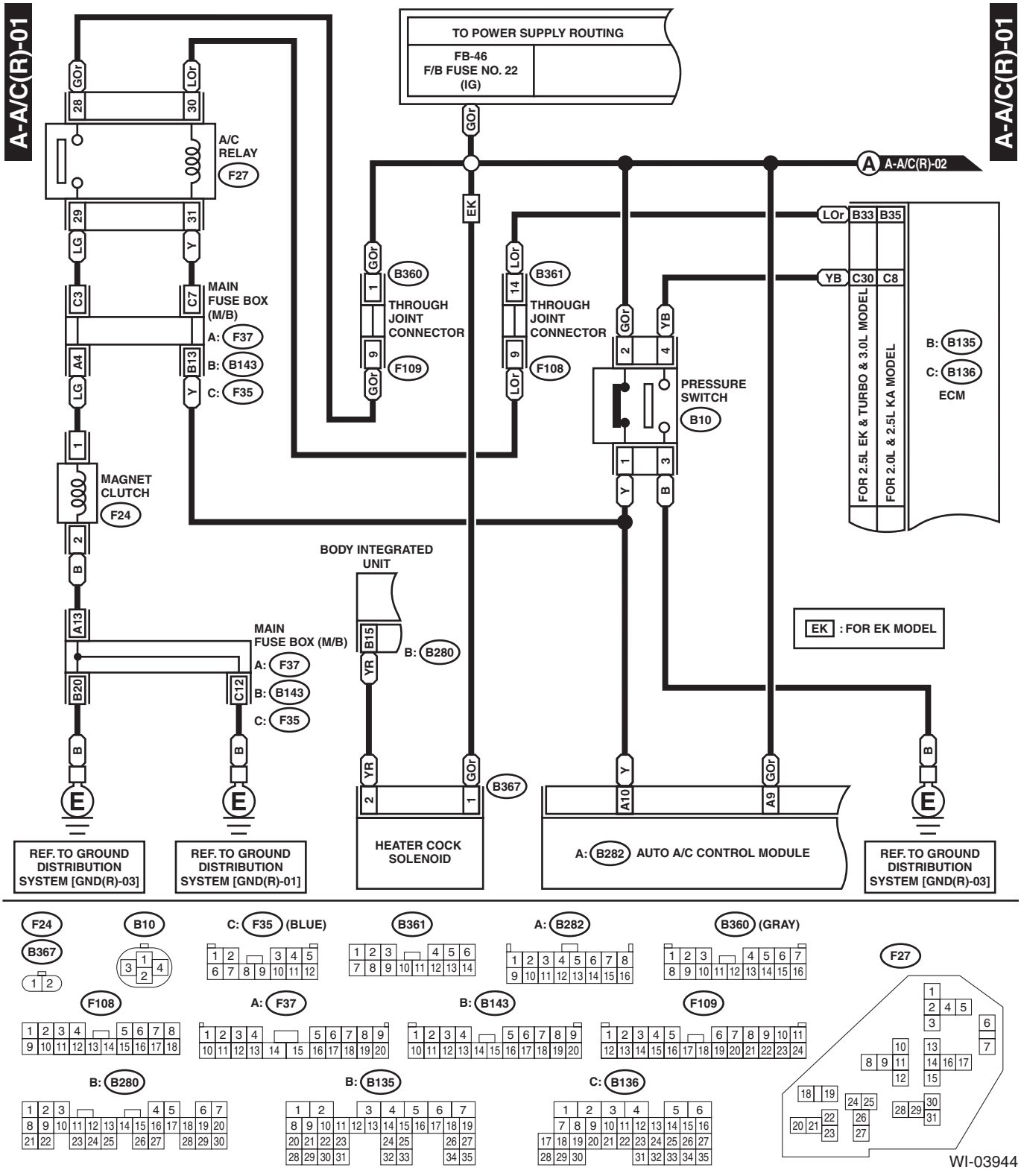
M-A/C(R)-03

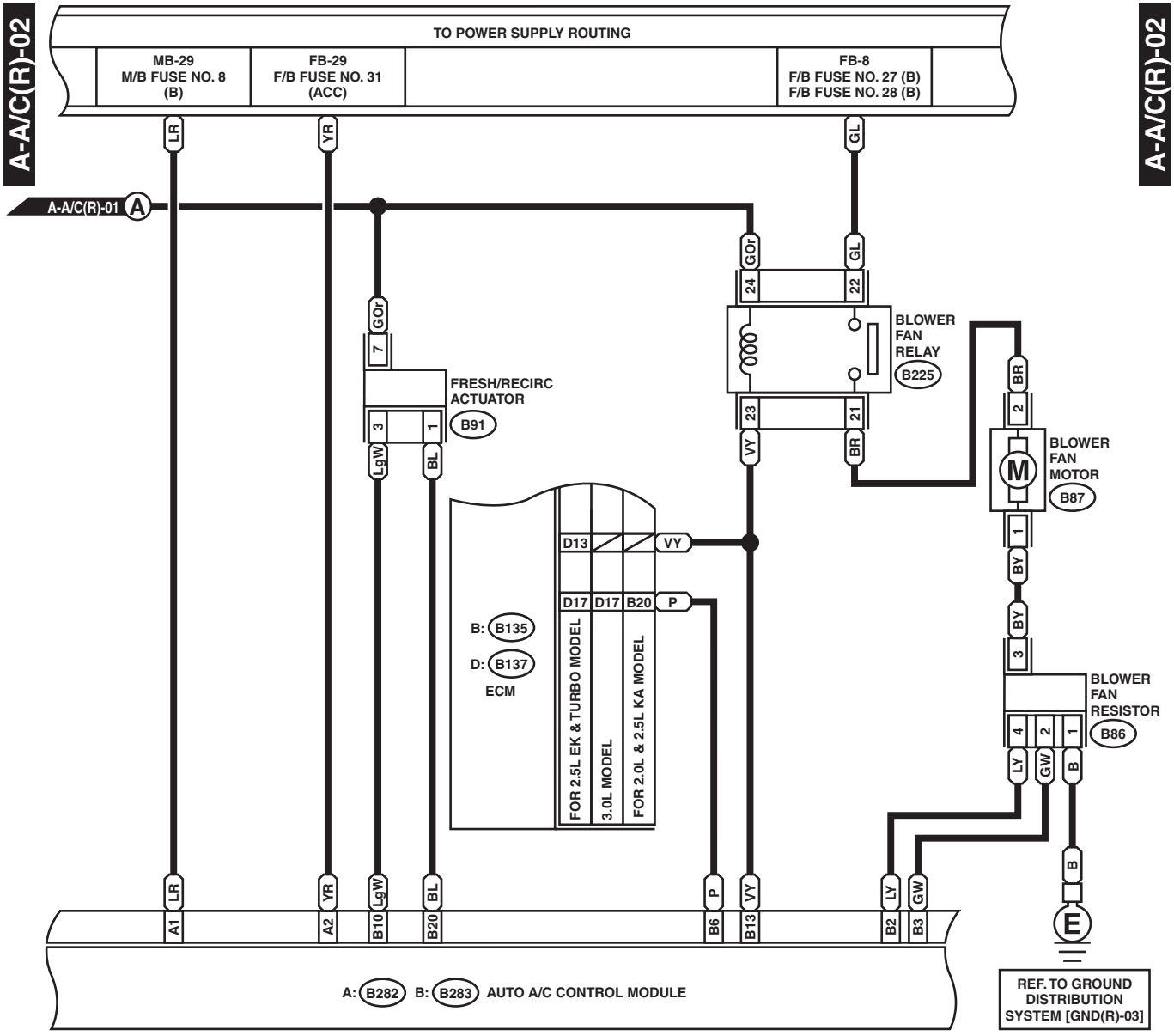


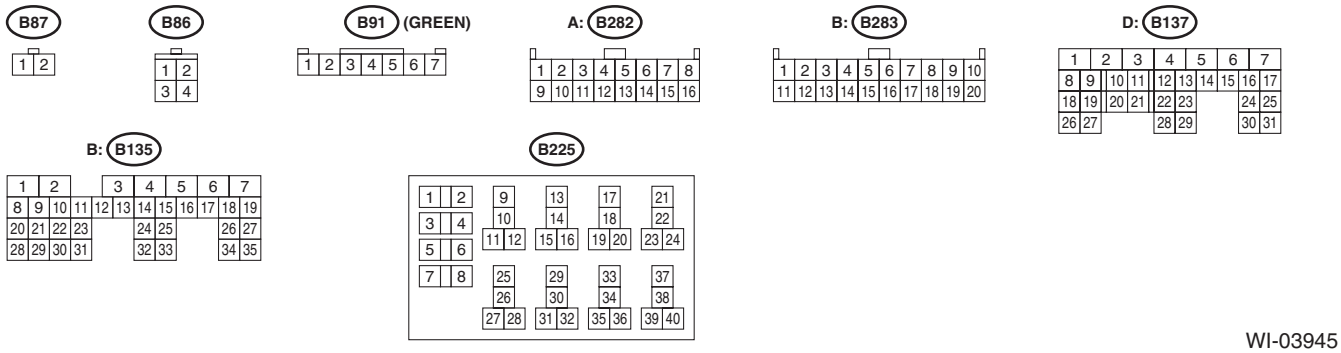


WI-03943

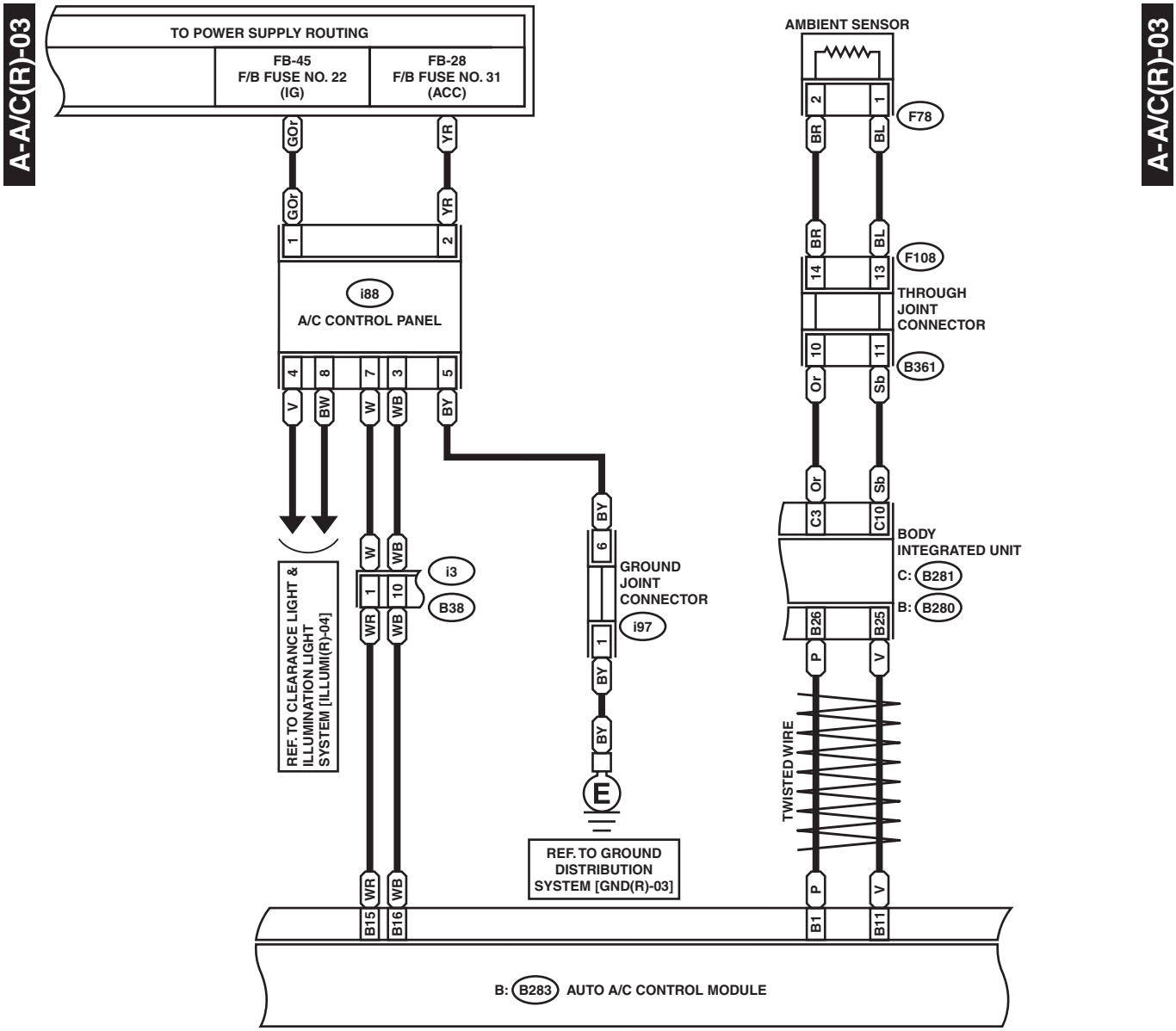
4. AUTO A/C RHD MODEL

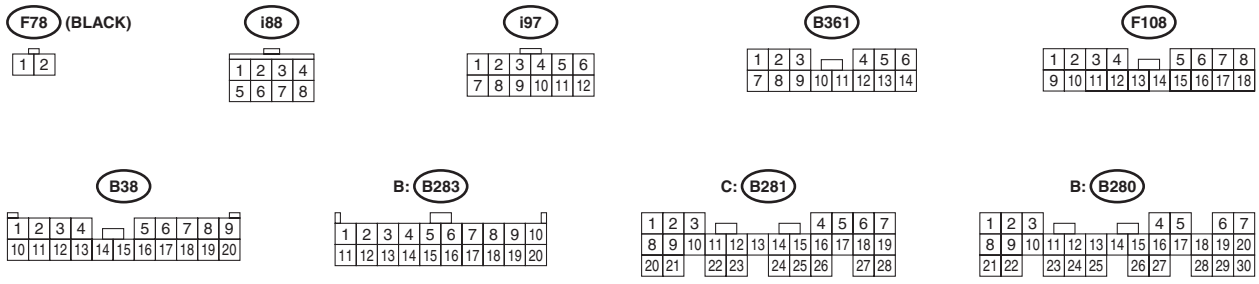



A-A/C(R)-02
A-A/C(R)-02
TO POWER SUPPLY ROUTING
MB-29
M/B FUSE NO. 8
(B)
FB-29
F/B FUSE NO. 31
(ACC)
FB-8
F/B FUSE NO. 27 (B)
F/B FUSE NO. 28 (B)
A-A/C(R)-01 A
LR
YR
GL
GOr
FRESH/RECIRC
ACTUATOR
B91
LgW
BL
BLOWER
FAN
RELAY
B225
BR
VY
BLOWER
FAN
MOTOR
B87
BY
BLOWER
FAN
RESISTOR
B86
LY
GW
B
D13
D17
B20
P
B: B135
D: B137
ECM
FOR 2.5L EK & TURBO MODEL
3.0L MODEL
FOR 2.0L & 2.5L KA MODEL
A1
A2
B10
B20
B6
B13
B2
B3
A: B282 B: B283 AUTO A/C CONTROL MODULE
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-03]

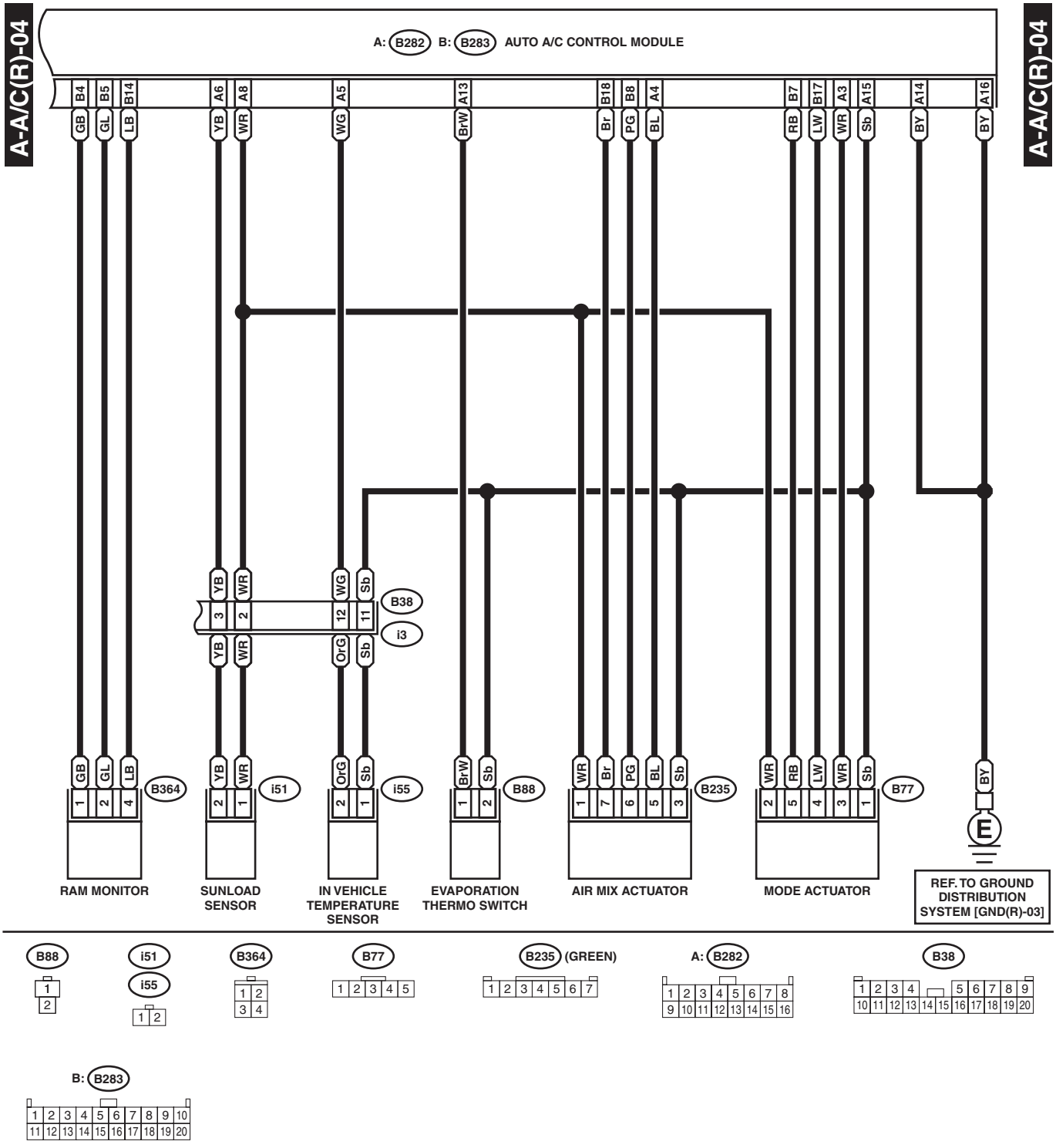

B87
B86
B91 (GREEN)
A: B282
B: B283
D: B137
B: B135
B225

WI-03945


A-A/C(R)-03
A-A/C(R)-03
TO POWER SUPPLY ROUTING
FB-45
F/B FUSE NO. 22
(IG)
FB-28
F/B FUSE NO. 31
(ACC)
AMBIENT SENSOR
F78
F108
THROUGH
JOINT
CONNECTOR
B361
i88
A/C CONTROL PANEL
BODY
INTEGRATED UNIT
C: B281
B: B280
i3
B38
GROUND
JOINT
CONNECTOR
i97
REF. TO CLEARANCE LIGHT &
ILLUMINATION LIGHT
SYSTEM [ILLUMI(R)-04]
TWISTED WIRE
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-03]
B: B283 AUTO A/C CONTROL MODULE


F78 (BLACK)
i88
i97
B361
F108
B38
B: B283
C: B281
B: B280

WI-03946

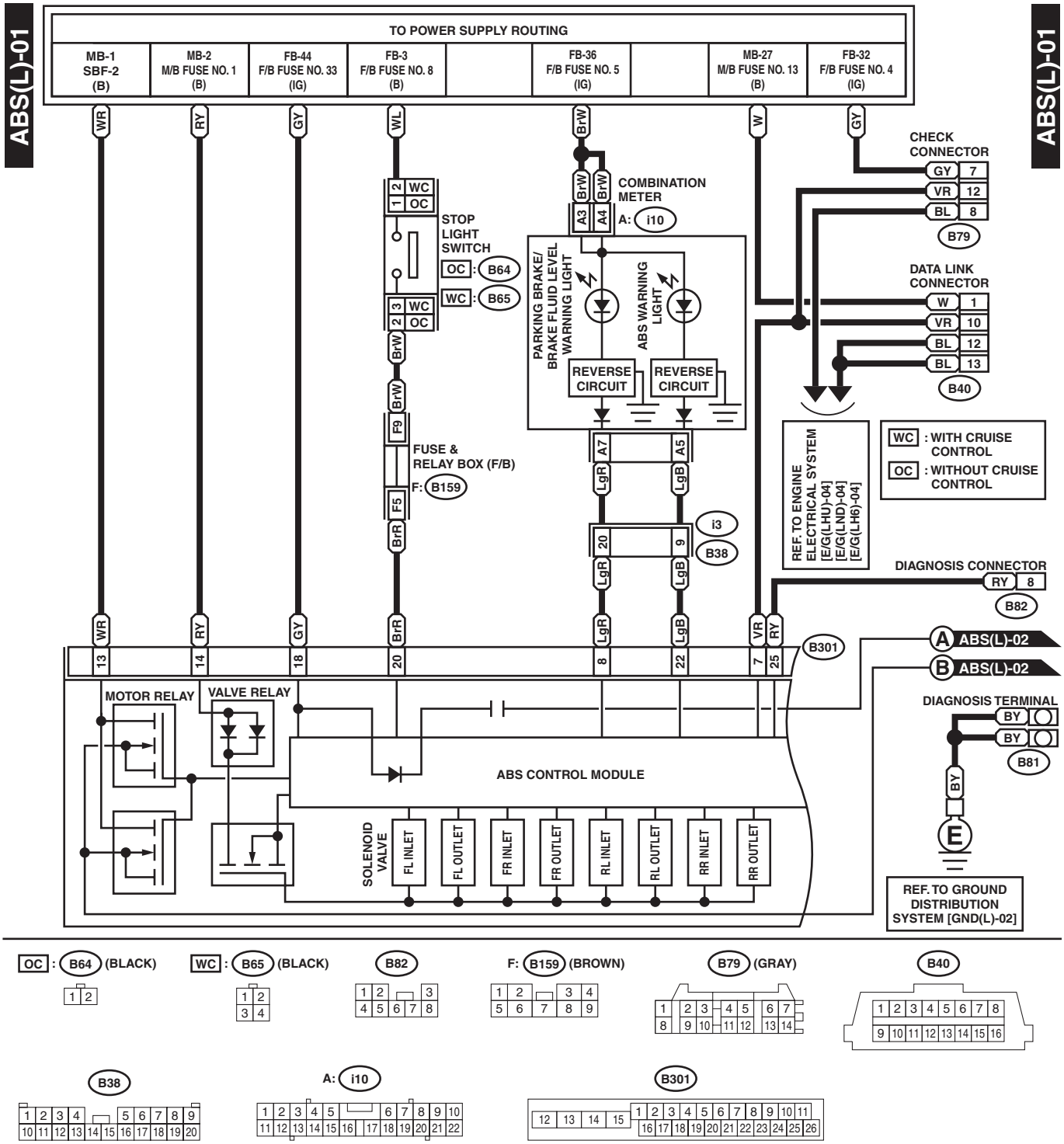

A-A/C(R)-04
A: B282 B: B283 AUTO A/C CONTROL MODULE
A-A/C(R)-04
B4 B5 B14 A6 A8 A5 A13 B18 B8 A4 B7 B17 A3 A15 A14 A16
GB GL LB YB WR WG BrW Br PG BL RB LW WR Sb BY BY
B38
i3
B364
i51
i55
B88
B235
B77
RAM MONITOR
SUNLOAD SENSOR
IN VEHICLE TEMPERATURE SENSOR
EVAPORATION THERMO SWITCH
AIR MIX ACTUATOR
MODE ACTUATOR
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
B88
i51
i55
B364
B77
B235 (GREEN)
A: B282
B38
B: B283

WI-03947

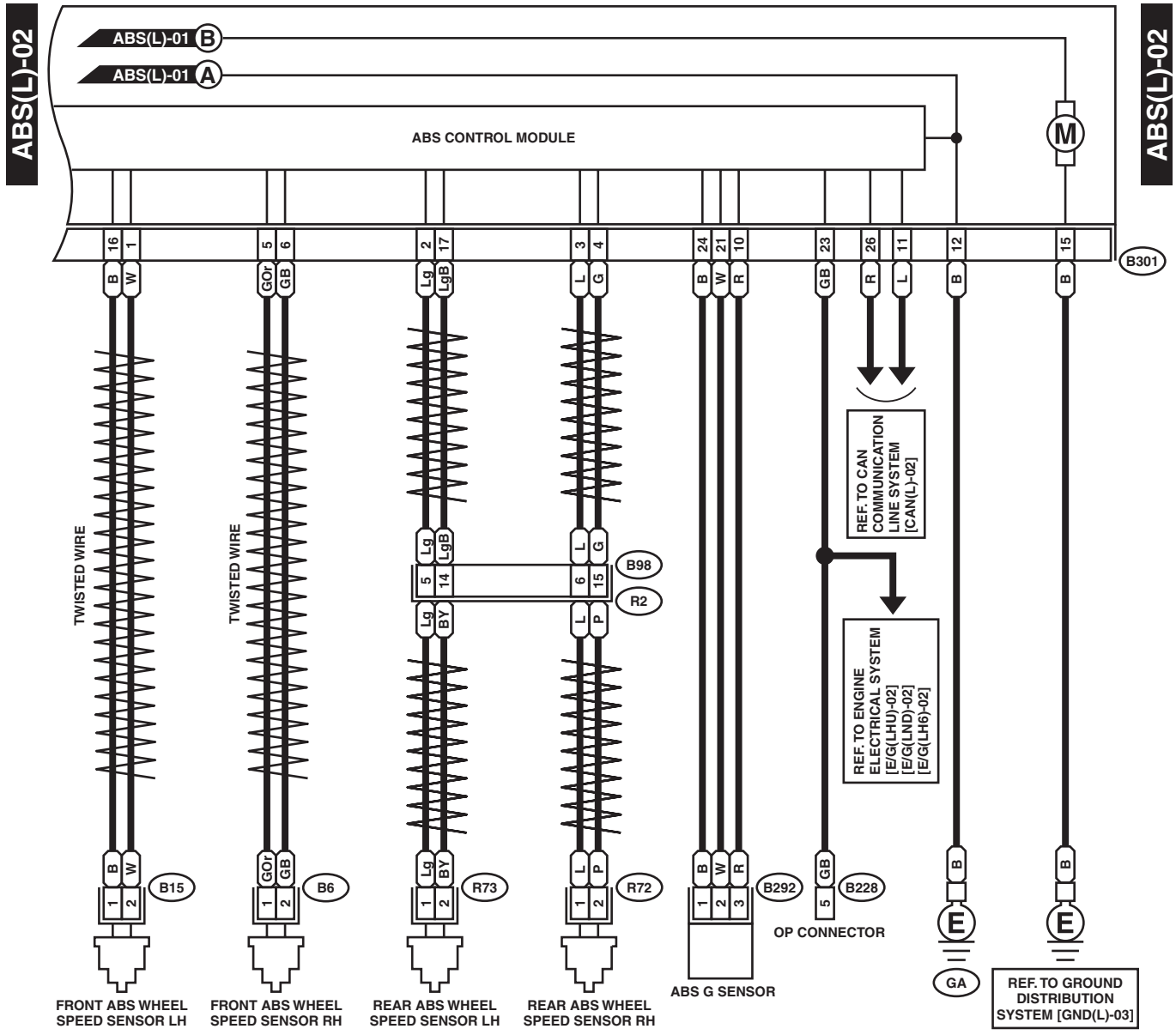
7. Anti-lock Brake System

A: WIRING DIAGRAM

1. LHD MODEL

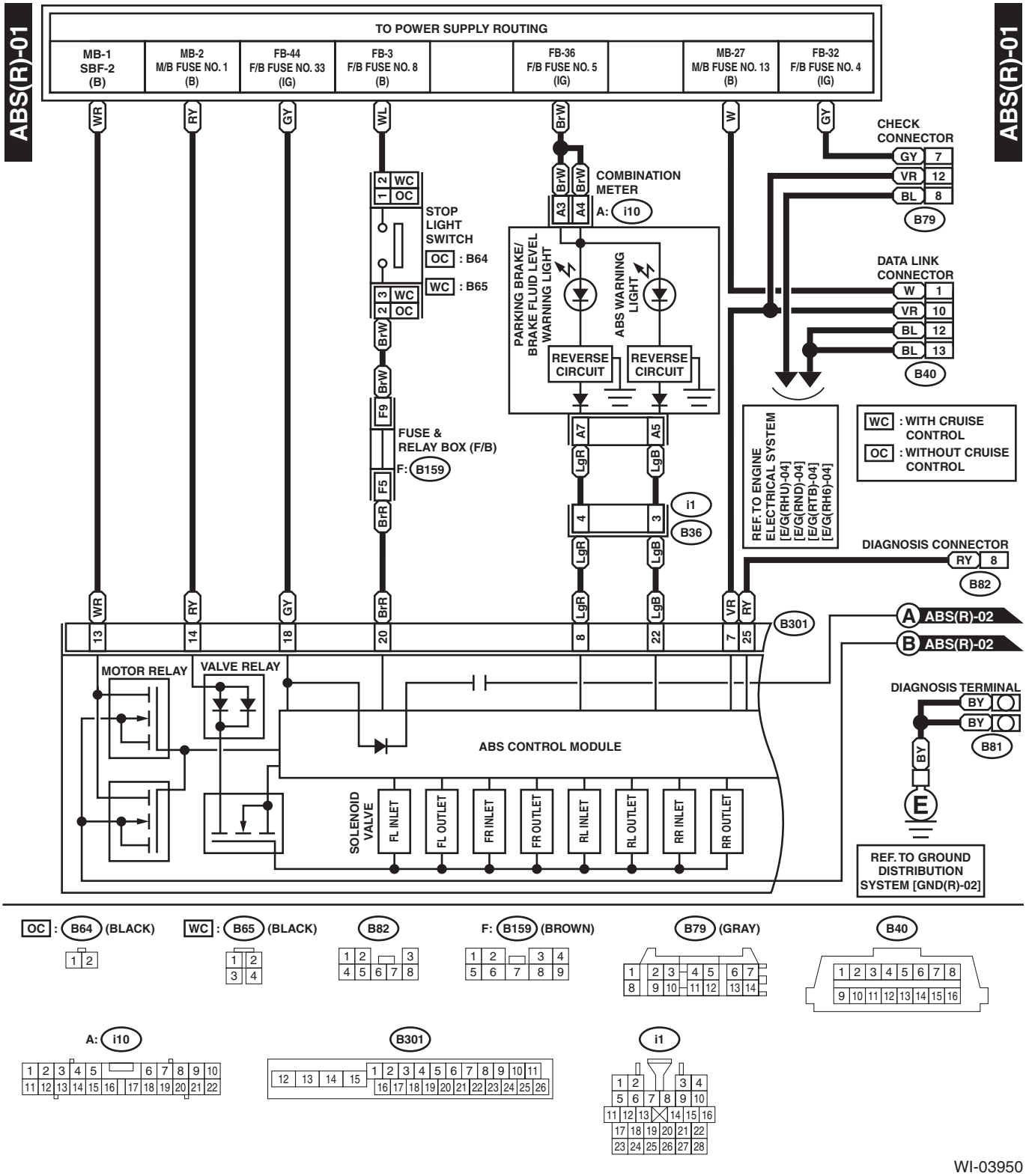


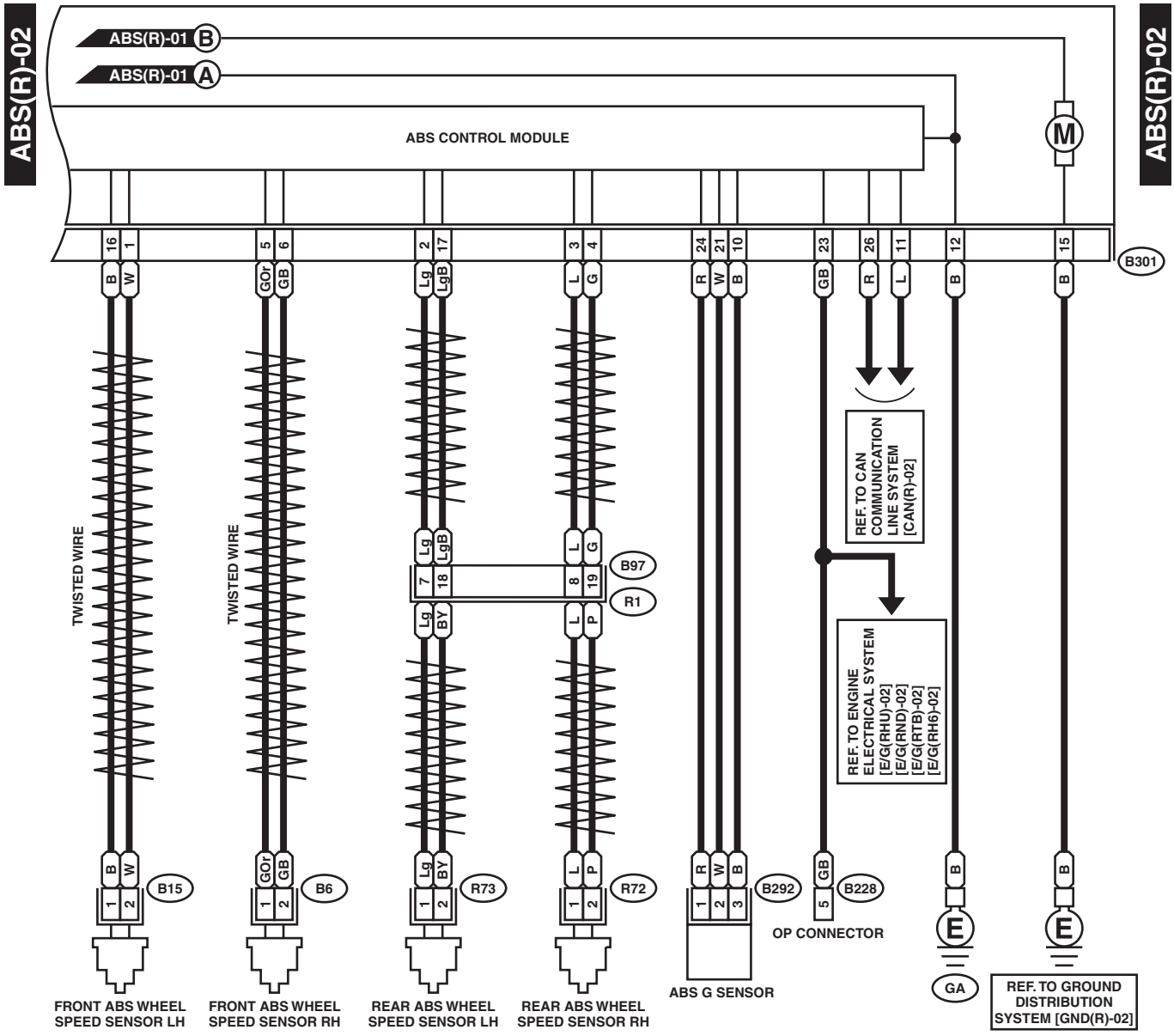
WI-03948

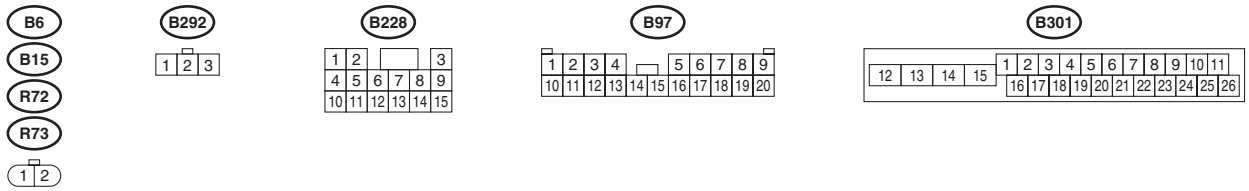

ABS(L)-02
ABS(L)-01 B
ABS(L)-01 A
ABS CONTROL MODULE
M
ABS(L)-02
B301
TWISTED WIRE
TWISTED WIRE
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-02]
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(LHU)-02] [E/G(LND)-02] [E/G(LH6)-02]
B98
R2
B15
B6
R73
R72
B292
B228
OP CONNECTOR
GA
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
FRONT ABS WHEEL SPEED SENSOR LH
FRONT ABS WHEEL SPEED SENSOR RH
REAR ABS WHEEL SPEED SENSOR LH
REAR ABS WHEEL SPEED SENSOR RH
ABS G SENSOR

WI-03949

2. RHD MODEL


ABS(R)-01
TO POWER SUPPLY ROUTING
MB-1 SBF-2 (B)
MB-2 M/B FUSE NO. 1 (B)
FB-44 F/B FUSE NO. 33 (IG)
FB-3 F/B FUSE NO. 8 (B)
FB-36 F/B FUSE NO. 5 (IG)
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
A: i10
STOP LIGHT SWITCH
OC : B64
WC : B65
PARKING BRAKE/ BRAKE FLUID LEVEL WARNING LIGHT
ABS WARNING LIGHT
REVERSE CIRCUIT
FUSE & RELAY BOX (F/B)
F: B159
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(RHU)-04] [E/G(RND)-04] [E/G(RTB)-04] [E/G(RH6)-04]
WC : WITH CRUISE CONTROL
OC : WITHOUT CRUISE CONTROL
DIAGNOSIS CONNECTOR
B82
B301
ABS(R)-02
MOTOR RELAY
VALVE RELAY
ABS CONTROL MODULE
SOLENOID VALVE
FL INLET
FL OUTLET
FR INLET
FR OUTLET
RL INLET
RL OUTLET
RR INLET
RR OUTLET
DIAGNOSIS TERMINAL
B81
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
OC : B64 (BLACK)
WC : B65 (BLACK)
B82
F: B159 (BROWN)
B79 (GRAY)
B40
A: i10
B301
i1
WI-03950


ABS(R)-02
ABS(R)-01 B
ABS(R)-01 A
ABS CONTROL MODULE
M
ABS(R)-02
B301
TWISTED WIRE
TWISTED WIRE
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(RHU)-02] [E/G(RND)-02] [E/G(RTB)-02] [E/G(RH6)-02]
B97
R1
B15
B6
R73
R72
B292
B228
OP CONNECTOR
GA
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
FRONT ABS WHEEL SPEED SENSOR LH
FRONT ABS WHEEL SPEED SENSOR RH
REAR ABS WHEEL SPEED SENSOR LH
REAR ABS WHEEL SPEED SENSOR RH
ABS G SENSOR

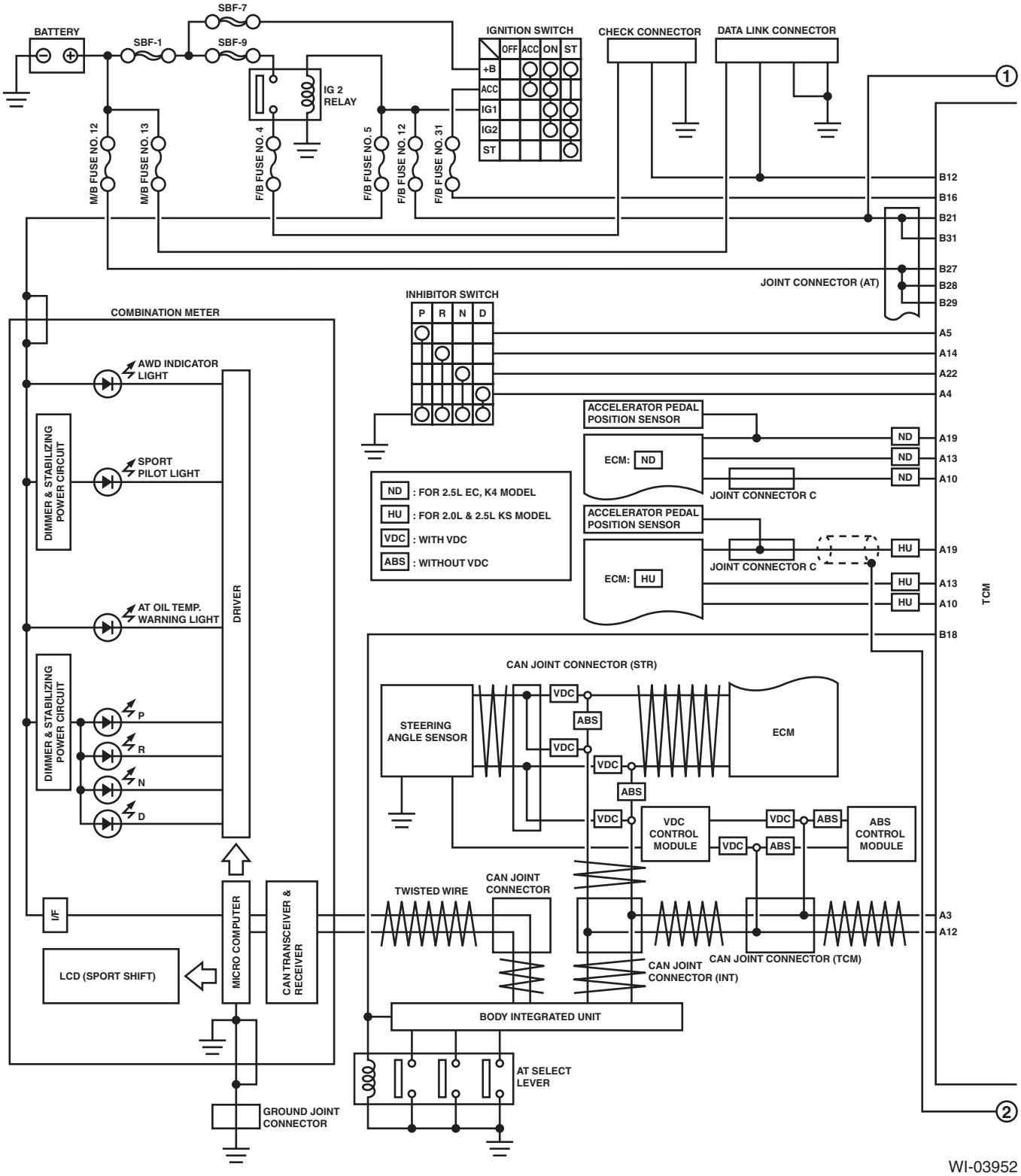

B6
B15
R72
R73
B292
B228
B97
B301

WI-03951

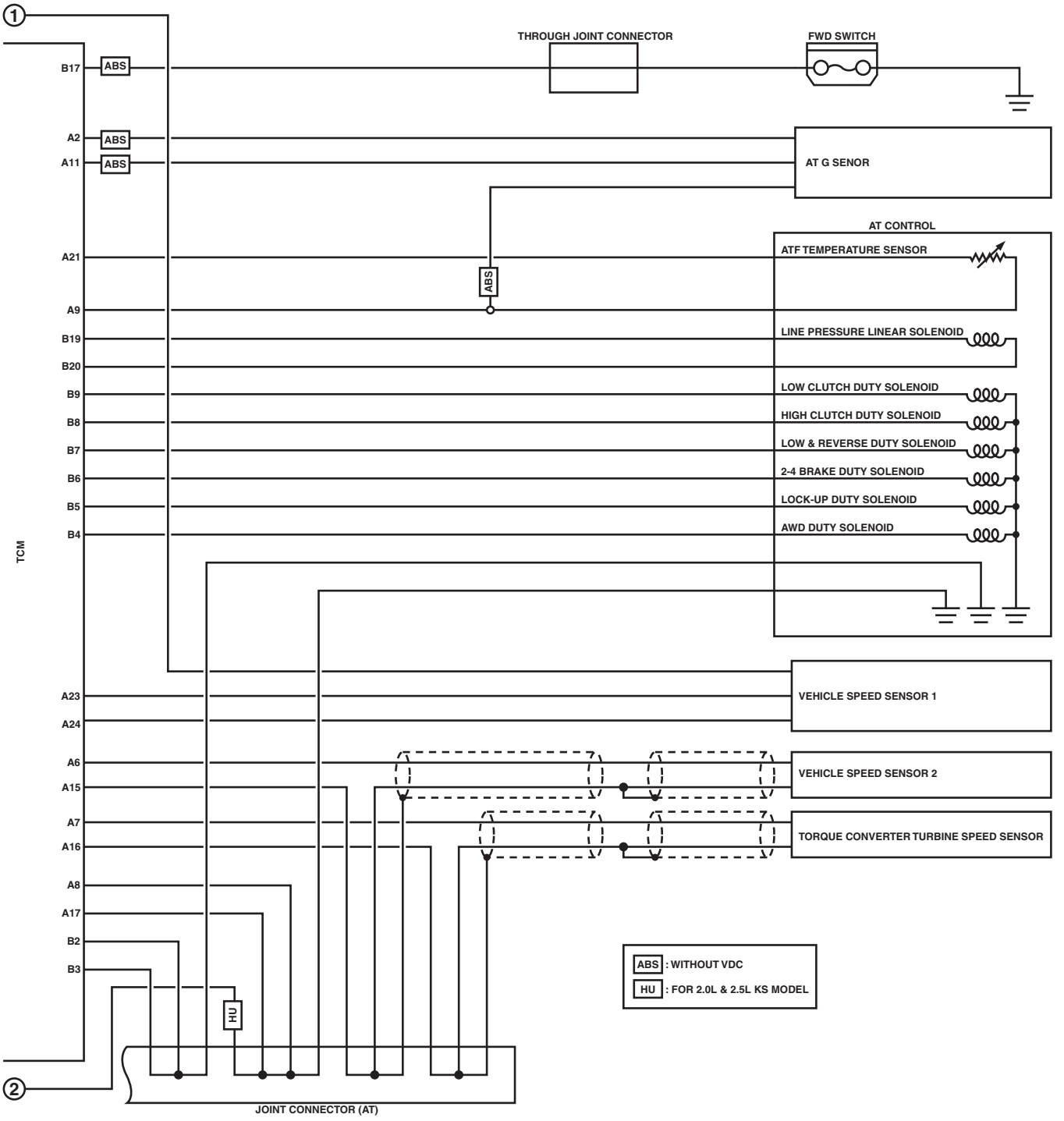
8. AT Control System

A: WIRING DIAGRAM

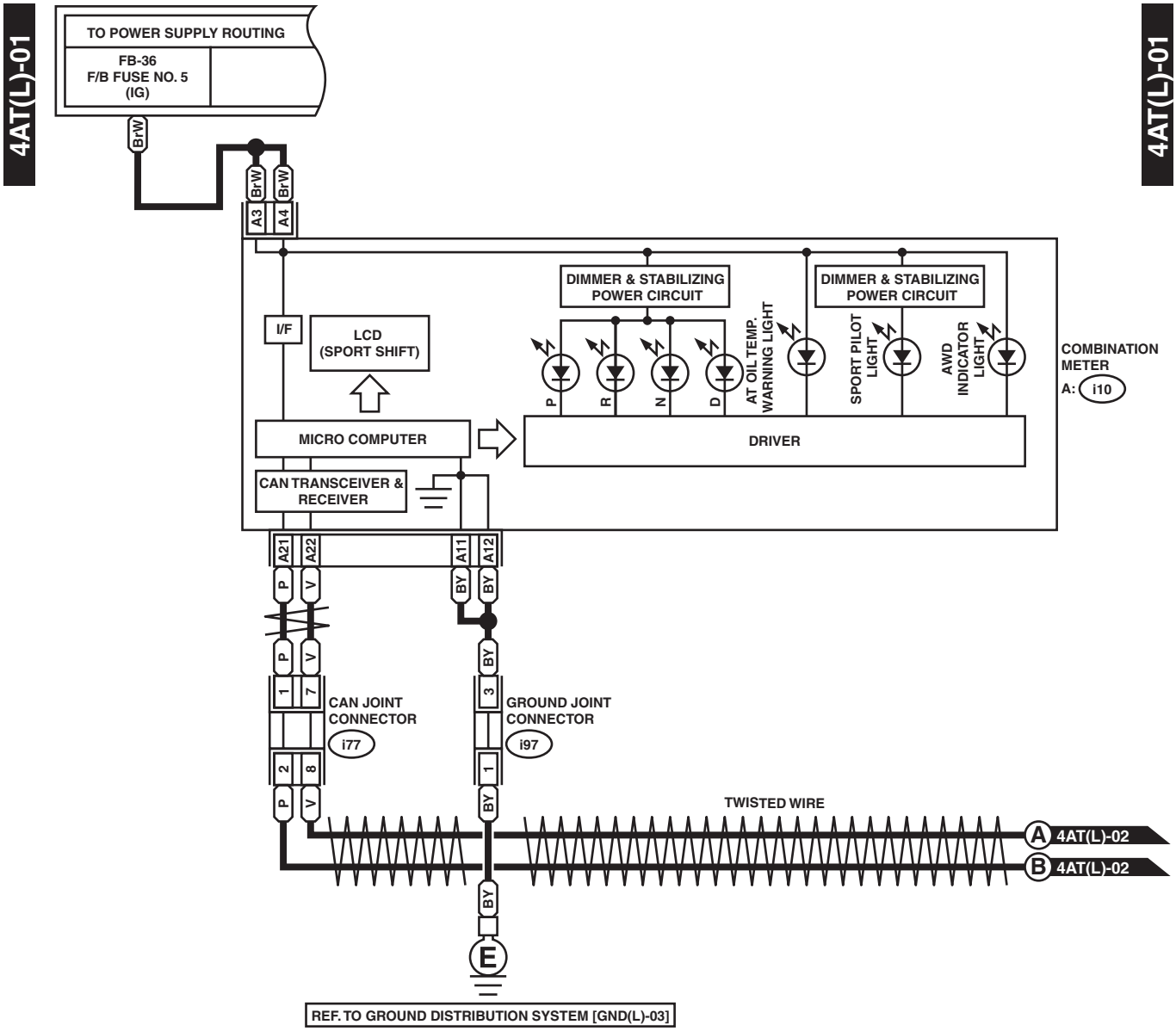
1. LHD 4AT MODEL

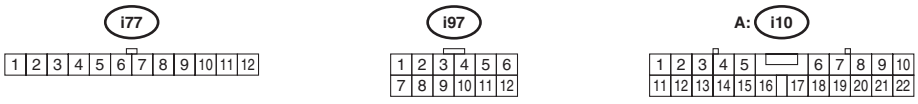


WI-03952

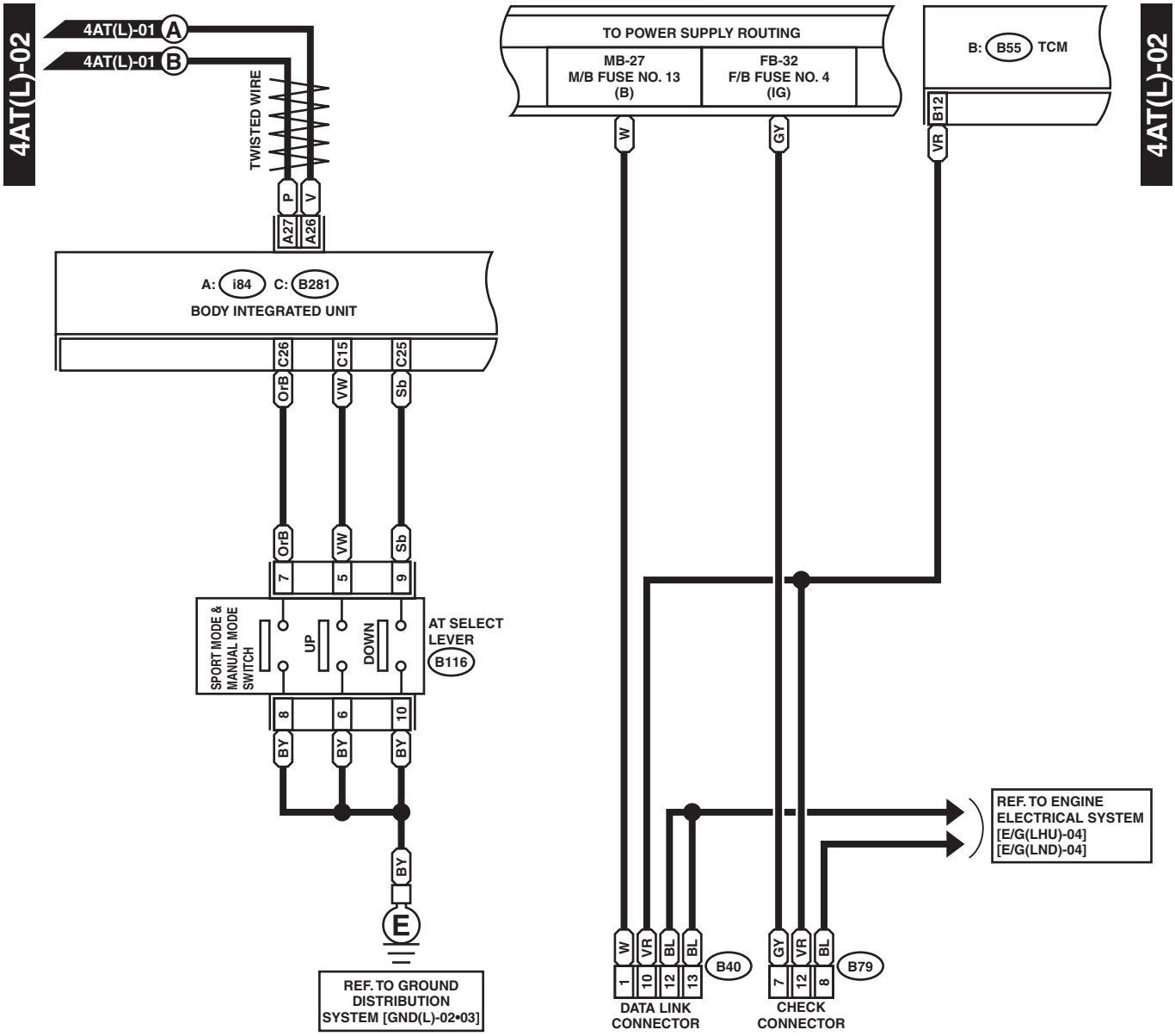

①
②
TCM
B17
ABS
THROUGH JOINT CONNECTOR
FWD SWITCH
A2
ABS
A11
ABS
AT G SENOR
AT CONTROL
A21
ATF TEMPERATURE SENSOR
ABS
A9
B19
LINE PRESSURE LINEAR SOLENOID
B20
B9
LOW CLUTCH DUTY SOLENOID
B8
HIGH CLUTCH DUTY SOLENOID
B7
LOW & REVERSE DUTY SOLENOID
B6
2-4 BRAKE DUTY SOLENOID
B5
LOCK-UP DUTY SOLENOID
B4
AWD DUTY SOLENOID
A23
VEHICLE SPEED SENSOR 1
A24
A6
VEHICLE SPEED SENSOR 2
A15
A7
TORQUE CONVERTER TURBINE SPEED SENSOR
A16
A8
A17
B2
B3
HU
JOINT CONNECTOR (AT)
ABS : WITHOUT VDC
HU : FOR 2.0L & 2.5L KS MODEL

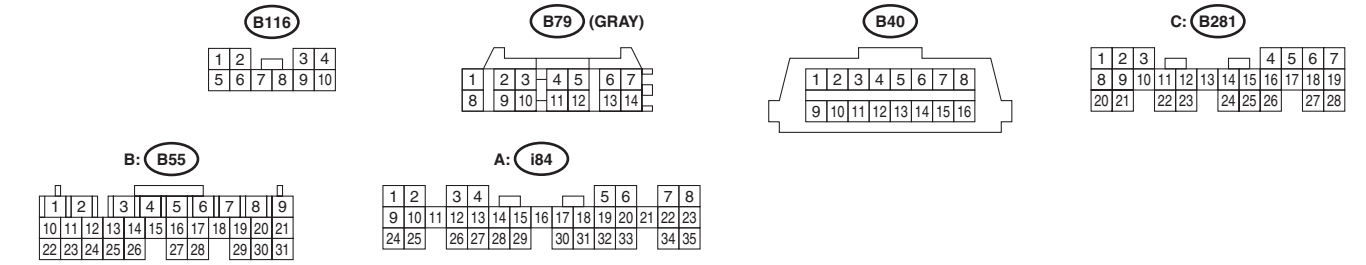
WI-03953


4AT(L)-01
4AT(L)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
BrW
BrW
A3
A4
DIMMER & STABILIZING POWER CIRCUIT
DIMMER & STABILIZING POWER CIRCUIT
I/F
LCD
(SPORT SHIFT)
P
R
N
D
AT OIL TEMP. WARNING LIGHT
SPORT PILOT LIGHT
AWD INDICATOR LIGHT
COMBINATION METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
P
V
BY
BY
P
V
BY
1
7
3
CAN JOINT CONNECTOR
i77
GROUND JOINT CONNECTOR
i97
2
8
1
P
V
BY
TWISTED WIRE
A 4AT(L)-02
B 4AT(L)-02
BY
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

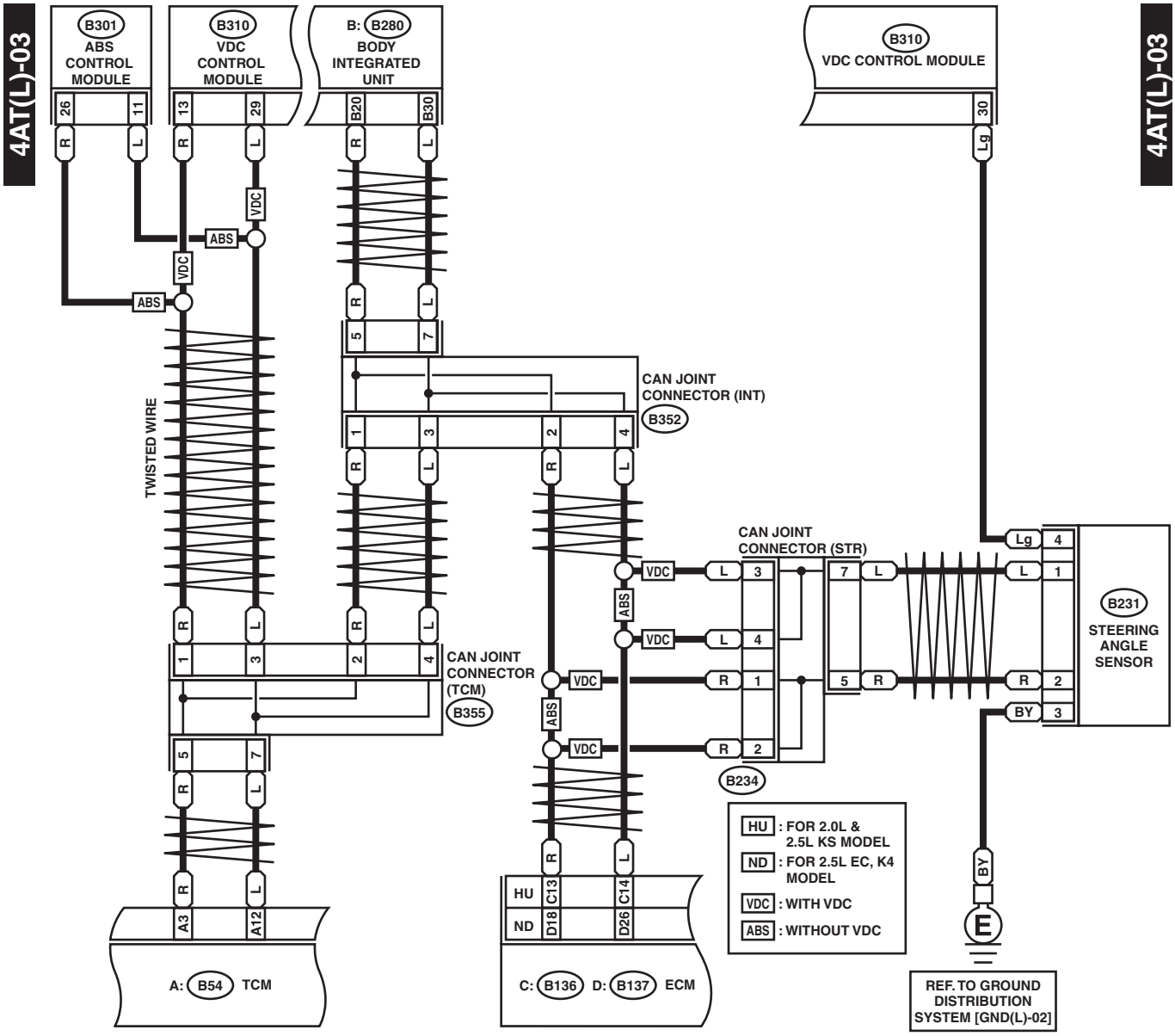

i77
1 2 3 4 5 6 7 8 9 10 11 12
i97
1 2 3 4 5 6
7 8 9 10 11 12
A: i10
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22

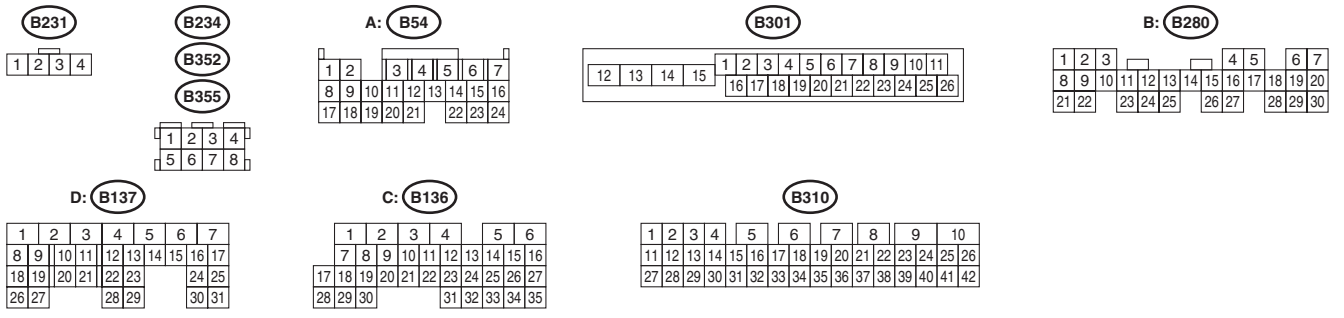
WI-03954


4AT(L)-02
4AT(L)-01 A
4AT(L)-01 B
TWISTED WIRE
P
V
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
C26
C15
C25
OrB
VW
Sb
7
5
9
SPORT MODE & MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
8
6
10
BY
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02•03]
TO POWER SUPPLY ROUTING
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
W
GY
B: B55 TCM
B12
VR
4AT(L)-02
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(LHU)-04] [E/G(LND)-04]
W
VR
BL
BL
1
10
12
13
B40
DATA LINK CONNECTOR
GY
VR
BL
7
12
8
B79
CHECK CONNECTOR

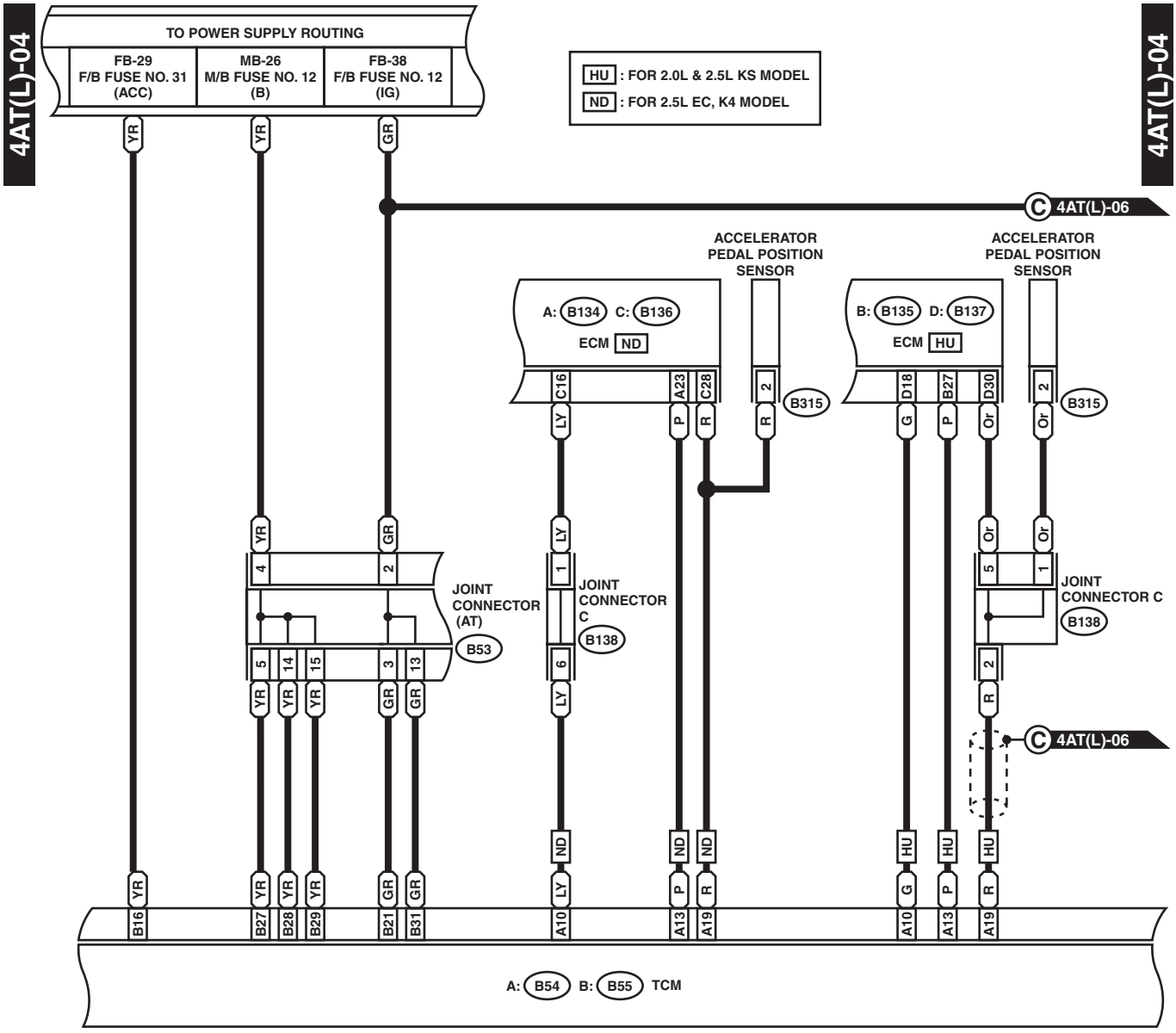

B116
B79 (GRAY)
B40
C: B281
B: B55
A: i84

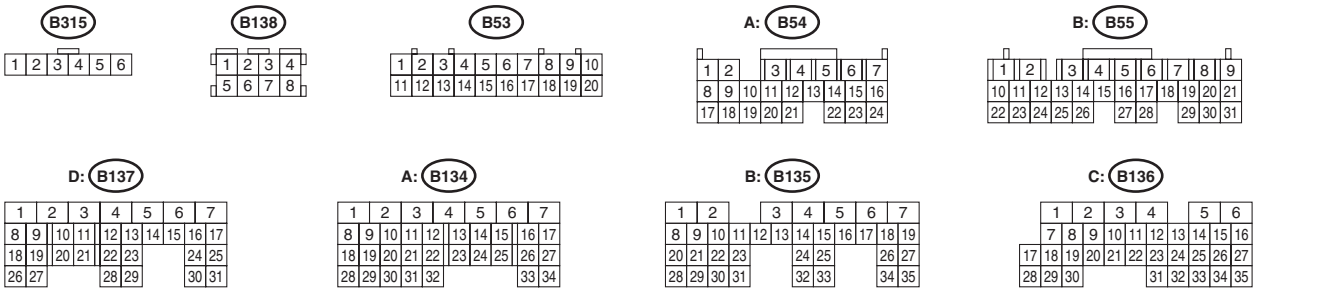
WI-03955


4AT(L)-03
B301
ABS CONTROL MODULE
B310
VDC CONTROL MODULE
B: B280
BODY INTEGRATED UNIT
B310
VDC CONTROL MODULE
4AT(L)-03
TWISTED WIRE
CAN JOINT CONNECTOR (INT)
B352
CAN JOINT CONNECTOR (STR)
CAN JOINT CONNECTOR (TCM)
B355
B234
B231
STEERING ANGLE SENSOR
HU : FOR 2.0L & 2.5L KS MODEL
ND : FOR 2.5L EC, K4 MODEL
VDC : WITH VDC
ABS : WITHOUT VDC
A: B54 TCM
C: B136 D: B137 ECM
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]

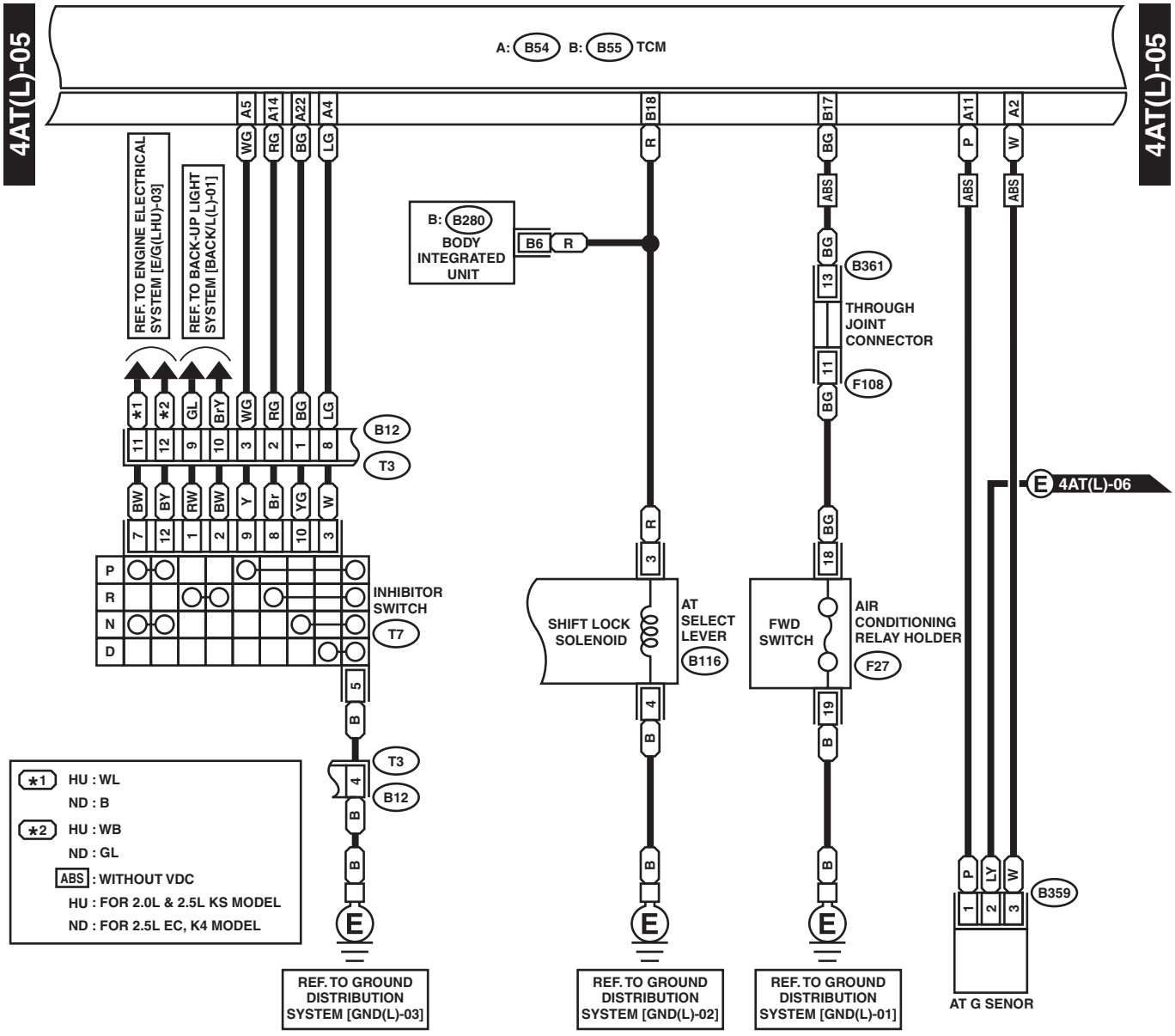

B231
B234
B352
B355
A: B54
B301
B: B280
D: B137
C: B136
B310

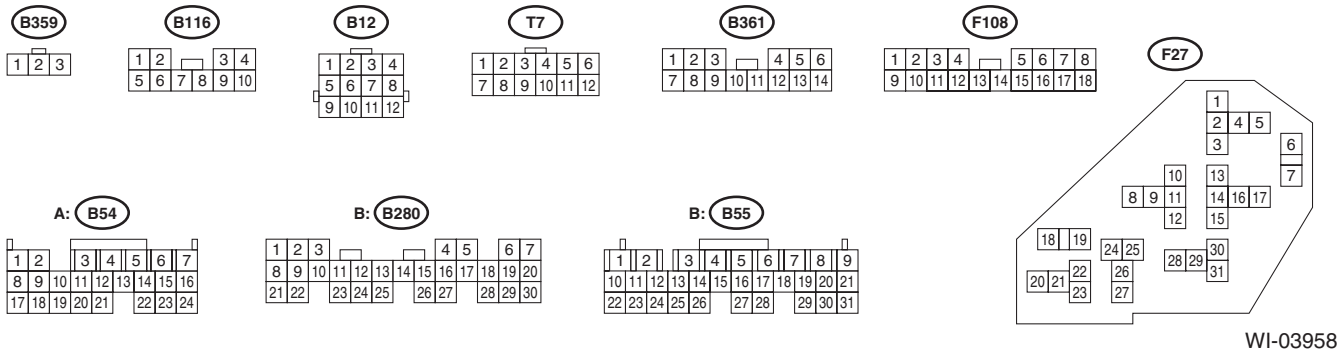
WI-03956


4AT(L)-04
TO POWER SUPPLY ROUTING
FB-29
F/B FUSE NO. 31
(ACC)
MB-26
M/B FUSE NO. 12
(B)
FB-38
F/B FUSE NO. 12
(IG)
HU : FOR 2.0L & 2.5L KS MODEL
ND : FOR 2.5L EC, K4 MODEL
4AT(L)-04
C 4AT(L)-06
ACCELERATOR PEDAL POSITION SENSOR
A: B134 C: B136
ECM ND
B: B135 D: B137
ECM HU
B315
JOINT CONNECTOR (AT)
B53
JOINT CONNECTOR C
B138
A: B54 B: B55 TCM

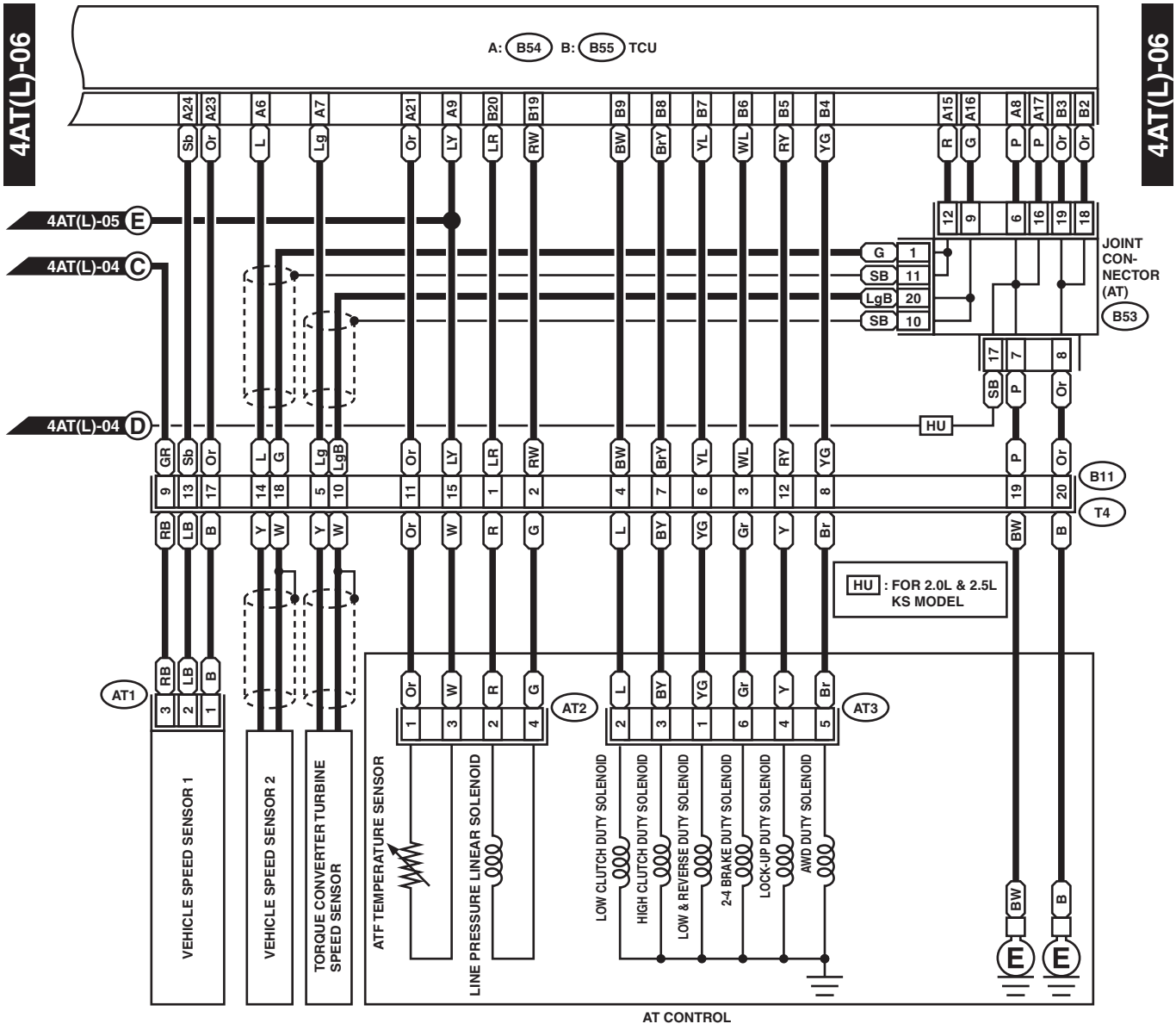

B315
B138
B53
A: B54
B: B55
D: B137
A: B134
B: B135
C: B136

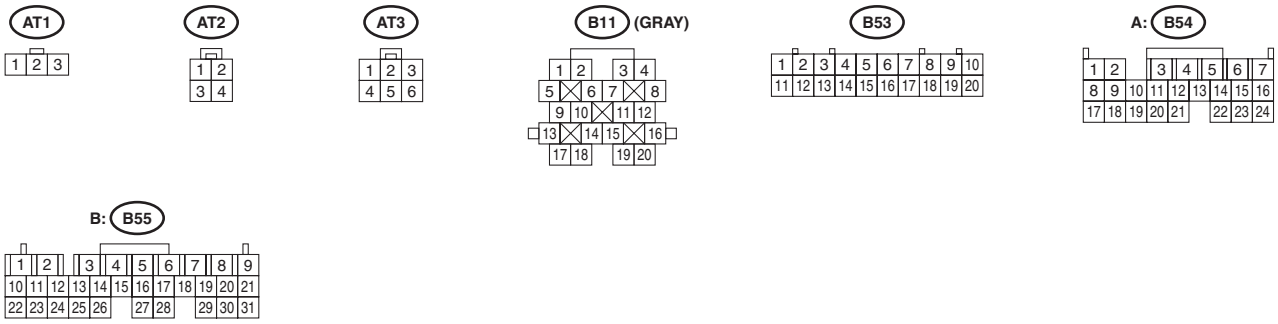
WI-03957


4AT(L)-05
4AT(L)-05
A: B54 B: B55 TCM
A5 A14 A22 A4
WG RG BG LG
B18 R
B17 BG
A11 P
A2 W
ABS
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(LHU)-03]
REF. TO BACK-UP LIGHT SYSTEM [BACK/L(L)-01]
B: B280
BODY INTEGRATED UNIT
B6 R
B361
13
THROUGH JOINT CONNECTOR
11
F108
BG
*1 *2 GL BrY WG RG BG LG
11 12 9 10 3 2 1 8
B12
T3
BW BY RW BW Y Br YG W
7 12 1 2 9 8 10 3
P
R
N
D
INHIBITOR SWITCH
T7
5
B
T3
4
B12
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
3
R
SHIFT LOCK SOLENOID
AT SELECT LEVER
B116
4
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
18
BG
FWD SWITCH
AIR CONDITIONING RELAY HOLDER
F27
19
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-01]
E 4AT(L)-06
P LY W
1 2 3
B359
AT G SENOR
*1 HU : WL
ND : B
*2 HU : WB
ND : GL
ABS : WITHOUT VDC
HU : FOR 2.0L & 2.5L KS MODEL
ND : FOR 2.5L EC, K4 MODEL


B359
B116
B12
T7
B361
F108
F27
A: B54
B: B280
B: B55

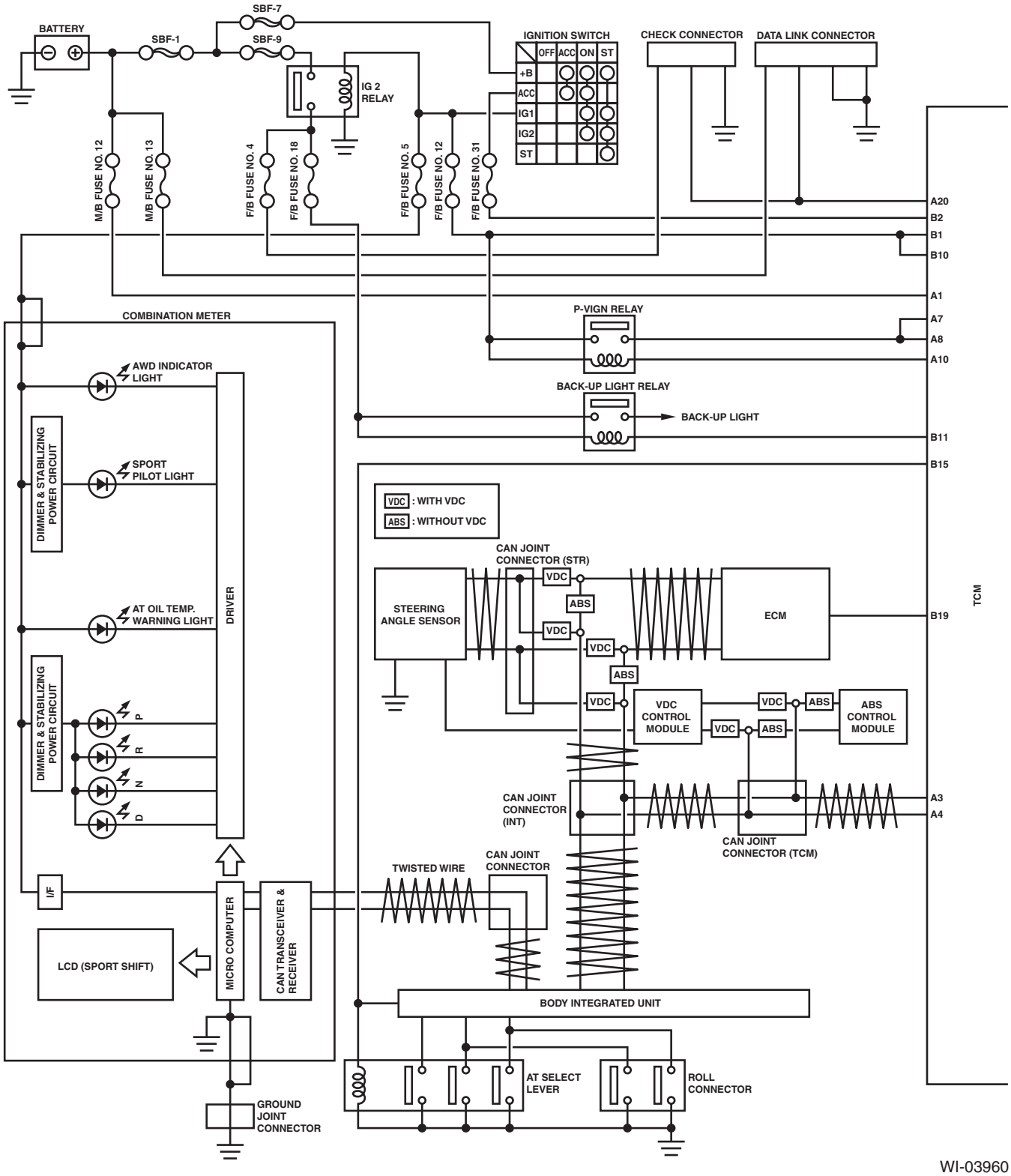
WI-03958


4AT(L)-06
4AT(L)-06
A: B54 B: B55 TCU
4AT(L)-05 E
4AT(L)-04 C
4AT(L)-04 D
JOINT CON-NECTOR (AT)
B53
B11
T4
HU
HU : FOR 2.0L & 2.5L KS MODEL
AT1
AT2
AT3
VEHICLE SPEED SENSOR 1
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
ATF TEMPERATURE SENSOR
LINE PRESSURE LINEAR SOLENOID
LOW CLUTCH DUTY SOLENOID
HIGH CLUTCH DUTY SOLENOID
LOW & REVERSE DUTY SOLENOID
2-4 BRAKE DUTY SOLENOID
LOCK-UP DUTY SOLENOID
AWD DUTY SOLENOID
AT CONTROL

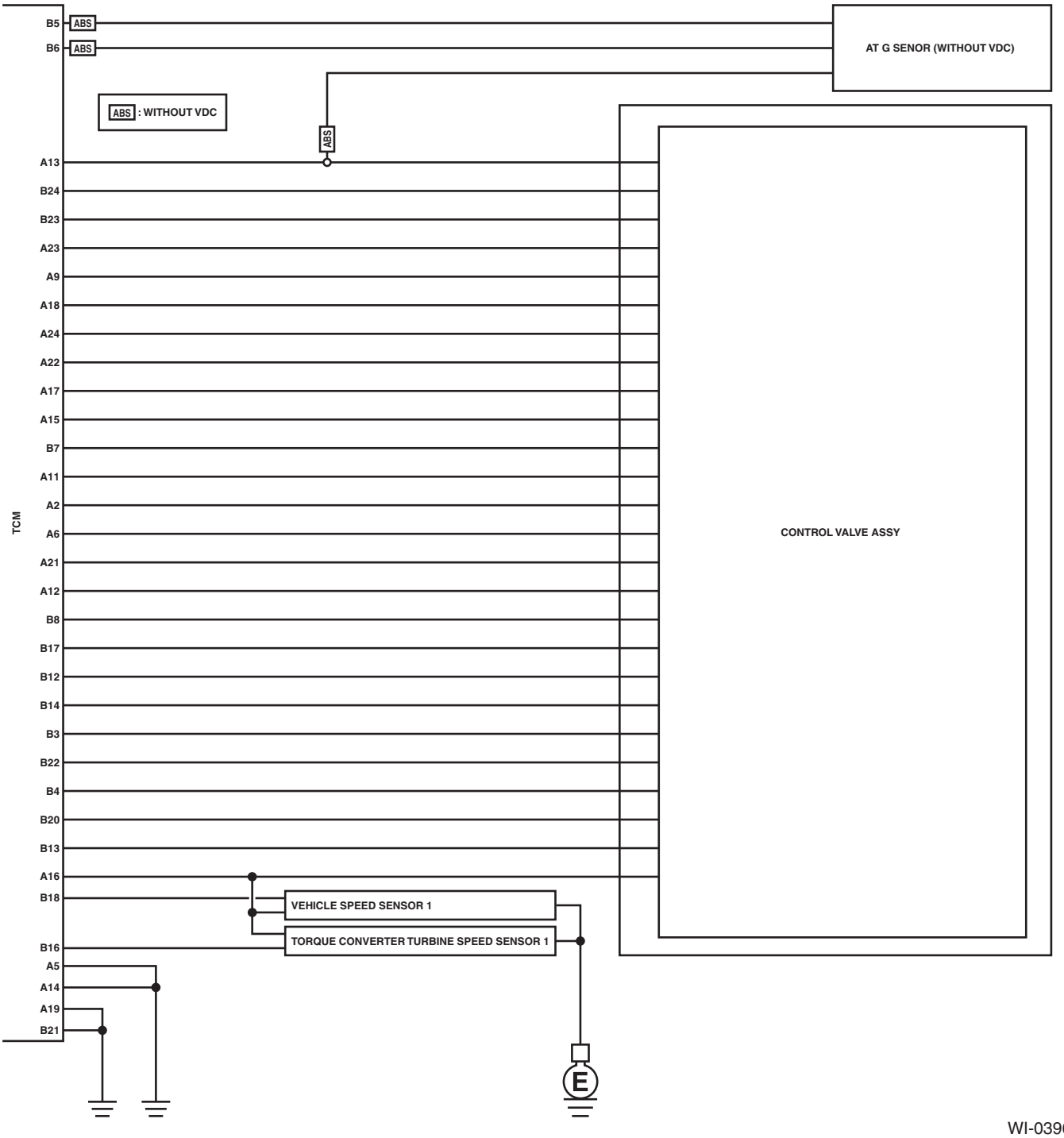

AT1
AT2
AT3
B11 (GRAY)
B53
A: B54
B: B55

WI-03959

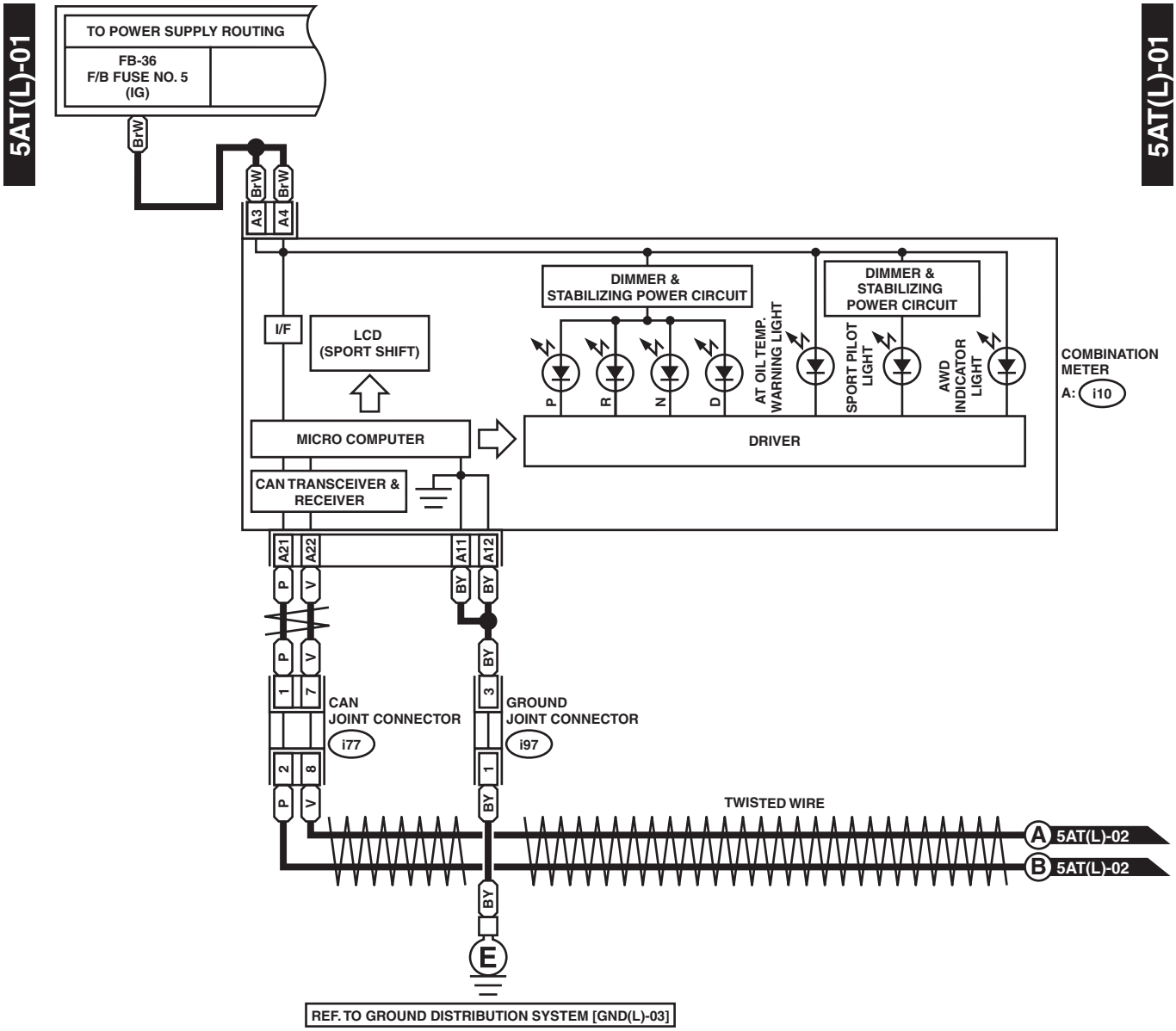
2. LHD 5AT MODEL

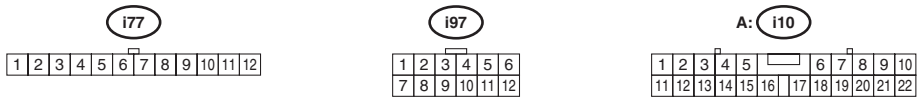


WI-03960

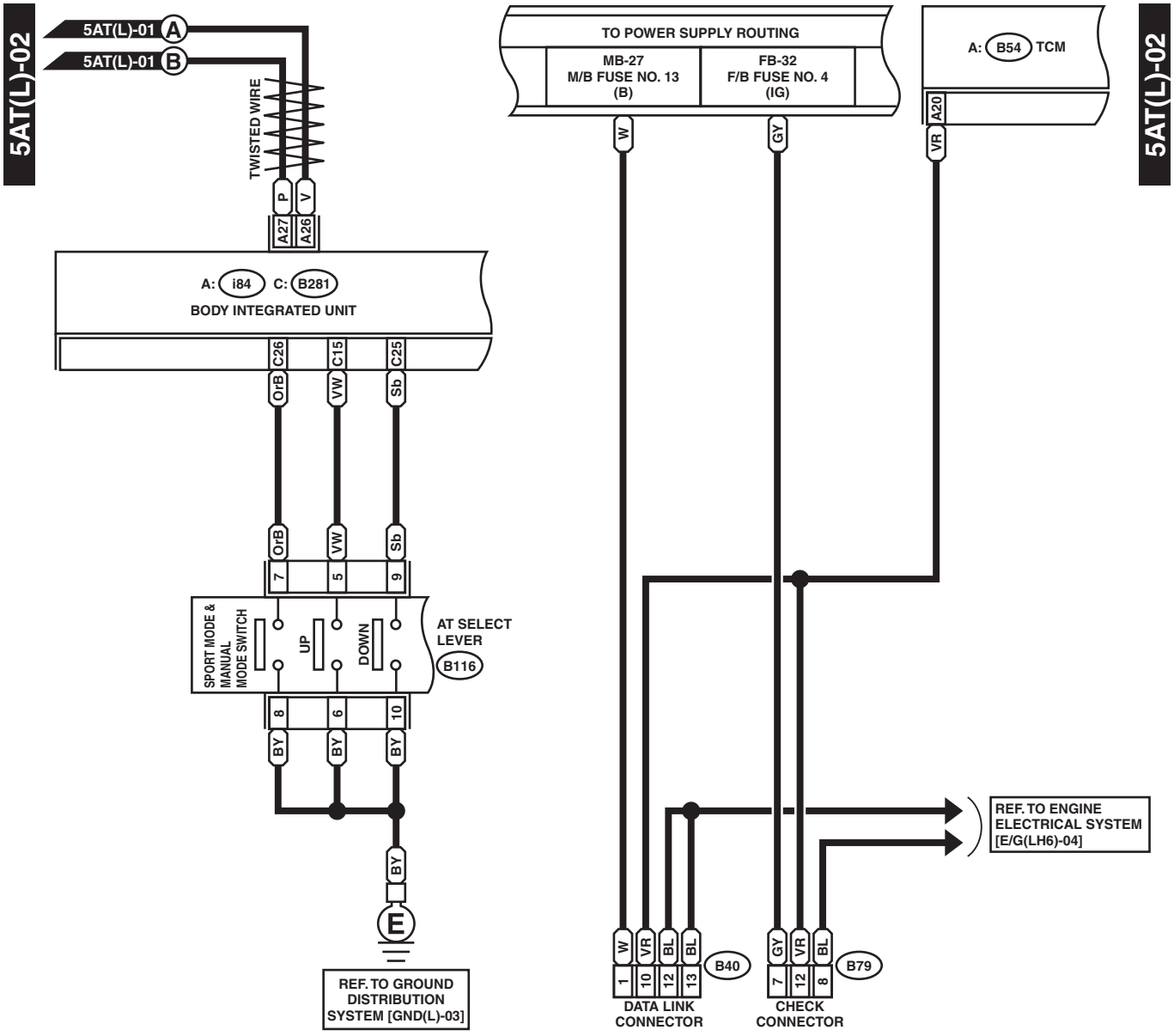

B5
ABS
B6
ABS
AT G SENOR (WITHOUT VDC)
ABS : WITHOUT VDC
ABS
A13
B24
B23
A23
A9
A18
A24
A22
A17
A15
B7
A11
A2
A6
A21
A12
B8
B17
B12
B14
B3
B22
B4
B20
B13
A16
B18
B16
A5
A14
A19
B21
TCM
CONTROL VALVE ASSY
VEHICLE SPEED SENSOR 1
TORQUE CONVERTER TURBINE SPEED SENSOR 1
E

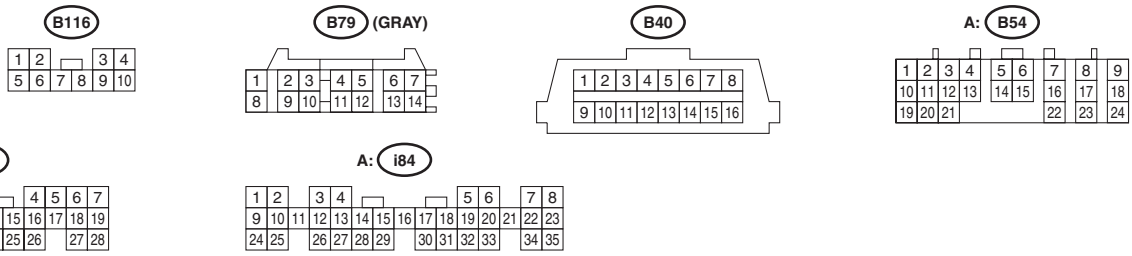
WI-03961


5AT(L)-01
5AT(L)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
Br/W
A3
A4
I/F
LCD
(SPORT SHIFT)
DIMMER &
STABILIZING POWER CIRCUIT
DIMMER &
STABILIZING
POWER CIRCUIT
P
R
N
D
AT OIL TEMP.
WARNING LIGHT
SPORT PILOT
LIGHT
AWD
INDICATOR
LIGHT
COMBINATION
METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER &
RECEIVER
A21
A22
A11
A12
P
V
BY
1
7
3
CAN
JOINT CONNECTOR
i77
GROUND
JOINT CONNECTOR
i97
2
8
TWISTED WIRE
A 5AT(L)-02
B 5AT(L)-02
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

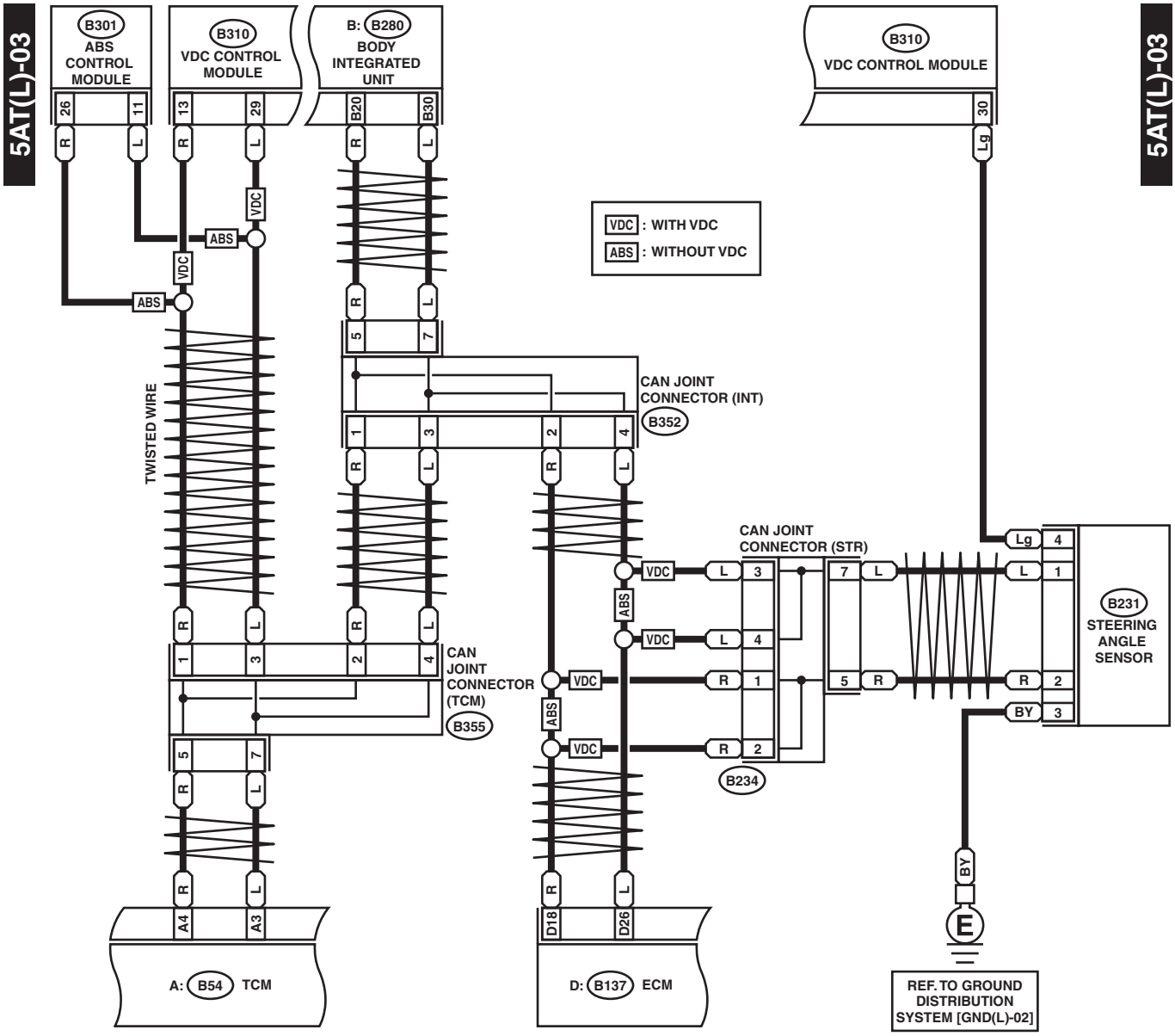

i77
1 2 3 4 5 6 7 8 9 10 11 12
i97
1 2 3 4 5 6
7 8 9 10 11 12
A: i10
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20 21 22

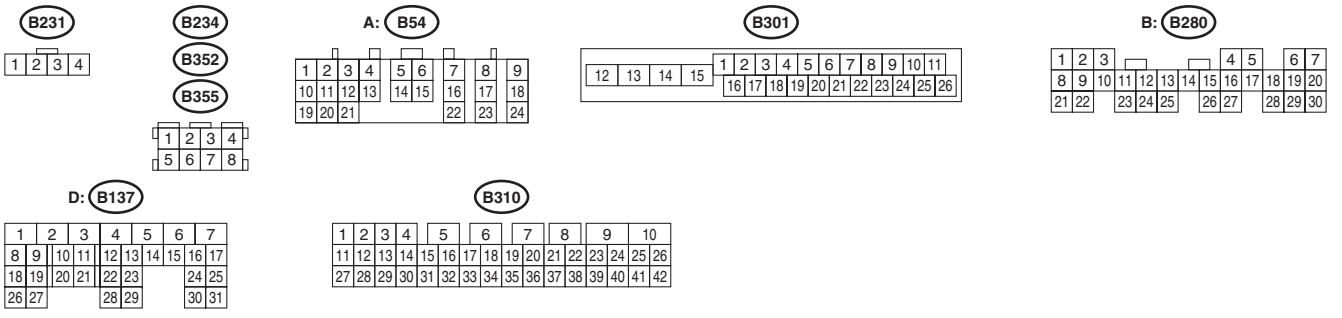
WI-03962


5AT(L)-02
5AT(L)-01 A
5AT(L)-01 B
TWISTED WIRE
P
V
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
C26
C15
C25
OrB
VW
Sb
7
5
9
SPORT MODE & MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
8
6
10
BY
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
TO POWER SUPPLY ROUTING
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
W
GY
A: B54 TCM
A20
VR
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(LH6)-04]
W
VR
BL
BL
1
10
12
13
B40
DATA LINK CONNECTOR
GY
VR
BL
7
12
8
B79
CHECK CONNECTOR

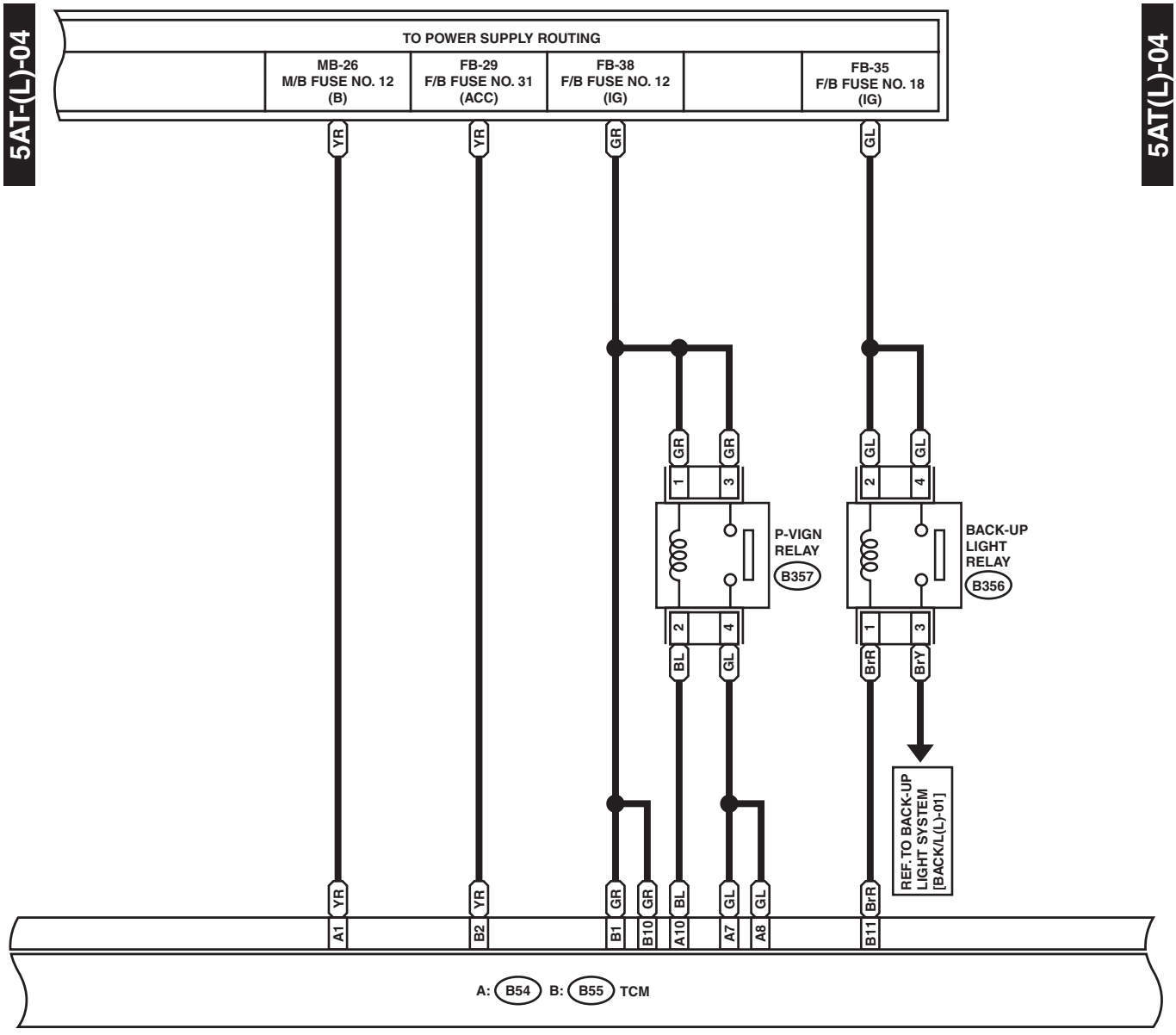

B116
B79 (GRAY)
B40
A: B54
C: B281
A: i84

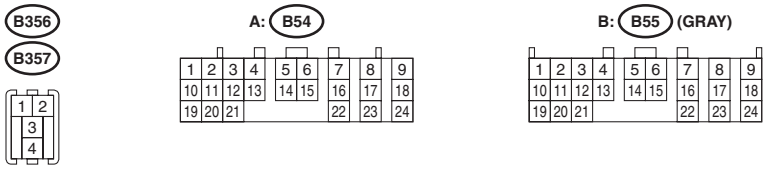
WI-03963


5AT(L)-03
B301
ABS CONTROL MODULE
B310
VDC CONTROL MODULE
B: B280
BODY INTEGRATED UNIT
B310
VDC CONTROL MODULE
5AT(L)-03
VDC : WITH VDC
ABS : WITHOUT VDC
TWISTED WIRE
CAN JOINT CONNECTOR (INT)
B352
CAN JOINT CONNECTOR (STR)
CAN JOINT CONNECTOR (TCM)
B355
B234
B231
STEERING ANGLE SENSOR
A: B54 TCM
D: B137 ECM
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]

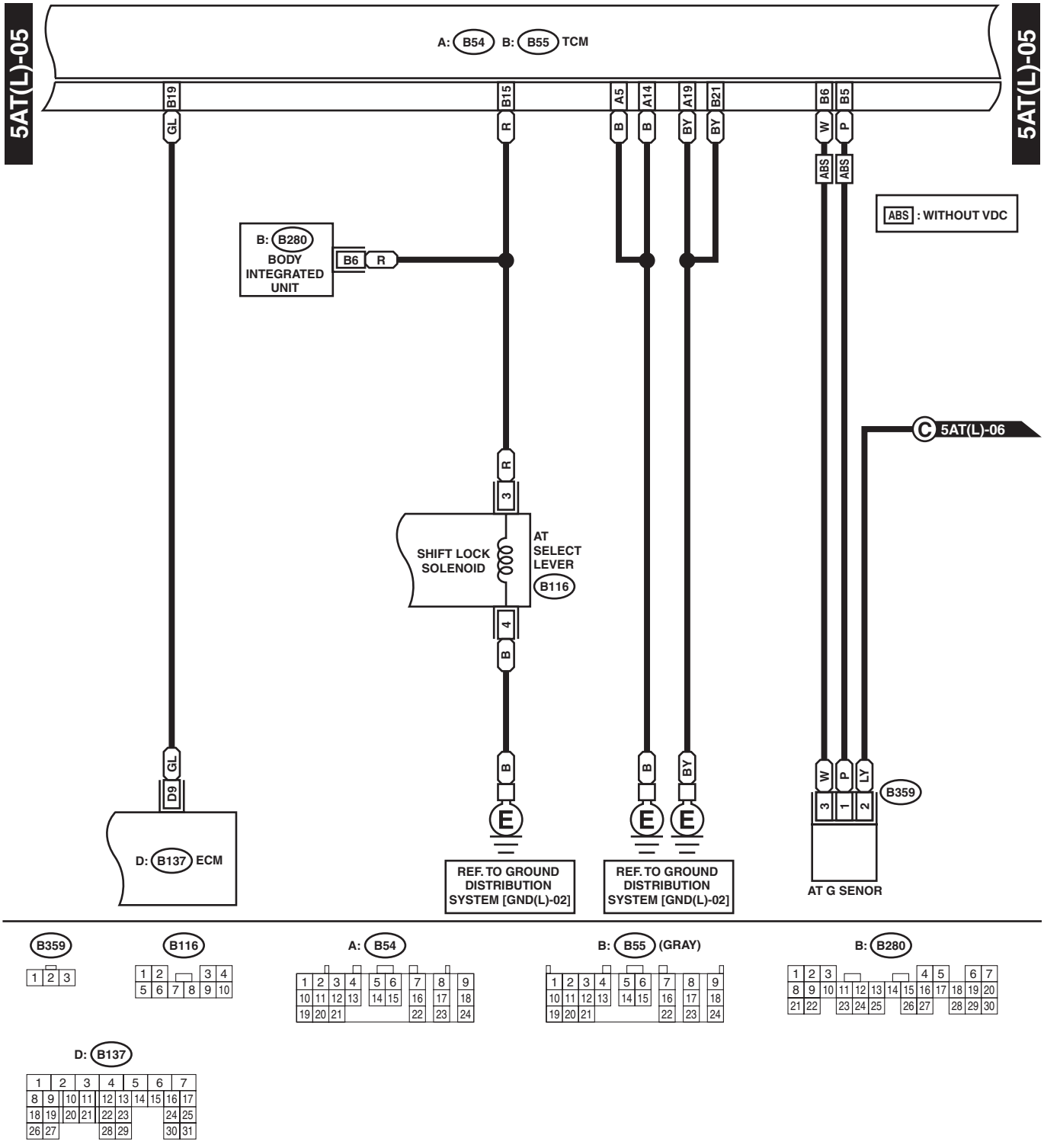

B231
B234
B352
B355
A: B54
B301
B: B280
D: B137
B310

WI-03964

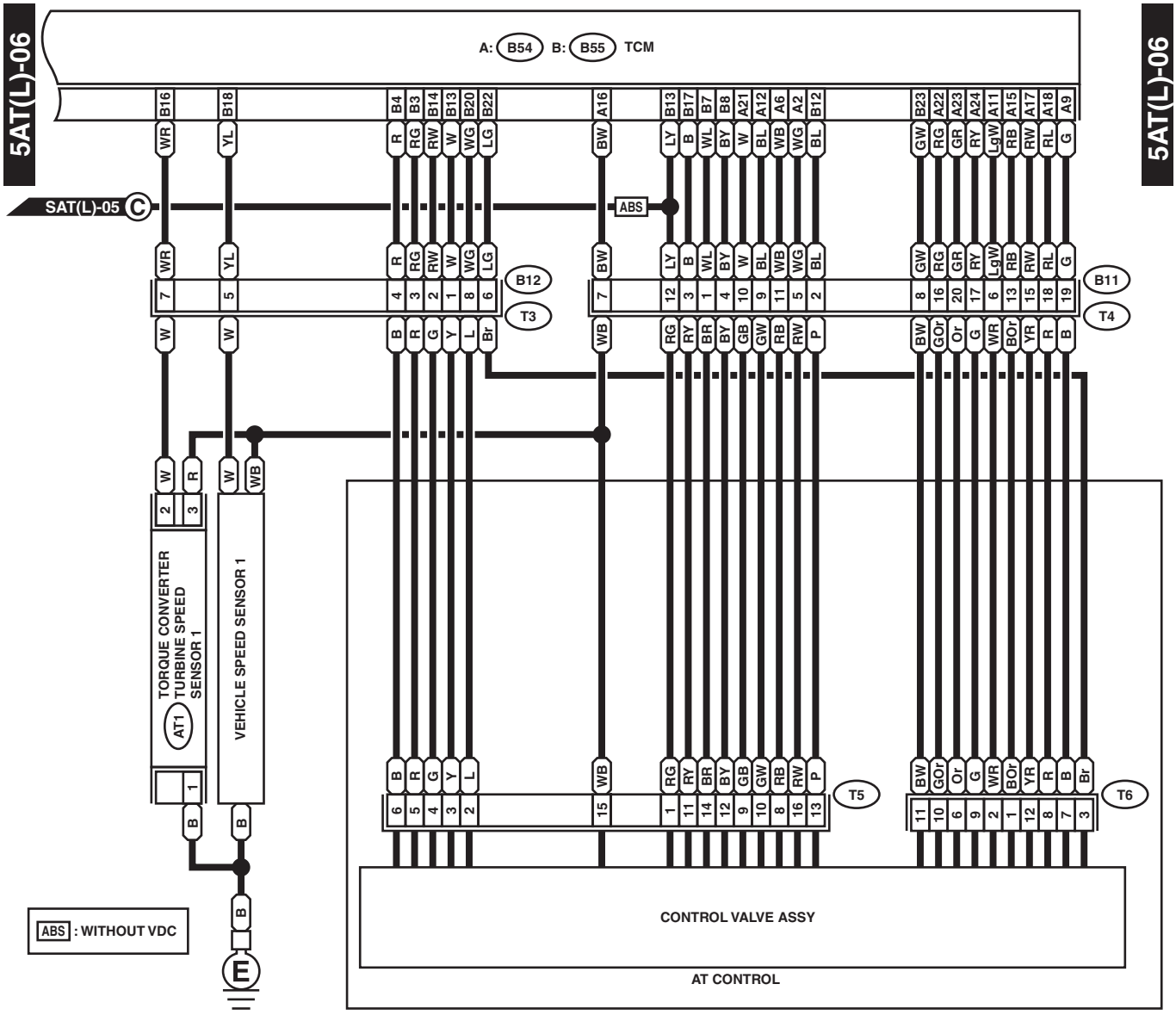

5AT-(L)-04
5AT(L)-04
TO POWER SUPPLY ROUTING
MB-26
M/B FUSE NO. 12
(B)
FB-29
F/B FUSE NO. 31
(ACC)
FB-38
F/B FUSE NO. 12
(IG)
FB-35
F/B FUSE NO. 18
(IG)
YR
YR
GR
GL
P-VIGN
RELAY
B357
BACK-UP
LIGHT
RELAY
B356
BL
GL
BrR
BrY
REF. TO BACK-UP
LIGHT SYSTEM
[BACK/L(L)-01]
A1
B2
B1
B10
A10
A7
A8
B11
A: B54 B: B55 TCM

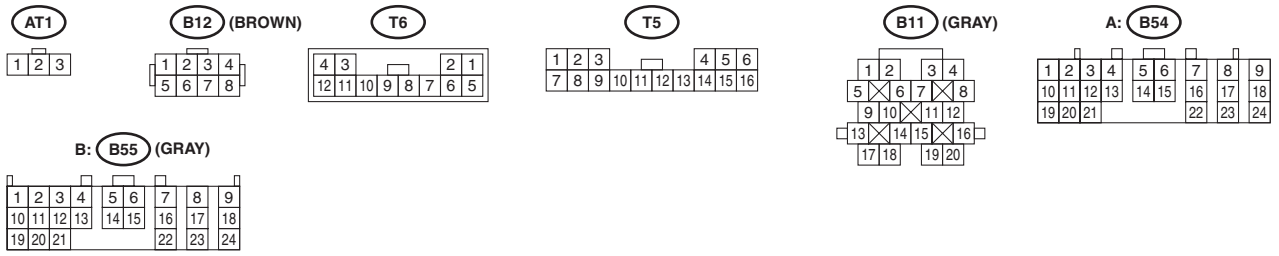

B356
B357
A: B54
B: B55 (GRAY)

WI-03965


5AT(L)-05
5AT(L)-05
A: B54 B: B55 TCM
B19
B15
A5
A14
A19
B21
B6
B5
GL
R
B
B
BY
BY
W
P
ABS
ABS
ABS : WITHOUT VDC
B: B280
BODY INTEGRATED UNIT
B6
R
C 5AT(L)-06
R
3
SHIFT LOCK SOLENOID
AT SELECT LEVER
B116
4
B
GL
D9
B
B
BY
W
P
LY
B359
3
1
2
D: B137 ECM
E
E
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
AT G SENOR
B359
B116
A: B54
B: B55 (GRAY)
B: B280
D: B137

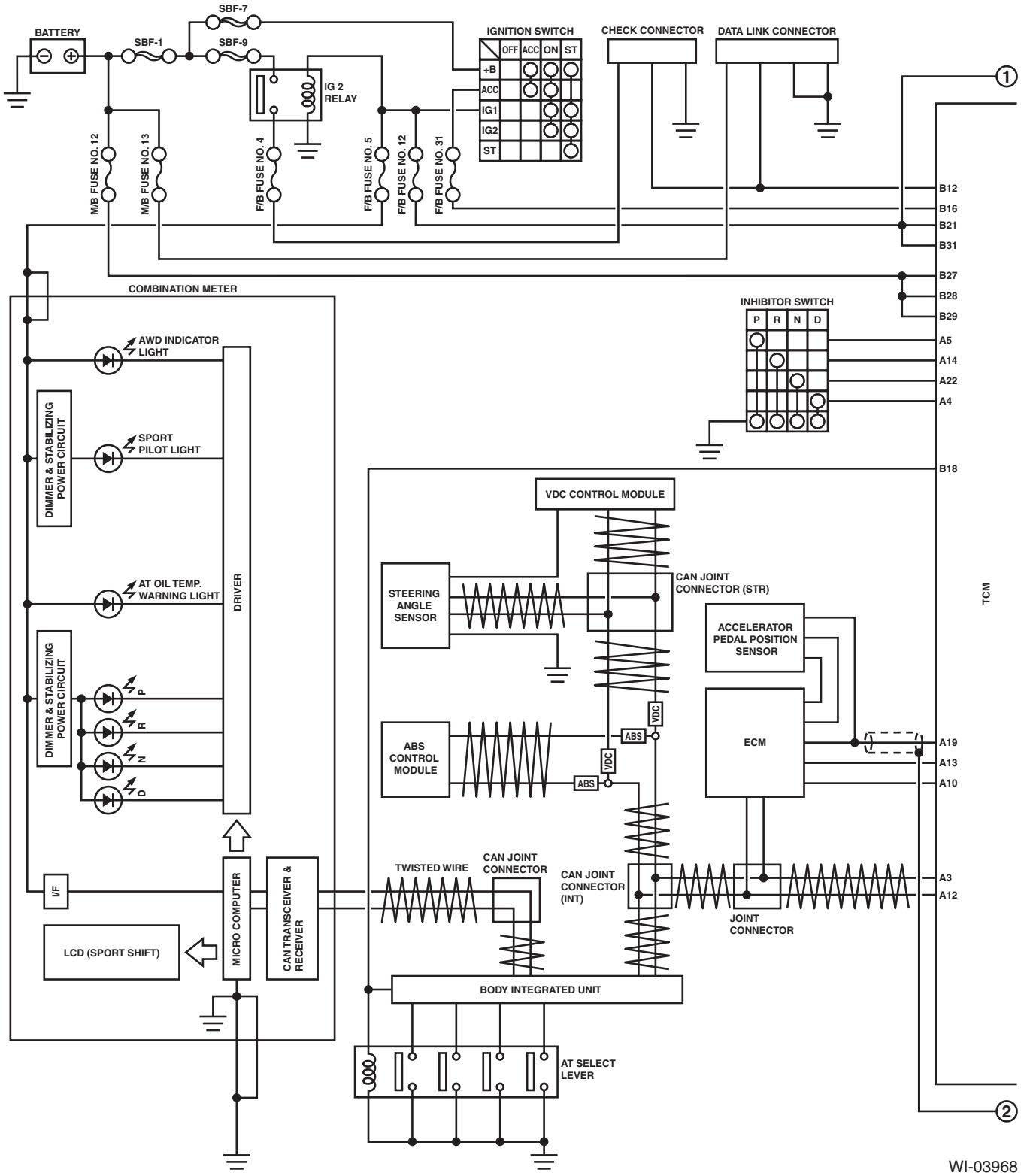
WI-03966

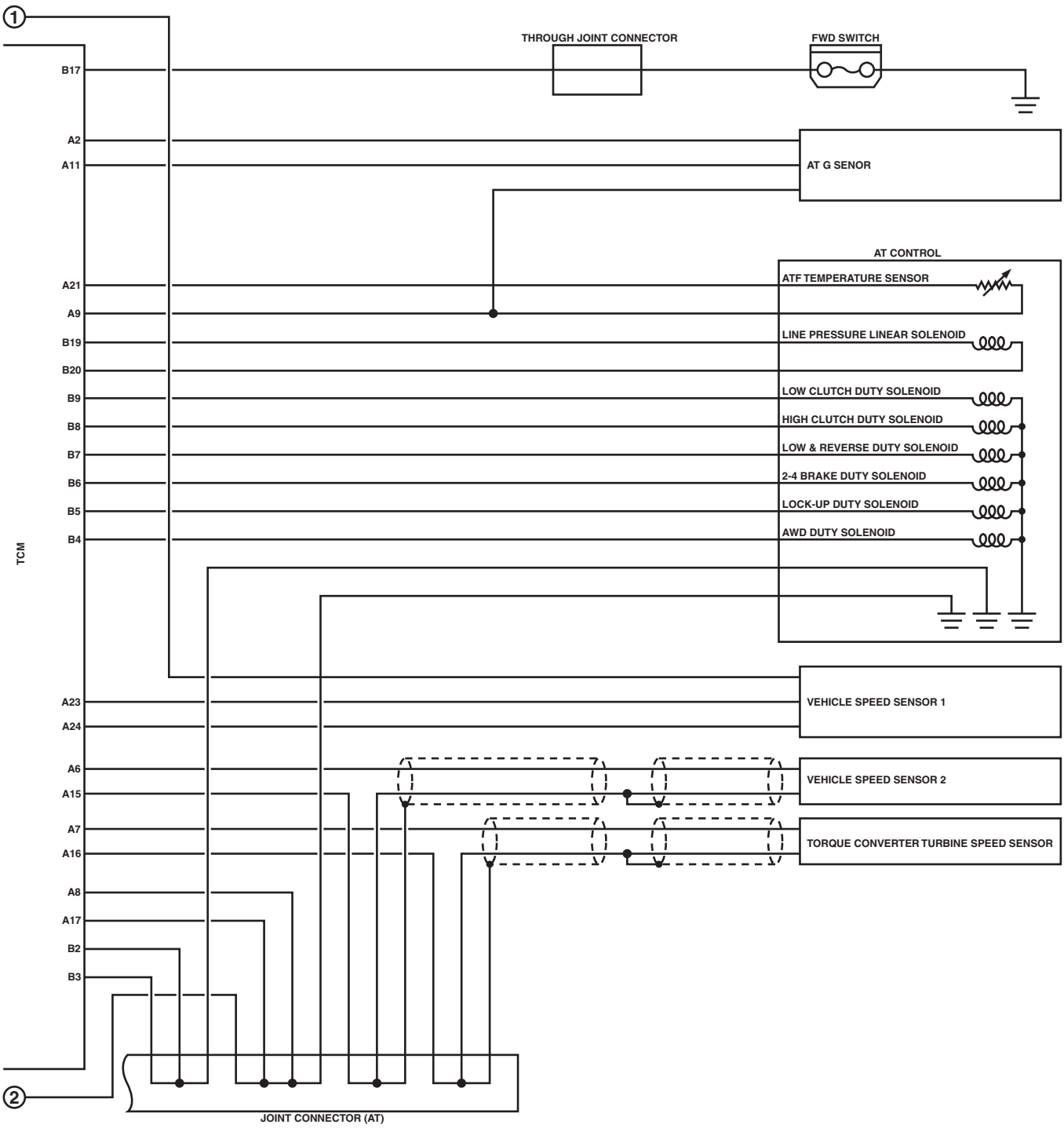

5AT(L)-06
5AT(L)-06
A: B54 B: B55 TCM
SAT(L)-05 C
ABS
B12
T3
B11
T4
T5
T6
TORQUE CONVERTER TURBINE SPEED SENSOR 1
AT1
VEHICLE SPEED SENSOR 1
CONTROL VALVE ASSY
AT CONTROL
ABS : WITHOUT VDC


AT1
B12 (BROWN)
T6
T5
B11 (GRAY)
A: B54
B: B55 (GRAY)

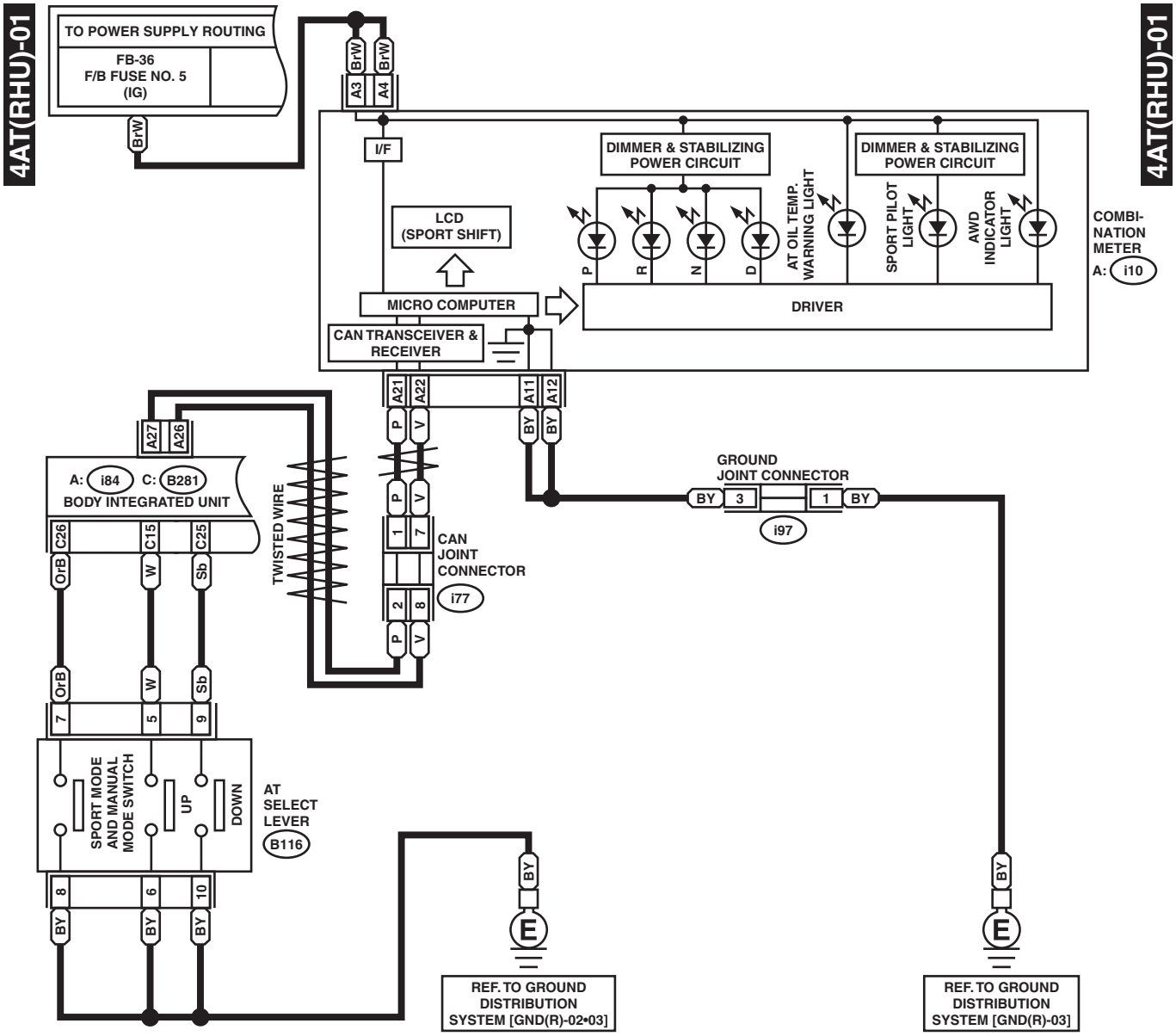
WI-03967

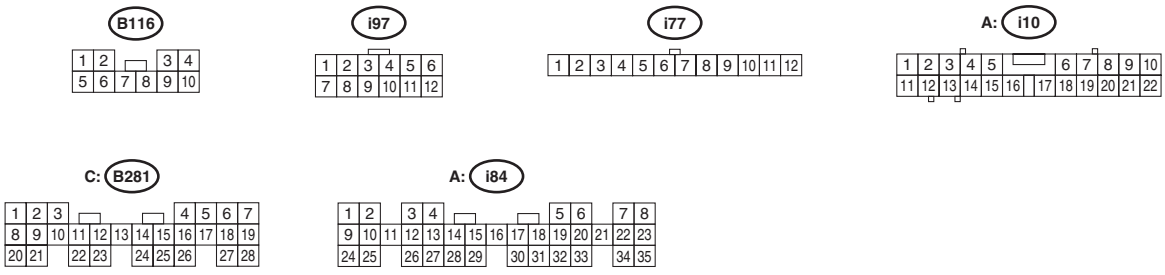
3. RHD 4AT MODEL (2.0 L NON-TURBO MODEL AND 2.5 L KA MODEL)



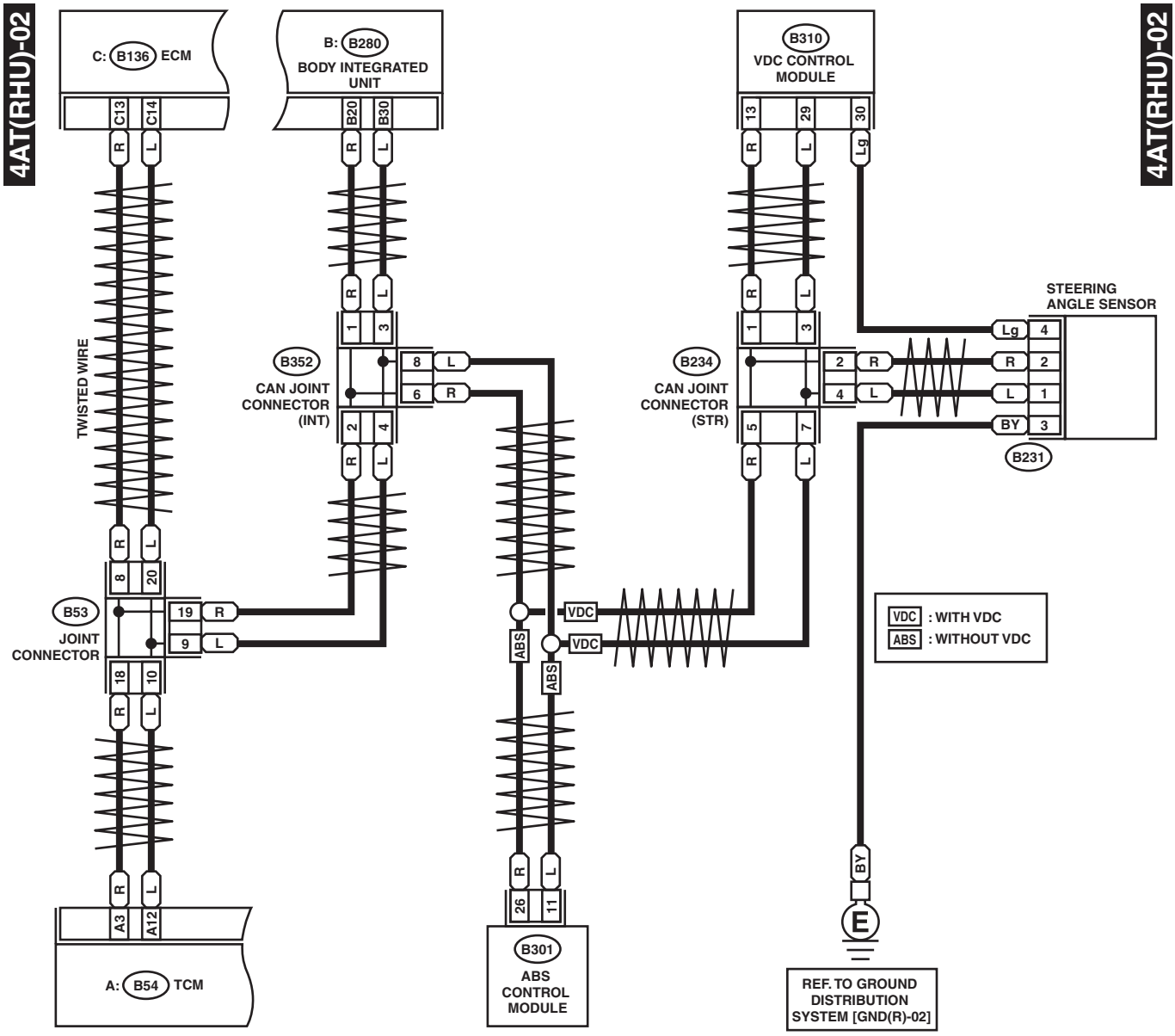

①
THROUGH JOINT CONNECTOR
FWD SWITCH
B17
A2
A11
AT G SENOR
AT CONTROL
A21
ATF TEMPERATURE SENSOR
A9
B19
LINE PRESSURE LINEAR SOLENOID
B20
B9
LOW CLUTCH DUTY SOLENOID
B8
HIGH CLUTCH DUTY SOLENOID
B7
LOW & REVERSE DUTY SOLENOID
B6
2-4 BRAKE DUTY SOLENOID
B5
LOCK-UP DUTY SOLENOID
B4
AWD DUTY SOLENOID
TCM
A23
VEHICLE SPEED SENSOR 1
A24
A6
VEHICLE SPEED SENSOR 2
A15
A7
TORQUE CONVERTER TURBINE SPEED SENSOR
A16
A8
A17
B2
B3
②
JOINT CONNECTOR (AT)

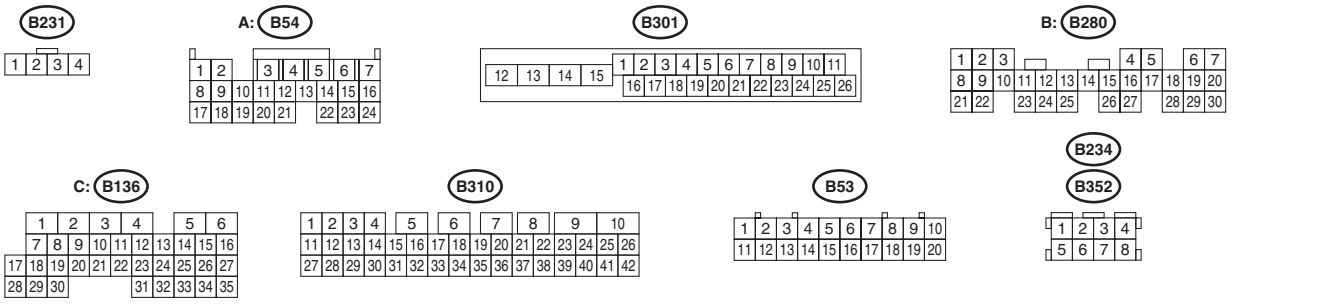
WI-03969


4AT(RHU)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
I/F
DIMMER & STABILIZING POWER CIRCUIT
DIMMER & STABILIZING POWER CIRCUIT
LCD (SPORT SHIFT)
P
R
N
D
AT OIL TEMP. WARNING LIGHT
SPORT PILOT LIGHT
AWD INDICATOR LIGHT
COMBI-NATION METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
BY
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
TWISTED WIRE
GROUND JOINT CONNECTOR
BY 3 1 BY
i97
C26
C15
C25
OrB
W
Sb
CAN JOINT CONNECTOR
i77
7
5
9
SPORT MODE AND MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
8
6
10
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02•03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
4AT(RHU)-01

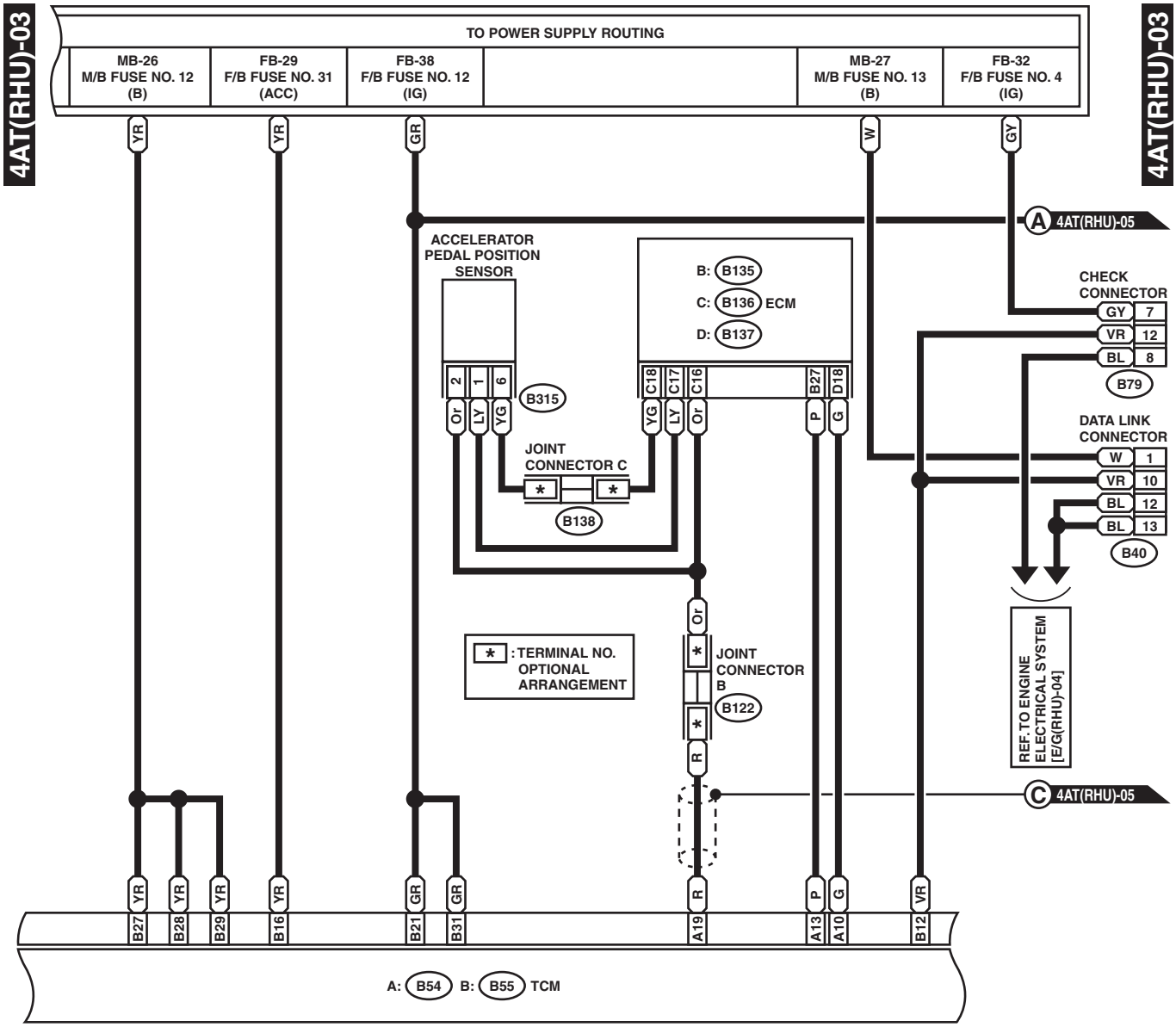

B116
i97
i77
A: i10
C: B281
A: i84

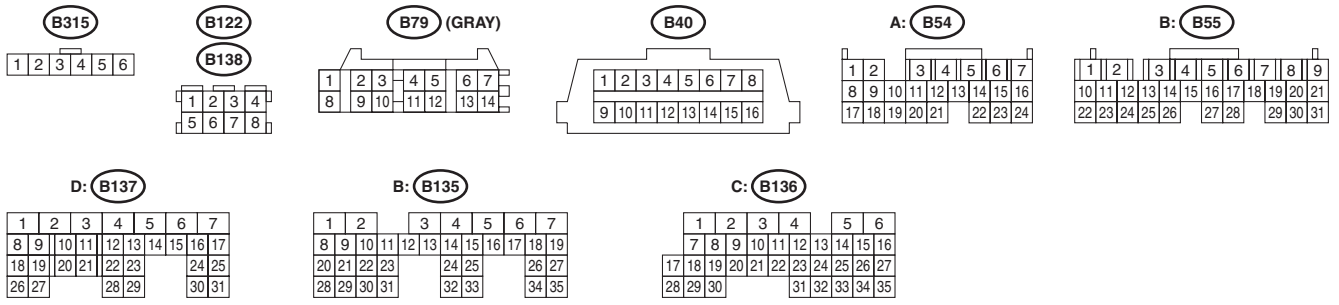
WI-03970


4AT(RHU)-02
4AT(RHU)-02
C: B136 ECM
B: B280 BODY INTEGRATED UNIT
B310 VDC CONTROL MODULE
C13
C14
B20
B30
13
29
30
TWISTED WIRE
B352 CAN JOINT CONNECTOR (INT)
B234 CAN JOINT CONNECTOR (STR)
STEERING ANGLE SENSOR
Lg
R
L
BY
B231
B53 JOINT CONNECTOR
VDC
ABS
VDC : WITH VDC
ABS : WITHOUT VDC
A3
A12
A: B54 TCM
B301 ABS CONTROL MODULE
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]

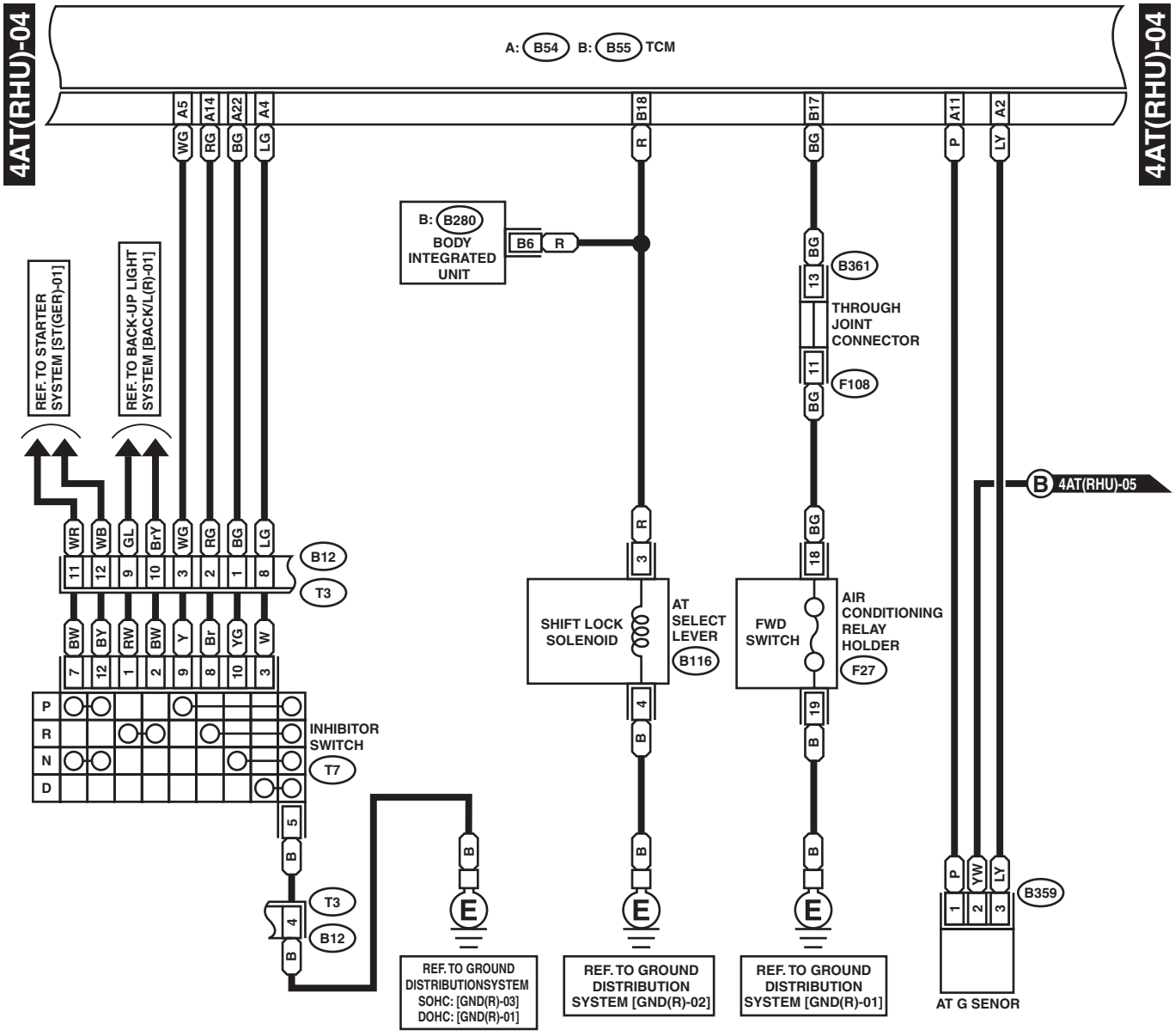

B231
A: B54
B301
B: B280
C: B136
B310
B53
B234
B352

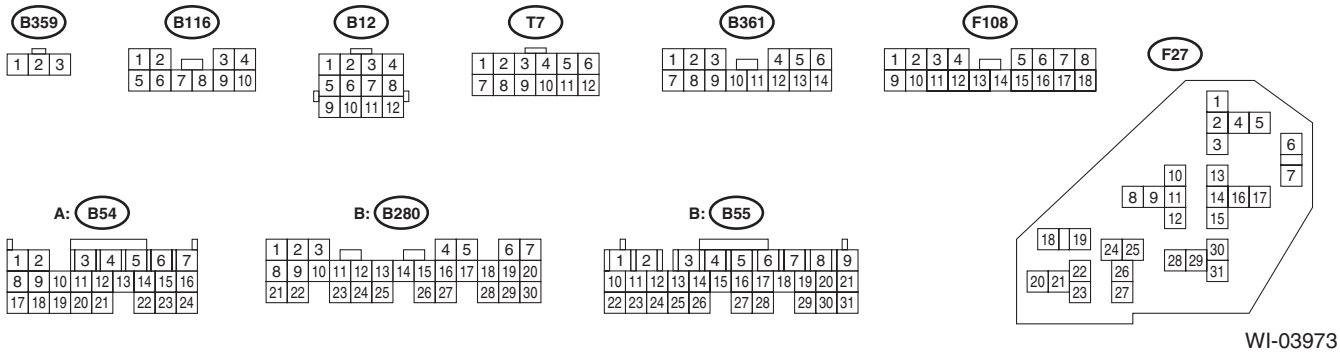
WI-03971


4AT(RHU)-03
4AT(RHU)-03
TO POWER SUPPLY ROUTING
MB-26 M/B FUSE NO. 12 (B)
FB-29 F/B FUSE NO. 31 (ACC)
FB-38 F/B FUSE NO. 12 (IG)
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
YR
YR
GR
W
GY
A 4AT(RHU)-05
ACCELERATOR PEDAL POSITION SENSOR
B315
B: B135
C: B136 ECM
D: B137
CHECK CONNECTOR
GY 7
VR 12
BL 8
B79
DATA LINK CONNECTOR
W 1
VR 10
BL 12
BL 13
B40
JOINT CONNECTOR C
B138
Or
LY
YG
P
G
JOINT CONNECTOR B
B122
R
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(RHU)-04]
C 4AT(RHU)-05
* : TERMINAL NO. OPTIONAL ARRANGEMENT
B27
B28
B29
B16
B21
B31
A19
A13
A10
B12
A: B54 B: B55 TCM

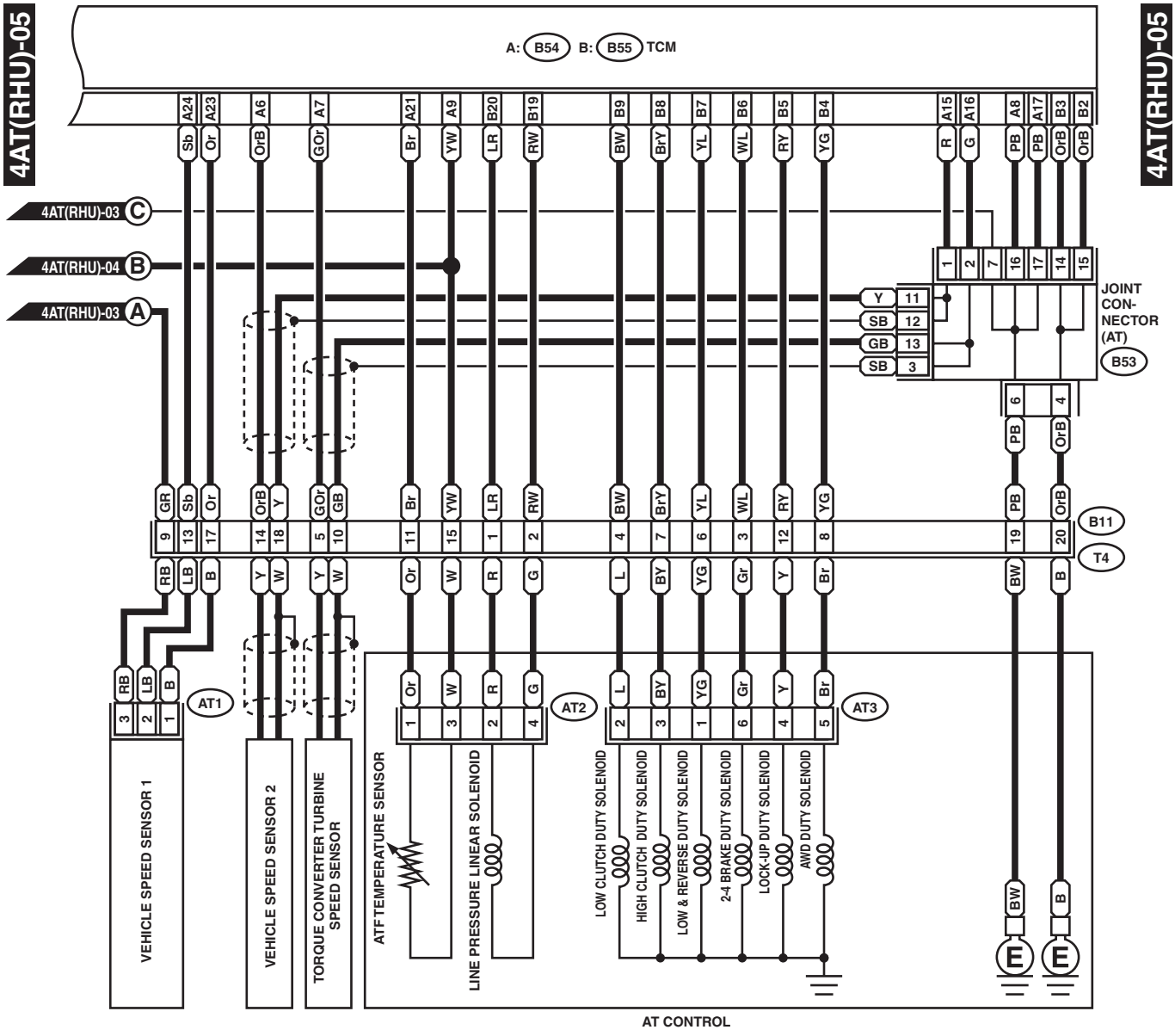

B315
B122
B138
B79 (GRAY)
B40
A: B54
B: B55
D: B137
B: B135
C: B136

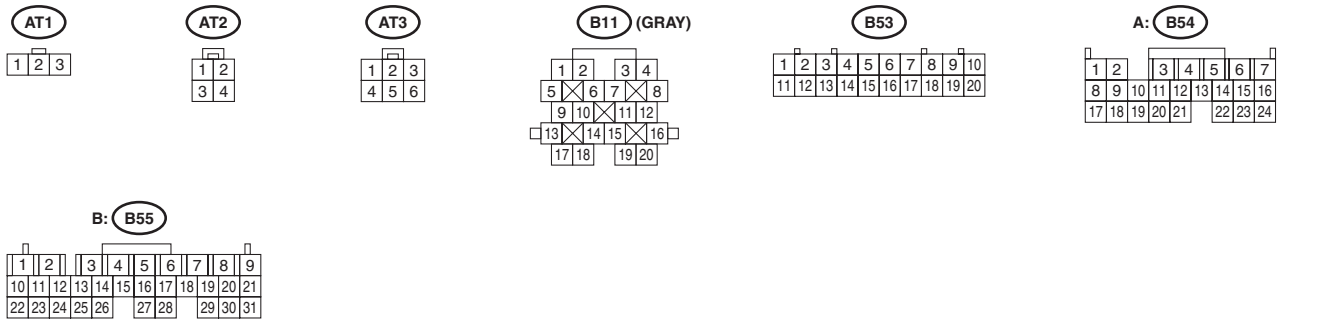
WI-03972


4AT(RHU)-04
4AT(RHU)-04
A: B54 B: B55 TCM
A5 A14 A22 A4
WG RG BG LG
B18 B17 A11 A2
R BG P LY
B: B280
BODY INTEGRATED UNIT
B6 R
B361
13 BG
THROUGH JOINT CONNECTOR
11 BG
F108
REF. TO STARTER SYSTEM [ST(GER)-01]
REF. TO BACK-UP LIGHT SYSTEM [BACK/L(R)-01]
B 4AT(RHU)-05
WR WB GL BrY WG RG BG LG
11 12 9 10 3 2 1 8
B12
T3
BW BY RW BW Y Br YG W
7 12 1 2 9 8 10 3
P
R
N
D
INHIBITOR SWITCH
T7
5
B
T3
4
B12
B
3 R
SHIFT LOCK SOLENOID
AT SELECT LEVER
B116
4
B
18 BG
FWD SWITCH
AIR CONDITIONING RELAY HOLDER
F27
19
B
P YW LY
1 2 3
B359
AT G SENOR
E
REF. TO GROUND DISTRIBUTIONSYSTEM SOHC: [GND(R)-03] DOHC: [GND(R)-01]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-01]


B359
B116
B12
T7
B361
F108
F27
A: B54
B: B280
B: B55

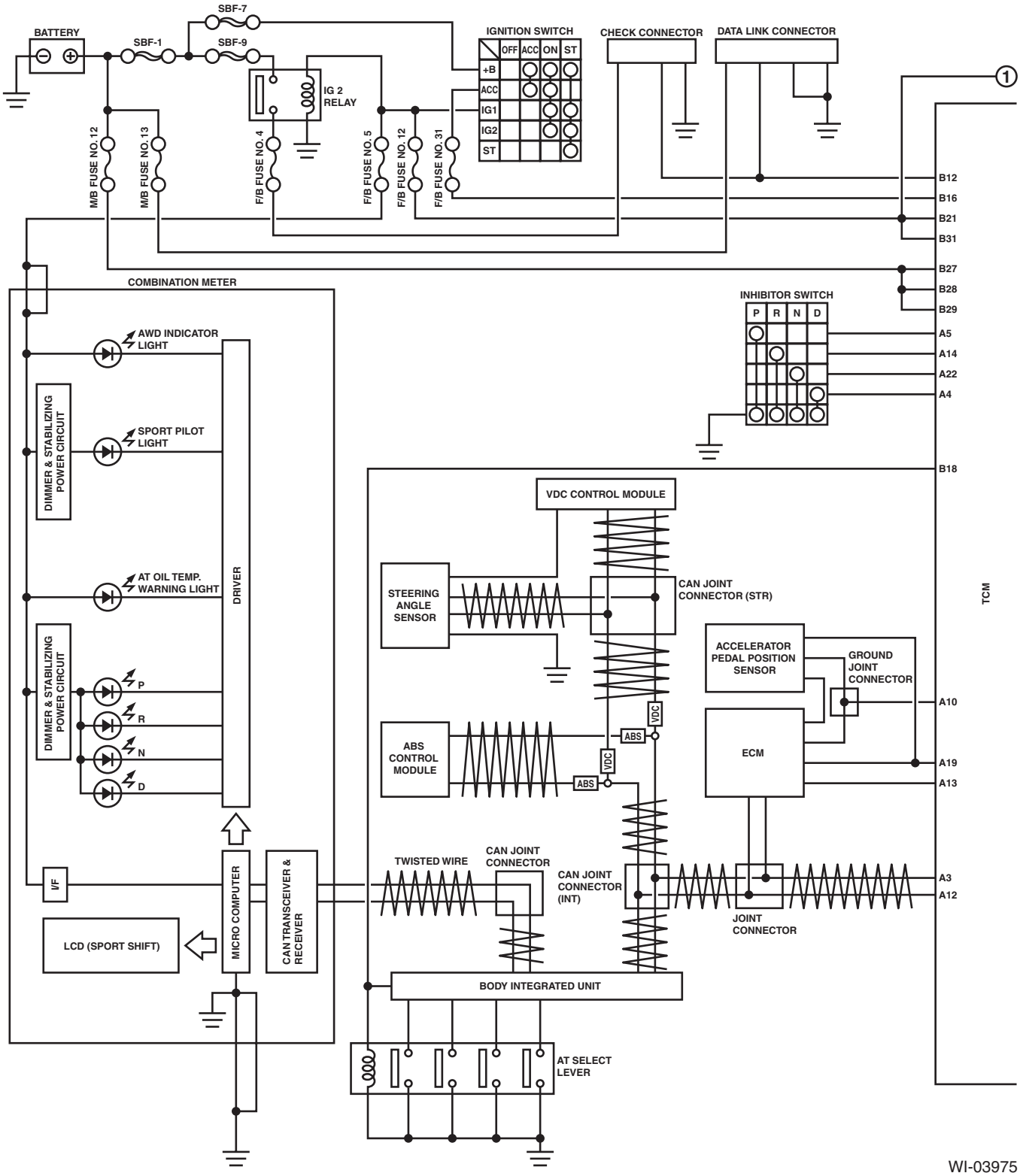
WI-03973

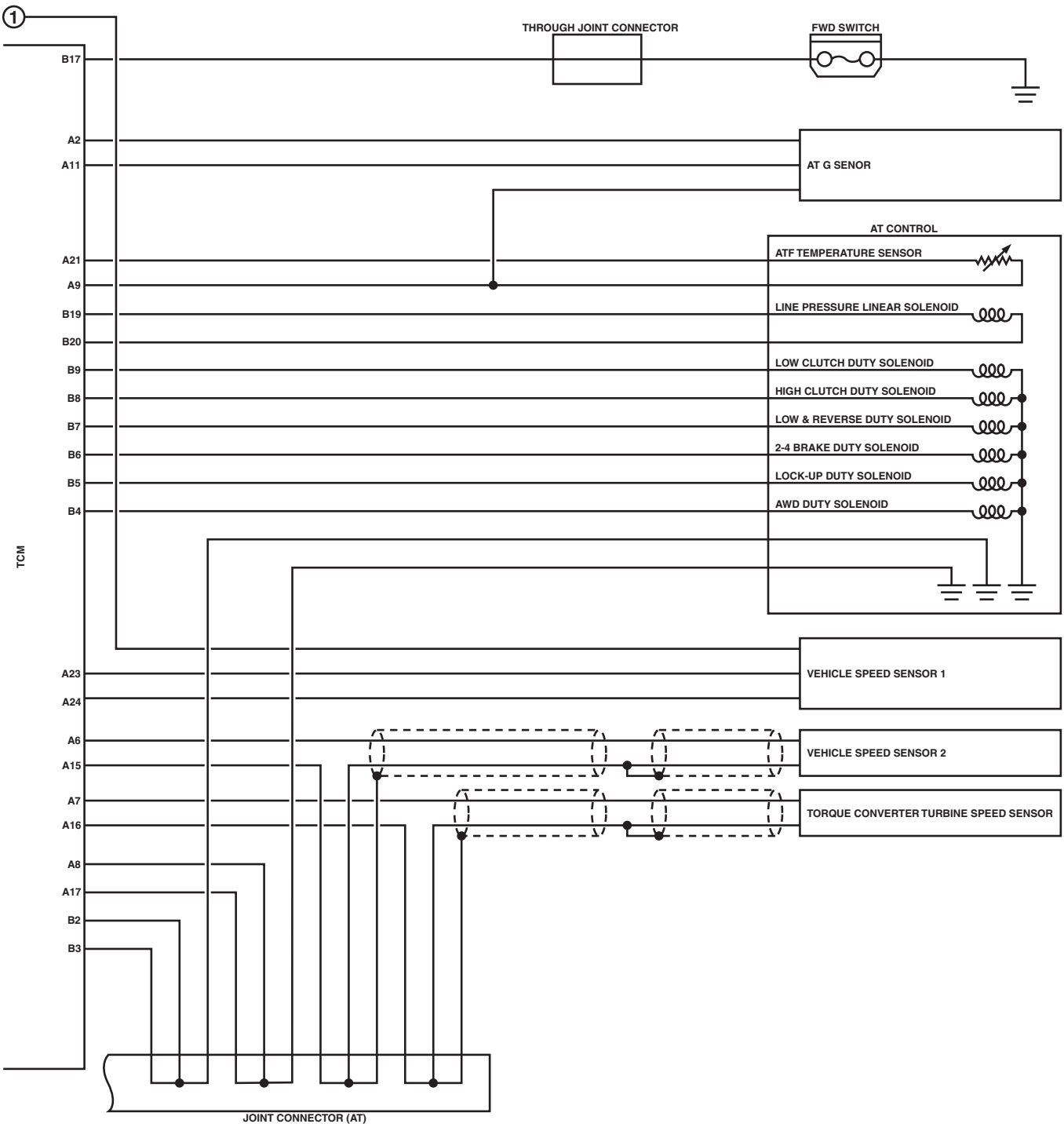

4AT(RHU)-05
4AT(RHU)-05
A: B54 B: B55 TCM
A24 A23 A6 A7 A21 A9 B20 B19 B9 B8 B7 B6 B5 B4 A15 A16 A8 A17 B3 B2
Sb Or OrB GOr Br YW LR RW BW BrY YL WL RY YG R G PB PB OrB OrB
4AT(RHU)-03 C
4AT(RHU)-04 B
4AT(RHU)-03 A
1 2 7 16 17 14 15
Y 11
SB 12
GB 13
SB 3
JOINT CON-NECTOR (AT)
B53
6 4
PB OrB
GR Sb Or OrB Y GOr GB Br YW LR RW BW BrY YL WL RY YG PB OrB
9 13 17 14 18 5 10 11 15 1 2 4 7 6 3 12 8 19 20
B11
T4
RB LB B Y W Y W Or W R G L BY YG Gr Y Br BW B
RB LB B
3 2 1
AT1
Or W R G
1 3 2 4
AT2
L BY YG Gr Y Br
2 3 1 6 4 5
AT3
VEHICLE SPEED SENSOR 1
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
ATF TEMPERATURE SENSOR
LINE PRESSURE LINEAR SOLENOID
LOW CLUTCH DUTY SOLENOID
HIGH CLUTCH DUTY SOLENOID
LOW & REVERSE DUTY SOLENOID
2-4 BRAKE DUTY SOLENOID
LOCK-UP DUTY SOLENOID
AWD DUTY SOLENOID
BW B
E E
AT CONTROL


AT1
1 2 3
AT2
1 2
3 4
AT3
1 2 3
4 5 6
B11 (GRAY)
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
17 18 19 20
B53
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
A: B54
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24
B: B55
1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17 18 19 20 21
22 23 24 25 26 27 28 29 30 31

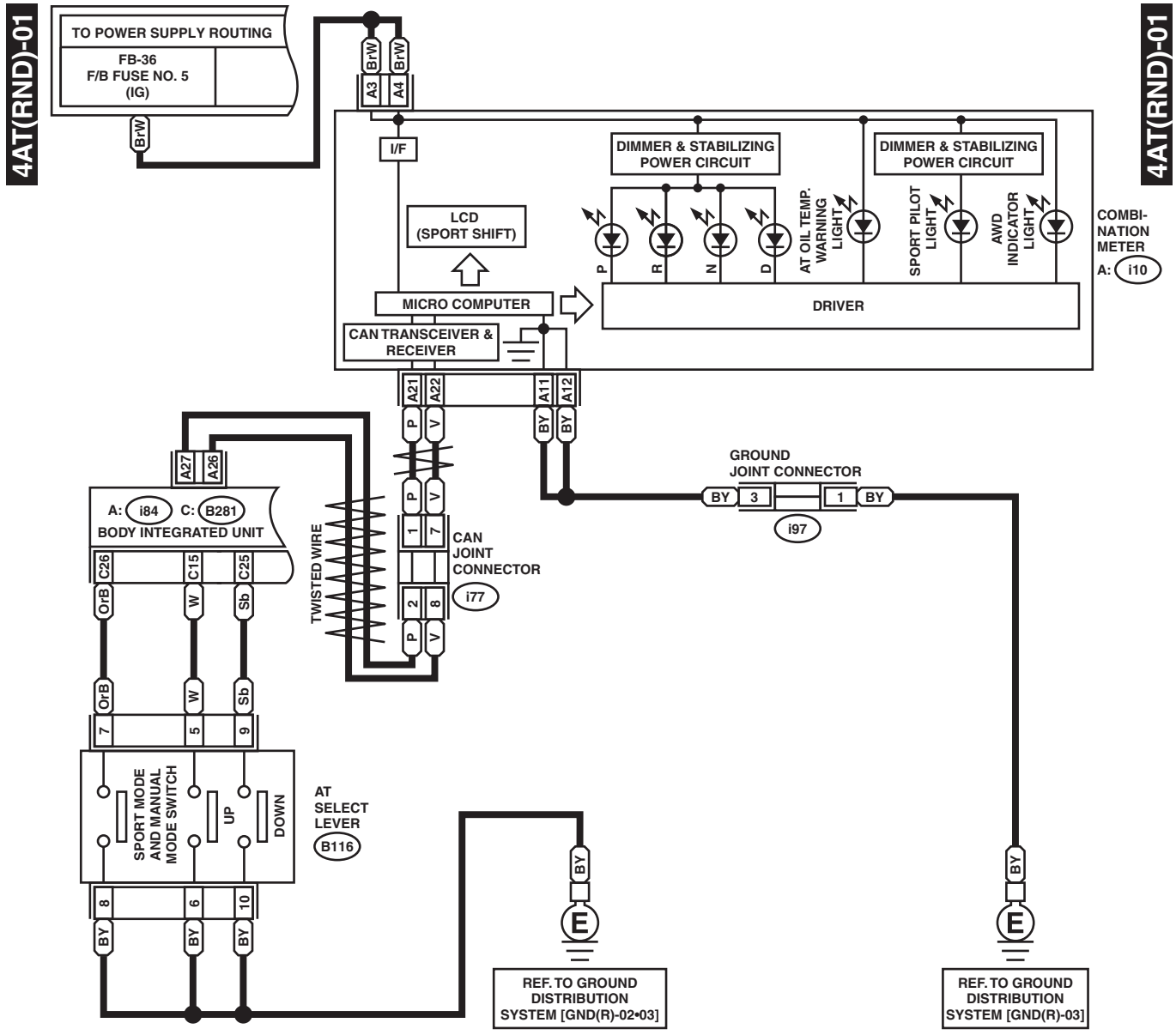
WI-03974

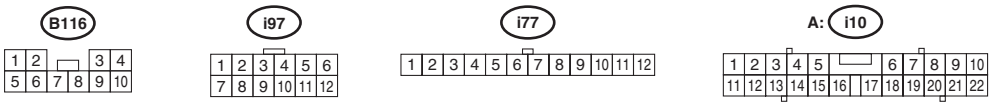
4. RHD 4AT MODEL (2.5 L EK MODEL)

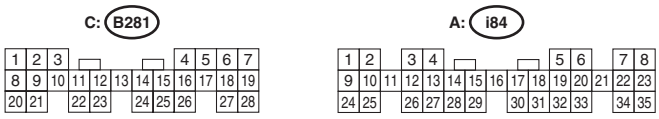



1
THROUGH JOINT CONNECTOR
FWD SWITCH
B17
A2
A11
AT G SENOR
AT CONTROL
A21
ATF TEMPERATURE SENSOR
A9
B19
LINE PRESSURE LINEAR SOLENOID
B20
B9
LOW CLUTCH DUTY SOLENOID
B8
HIGH CLUTCH DUTY SOLENOID
B7
LOW & REVERSE DUTY SOLENOID
B6
2-4 BRAKE DUTY SOLENOID
B5
LOCK-UP DUTY SOLENOID
B4
AWD DUTY SOLENOID
TCM
A23
VEHICLE SPEED SENSOR 1
A24
A6
VEHICLE SPEED SENSOR 2
A15
A7
TORQUE CONVERTER TURBINE SPEED SENSOR
A16
A8
A17
B2
B3
JOINT CONNECTOR (AT)

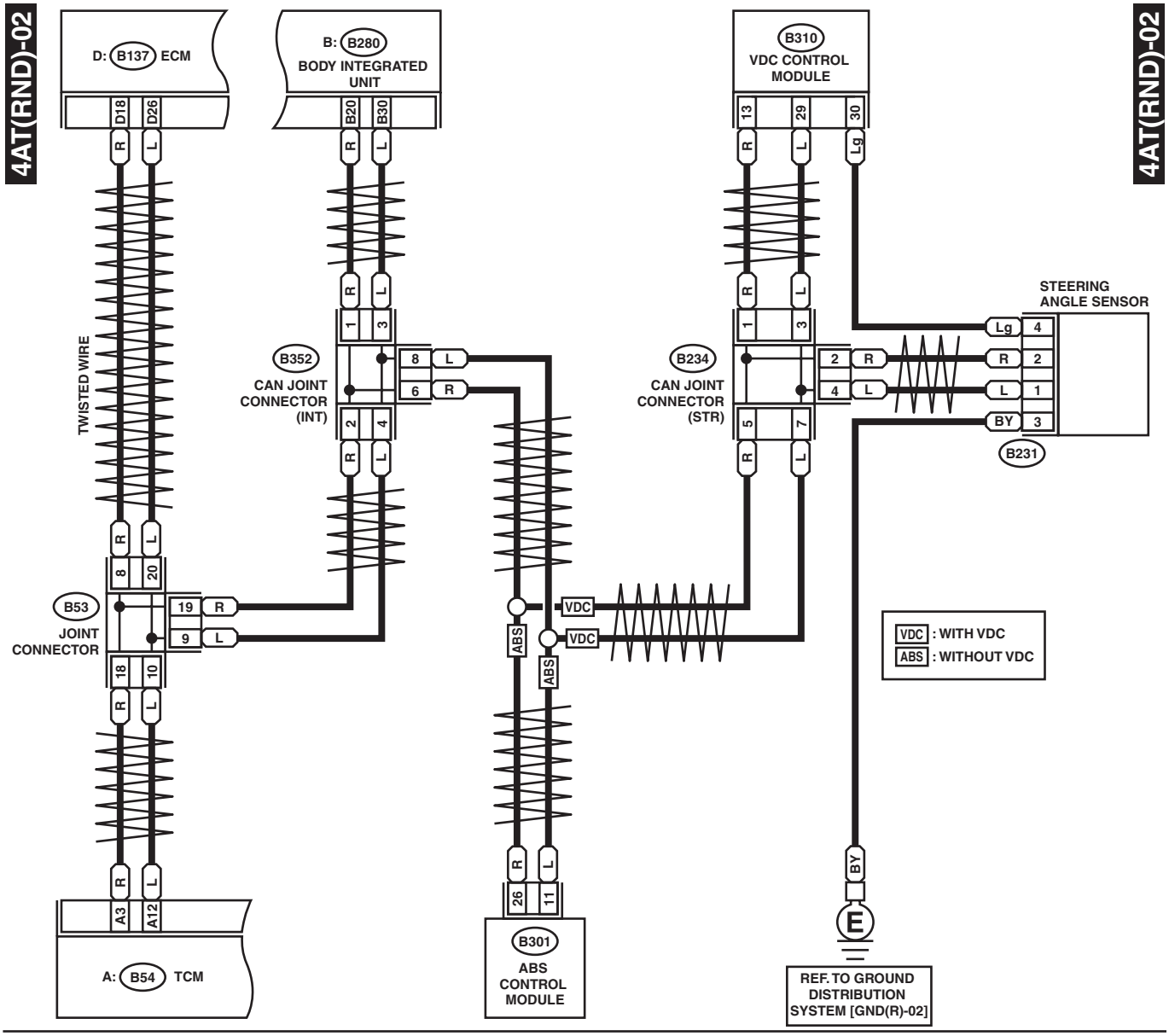
WI-04300

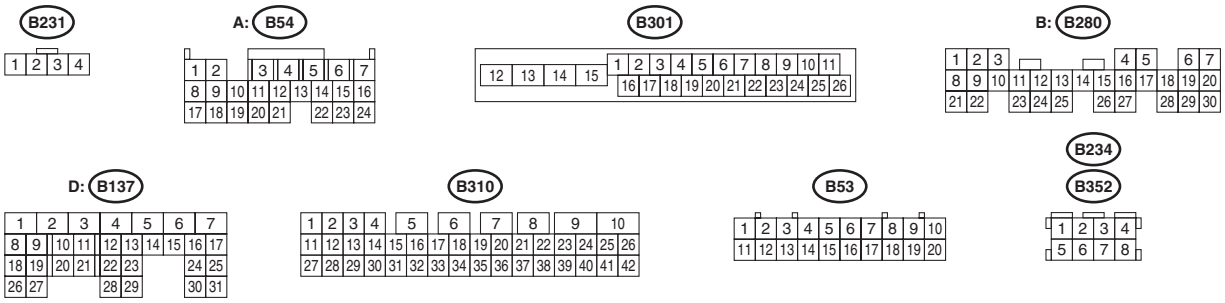

4AT(RND)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
I/F
DIMMER & STABILIZING POWER CIRCUIT
DIMMER & STABILIZING POWER CIRCUIT
LCD (SPORT SHIFT)
P
R
N
D
AT OIL TEMP. WARNING LIGHT
SPORT PILOT LIGHT
AWD INDICATOR LIGHT
COMBI-NATION METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
P
V
BY
GROUND JOINT CONNECTOR
BY 3
1 BY
i97
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
TWISTED WIRE
CAN JOINT CONNECTOR
i77
C26
C15
C25
OrB
W
Sb
7
5
9
SPORT MODE AND MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
8
6
10
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02•03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
4AT(RND)-01


B116
i97
i77
A: i10

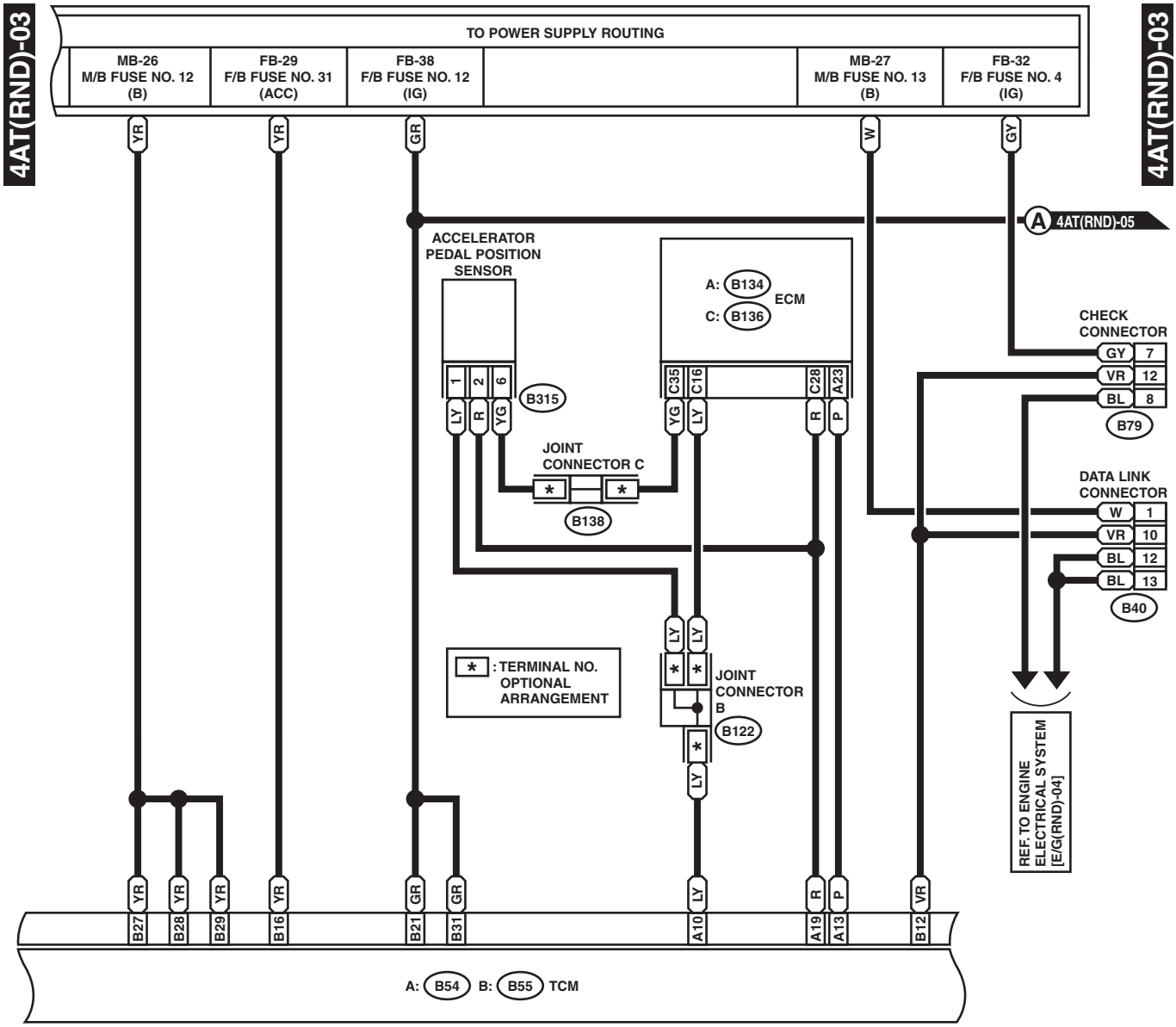

C: B281
A: i84

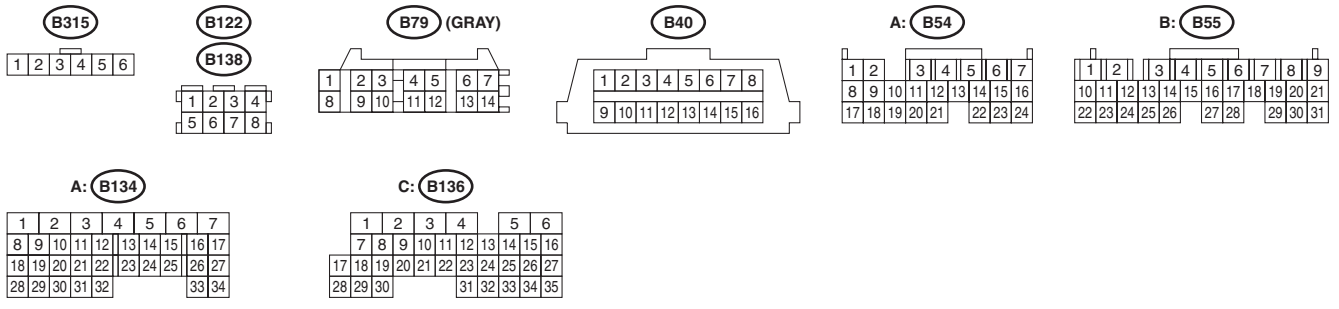
WI-03976


4AT(RND)-02
4AT(RND)-02
D: B137 ECM
B: B280 BODY INTEGRATED UNIT
B310 VDC CONTROL MODULE
STEERING ANGLE SENSOR
TWISTED WIRE
B352 CAN JOINT CONNECTOR (INT)
B234 CAN JOINT CONNECTOR (STR)
B53 JOINT CONNECTOR
B231
VDC : WITH VDC
ABS : WITHOUT VDC
A: B54 TCM
B301 ABS CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]

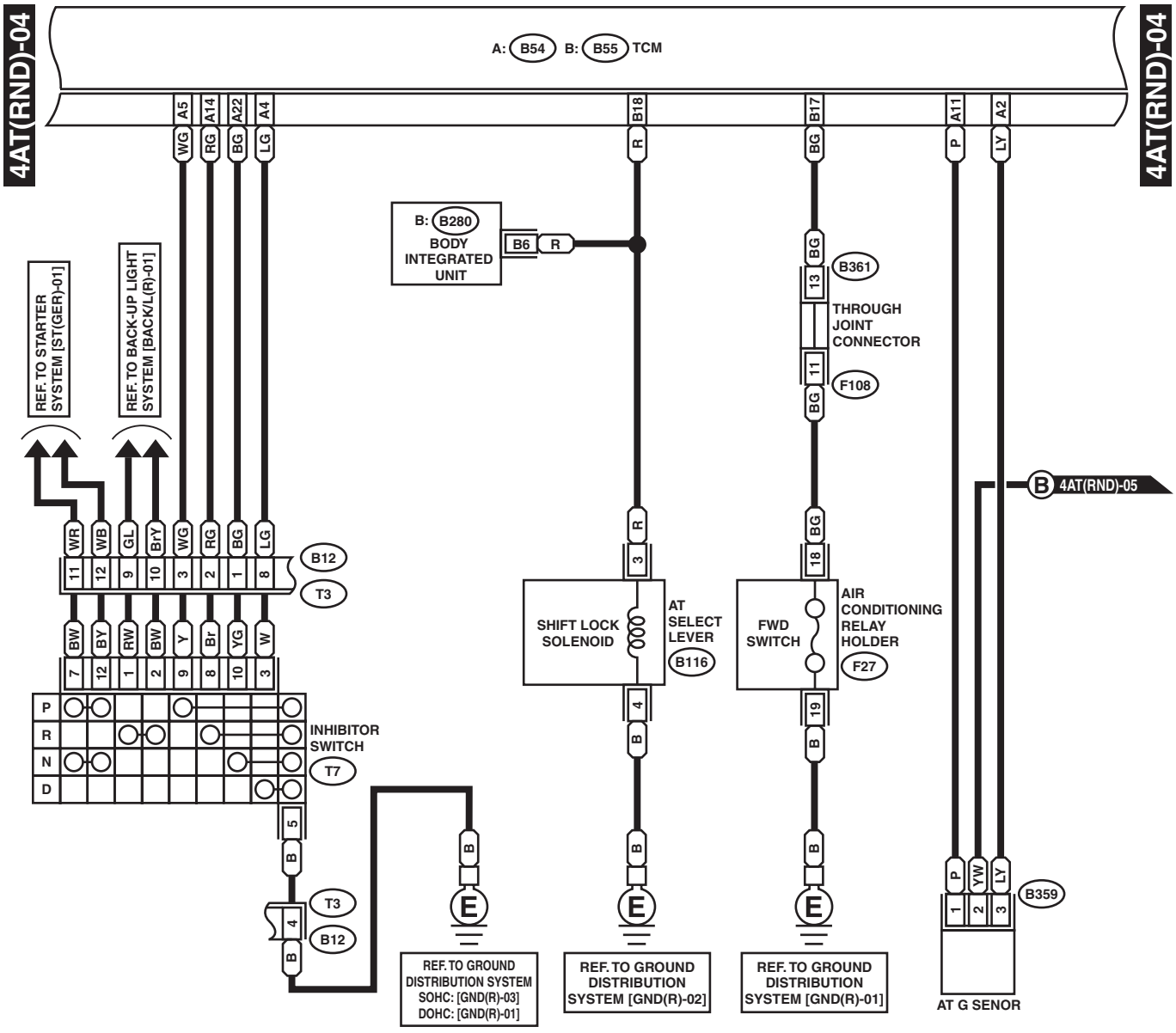

B231
A: B54
B301
B: B280
D: B137
B310
B53
B234
B352

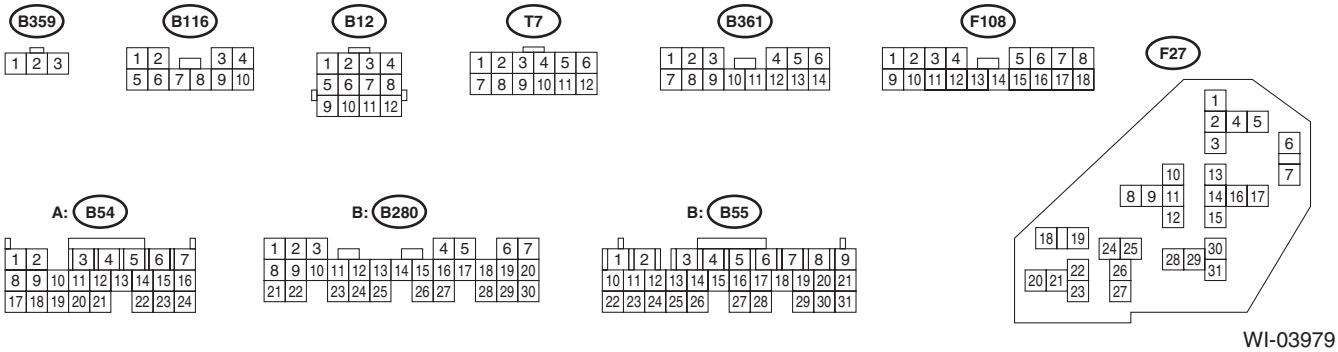
WI-03977


4AT(RND)-03
TO POWER SUPPLY ROUTING
MB-26 M/B FUSE NO. 12 (B)
FB-29 F/B FUSE NO. 31 (ACC)
FB-38 F/B FUSE NO. 12 (IG)
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
4AT(RND)-03
YR
YR
GR
W
GY
A 4AT(RND)-05
ACCELERATOR PEDAL POSITION SENSOR
B315
A: B134
C: B136
ECM
CHECK CONNECTOR
GY 7
VR 12
BL 8
B79
JOINT CONNECTOR C
B138
DATA LINK CONNECTOR
W 1
VR 10
BL 12
BL 13
B40
* : TERMINAL NO. OPTIONAL ARRANGEMENT
JOINT CONNECTOR B
B122
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(RND)-04]
B27
B28
B29
B16
B21
B31
A10
A19
A13
B12
A: B54 B: B55 TCM

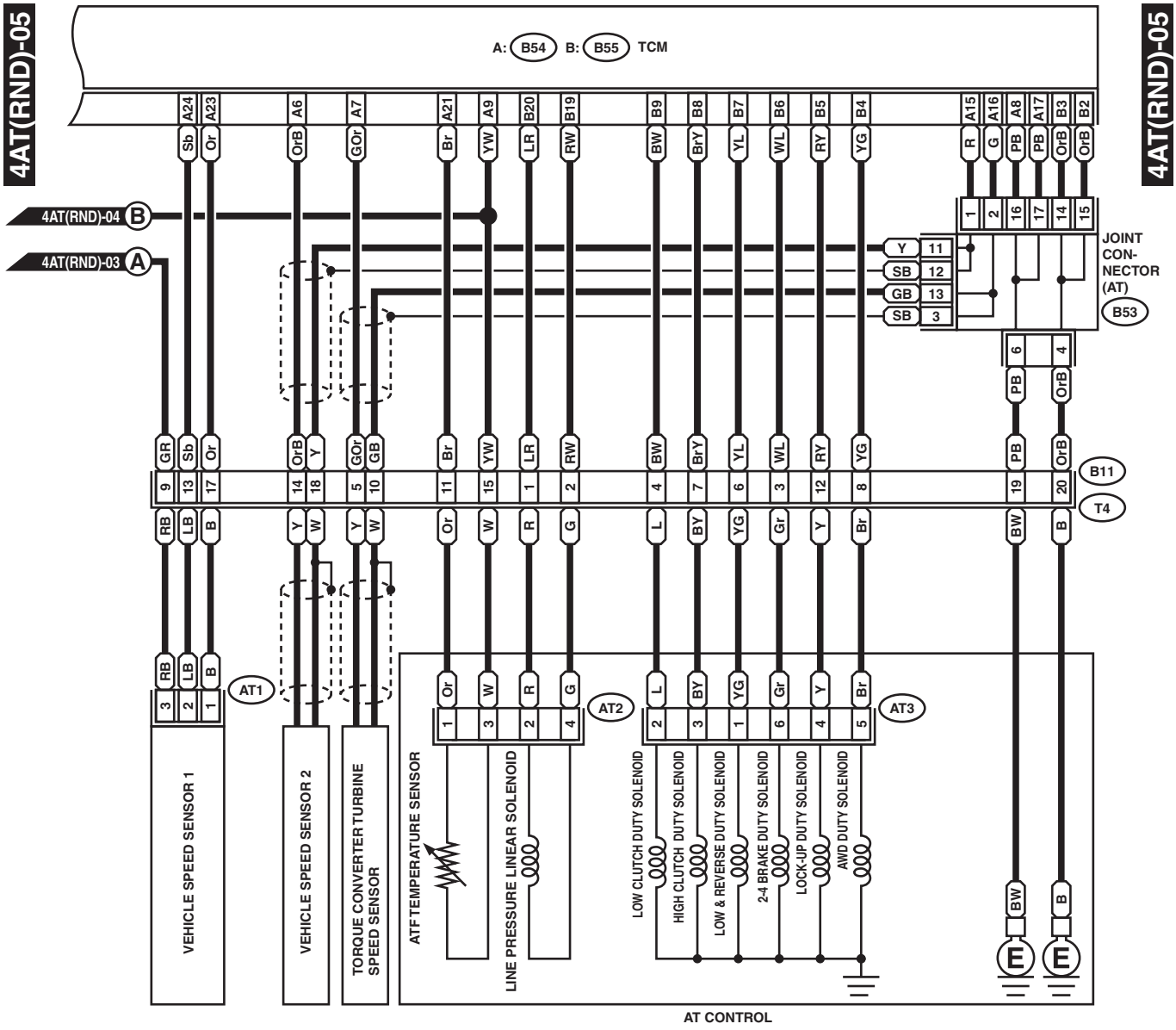

B315
B122
B138
B79 (GRAY)
B40
A: B54
B: B55
A: B134
C: B136

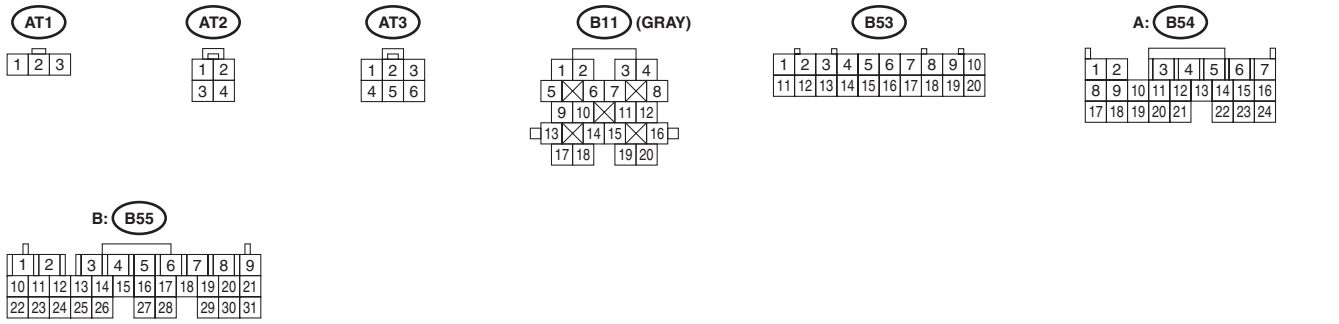
WI-03978


4AT(RND)-04
4AT(RND)-04
A: B54 B: B55 TCM
A5 A14 A22 A4 B18 B17 A11 A2
WG RG BG LG R BG P LY
B: B280
BODY INTEGRATED UNIT
B6 R
B361
THROUGH JOINT CONNECTOR
F108
REF. TO STARTER SYSTEM [ST(GER)-01]
REF. TO BACK-UP LIGHT SYSTEM [BACK/L(R)-01]
B 4AT(RND)-05
WR WB GL BrY WG RG BG LG
B12
T3
BW BY RW BW Y Br YG W
SHIFT LOCK SOLENOID
AT SELECT LEVER
B116
FWD SWITCH
AIR CONDITIONING RELAY HOLDER
F27
P R N D
INHIBITOR SWITCH
T7
B359
P YW LY
AT G SENOR
REF. TO GROUND DISTRIBUTION SYSTEM SOHC: [GND(R)-03] DOHC: [GND(R)-01]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-01]


B359
B116
B12
T7
B361
F108
F27
A: B54
B: B280
B: B55

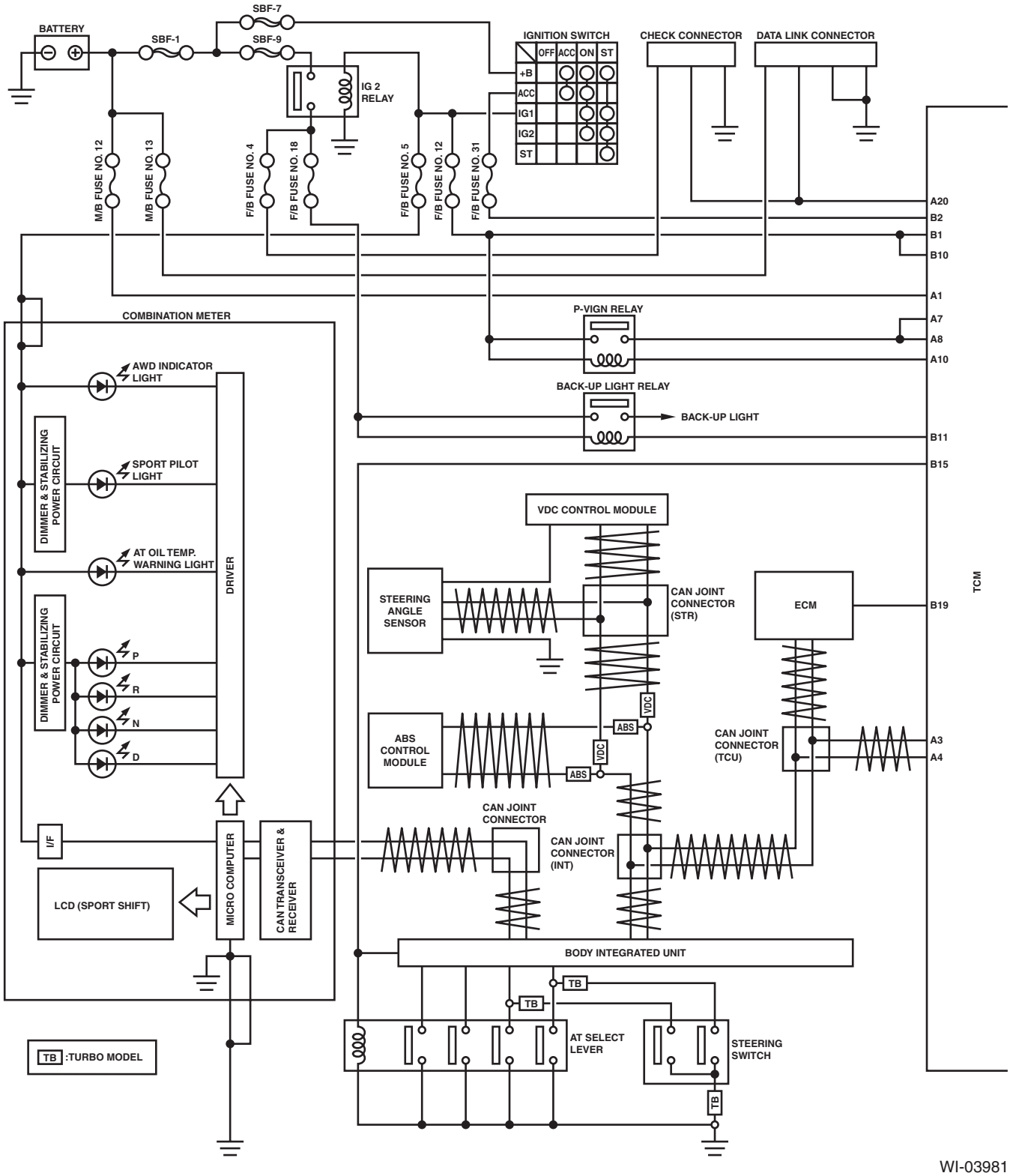
WI-03979


4AT(RND)-05
4AT(RND)-05
A: B54 B: B55 TCM
4AT(RND)-04 B
4AT(RND)-03 A
JOINT CON-NECTOR (AT) B53
B11
T4
AT1
AT2
AT3
VEHICLE SPEED SENSOR 1
VEHICLE SPEED SENSOR 2
TORQUE CONVERTER TURBINE SPEED SENSOR
ATF TEMPERATURE SENSOR
LINE PRESSURE LINEAR SOLENOID
LOW CLUTCH DUTY SOLENOID
HIGH CLUTCH DUTY SOLENOID
LOW & REVERSE DUTY SOLENOID
2-4 BRAKE DUTY SOLENOID
LOCK-UP DUTY SOLENOID
AWD DUTY SOLENOID
AT CONTROL

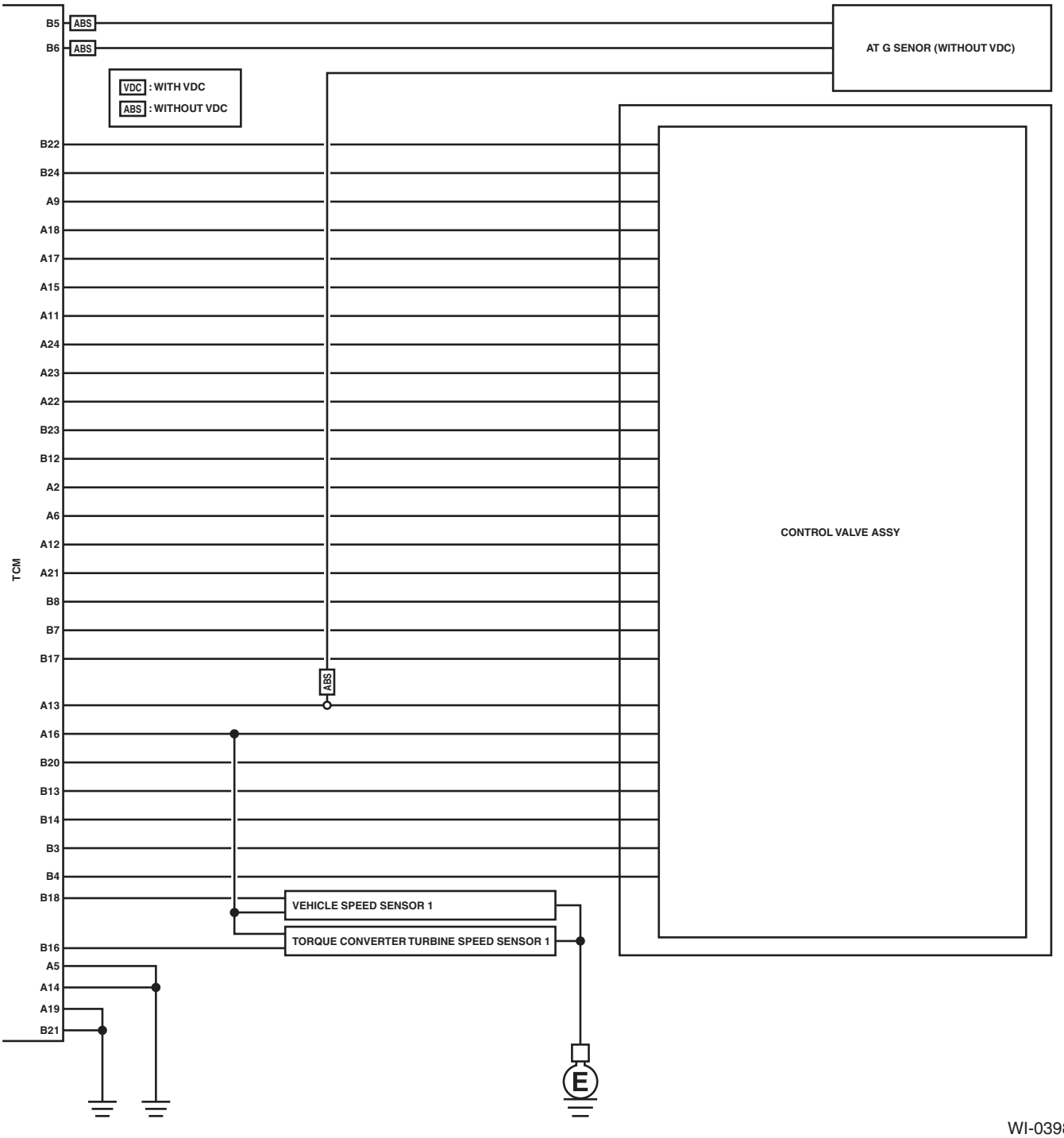

AT1
AT2
AT3
B11 (GRAY)
B53
A: B54
B: B55

WI-03980

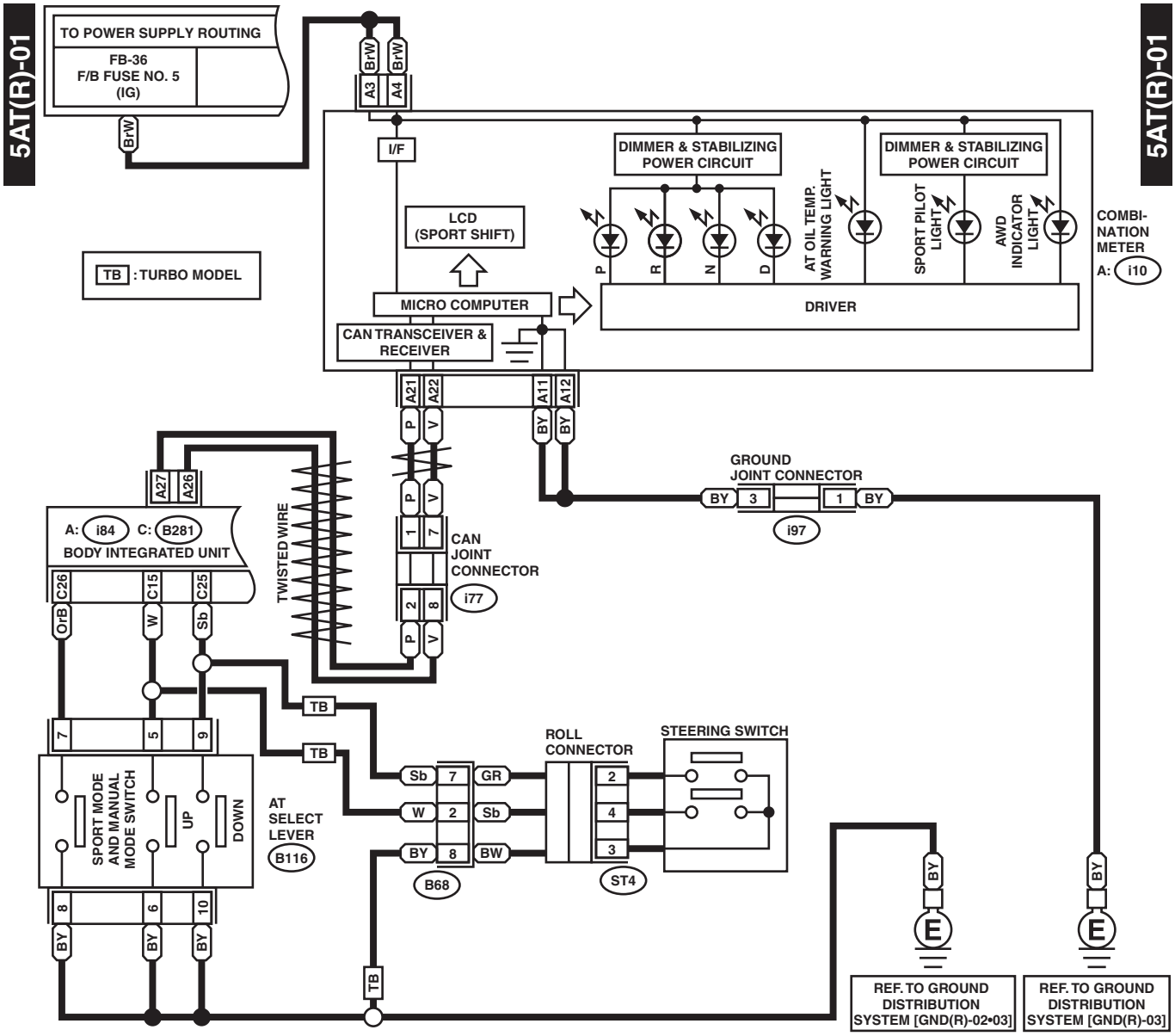
5. RHD 5AT MODEL

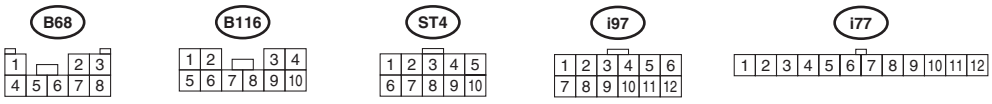


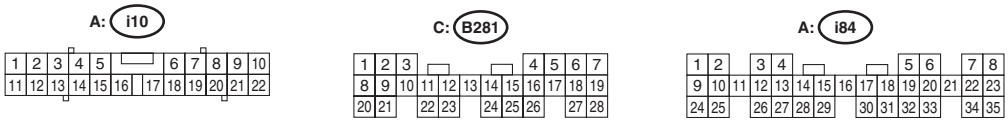
WI-03981


B5
ABS
B6
ABS
VDC : WITH VDC
ABS : WITHOUT VDC
AT G SENOR (WITHOUT VDC)
B22
B24
A9
A18
A17
A15
A11
A24
A23
A22
B23
B12
A2
A6
A12
A21
B8
B7
B17
A13
A16
B20
B13
B14
B3
B4
B18
B16
A5
A14
A19
B21
TCM
ABS
CONTROL VALVE ASSY
VEHICLE SPEED SENSOR 1
TORQUE CONVERTER TURBINE SPEED SENSOR 1
E

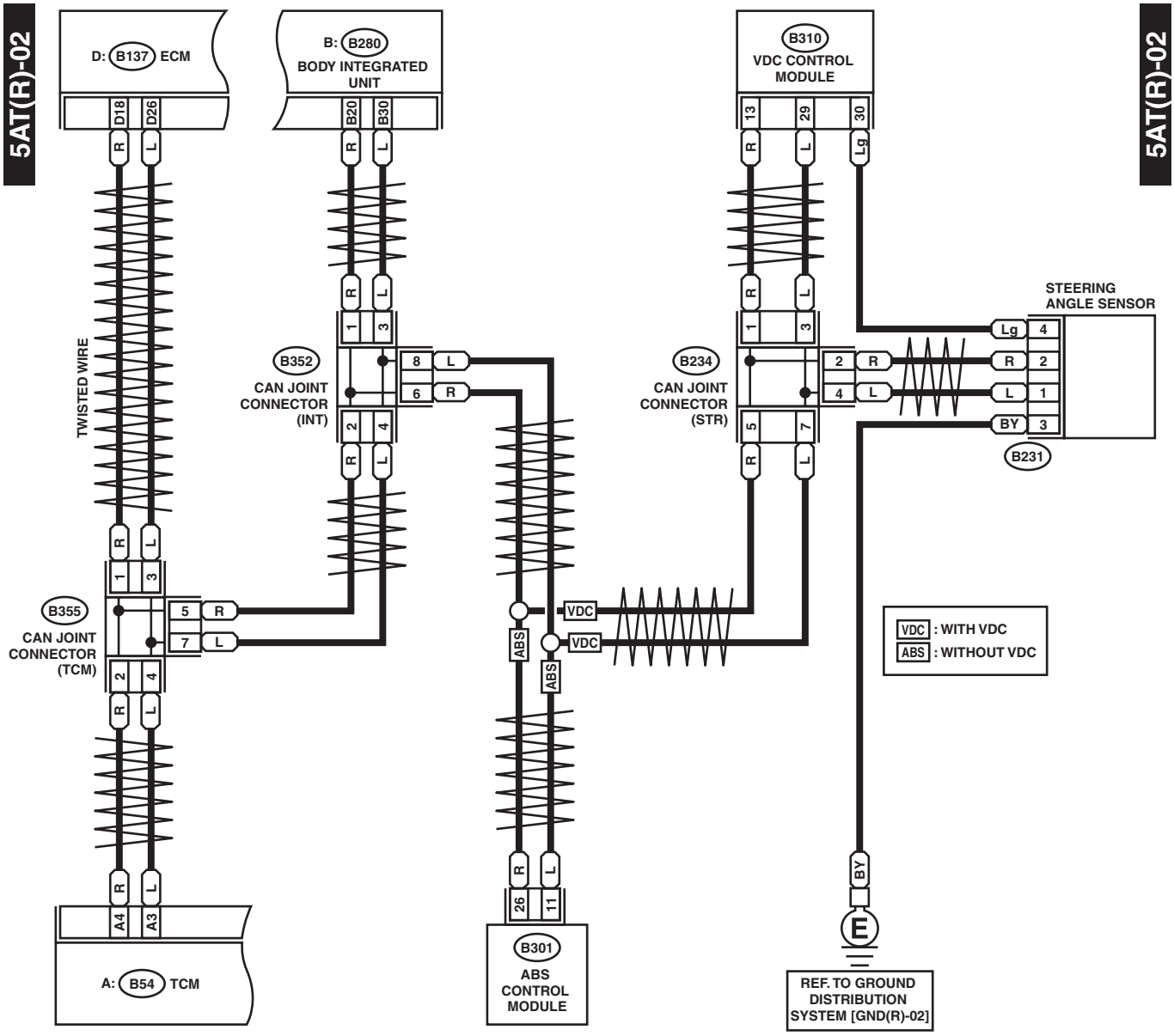
WI-03982

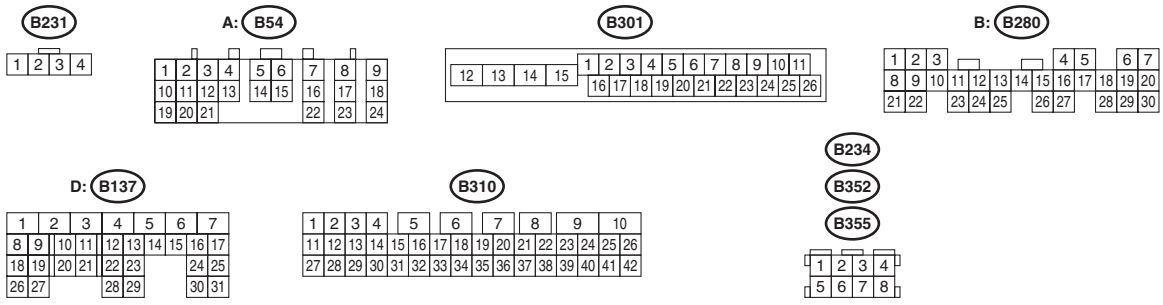

5AT(R)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
I/F
DIMMER & STABILIZING POWER CIRCUIT
DIMMER & STABILIZING POWER CIRCUIT
AT OIL TEMP. WARNING LIGHT
SPORT PILOT LIGHT
AWD INDICATOR LIGHT
COMBI-NATION METER
A: i10
LCD (SPORT SHIFT)
P
R
N
D
TB : TURBO MODEL
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
BY
V
GROUND JOINT CONNECTOR
BY 3
1 BY
i97
A27
A26
A: i84 C: B281
BODY INTEGRATED UNIT
TWISTED WIRE
CAN JOINT CONNECTOR
i77
C26
C15
C25
OrB
W
Sb
TB
7
5
9
SPORT MODE AND MANUAL MODE SWITCH
UP
DOWN
AT SELECT LEVER
B116
ROLL CONNECTOR
STEERING SWITCH
GR
BW
2
4
3
B68
ST4
8
6
10
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02•03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
5AT(R)-01


B68
B116
ST4
i97
i77

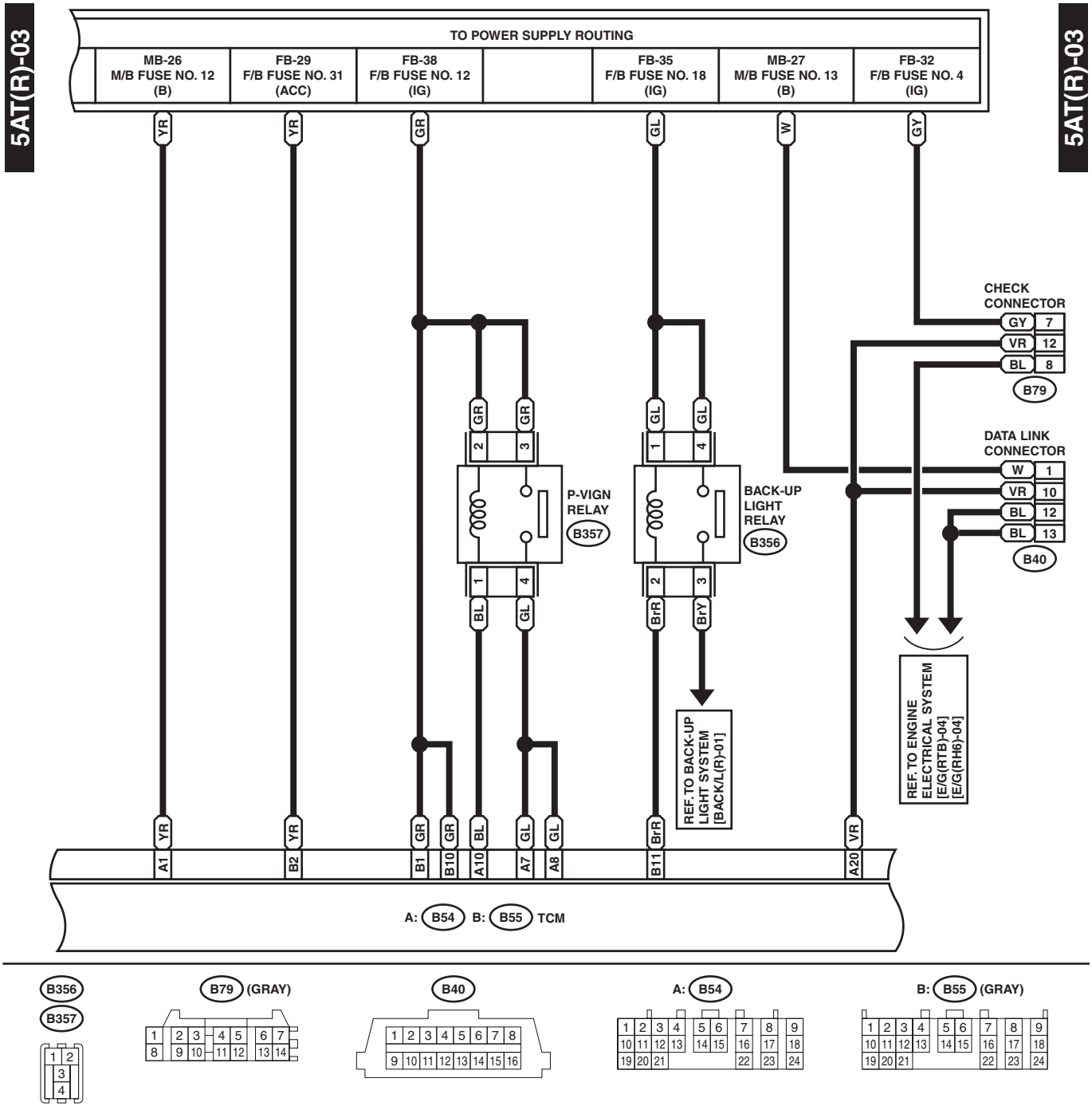

A: i10
C: B281
A: i84

WI-03983

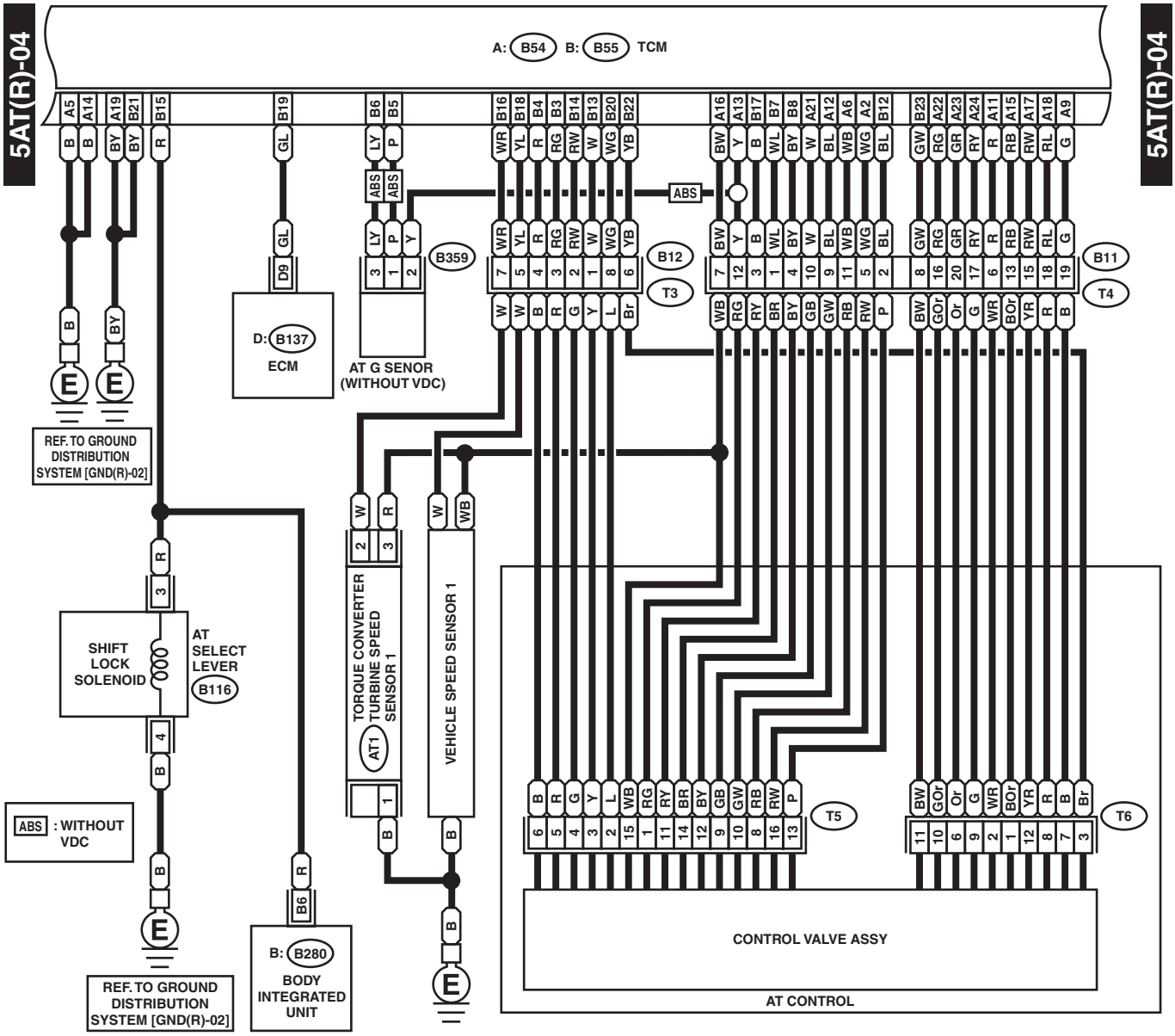

5AT(R)-02
5AT(R)-02
D: B137 ECM
B: B280 BODY INTEGRATED UNIT
B310 VDC CONTROL MODULE
D18
D26
B20
B30
13
29
30
R
L
Lg
TWISTED WIRE
B352 CAN JOINT CONNECTOR (INT)
B234 CAN JOINT CONNECTOR (STR)
STEERING ANGLE SENSOR
B231
B355 CAN JOINT CONNECTOR (TCM)
VDC
ABS
VDC : WITH VDC
ABS : WITHOUT VDC
A: B54 TCM
B301 ABS CONTROL MODULE
BY
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]

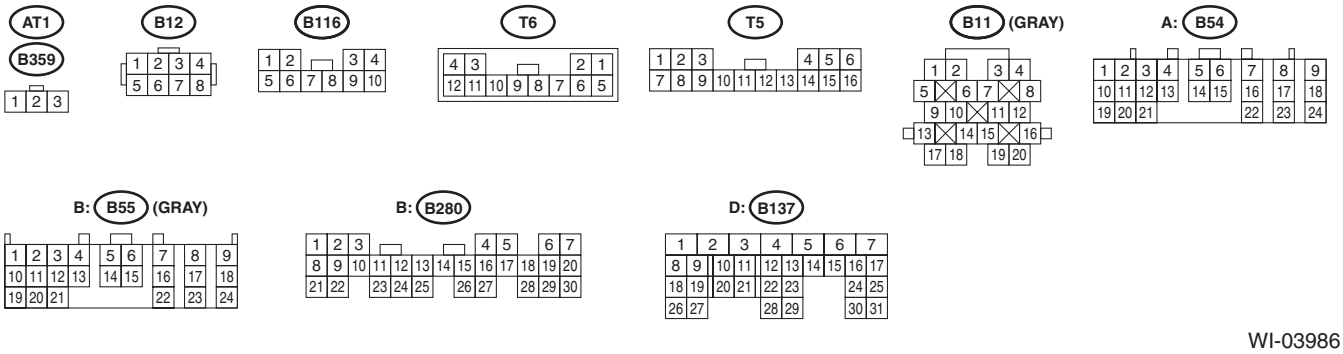

B231
A: B54
B301
B: B280
D: B137
B310
B234
B352
B355

WI-03984


5AT(R)-03
5AT(R)-03
TO POWER SUPPLY ROUTING
MB-26 M/B FUSE NO. 12 (B)
FB-29 F/B FUSE NO. 31 (ACC)
FB-38 F/B FUSE NO. 12 (IG)
FB-35 F/B FUSE NO. 18 (IG)
MB-27 M/B FUSE NO. 13 (B)
FB-32 F/B FUSE NO. 4 (IG)
YR
YR
GR
GL
W
GY
CHECK CONNECTOR
GY 7
VR 12
BL 8
B79
DATA LINK CONNECTOR
W 1
VR 10
BL 12
BL 13
B40
P-VIGN RELAY
B357
BACK-UP LIGHT RELAY
B356
REF. TO BACK-UP LIGHT SYSTEM [BACK/L(R)-01]
REF. TO ENGINE ELECTRICAL SYSTEM [E/G(RTB)-04] [E/G(RH6)-04]
A1
B2
B1
B10
A10
A7
A8
B11
A20
A: B54 B: B55 TCM
B356
B357
B79 (GRAY)
B40
A: B54
B: B55 (GRAY)

WI-03985


5AT(R)-04
5AT(R)-04
A: B54 B: B55 TCM
ABS
B359
B12
T3
B11
T4
D: B137
ECM
AT G SENOR
(WITHOUT VDC)
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-02]
SHIFT
LOCK
SOLENOID
AT
SELECT
LEVER
B116
TORQUE CONVERTER
TURBINE SPEED
SENSOR 1
AT1
VEHICLE SPEED SENSOR 1
ABS : WITHOUT
VDC
B: B280
BODY
INTEGRATED
UNIT
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-02]
T5
T6
CONTROL VALVE ASSY
AT CONTROL


AT1
B359
B12
B116
T6
T5
B11 (GRAY)
A: B54
B: B55 (GRAY)
B: B280
D: B137

WI-03986

WIRING SYSTEM SECTION

WIRING SYSTEM WI

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE8

WIRING SYSTEM

WI

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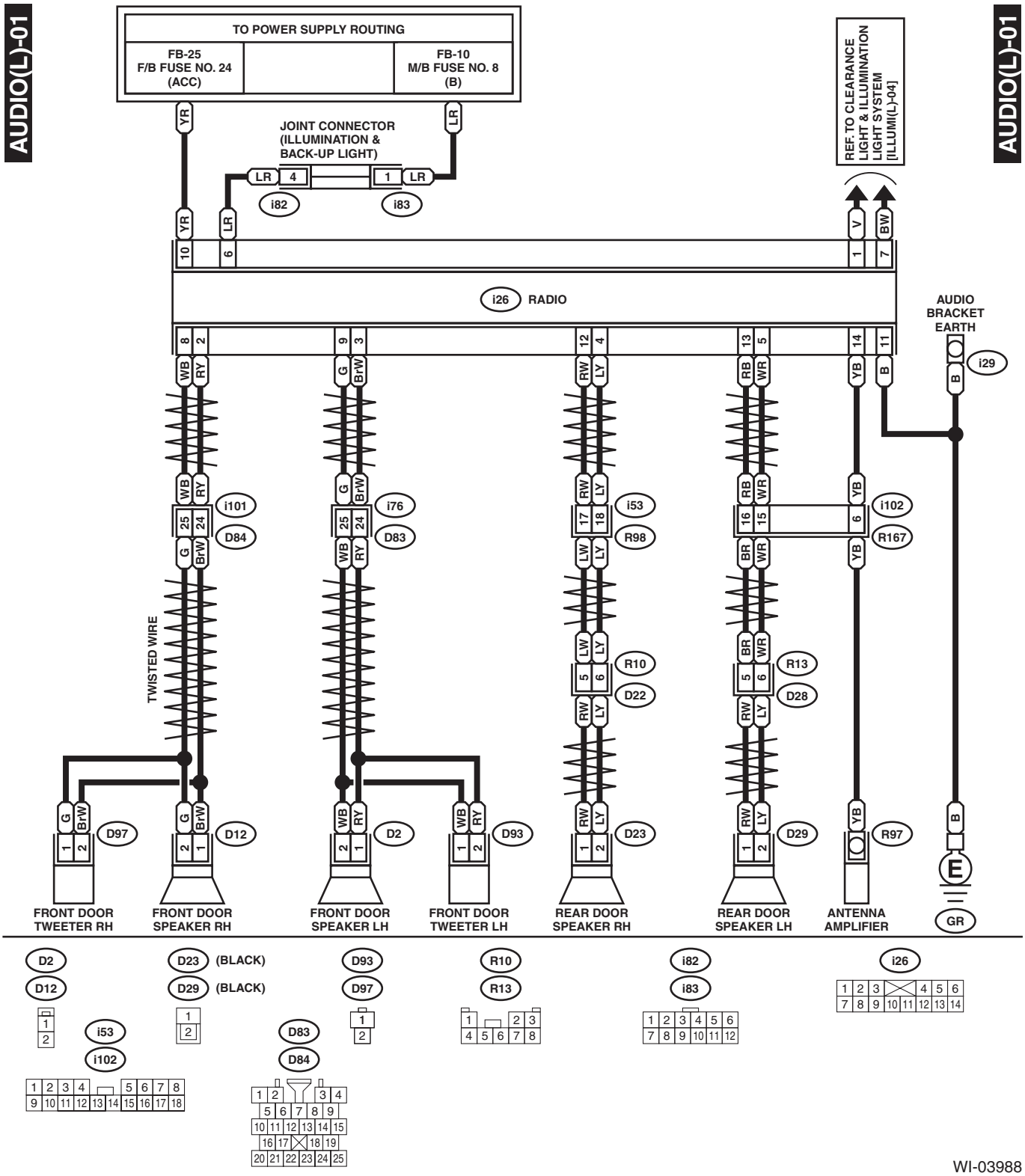
9. Audio System

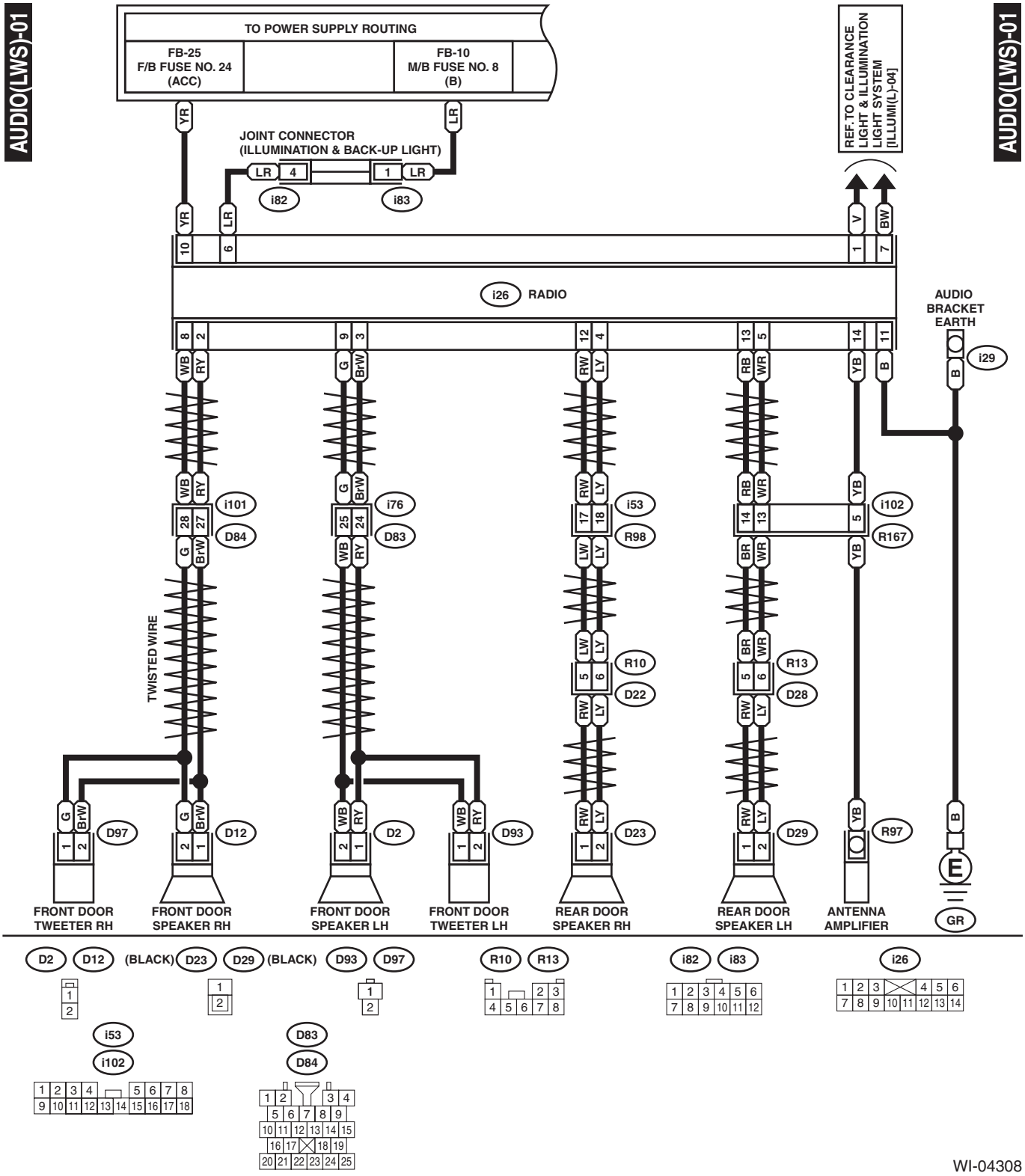
A: WIRING DIAGRAM

1. LHD MODEL

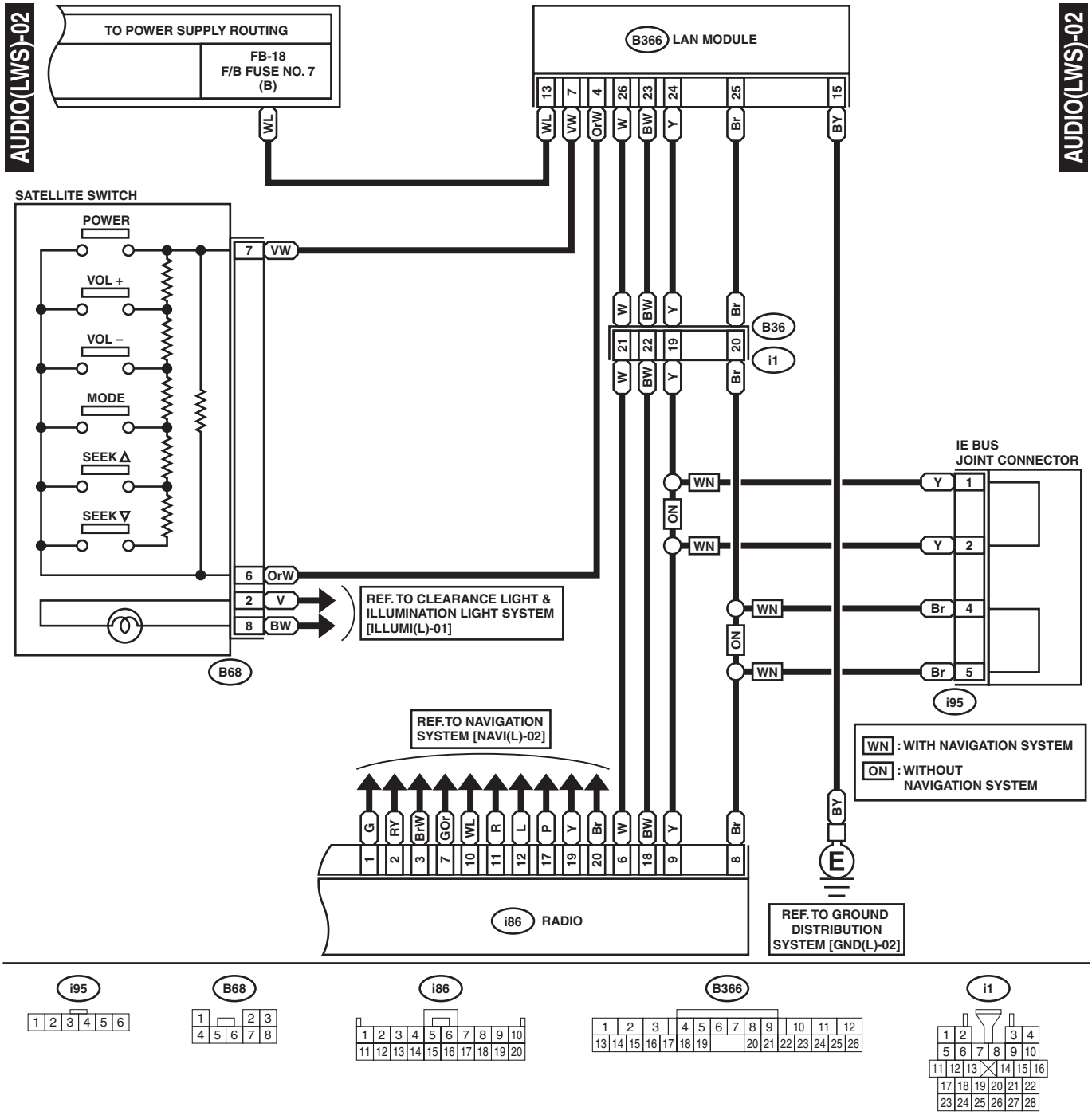


WI-03988

2. LHD MODEL WITH SATELLITE SWITCH

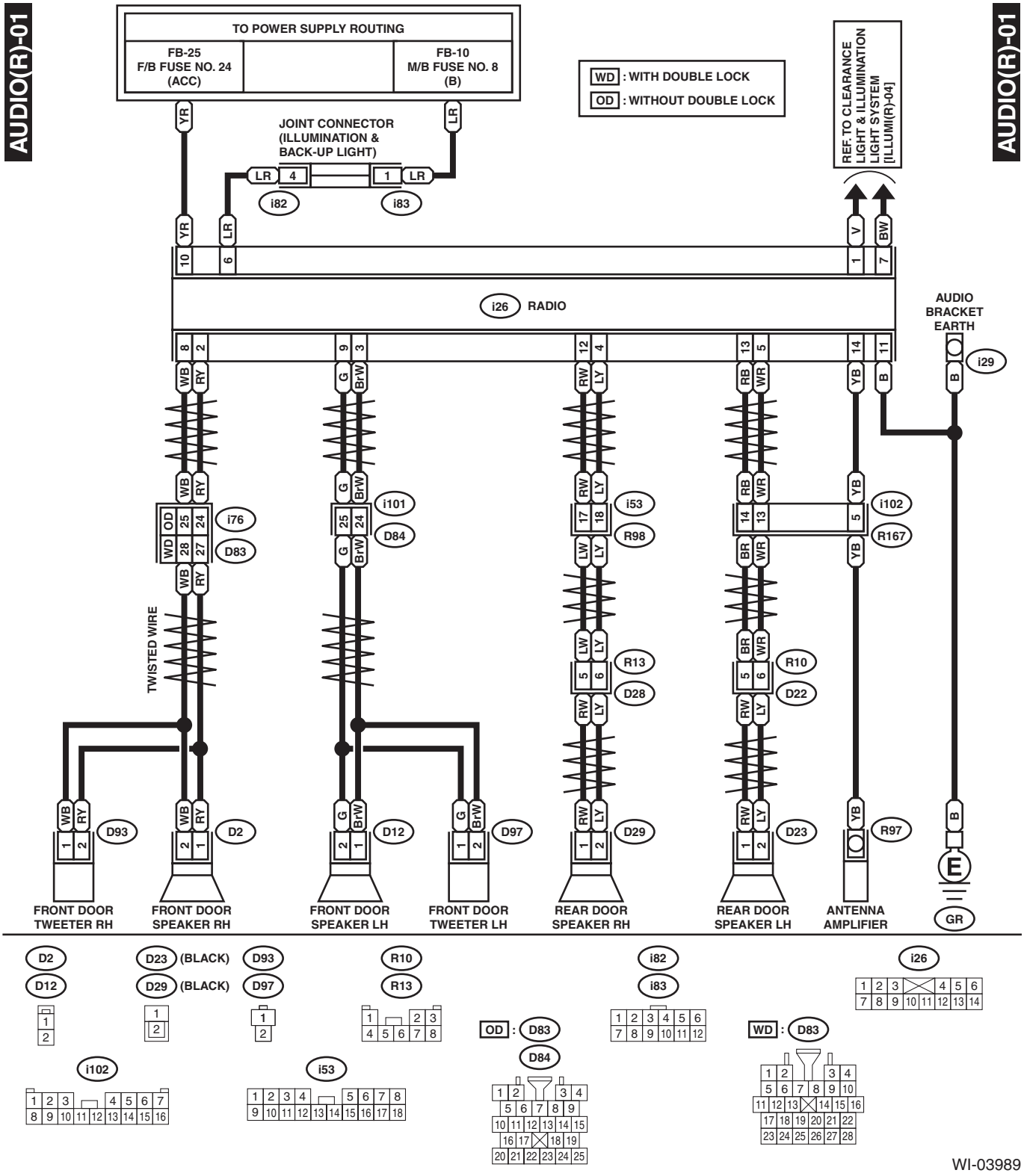


WI-04308


AUDIO(LWS)-02
TO POWER SUPPLY ROUTING
FB-18
F/B FUSE NO. 7
(B)
WL
B366 LAN MODULE
13 7 4 26 23 24 25 15
WL VW OrW W BW Y Br BY
SATELLITE SWITCH
POWER
VOL +
VOL –
MODE
SEEK △
SEEK ▽
7 VW
6 OrW
2 V
8 BW
B68
REF. TO CLEARANCE LIGHT & ILLUMINATION LIGHT SYSTEM [ILLUMI(L)-01]
W BW Y Br
B36
21 22 19 20
i1
IE BUS
JOINT CONNECTOR
WN
ON
Y 1
Y 2
Br 4
Br 5
i95
WN : WITH NAVIGATION SYSTEM
ON : WITHOUT NAVIGATION SYSTEM
REF.TO NAVIGATION SYSTEM [NAVI(L)-02]
G RY BrW GOr WL R L P Y Br W BW Y Br
1 2 3 7 10 11 12 17 19 20 6 18 9 8
i86 RADIO
BY
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
AUDIO(LWS)-02
i95
1 2 3 4 5 6
B68
1 2 3
4 5 6 7 8
i86
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
B366
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24 25 26
i1
1 2 3 4
5 6 7 8 9 10
11 12 13 14 15 16
17 18 19 20 21 22
23 24 25 26 27 28

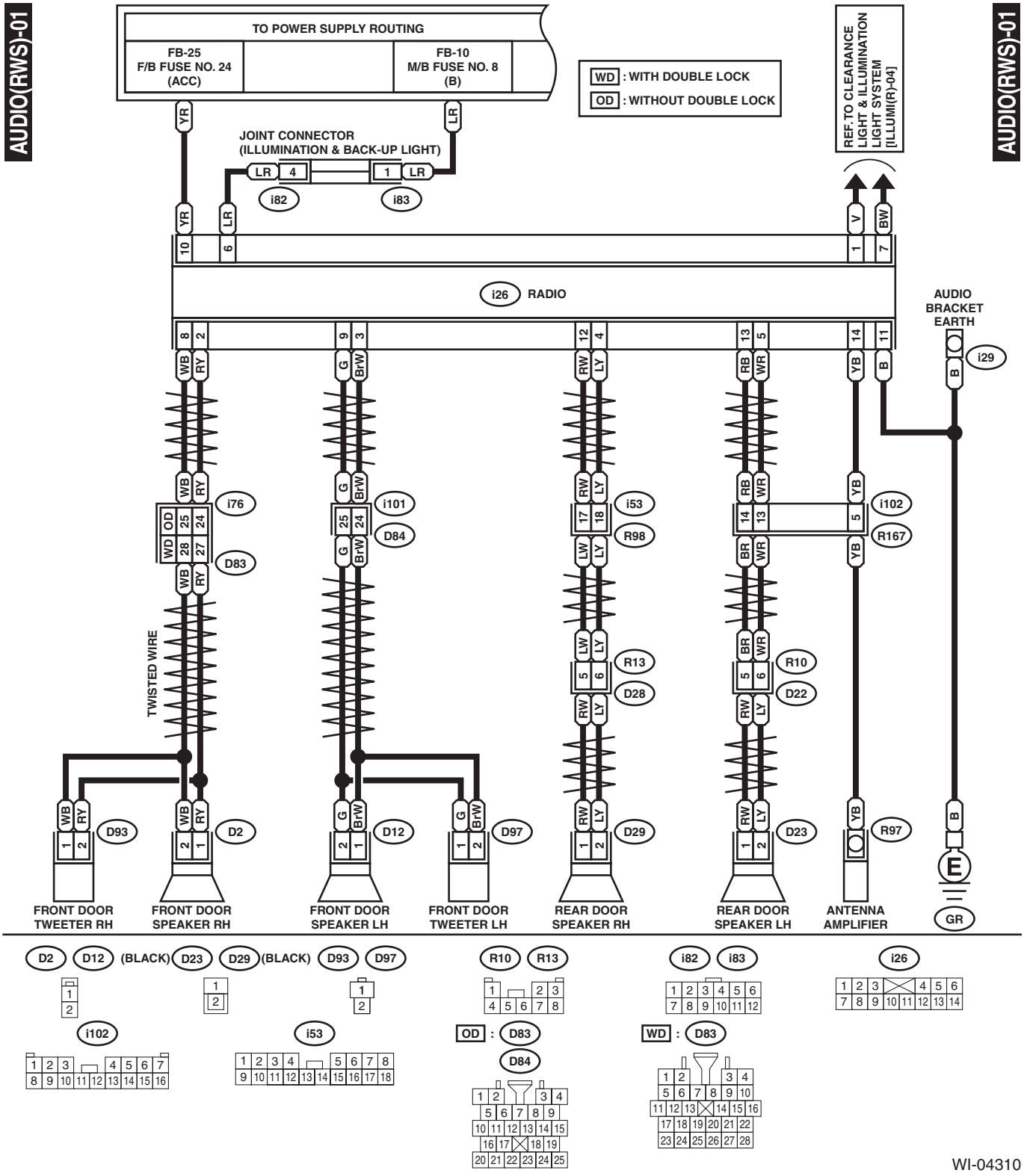
WI-04309

3. RHD MODEL

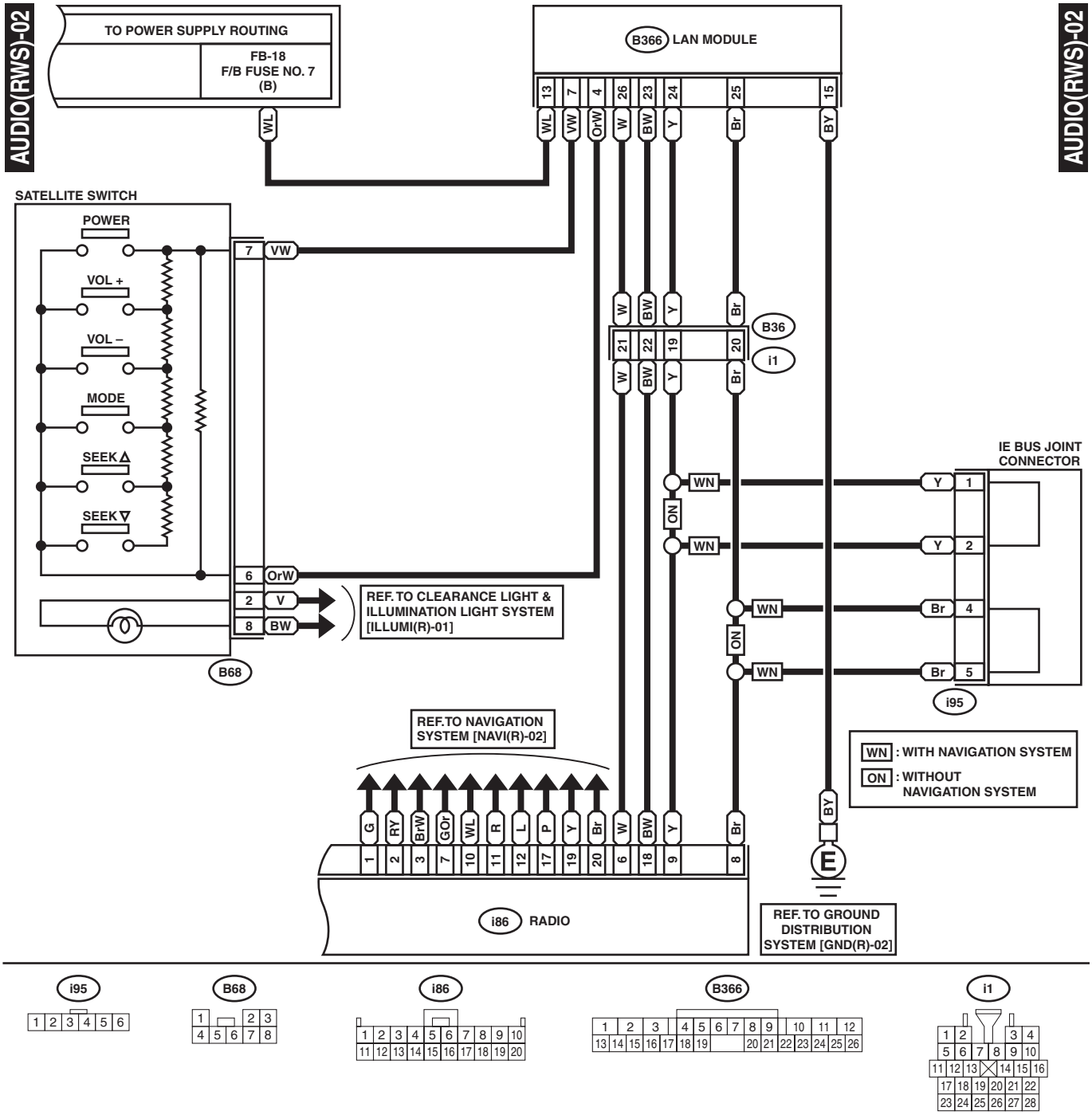


WI-03989

4. RHD MODEL WITH SATELLITE SWITCH

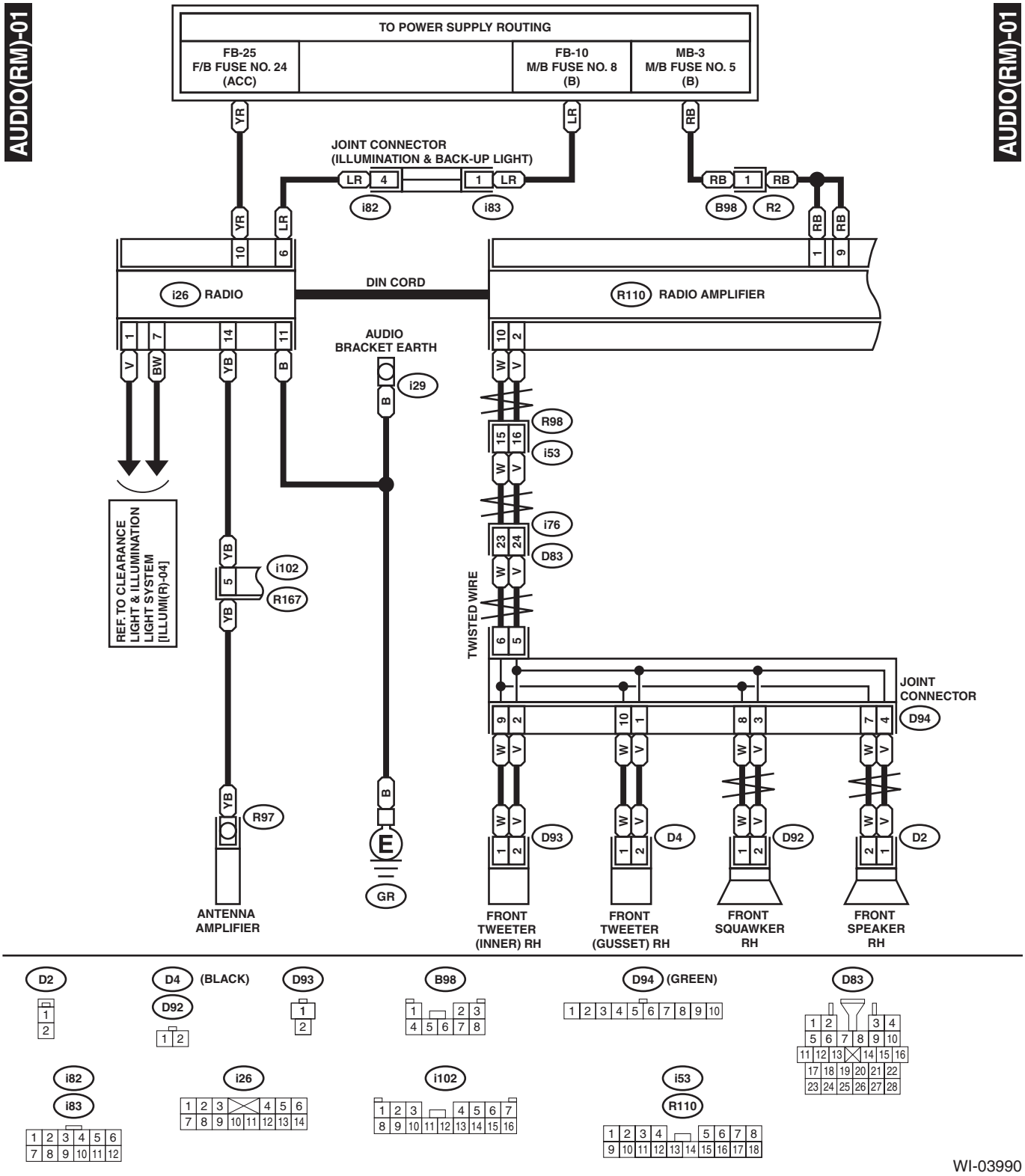


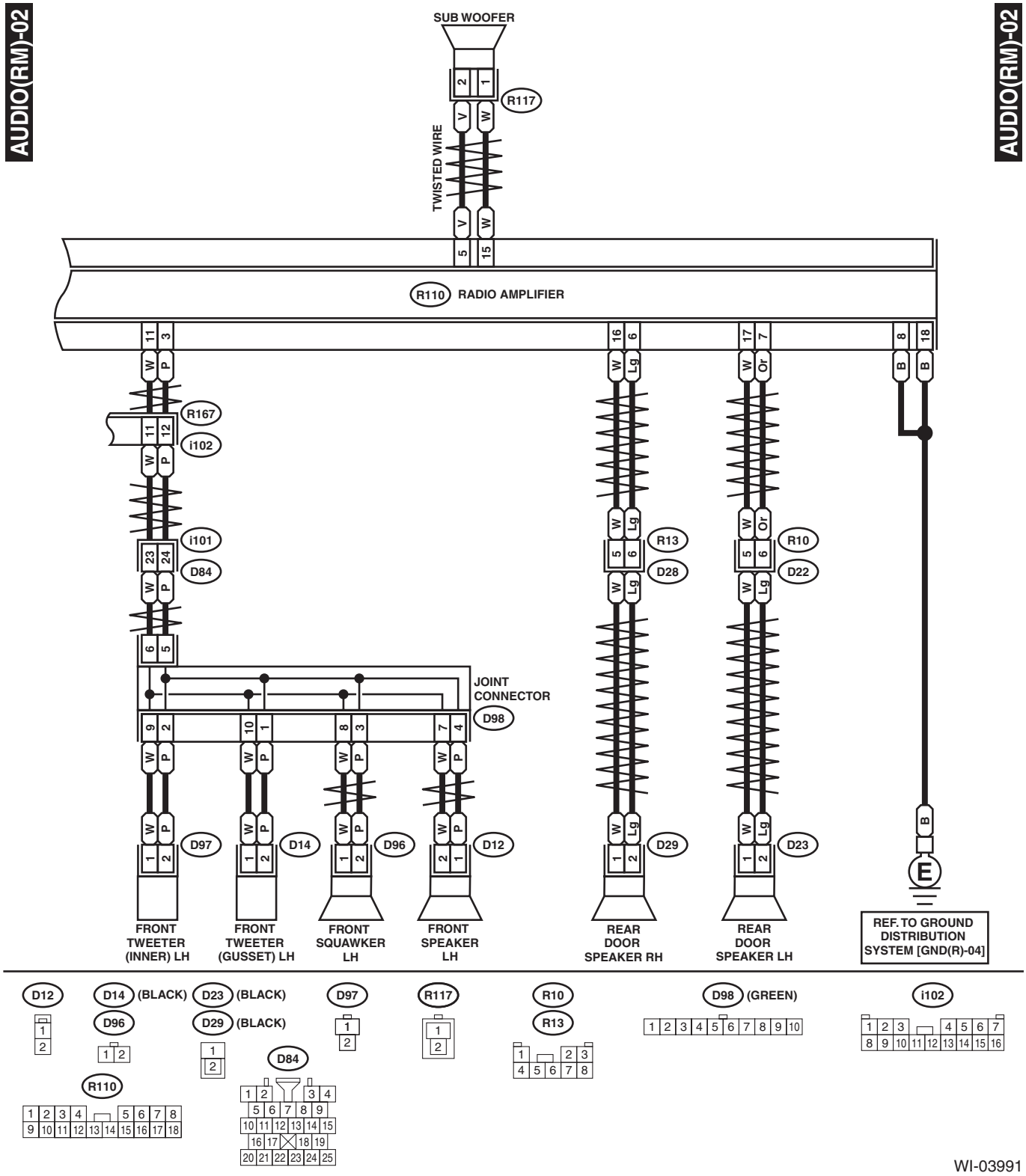
WI-04310


AUDIO(RWS)-02
TO POWER SUPPLY ROUTING
FB-18
F/B FUSE NO. 7
(B)
WL
B366 LAN MODULE
13 7 4 26 23 24 25 15
WL VW OrW W BW Y Br BY
AUDIO(RWS)-02
SATELLITE SWITCH
POWER
VOL +
VOL –
MODE
SEEK △
SEEK ▽
7 VW
6 OrW
2 V
8 BW
B68
REF. TO CLEARANCE LIGHT & ILLUMINATION LIGHT SYSTEM [ILLUMI(R)-01]
W BW Y Br
B36
21 22 19 20
i1
IE BUS JOINT CONNECTOR
WN
ON
Y 1
Y 2
Br 4
Br 5
i95
REF.TO NAVIGATION SYSTEM [NAVI(R)-02]
G RY BrW GOr WL R L P Y Br W BW Y Br
1 2 3 7 10 11 12 17 19 20 6 18 9 8
i86 RADIO
BY
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
WN : WITH NAVIGATION SYSTEM
ON : WITHOUT NAVIGATION SYSTEM
i95
1 2 3 4 5 6
B68
1 2 3
4 5 6 7 8
i86
1 2 3 4 5 6 7 8 9 10
11 12 13 14 15 16 17 18 19 20
B366
1 2 3 4 5 6 7 8 9 10 11 12
13 14 15 16 17 18 19 20 21 22 23 24 25 26
i1
1 2 3 4
5 6 7 8 9 10
11 12 13 14 15 16
17 18 19 20 21 22
23 24 25 26 27 28

WI-04311

5. RHD MODEL WITH MCINTOSH



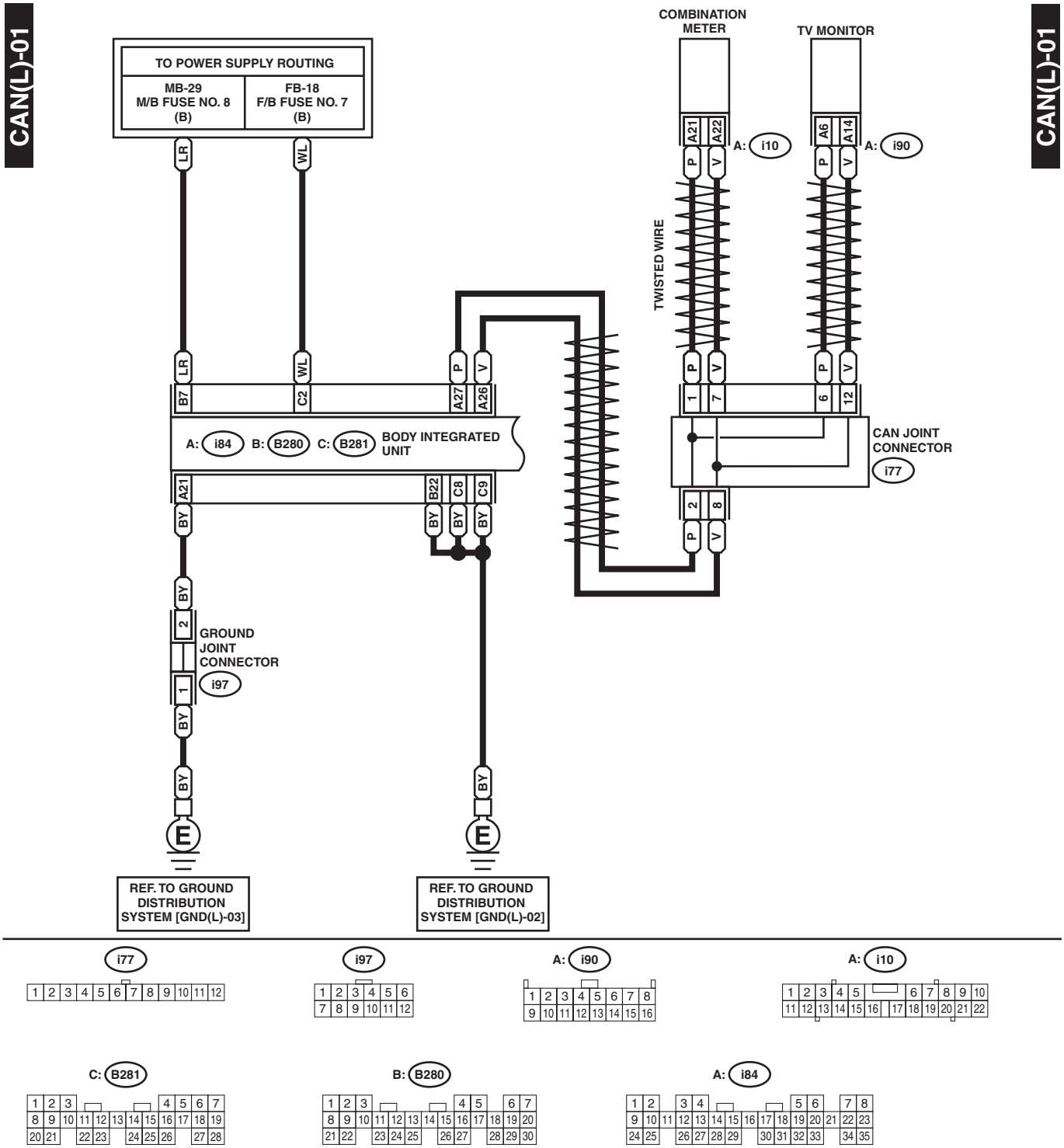

AUDIO(RM)-02
AUDIO(RM)-02
SUB WOOFER
R117
TWISTED WIRE
R110 RADIO AMPLIFIER
R167
i102
i101
D84
JOINT CONNECTOR
D98
D97
D14
D96
D12
R13
D28
D29
R10
D22
D23
FRONT TWEETER (INNER) LH
FRONT TWEETER (GUSSET) LH
FRONT SQUAWKER LH
FRONT SPEAKER LH
REAR DOOR SPEAKER RH
REAR DOOR SPEAKER LH
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
D12
D14 (BLACK)
D96
D23 (BLACK)
D29 (BLACK)
D84
D97
R117
R10
R13
D98 (GREEN)
i102
R110

WI-03991

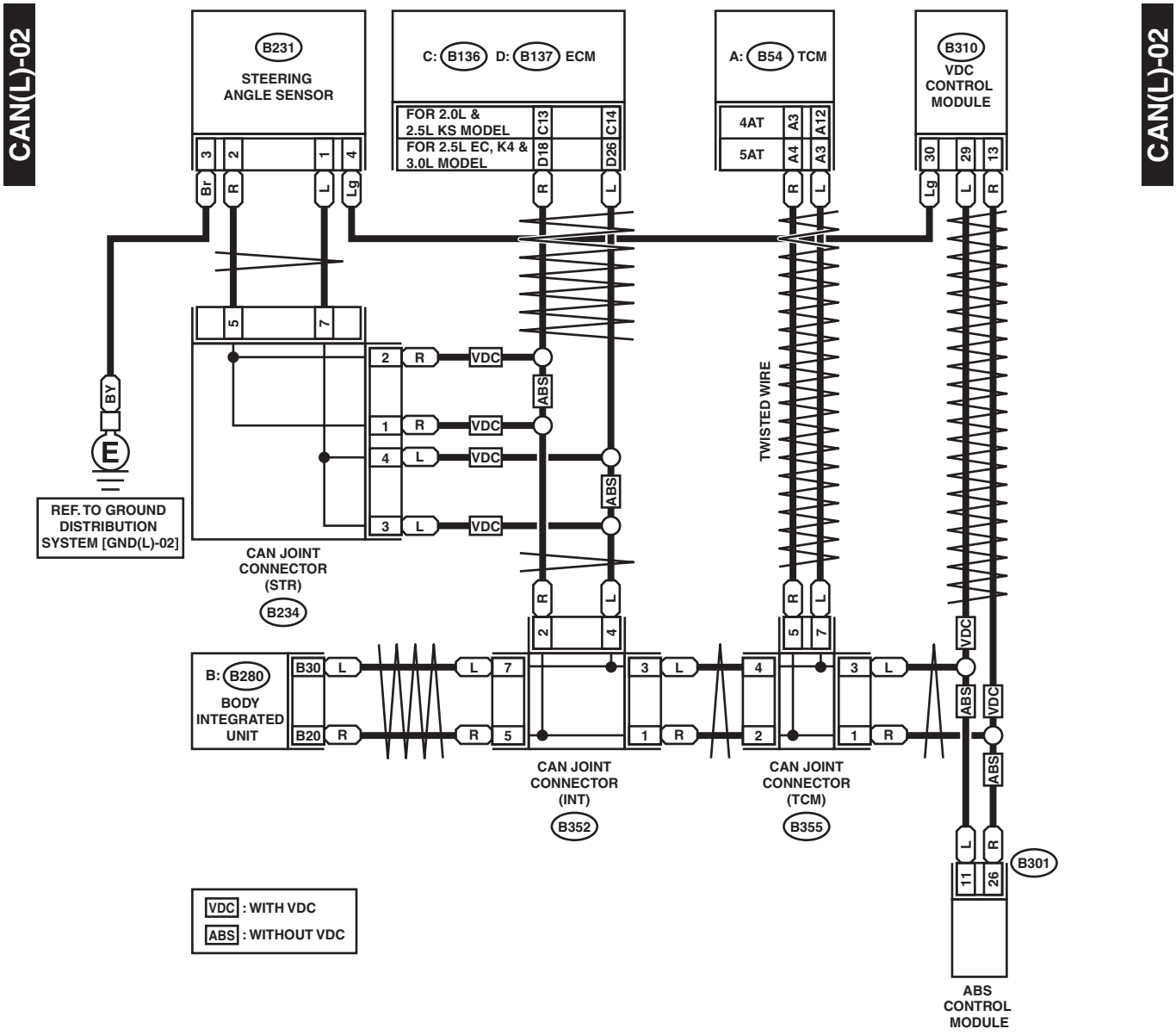
10.CAN Communication System

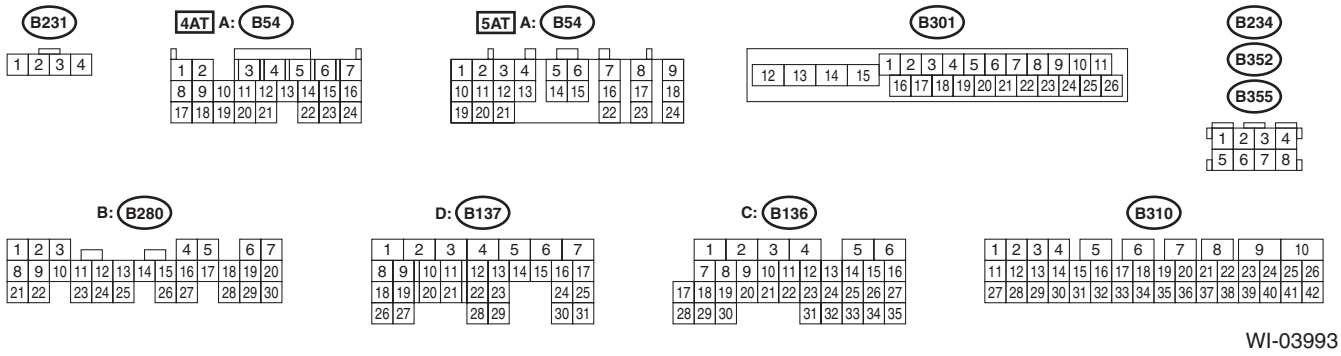
A: WIRING DIAGRAM

1. LHD MODEL



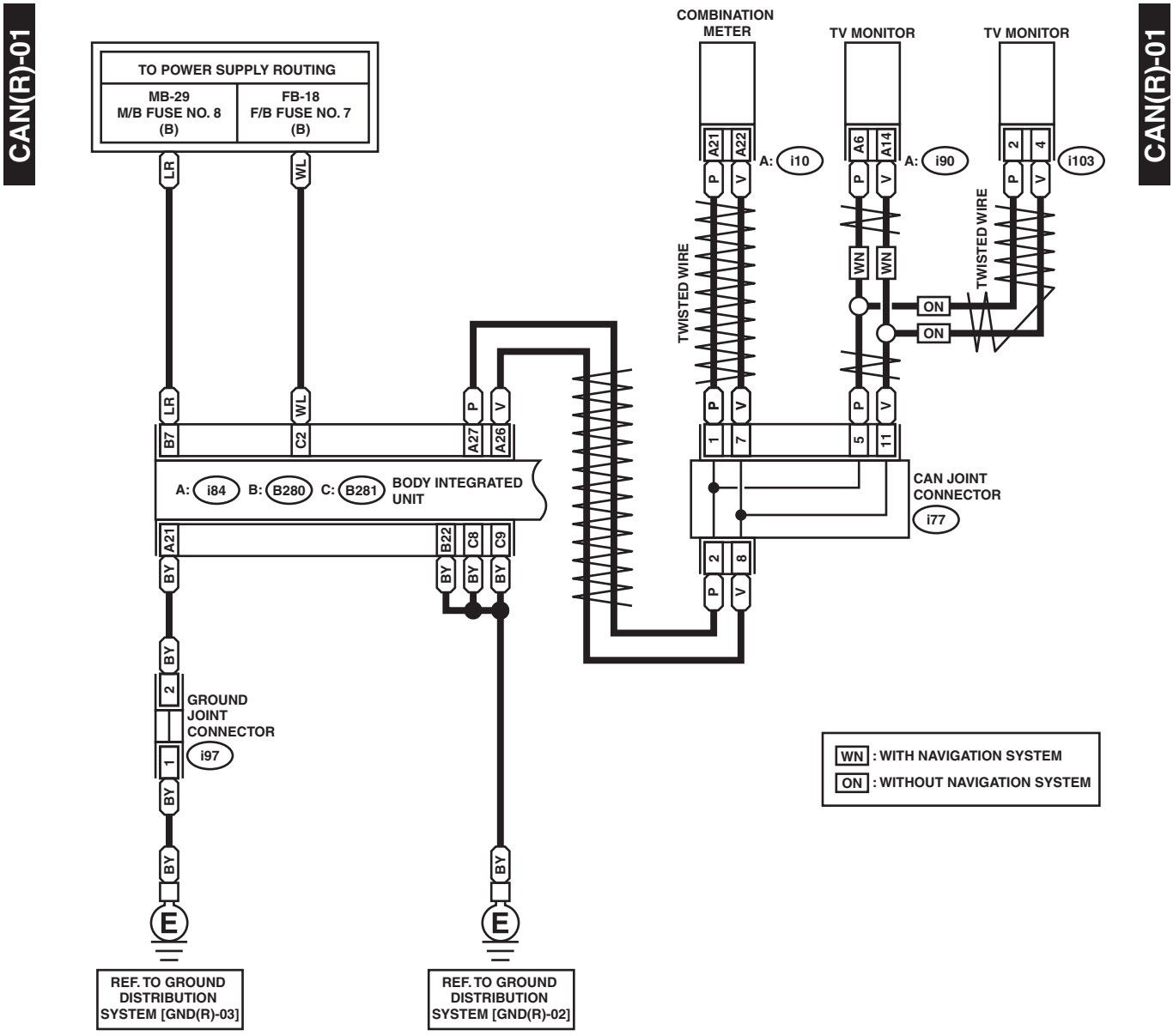
WI-03992


CAN(L)-02
CAN(L)-02
B231
STEERING ANGLE SENSOR
C: B136 D: B137 ECM
FOR 2.0L & 2.5L KS MODEL
FOR 2.5L EC, K4 & 3.0L MODEL
A: B54 TCM
4AT
5AT
B310
VDC CONTROL MODULE
TWISTED WIRE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
CAN JOINT CONNECTOR (STR)
B234
B: B280
BODY INTEGRATED UNIT
CAN JOINT CONNECTOR (INT)
B352
CAN JOINT CONNECTOR (TCM)
B355
B301
ABS CONTROL MODULE
VDC : WITH VDC
ABS : WITHOUT VDC

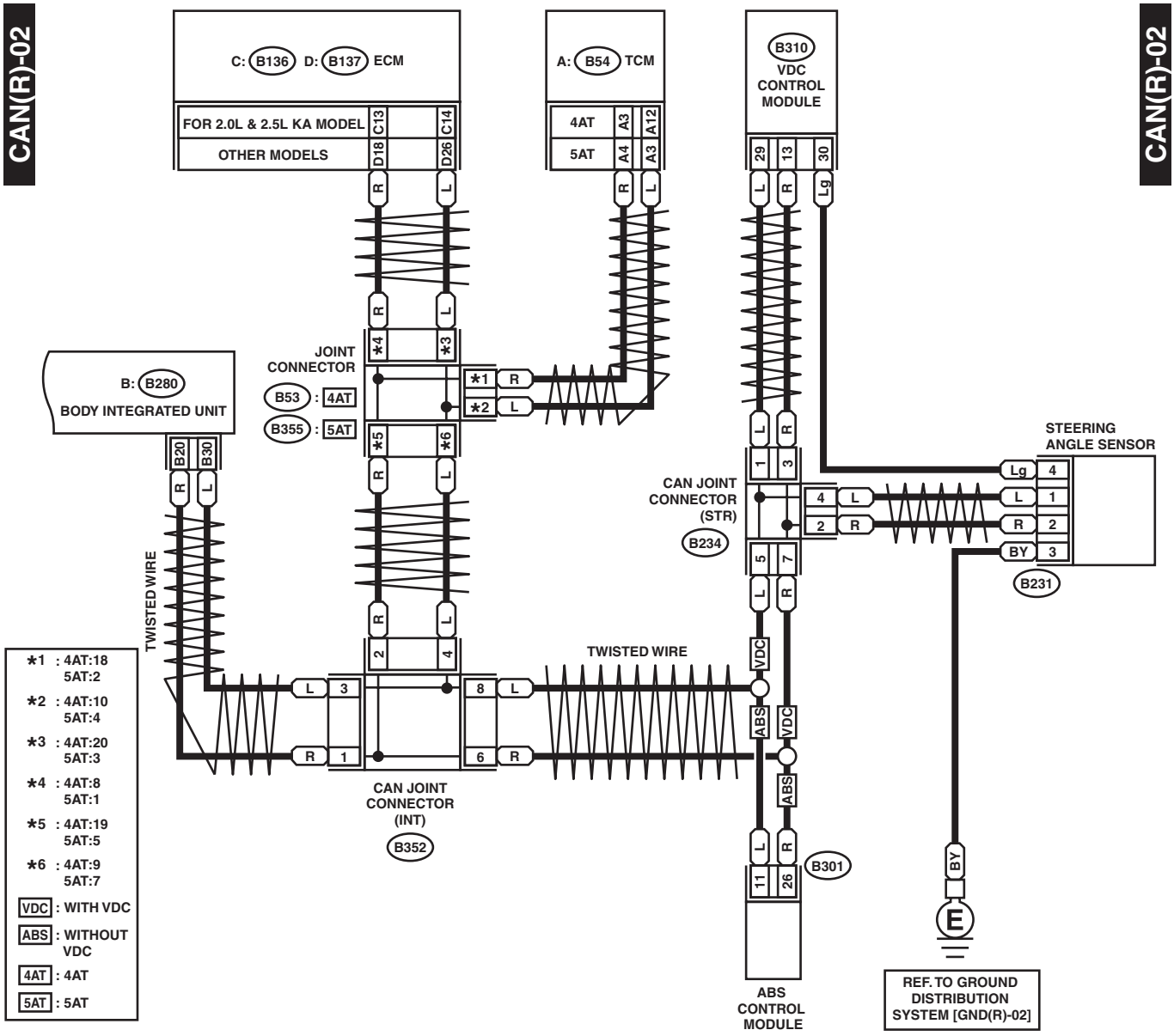

B231
4AT A: B54
5AT A: B54
B301
B234
B352
B355
B: B280
D: B137
C: B136
B310

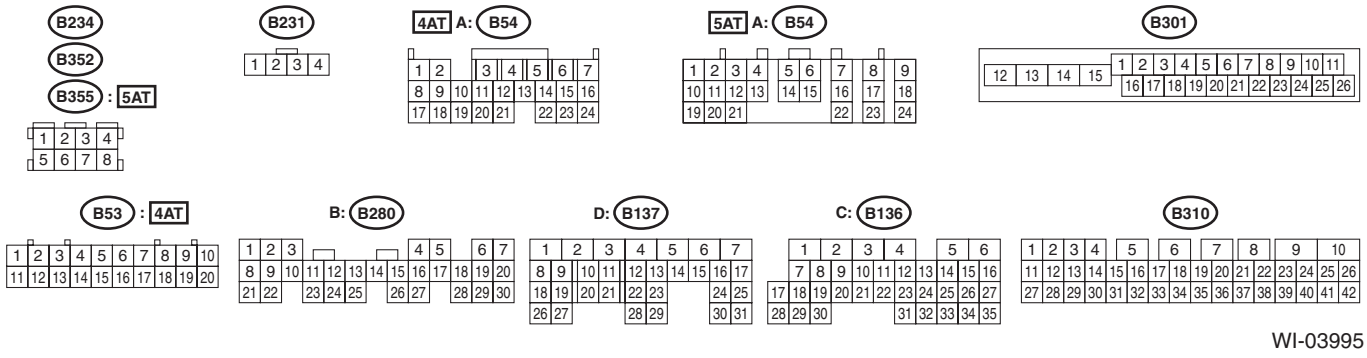
WI-03993

2. RHD MODEL



WI-03994

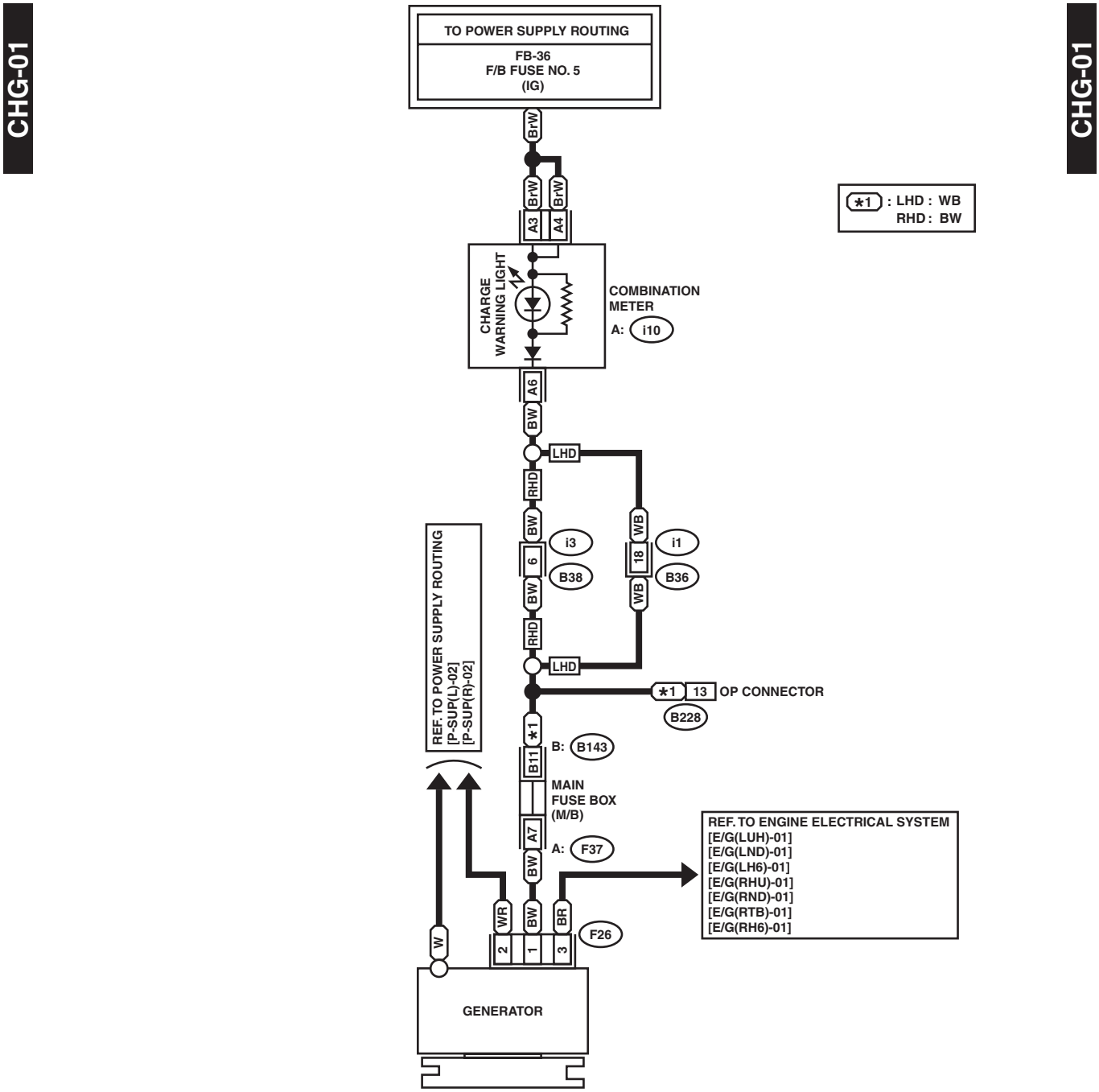

CAN(R)-02
CAN(R)-02
C: B136 D: B137 ECM
FOR 2.0L & 2.5L KA MODEL
OTHER MODELS
C13
C14
D18
D26
A: B54 TCM
4AT
5AT
A3
A4
A12
B310
VDC CONTROL MODULE
29
13
30
Lg
B: B280
BODY INTEGRATED UNIT
B20
B30
JOINT CONNECTOR
B53 : 4AT
B355 : 5AT
*1
*2
*3
*4
*5
*6
STEERING ANGLE SENSOR
CAN JOINT CONNECTOR (STR)
B234
B231
TWISTED WIRE
TWISTED WIRE
CAN JOINT CONNECTOR (INT)
B352
B301
ABS CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
*1 : 4AT:18 5AT:2
*2 : 4AT:10 5AT:4
*3 : 4AT:20 5AT:3
*4 : 4AT:8 5AT:1
*5 : 4AT:19 5AT:5
*6 : 4AT:9 5AT:7
VDC : WITH VDC
ABS : WITHOUT VDC
4AT : 4AT
5AT : 5AT

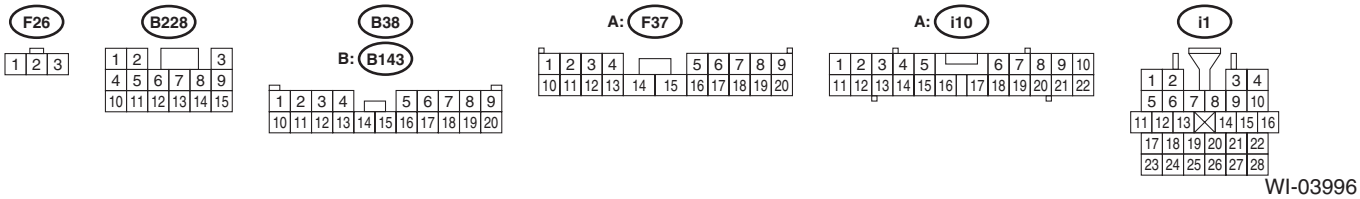

B234
B352
B355 : 5AT
B231
4AT A: B54
5AT A: B54
B301
B53 : 4AT
B: B280
D: B137
C: B136
B310

WI-03995

11.Charging System

A: WIRING DIAGRAM

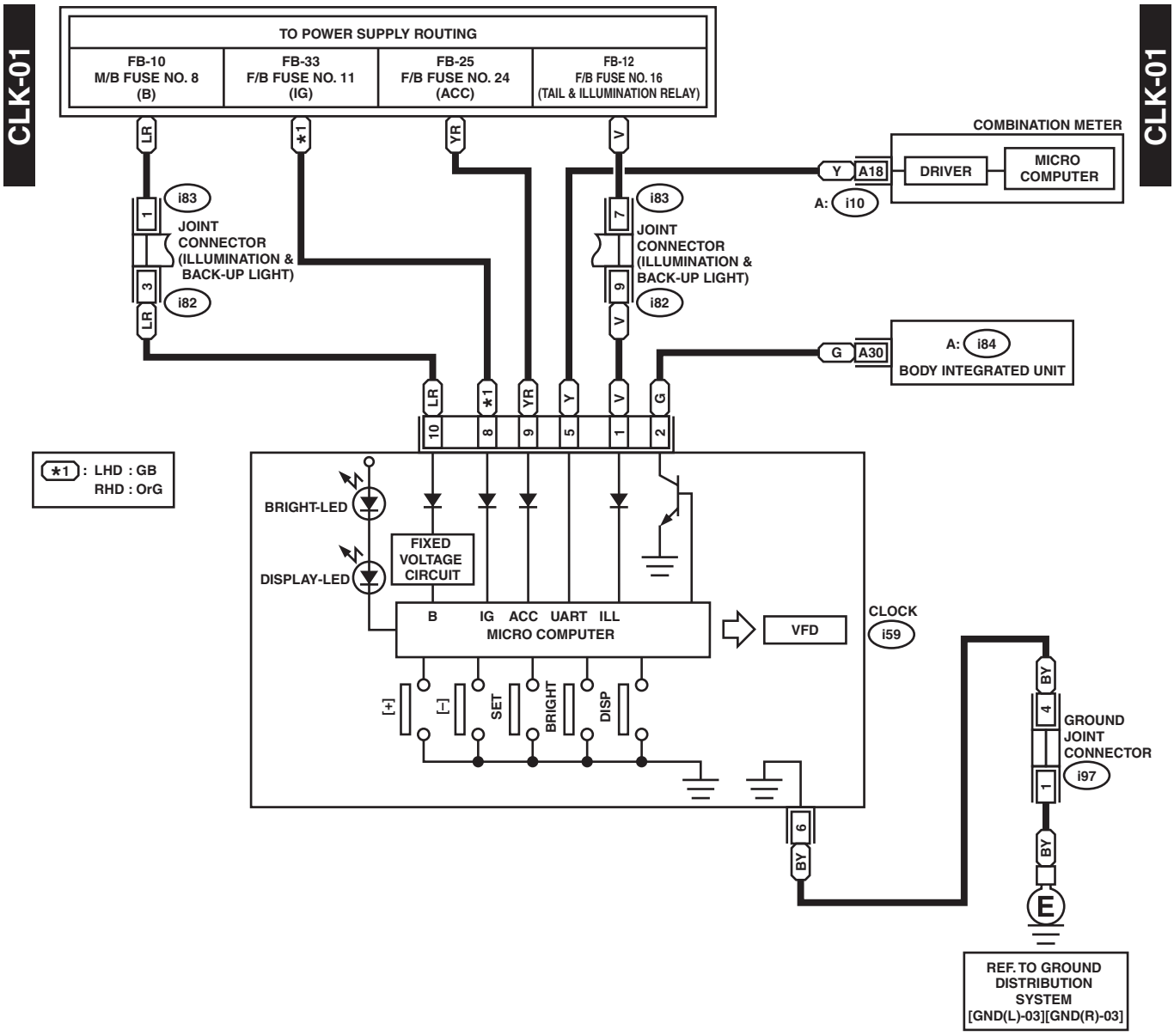


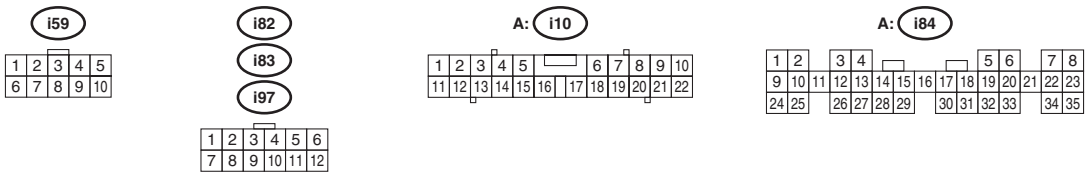


WI-03996

12.Clock System

A: WIRING DIAGRAM





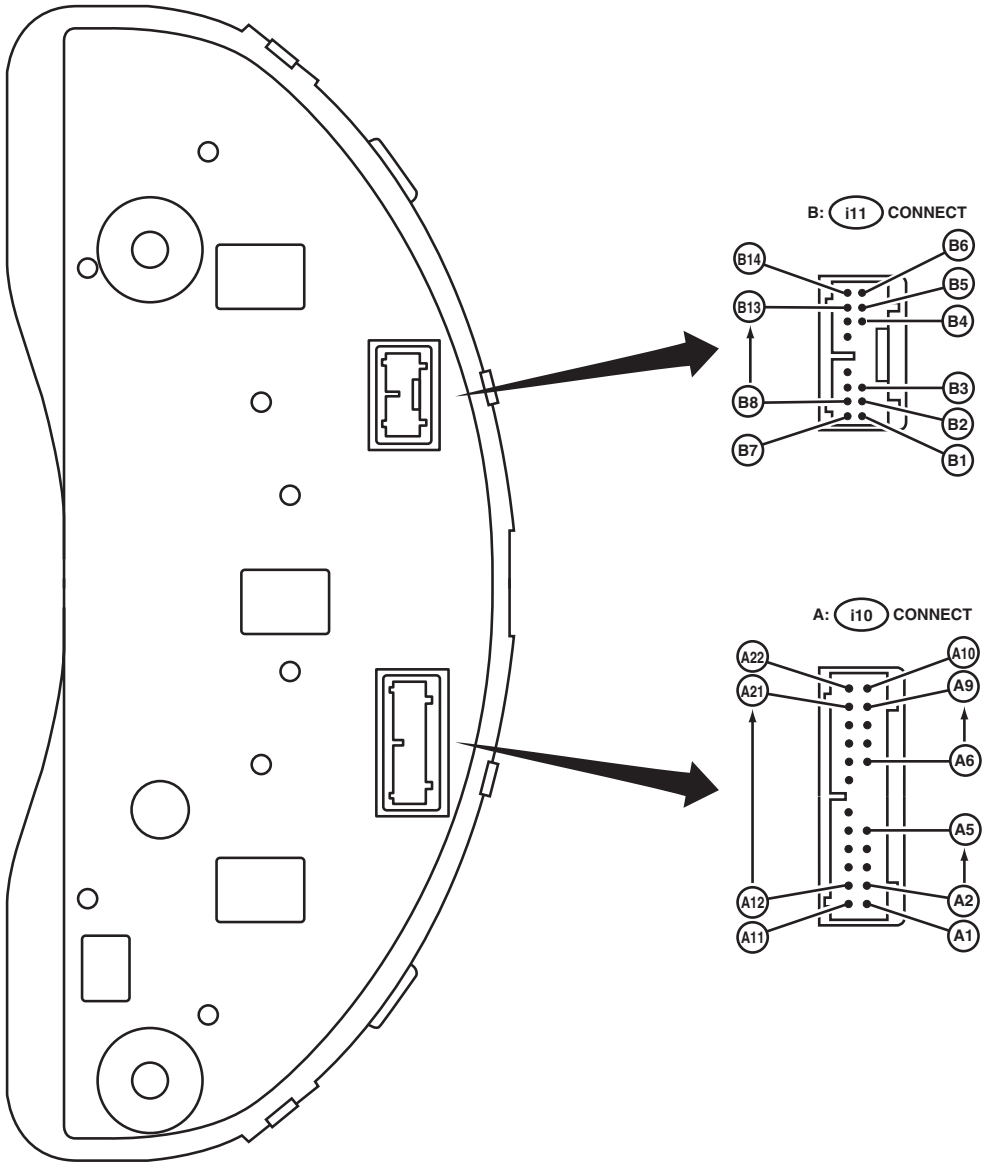
WI-03997

13.Combination Meter

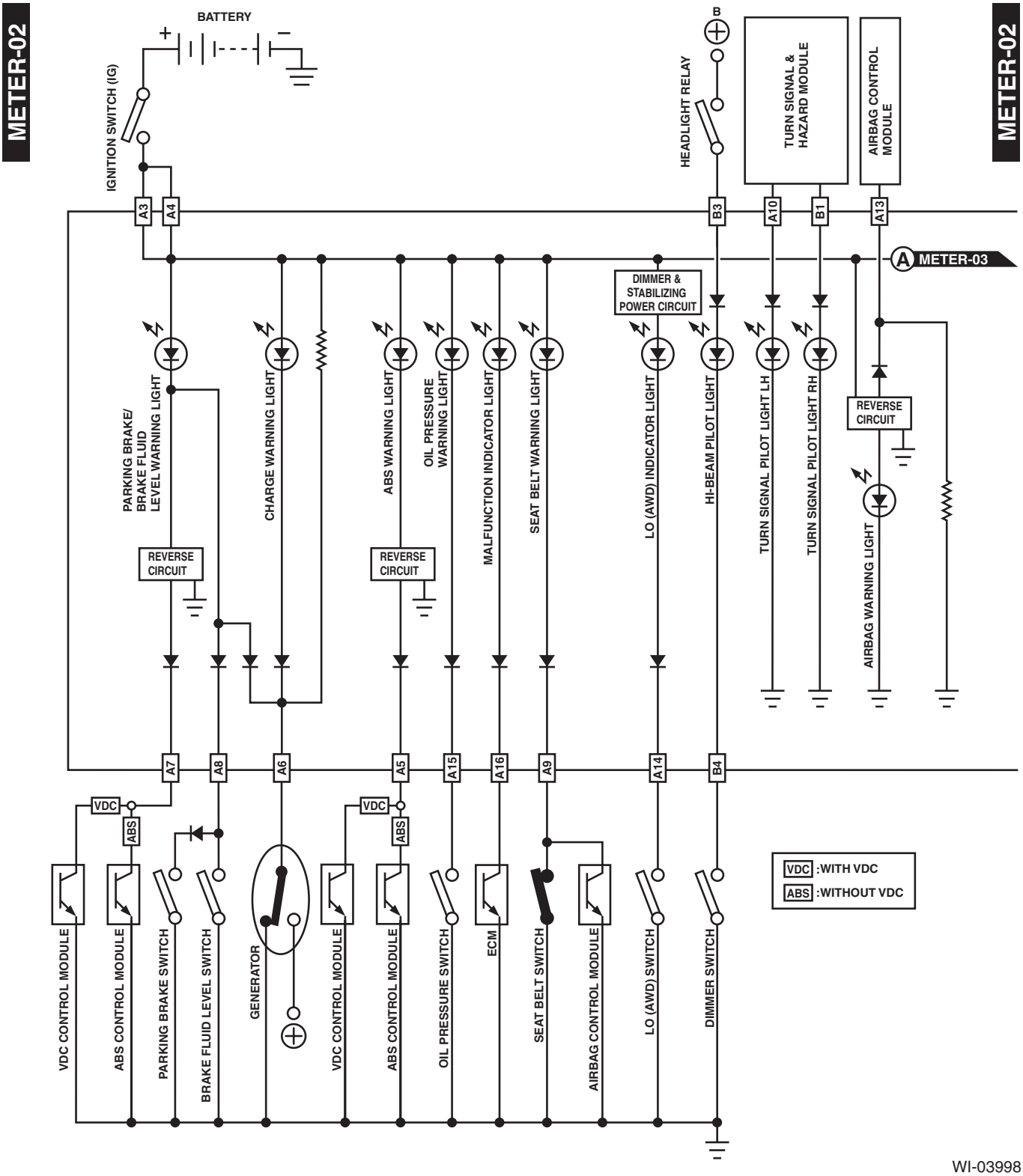
A: WIRING DIAGRAM

METER-01

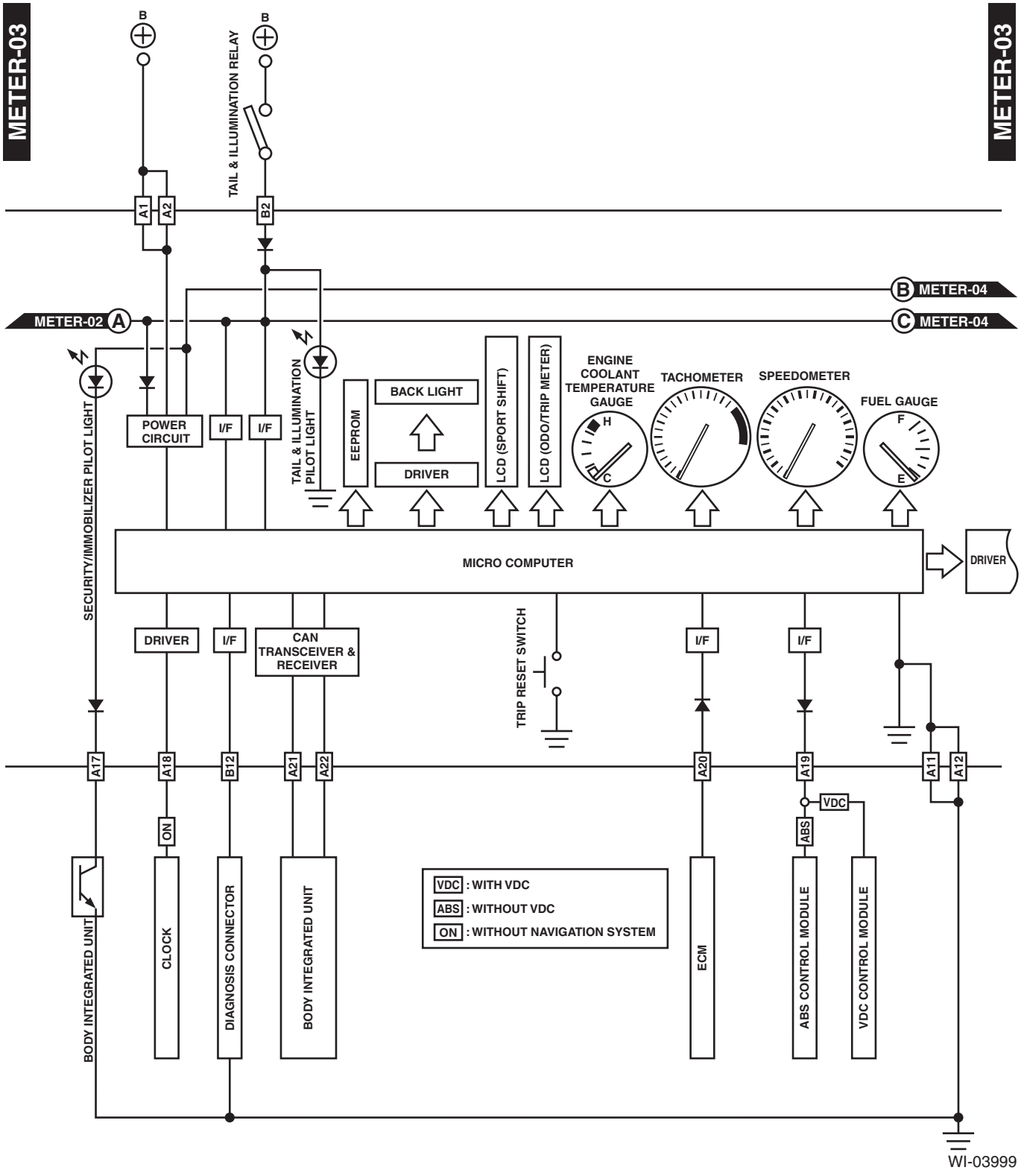
METER-01



WI-03684

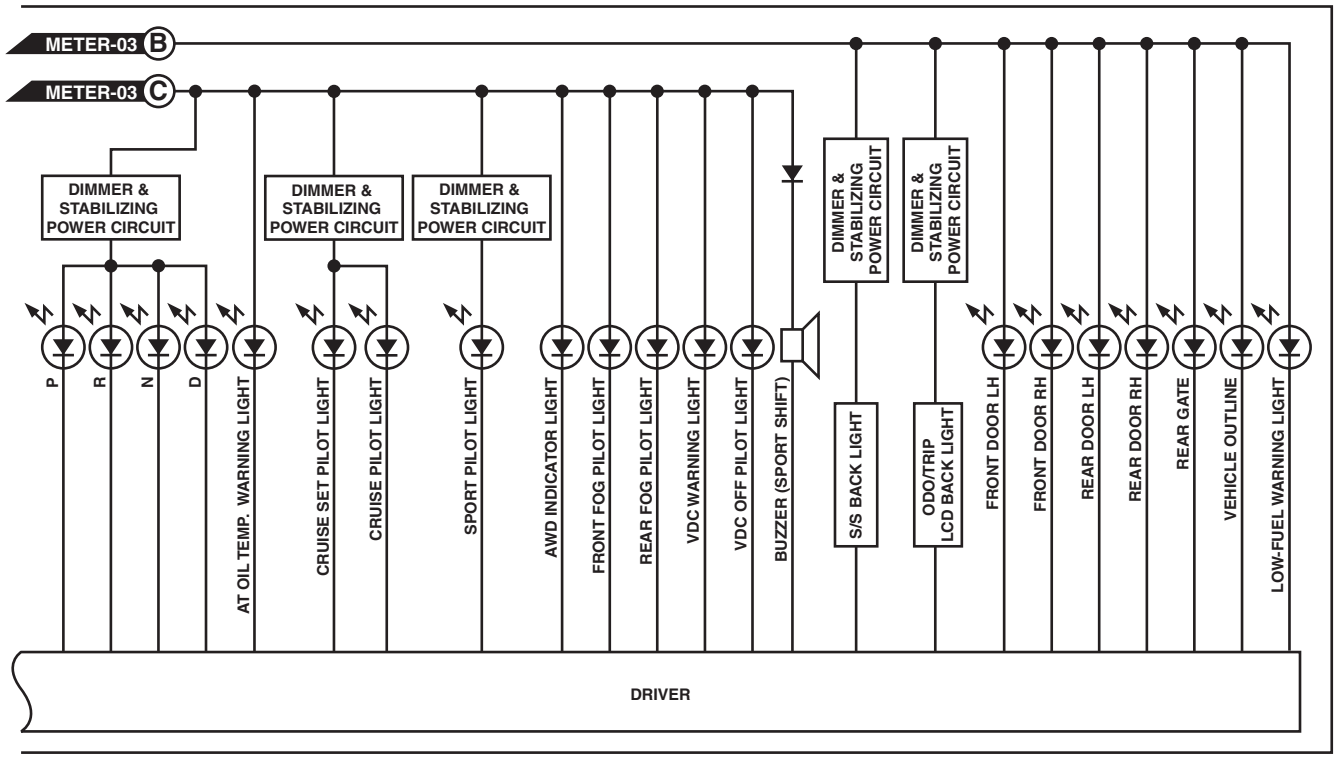

METER-02
METER-02
BATTERY
IGNITION SWITCH (IG)
HEADLIGHT RELAY
B
TURN SIGNAL & HAZARD MODULE
AIRBAG CONTROL MODULE
A3
A4
B3
A10
B1
A13
A METER-03
DIMMER & STABILIZING POWER CIRCUIT
PARKING BRAKE/ BRAKE FLUID LEVEL WARNING LIGHT
CHARGE WARNING LIGHT
ABS WARNING LIGHT
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
SEAT BELT WARNING LIGHT
LO (AWD) INDICATOR LIGHT
HI-BEAM PILOT LIGHT
TURN SIGNAL PILOT LIGHT LH
TURN SIGNAL PILOT LIGHT RH
REVERSE CIRCUIT
AIRBAG WARNING LIGHT
REVERSE CIRCUIT
REVERSE CIRCUIT
A7
A8
A6
A5
A15
A16
A9
A14
B4
VDC
ABS
VDC
ABS
VDC :WITH VDC
ABS :WITHOUT VDC
VDC CONTROL MODULE
ABS CONTROL MODULE
PARKING BRAKE SWITCH
BRAKE FLUID LEVEL SWITCH
GENERATOR
VDC CONTROL MODULE
ABS CONTROL MODULE
OIL PRESSURE SWITCH
ECM
SEAT BELT SWITCH
AIRBAG CONTROL MODULE
LO (AWD) SWITCH
DIMMER SWITCH

WI-03998


METER-03
METER-03
B
B
TAIL & ILLUMINATION RELAY
A1
A2
B2
METER-02 A
B METER-04
C METER-04
SECURITY/IMMOBILIZER PILOT LIGHT
POWER CIRCUIT
I/F
I/F
TAIL & ILLUMINATION PILOT LIGHT
EEPROM
BACK LIGHT
DRIVER
LCD (SPORT SHIFT)
LCD (ODO/TRIP METER)
ENGINE COOLANT TEMPERATURE GAUGE
H
C
TACHOMETER
SPEEDOMETER
FUEL GAUGE
F
E
MICRO COMPUTER
DRIVER
DRIVER
I/F
CAN TRANSCEIVER & RECEIVER
TRIP RESET SWITCH
I/F
I/F
A17
A18
B12
A21
A22
A20
A19
A11
A12
ON
VDC
ABS
VDC : WITH VDC
ABS : WITHOUT VDC
ON : WITHOUT NAVIGATION SYSTEM
BODY INTEGRATED UNIT
CLOCK
DIAGNOSIS CONNECTOR
BODY INTEGRATED UNIT
ECM
ABS CONTROL MODULE
VDC CONTROL MODULE
WI-03999

METER-04

METER-04

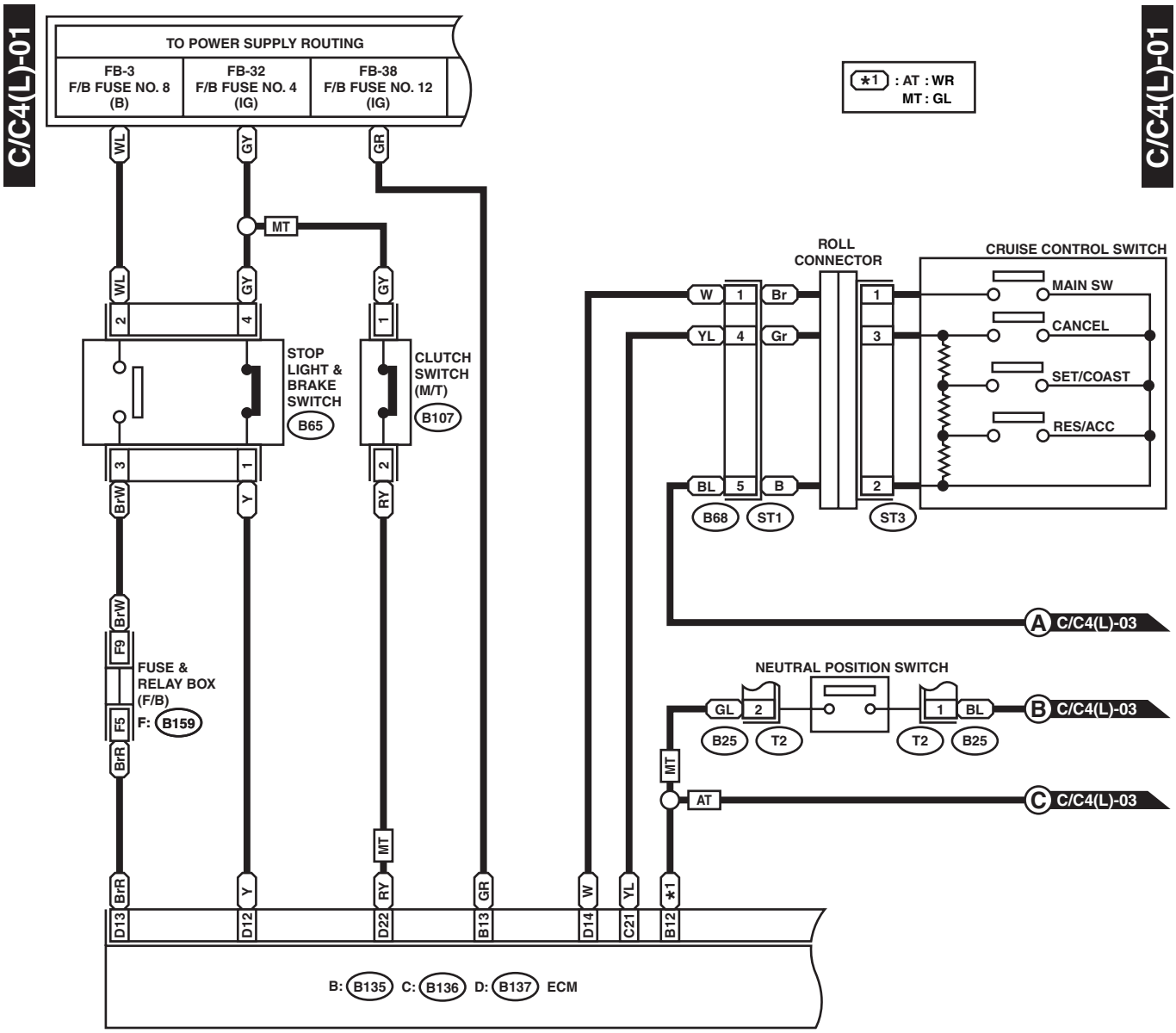


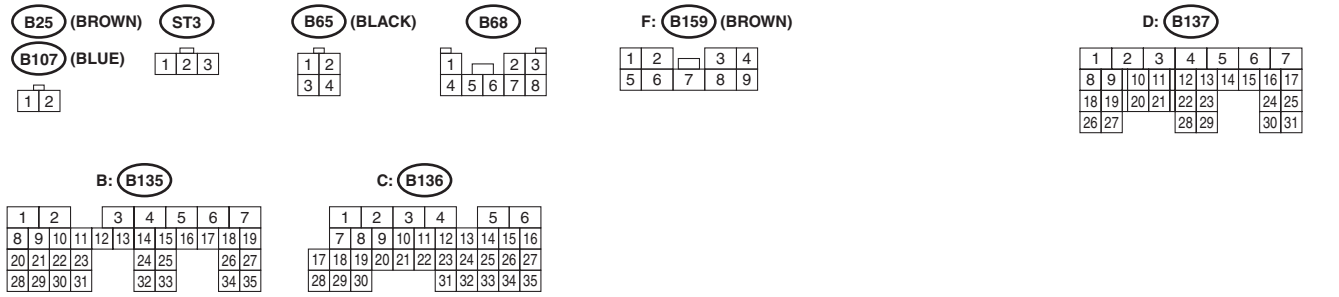
WI-04000

14.Cruise Control System

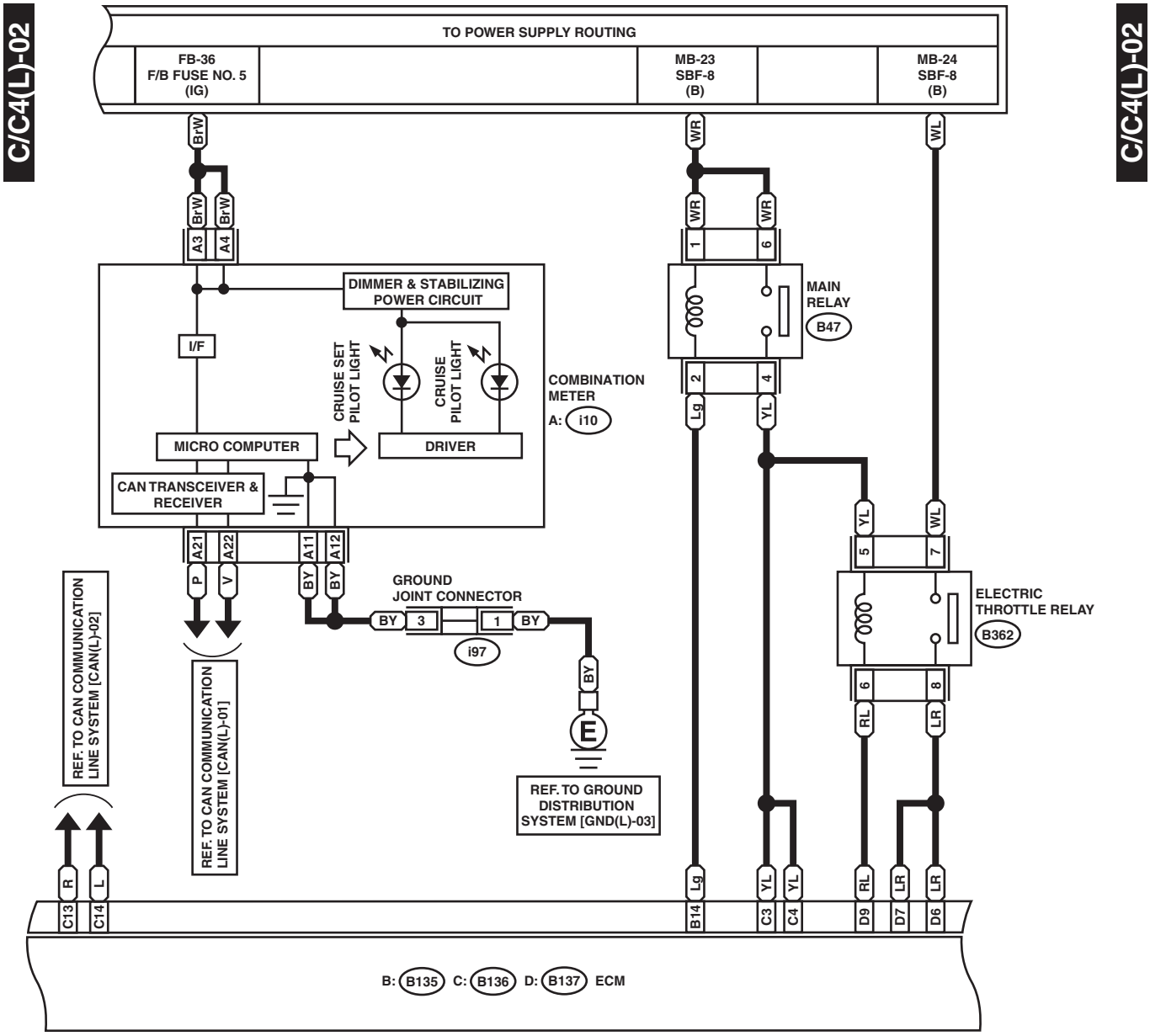
A: WIRING DIAGRAM

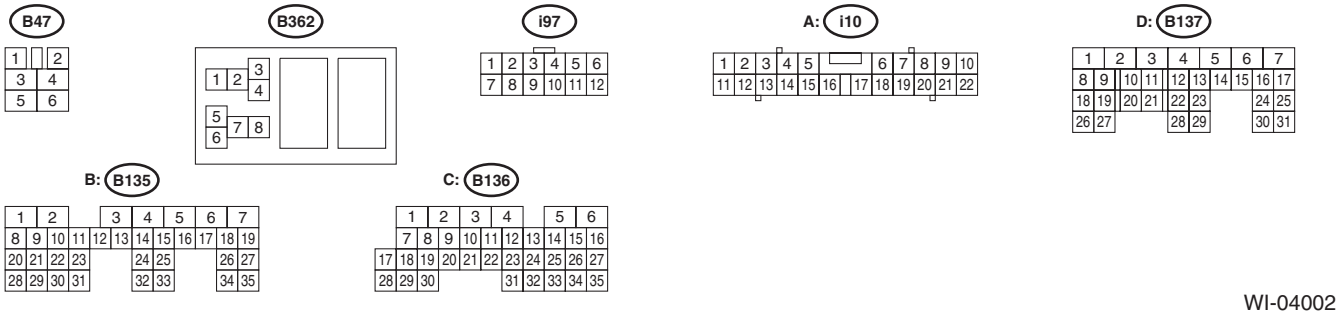
1. LHD 2.0 L MODEL AND 2.5 L KS MODEL



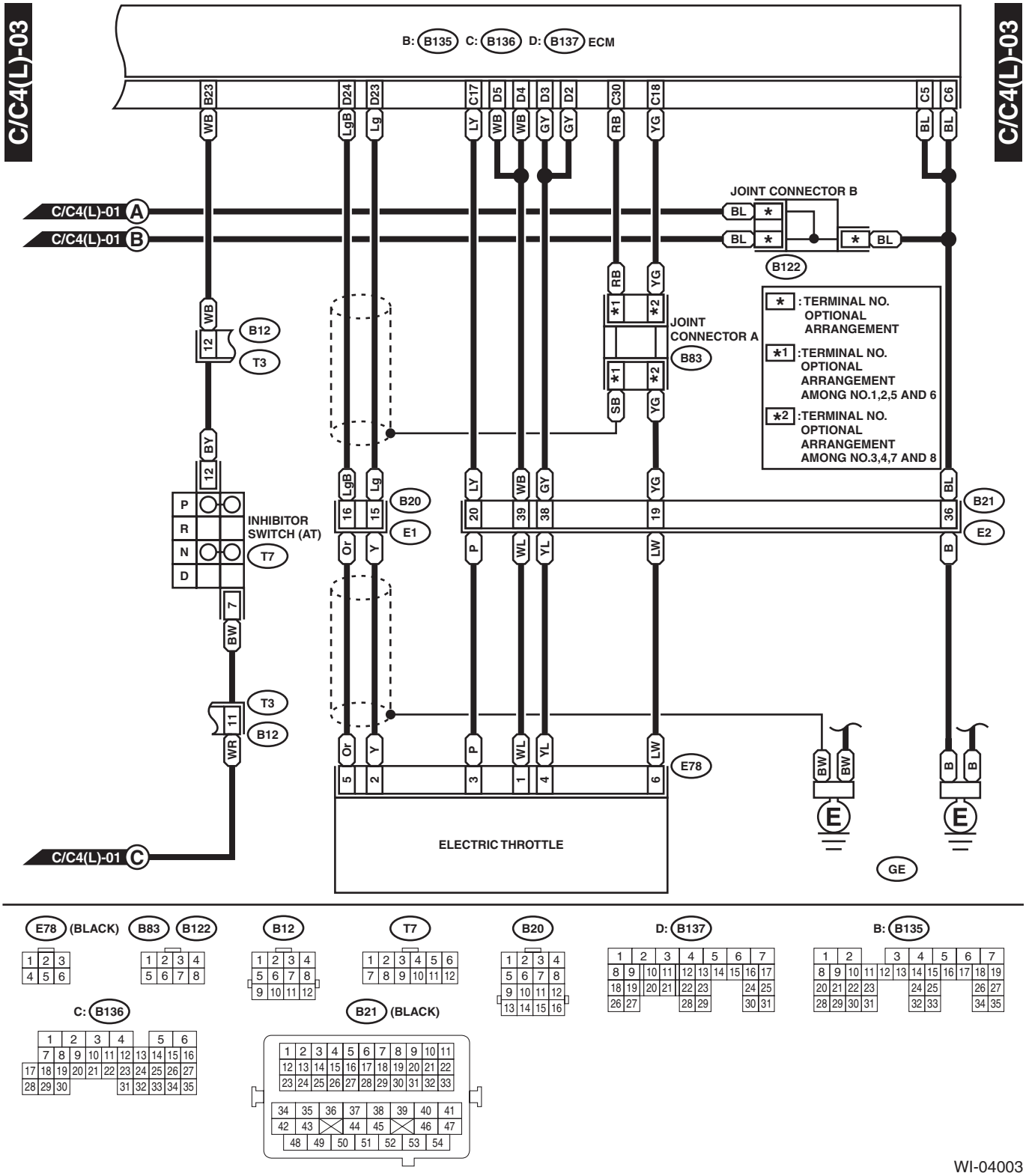


WI-04001


C/C4(L)-02
C/C4(L)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
MB-23
SBF-8
(B)
MB-24
SBF-8
(B)
BrW
WR
WL
A3
A4
1
6
DIMMER & STABILIZING POWER CIRCUIT
I/F
CRUISE SET PILOT LIGHT
CRUISE PILOT LIGHT
COMBINATION METER
A: i10
MAIN RELAY
B47
2
4
Lg
YL
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
P
V
BY
5
7
ELECTRIC THROTTLE RELAY
B362
6
8
RL
LR
GROUND JOINT CONNECTOR
3
1
i97
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-01]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
R
L
C13
C14
B14
C3
C4
D9
D7
D6
B: B135 C: B136 D: B137 ECM


B47
B362
i97
A: i10
D: B137
B: B135
C: B136

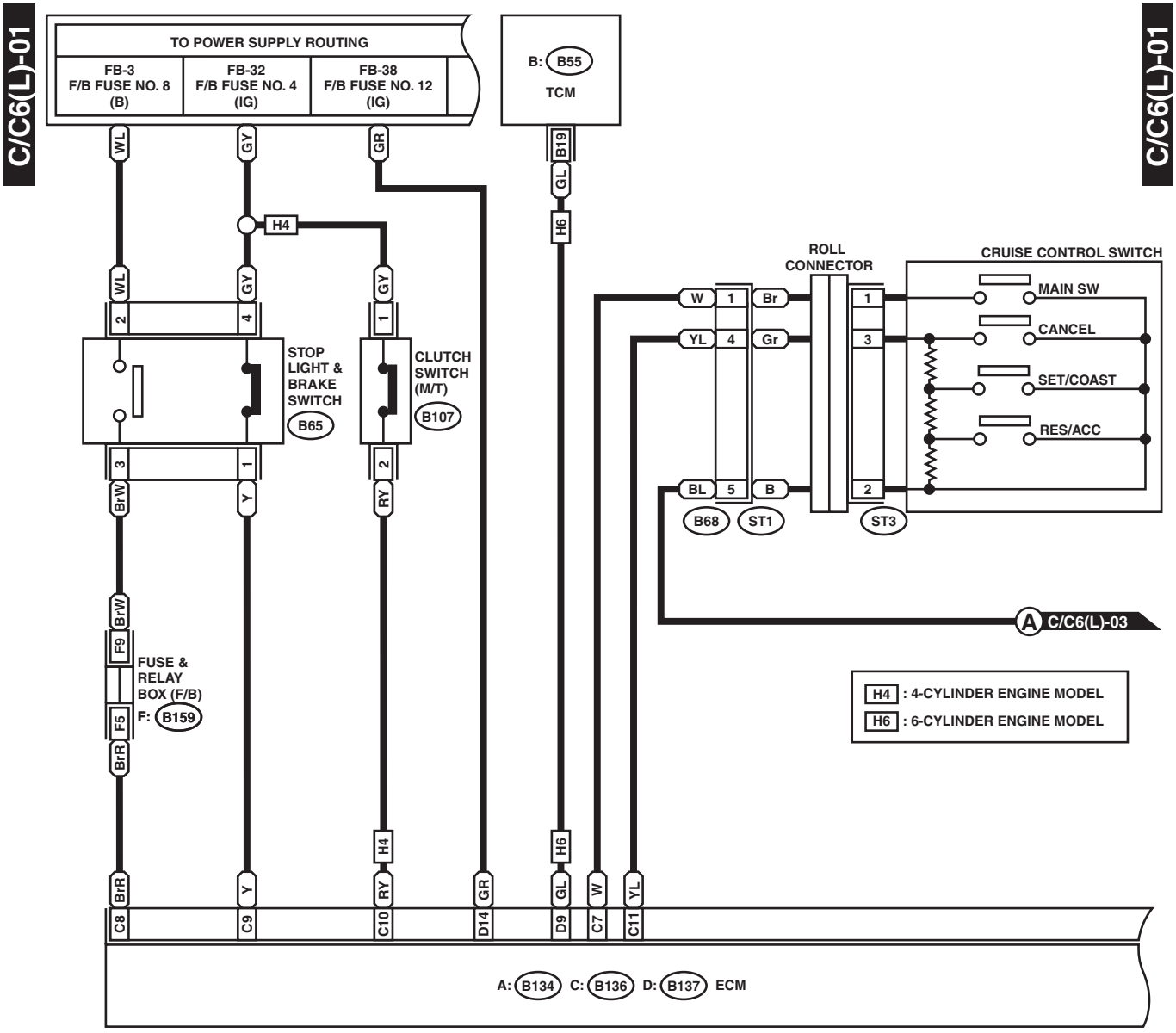
WI-04002

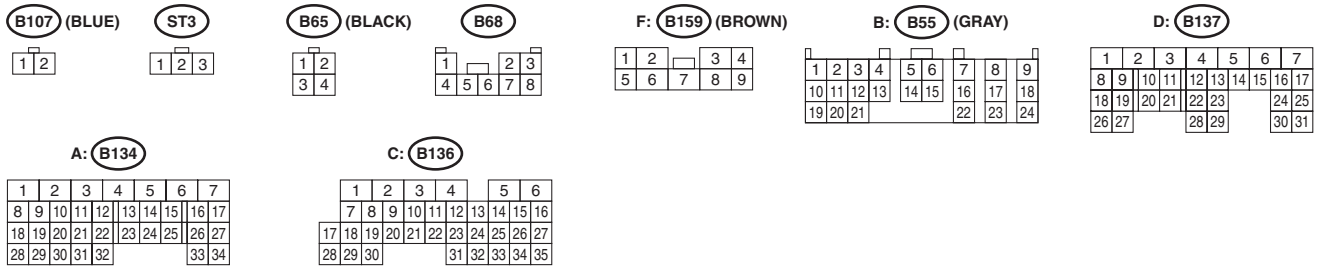

C/C4(L)-03
C/C4(L)-03
B: B135 C: B136 D: B137 ECM
B23 D24 D23 C17 D5 D4 D3 D2 C30 C18 C5 C6
WB LgB Lg LY WB WB GY GY RB YG BL BL
C/C4(L)-01 A
C/C4(L)-01 B
JOINT CONNECTOR B
B122
JOINT CONNECTOR A
B83
* : TERMINAL NO. OPTIONAL ARRANGEMENT
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.1,2,5 AND 6
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.3,4,7 AND 8
B12
T3
INHIBITOR SWITCH (AT)
T7
P
R
N
D
B20
E1
B21
E2
E78
ELECTRIC THROTTLE
GE
C/C4(L)-01 C

E78 (BLACK)
B83
B122
B12
T7
B20
D: B137
B: B135
C: B136
B21 (BLACK)

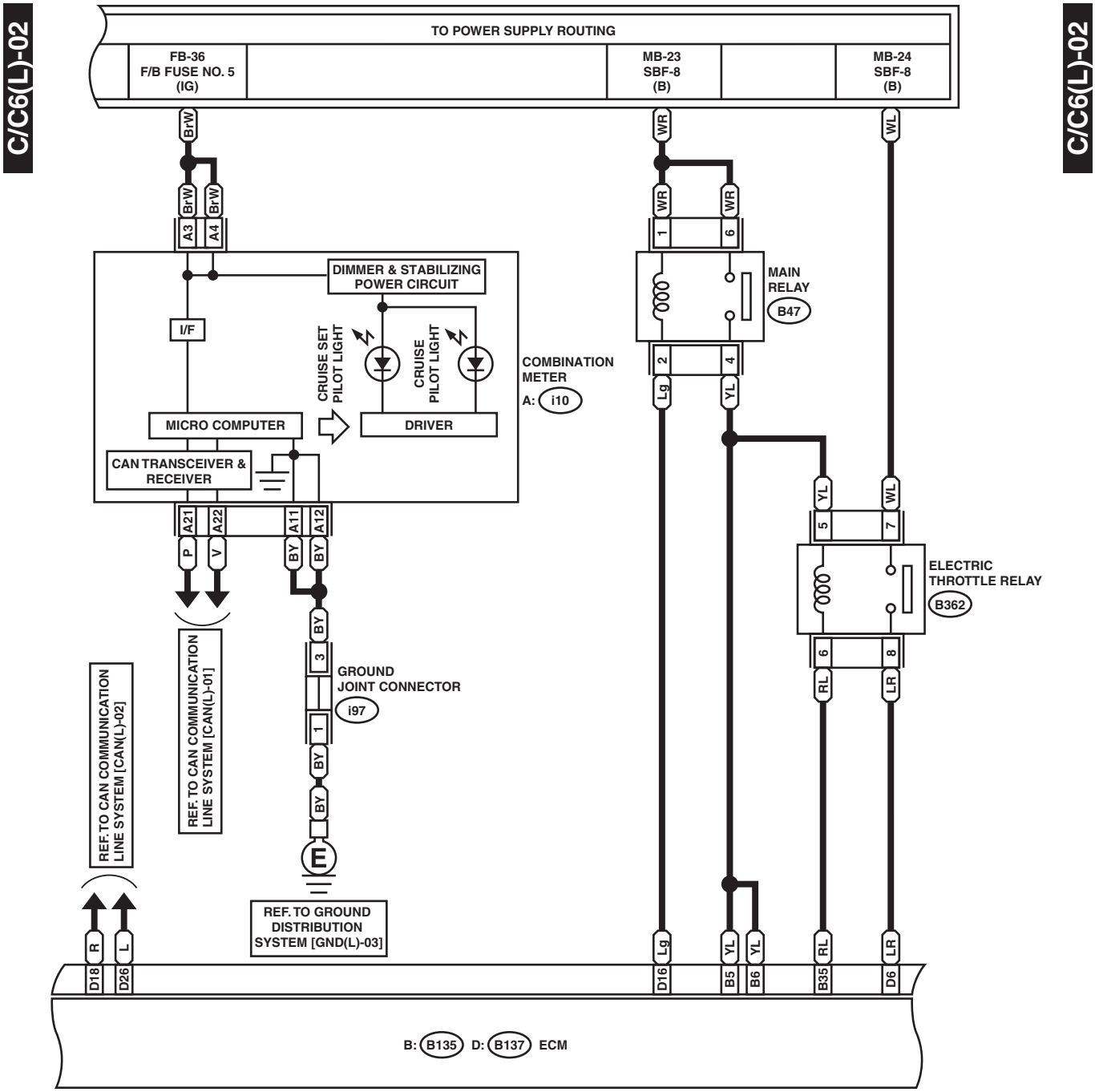
WI-04003

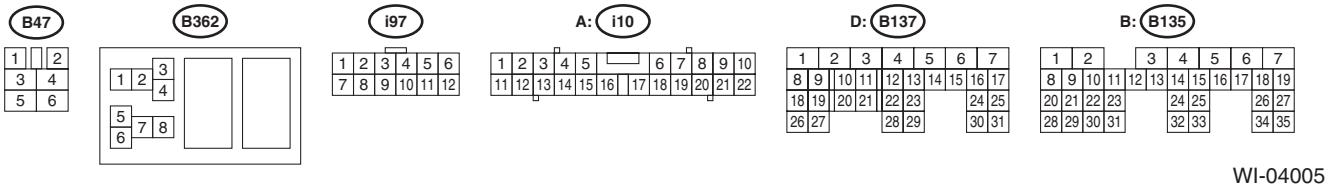
2. LHD 2.5 L EC, K4 MODEL AND 3.0 L MODEL



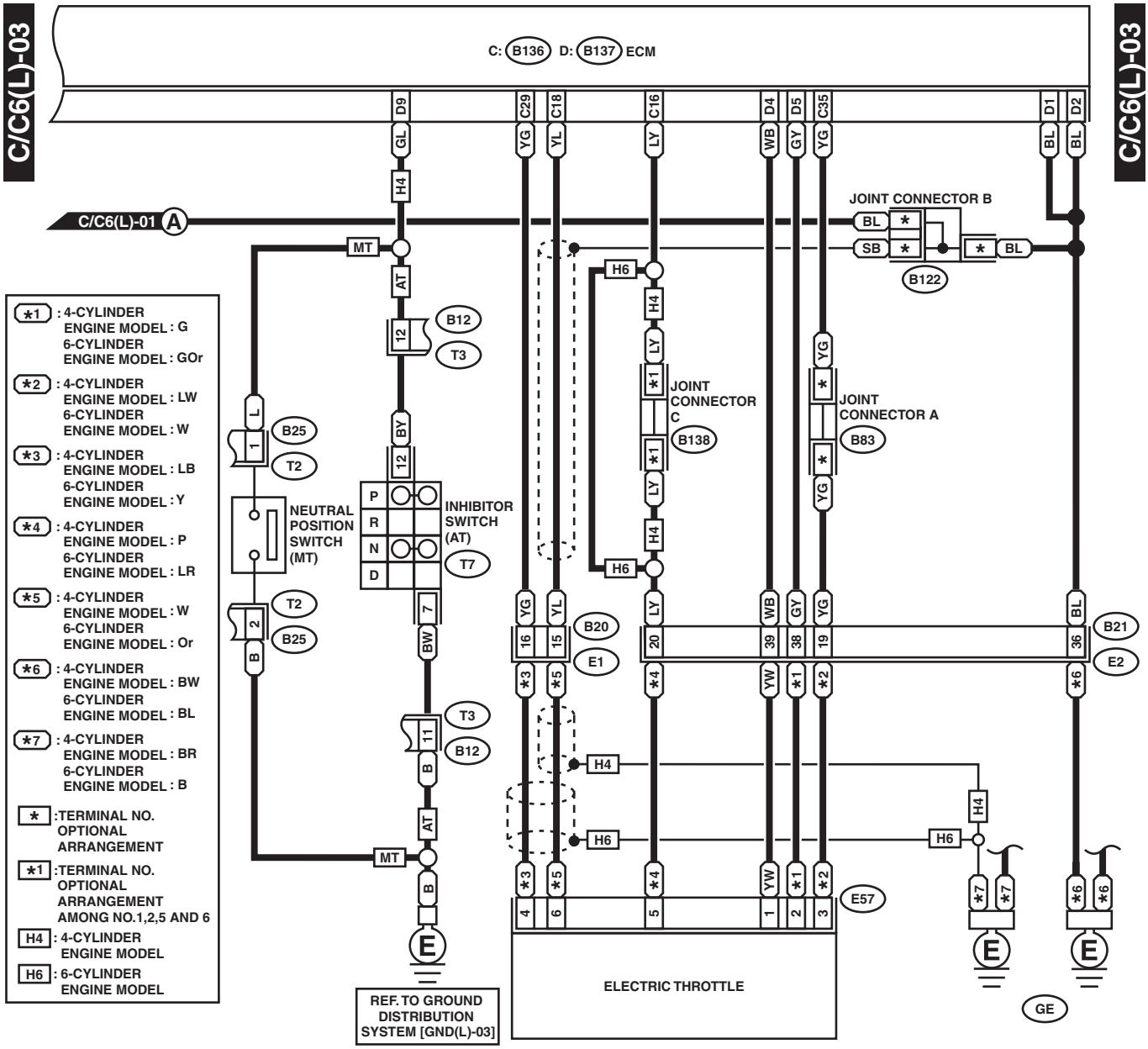


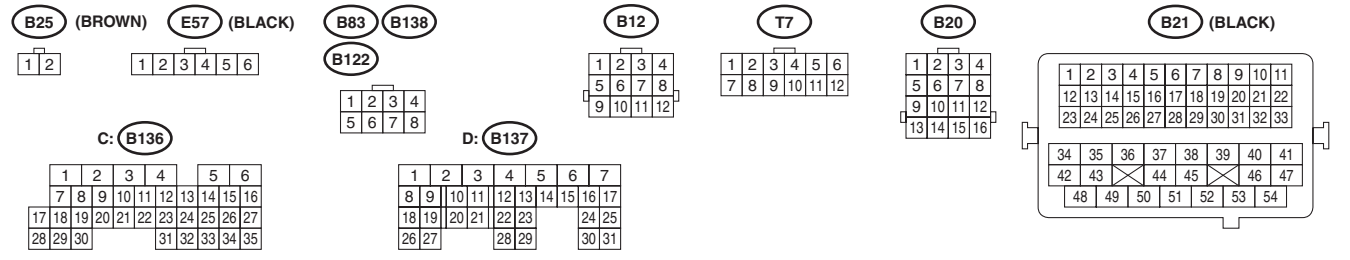
WI-04004


C/C6(L)-02
C/C6(L)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
MB-23
SBF-8
(B)
MB-24
SBF-8
(B)
BrW
WR
WL
A3
A4
1
6
DIMMER & STABILIZING POWER CIRCUIT
I/F
CRUISE SET PILOT LIGHT
CRUISE PILOT LIGHT
COMBINATION METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
MAIN RELAY
B47
2
4
Lg
YL
A21
A22
A11
A12
P
V
BY
5
7
ELECTRIC THROTTLE RELAY
B362
6
8
RL
LR
3
GROUND JOINT CONNECTOR
i97
1
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-01]
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
R
L
D18
D26
D16
B5
B6
B35
D6
B: B135 D: B137 ECM


B47
B362
i97
A: i10
D: B137
B: B135

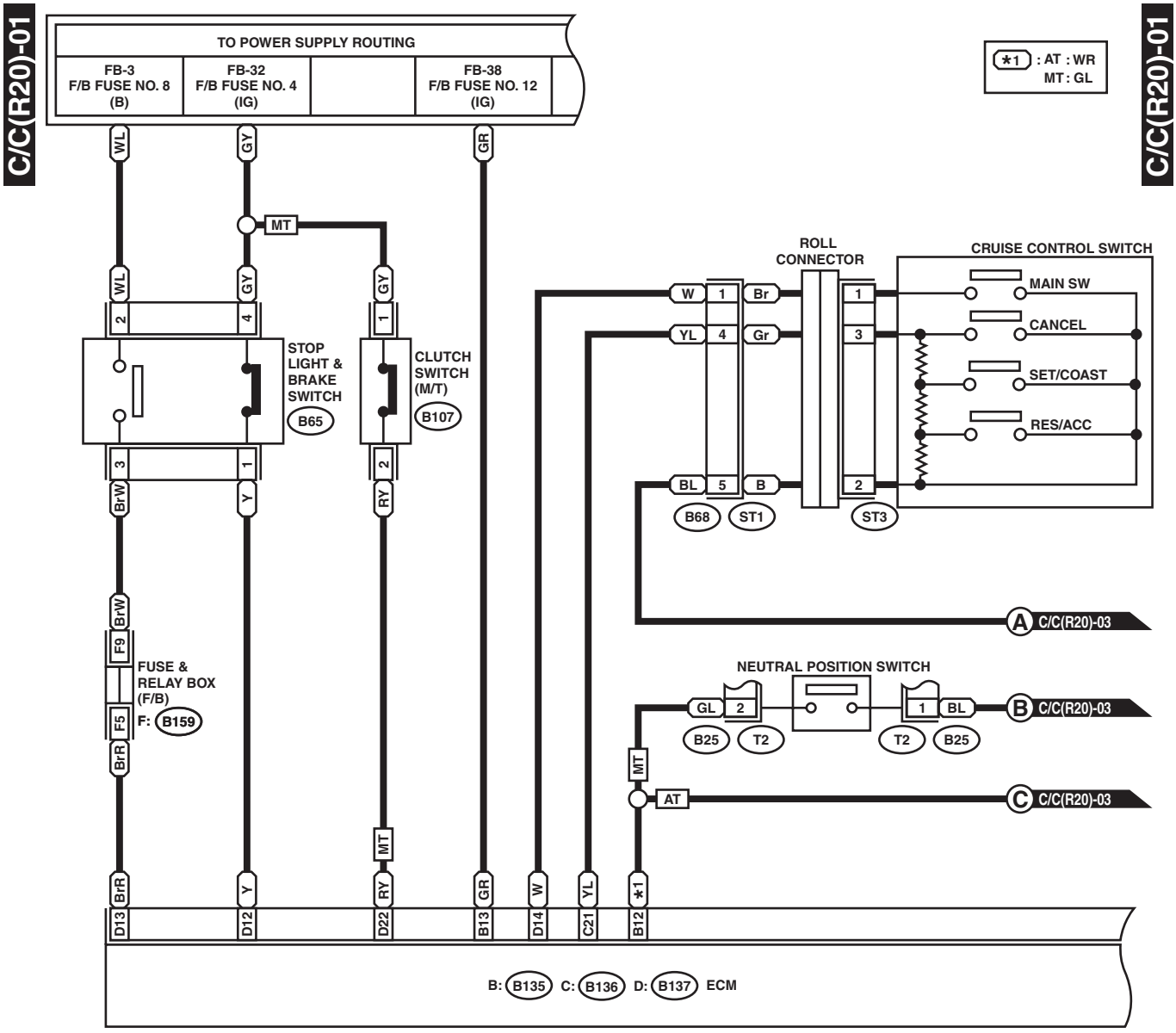
WI-04005

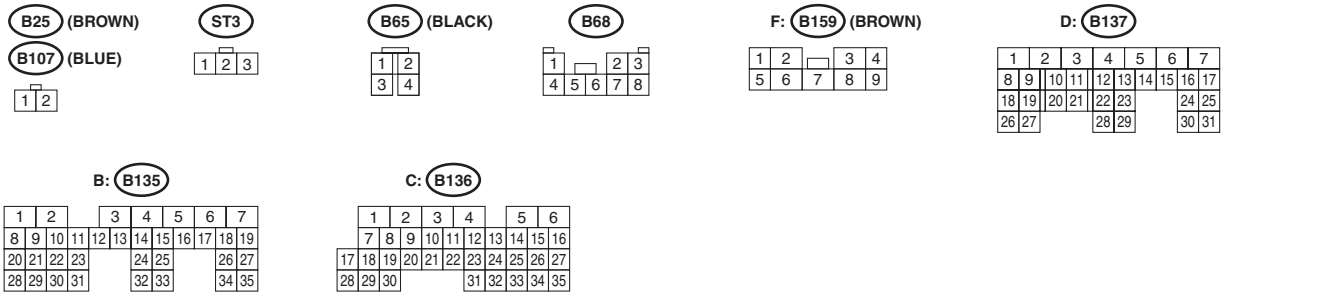

C/C6(L)-03
C: B136 D: B137 ECM
C/C6(L)-01 A
JOINT CONNECTOR B
B122
JOINT CONNECTOR C
B138
JOINT CONNECTOR A
B83
NEUTRAL POSITION SWITCH (MT)
INHIBITOR SWITCH (AT)
B25
B12
B20
B21
E1
E2
E57
T2
T3
T7
ELECTRIC THROTTLE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
GE
*1 : 4-CYLINDER ENGINE MODEL : G 6-CYLINDER ENGINE MODEL : GOr
*2 : 4-CYLINDER ENGINE MODEL : LW 6-CYLINDER ENGINE MODEL : W
*3 : 4-CYLINDER ENGINE MODEL : LB 6-CYLINDER ENGINE MODEL : Y
*4 : 4-CYLINDER ENGINE MODEL : P 6-CYLINDER ENGINE MODEL : LR
*5 : 4-CYLINDER ENGINE MODEL : W 6-CYLINDER ENGINE MODEL : Or
*6 : 4-CYLINDER ENGINE MODEL : BW 6-CYLINDER ENGINE MODEL : BL
*7 : 4-CYLINDER ENGINE MODEL : BR 6-CYLINDER ENGINE MODEL : B
* :TERMINAL NO. OPTIONAL ARRANGEMENT
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.1,2,5 AND 6
H4 : 4-CYLINDER ENGINE MODEL
H6 : 6-CYLINDER ENGINE MODEL


B25 (BROWN)
E57 (BLACK)
B83 B138
B122
B12
T7
B20
B21 (BLACK)
C: B136
D: B137

WI-04006

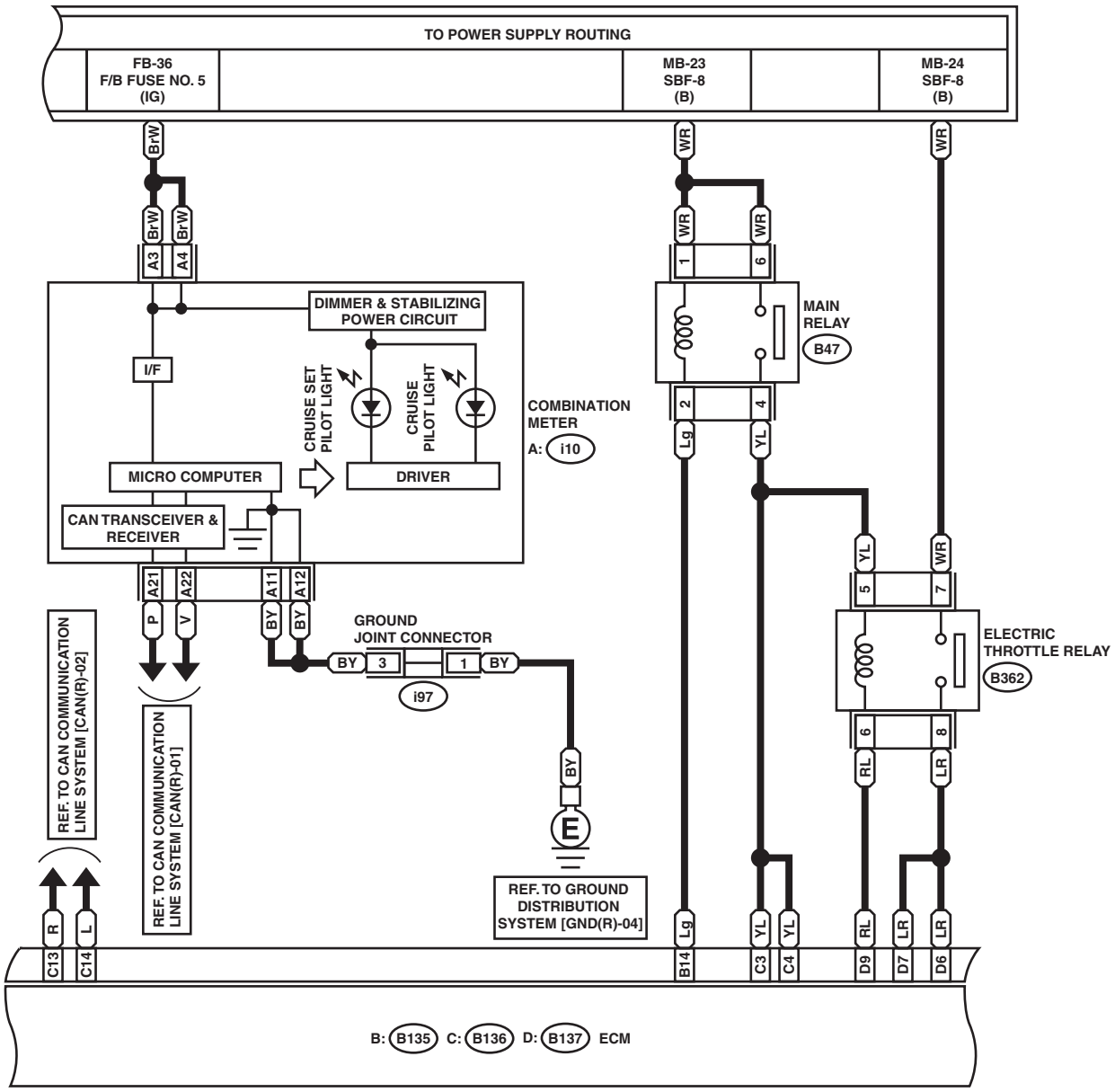
3. RHD 2.0 L NON-TURBO MODEL AND 2.5 L KA MODEL

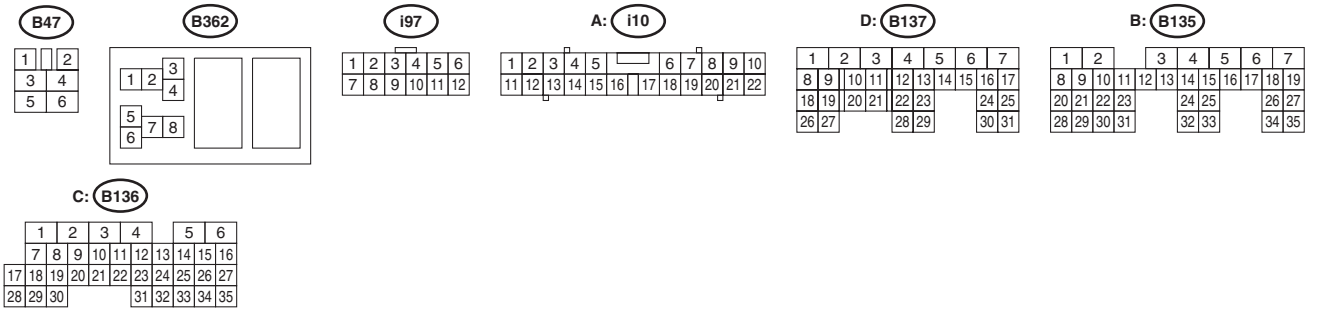




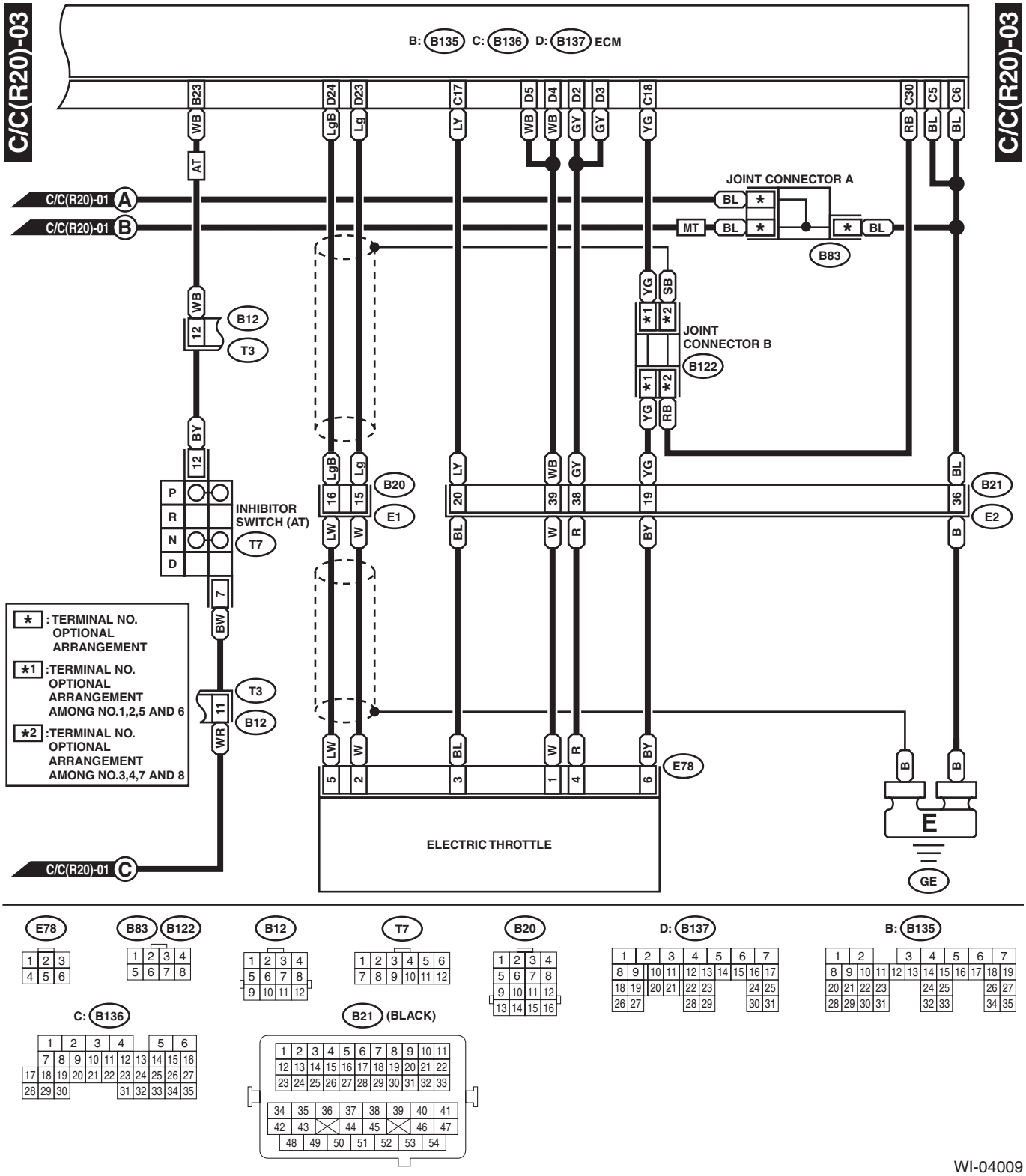
WI-04007

C/C(R20)-02





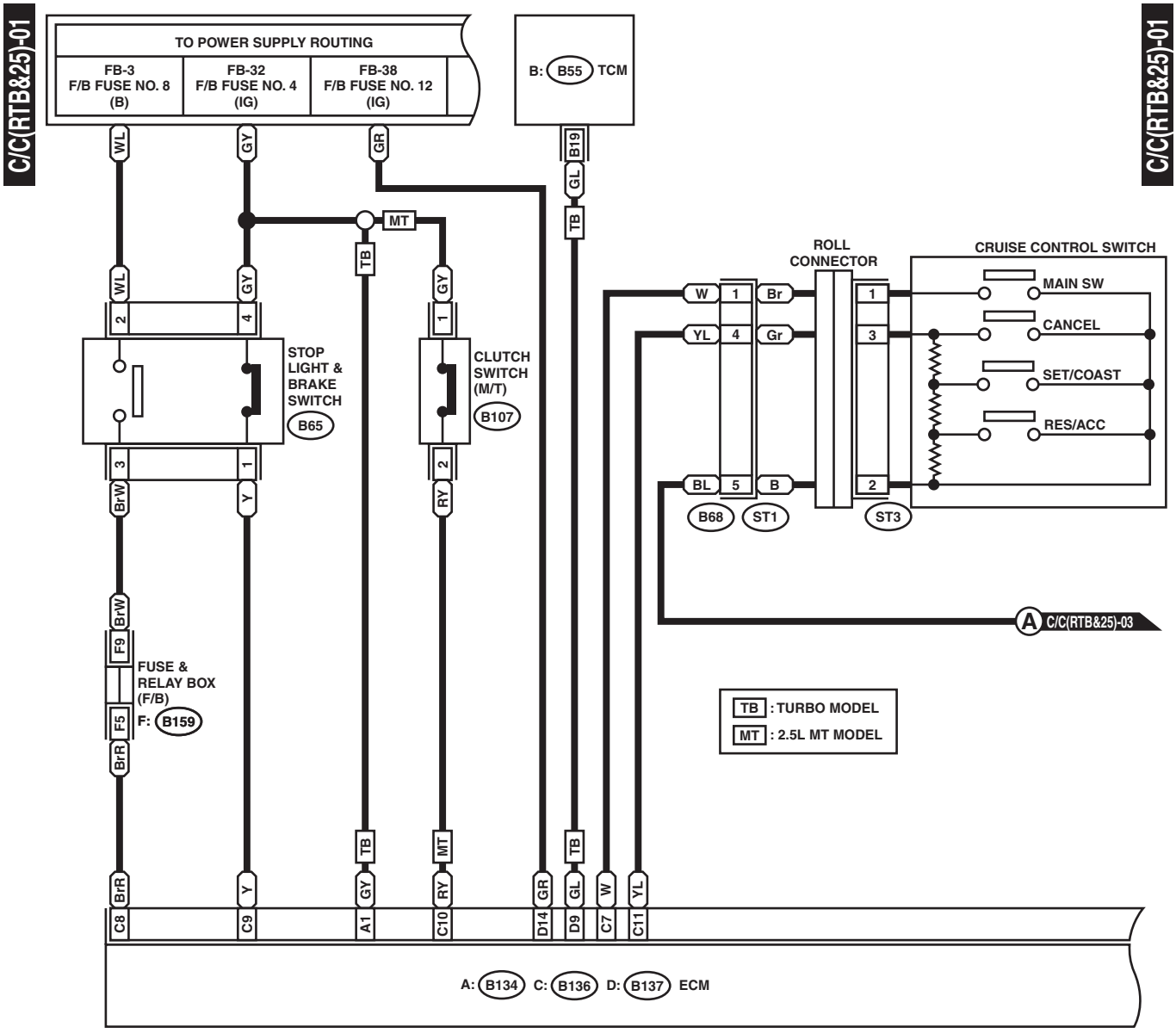
WI-04008

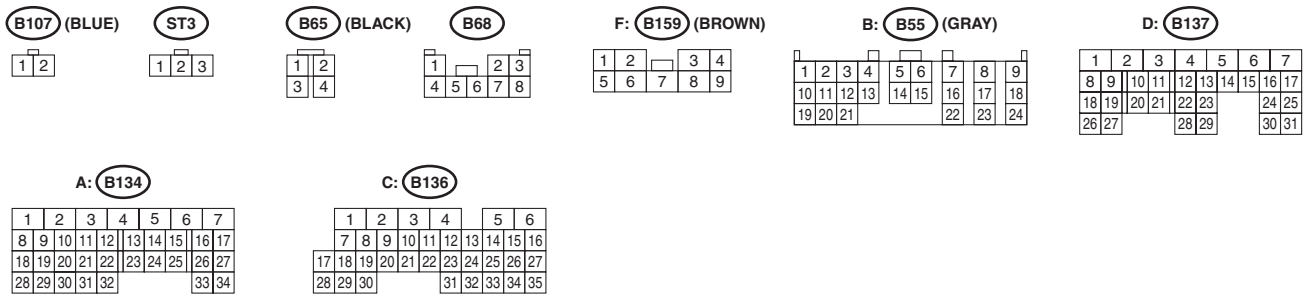

C/C(R20)-03
C/C(R20)-03
B: B135 C: B136 D: B137 ECM
B23 D24 D23 C17 D5 D4 D2 D3 C18 C30 C5 C6
WB LgB Lg LY WB WB GY GY YG RB BL BL
AT
C/C(R20)-01 A
C/C(R20)-01 B
JOINT CONNECTOR A
BL * MT BL * * BL
B83
YG SB
*1 *2
JOINT CONNECTOR B
B122
YG RB
WB
12
B12
T3
BY
12
P
R
N
D
INHIBITOR SWITCH (AT)
T7
7
BW
T3
11
B12
WR
LgB Lg LY WB GY YG BL
16 15 20 39 38 19 36
B20 E1 B21 E2
LW W BL W R BY B
LW W BL W R BY
5 2 3 1 4 6
E78
ELECTRIC THROTTLE
B B
E
GE
C/C(R20)-01 C
* : TERMINAL NO. OPTIONAL ARRANGEMENT
*1 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.1,2,5 AND 6
*2 : TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.3,4,7 AND 8

E78
B83 B122
B12
T7
B20
D: B137
B: B135
C: B136
B21 (BLACK)

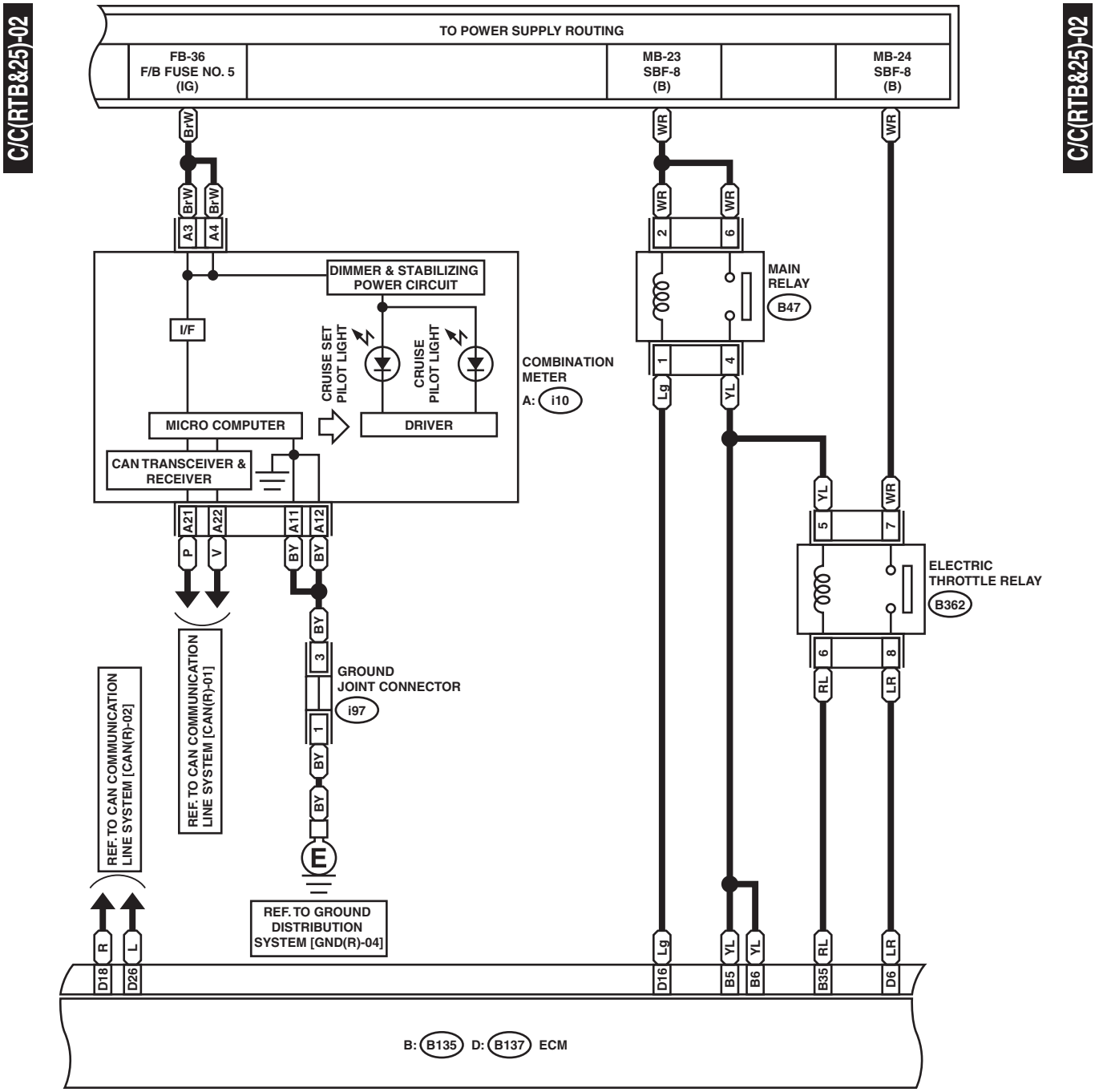
WI-04009

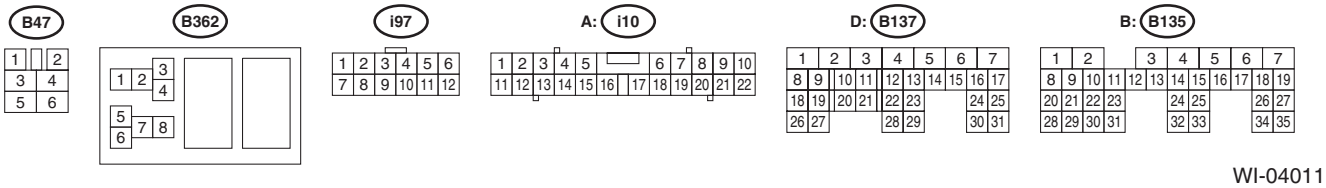
4. RHD 2.5 L EK AND TURBO MODEL



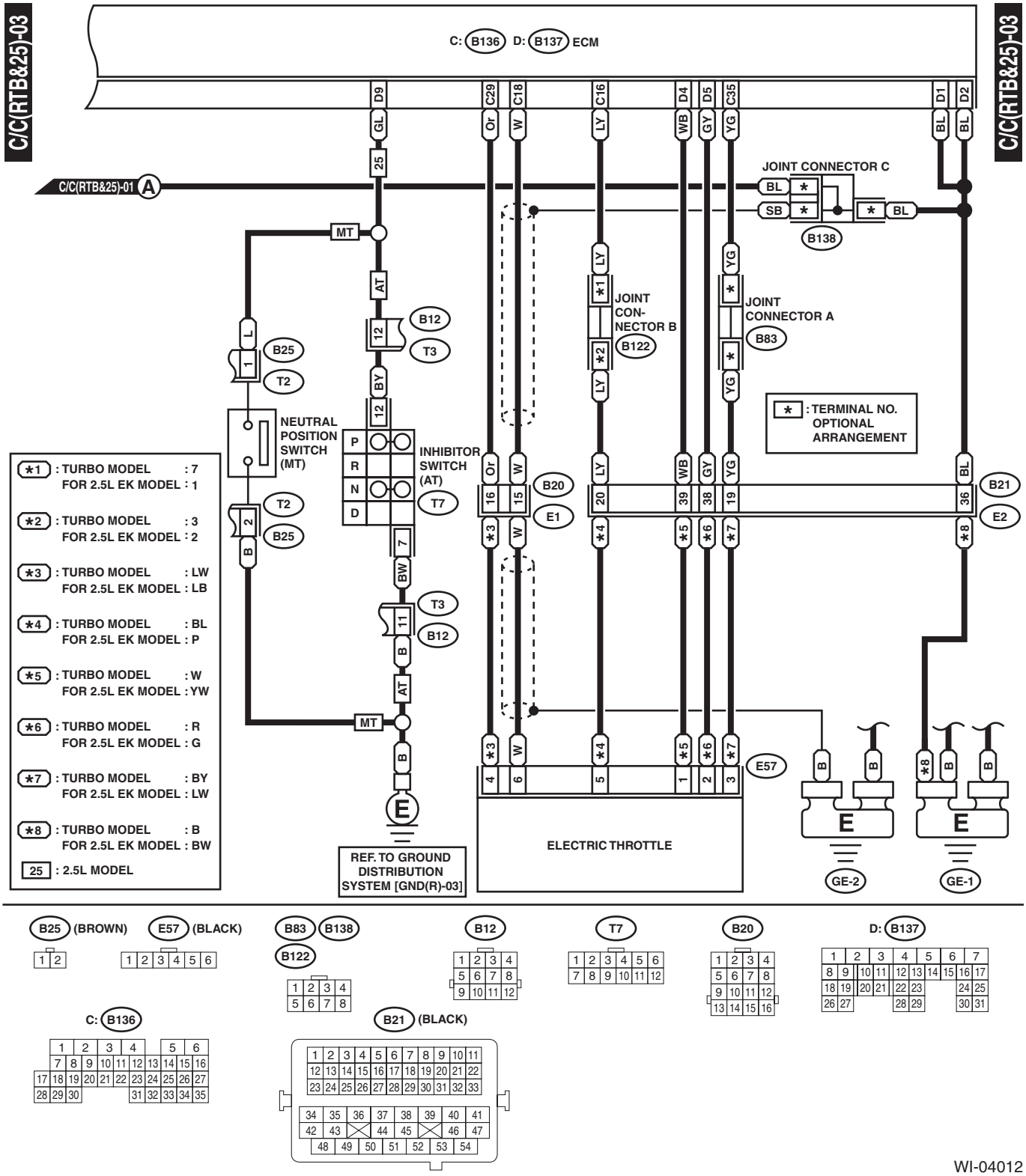


WI-04010


C/C(RTB&25)-02
C/C(RTB&25)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
MB-23
SBF-8
(B)
MB-24
SBF-8
(B)
BrW
WR
DIMMER & STABILIZING POWER CIRCUIT
I/F
CRUISE SET PILOT LIGHT
CRUISE PILOT LIGHT
COMBINATION METER
A: i10
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
MAIN RELAY
B47
ELECTRIC THROTTLE RELAY
B362
A21
A22
A11
A12
P
V
BY
YL
Lg
RL
LR
GROUND JOINT CONNECTOR
i97
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-01]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
D18
D26
D16
B5
B6
B35
D6
B: B135 D: B137 ECM


B47
B362
i97
A: i10
D: B137
B: B135

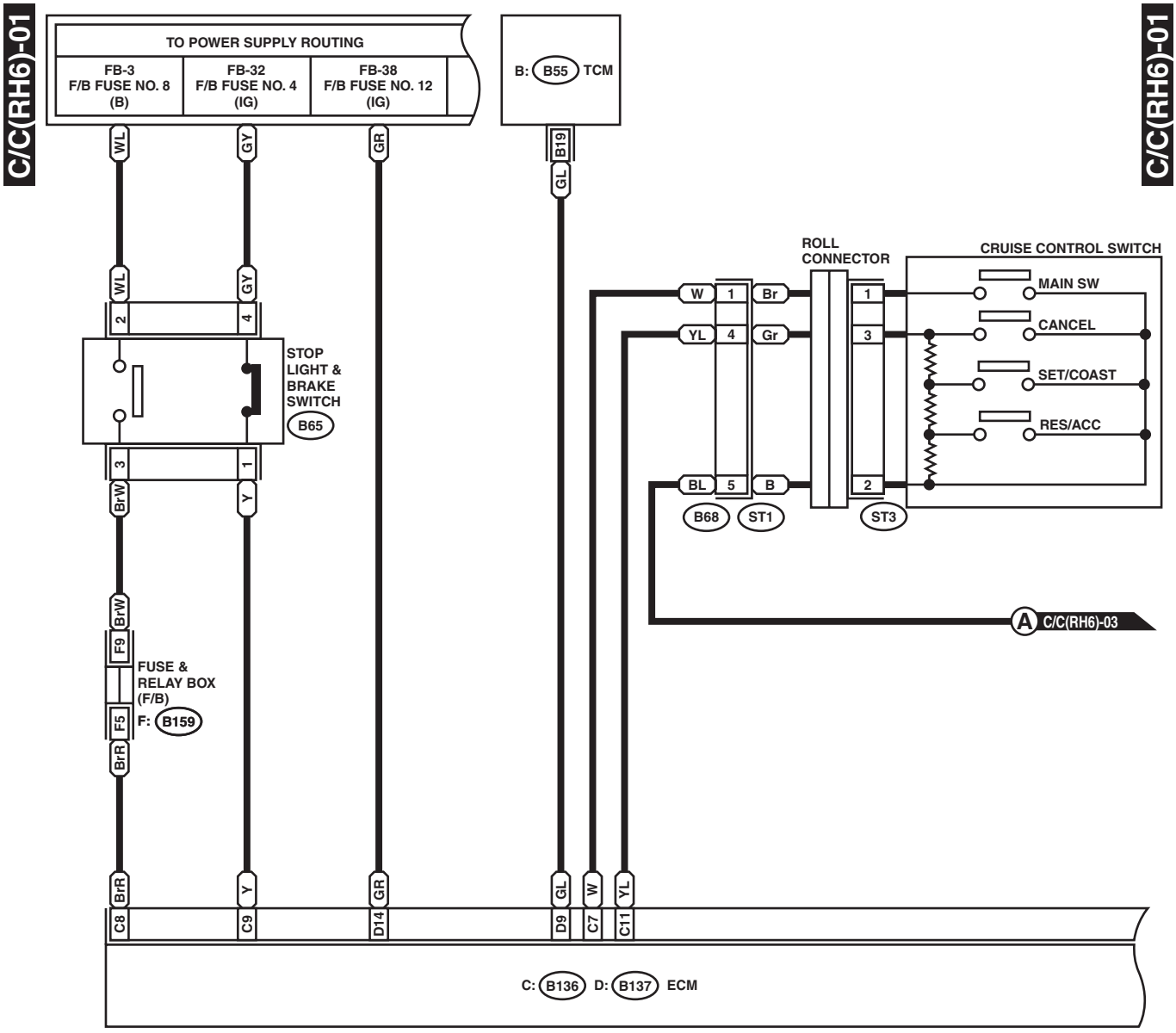
WI-04011

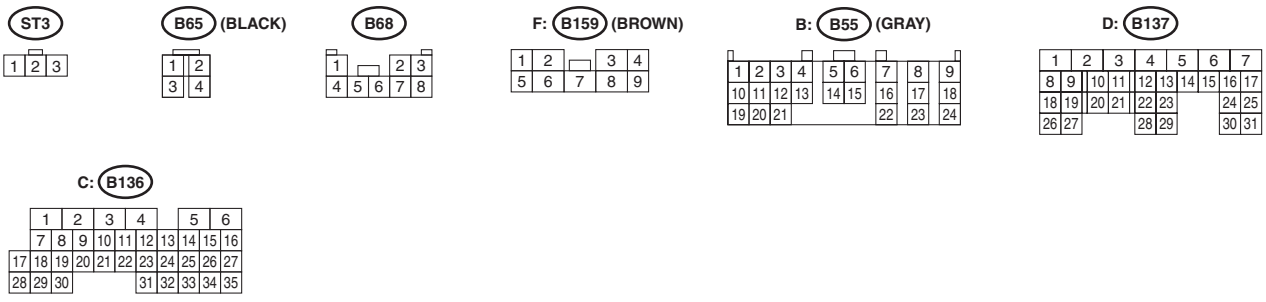

C/C(RTB&25)-03
C/C(RTB&25)-03
C: B136 D: B137 ECM
C/C(RTB&25)-01 A
JOINT CONNECTOR C
JOINT CONNECTOR A
JOINT CON-NECTOR B
NEUTRAL POSITION SWITCH (MT)
INHIBITOR SWITCH (AT)
: TERMINAL NO. OPTIONAL ARRANGEMENT
*1 : TURBO MODEL : 7 FOR 2.5L EK MODEL : 1
*2 : TURBO MODEL : 3 FOR 2.5L EK MODEL : 2
*3 : TURBO MODEL : LW FOR 2.5L EK MODEL : LB
*4 : TURBO MODEL : BL FOR 2.5L EK MODEL : P
*5 : TURBO MODEL : W FOR 2.5L EK MODEL : YW
*6 : TURBO MODEL : R FOR 2.5L EK MODEL : G
*7 : TURBO MODEL : BY FOR 2.5L EK MODEL : LW
*8 : TURBO MODEL : B FOR 2.5L EK MODEL : BW
25 : 2.5L MODEL
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
ELECTRIC THROTTLE
GE-2
GE-1

B25 (BROWN)
E57 (BLACK)
B83 B138 B122
B12
T7
B20
D: B137
C: B136
B21 (BLACK)

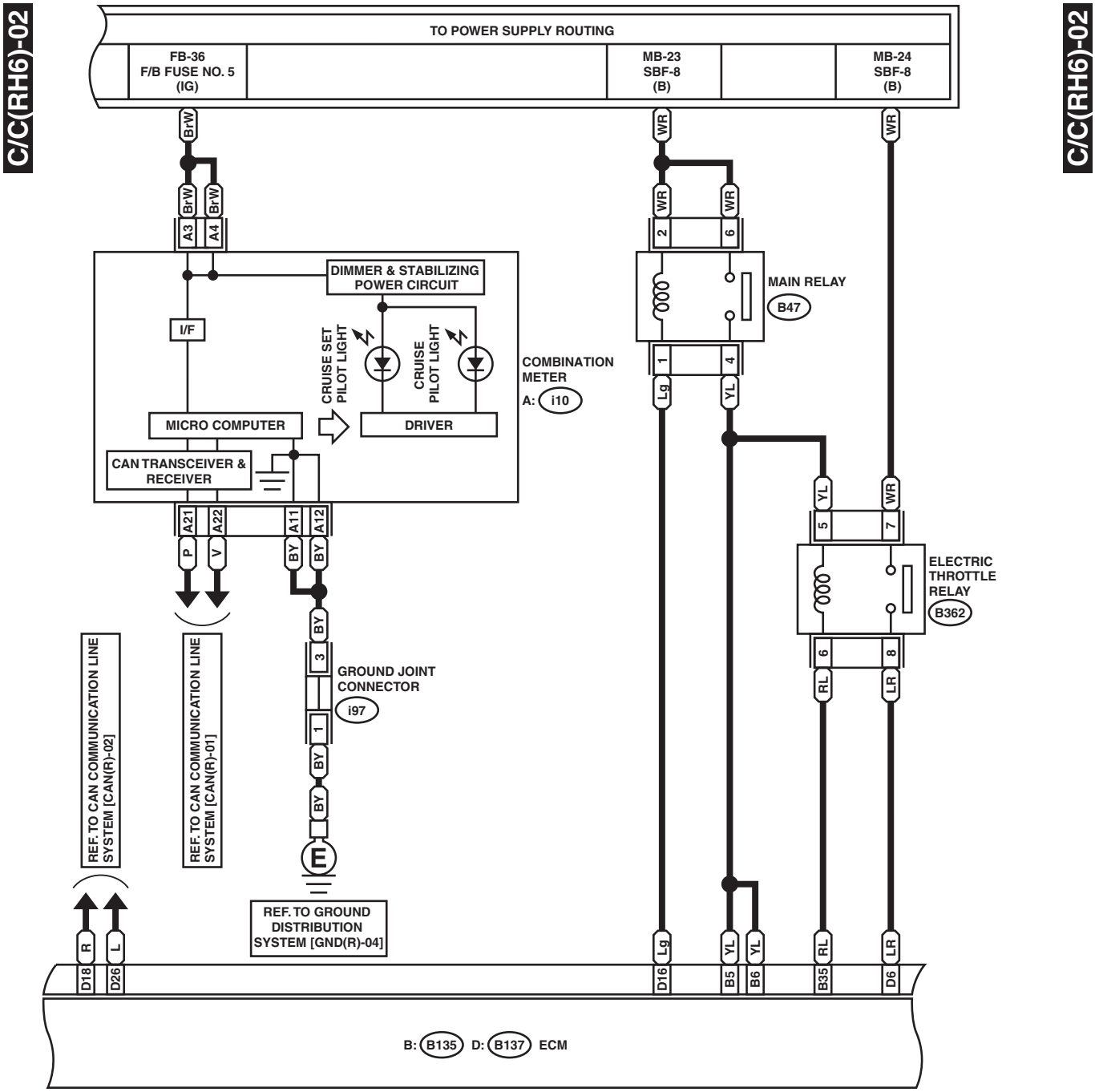
WI-04012

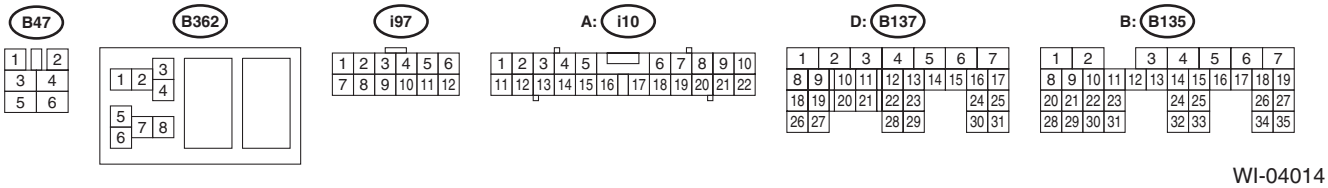
5. RHD 3.0 L MODEL



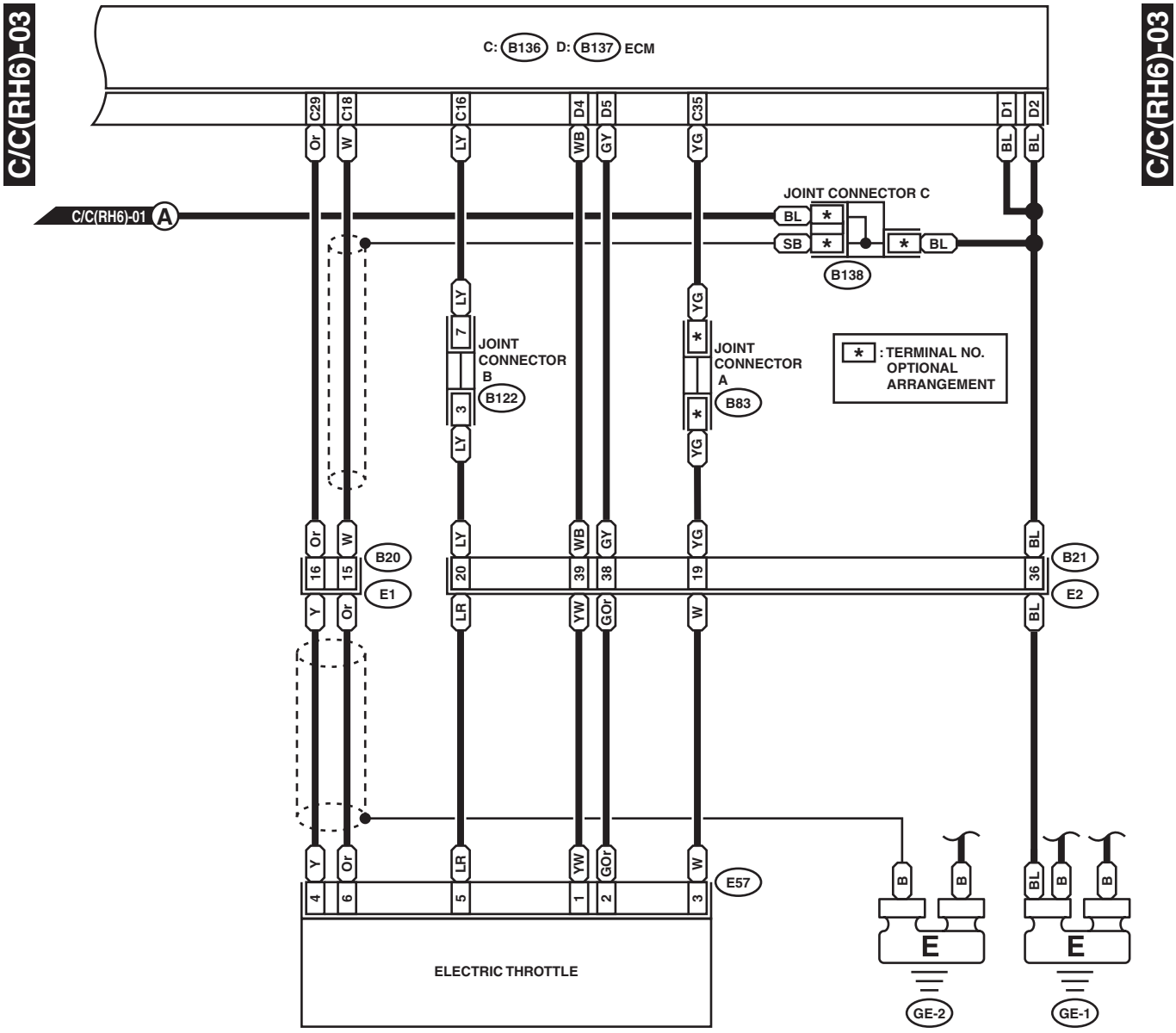


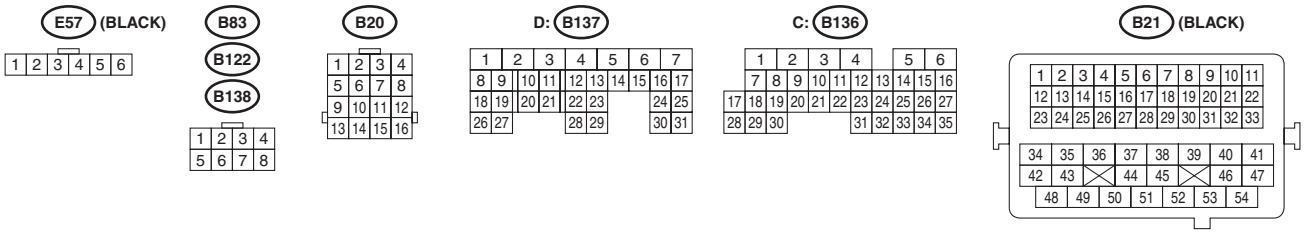
WI-04013


C/C(RH6)-02
C/C(RH6)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
MB-23
SBF-8
(B)
MB-24
SBF-8
(B)
BrW
WR
A3
A4
2
6
DIMMER & STABILIZING POWER CIRCUIT
I/F
CRUISE SET PILOT LIGHT
CRUISE PILOT LIGHT
COMBINATION METER
A: i10
MAIN RELAY
B47
1
4
Lg
YL
MICRO COMPUTER
DRIVER
CAN TRANSCEIVER & RECEIVER
A21
A22
A11
A12
P
V
BY
5
7
ELECTRIC THROTTLE RELAY
B362
6
8
RL
LR
3
GROUND JOINT CONNECTOR
i97
1
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-01]
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
R
L
D18
D26
D16
B5
B6
B35
D6
B: B135 D: B137 ECM


B47
B362
i97
A: i10
D: B137
B: B135

WI-04014

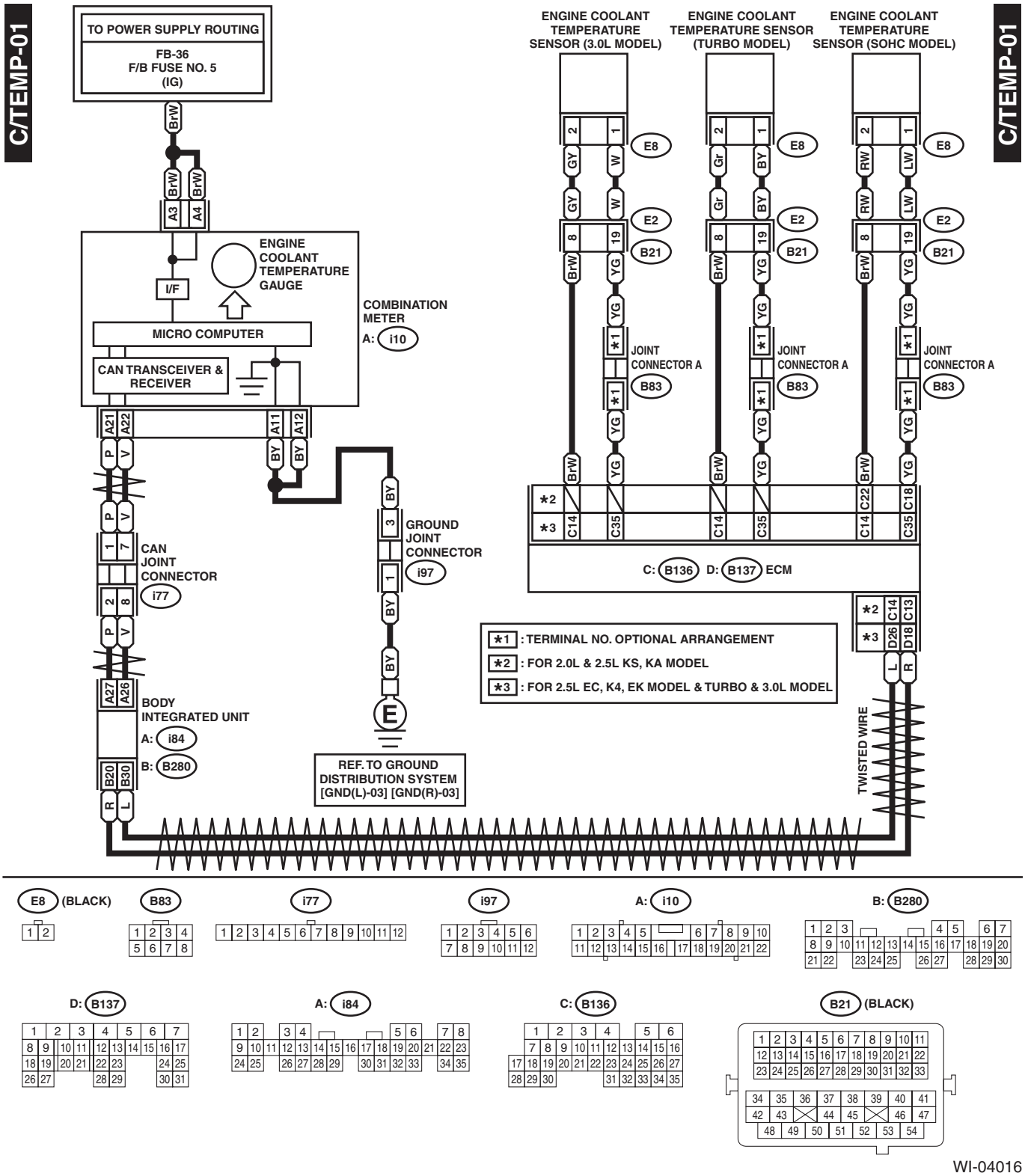

C/C(RH6)-03
C/C(RH6)-03
C: B136 D: B137 ECM
C29
C18
C16
D4
D5
C35
D1
D2
Or
W
LY
WB
GY
YG
BL
BL
C/C(RH6)-01 A
JOINT CONNECTOR C
BL
SB
BL
B138
LY
7
3
LY
JOINT CONNECTOR B
B122
YG
*
JOINT CONNECTOR A
B83
YG
* : TERMINAL NO. OPTIONAL ARRANGEMENT
Or
W
LY
WB
GY
YG
BL
16
15
20
39
38
19
36
B20
E1
B21
E2
Y
Or
LR
YW
GOr
W
BL
Y
Or
LR
YW
GOr
W
E57
4
6
5
1
2
3
B
B
BL
B
B
E
E
ELECTRIC THROTTLE
GE-2
GE-1


E57 (BLACK)
1 2 3 4 5 6
B83
B122
B138
1 2 3 4
5 6 7 8
B20
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54

WI-04015

15.Coolant Temperature System

A: WIRING DIAGRAM

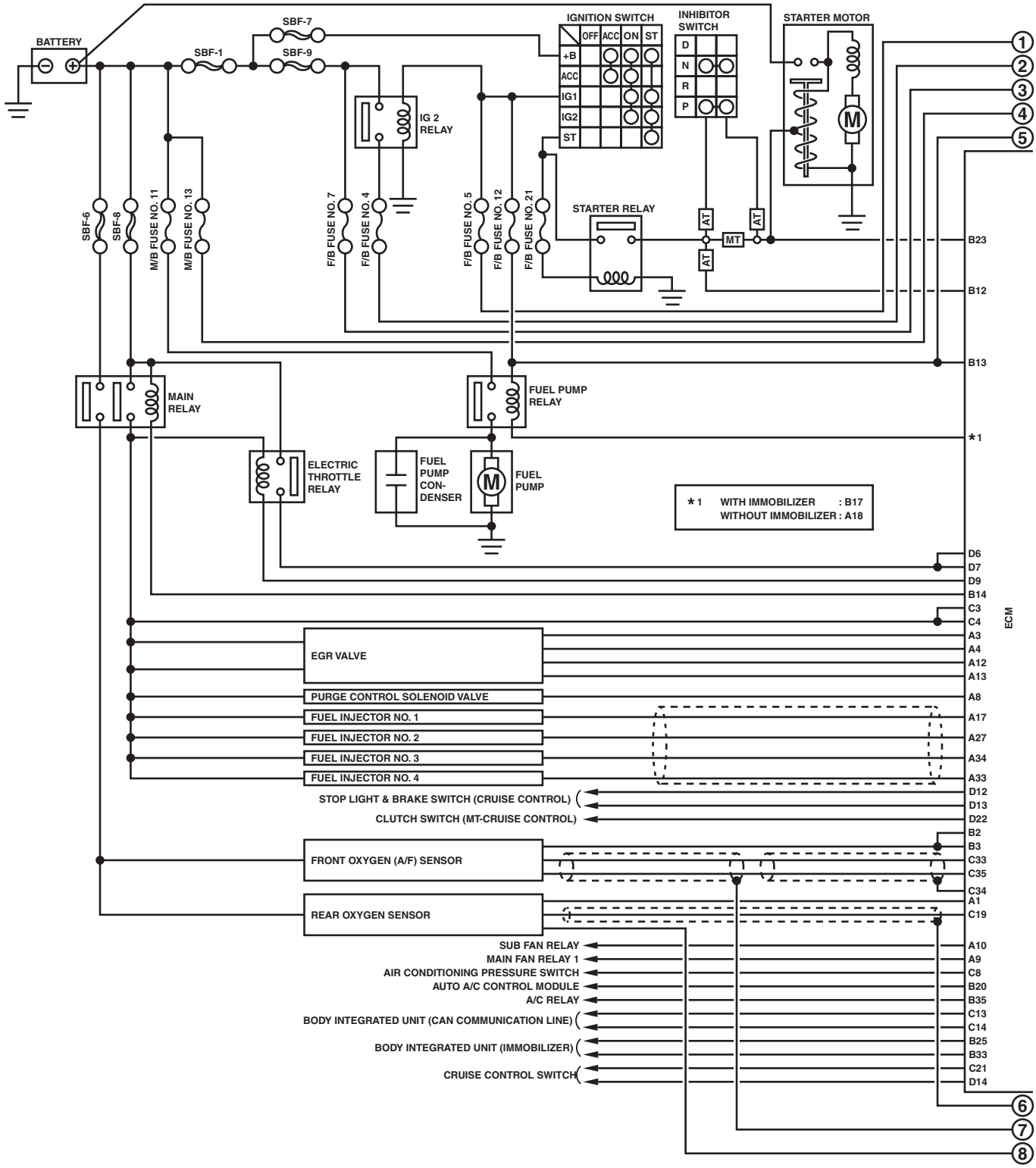


WI-04016

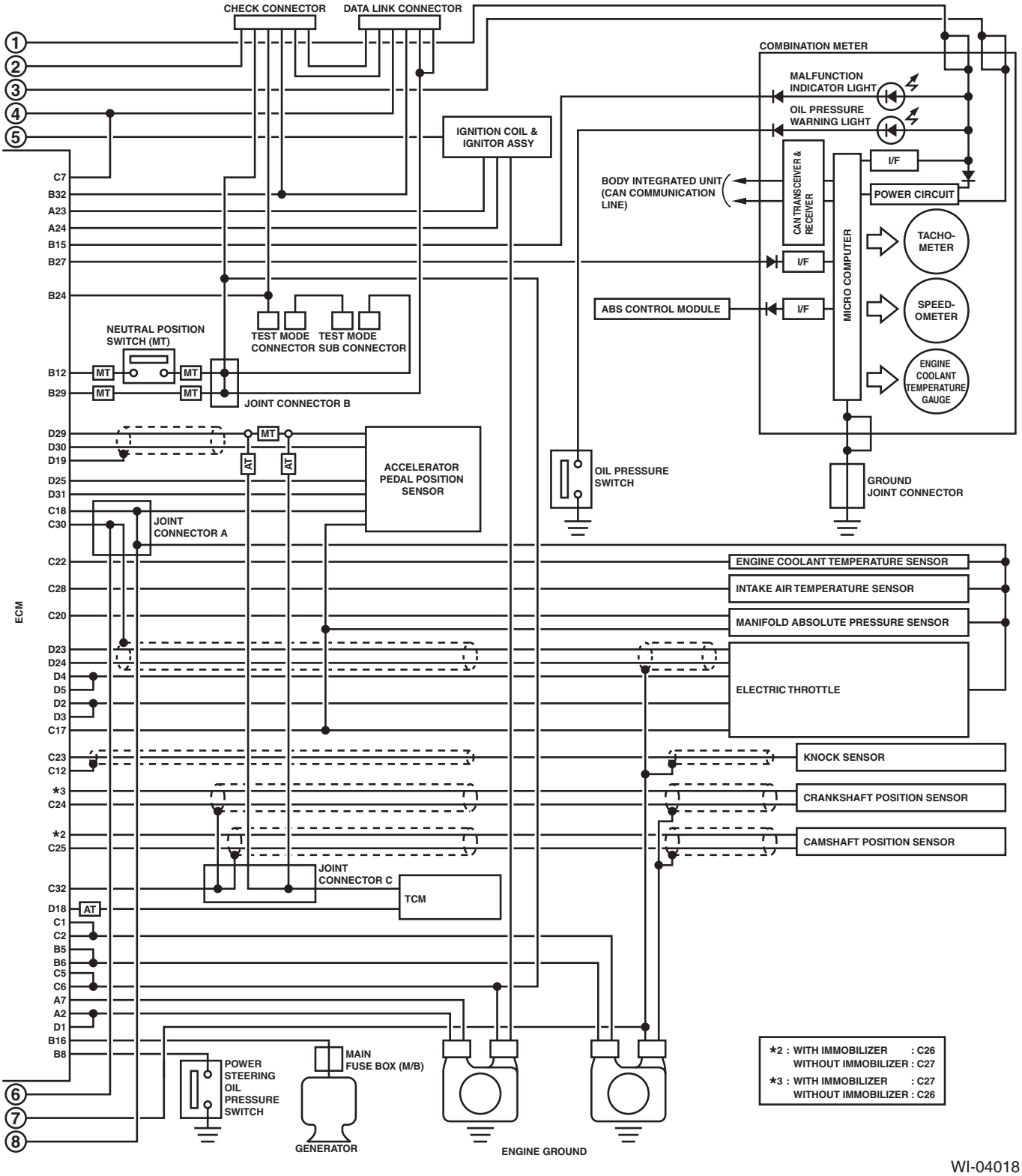
16.Engine Electrical System

A: WIRING DIAGRAM

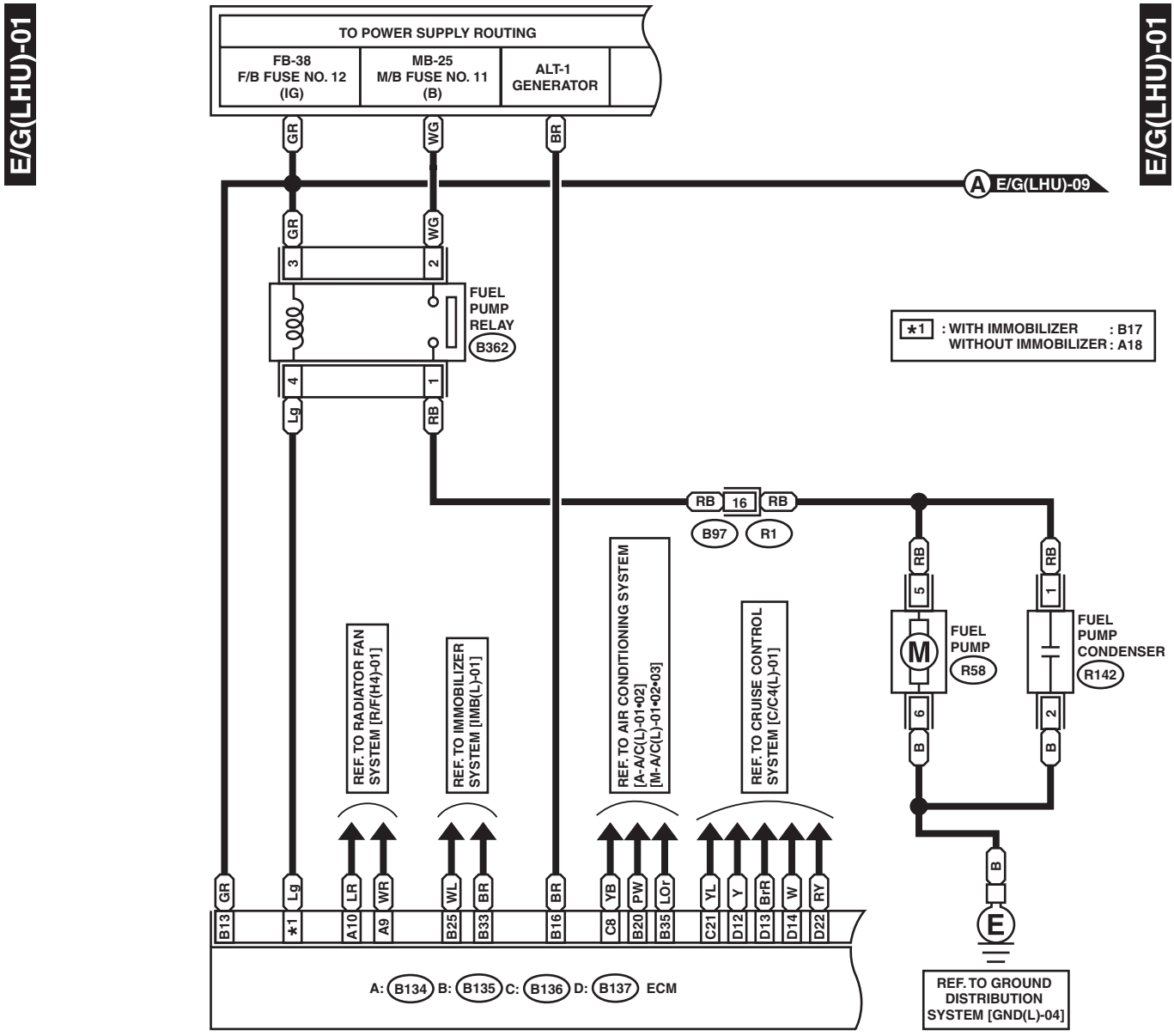
1. LHD 2.0 L MODEL AND 2.5 L KS MODEL



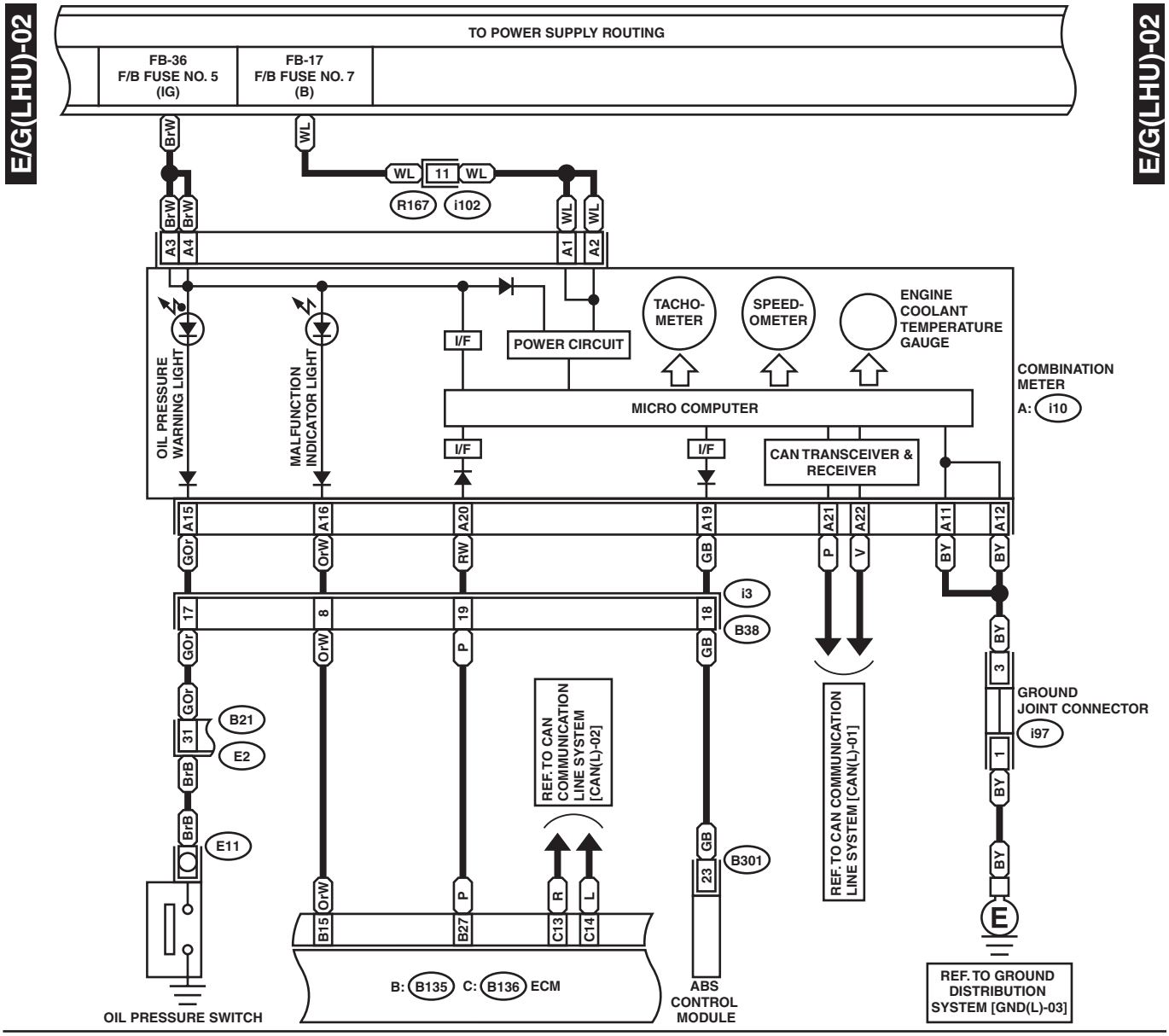
WI-04017

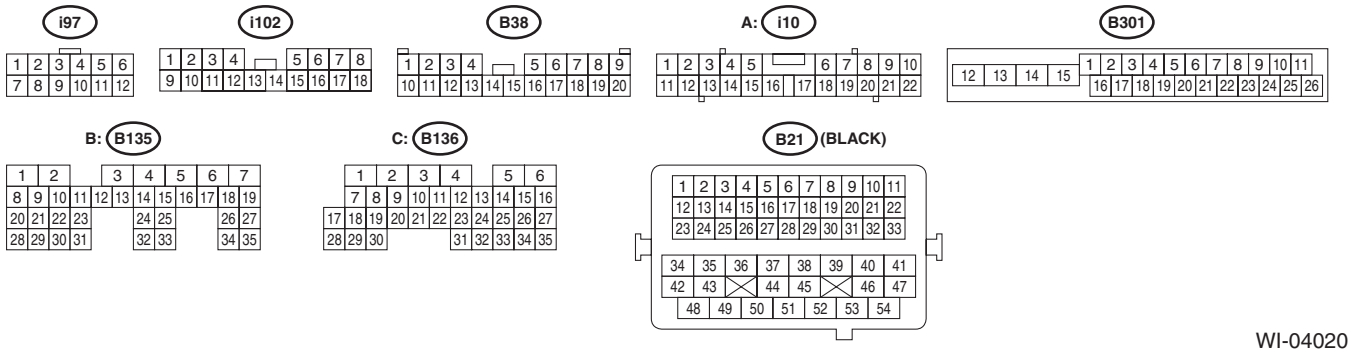

CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
IGNITION COIL & IGNITOR ASSY
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
I/F
POWER CIRCUIT
MICRO COMPUTER
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS CONTROL MODULE
NEUTRAL POSITION SWITCH (MT)
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
JOINT CONNECTOR B
ACCELERATOR PEDAL POSITION SENSOR
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
JOINT CONNECTOR A
ECM
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
MANIFOLD ABSOLUTE PRESSURE SENSOR
ELECTRIC THROTTLE
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
JOINT CONNECTOR C
TCM
POWER STEERING OIL PRESSURE SWITCH
MAIN FUSE BOX (M/B)
GENERATOR
ENGINE GROUND
*2 : WITH IMMOBILIZER : C26
WITHOUT IMMOBILIZER : C27
*3 : WITH IMMOBILIZER : C27
WITHOUT IMMOBILIZER : C26

WI-04018

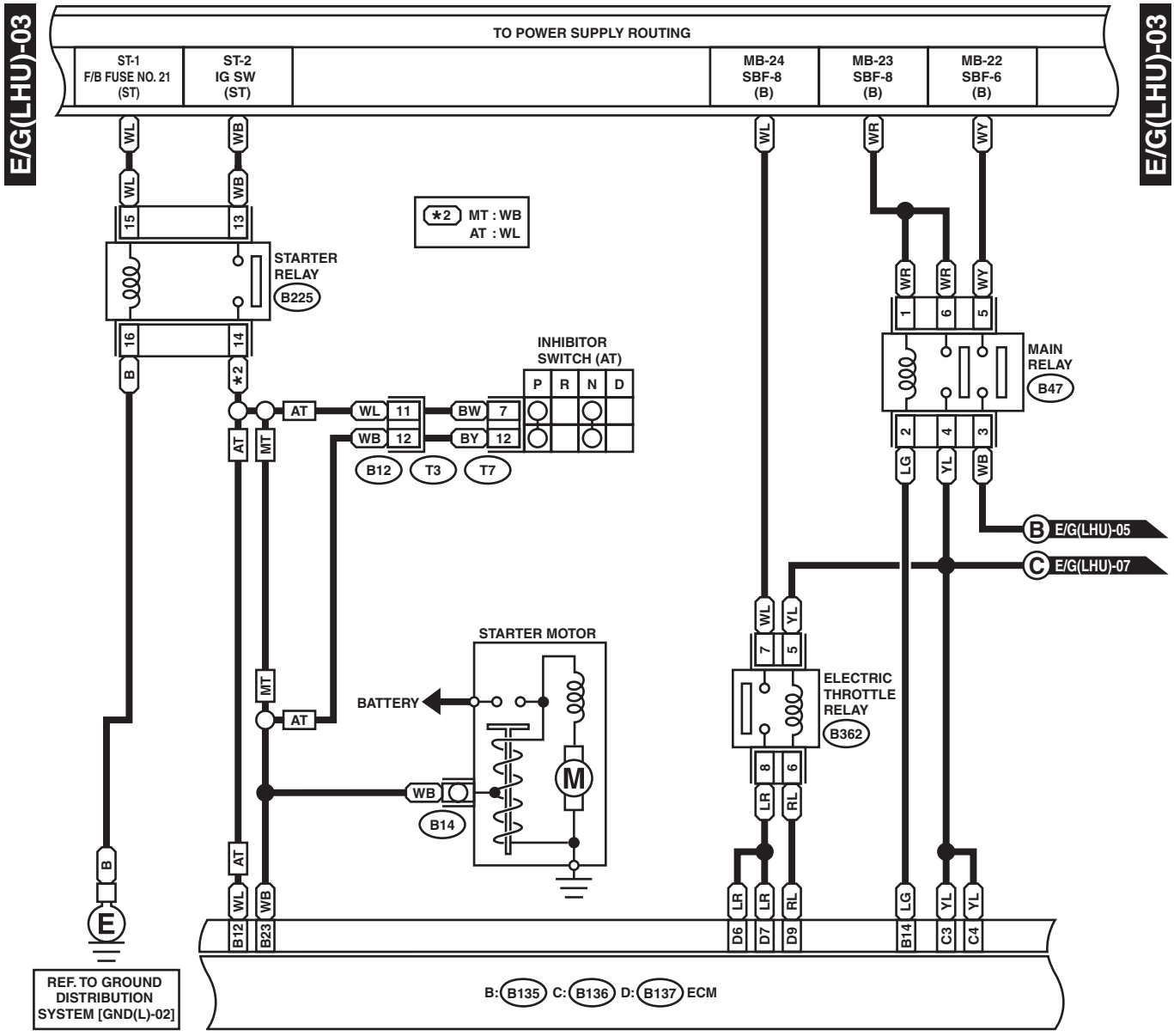

E/G(LHU)-01
E/G(LHU)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
GR
WG
BR
A E/G(LHU)-09
FUEL PUMP RELAY B362
*1 : WITH IMMOBILIZER : B17
WITHOUT IMMOBILIZER : A18
RB 16 RB
B97 R1
REF. TO RADIATOR FAN SYSTEM [R/F(H4)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(L)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(L)-01•02] [M-A/C(L)-01•02•03]
REF. TO CRUISE CONTROL SYSTEM [C/C4(L)-01]
FUEL PUMP R58
FUEL PUMP CONDENSER R142
B13 *1 A10 A9 B25 B33 B16 C8 B20 B35 C21 D12 D13 D14 D22
A: B134 B: B135 C: B136 D: B137 ECM
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]
R142 (BLACK)
R58
B362
B97
D: B137
A: B134
B: B135
C: B136

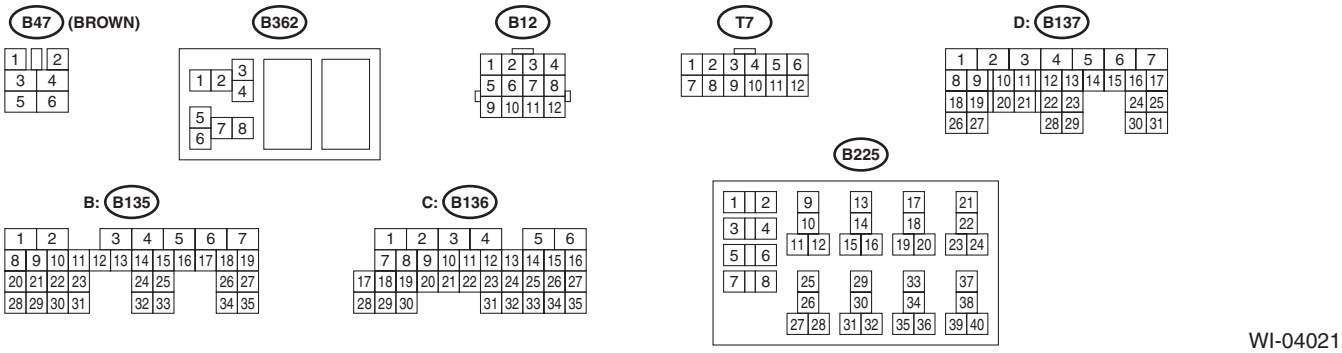
WI-04019


E/G(LHU)-02
E/G(LHU)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
BrW
WL
WL
11
WL
R167
i102
BrW
BrW
WL
WL
A3
A4
A1
A2
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
I/F
POWER CIRCUIT
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
COMBINATION METER
A: i10
MICRO COMPUTER
I/F
I/F
CAN TRANSCEIVER & RECEIVER
A15
A16
A20
A19
A21
A22
A11
A12
GOr
OrW
RW
GB
P
V
BY
BY
i3
17
8
19
18
B38
GOr
OrW
P
GB
BY
3
GROUND JOINT CONNECTOR
i97
GOr
31
B21
E2
1
BrB
BrB
E11
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(L)-01]
GB
B301
23
BY
BY
OrW
P
R
L
E
B15
B27
C13
C14
B: B135 C: B136 ECM
ABS CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
OIL PRESSURE SWITCH

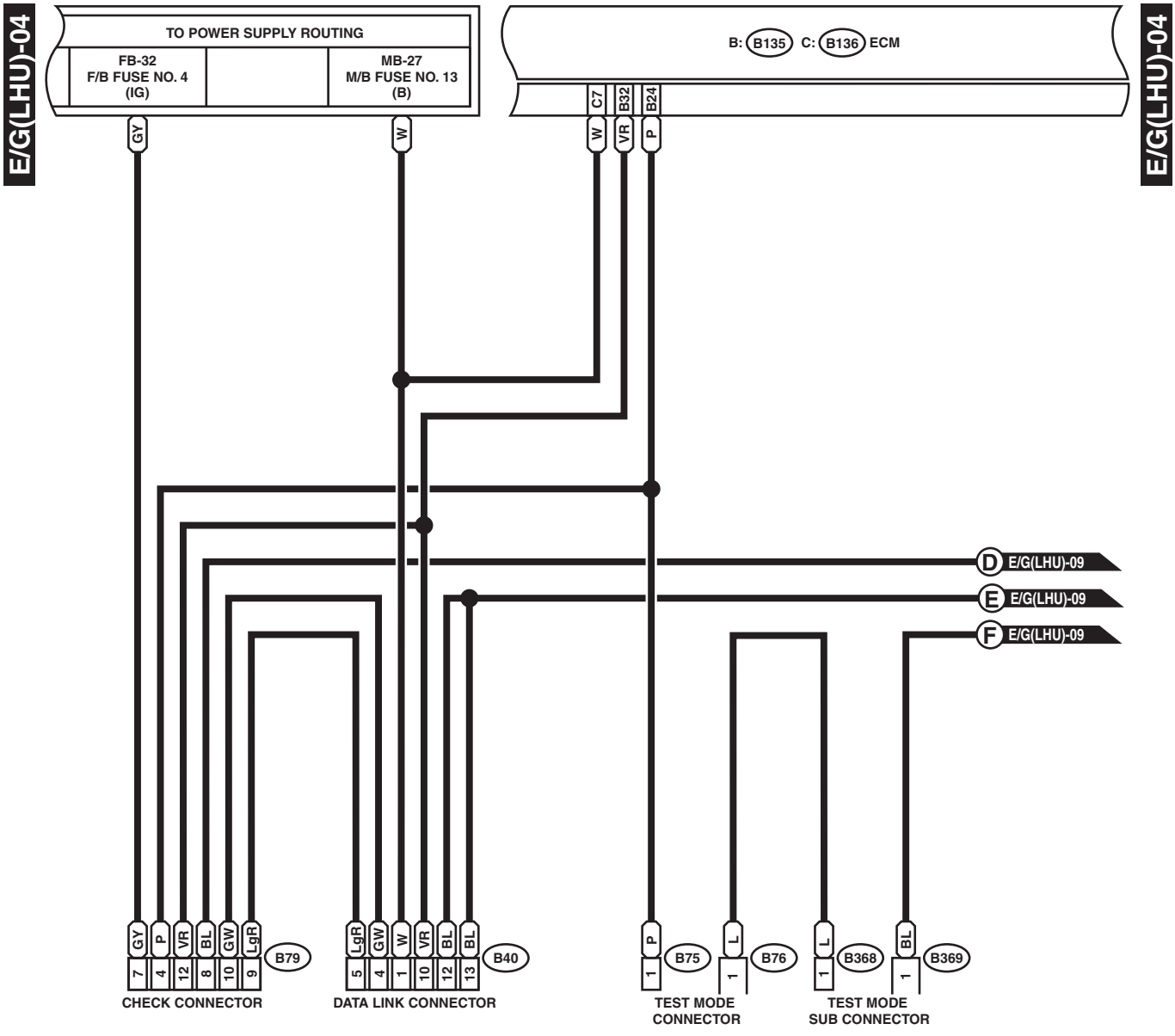

i97
i102
B38
A: i10
B301
B: B135
C: B136
B21 (BLACK)

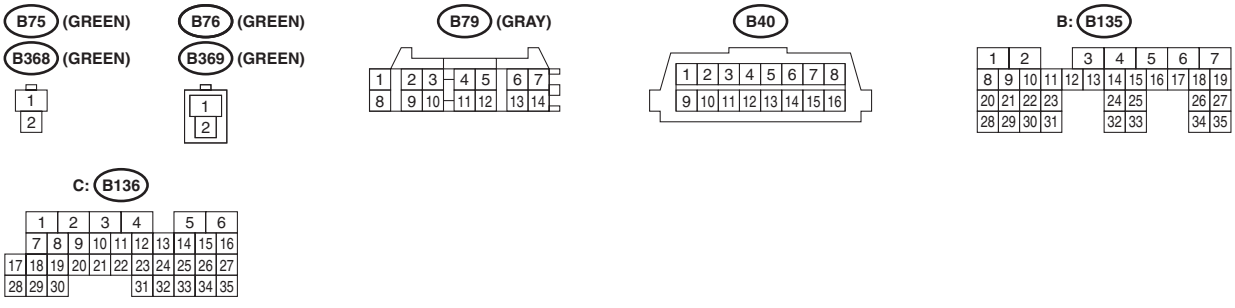
WI-04020


E/G(LHU)-03
E/G(LHU)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
*2 MT : WB
AT : WL
STARTER
RELAY
B225
INHIBITOR
SWITCH (AT)
P R N D
MAIN
RELAY
B47
B12 T3 T7
B E/G(LHU)-05
C E/G(LHU)-07
STARTER MOTOR
BATTERY
ELECTRIC
THROTTLE
RELAY
B362
B14
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-02]
B: B135 C: B136 D: B137 ECM

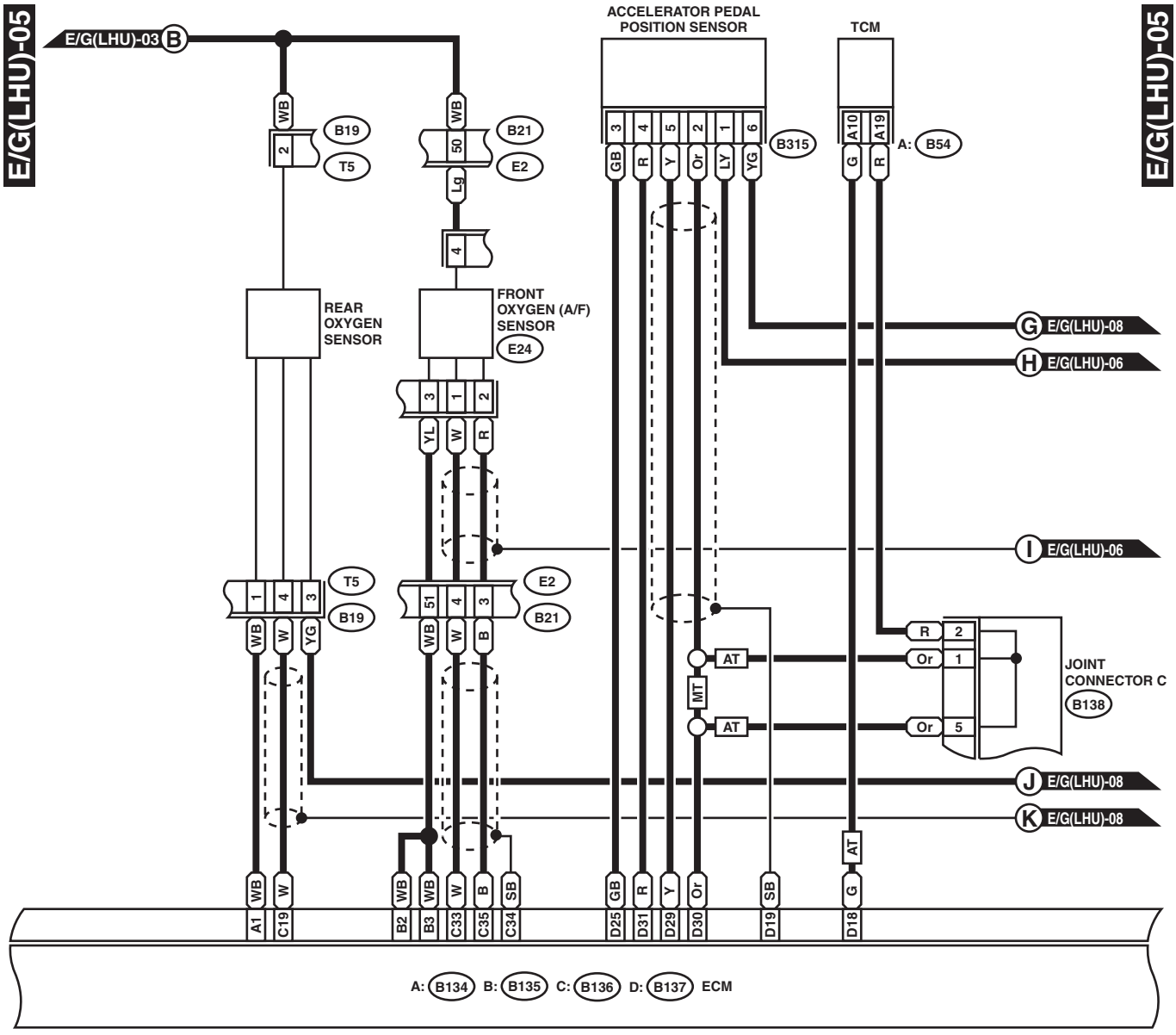

B47 (BROWN)
B362
B12
T7
D: B137
B225
B: B135
C: B136

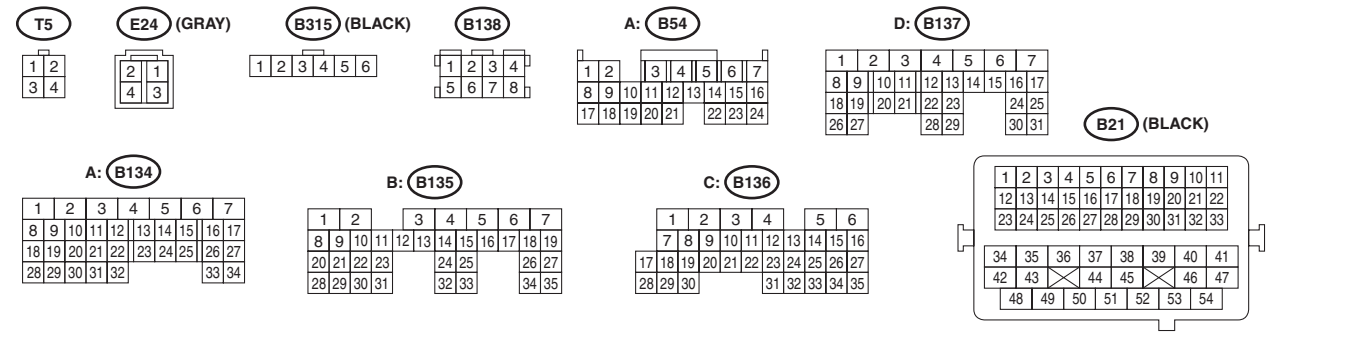
WI-04021


E/G(LHU)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 C: B136 ECM
C7
B32
B24
GY
W
W
VR
P
D E/G(LHU)-09
E E/G(LHU)-09
F E/G(LHU)-09
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
LgR GW W VR BL BL
5 4 1 10 12 13
B40
DATA LINK CONNECTOR
P
1
B75
L
1
B76
TEST MODE
CONNECTOR
L
1
B368
BL
1
B369
TEST MODE
SUB CONNECTOR

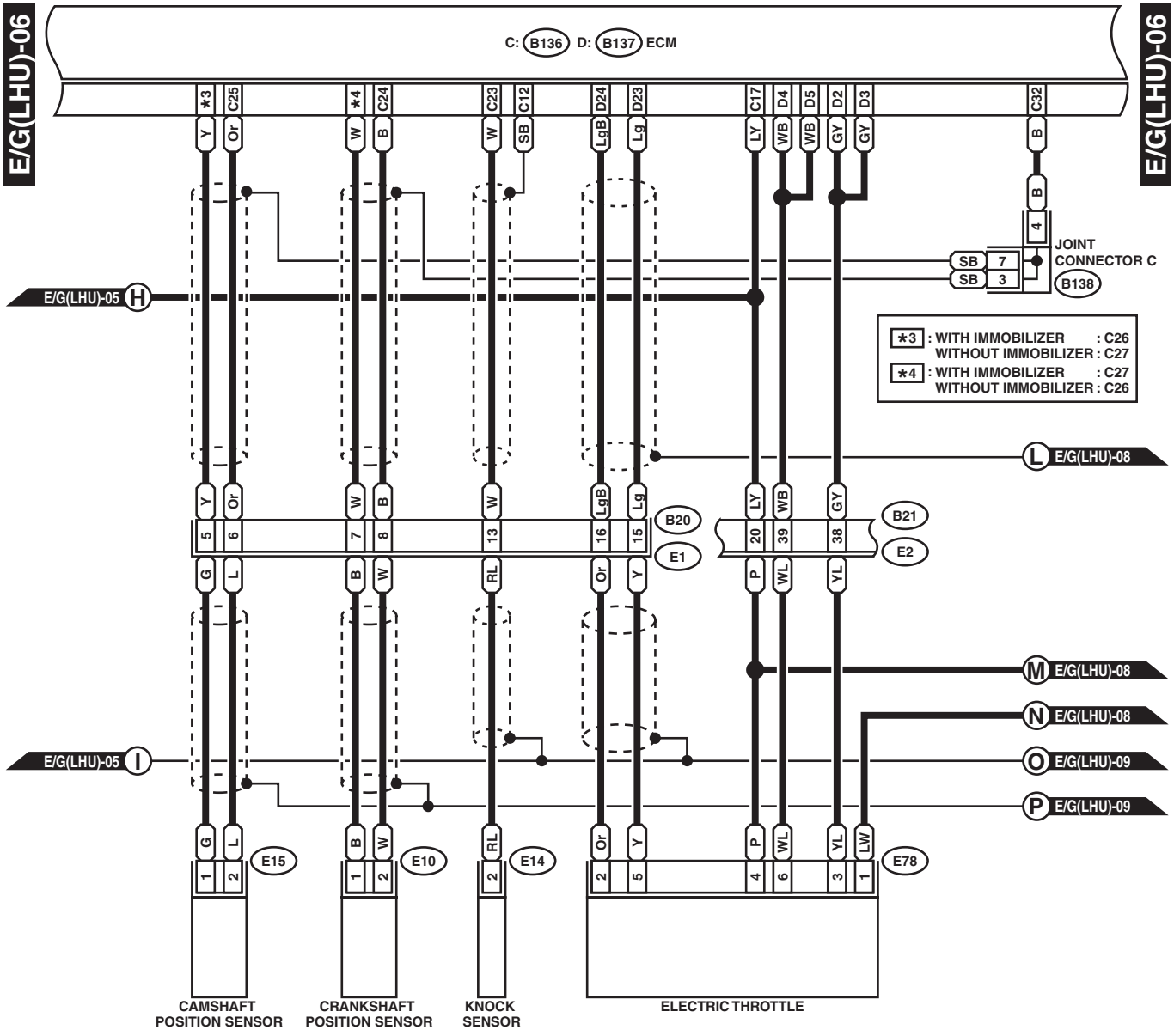

B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
B: B135
C: B136

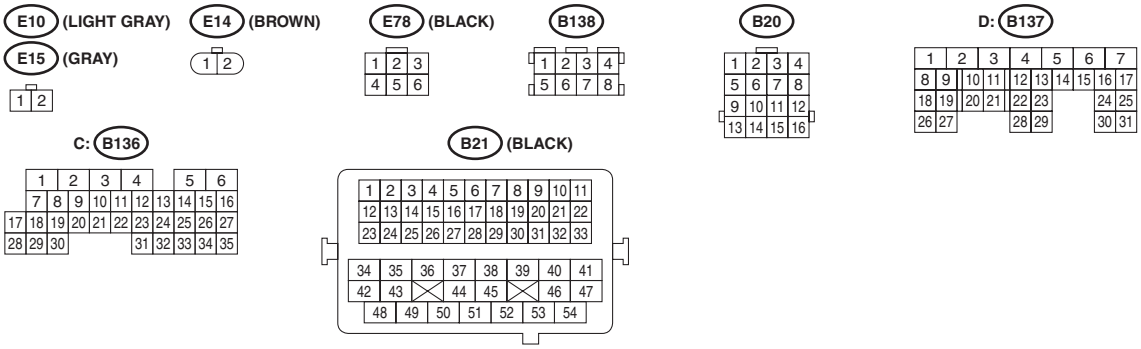
WI-04022


E/G(LHU)-05
E/G(LHU)-03 B
ACCELERATOR PEDAL POSITION SENSOR
TCM
B315
A: B54
B19
T5
B21
E2
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
E24
G E/G(LHU)-08
H E/G(LHU)-06
I E/G(LHU)-06
J E/G(LHU)-08
K E/G(LHU)-08
AT
MT
JOINT CONNECTOR C
B138
A: B134 B: B135 C: B136 D: B137 ECM

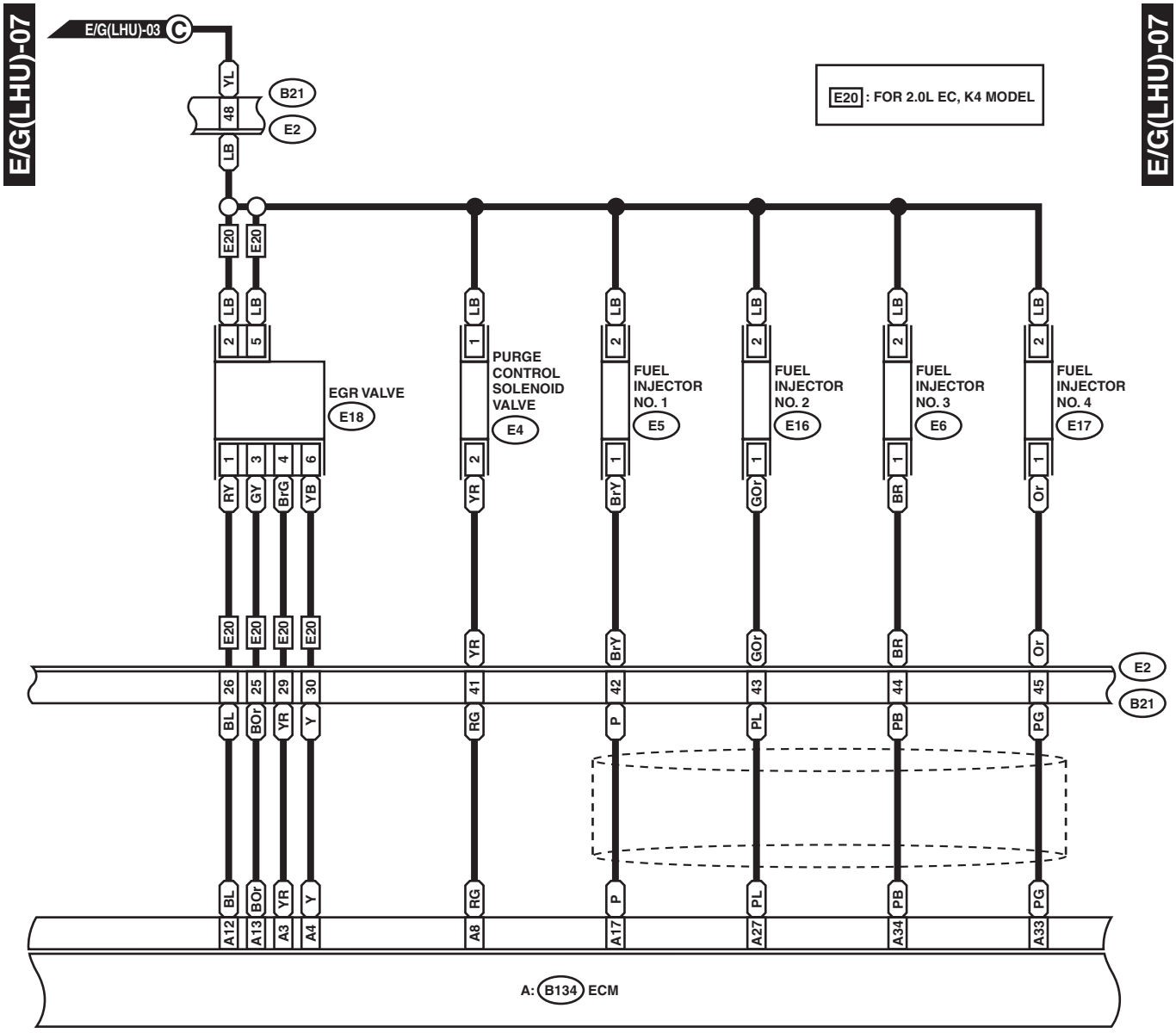

T5
E24 (GRAY)
B315 (BLACK)
B138
A: B54
D: B137
B21 (BLACK)
A: B134
B: B135
C: B136

WI-04023


E/G(LHU)-06
E/G(LHU)-06
C: B136 D: B137 ECM
*3 C25
*4 C24
C23 C12
D24 D23
C17 D4 D5 D2 D3
C32
JOINT CONNECTOR C
B138
E/G(LHU)-05 H
*3 : WITH IMMOBILIZER : C26
WITHOUT IMMOBILIZER : C27
*4 : WITH IMMOBILIZER : C27
WITHOUT IMMOBILIZER : C26
L E/G(LHU)-08
B20
B21
E1
E2
M E/G(LHU)-08
N E/G(LHU)-08
E/G(LHU)-05 I
O E/G(LHU)-09
P E/G(LHU)-09
E15
E10
E14
E78
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR
ELECTRIC THROTTLE


E10 (LIGHT GRAY)
E14 (BROWN)
E78 (BLACK)
B138
B20
D: B137
E15 (GRAY)
C: B136
B21 (BLACK)

WI-04024

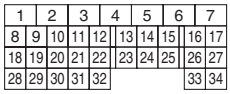


E4 (BLUE)

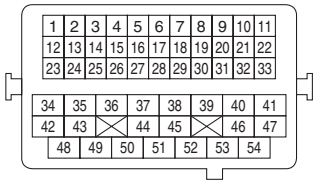
E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

E18 (DARK GRAY)

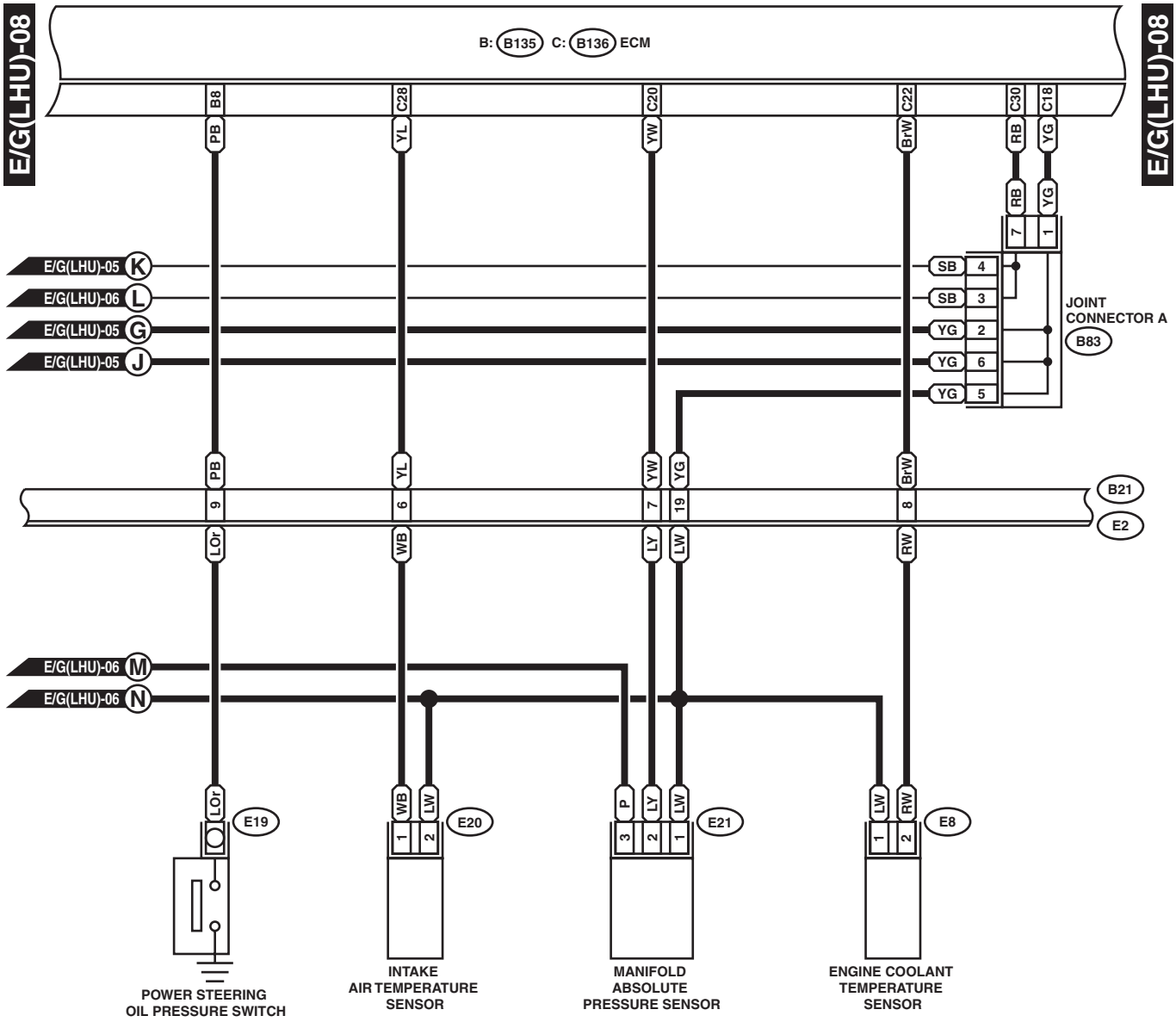
A: B134

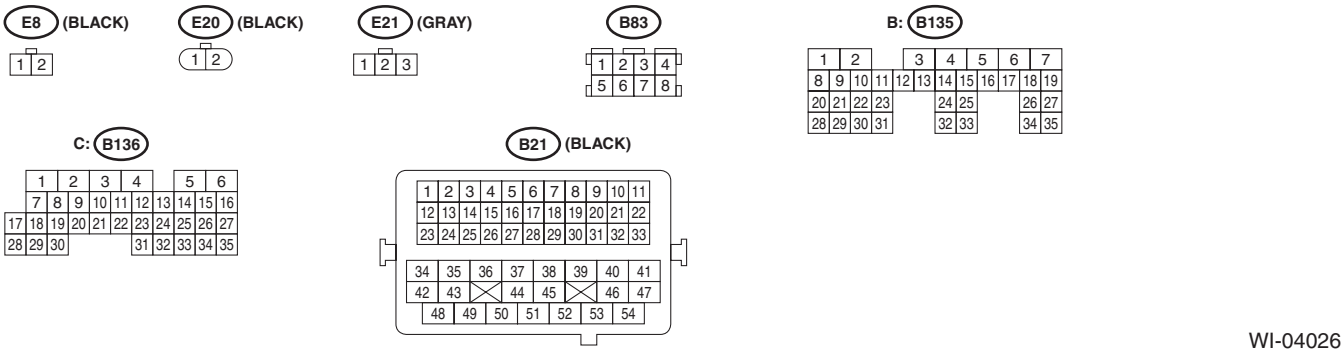


B21 (BLACK)

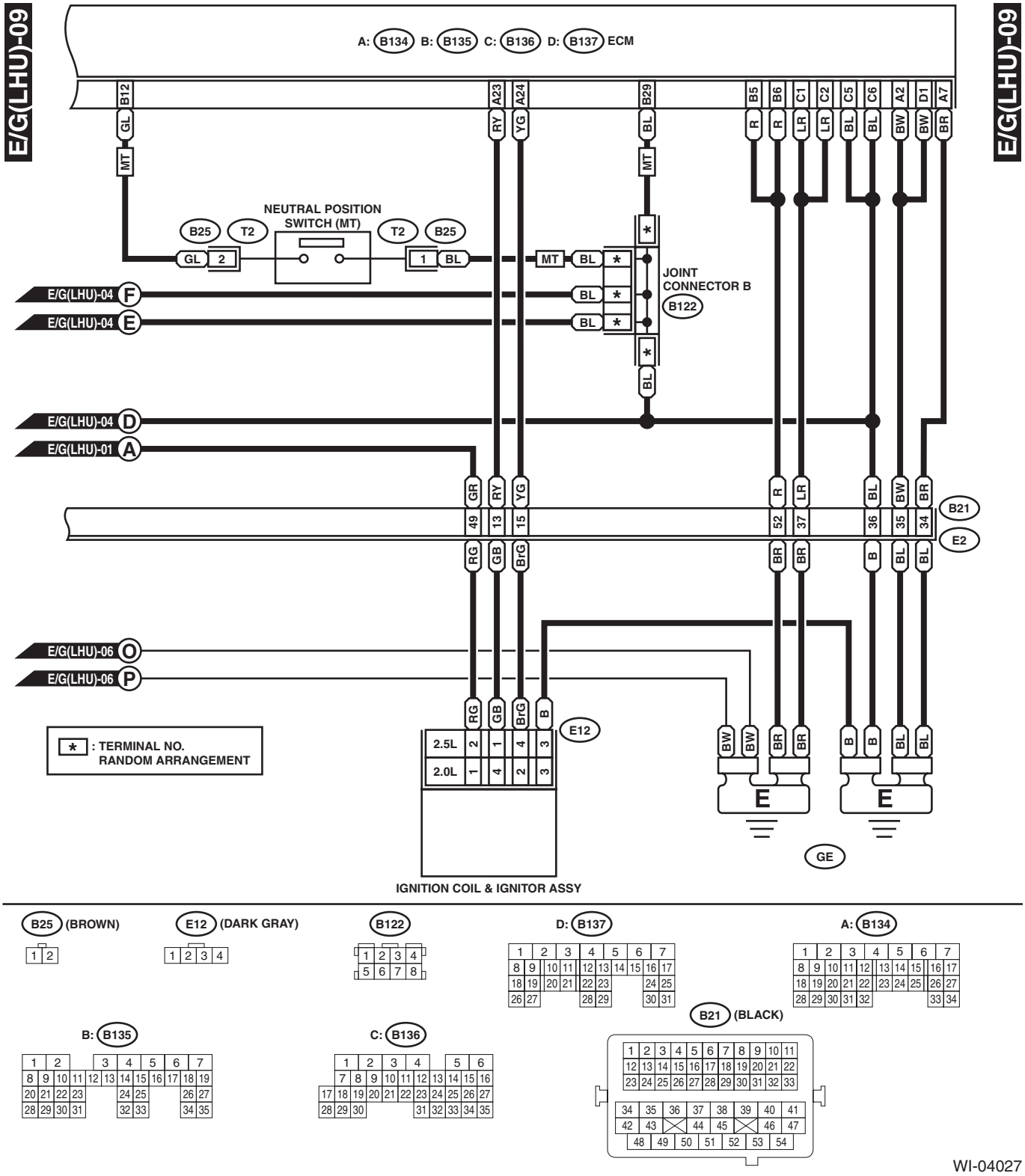


WI-04025


E/G(LHU)-08
E/G(LHU)-08
B: B135 C: B136 ECM
B8
C28
C20
C22
C30
C18
PB
YL
YW
BrW
RB
YG
E/G(LHU)-05 K
E/G(LHU)-06 L
E/G(LHU)-05 G
E/G(LHU)-05 J
SB
YG
JOINT CONNECTOR A
B83
B21
E2
LOr
WB
LY
LW
RW
E/G(LHU)-06 M
E/G(LHU)-06 N
E19
E20
E21
E8
P
POWER STEERING OIL PRESSURE SWITCH
INTAKE AIR TEMPERATURE SENSOR
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR


E8 (BLACK)
E20 (BLACK)
E21 (GRAY)
B83
B: B135
C: B136
B21 (BLACK)

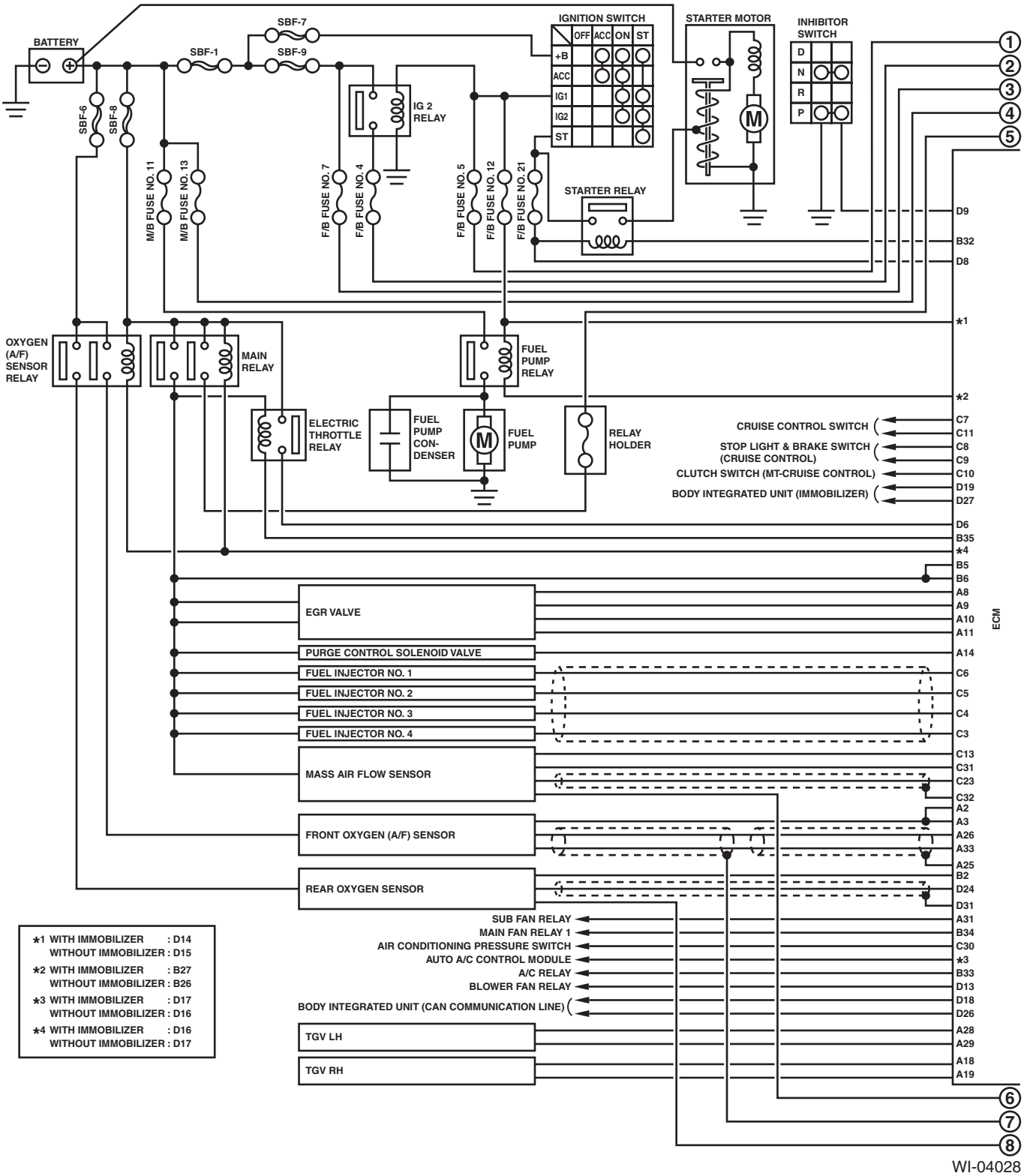
WI-04026

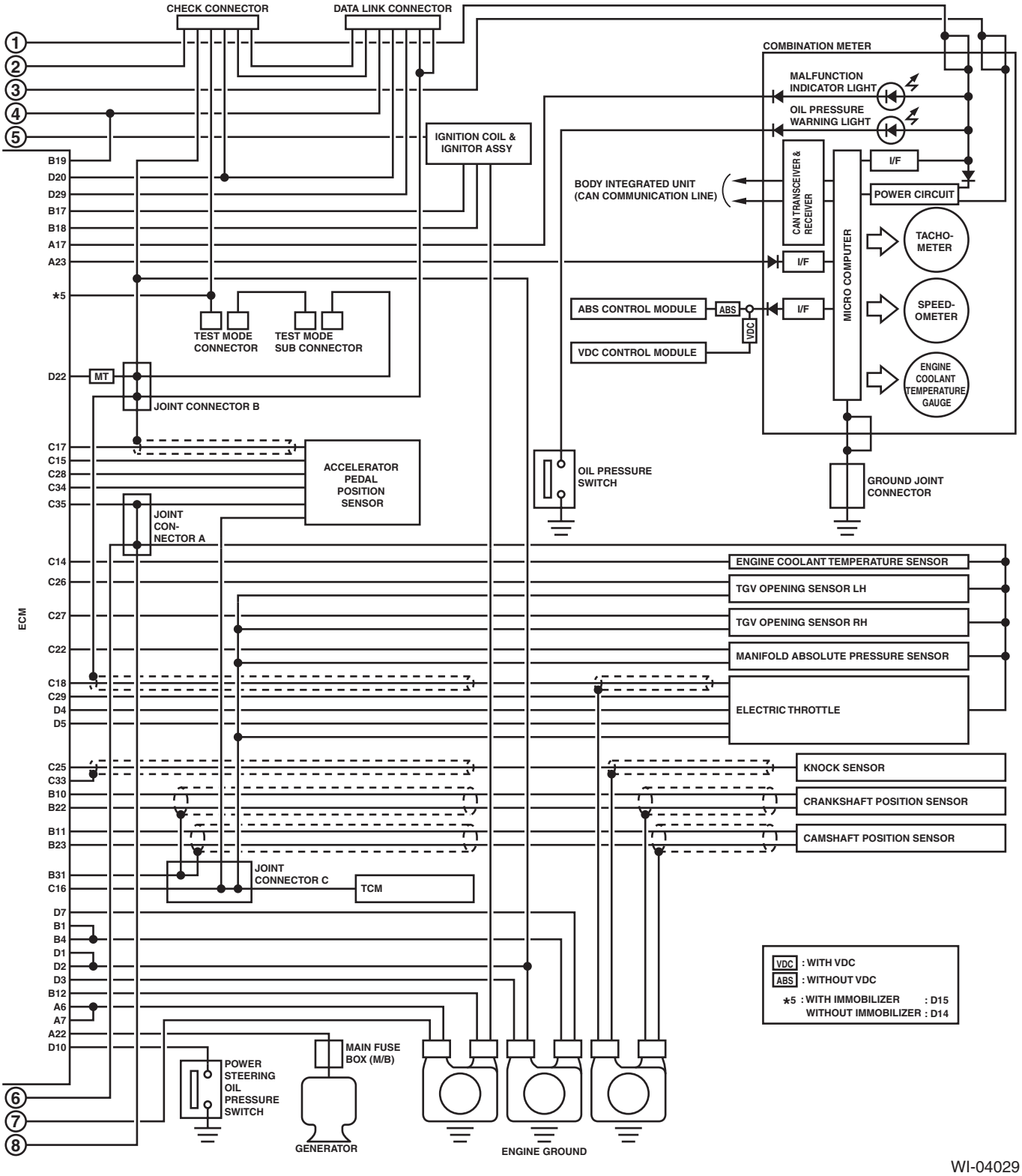

E/G(LHU)-09
E/G(LHU)-09
A: B134 B: B135 C: B136 D: B137 ECM
B12 A23 A24 B29 B5 B6 C1 C2 C5 C6 A2 D1 A7
GL RY YG BL R R LR LR BL BL BW BW BR
MT MT
NEUTRAL POSITION SWITCH (MT)
B25 T2 T2 B25
GL 2 1 BL
MT BL
JOINT CONNECTOR B
B122
E/G(LHU)-04 F
E/G(LHU)-04 E
E/G(LHU)-04 D
E/G(LHU)-01 A
GR RY YG R LR BL BW BR
49 13 15 52 37 36 35 34
B21
E2
RG GB BrG BR BR B BL BL
E/G(LHU)-06 O
E/G(LHU)-06 P
RG GB BrG B
E12
2.5L 2 1 4 3
2.0L 1 4 2 3
BW BW BR BR B B BL BL
E E
GE
: TERMINAL NO. RANDOM ARRANGEMENT
IGNITION COIL & IGNITOR ASSY

B25 (BROWN)
E12 (DARK GRAY)
B122
D: B137
A: B134
B21 (BLACK)
B: B135
C: B136

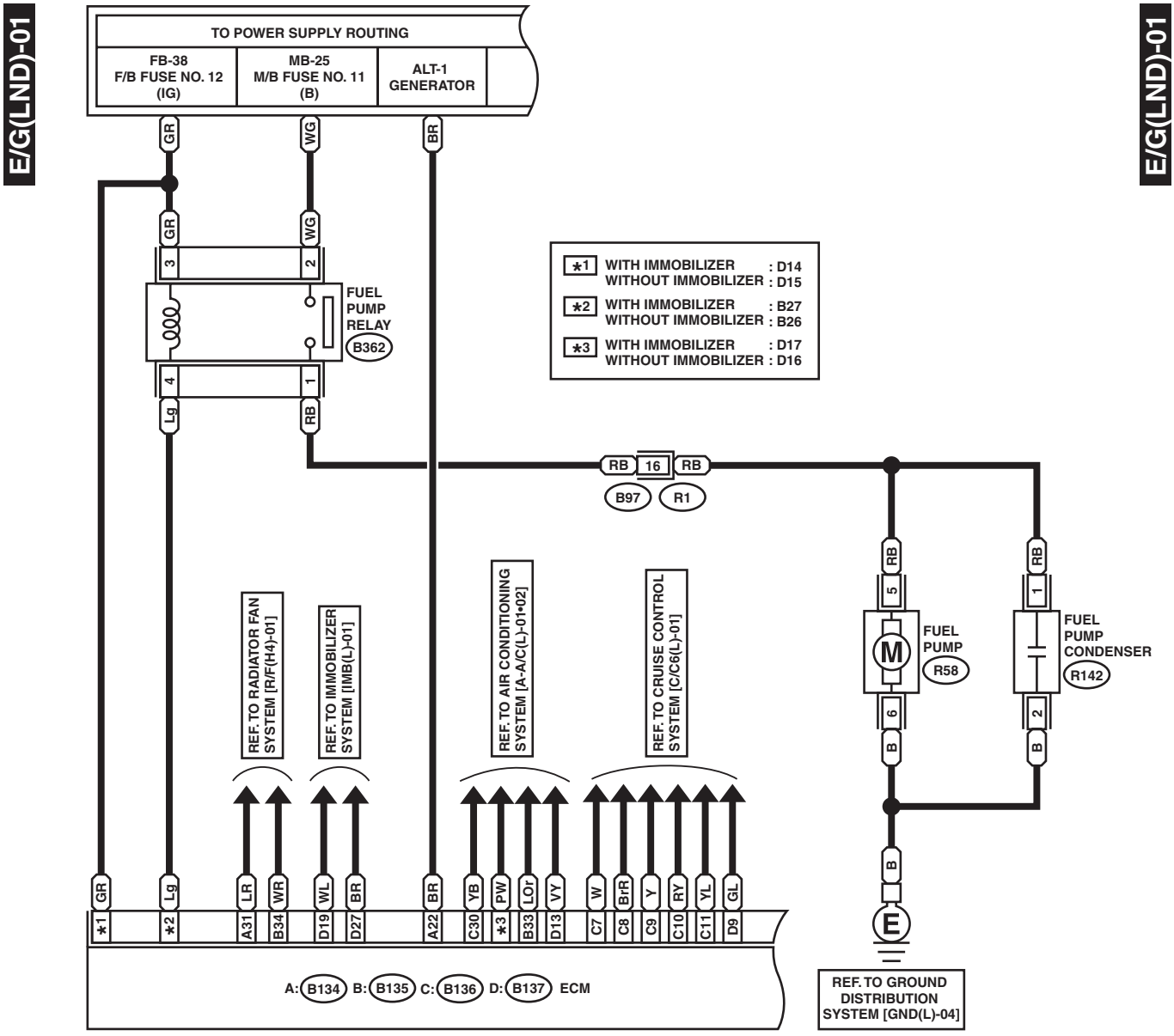
WI-04027

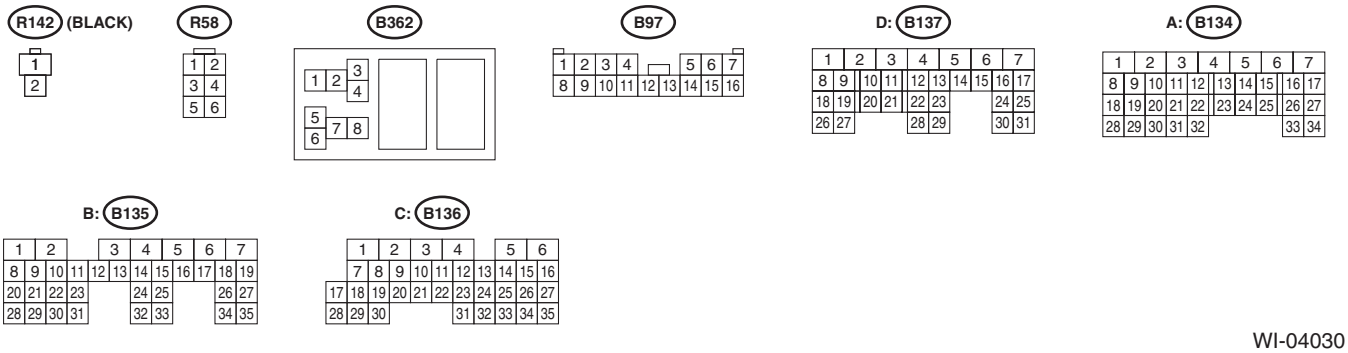
2. LHD 2.5 L EC, K4 MODEL



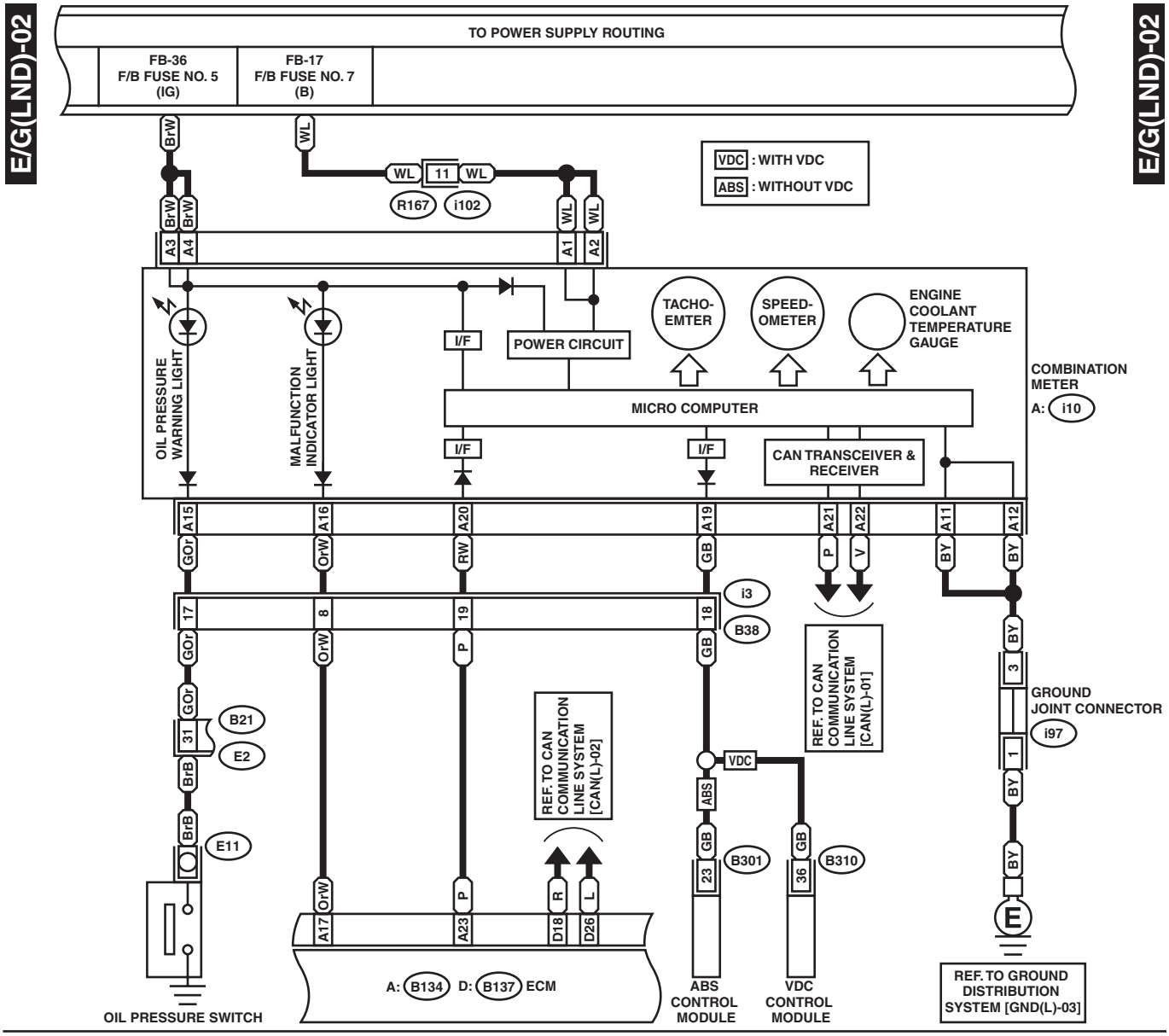

CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
IGNITION COIL & IGNITOR ASSY
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
MICRO COMPUTER
I/F
POWER CIRCUIT
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS CONTROL MODULE
ABS
VDC
VDC CONTROL MODULE
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
MT
JOINT CONNECTOR B
ACCELERATOR PEDAL POSITION SENSOR
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
JOINT CON-NECTOR A
ECM
ENGINE COOLANT TEMPERATURE SENSOR
TGV OPENING SENSOR LH
TGV OPENING SENSOR RH
MANIFOLD ABSOLUTE PRESSURE SENSOR
ELECTRIC THROTTLE
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
JOINT CONNECTOR C
TCM
VDC : WITH VDC
ABS : WITHOUT VDC
★5 : WITH IMMOBILIZER : D15
WITHOUT IMMOBILIZER : D14
POWER STEERING OIL PRESSURE SWITCH
MAIN FUSE BOX (M/B)
GENERATOR
ENGINE GROUND

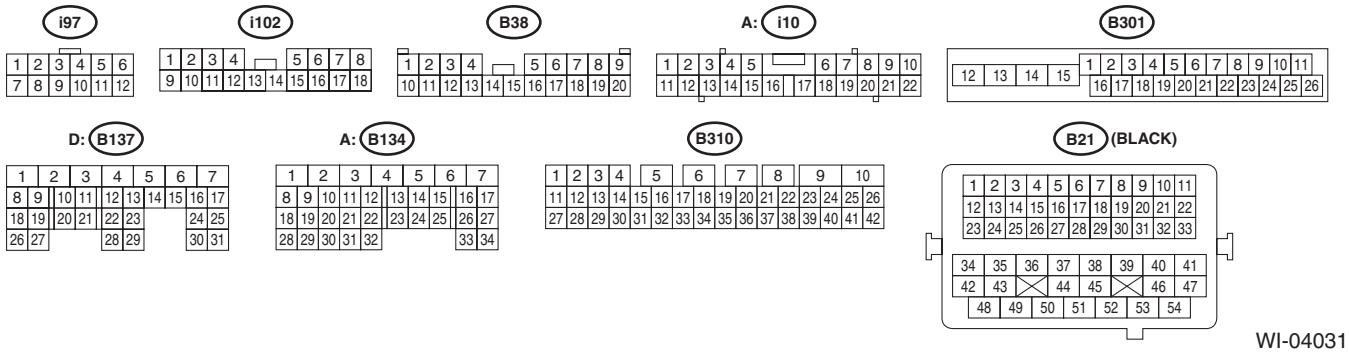
WI-04029


E/G(LND)-01
E/G(LND)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
GR
WG
BR
FUEL PUMP RELAY
B362
Lg
RB
*1 WITH IMMOBILIZER : D14
WITHOUT IMMOBILIZER : D15
*2 WITH IMMOBILIZER : B27
WITHOUT IMMOBILIZER : B26
*3 WITH IMMOBILIZER : D17
WITHOUT IMMOBILIZER : D16
RB 16 RB
B97 R1
REF. TO RADIATOR FAN SYSTEM [R/F(H4)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(L)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(L)-01•02]
REF. TO CRUISE CONTROL SYSTEM [C/C6(L)-01]
FUEL PUMP
R58
FUEL PUMP CONDENSER
R142
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]
A: B134 B: B135 C: B136 D: B137 ECM

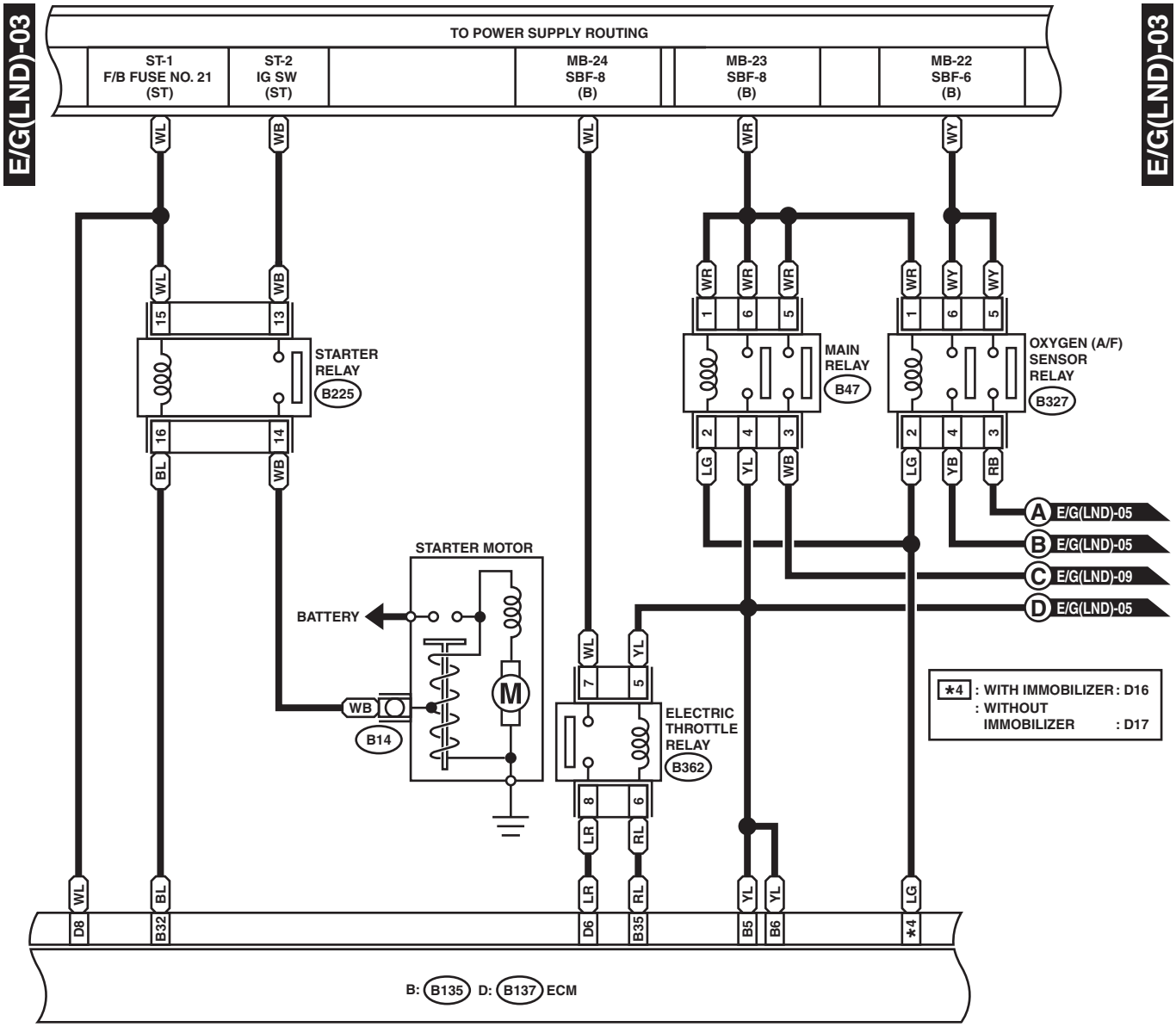

R142 (BLACK)
R58
B362
B97
D: B137
A: B134
B: B135
C: B136

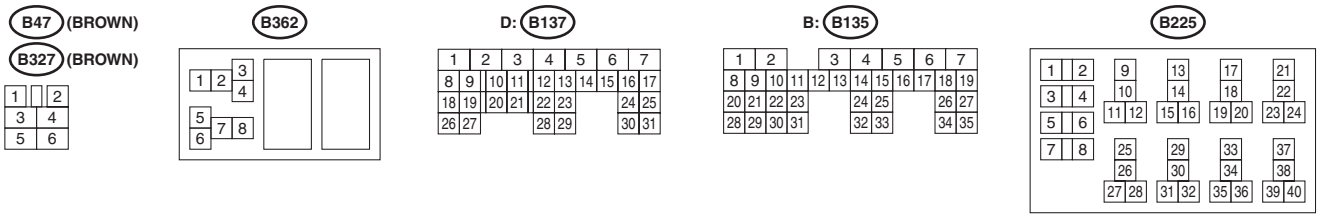
WI-04030


E/G(LND)-02
E/G(LND)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
VDC : WITH VDC
ABS : WITHOUT VDC
R167
i102
TACHO-
EMTER
SPEED-
OMETER
ENGINE
COOLANT
TEMPERATURE
GAUGE
COMBINATION
METER
A: i10
OIL PRESSURE
WARNING LIGHT
MALFUNCTION
INDICATOR LIGHT
I/F
POWER CIRCUIT
MICRO COMPUTER
CAN TRANSCEIVER &
RECEIVER
i3
B38
B21
E2
E11
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(L)-02]
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(L)-01]
GROUND
JOINT CONNECTOR
i97
B301
B310
A: B134 D: B137 ECM
ABS
CONTROL
MODULE
VDC
CONTROL
MODULE
OIL PRESSURE SWITCH
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-03]

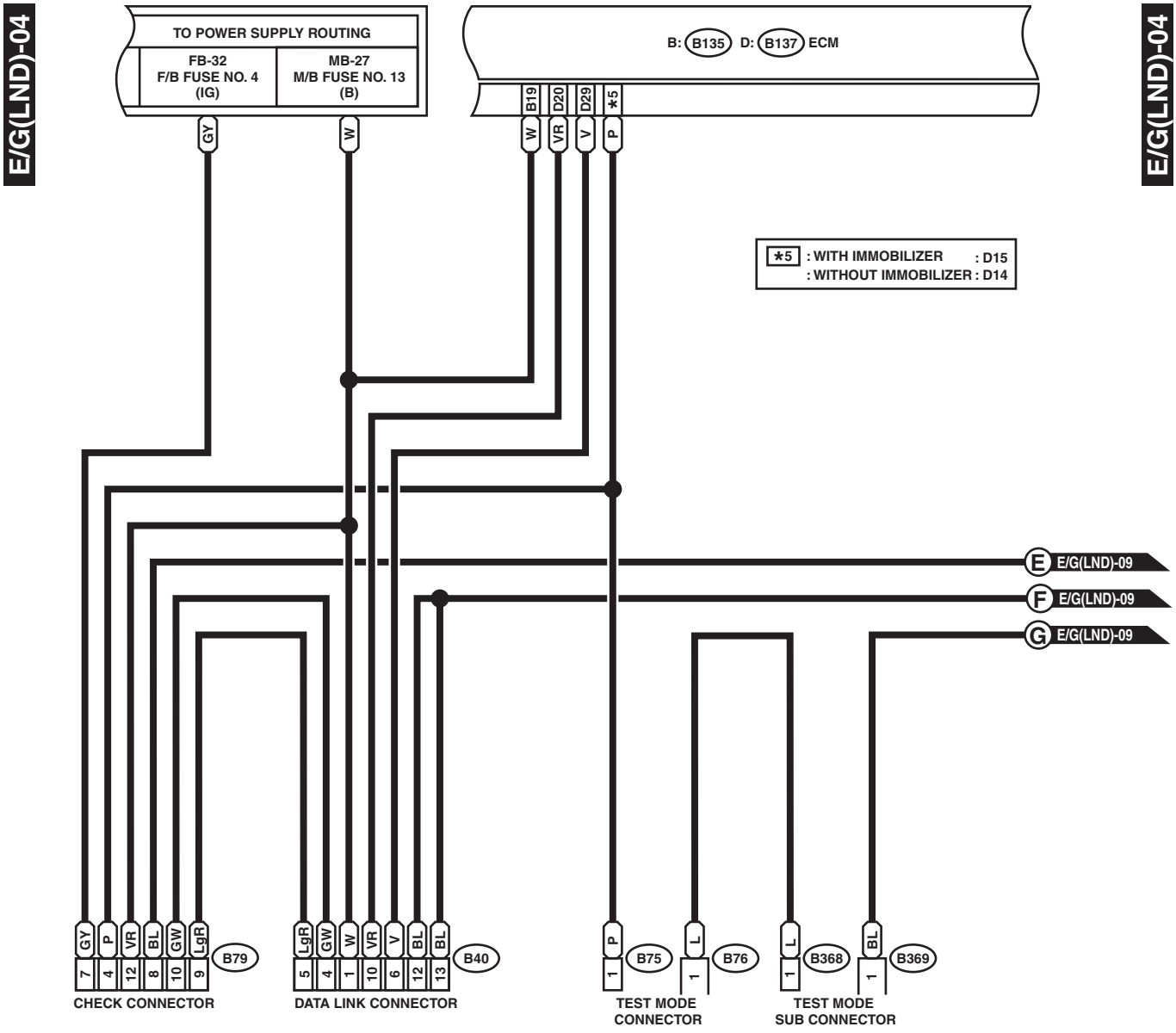

i97
i102
B38
A: i10
B301
D: B137
A: B134
B310
B21 (BLACK)

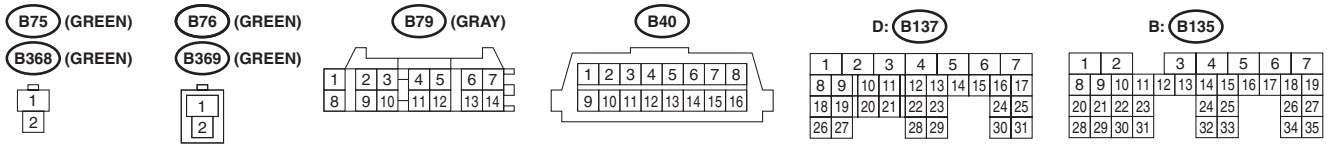
WI-04031


E/G(LND)-03
E/G(LND)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
STARTER
RELAY
B225
MAIN
RELAY
B47
OXYGEN (A/F)
SENSOR
RELAY
B327
STARTER MOTOR
BATTERY
B14
ELECTRIC
THROTTLE
RELAY
B362
A E/G(LND)-05
B E/G(LND)-05
C E/G(LND)-09
D E/G(LND)-05
*4 : WITH IMMOBILIZER : D16
: WITHOUT
IMMOBILIZER : D17
B: B135 D: B137 ECM

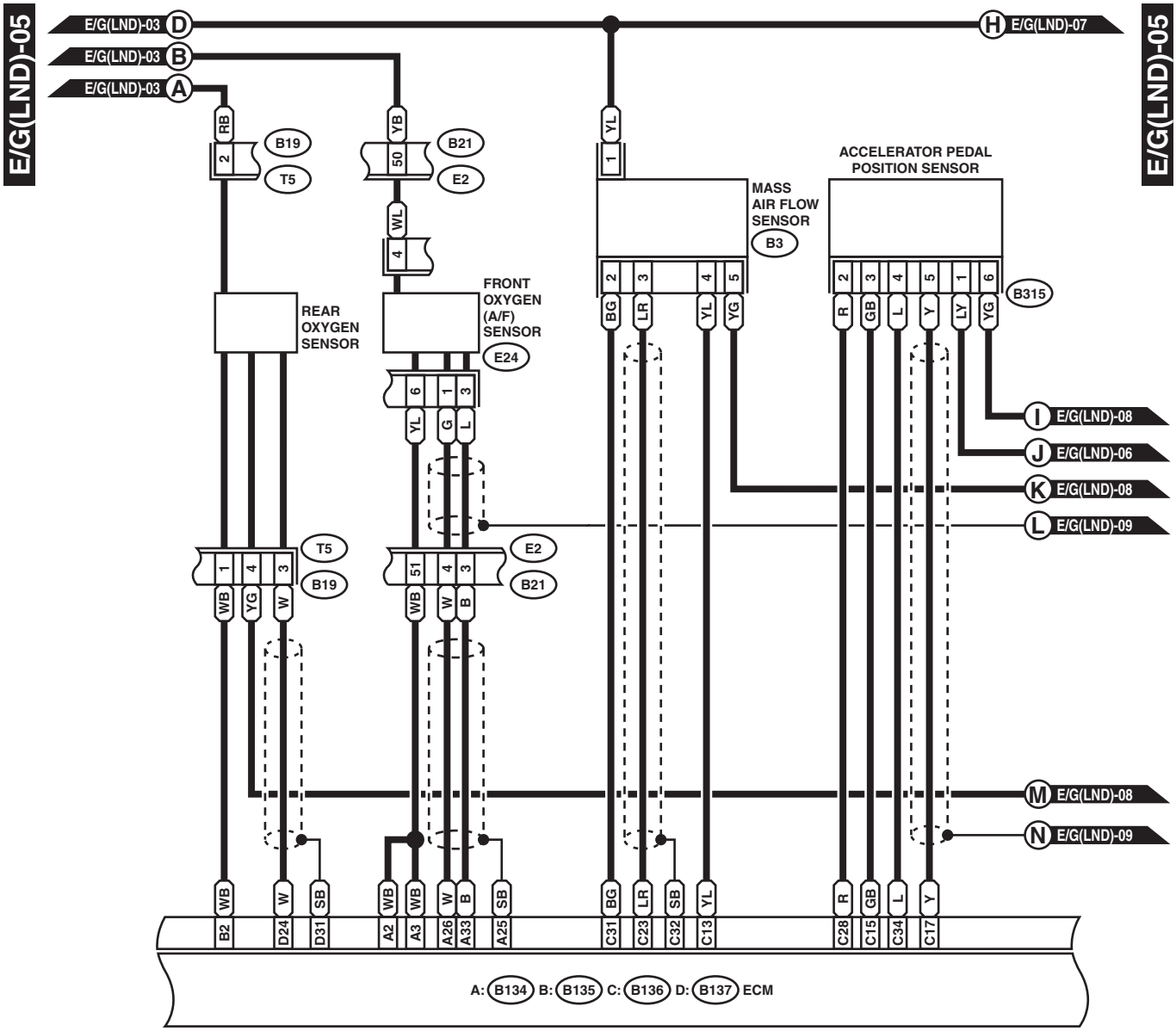

B47 (BROWN)
B327 (BROWN)
B362
D: B137
B: B135
B225

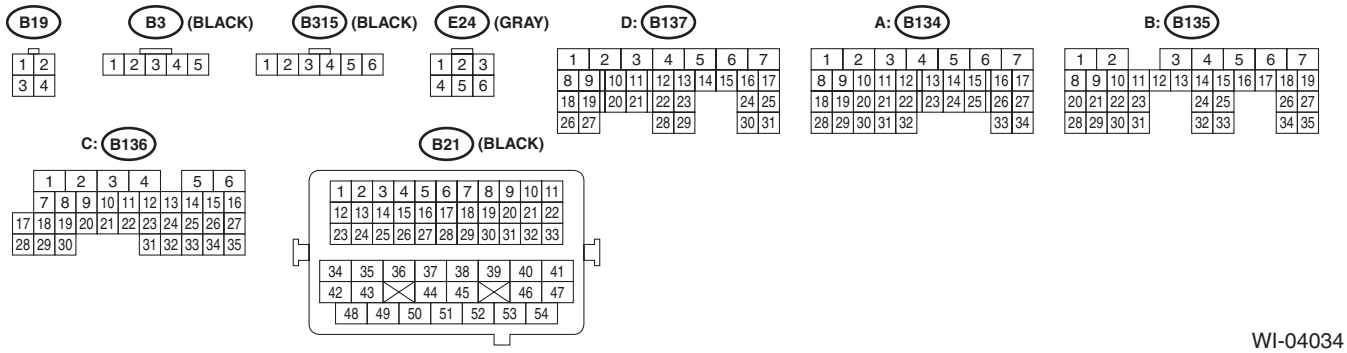
WI-04032


E/G(LND)-04
E/G(LND)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 D: B137 ECM
B19
D20
D29
*5
GY
W
W
VR
V
P
*5 : WITH IMMOBILIZER : D15
: WITHOUT IMMOBILIZER : D14
E E/G(LND)-09
F E/G(LND)-09
G E/G(LND)-09
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
LgR GW W VR V BL BL
5 4 1 10 6 12 13
B40
DATA LINK CONNECTOR
P
1
B75
L
1
B76
TEST MODE
CONNECTOR
L
1
B368
BL
1
B369
TEST MODE
SUB CONNECTOR

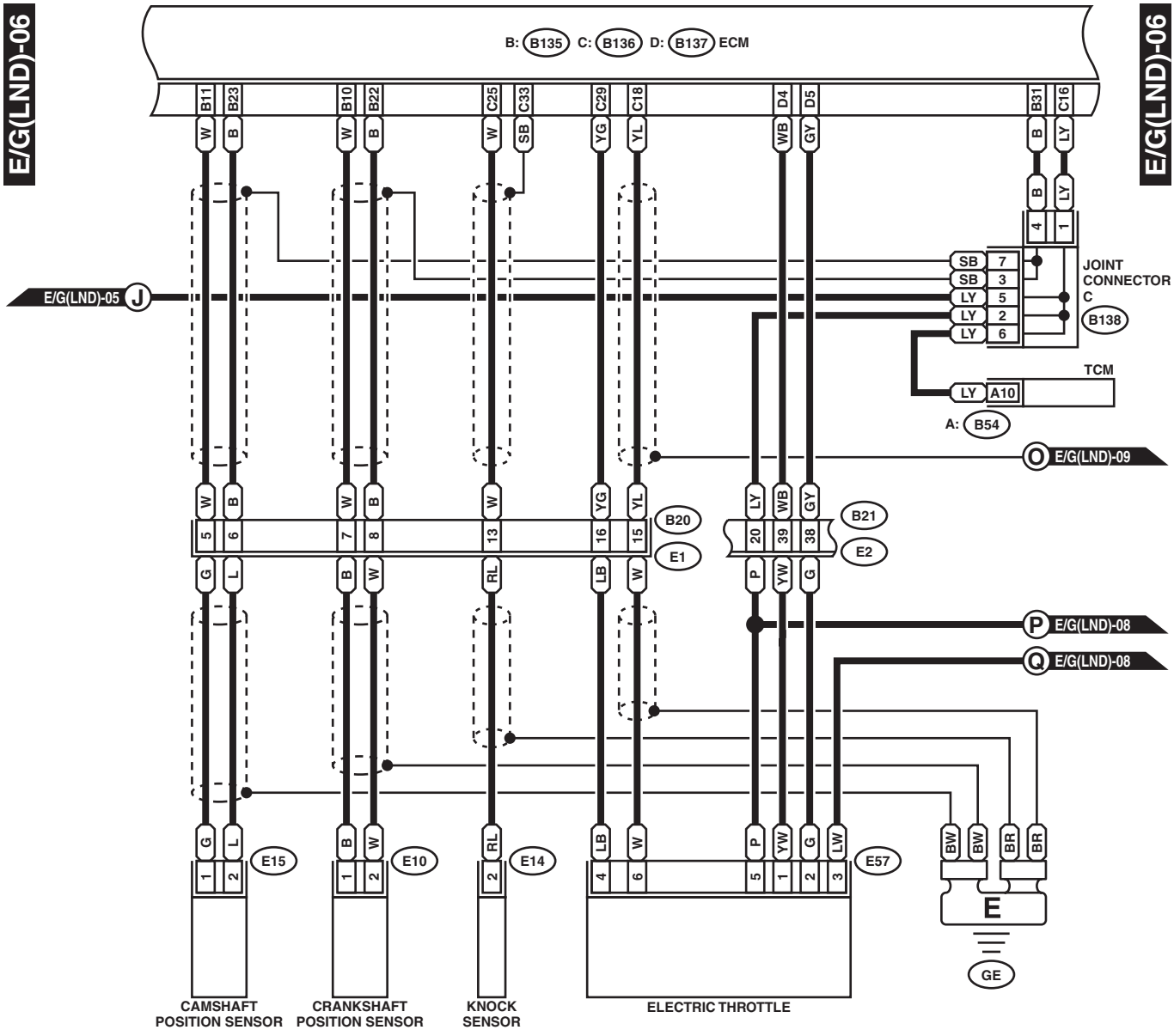

B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
D: B137
B: B135

WI-04033


E/G(LND)-05
E/G(LND)-03 D
E/G(LND)-03 B
E/G(LND)-03 A
H E/G(LND)-07
E/G(LND)-05
RB
2
B19
T5
YB
50
B21
E2
WL
4
YL
1
MASS AIR FLOW SENSOR
B3
ACCELERATOR PEDAL POSITION SENSOR
B315
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
E24
BG
LR
YL
YG
R
GB
L
Y
LY
I E/G(LND)-08
J E/G(LND)-06
K E/G(LND)-08
L E/G(LND)-09
M E/G(LND)-08
N E/G(LND)-09
WB
W
YG
B
SB
B2
D24
D31
A2
A3
A26
A33
A25
C31
C23
C32
C13
C28
C15
C34
C17
A: B134 B: B135 C: B136 D: B137 ECM


B19
B3 (BLACK)
B315 (BLACK)
E24 (GRAY)
D: B137
A: B134
B: B135
C: B136
B21 (BLACK)

WI-04034



E10 (LIGHT GRAY)

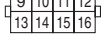
E15 (GRAY)

E14 (BROWN)

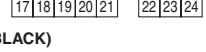
E57 (BLACK)

B138

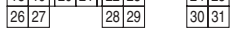
B20



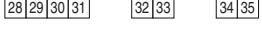
A: B54



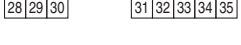
D: B137



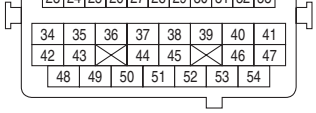
B: B135



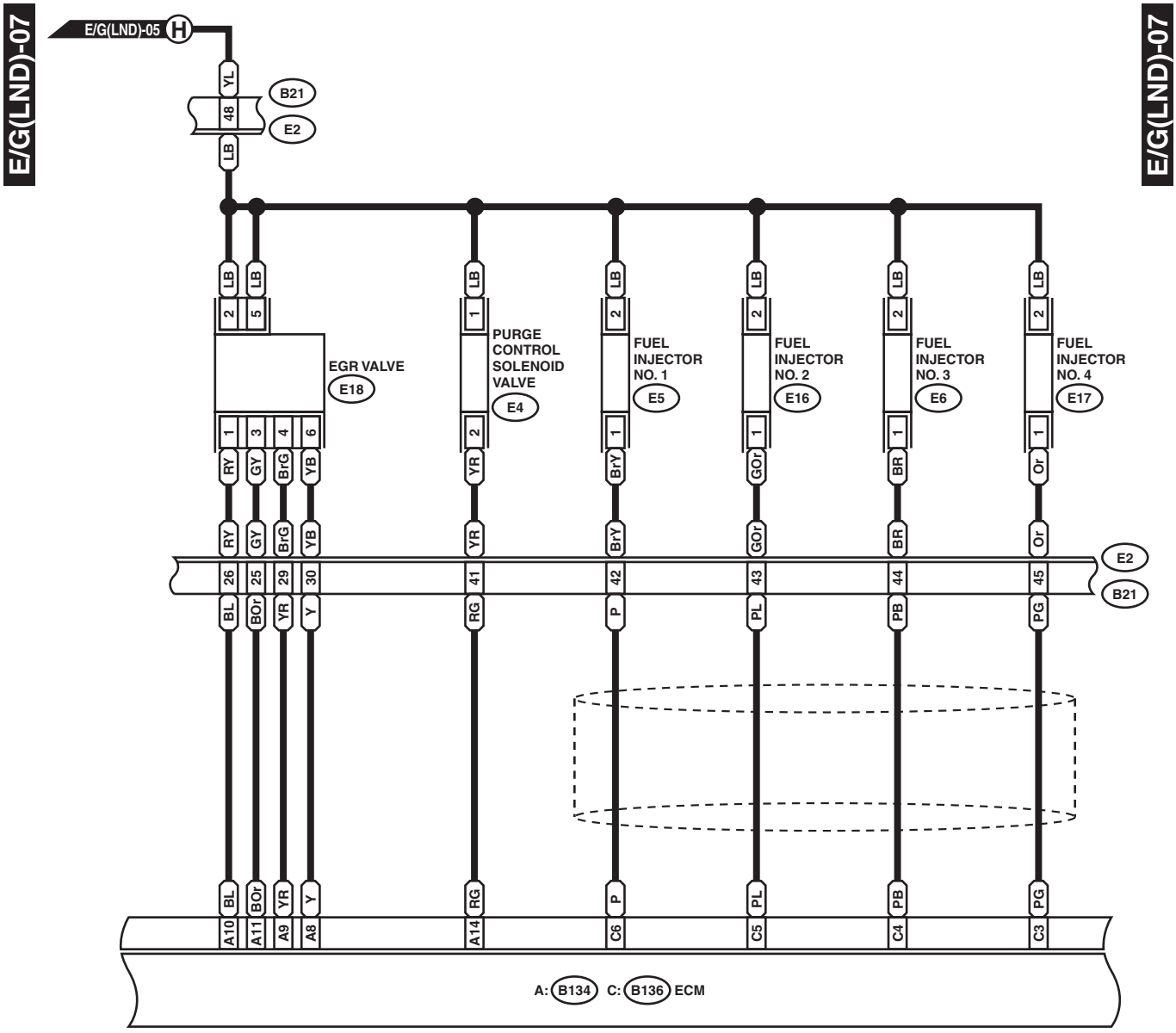
C: B136

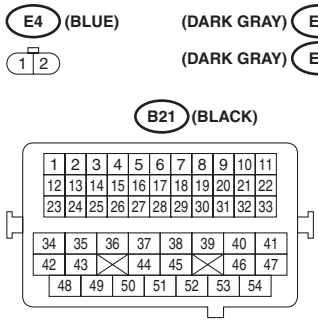


B21 (BLACK)



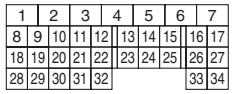
WI-04035

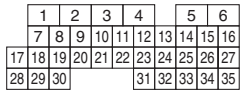

E/G(LND)-07
E/G(LND)-05 H
YL
48
LB
B21
E2
LB
2
5
EGR VALVE
E18
1
3
4
6
RY
GY
BrG
YB
1
PURGE CONTROL SOLENOID VALVE
E4
2
YR
FUEL INJECTOR NO. 1
E5
BrY
FUEL INJECTOR NO. 2
E16
GOr
FUEL INJECTOR NO. 3
E6
BR
FUEL INJECTOR NO. 4
E17
Or
26
25
29
30
41
42
43
44
45
BL
BOr
YR
Y
RG
P
PL
PB
PG
A10
A11
A9
A8
A14
C6
C5
C4
C3
A: B134 C: B136 ECM


E4 (BLUE)
1 2
B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54

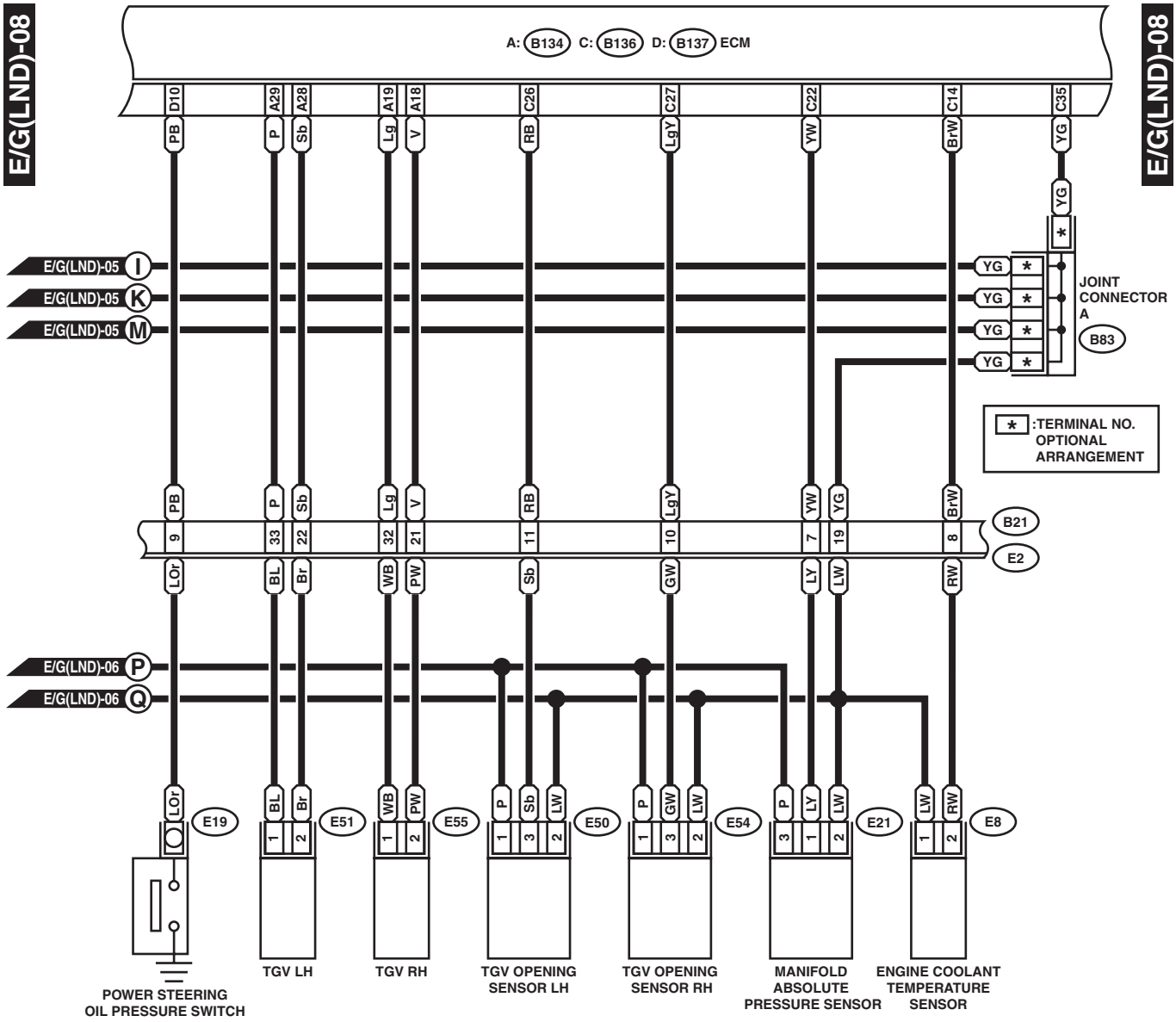
(DARK GRAY) E5
E16 (DARK GRAY)
(DARK GRAY) E6
E17 (DARK GRAY)
1 2

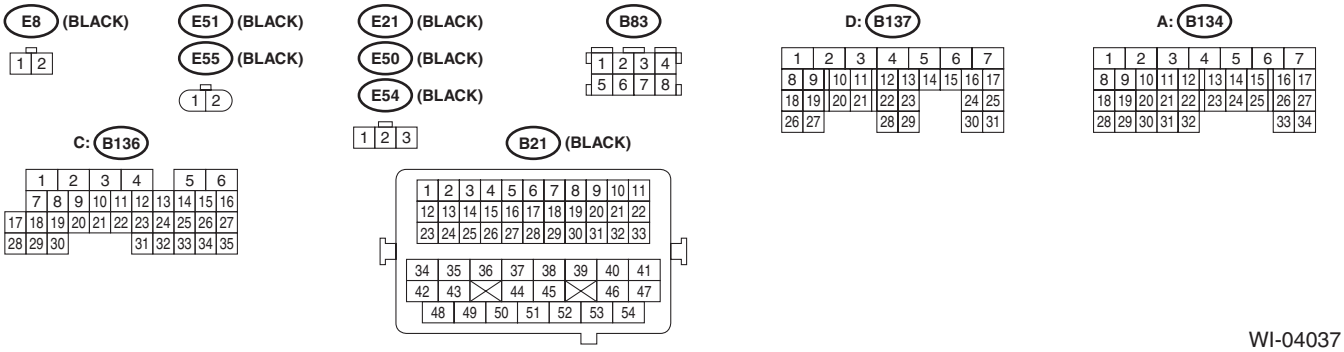
E18 (DARK GRAY)
1 2 3
4 5 6


A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34

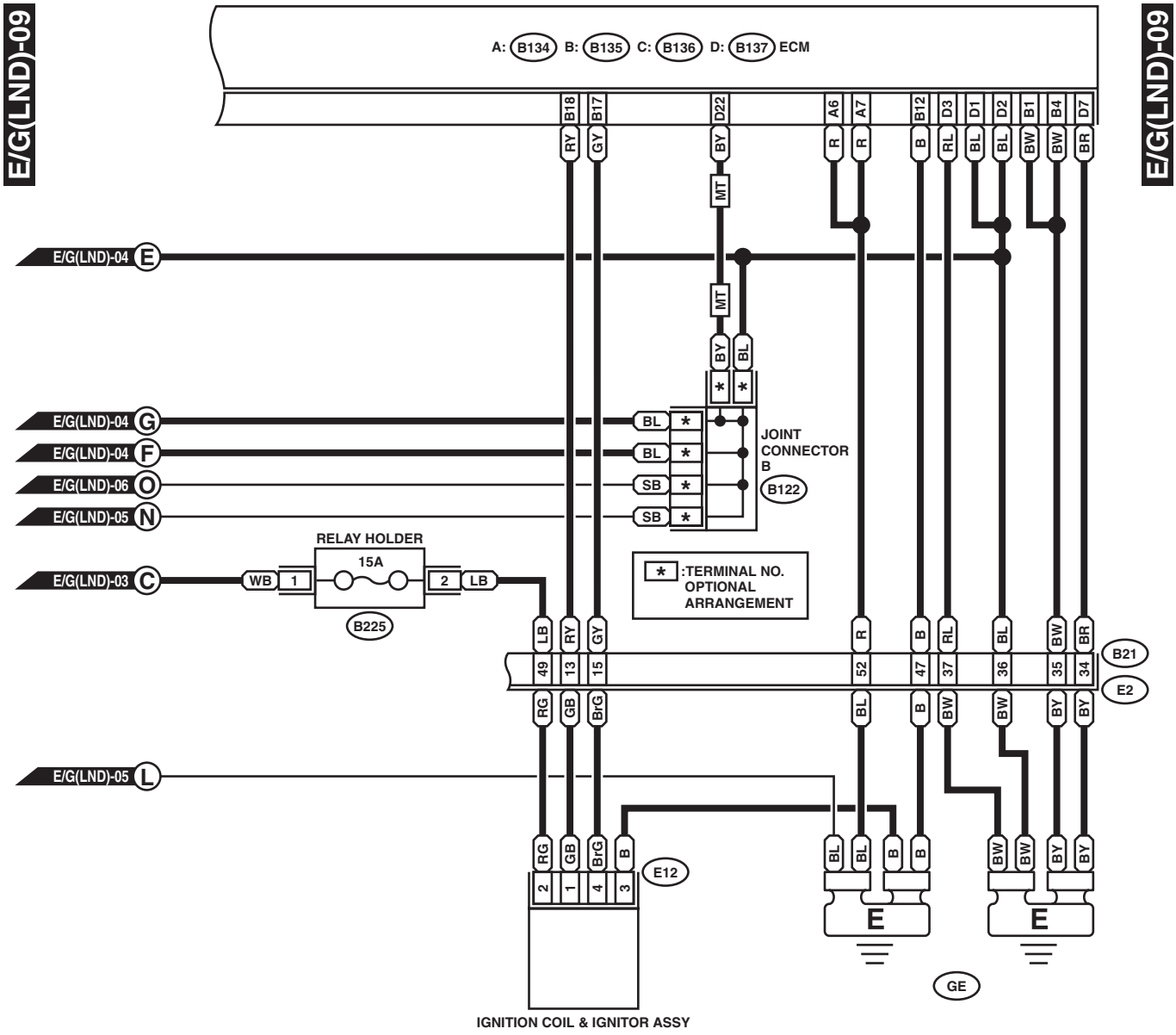

C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35

WI-04036


E/G(LND)-08
E/G(LND)-08
A: B134 C: B136 D: B137 ECM
D10 A29 A28 A19 A18 C26 C27 C22 C14 C35
PB P Sb Lg V RB LgY YW BrW YG
YG *
E/G(LND)-05 I
E/G(LND)-05 K
E/G(LND)-05 M
JOINT CONNECTOR A
B83
* :TERMINAL NO. OPTIONAL ARRANGEMENT
9 33 22 32 21 11 10 7 19 8
B21
E2
LOr BL Br WB PW Sb GW LY LW RW
E/G(LND)-06 P
E/G(LND)-06 Q
E19 E51 E55 E50 E54 E21 E8
POWER STEERING OIL PRESSURE SWITCH
TGV LH
TGV RH
TGV OPENING SENSOR LH
TGV OPENING SENSOR RH
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR


E8 (BLACK)
E51 (BLACK)
E55 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
B83
D: B137
A: B134
C: B136
B21 (BLACK)

WI-04037



E12 (DARK GRAY)

1	2	3	4

B122

1	2	3	4
5	6	7	8

D: B137

1	2	3	4	5	6	7	
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23			24	25
26	27			28	29			30	31

A: B134

1	2	3	4	5	6	7	
8	9	10	11	12	13	14	15	16	17
18	19	20	21	22	23	24	25		
26	27	28	29	30	31	32		33	34

B21 (BLACK)

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

34	35	36	37	38	39	40	41
42	43		44	45		46	47
48	49	50	51	52	53	54	

B: B135

1	2				3	4	5		6		7								
8	9	10	11	12	13	14	15	16	17	18	19								
20	21	22	23			24	25			26	27								
28	29	30	31			32	33			34	35								

C: B136

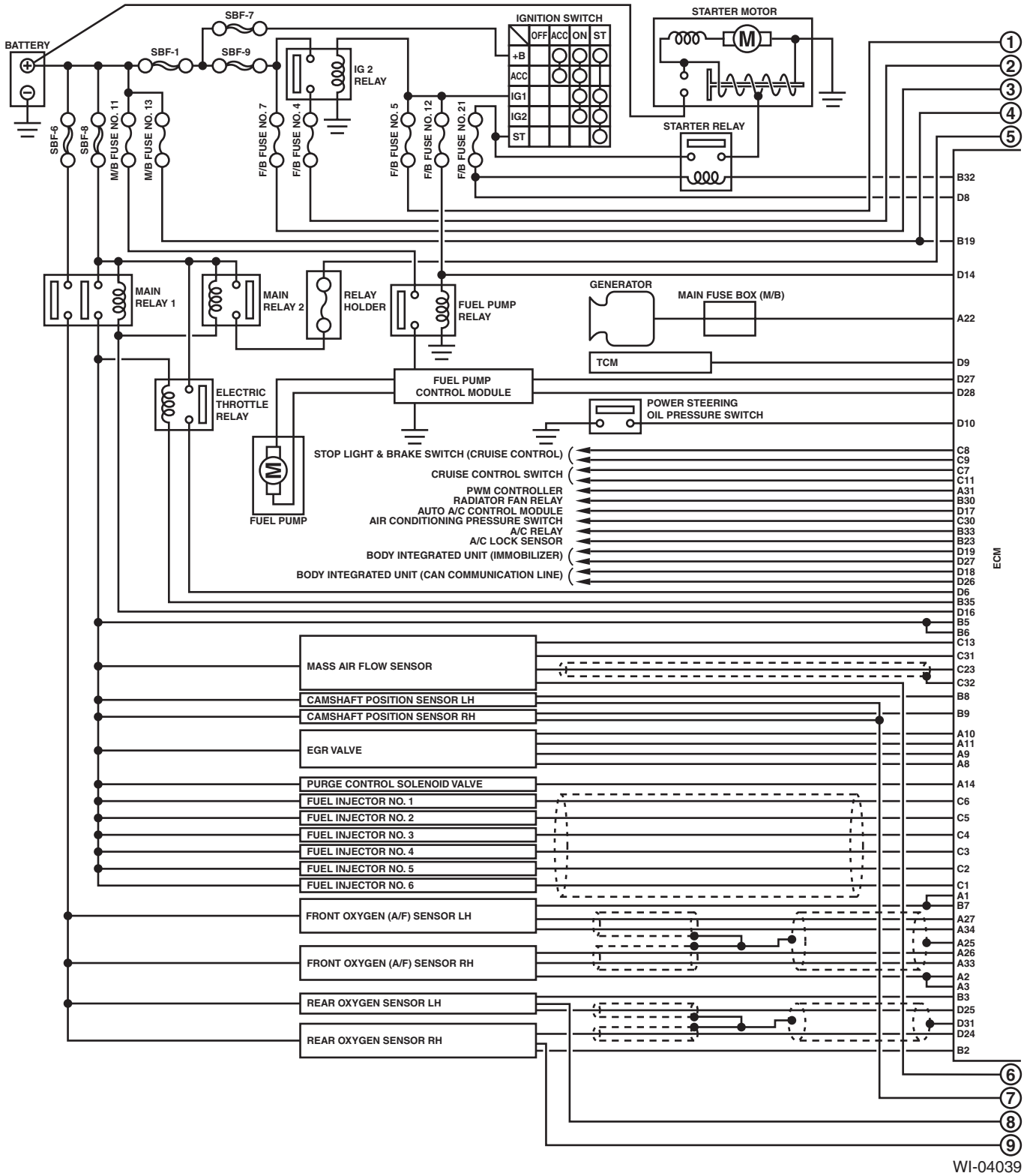
1	2	3	4			5	6									
	7	8	9	10	11	12	13	14	15	16						
17	18	19	20	21	22	23	24	25	26	27						
28	29	30				31	32	33	34	35						

B225

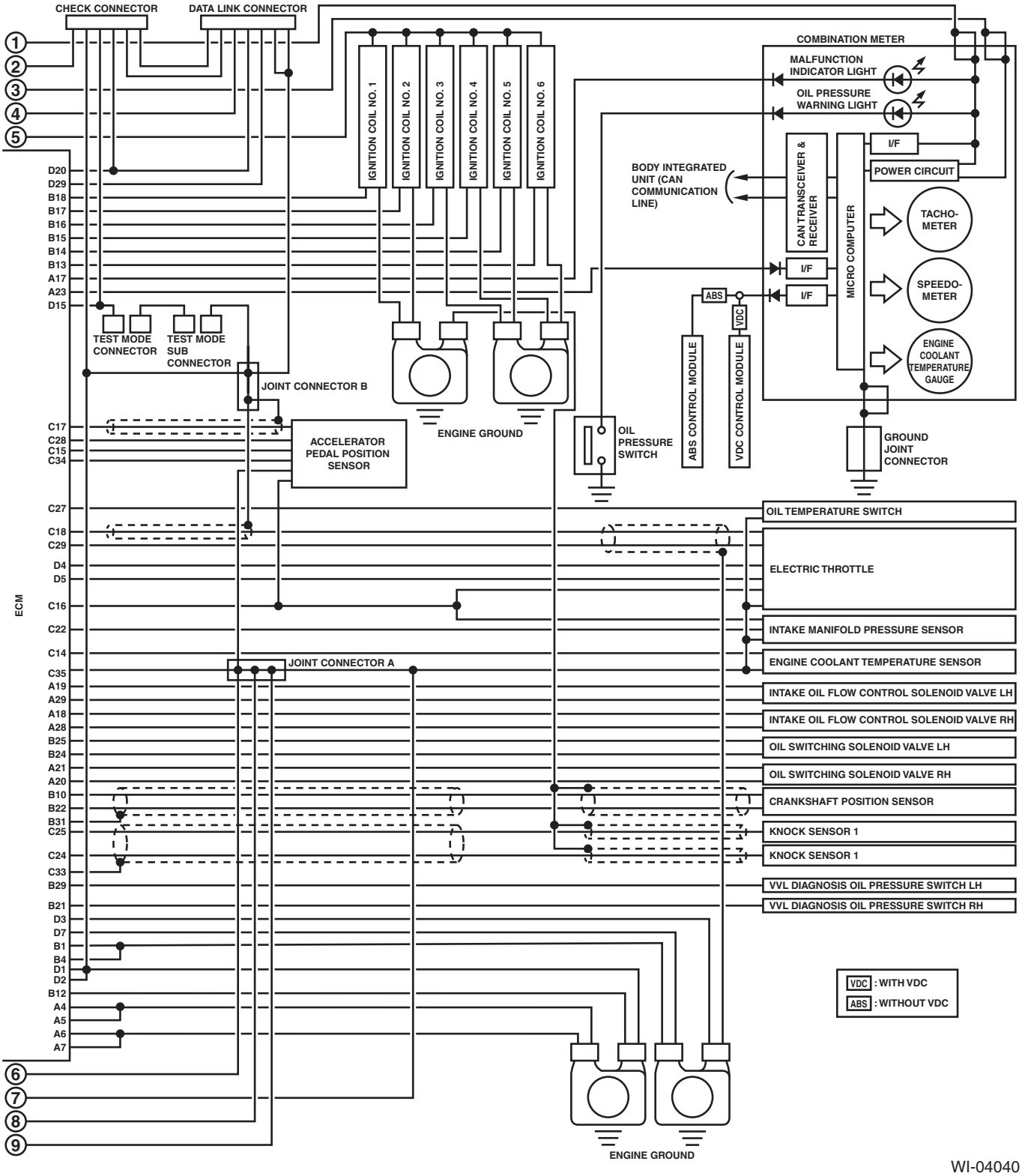
1	2				9			13			17			21					
3	4				10			14			18			22					
5	6			11	12		15	16		19	20		23	24					
7	8				25			29			33			37					
				26			30			34			38						
			27	28		31	32		35	36		39	40						

WI-04038

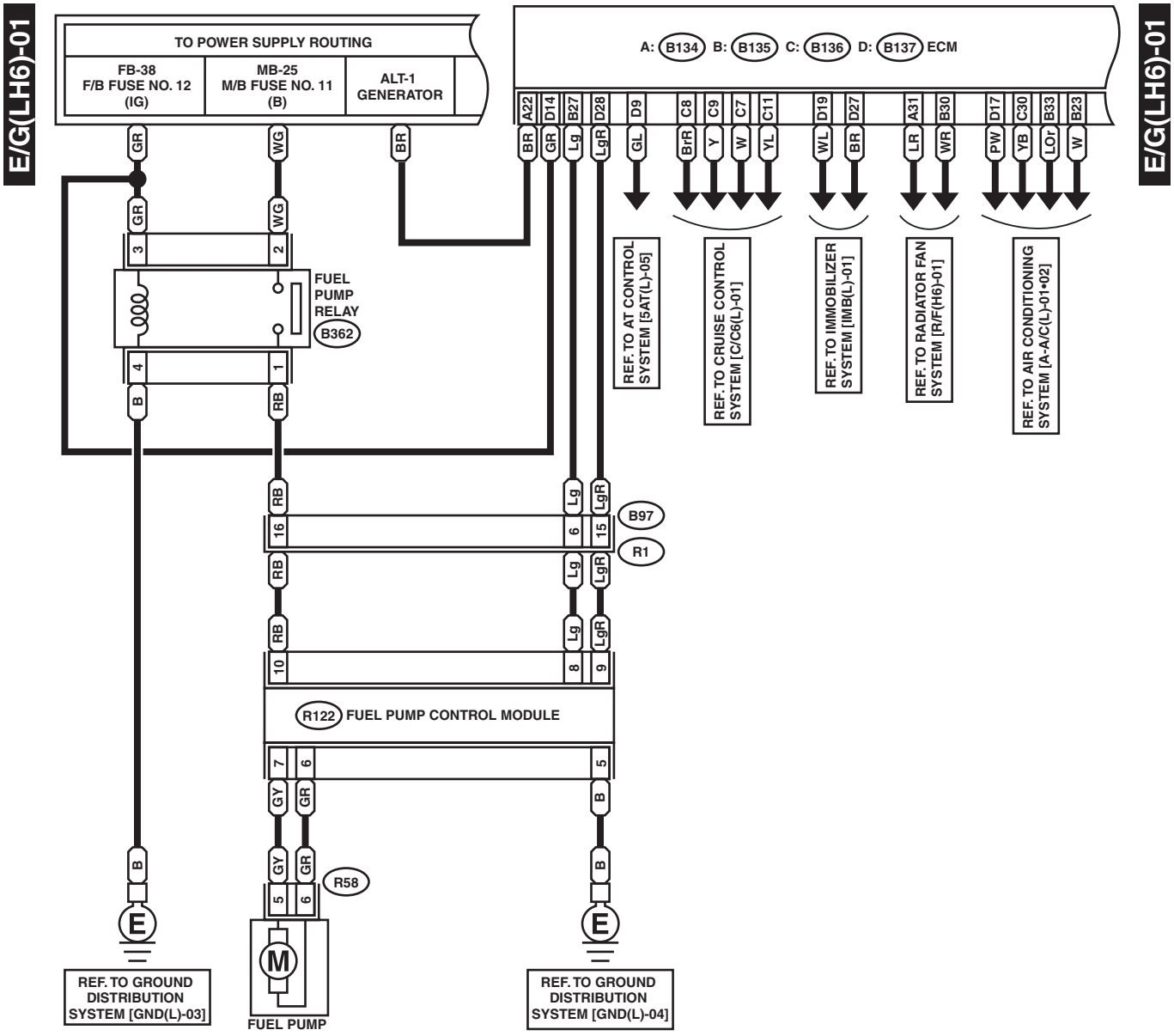
3. LHD 3.0 L MODEL

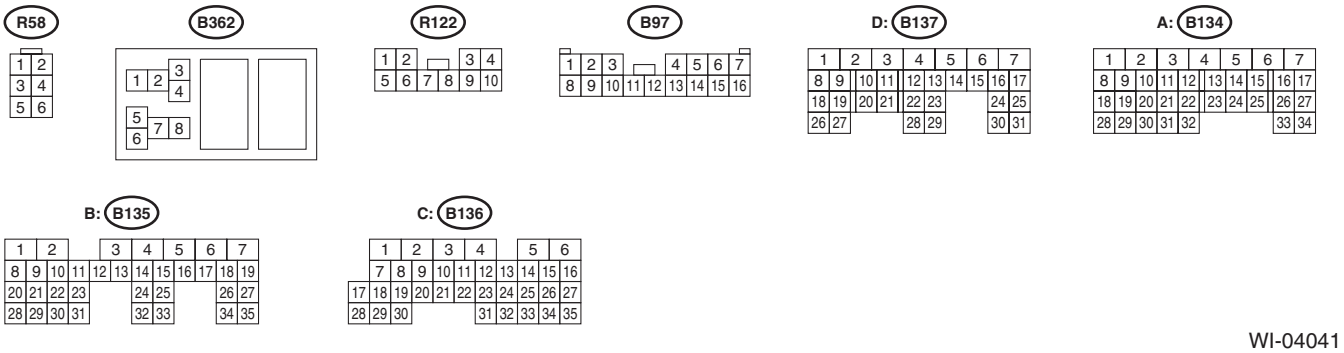


WI-04039

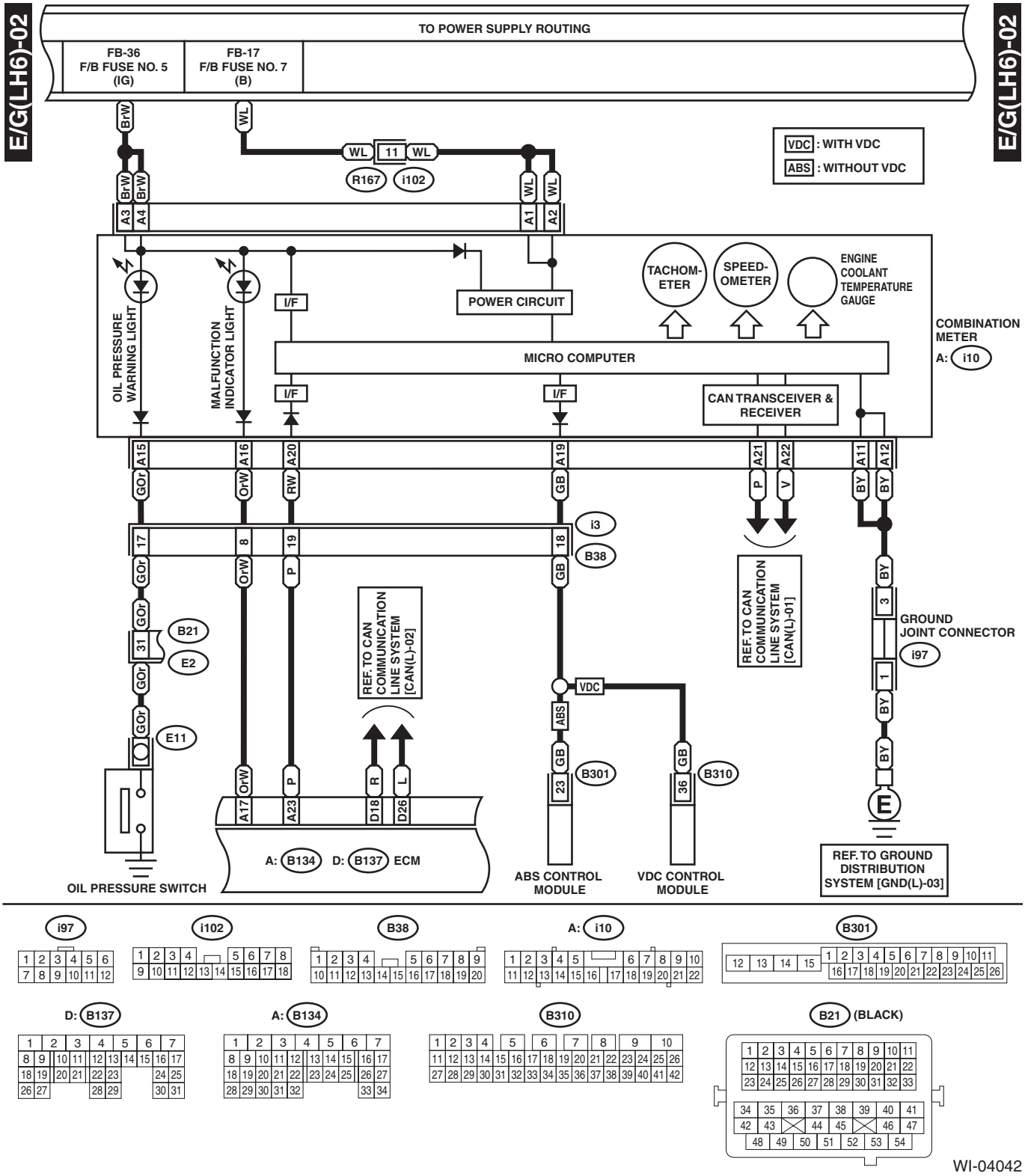

CHECK CONNECTOR
DATA LINK CONNECTOR
IGNITION COIL NO. 1
IGNITION COIL NO. 2
IGNITION COIL NO. 3
IGNITION COIL NO. 4
IGNITION COIL NO. 5
IGNITION COIL NO. 6
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
I/F
POWER CIRCUIT
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
MICRO COMPUTER
TACHO-METER
SPEEDO-METER
ENGINE COOLANT TEMPERATURE GAUGE
ABS
VDC
ABS CONTROL MODULE
VDC CONTROL MODULE
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
JOINT CONNECTOR B
ENGINE GROUND
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
ACCELERATOR PEDAL POSITION SENSOR
JOINT CONNECTOR A
ECM
OIL TEMPERATURE SWITCH
ELECTRIC THROTTLE
INTAKE MANIFOLD PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR 1
KNOCK SENSOR 1
VVL DIAGNOSIS OIL PRESSURE SWITCH LH
VVL DIAGNOSIS OIL PRESSURE SWITCH RH
VDC : WITH VDC
ABS : WITHOUT VDC
ENGINE GROUND

WI-04040


E/G(LH6)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
A: B134 B: B135 C: B136 D: B137 ECM
E/G(LH6)-01
FUEL PUMP RELAY B362
REF. TO AT CONTROL SYSTEM [5AT(L)-05]
REF. TO CRUISE CONTROL SYSTEM [C/C6(L)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(L)-01]
REF. TO RADIATOR FAN SYSTEM [R/F(H6)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(L)-01•02]
B97
R1
R122 FUEL PUMP CONTROL MODULE
R58
M
FUEL PUMP
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]

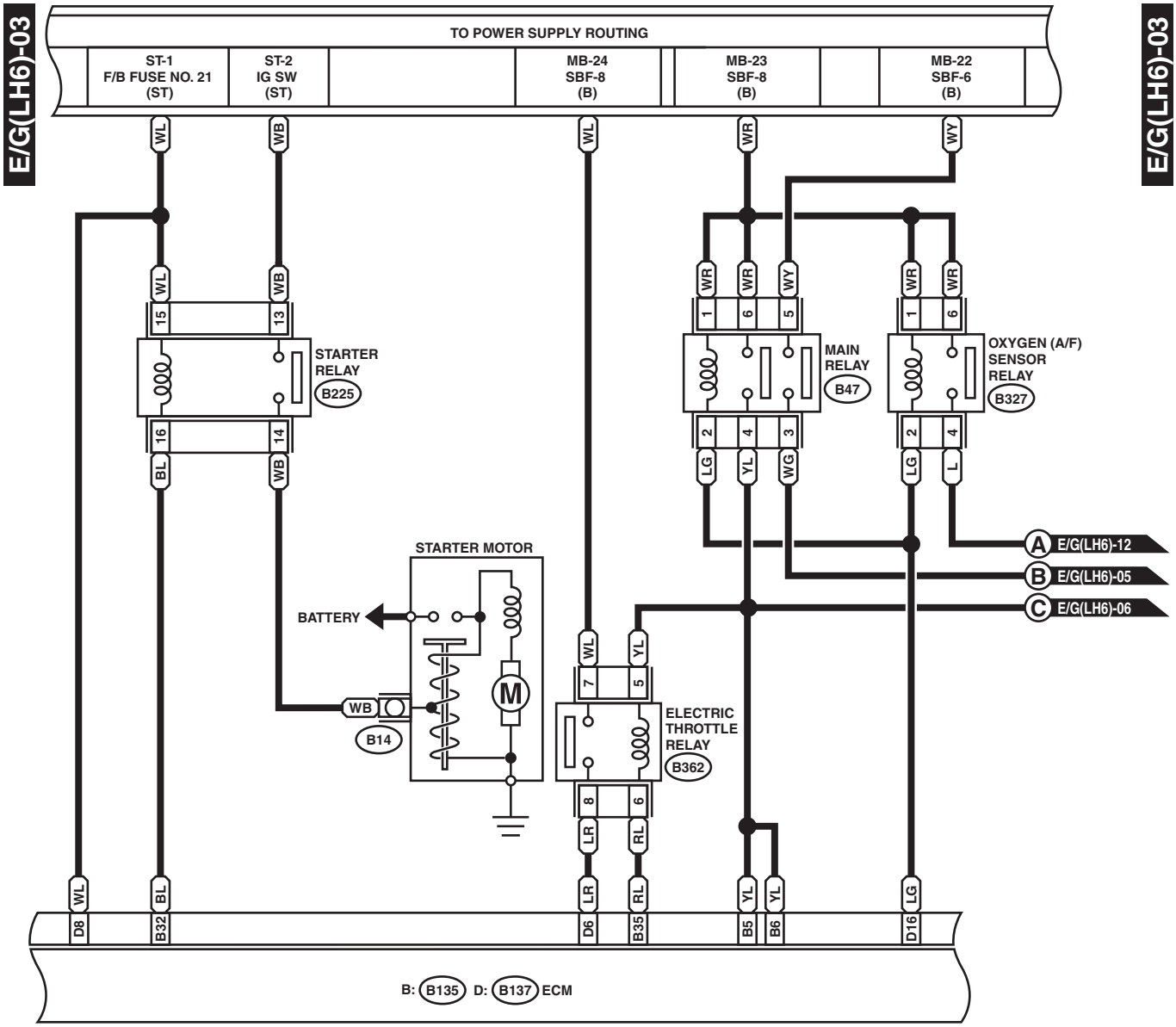

R58
B362
R122
B97
D: B137
A: B134
B: B135
C: B136

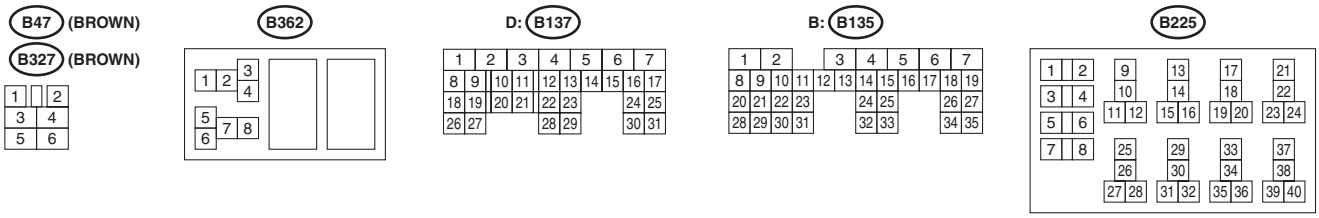
WI-04041


E/G(LH6)-02
E/G(LH6)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
VDC : WITH VDC
ABS : WITHOUT VDC
R167
i102
TACHOM-
ETER
SPEED-
OMETER
ENGINE
COOLANT
TEMPERATURE
GAUGE
COMBINATION
METER
A: i10
OIL PRESSURE
WARNING LIGHT
MALFUNCTION
INDICATOR LIGHT
I/F
POWER CIRCUIT
MICRO COMPUTER
CAN TRANSCEIVER &
RECEIVER
i3
B38
B21
E2
E11
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(L)-02]
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(L)-01]
GROUND
JOINT CONNECTOR
i97
B301
B310
A: B134
D: B137
ECM
ABS CONTROL
MODULE
VDC CONTROL
MODULE
OIL PRESSURE SWITCH
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-03]

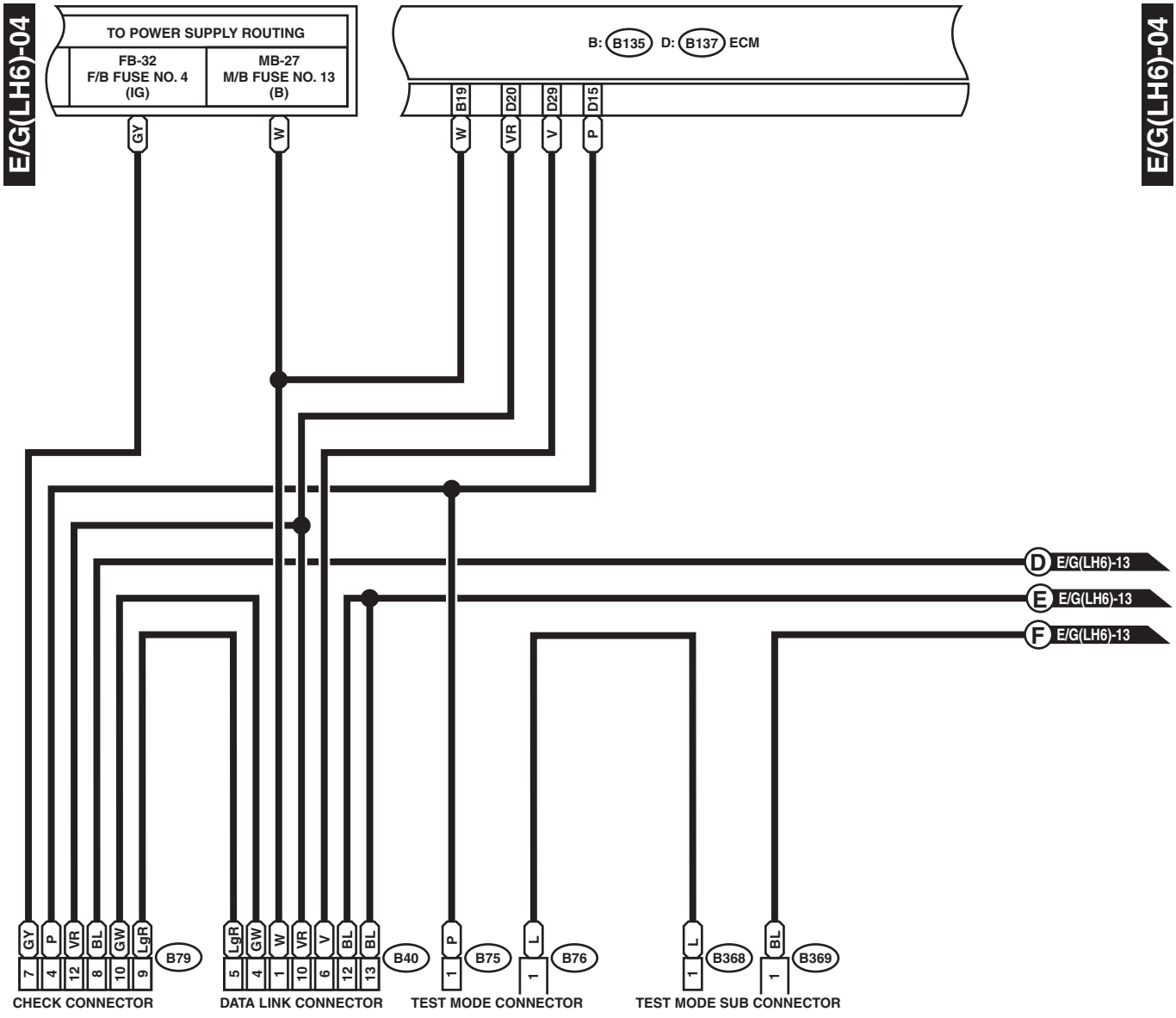
i97
i102
B38
A: i10
B301
D: B137
A: B134
B310
B21 (BLACK)

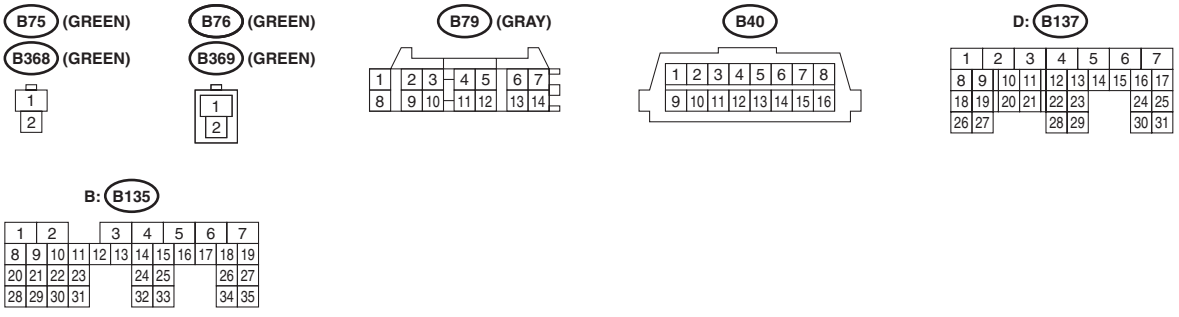
WI-04042


E/G(LH6)-03
E/G(LH6)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
STARTER
RELAY
B225
MAIN
RELAY
B47
OXYGEN (A/F)
SENSOR
RELAY
B327
STARTER MOTOR
BATTERY
B14
ELECTRIC
THROTTLE
RELAY
B362
A E/G(LH6)-12
B E/G(LH6)-05
C E/G(LH6)-06
B: B135 D: B137 ECM

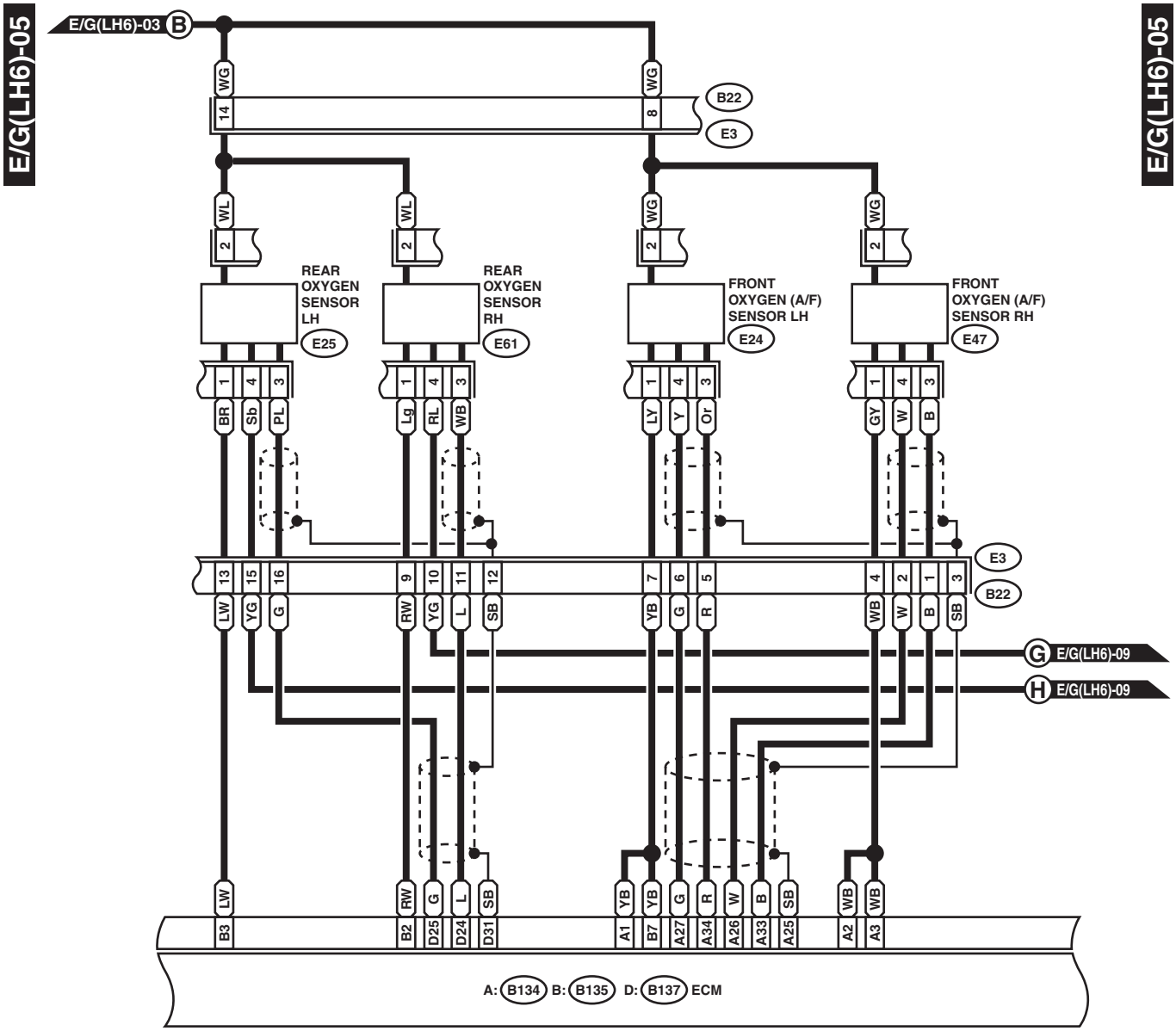

B47 (BROWN)
B327 (BROWN)
B362
D: B137
B: B135
B225

WI-04043


E/G(LH6)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 D: B137 ECM
B19
D20
D29
D15
GY
W
W
VR
V
P
E/G(LH6)-04
D E/G(LH6)-13
E E/G(LH6)-13
F E/G(LH6)-13
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
LgR GW W VR V BL BL
5 4 1 10 6 12 13
B40
DATA LINK CONNECTOR
P
1
B75
L
1
B76
TEST MODE CONNECTOR
L
1
B368
BL
1
B369
TEST MODE SUB CONNECTOR

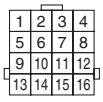

B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
D: B137
B: B135

WI-04044

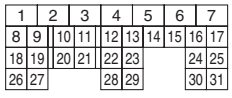


E24 (BLACK)
E25 (DARK GRAY)
E47 (BLACK)
E61 (DARK GRAY)

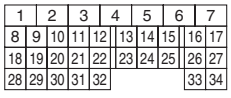
B22



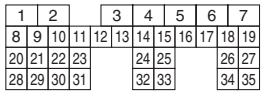
D: B137



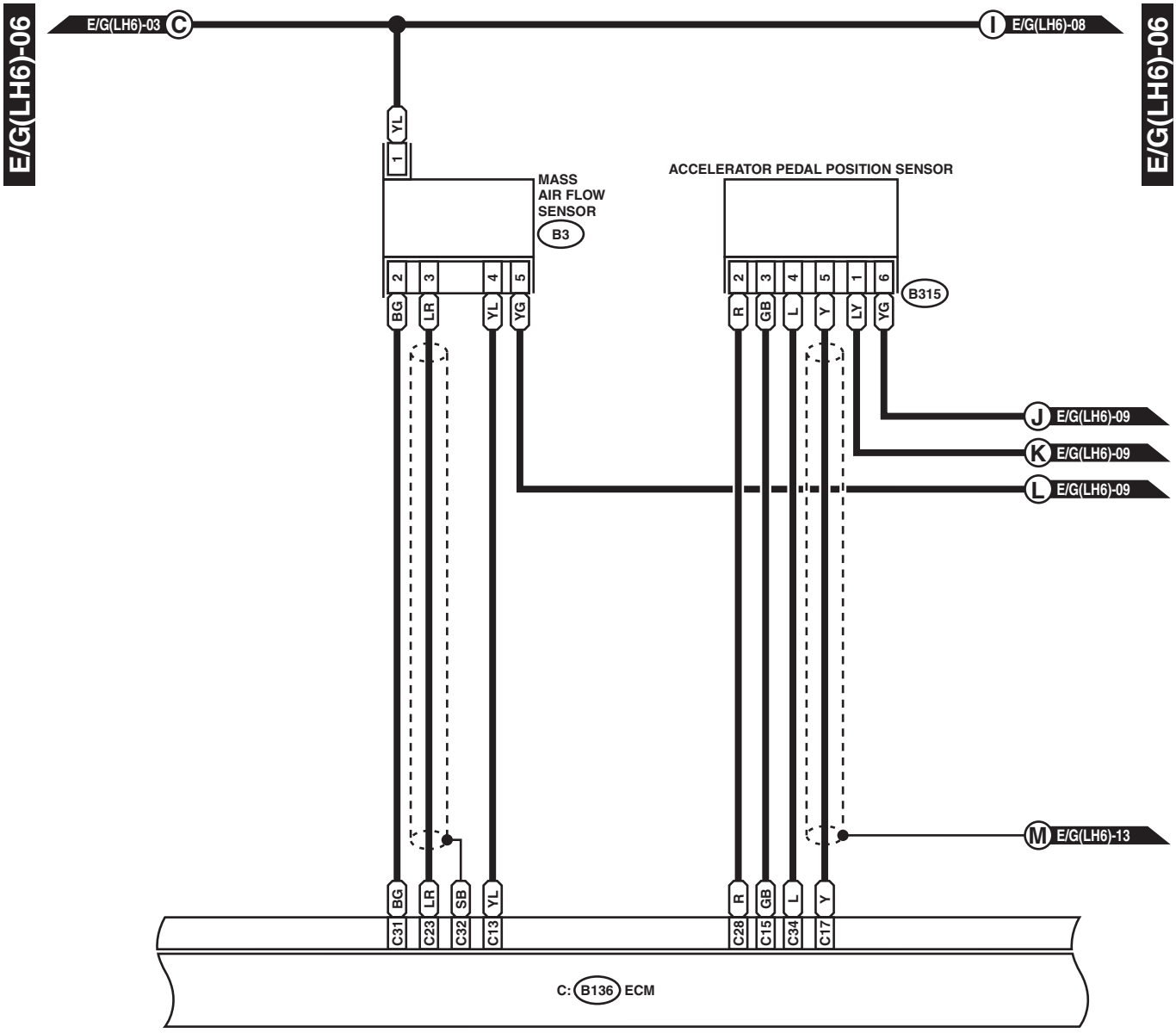
A: B134



B: B135



WI-04045



B3 (BLACK)

1	2	3	4	5

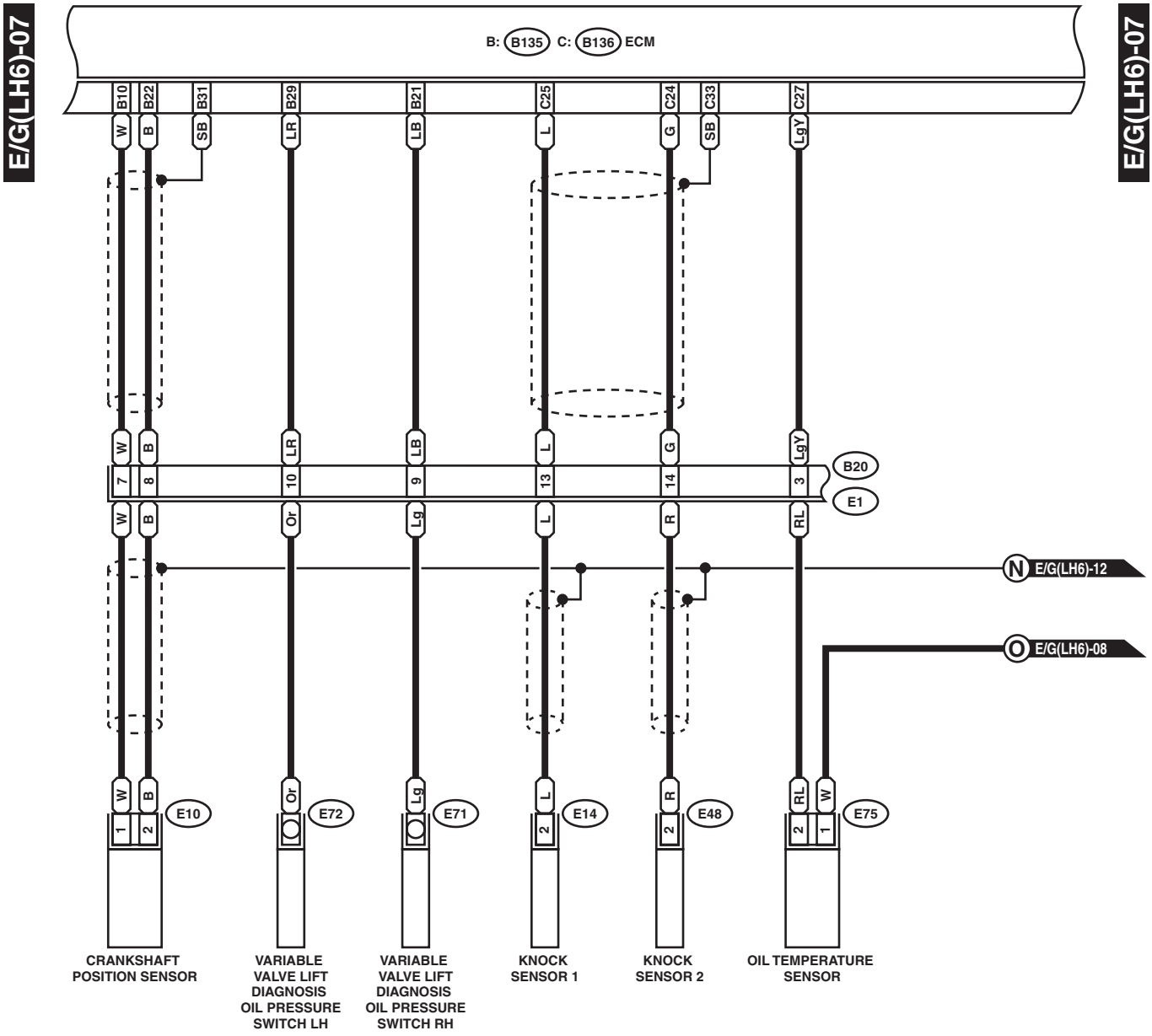
B315 (BLACK)

1	2	3	4	5	6

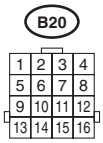
C: B136

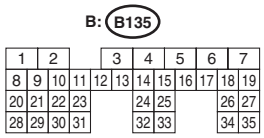
1	2	3	4				5	6		
7	8	9	10	11	12	13	14	15	16	
17	18	19	20	21	22	23	24	25	26	27
28	29	30				31	32	33	34	35

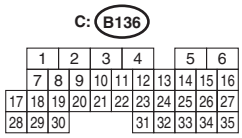
WI-04046



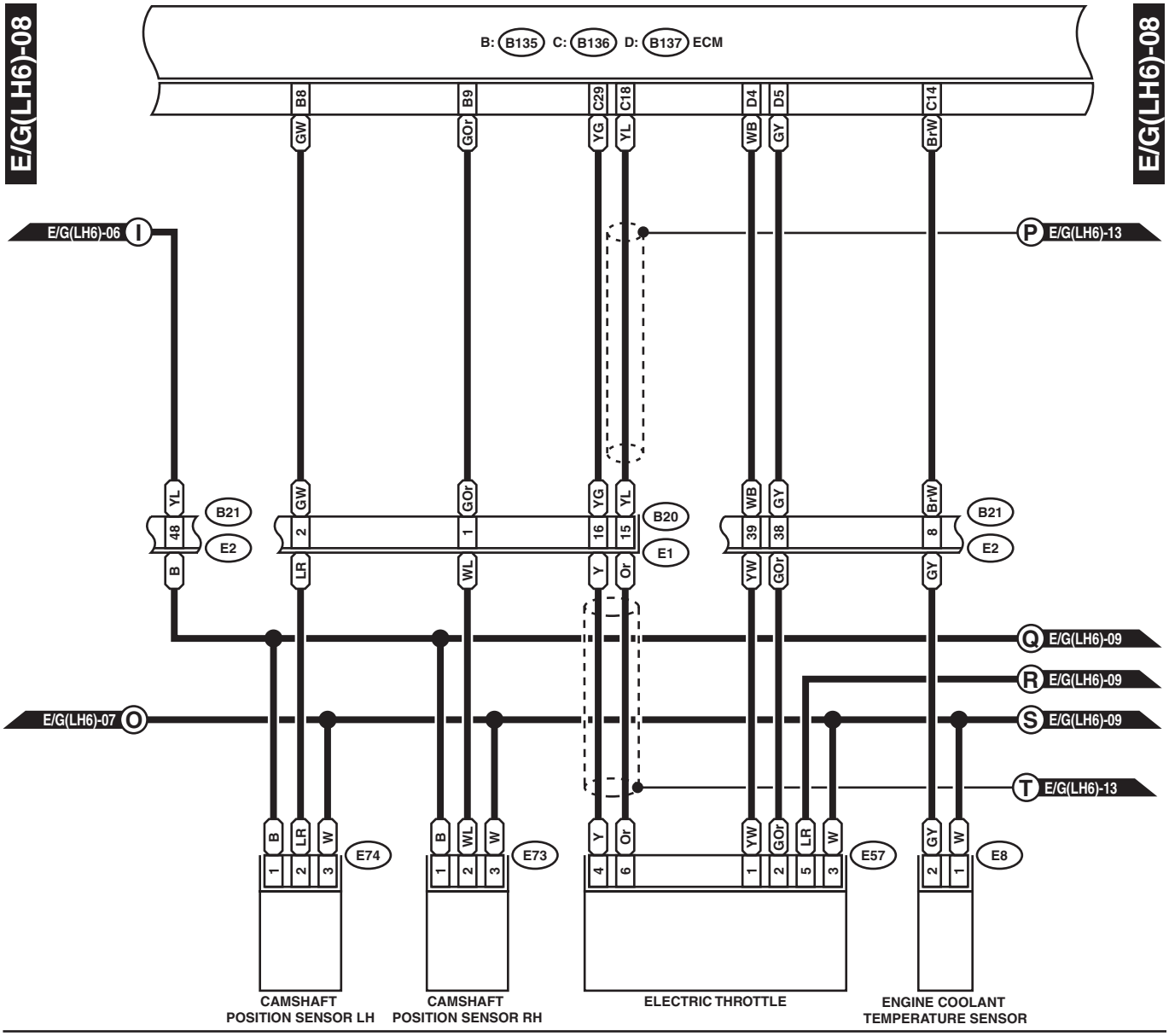
E10 (DARK GRAY)
E14 (GREEN)
E48 (GREEN)
E75 (BLACK)

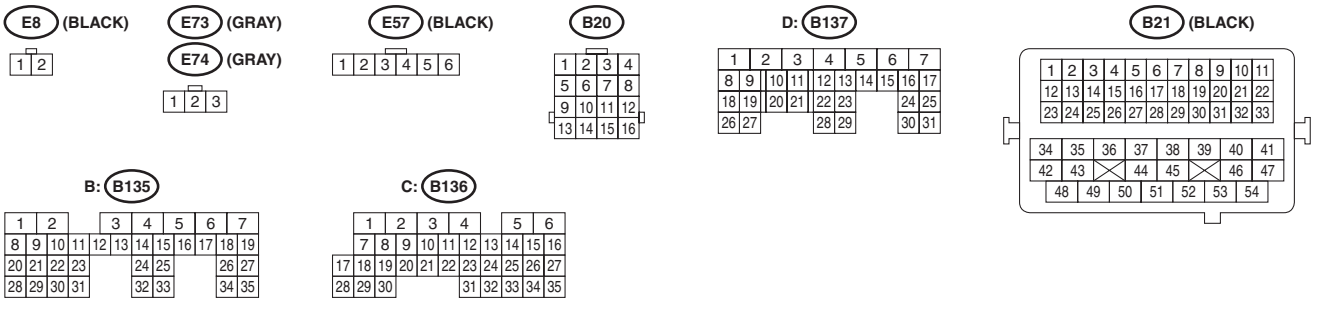




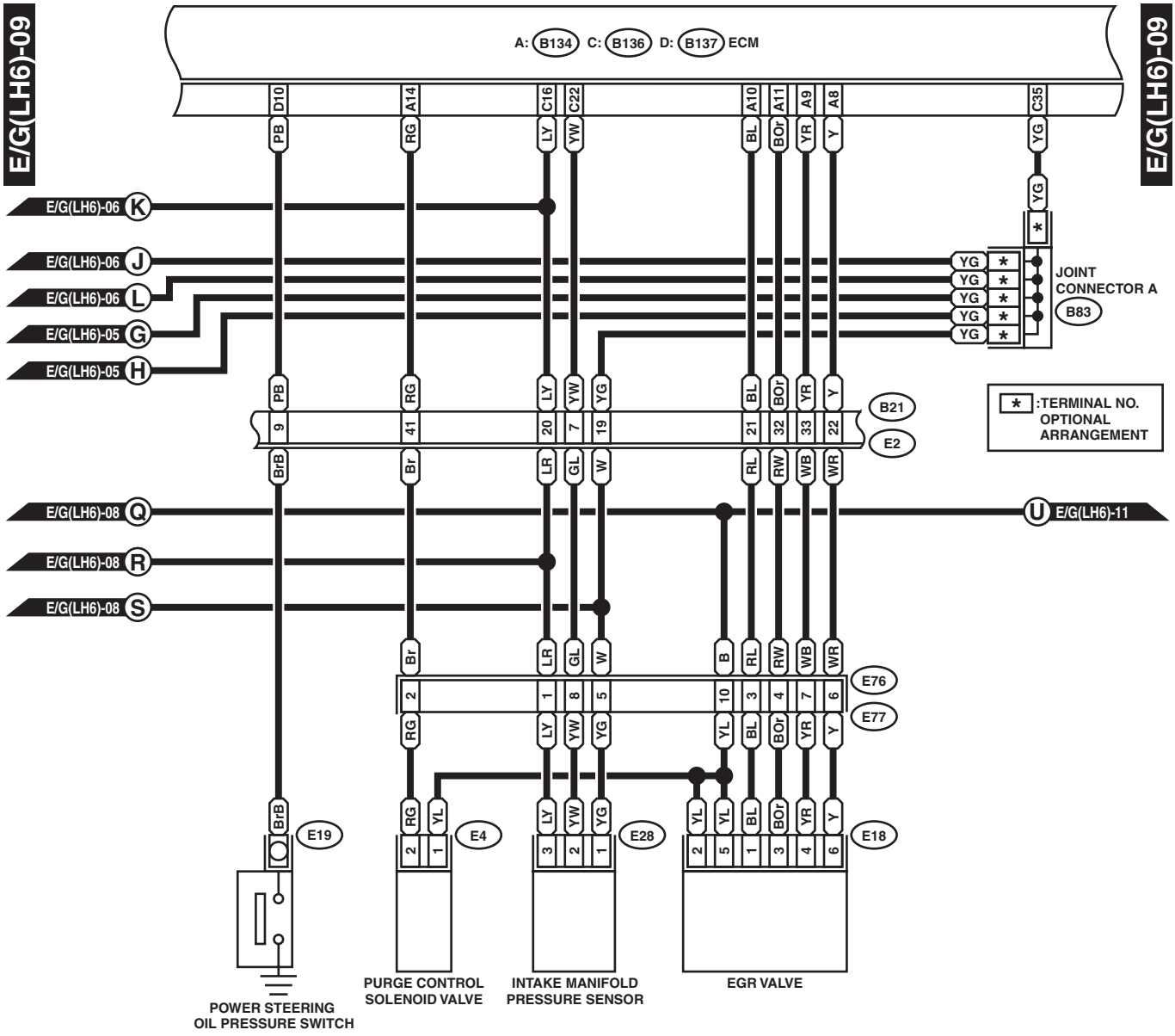


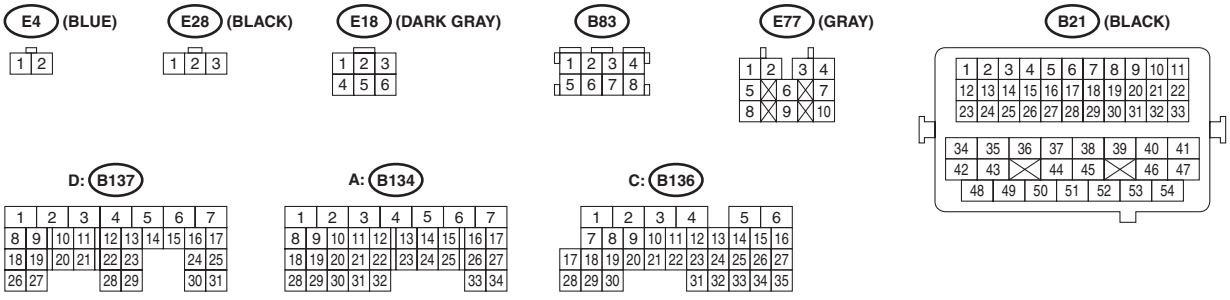
WI-04047


E/G(LH6)-08
E/G(LH6)-08
B: B135 C: B136 D: B137 ECM
B8 B9 C29 C18 D4 D5 C14
GW GOr YG YL WB GY BrW
E/G(LH6)-06 I
P E/G(LH6)-13
B21 B20 B21
E2 E1 E2
Q E/G(LH6)-09
R E/G(LH6)-09
E/G(LH6)-07 O
S E/G(LH6)-09
T E/G(LH6)-13
E74 E73 E57 E8
CAMSHAFT POSITION SENSOR LH
CAMSHAFT POSITION SENSOR RH
ELECTRIC THROTTLE
ENGINE COOLANT TEMPERATURE SENSOR

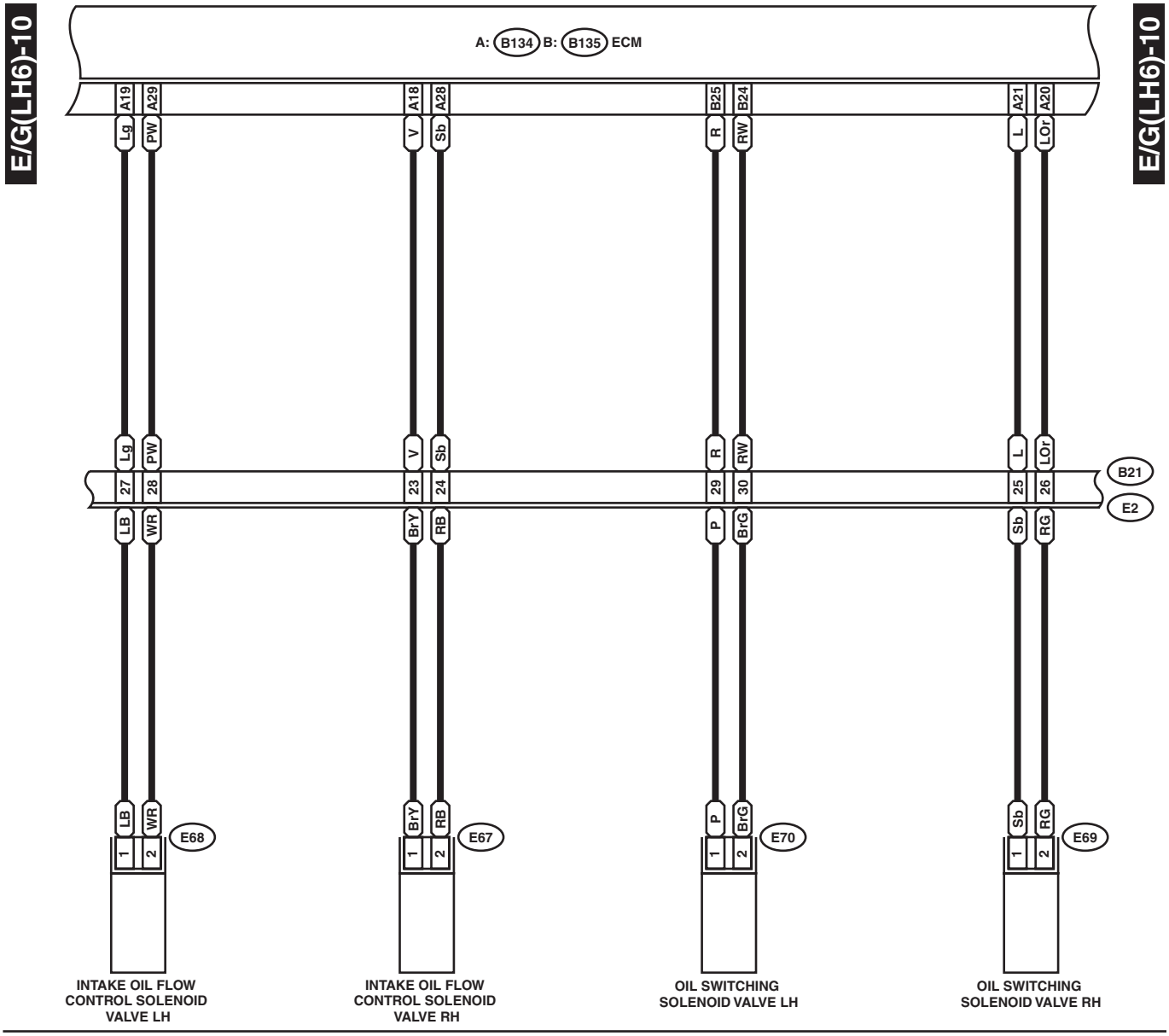

E8 (BLACK)
E73 (GRAY)
E74 (GRAY)
E57 (BLACK)
B20
D: B137
B21 (BLACK)
B: B135
C: B136

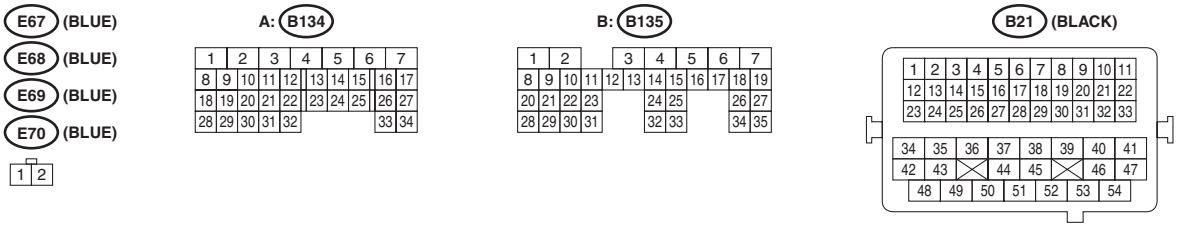
WI-04048


E/G(LH6)-09
E/G(LH6)-09
A: B134 C: B136 D: B137 ECM
D10 A14 C16 C22 A10 A11 A9 A8 C35
PB RG LY YW BL BOr YR Y YG
E/G(LH6)-06 K
E/G(LH6)-06 J
E/G(LH6)-06 L
E/G(LH6)-05 G
E/G(LH6)-05 H
JOINT CONNECTOR A
B83
B21
E2
*:TERMINAL NO. OPTIONAL ARRANGEMENT
BrB Br LR GL W RL RW WB WR
E/G(LH6)-08 Q
E/G(LH6)-08 R
E/G(LH6)-08 S
U E/G(LH6)-11
B E76 E77
RG LY YW YG YL BL BOr YR Y
E19 E4 E28 E18
POWER STEERING OIL PRESSURE SWITCH
PURGE CONTROL SOLENOID VALVE
INTAKE MANIFOLD PRESSURE SENSOR
EGR VALVE


E4 (BLUE)
E28 (BLACK)
E18 (DARK GRAY)
B83
E77 (GRAY)
B21 (BLACK)
D: B137
A: B134
C: B136

WI-04049

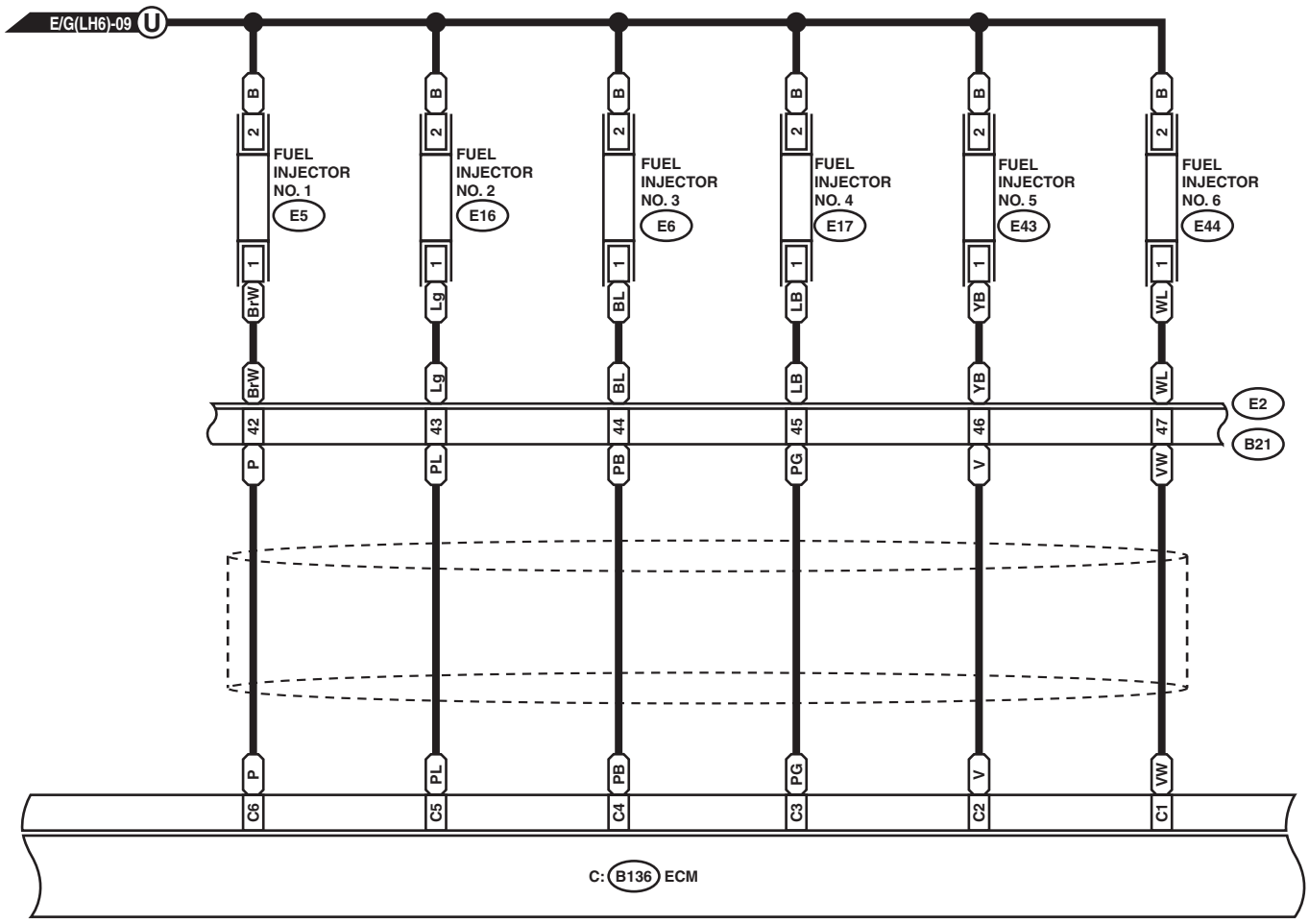

E/G(LH6)-10
E/G(LH6)-10
A: B134 B: B135 ECM
A19
A29
A18
A28
B25
B24
A21
A20
Lg
PW
V
Sb
R
RW
L
LOr
27
28
23
24
29
30
25
26
B21
E2
LB
WR
BrY
RB
P
BrG
Sb
RG
E68
E67
E70
E69
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH

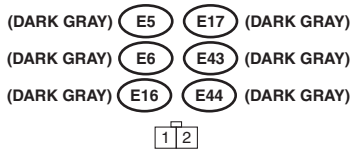

E67 (BLUE)
E68 (BLUE)
E69 (BLUE)
E70 (BLUE)
A: B134
B: B135
B21 (BLACK)

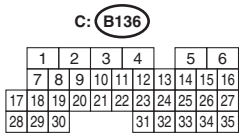
WI-04050

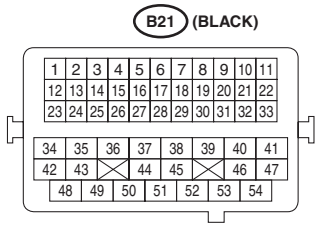
E/G(LH6)-11

E/G(LH6)-11

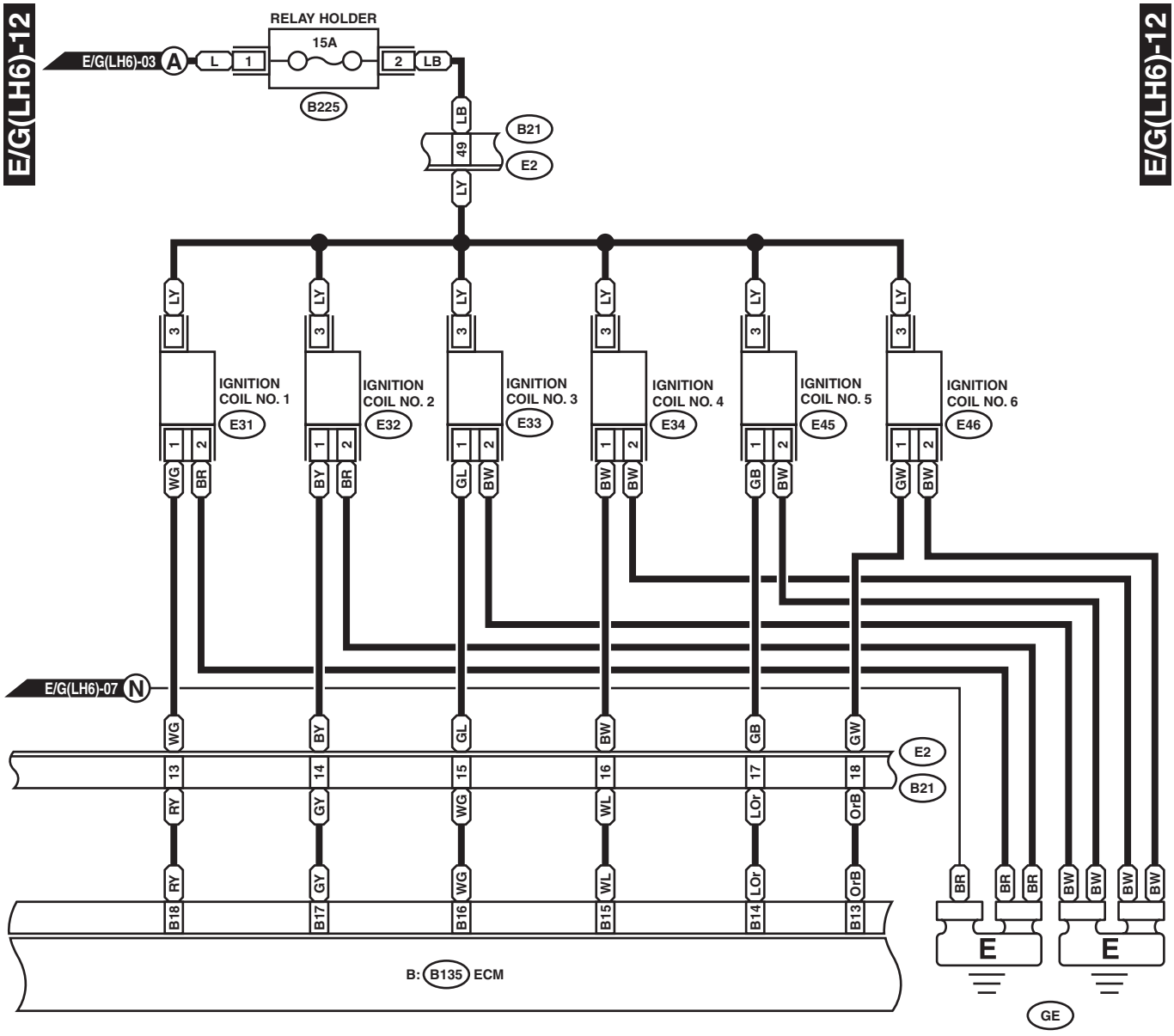


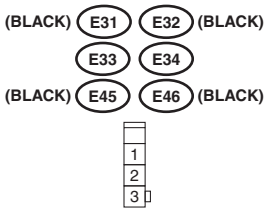


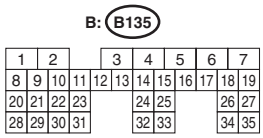


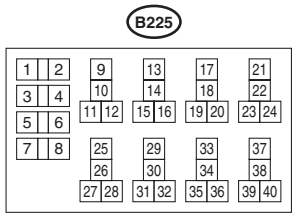


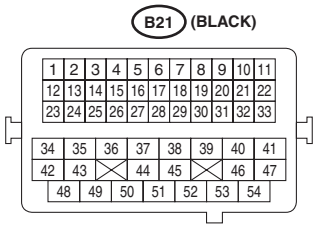
WI-04051


E/G(LH6)-12
E/G(LH6)-12
RELAY HOLDER
15A
E/G(LH6)-03
A
L
1
2
LB
B225
LB
49
B21
E2
LY
3
IGNITION COIL NO. 1
E31
IGNITION COIL NO. 2
E32
IGNITION COIL NO. 3
E33
IGNITION COIL NO. 4
E34
IGNITION COIL NO. 5
E45
IGNITION COIL NO. 6
E46
1
2
WG
BR
BY
BR
GL
BW
BW
BW
GB
BW
GW
BW
E/G(LH6)-07
N
WG
BY
GL
BW
GB
GW
E2
B21
13
14
15
16
17
18
RY
GY
WG
WL
LOr
OrB
B18
B17
B16
B15
B14
B13
BR
BR
BR
BW
BW
BW
BW
E
E
B: B135 ECM
GE

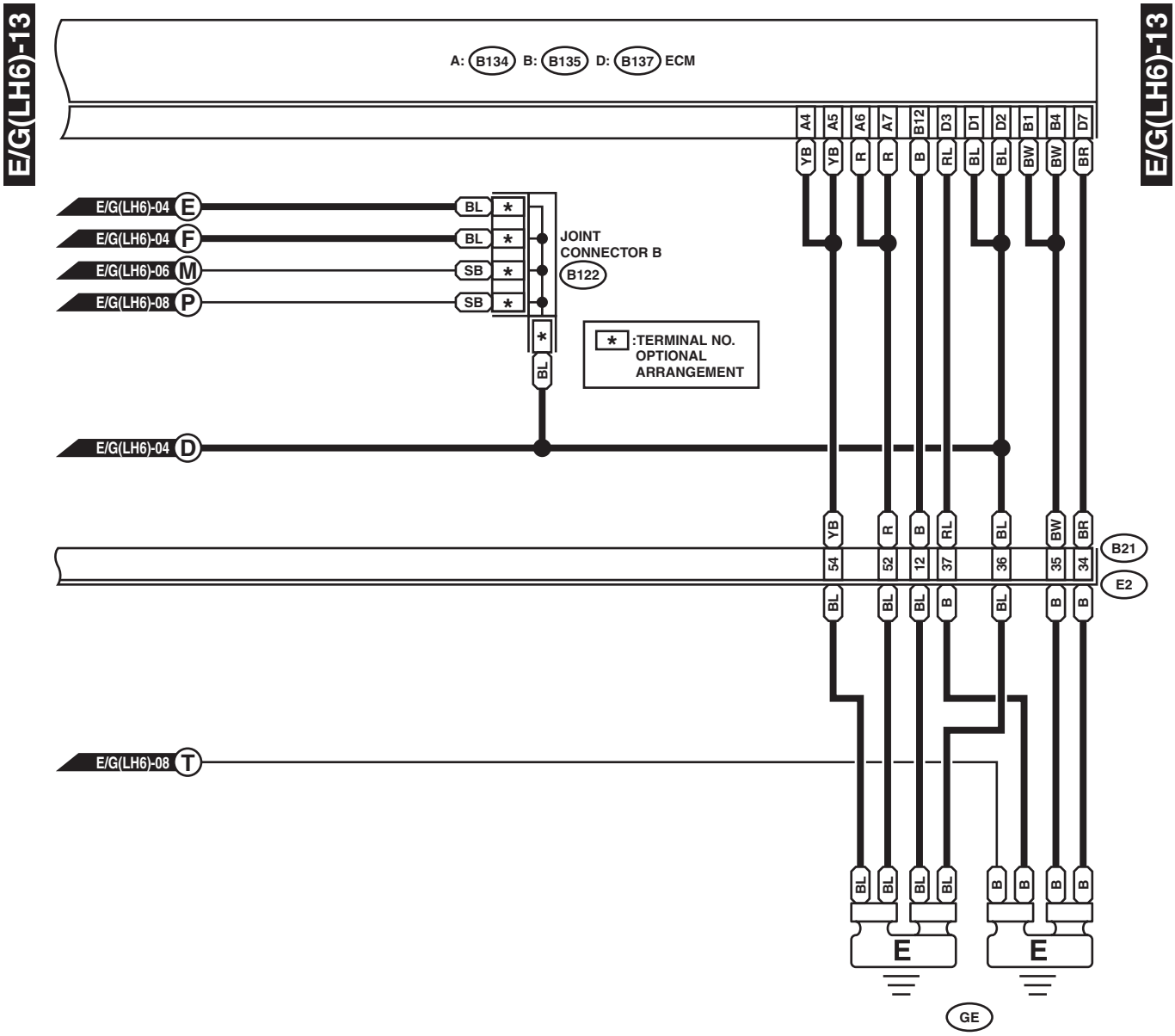

(BLACK) E31 E32 (BLACK)
E33 E34
(BLACK) E45 E46 (BLACK)
1
2
3

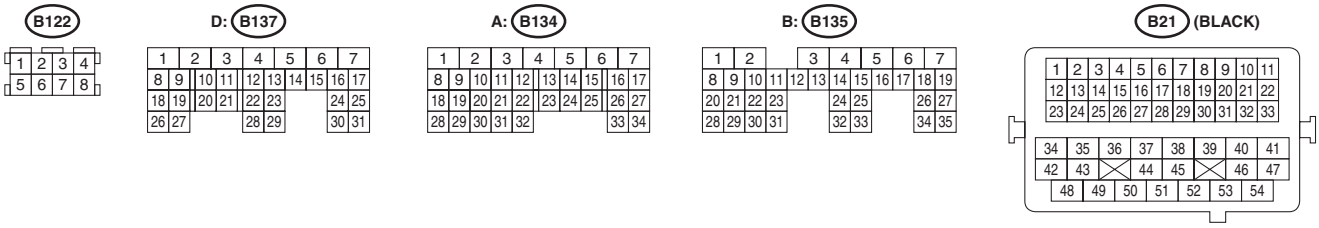

B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35


B225
1 2 9 10 13 14 17 18 21 22
3 4 11 12 15 16 19 20 23 24
5 6
7 8 25 26 29 30 33 34 37 38
27 28 31 32 35 36 39 40


B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54

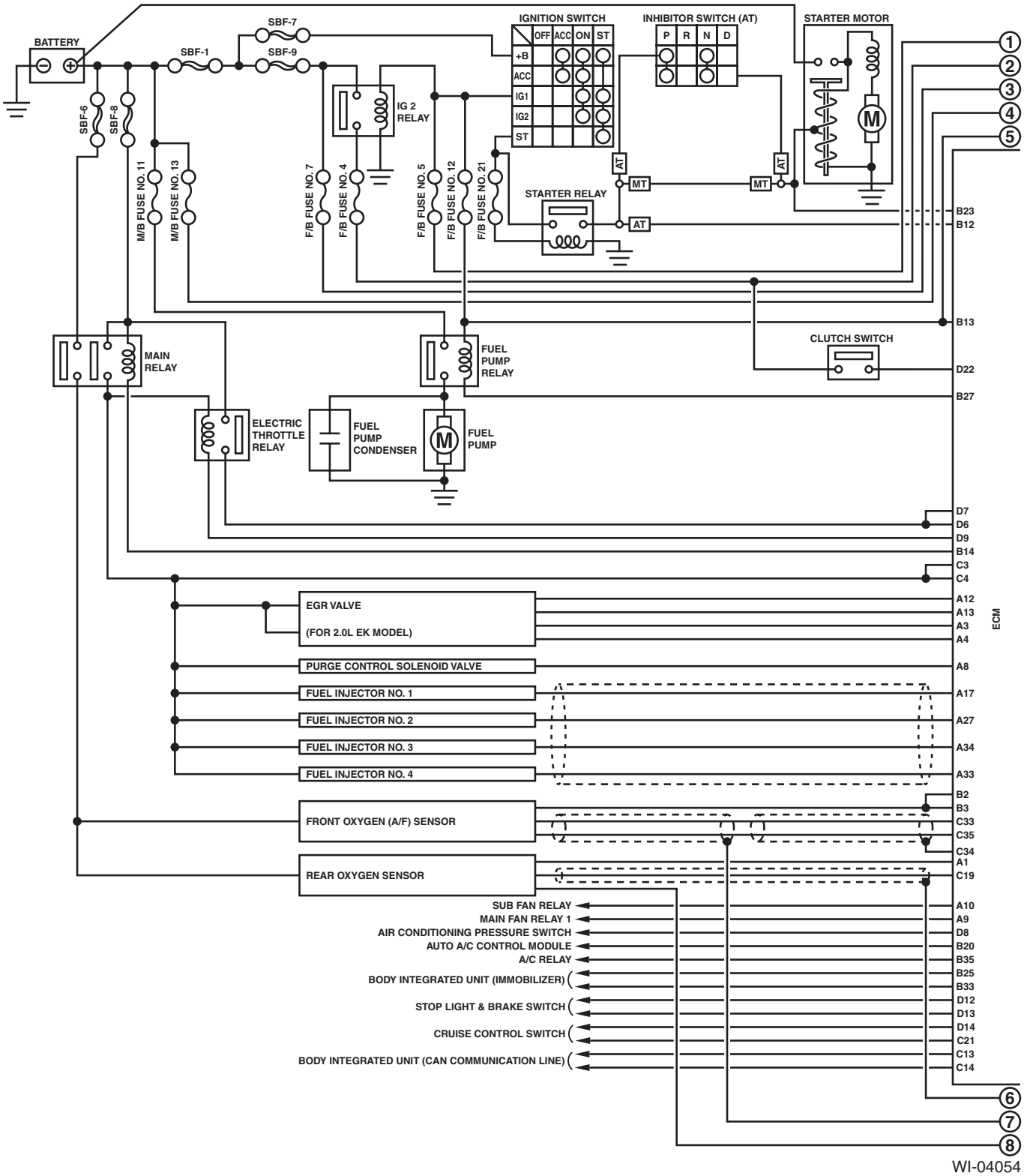
WI-04052


E/G(LH6)-13
E/G(LH6)-13
A: B134 B: B135 D: B137 ECM
A4 A5 A6 A7 B12 D3 D1 D2 B1 B4 D7
YB YB R R B RL BL BL BW BW BR
E/G(LH6)-04 E
E/G(LH6)-04 F
E/G(LH6)-06 M
E/G(LH6)-08 P
BL
BL
SB
SB
JOINT CONNECTOR B
B122
:TERMINAL NO. OPTIONAL ARRANGEMENT
BL
E/G(LH6)-04 D
YB R B RL BL BW BR
54 52 12 37 36 35 34
B21
E2
BL BL BL B BL B B
E/G(LH6)-08 T
BL BL BL BL B B B B
E
E
GE

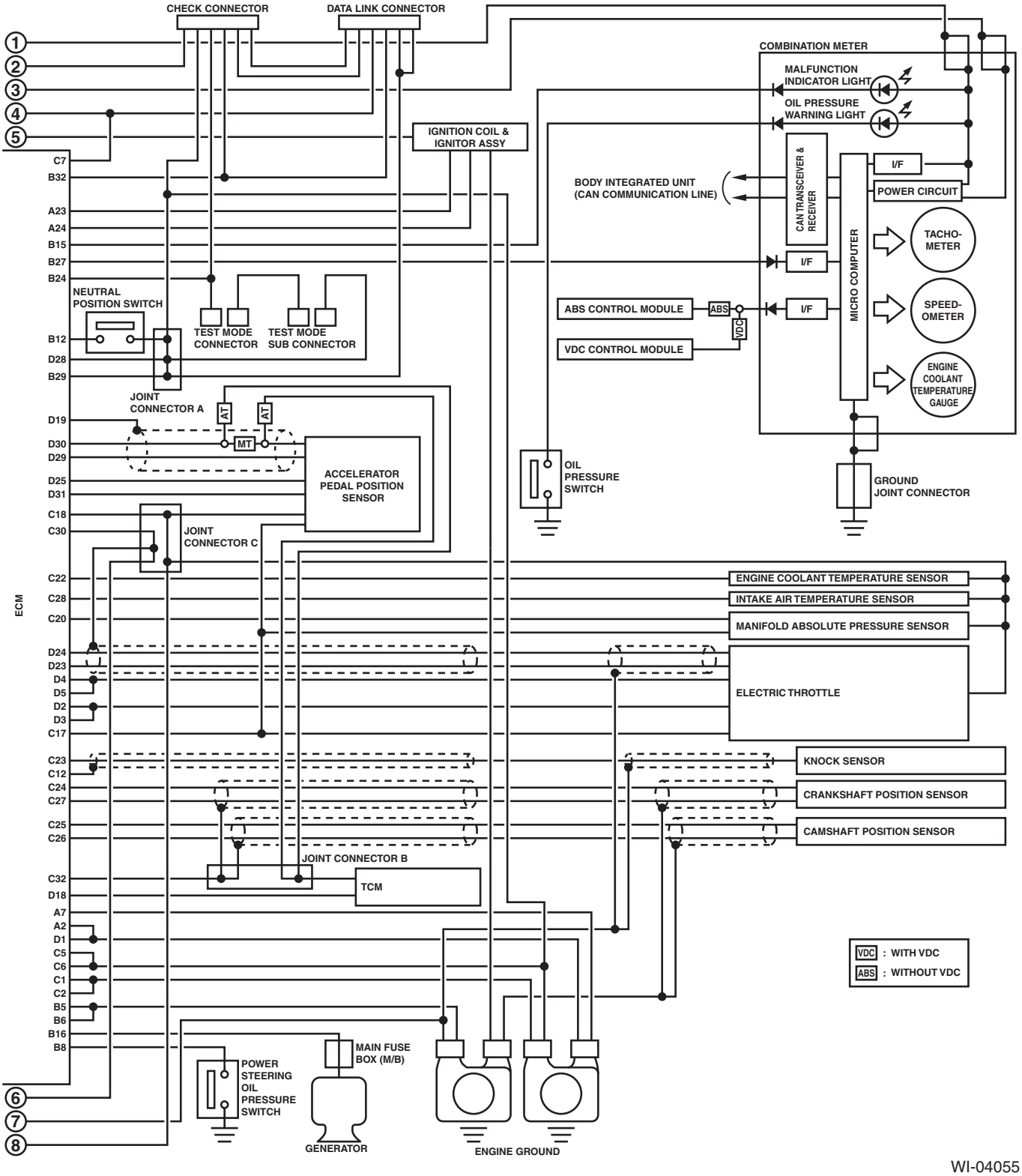

B122
1 2 3 4
5 6 7 8
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54

WI-04053

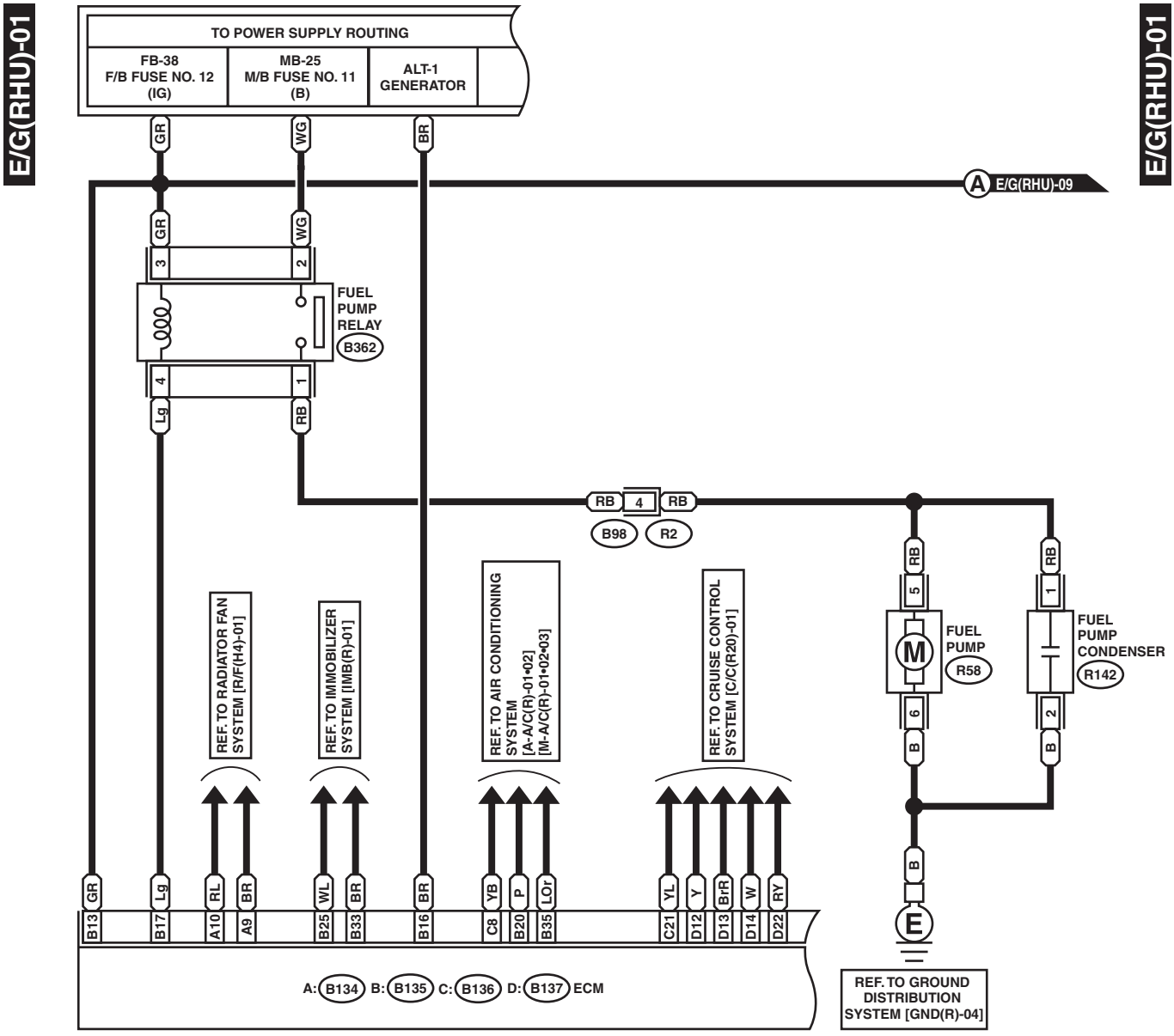
4. RHD 2.0 L NON-TURBO MODEL AND 2.5 L KA MODEL

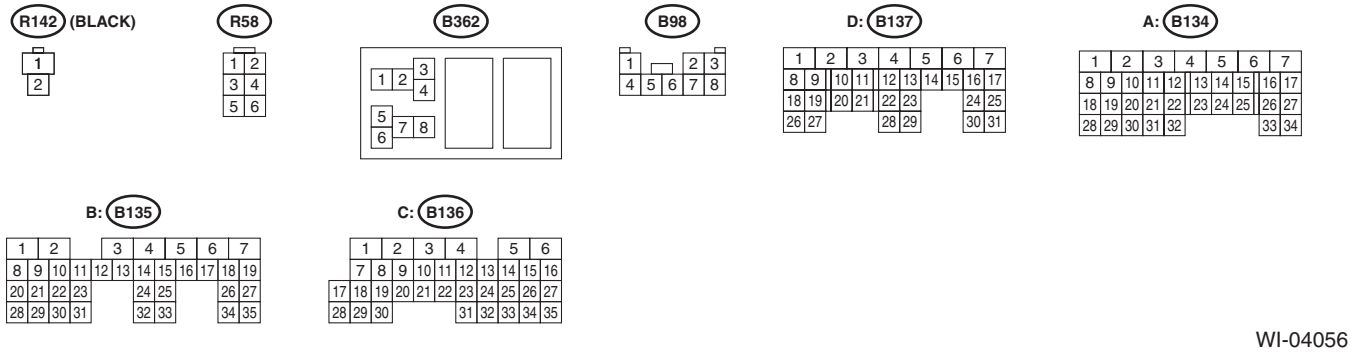


WI-04054

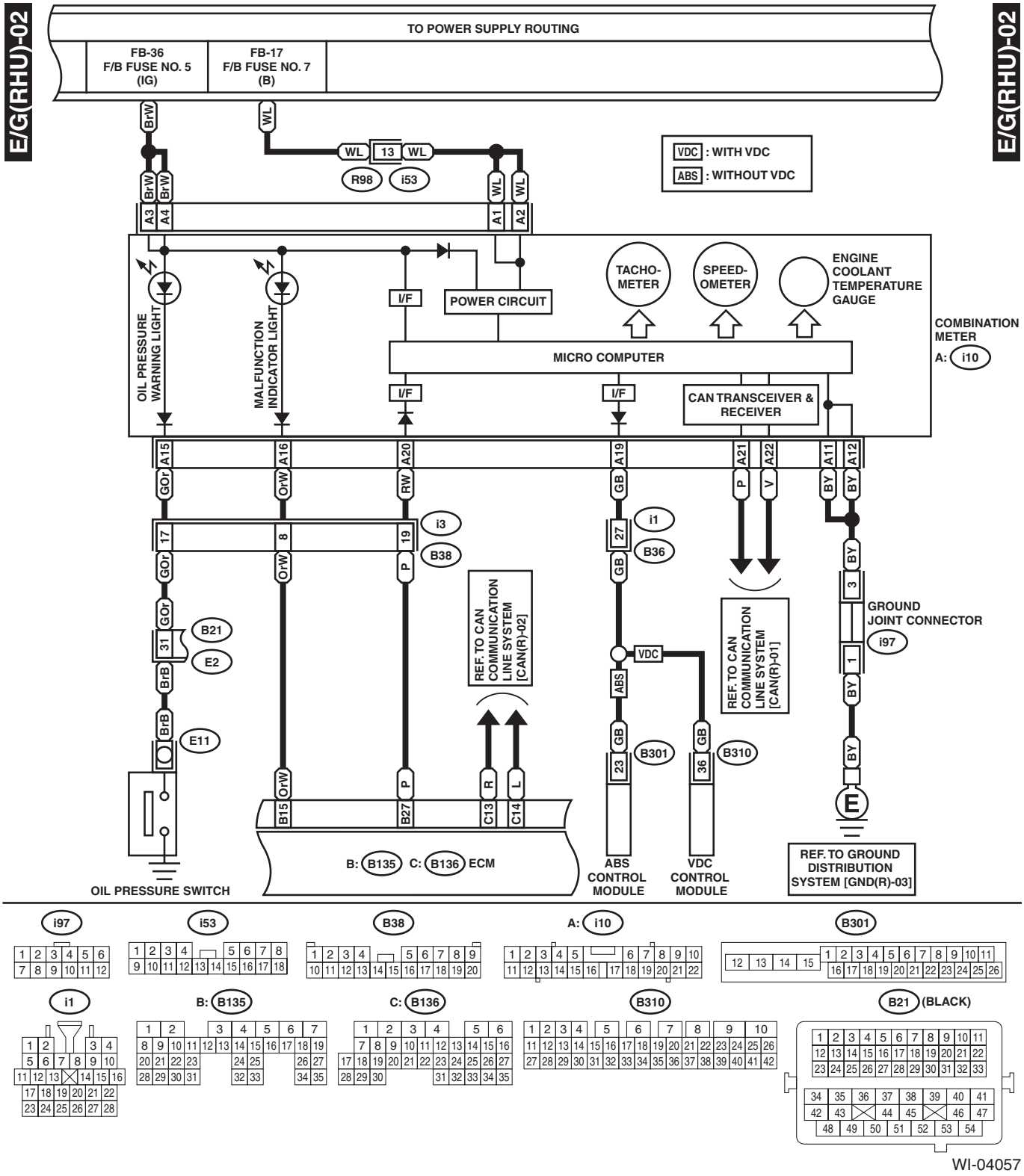

CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
IGNITION COIL & IGNITOR ASSY
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
I/F
POWER CIRCUIT
MICRO COMPUTER
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS CONTROL MODULE
VDC CONTROL MODULE
ABS
VDC
NEUTRAL POSITION SWITCH
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
JOINT CONNECTOR A
AT
MT
ACCELERATOR PEDAL POSITION SENSOR
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
JOINT CONNECTOR C
ECM
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE AIR TEMPERATURE SENSOR
MANIFOLD ABSOLUTE PRESSURE SENSOR
ELECTRIC THROTTLE
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
JOINT CONNECTOR B
TCM
VDC : WITH VDC
ABS : WITHOUT VDC
POWER STEERING OIL PRESSURE SWITCH
MAIN FUSE BOX (M/B)
GENERATOR
ENGINE GROUND
C7
B32
A23
A24
B15
B27
B24
B12
D28
B29
D19
D30
D29
D25
D31
C18
C30
C22
C28
C20
D24
D23
D4
D5
D2
D3
C17
C23
C12
C24
C27
C25
C26
C32
D18
A7
A2
D1
C5
C6
C1
C2
B5
B6
B16
B8

WI-04055

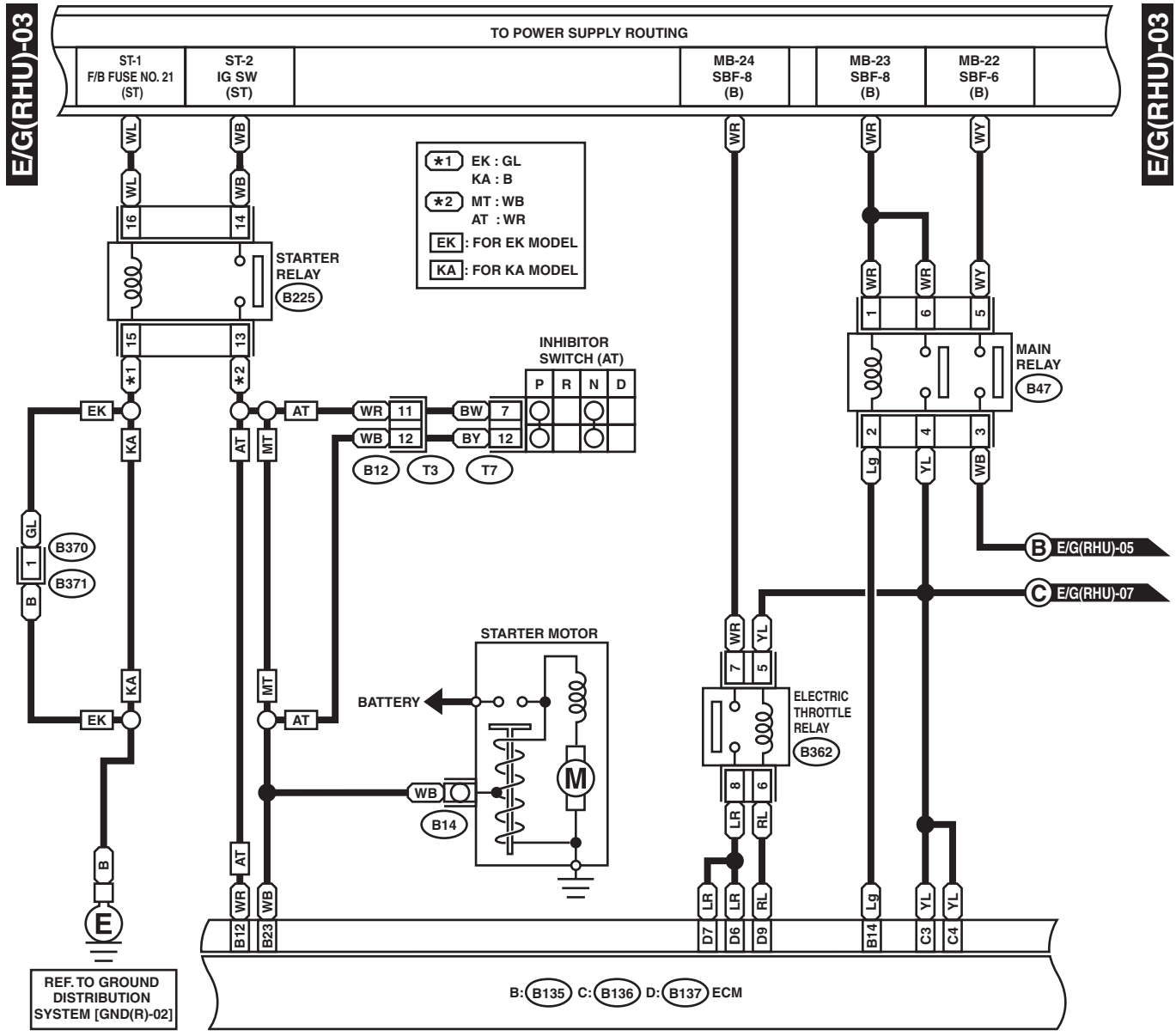

E/G(RHU)-01
E/G(RHU)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
GR
WG
BR
A E/G(RHU)-09
FUEL PUMP RELAY B362
Lg
RB
B98 R2
REF. TO RADIATOR FAN SYSTEM [R/F(H4)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(R)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(R)-01•02] [M-A/C(R)-01•02•03]
REF. TO CRUISE CONTROL SYSTEM [C/C(R20)-01]
FUEL PUMP R58
FUEL PUMP CONDENSER R142
RL
WL
YB
P
LOr
YL
Y
BrR
W
RY
B13
B17
A10
A9
B25
B33
B16
C8
B20
B35
C21
D12
D13
D14
D22
A: B134 B: B135 C: B136 D: B137 ECM
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]

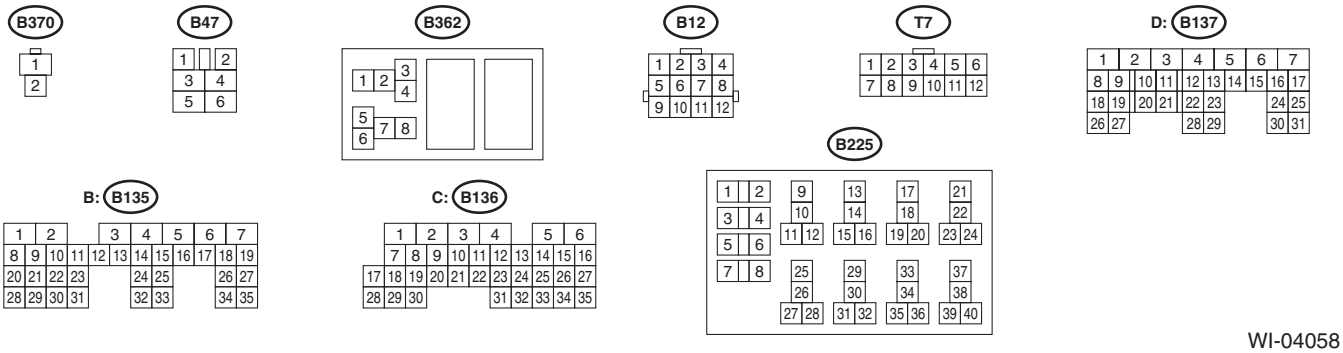

R142 (BLACK)
R58
B362
B98
D: B137
A: B134
B: B135
C: B136

WI-04056

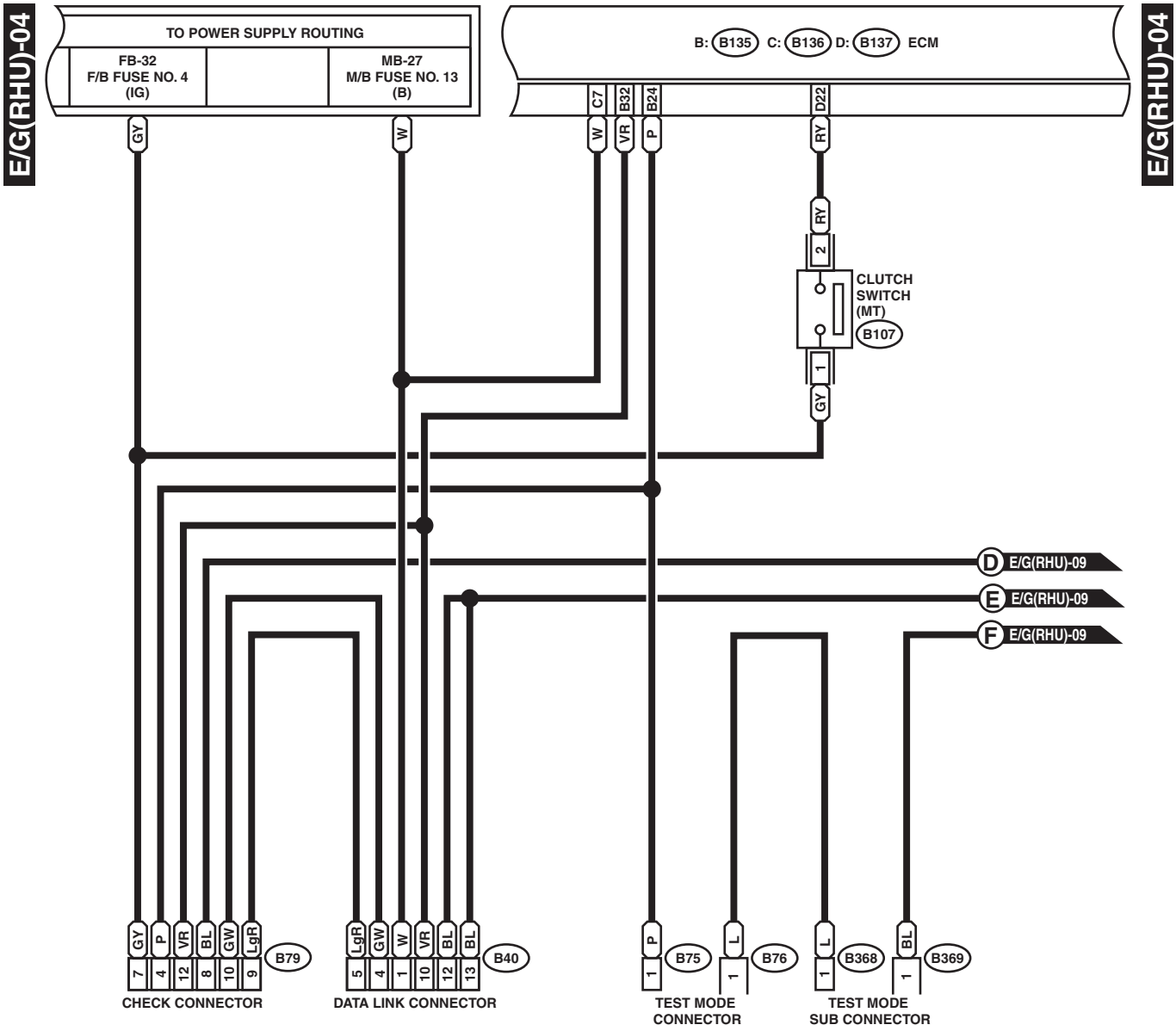

E/G(RHU)-02
E/G(RHU)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
VDC : WITH VDC
ABS : WITHOUT VDC
R98
i53
13
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
COMBINATION METER
A: i10
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
I/F
POWER CIRCUIT
MICRO COMPUTER
CAN TRANSCEIVER & RECEIVER
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-01]
GROUND JOINT CONNECTOR
i97
i3
B38
i1
B36
B21
E2
E11
B: B135 C: B136 ECM
ABS CONTROL MODULE
VDC CONTROL MODULE
B301
B310
OIL PRESSURE SWITCH
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
i97
i53
B38
A: i10
B301
i1
B: B135
C: B136
B310
B21 (BLACK)

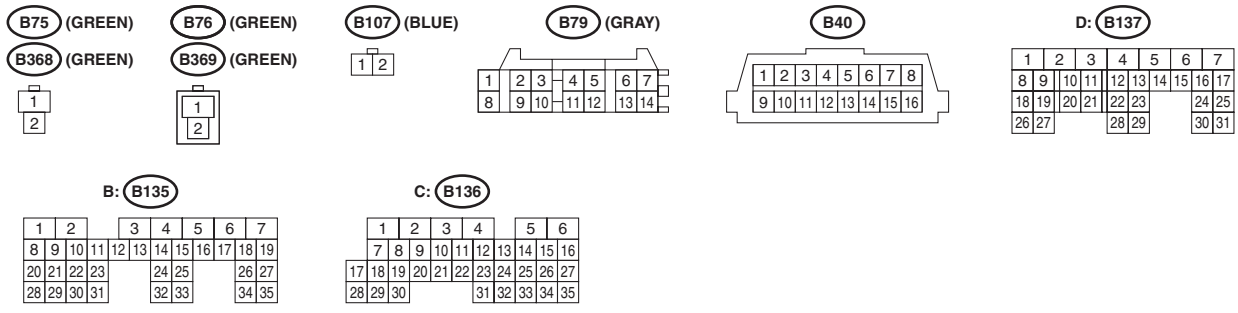
WI-04057


E/G(RHU)-03
E/G(RHU)-03
TO POWER SUPPLY ROUTING
ST-1 F/B FUSE NO. 21 (ST)
ST-2 IG SW (ST)
MB-24 SBF-8 (B)
MB-23 SBF-8 (B)
MB-22 SBF-6 (B)
*1 EK : GL KA : B
*2 MT : WB AT : WR
EK : FOR EK MODEL
KA : FOR KA MODEL
STARTER RELAY
B225
INHIBITOR SWITCH (AT)
P R N D
MAIN RELAY
B47
B12 T3 T7
B370
B371
B E/G(RHU)-05
C E/G(RHU)-07
STARTER MOTOR
BATTERY
ELECTRIC THROTTLE RELAY
B362
B14
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
B: B135 C: B136 D: B137 ECM

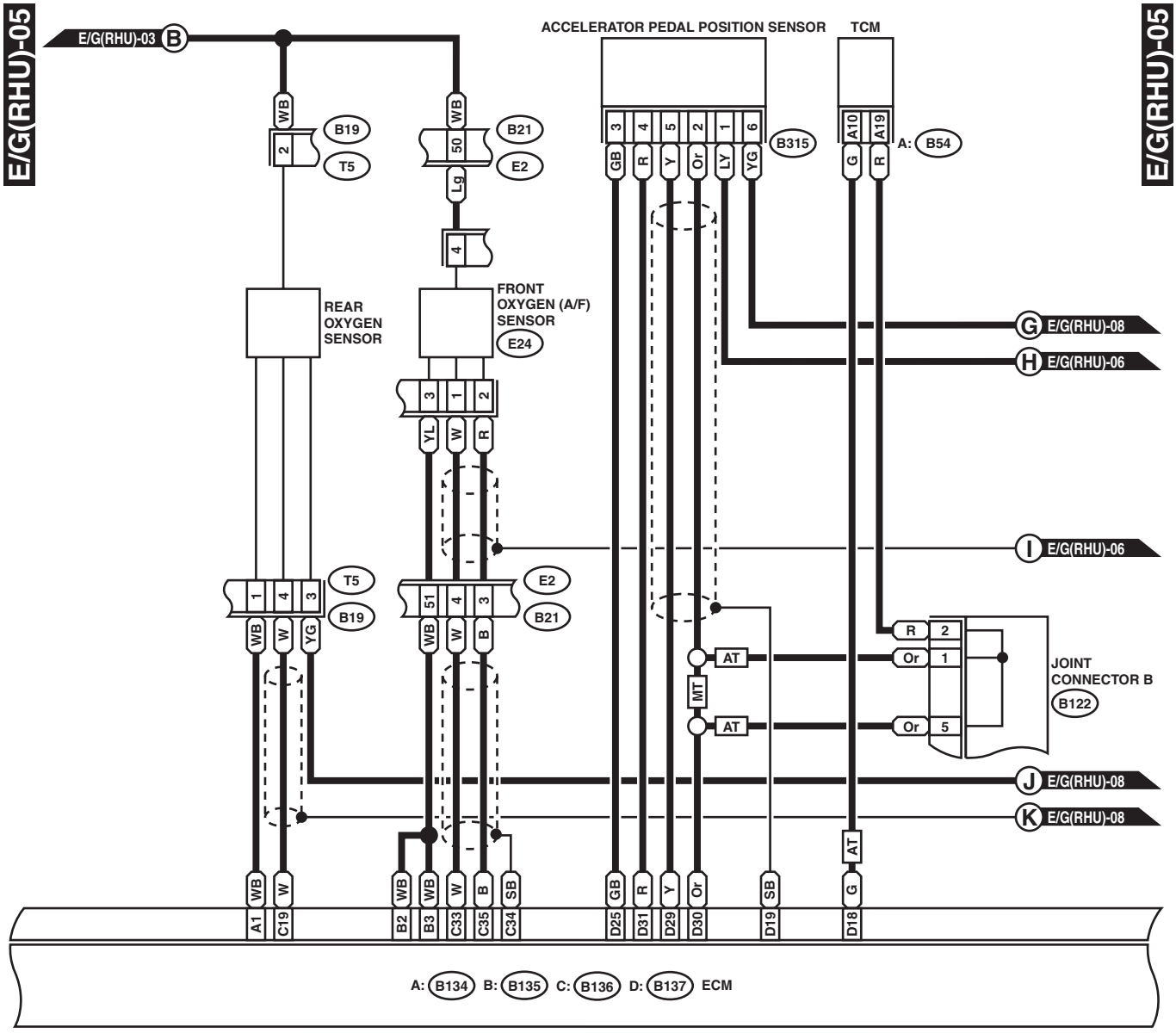

B370
B47
B362
B12
T7
D: B137
B225
B: B135
C: B136

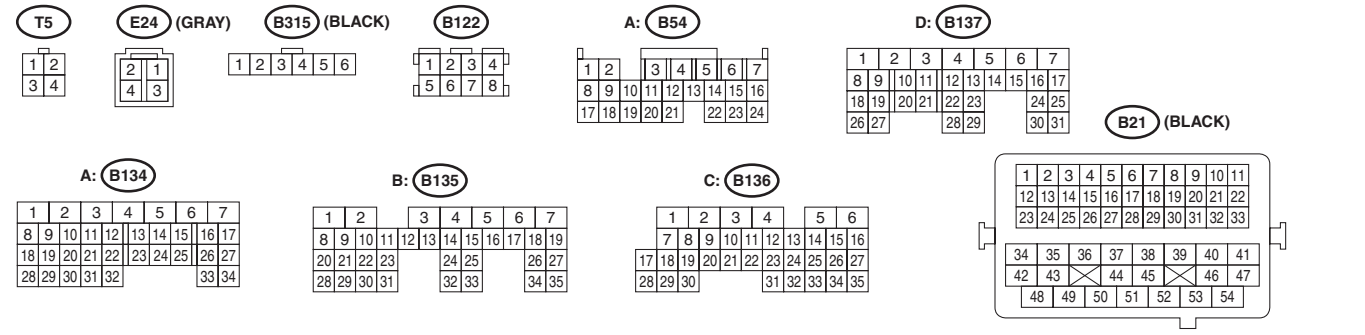
WI-04058


E/G(RHU)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 C: B136 D: B137 ECM
C7
B32
B24
D22
GY
W
W
VR
P
RY
RY
2
CLUTCH
SWITCH
(MT)
B107
1
GY
D E/G(RHU)-09
E E/G(RHU)-09
F E/G(RHU)-09
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
LgR GW W VR BL BL
5 4 1 10 12 13
B40
DATA LINK CONNECTOR
P
1
B75
L
1
B76
TEST MODE
CONNECTOR
L
1
B368
BL
1
B369
TEST MODE
SUB CONNECTOR

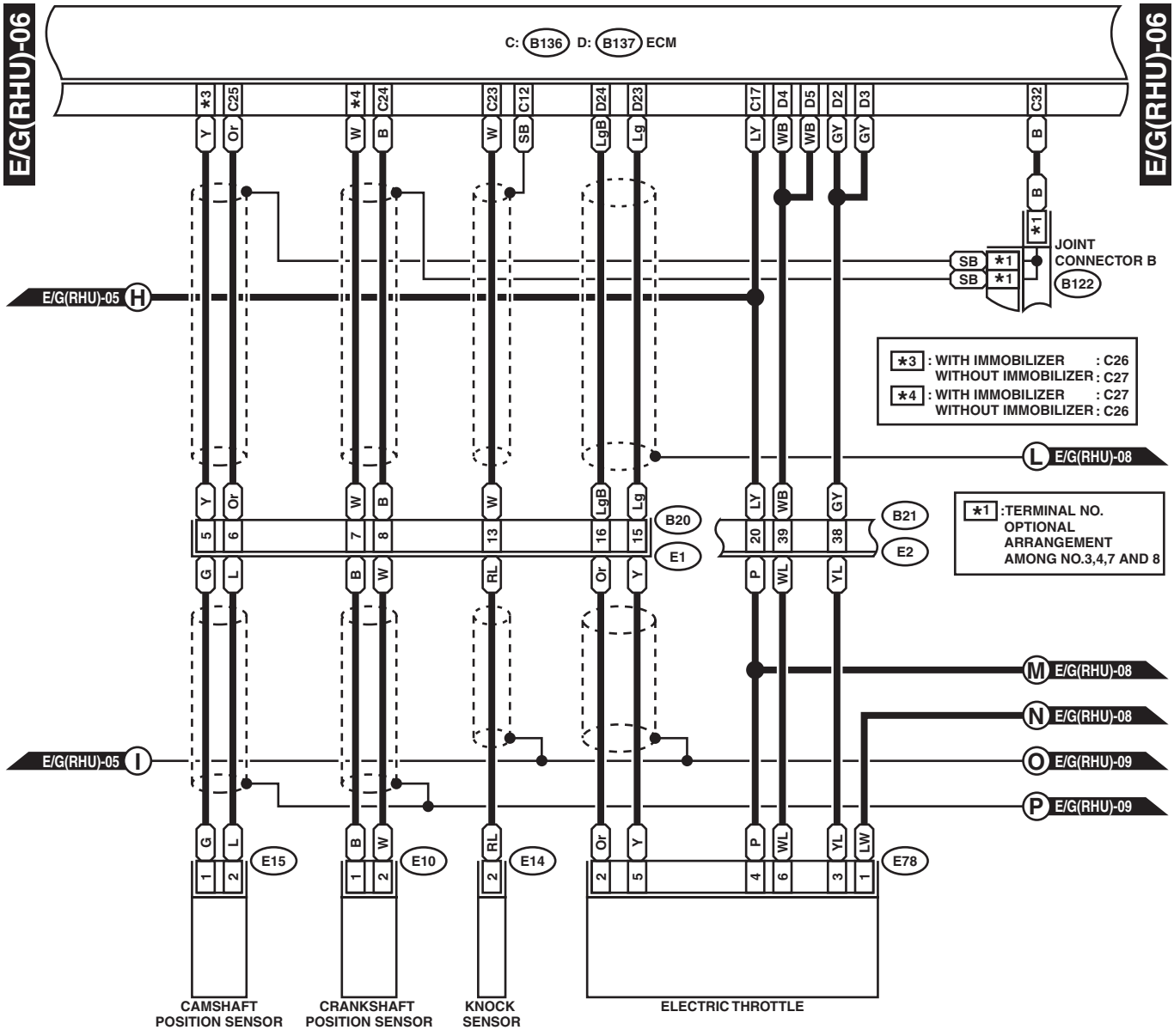

B75 (GREEN)
B76 (GREEN)
B107 (BLUE)
B79 (GRAY)
B40
D: B137
B368 (GREEN)
B369 (GREEN)
B: B135
C: B136

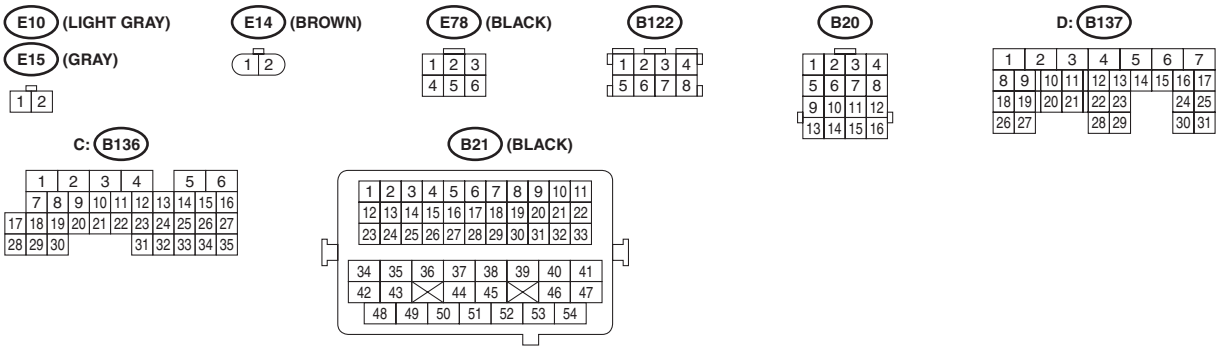
WI-04059


E/G(RHU)-05
E/G(RHU)-03 B
ACCELERATOR PEDAL POSITION SENSOR
TCM
B315
A: B54
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR E24
B19
T5
B21
E2
G E/G(RHU)-08
H E/G(RHU)-06
I E/G(RHU)-06
J E/G(RHU)-08
K E/G(RHU)-08
AT
MT
JOINT CONNECTOR B B122
A: B134 B: B135 C: B136 D: B137 ECM

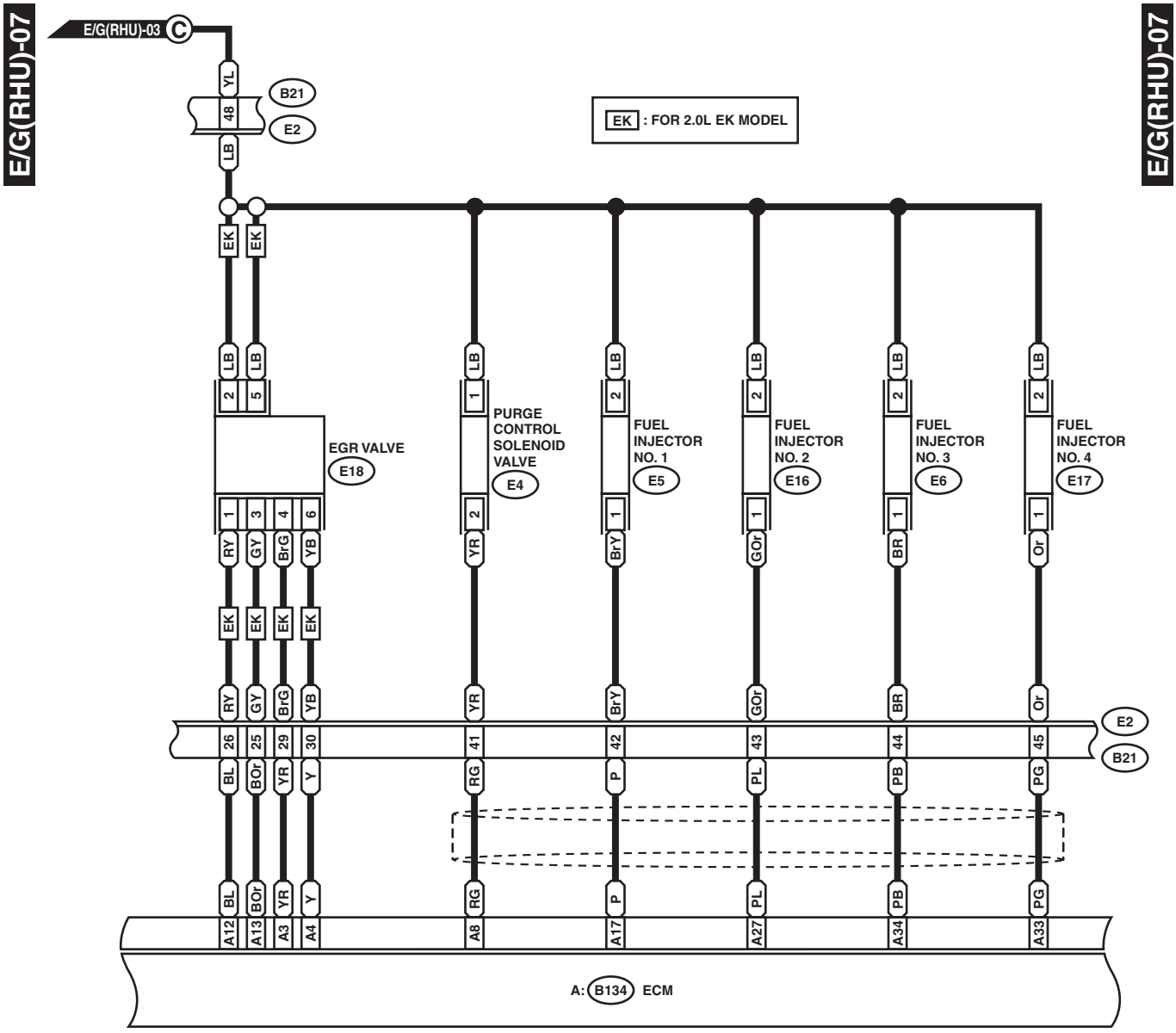

T5
E24 (GRAY)
B315 (BLACK)
B122
A: B54
D: B137
B21 (BLACK)
A: B134
B: B135
C: B136

WI-04060


E/G(RHU)-06
E/G(RHU)-06
C: B136 D: B137 ECM
JOINT CONNECTOR B
B122
E/G(RHU)-05 H
E/G(RHU)-05 I
*3 : WITH IMMOBILIZER : C26
WITHOUT IMMOBILIZER : C27
*4 : WITH IMMOBILIZER : C27
WITHOUT IMMOBILIZER : C26
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.3,4,7 AND 8
L E/G(RHU)-08
M E/G(RHU)-08
N E/G(RHU)-08
O E/G(RHU)-09
P E/G(RHU)-09
B20
B21
E1
E2
E15
E10
E14
E78
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR
ELECTRIC THROTTLE


E10 (LIGHT GRAY)
E15 (GRAY)
E14 (BROWN)
E78 (BLACK)
B122
B20
D: B137
C: B136
B21 (BLACK)

WI-04061

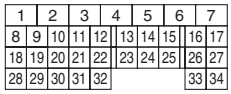


E4 (BLUE)

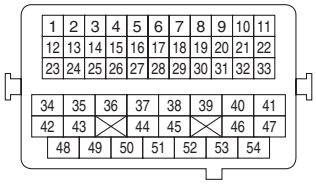
E5 (LIGHT GRAY)
E6 (LIGHT GRAY)
E16 (LIGHT GRAY)
E17 (LIGHT GRAY)

E18 (DARK GRAY)

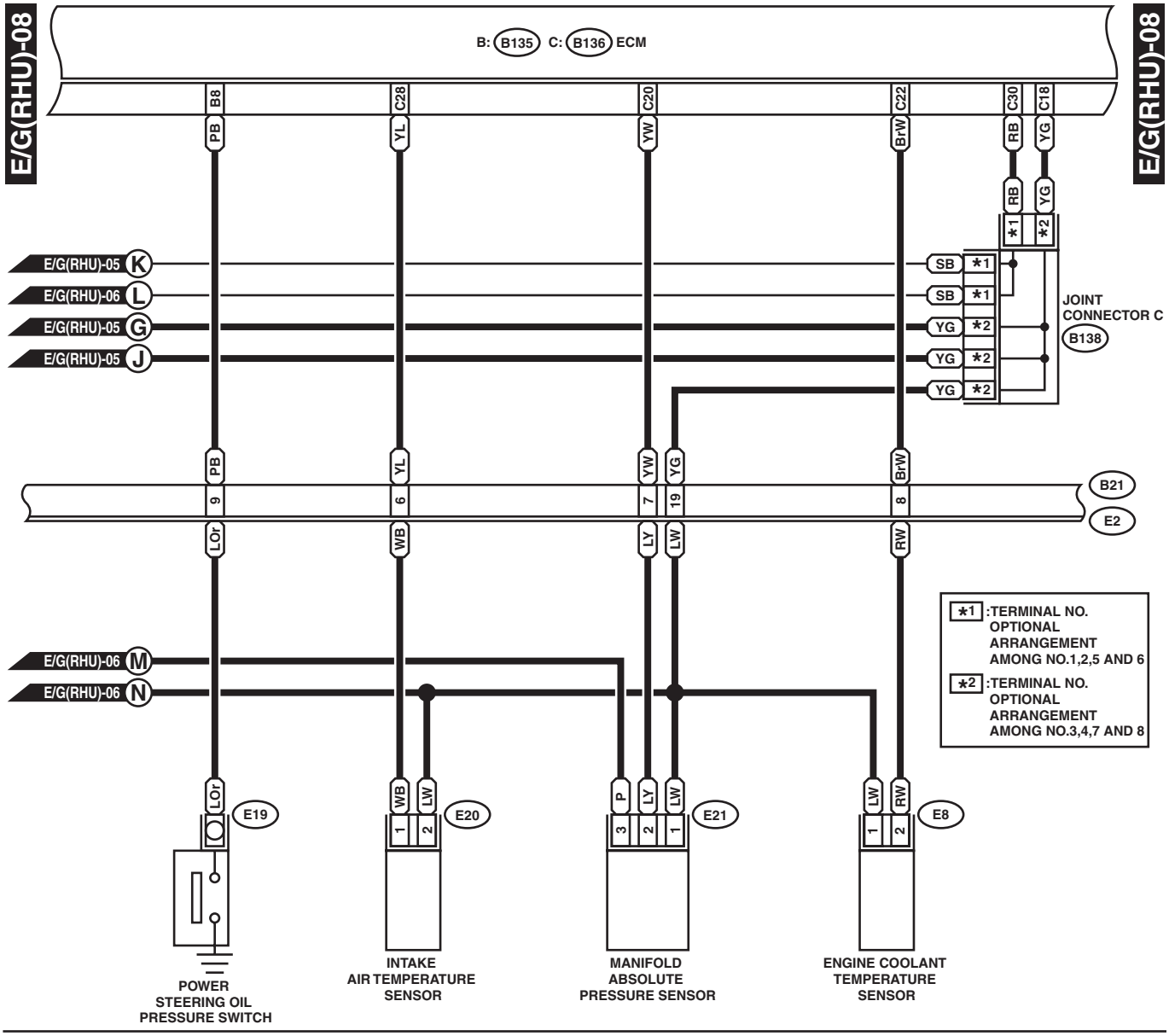
A: B134

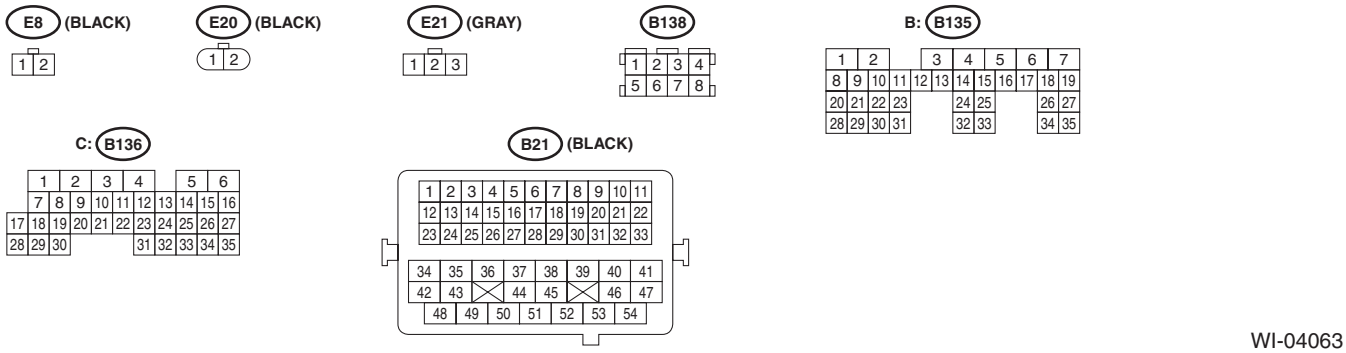


B21 (BLACK)

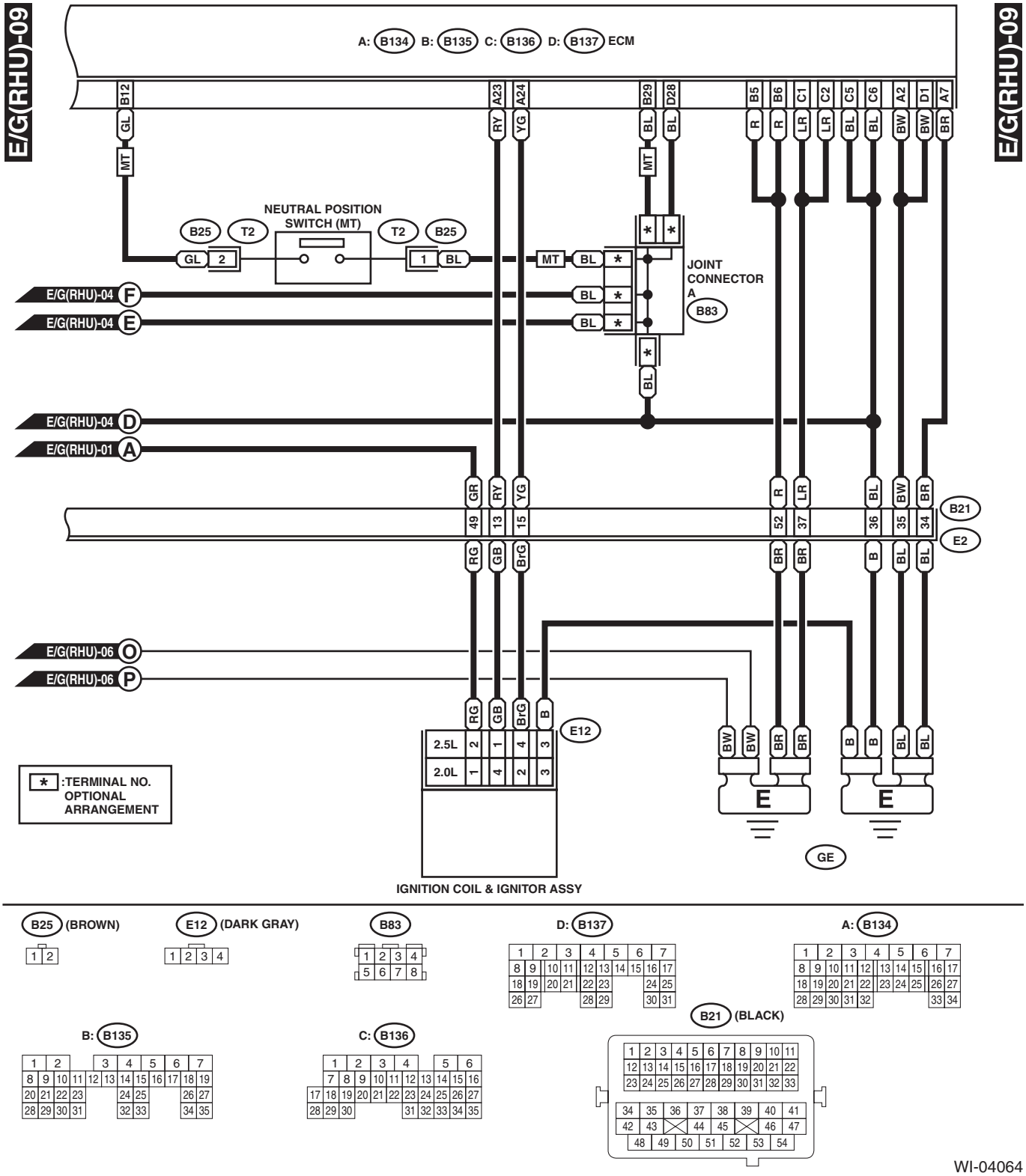


WI-04062


E/G(RHU)-08
E/G(RHU)-08
B: B135 C: B136 ECM
B8
C28
C20
C22
C30
C18
PB
YL
YW
BrW
RB
YG
*1
*2
E/G(RHU)-05 K
E/G(RHU)-06 L
E/G(RHU)-05 G
E/G(RHU)-05 J
SB *1
SB *1
YG *2
YG *2
YG *2
JOINT CONNECTOR C
B138
9
6
7
19
8
B21
E2
LOr
WB
LY
LW
RW
*1 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.1,2,5 AND 6
*2 :TERMINAL NO. OPTIONAL ARRANGEMENT AMONG NO.3,4,7 AND 8
E/G(RHU)-06 M
E/G(RHU)-06 N
E19
E20
E21
E8
P
POWER STEERING OIL PRESSURE SWITCH
INTAKE AIR TEMPERATURE SENSOR
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR


E8 (BLACK)
E20 (BLACK)
E21 (GRAY)
B138
B: B135
C: B136
B21 (BLACK)

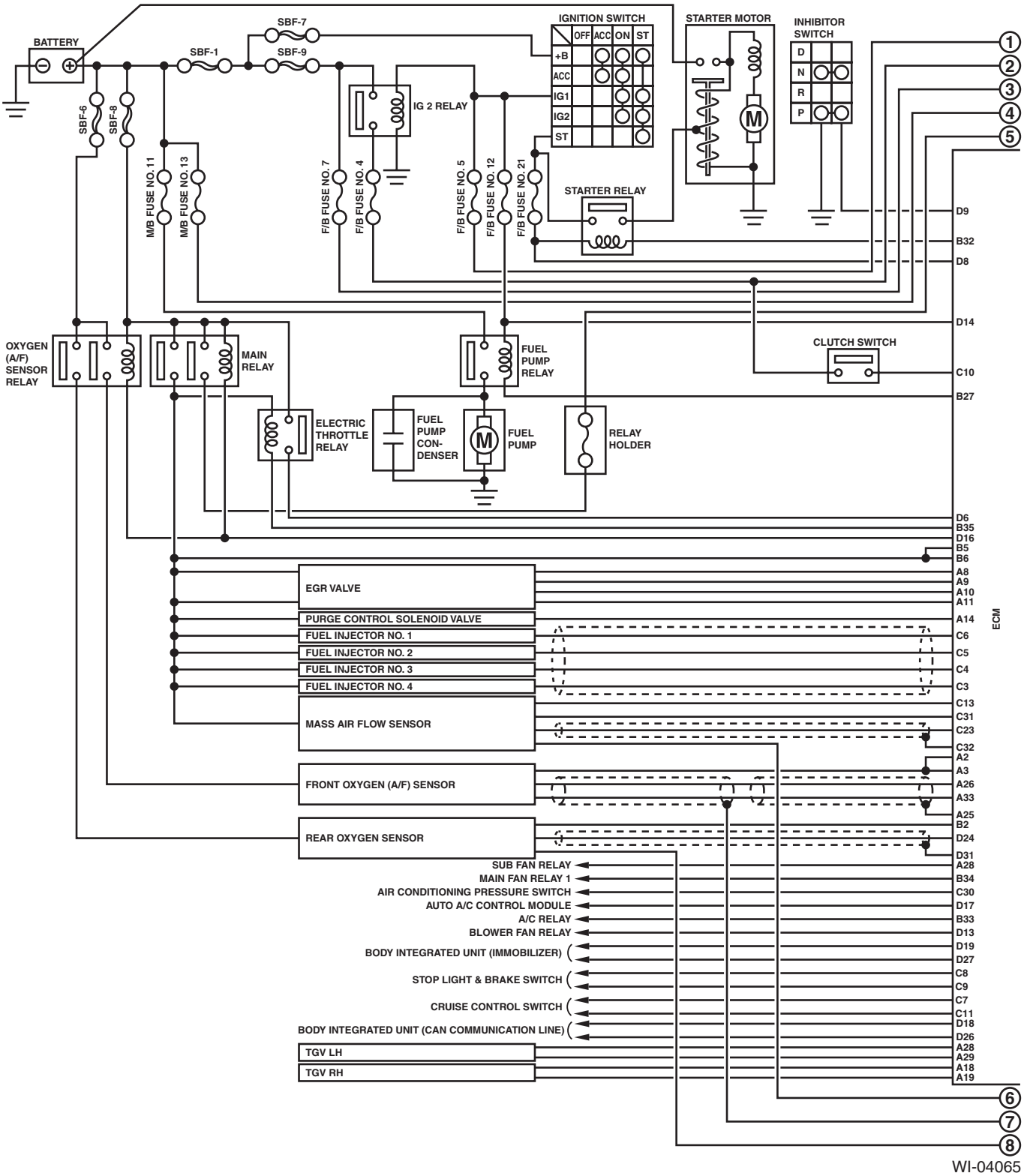
WI-04063


E/G(RHU)-09
E/G(RHU)-09
A: B134 B: B135 C: B136 D: B137 ECM
NEUTRAL POSITION SWITCH (MT)
JOINT CONNECTOR A
B83
E/G(RHU)-04 F
E/G(RHU)-04 E
E/G(RHU)-04 D
E/G(RHU)-01 A
E/G(RHU)-06 O
E/G(RHU)-06 P
B21
E2
E12
2.5L
2.0L
*:TERMINAL NO. OPTIONAL ARRANGEMENT
IGNITION COIL & IGNITOR ASSY
GE

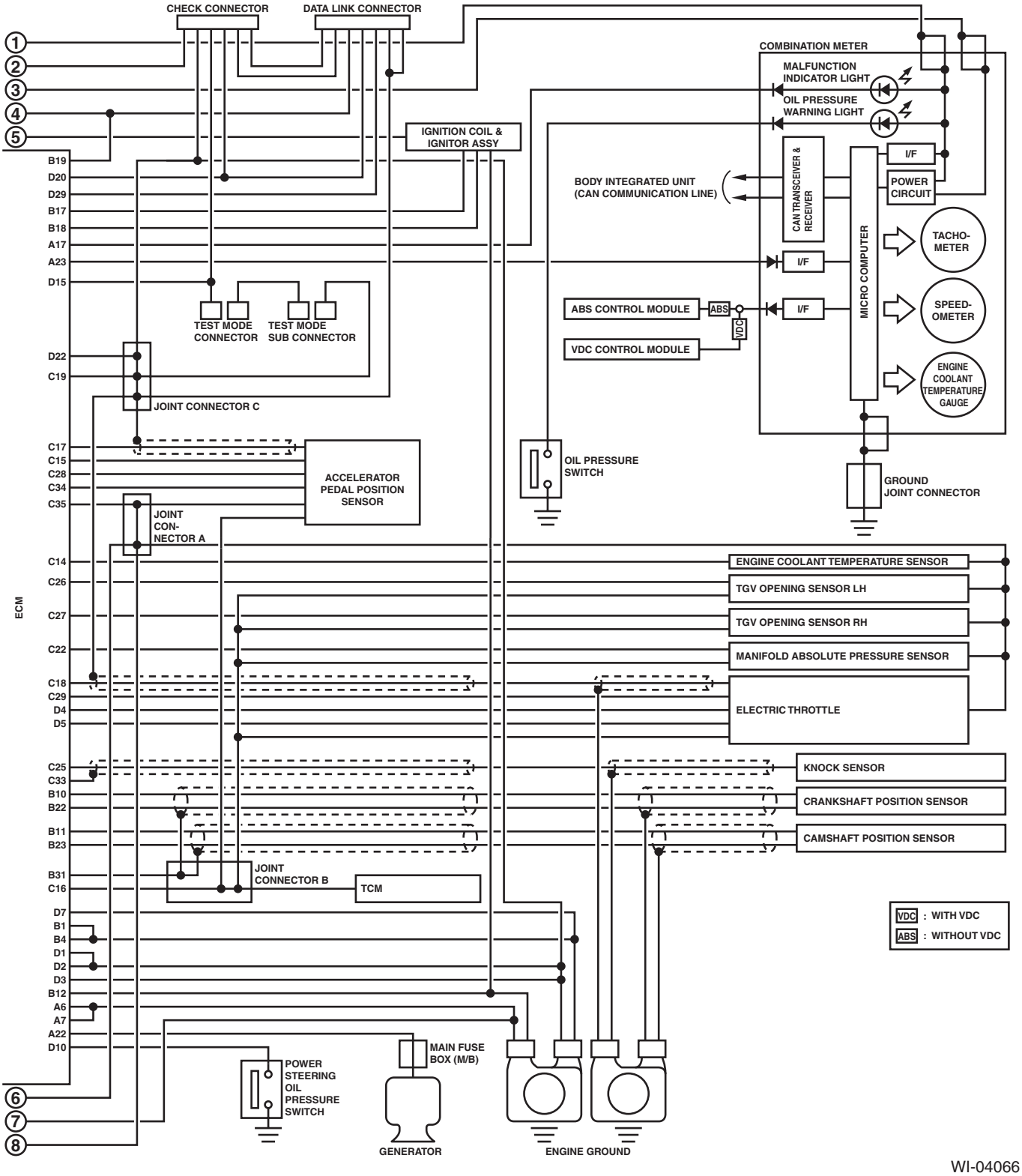
B25 (BROWN)
E12 (DARK GRAY)
B83
D: B137
A: B134
B21 (BLACK)
B: B135
C: B136

WI-04064

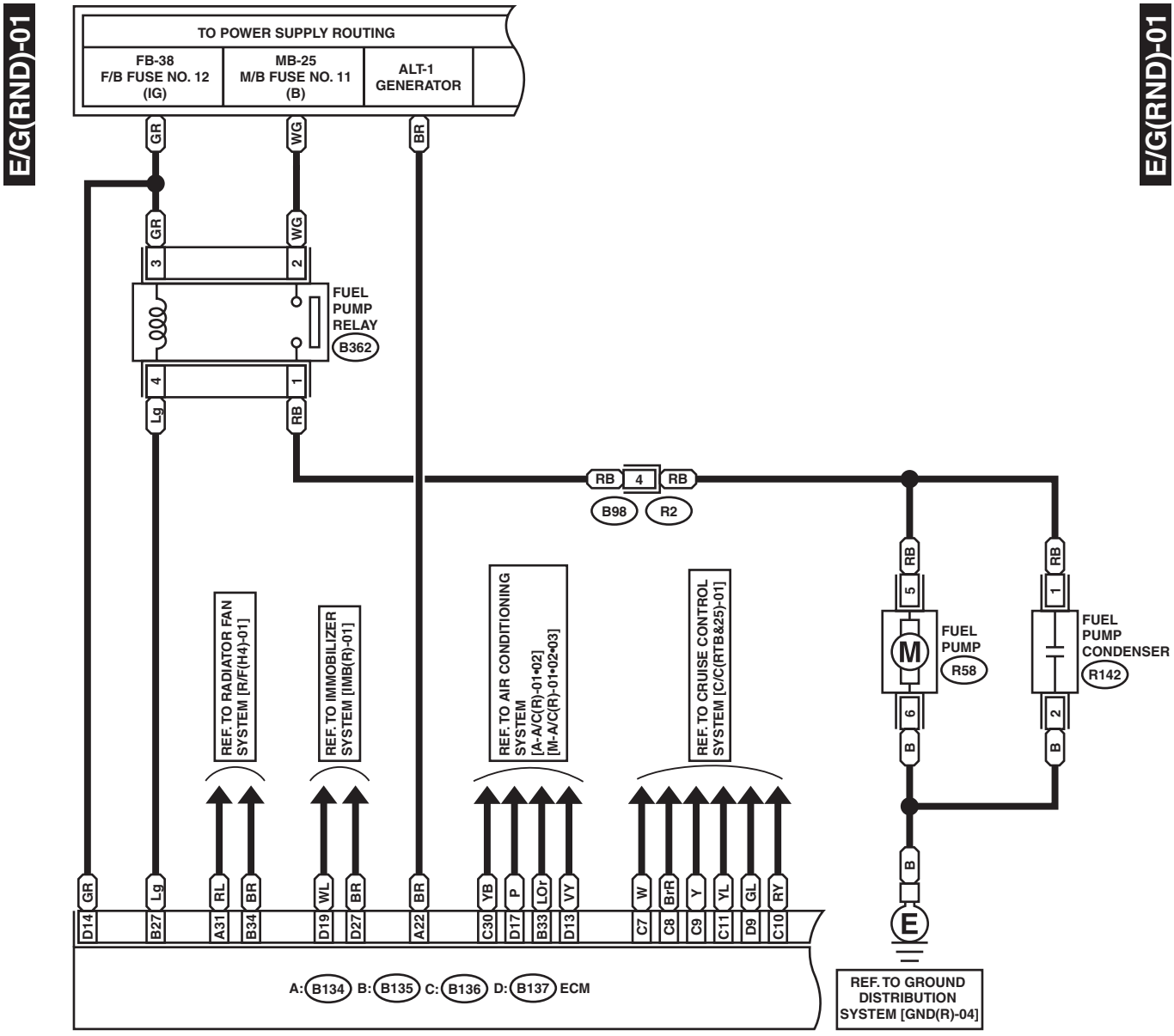
5. RHD 2.5 L EK MODEL

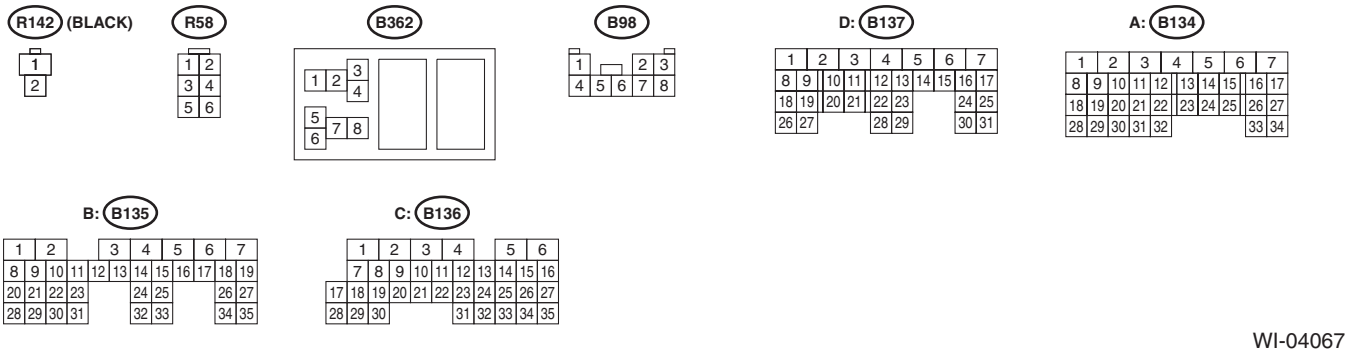


WI-04065

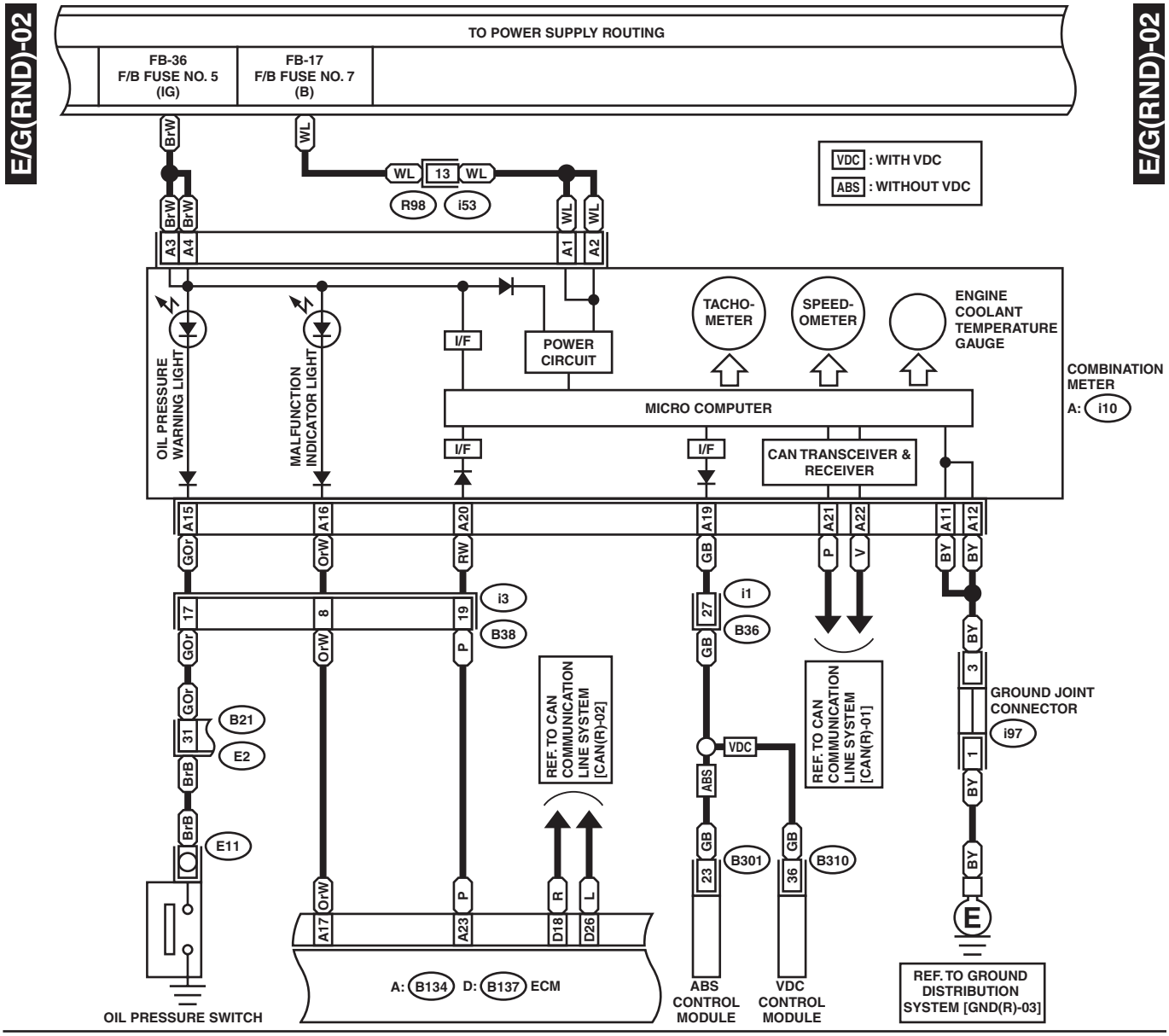

CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
IGNITION COIL & IGNITOR ASSY
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
I/F
POWER CIRCUIT
MICRO COMPUTER
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS CONTROL MODULE
ABS
VDC
VDC CONTROL MODULE
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
JOINT CONNECTOR C
ACCELERATOR PEDAL POSITION SENSOR
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
JOINT CON-NECTOR A
ECM
ENGINE COOLANT TEMPERATURE SENSOR
TGV OPENING SENSOR LH
TGV OPENING SENSOR RH
MANIFOLD ABSOLUTE PRESSURE SENSOR
ELECTRIC THROTTLE
KNOCK SENSOR
CRANKSHAFT POSITION SENSOR
CAMSHAFT POSITION SENSOR
JOINT CONNECTOR B
TCM
VDC : WITH VDC
ABS : WITHOUT VDC
POWER STEERING OIL PRESSURE SWITCH
MAIN FUSE BOX (M/B)
GENERATOR
ENGINE GROUND
B19
D20
D29
B17
B18
A17
A23
D15
D22
C19
C17
C15
C28
C34
C35
C14
C26
C27
C22
C18
C29
D4
D5
C25
C33
B10
B22
B11
B23
B31
C16
D7
B1
B4
D1
D2
D3
B12
A6
A7
A22
D10

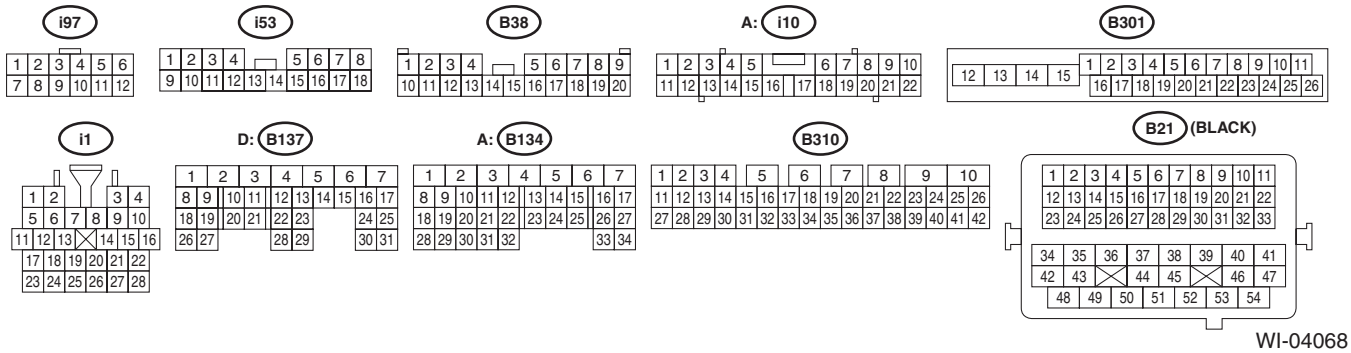
WI-04066


E/G(RND)-01
E/G(RND)-01
TO POWER SUPPLY ROUTING
FB-38
F/B FUSE NO. 12
(IG)
MB-25
M/B FUSE NO. 11
(B)
ALT-1
GENERATOR
GR
WG
BR
FUEL
PUMP
RELAY
B362
Lg
RB
B98
R2
REF. TO RADIATOR FAN
SYSTEM [R/F(H4)-01]
REF. TO IMMOBILIZER
SYSTEM [IMB(R)-01]
REF. TO AIR CONDITIONING
SYSTEM
[A-A/C(R)-01•02]
[M-A/C(R)-01•02•03]
REF. TO CRUISE CONTROL
SYSTEM [C/C(RTB&25)-01]
FUEL
PUMP
R58
FUEL
PUMP
CONDENSER
R142
RL
WL
YB
P
LOr
VY
W
BrR
Y
YL
GL
RY
D14
B27
A31
B34
D19
D27
A22
C30
D17
B33
D13
C7
C8
C9
C11
D9
C10
A: B134 B: B135 C: B136 D: B137 ECM
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-04]

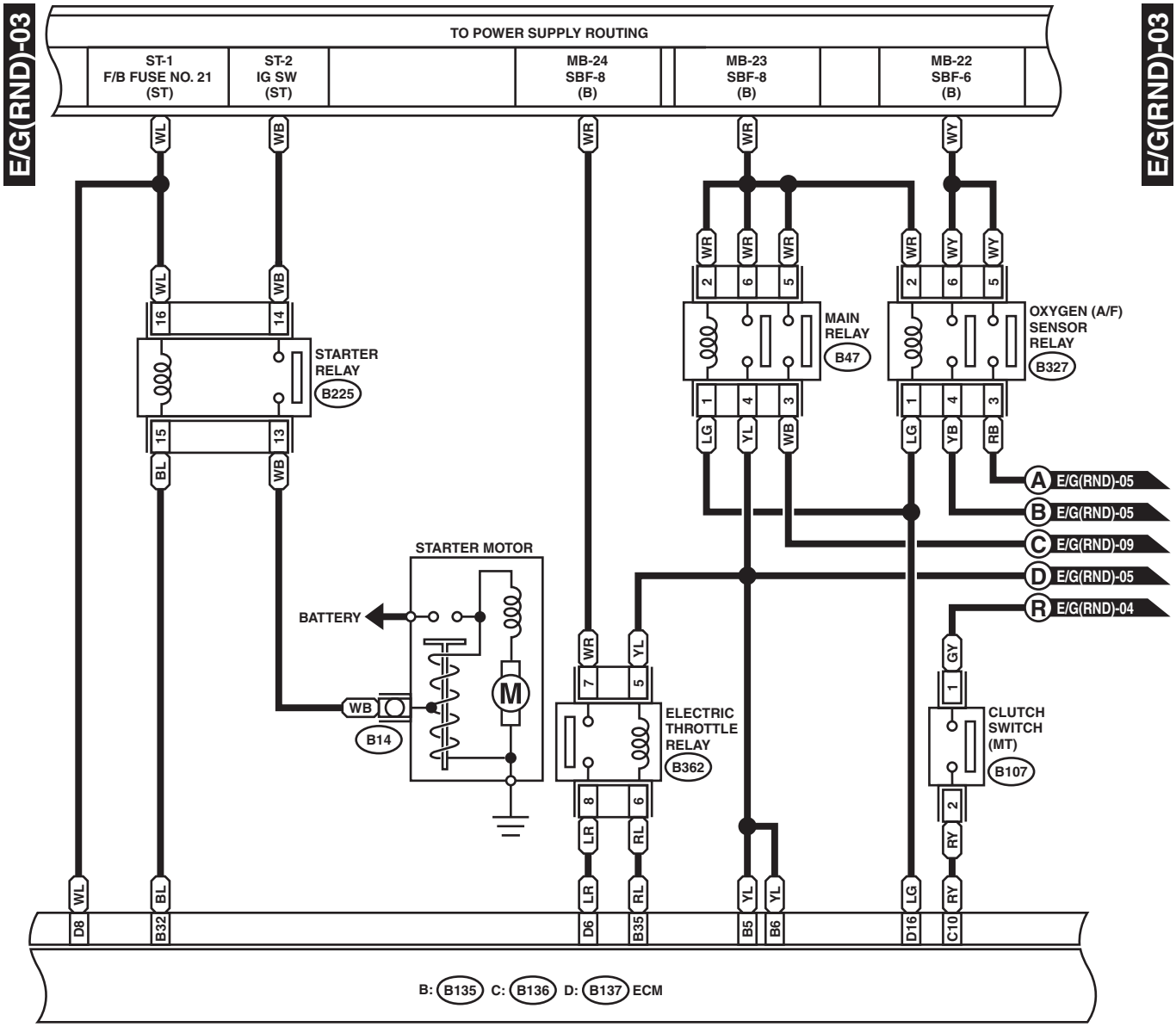

R142 (BLACK)
R58
B362
B98
D: B137
A: B134
B: B135
C: B136

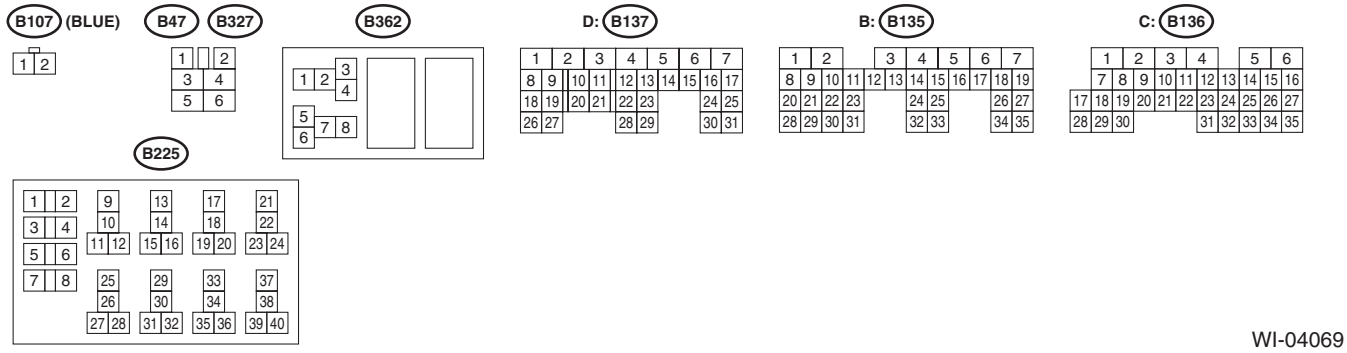
WI-04067


E/G(RND)-02
E/G(RND)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
VDC : WITH VDC
ABS : WITHOUT VDC
BrW
WL
WL
13
WL
R98
i53
BrW
BrW
WL
WL
A3
A4
A1
A2
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
COMBINATION METER
A: i10
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
I/F
POWER CIRCUIT
MICRO COMPUTER
I/F
I/F
CAN TRANSCEIVER & RECEIVER
A15
A16
A20
A19
A21
A22
A11
A12
GOr
OrW
RW
GB
P
V
BY
BY
17
8
19
27
i3
i1
B38
B36
GOr
OrW
P
GB
BY
3
GROUND JOINT CONNECTOR
i97
GOr
31
B21
E2
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-01]
VDC
1
BrB
ABS
BY
BrB
GB
GB
E11
B301
B310
23
36
BY
OrW
P
R
L
E
A17
A23
D18
D26
A: B134 D: B137 ECM
ABS CONTROL MODULE
VDC CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
OIL PRESSURE SWITCH

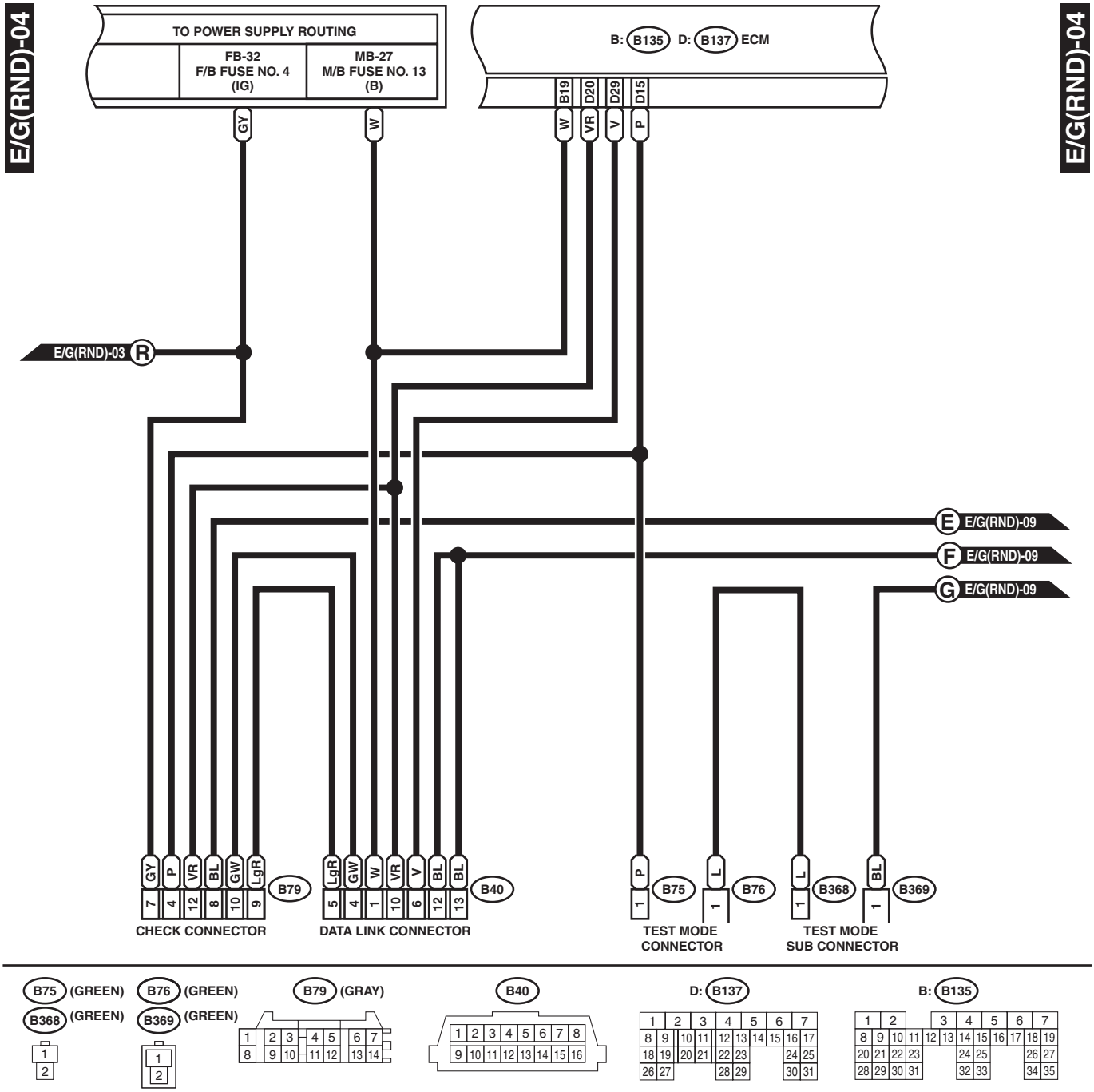

i97
i53
B38
A: i10
B301
i1
D: B137
A: B134
B310
B21 (BLACK)

WI-04068

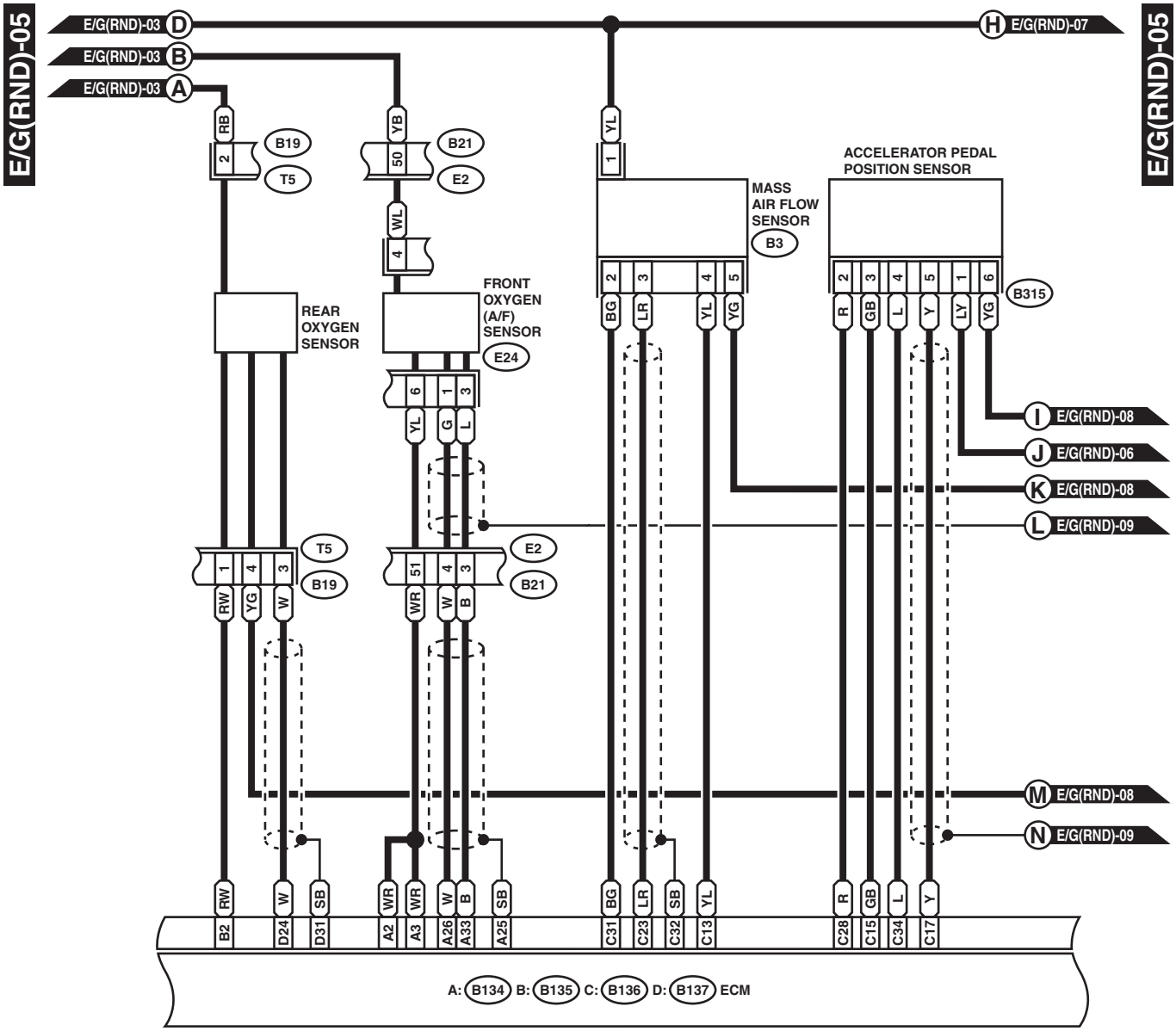

E/G(RND)-03
E/G(RND)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
STARTER
RELAY
B225
MAIN
RELAY
B47
OXYGEN (A/F)
SENSOR
RELAY
B327
STARTER MOTOR
BATTERY
B14
ELECTRIC
THROTTLE
RELAY
B362
CLUTCH
SWITCH
(MT)
B107
A E/G(RND)-05
B E/G(RND)-05
C E/G(RND)-09
D E/G(RND)-05
R E/G(RND)-04
B: B135 C: B136 D: B137 ECM

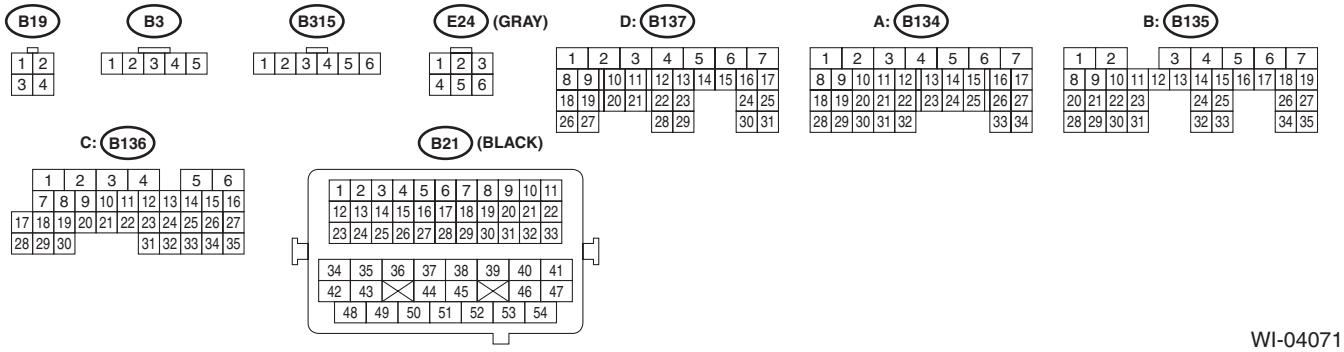

B107 (BLUE)
B47
B327
B362
D: B137
B: B135
C: B136
B225

WI-04069

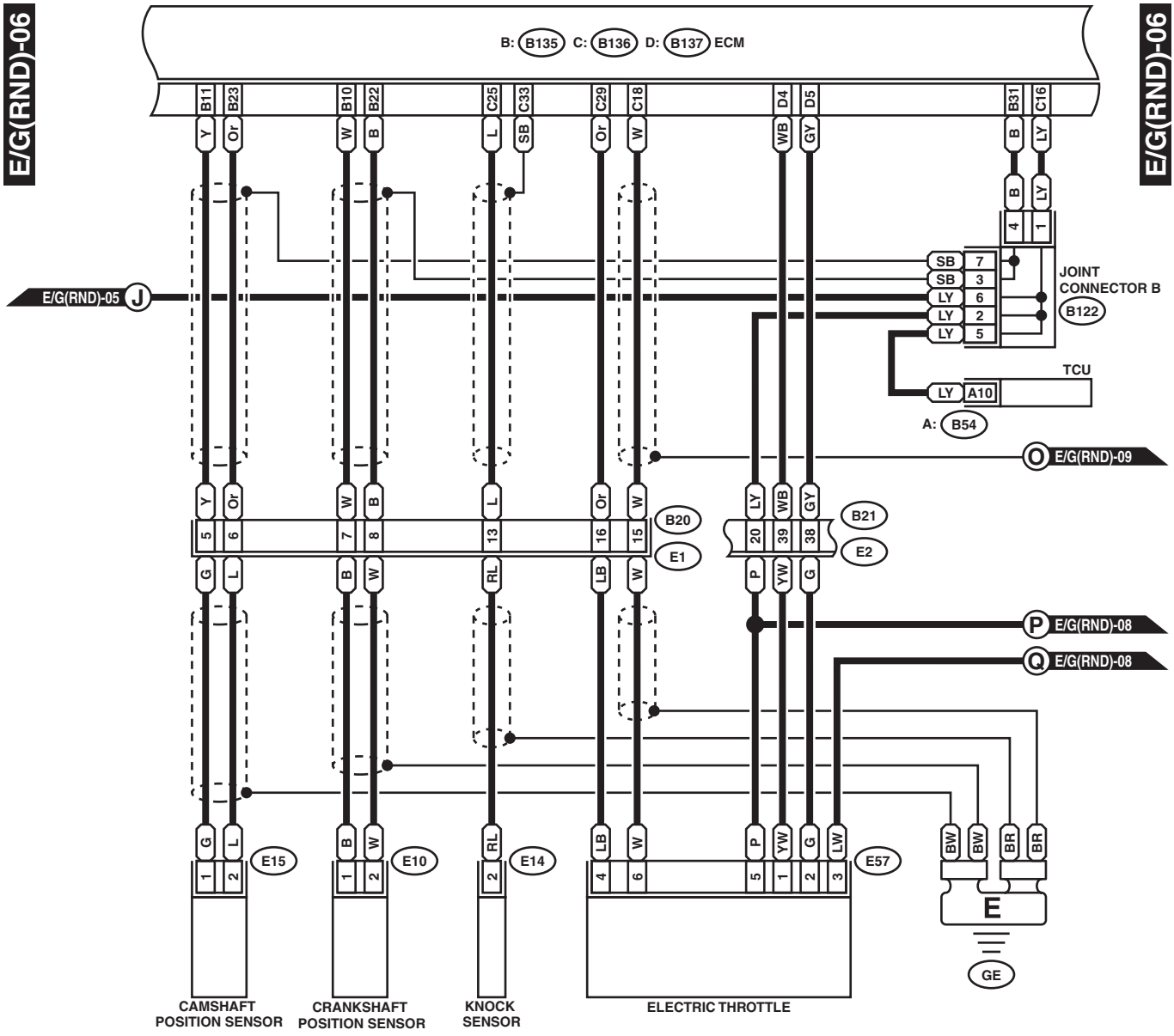

E/G(RND)-04
E/G(RND)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
MB-27
M/B FUSE NO. 13
(B)
B: B135 D: B137 ECM
B19
D20
D29
D15
GY
W
W
VR
V
P
E/G(RND)-03 R
E E/G(RND)-09
F E/G(RND)-09
G E/G(RND)-09
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
LgR GW W VR V BL BL
5 4 1 10 6 12 13
B40
DATA LINK CONNECTOR
P
1
B75
L
1
B76
TEST MODE
CONNECTOR
L
1
B368
BL
1
B369
TEST MODE
SUB CONNECTOR
B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
D: B137
B: B135

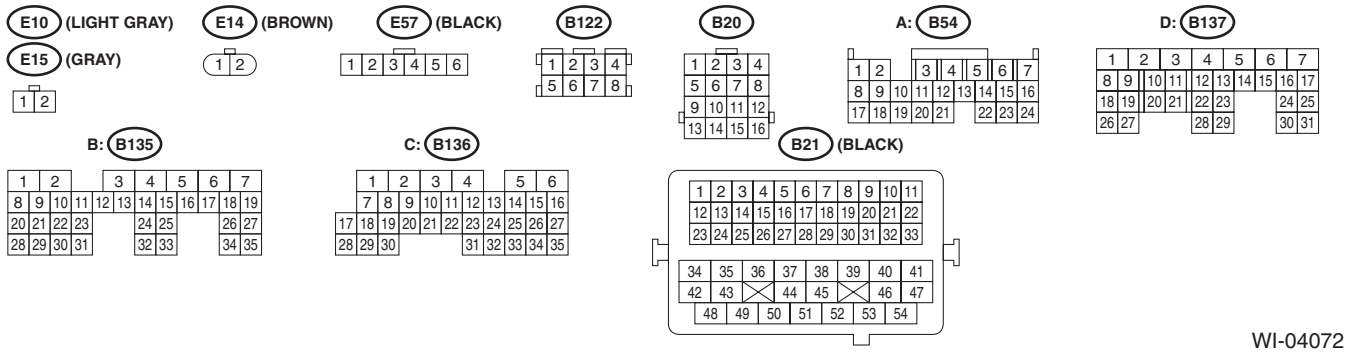
WI-04070


E/G(RND)-05
E/G(RND)-03 D
E/G(RND)-03 B
E/G(RND)-03 A
H E/G(RND)-07
E/G(RND)-05
RB
2
B19
T5
YB
50
B21
E2
WL
4
YL
1
ACCELERATOR PEDAL POSITION SENSOR
MASS AIR FLOW SENSOR
B3
2 3 4 5
BG LR YL YG
2 3 4 5 1 6
R GB L Y LY YG
B315
REAR OXYGEN SENSOR
FRONT OXYGEN (A/F) SENSOR
E24
6 1 3
YL G L
I E/G(RND)-08
J E/G(RND)-06
K E/G(RND)-08
L E/G(RND)-09
T5
B19
1 4 3
RW YG W
E2
B21
51 4 3
WR W B
M E/G(RND)-08
N E/G(RND)-09
RW W SB WR WR W B SB BG LR SB YL R GB L Y
B2 D24 D31 A2 A3 A26 A33 A25 C31 C23 C32 C13 C28 C15 C34 C17
A: B134 B: B135 C: B136 D: B137 ECM

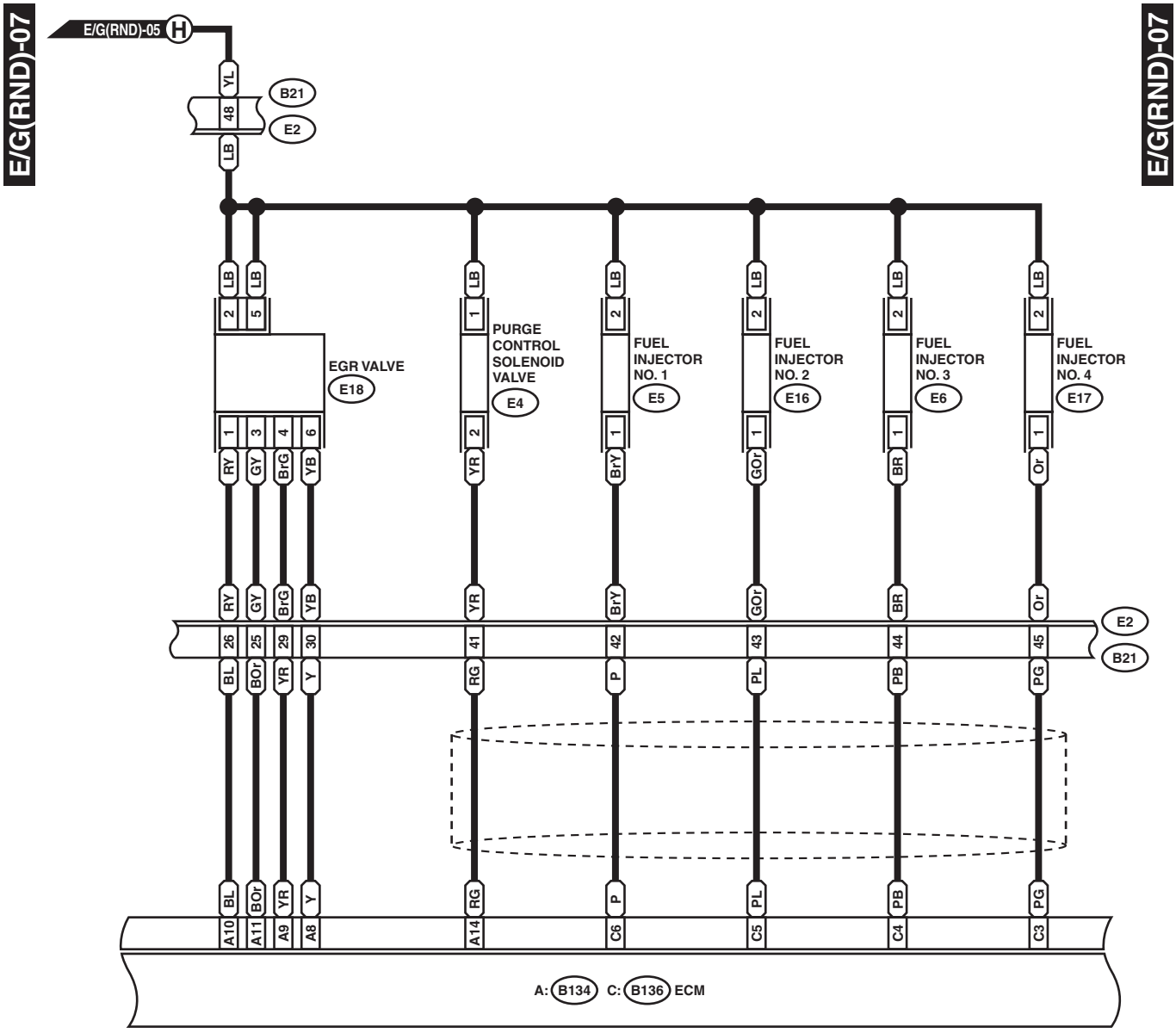

B19
1 2
3 4
B3
1 2 3 4 5
B315
1 2 3 4 5 6
E24 (GRAY)
1 2 3
4 5 6
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54

WI-04071


E/G(RND)-06
E/G(RND)-06
B: B135 C: B136 D: B137 ECM
B11 B23 B10 B22 C25 C33 C29 C18 D4 D5 B31 C16
Y Or W B L SB Or W WB GY B LY
JOINT CONNECTOR B
B122
SB 7
SB 3
LY 6
LY 2
LY 5
TCU
LY A10
A: B54
E/G(RND)-05 J
O E/G(RND)-09
B20
B21
E1
E2
P E/G(RND)-08
Q E/G(RND)-08
E15
E10
E14
E57
E
GE
CAMSHAFT POSITION SENSOR
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR
ELECTRIC THROTTLE


E10 (LIGHT GRAY)
E15 (GRAY)
E14 (BROWN)
E57 (BLACK)
B122
B20
A: B54
D: B137
B: B135
C: B136
B21 (BLACK)

WI-04072

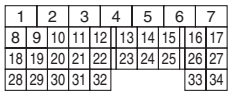


E4 (BLUE)

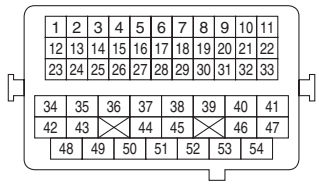
(DARK GRAY) E5 E16 (DARK GRAY)
(DARK GRAY) E6 E17 (DARK GRAY)

E18 (DARK GRAY)

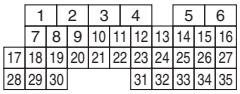
A: B134



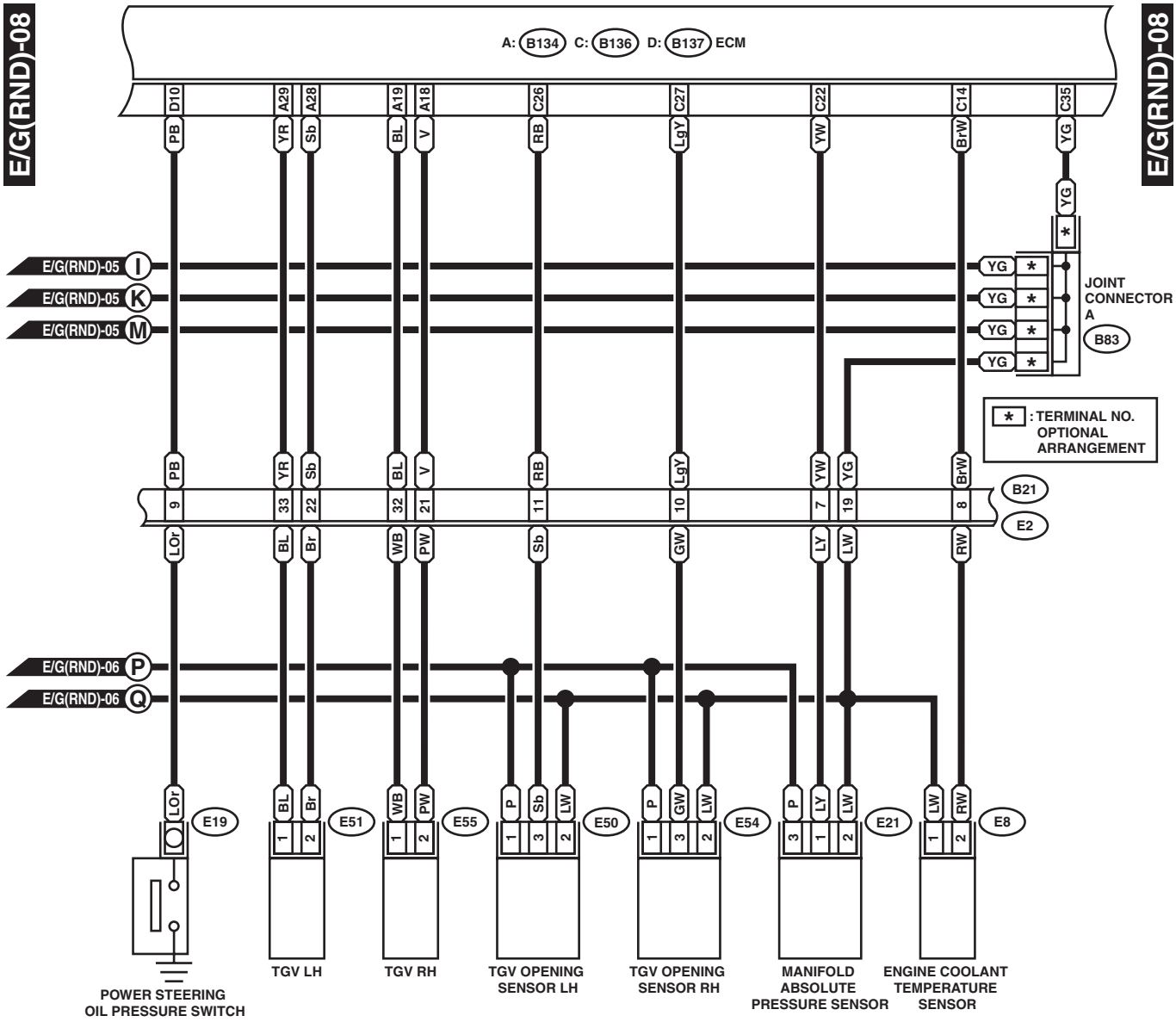
B21 (BLACK)

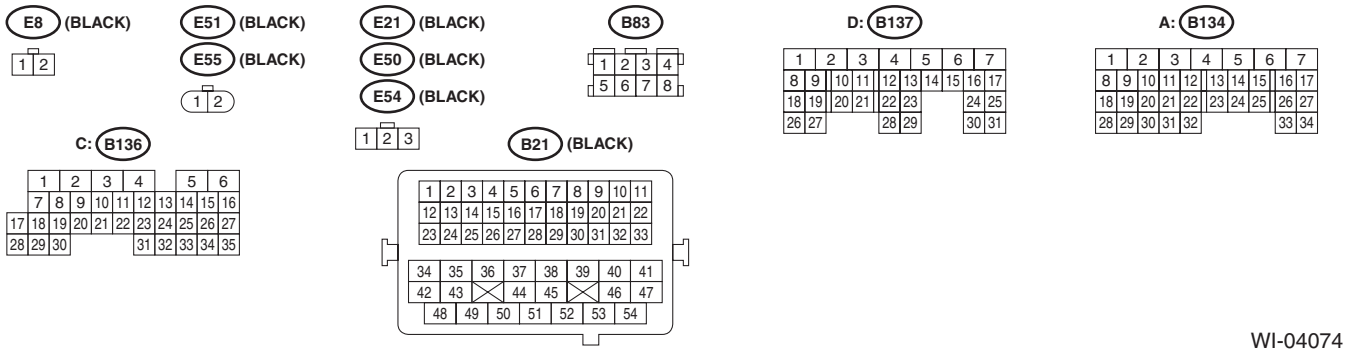


C: B136

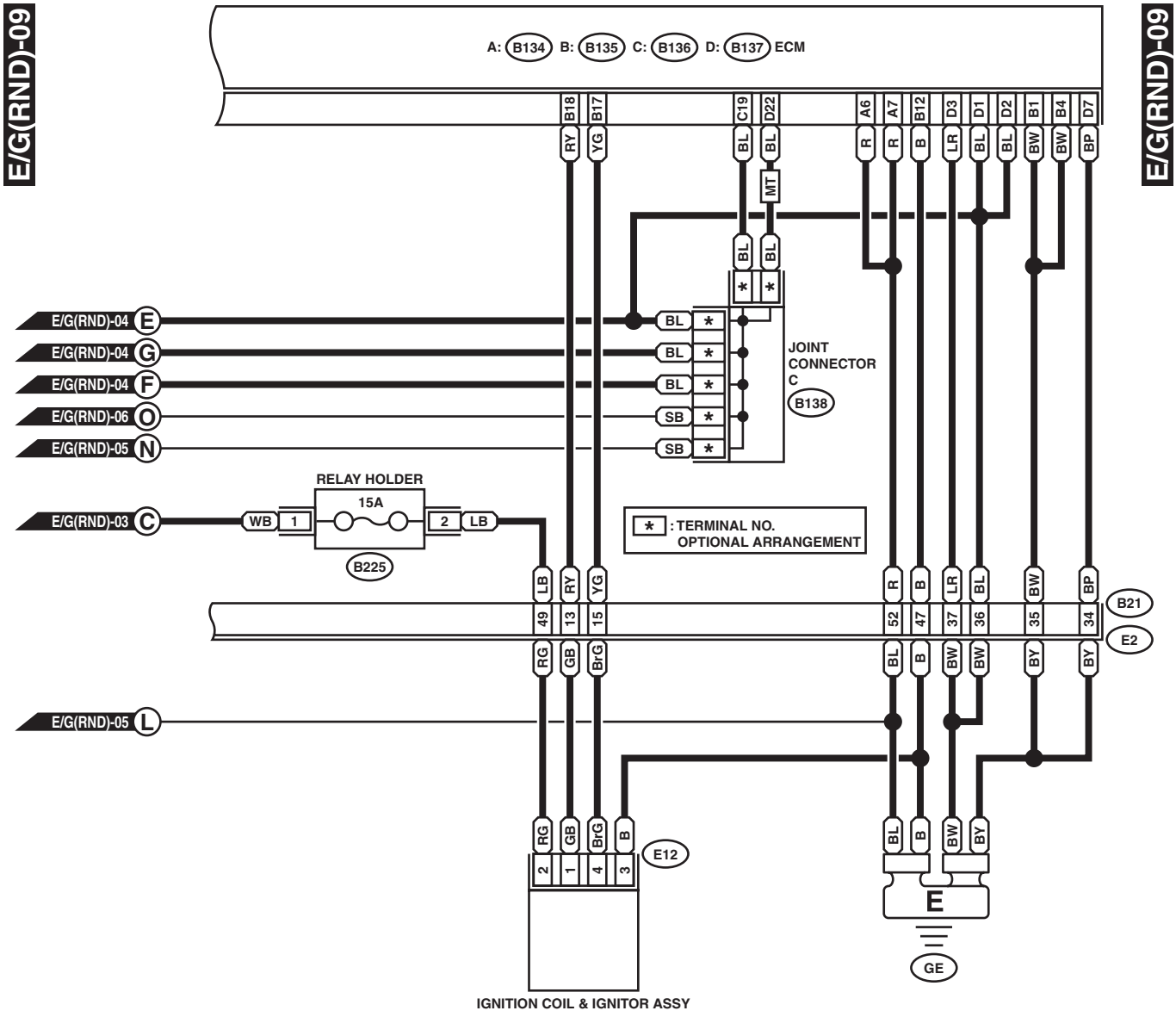


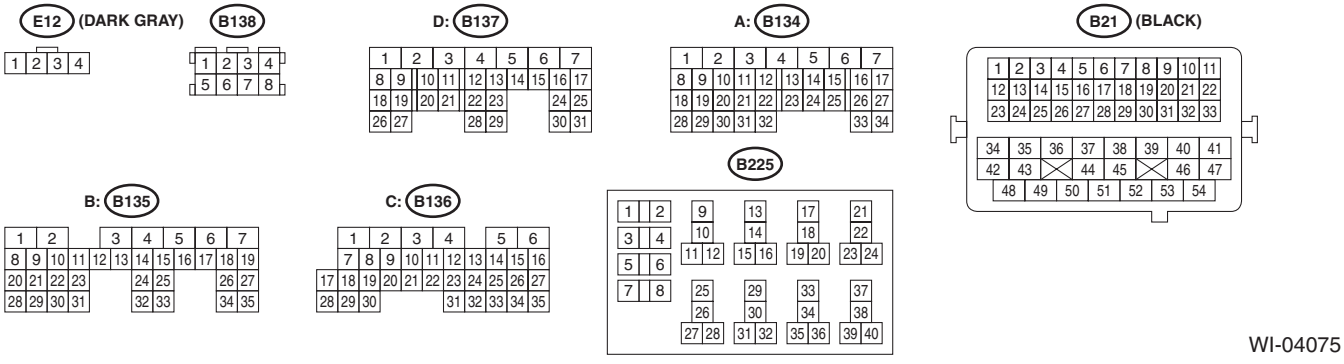
WI-04073


E/G(RND)-08
E/G(RND)-08
A: B134 C: B136 D: B137 ECM
D10 A29 A28 A19 A18 C26 C27 C22 C14 C35
PB YR Sb BL V RB LgY YW BrW YG
YG *
E/G(RND)-05 I
E/G(RND)-05 K
E/G(RND)-05 M
YG *
JOINT CONNECTOR A
B83
* : TERMINAL NO. OPTIONAL ARRANGEMENT
PB YR Sb BL V RB LgY YW YG BrW
9 33 22 32 21 11 10 7 19 8
B21
E2
LOr BL Br WB PW Sb GW LY LW RW
E/G(RND)-06 P
E/G(RND)-06 Q
LOr BL Br WB PW P Sb LW P GW LW P LY LW LW RW
E19 E51 E55 E50 E54 E21 E8
POWER STEERING OIL PRESSURE SWITCH
TGV LH
TGV RH
TGV OPENING SENSOR LH
TGV OPENING SENSOR RH
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR


E8 (BLACK)
E51 (BLACK)
E55 (BLACK)
E21 (BLACK)
E50 (BLACK)
E54 (BLACK)
B83
D: B137
A: B134
C: B136
B21 (BLACK)

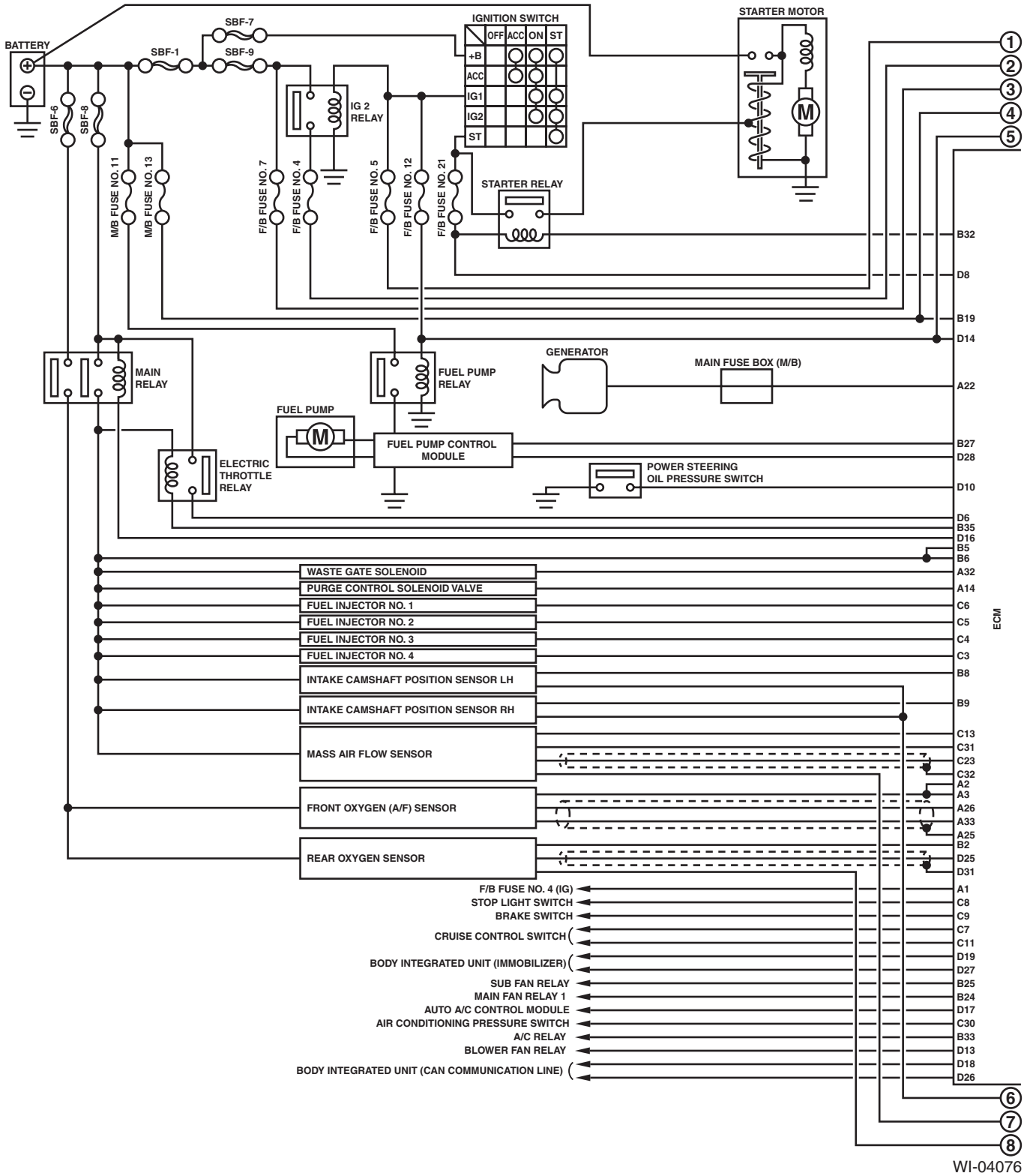
WI-04074


E/G(RND)-09
E/G(RND)-09
A: B134 B: B135 C: B136 D: B137 ECM
B18 B17 C19 D22 A6 A7 B12 D3 D1 D2 B1 B4 D7
RY YG BL BL R R B LR BL BL BW BW BP
MT
BL BL
* *
E/G(RND)-04 E
E/G(RND)-04 G
E/G(RND)-04 F
E/G(RND)-06 O
E/G(RND)-05 N
BL *
BL *
BL *
SB *
SB *
JOINT CONNECTOR C
B138
RELAY HOLDER
15A
E/G(RND)-03 C
WB 1
2 LB
B225
* : TERMINAL NO. OPTIONAL ARRANGEMENT
LB RY YG R B LR BL BW BP
49 13 15 52 47 37 36 35 34
B21
E2
RG GB BrG BL B BW BW BY BY
E/G(RND)-05 L
RG GB BrG B BL B BW BY
2 1 4 3
E12
E
GE
IGNITION COIL & IGNITOR ASSY

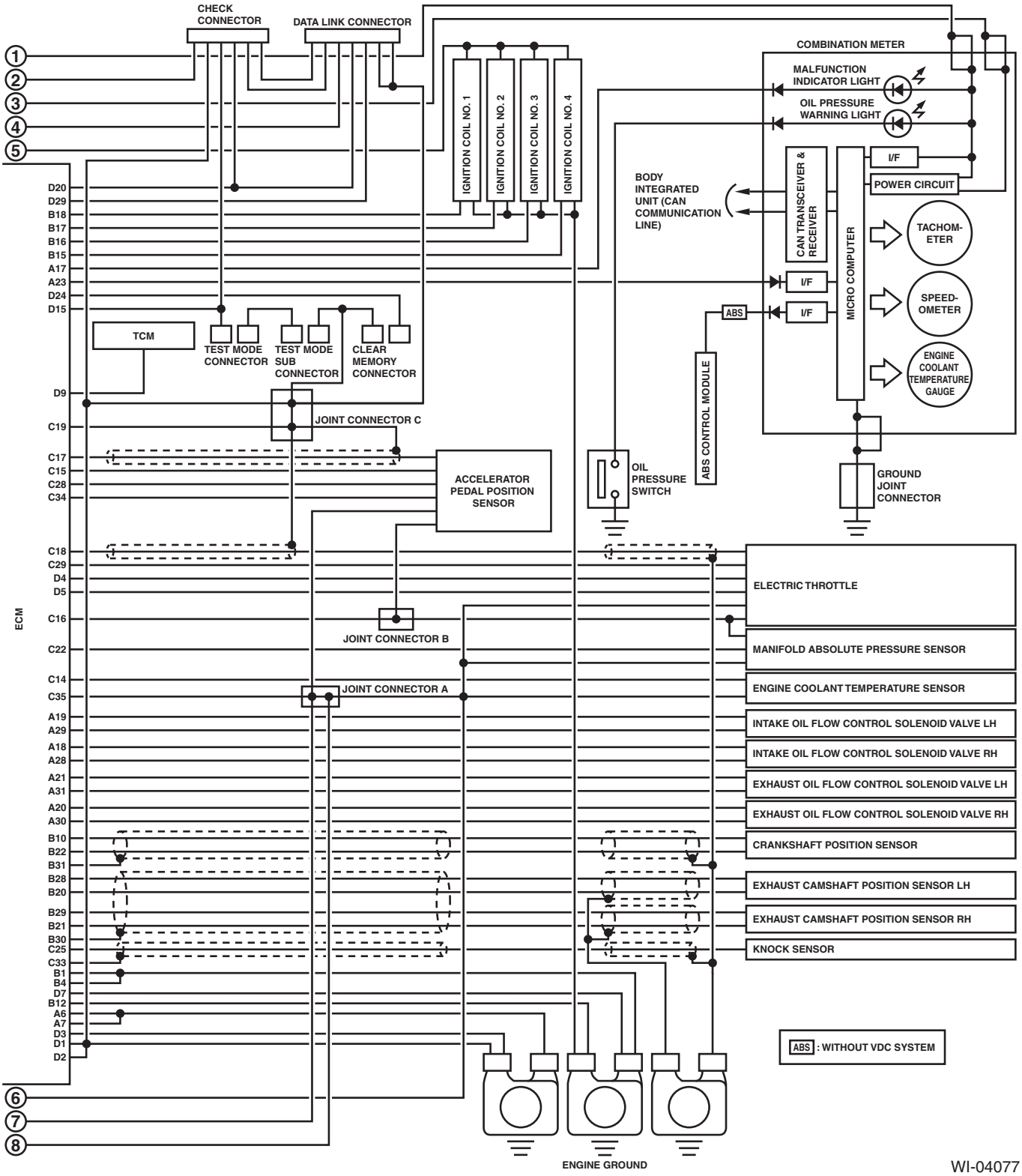

E12 (DARK GRAY)
B138
D: B137
A: B134
B21 (BLACK)
B: B135
C: B136
B225

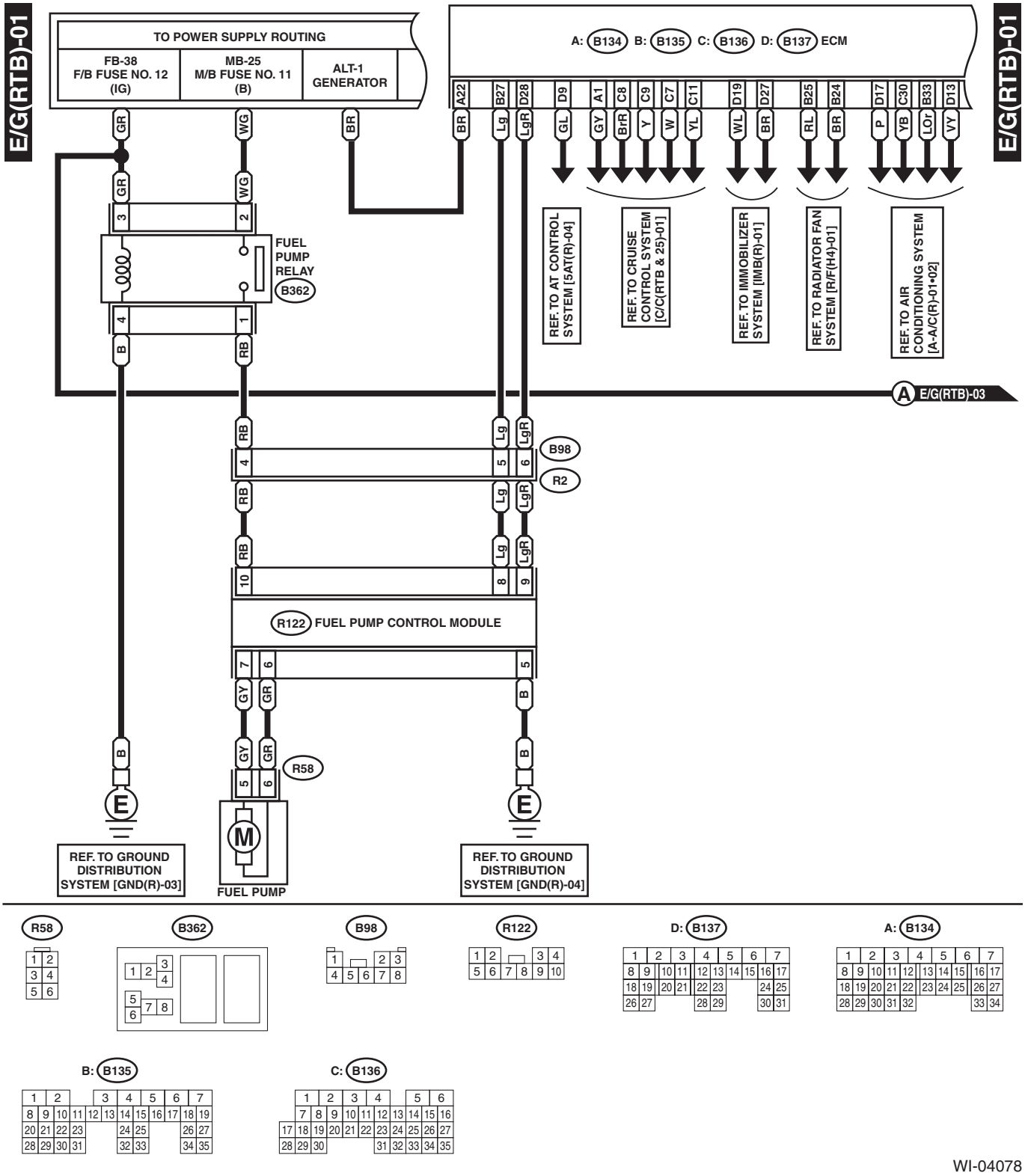
WI-04075

6. RHD TURBO MODEL

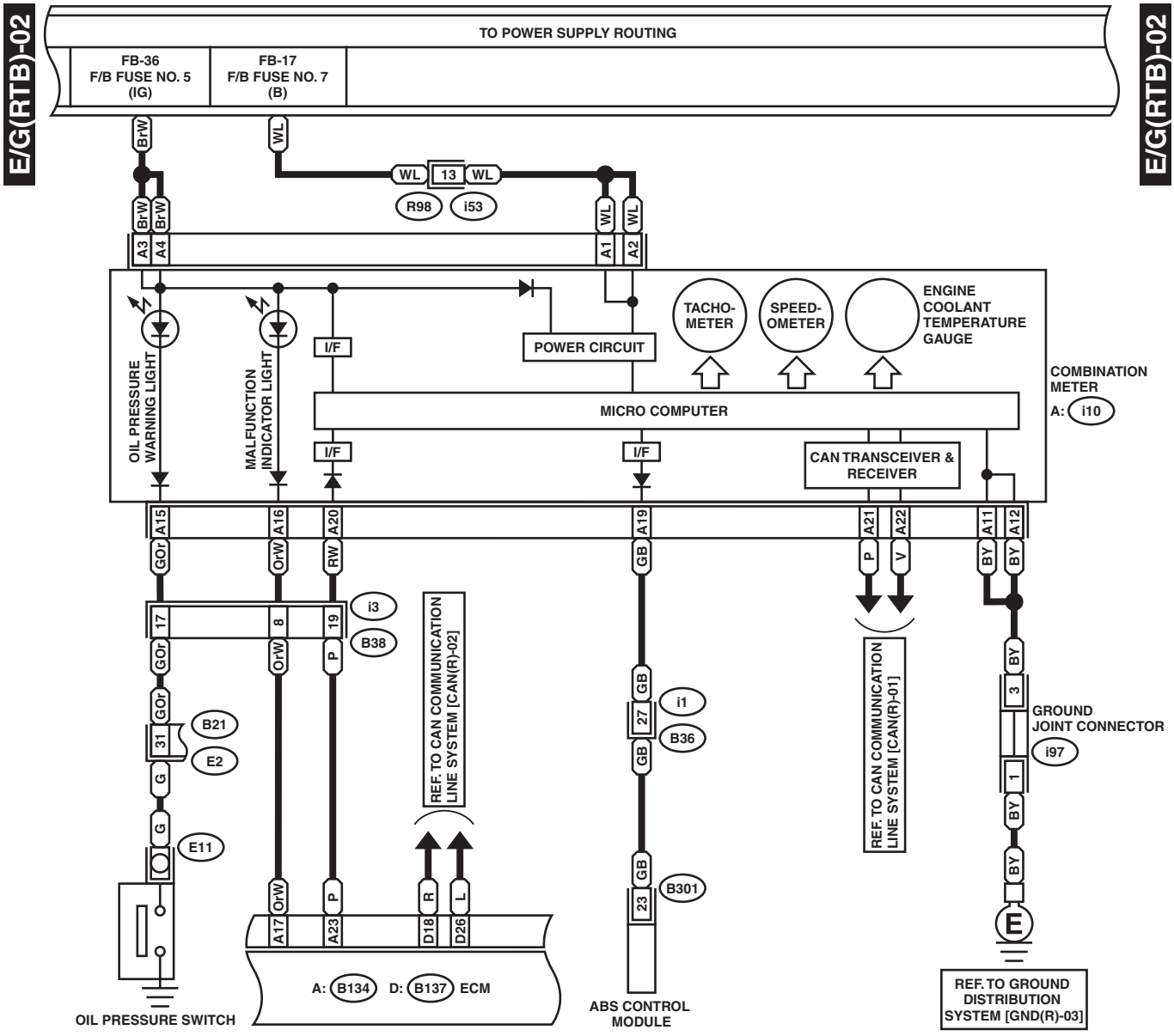


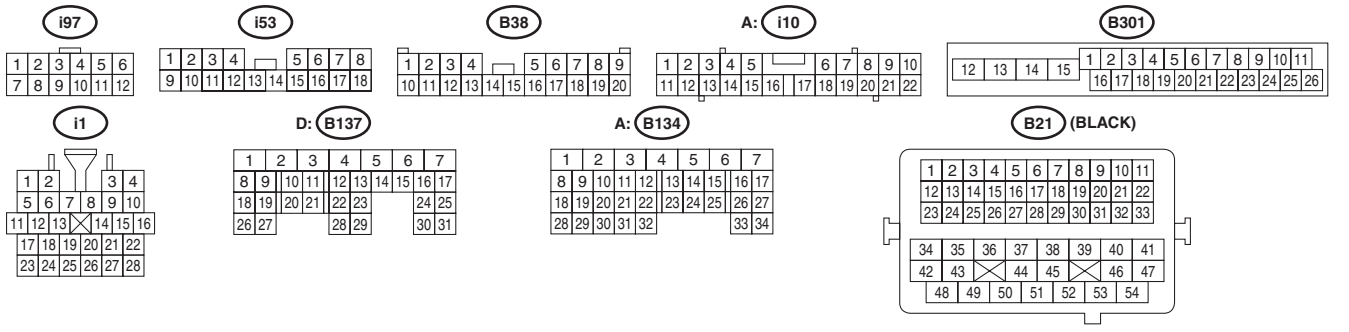
WI-04076


CHECK CONNECTOR
DATA LINK CONNECTOR
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
IGNITION COIL NO. 1
IGNITION COIL NO. 2
IGNITION COIL NO. 3
IGNITION COIL NO. 4
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
MICRO COMPUTER
I/F
POWER CIRCUIT
TACHOM-ETER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS
ABS CONTROL MODULE
TCM
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
CLEAR MEMORY CONNECTOR
JOINT CONNECTOR C
JOINT CONNECTOR B
JOINT CONNECTOR A
ACCELERATOR PEDAL POSITION SENSOR
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
ECM
ELECTRIC THROTTLE
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH
CRANKSHAFT POSITION SENSOR
EXHAUST CAMSHAFT POSITION SENSOR LH
EXHAUST CAMSHAFT POSITION SENSOR RH
KNOCK SENSOR
ABS : WITHOUT VDC SYSTEM
ENGINE GROUND
WI-04077

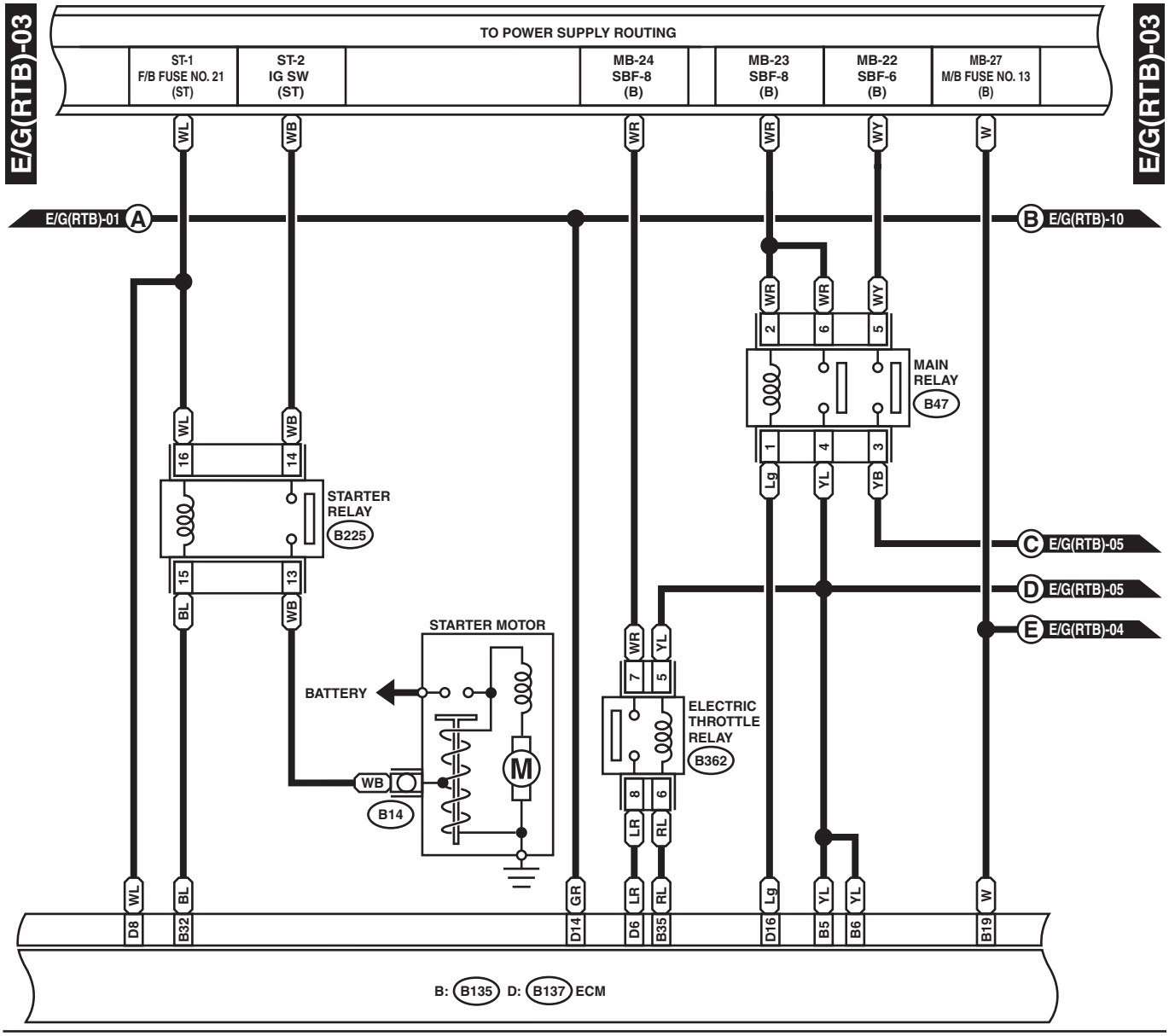

E/G(RTB)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
A: B134 B: B135 C: B136 D: B137 ECM
A22 B27 D28 D9 A1 C8 C9 C7 C11 D19 D27 B25 B24 D17 C30 B33 D13
GR WG BR BR Lg LgR GL GY BrR Y W YL WL BR RL BR P YB LOr VY
FUEL PUMP RELAY
B362
REF. TO AT CONTROL SYSTEM [5AT(R)-04]
REF. TO CRUISE CONTROL SYSTEM [C/C(RTB & 25)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(R)-01]
REF. TO RADIATOR FAN SYSTEM [R/F(H4)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(R)-01•02]
A E/G(RTB)-03
B98
R2
R122 FUEL PUMP CONTROL MODULE
R58
M
FUEL PUMP
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
R58
B362
B98
R122
D: B137
A: B134
B: B135
C: B136

WI-04078

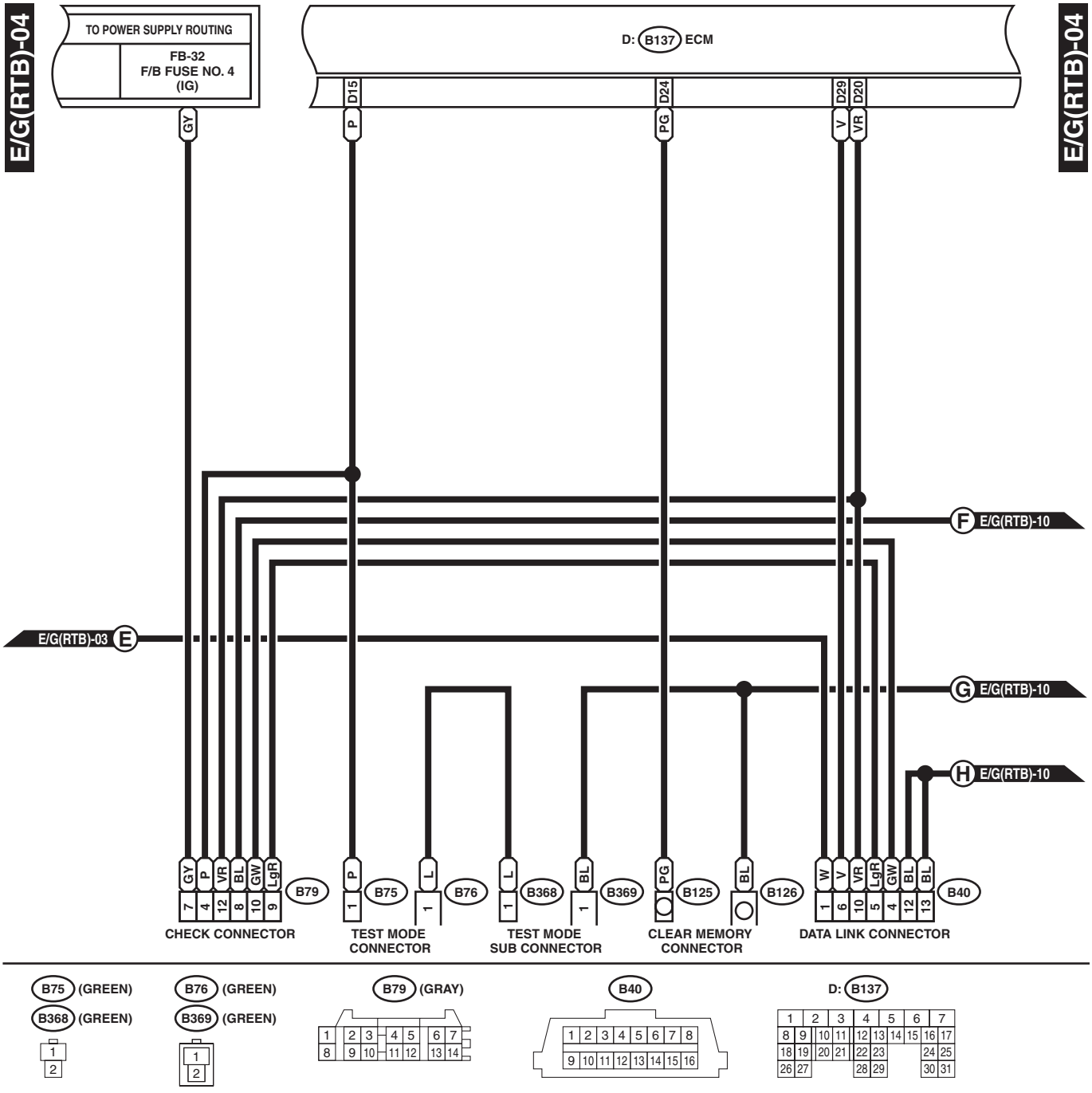

E/G(RTB)-02
E/G(RTB)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
BrW
WL
WL
13
WL
R98
i53
BrW
BrW
WL
WL
A3
A4
A1
A2
I/F
POWER CIRCUIT
TACHO-
METER
SPEED-
OMETER
ENGINE
COOLANT
TEMPERATURE
GAUGE
COMBINATION
METER
A: i10
OIL PRESSURE
WARNING LIGHT
MALFUNCTION
INDICATOR LIGHT
MICRO COMPUTER
I/F
I/F
CAN TRANSCEIVER &
RECEIVER
A15
A16
A20
A19
A21
A22
A11
A12
GOr
OrW
RW
GB
P
V
BY
BY
i3
B38
17
8
19
GOr
OrW
P
REF. TO CAN COMMUNICATION
LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION
LINE SYSTEM [CAN(R)-01]
BY
3
GROUND
JOINT CONNECTOR
i97
GOr
31
B21
E2
G
1
BY
G
E11
GB
27
i1
B36
GB
BY
BY
E
OrW
P
R
L
GB
B301
23
A17
A23
D18
D26
A: B134 D: B137 ECM
ABS CONTROL
MODULE
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-03]
OIL PRESSURE SWITCH


i97
i53
B38
A: i10
B301
i1
D: B137
A: B134
B21 (BLACK)

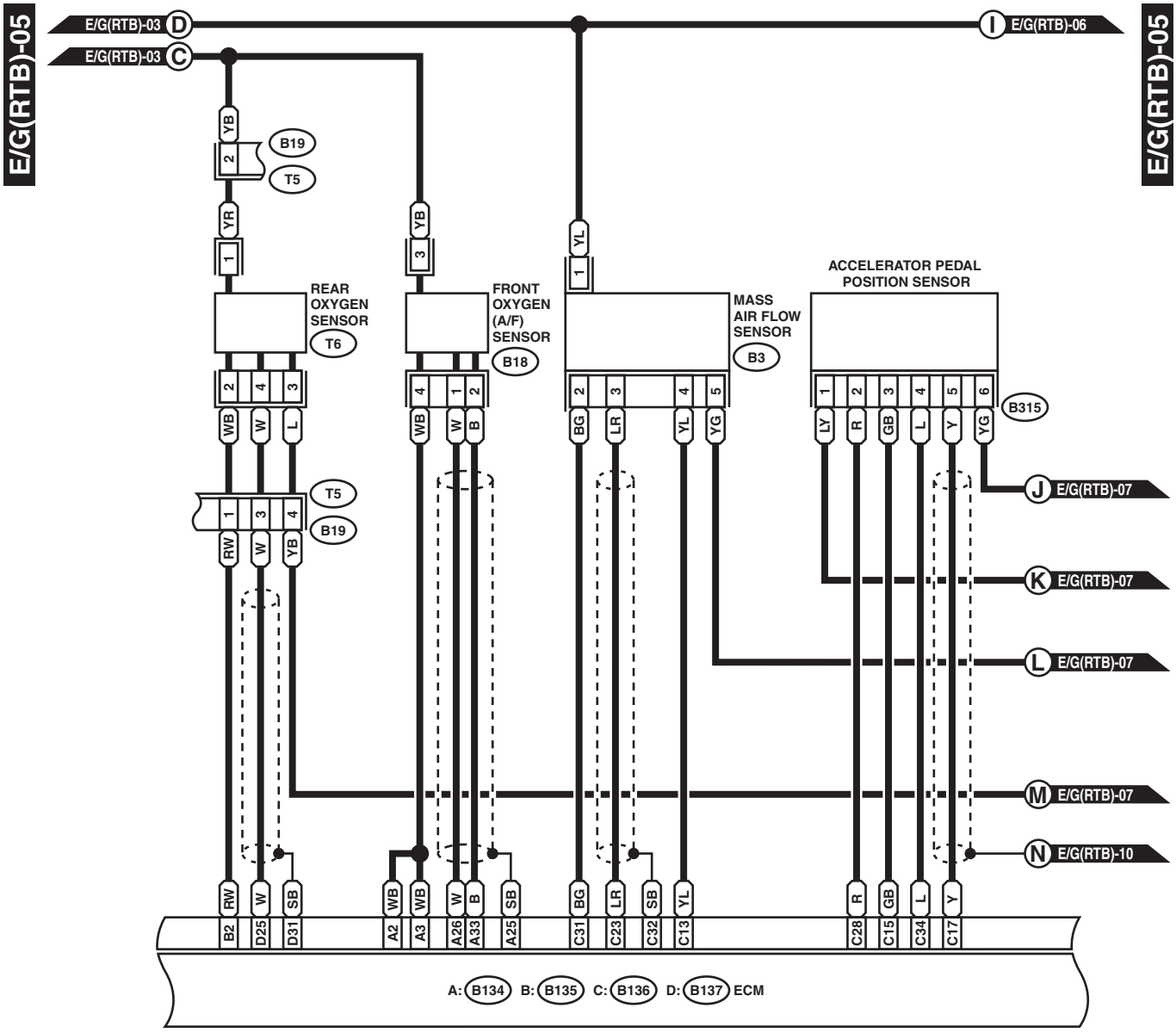
WI-04079

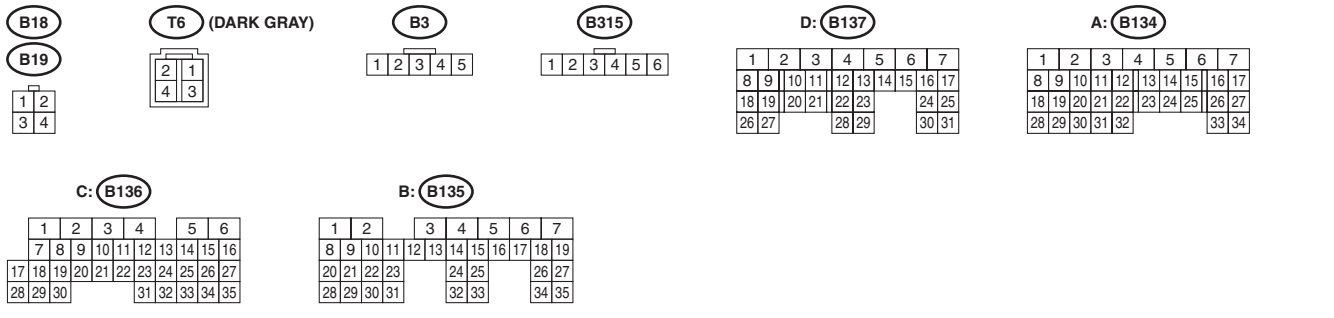

E/G(RTB)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
MB-27
M/B FUSE NO. 13
(B)
E/G(RTB)-01
E/G(RTB)-10
MAIN
RELAY
B47
STARTER
RELAY
B225
STARTER MOTOR
BATTERY
B14
ELECTRIC
THROTTLE
RELAY
B362
E/G(RTB)-05
E/G(RTB)-05
E/G(RTB)-04
B: B135 D: B137 ECM
B47
B362
D: B137
B: B135
B225

WI-04080

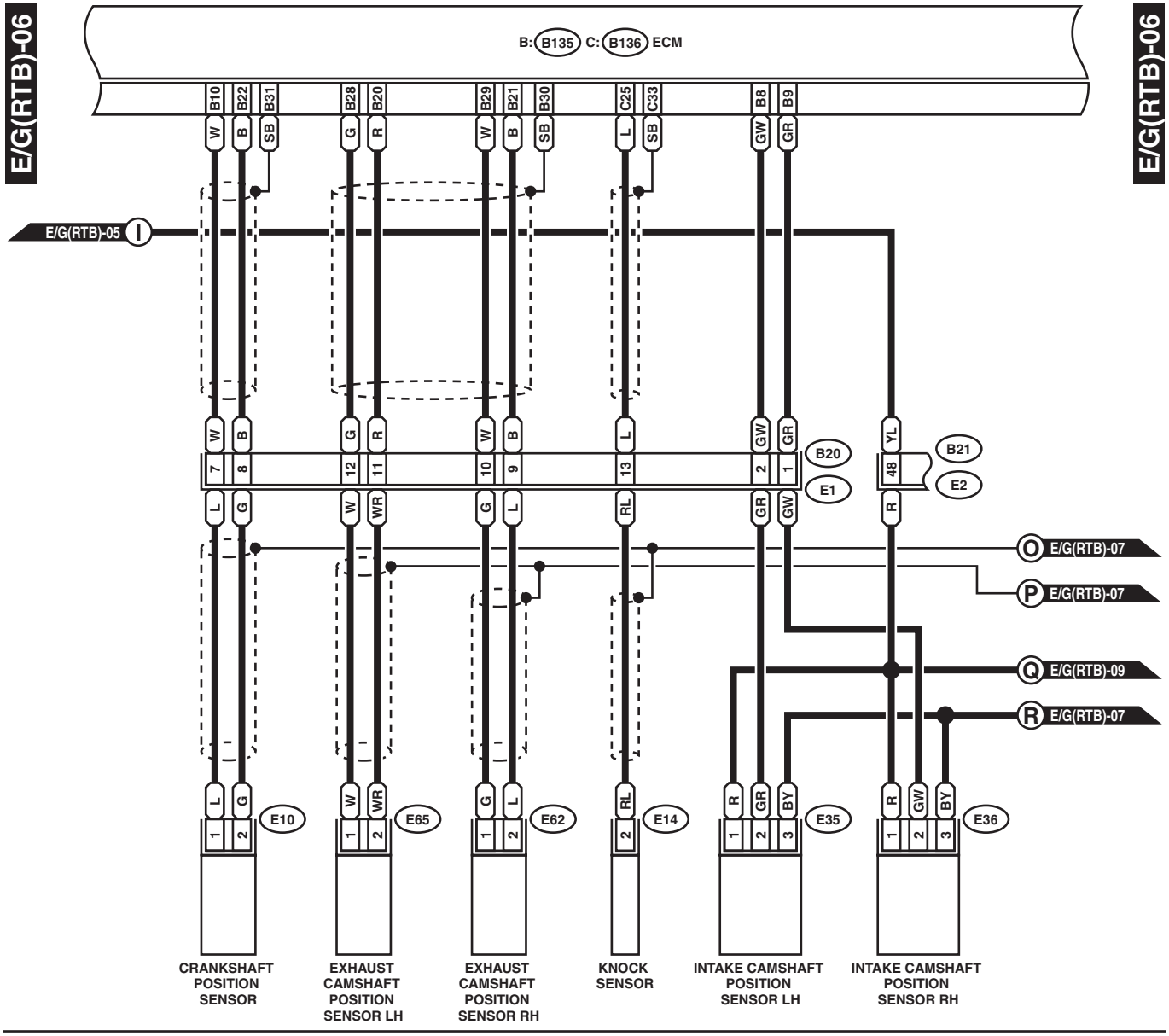

E/G(RTB)-04
E/G(RTB)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
GY
D: B137 ECM
D15
D24
D29
D20
P
PG
V
VR
F E/G(RTB)-10
E/G(RTB)-03 E
G E/G(RTB)-10
H E/G(RTB)-10
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
P
1
B75
TEST MODE CONNECTOR
L
1
B76
L
1
B368
TEST MODE SUB CONNECTOR
BL
1
B369
PG
B125
CLEAR MEMORY CONNECTOR
BL
B126
W V VR LgR GW BL BL
1 6 10 5 4 12 13
B40
DATA LINK CONNECTOR
B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
D: B137

WI-04081


E/G(RTB)-05
E/G(RTB)-03 D
E/G(RTB)-03 C
I E/G(RTB)-06
E/G(RTB)-05
B19
T5
REAR OXYGEN SENSOR
T6
FRONT OXYGEN (A/F) SENSOR
B18
MASS AIR FLOW SENSOR
B3
ACCELERATOR PEDAL POSITION SENSOR
B315
J E/G(RTB)-07
K E/G(RTB)-07
L E/G(RTB)-07
M E/G(RTB)-07
N E/G(RTB)-10
A: B134 B: B135 C: B136 D: B137 ECM


B18
B19
T6 (DARK GRAY)
B3
B315
D: B137
A: B134
C: B136
B: B135

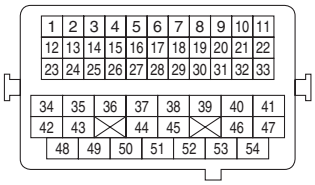
WI-04082



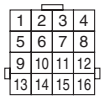
E10 (LIGHT GRAY)
E14 (BROWN)
E62 (LIGHT GRAY)
E65 (LIGHT GRAY)

E35 (LIGHT GRAY)
E36 (LIGHT GRAY)

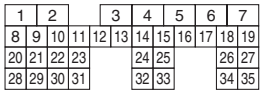
B21 (BLACK)



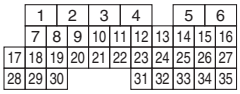
B20



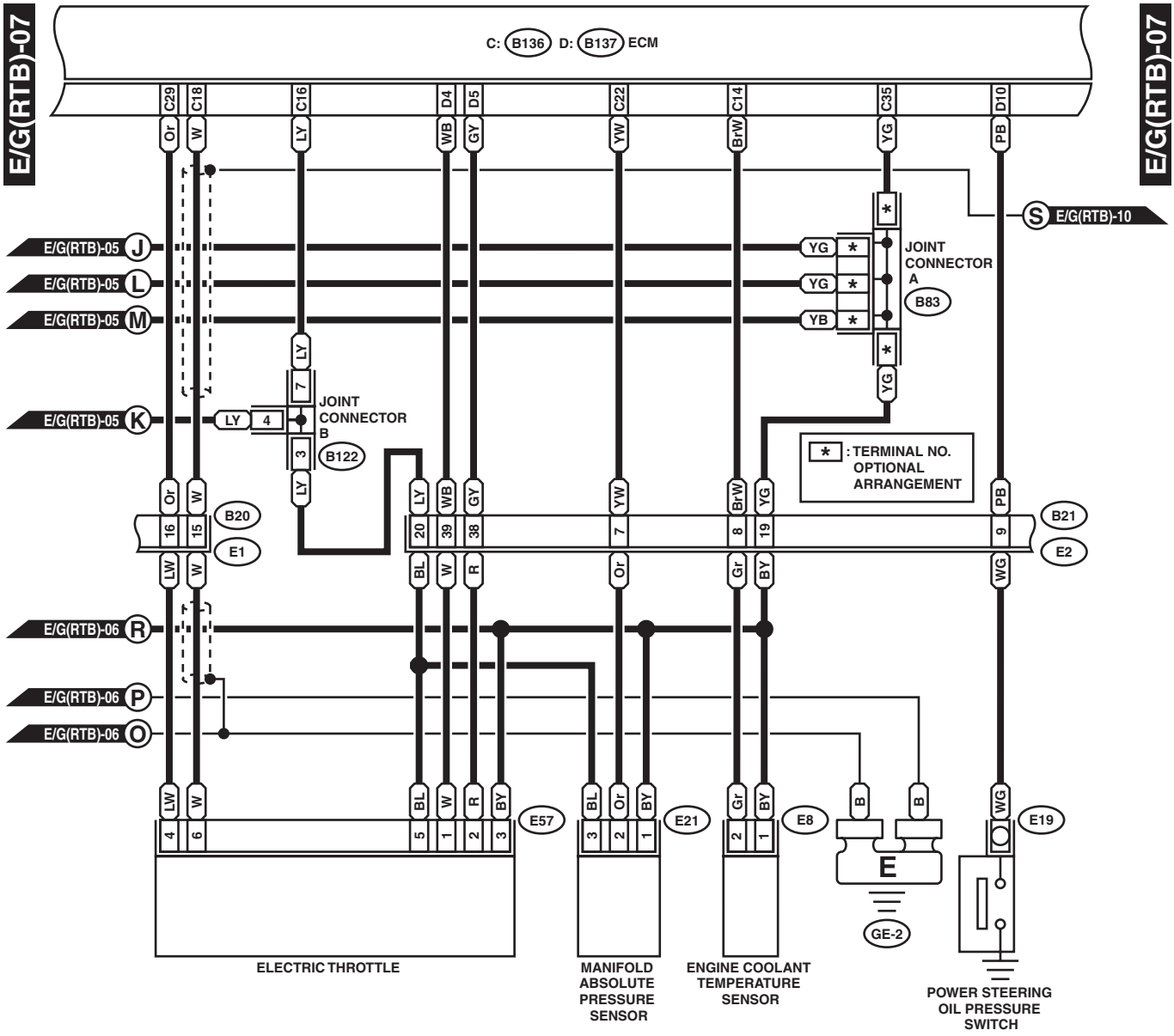
B: B135

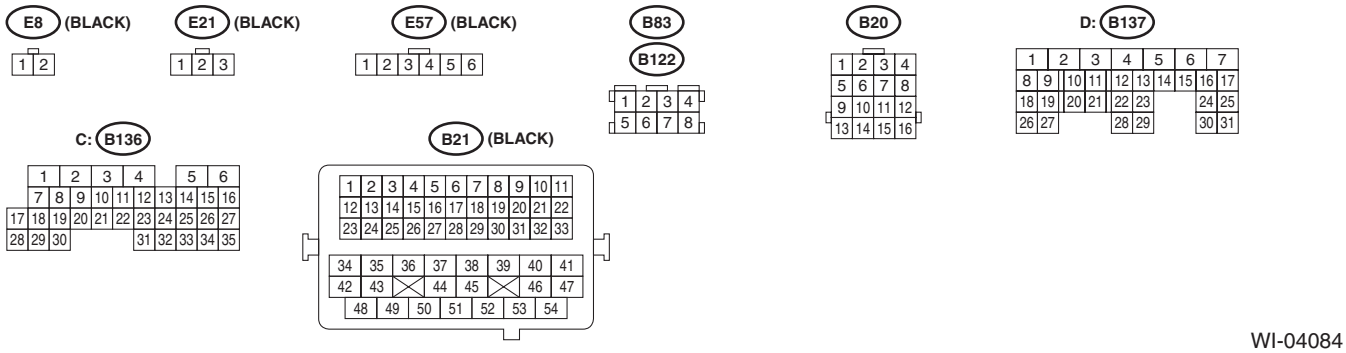


C: B136

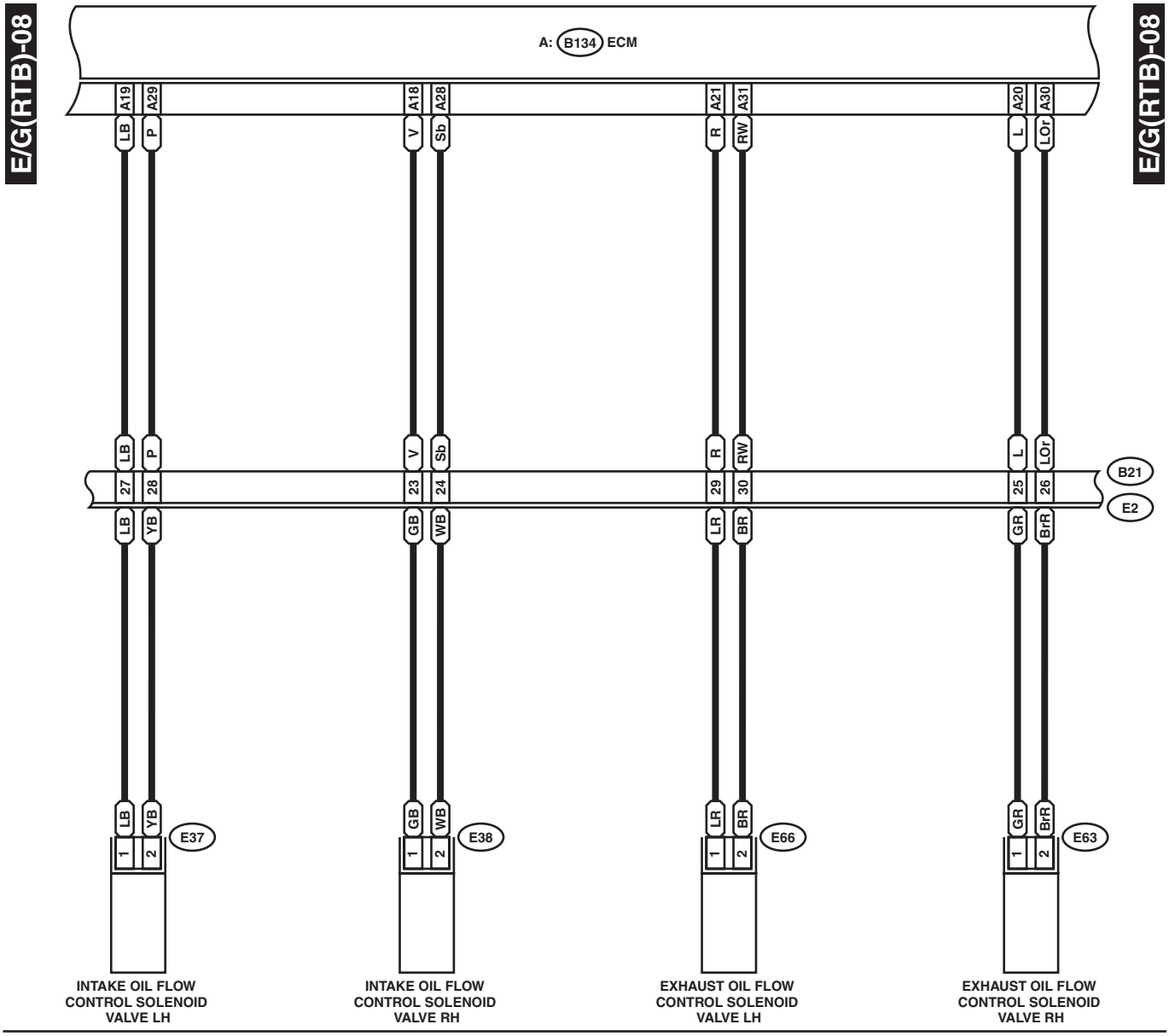


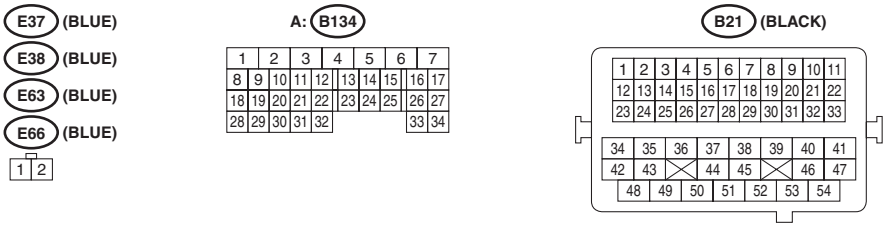
WI-04083


E/G(RTB)-07
E/G(RTB)-07
C: B136 D: B137 ECM
C29
C18
C16
D4
D5
C22
C14
C35
D10
Or
W
LY
WB
GY
YW
BrW
YG
PB
S E/G(RTB)-10
E/G(RTB)-05 J
E/G(RTB)-05 L
E/G(RTB)-05 M
E/G(RTB)-05 K
E/G(RTB)-06 R
E/G(RTB)-06 P
E/G(RTB)-06 O
JOINT CONNECTOR A
B83
JOINT CONNECTOR B
B122
: TERMINAL NO. OPTIONAL ARRANGEMENT
B20
E1
B21
E2
LW
BL
R
BY
Gr
B
WG
E57
E21
E8
E19
E
GE-2
ELECTRIC THROTTLE
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
POWER STEERING OIL PRESSURE SWITCH


E8 (BLACK)
E21 (BLACK)
E57 (BLACK)
B83
B122
B20
D: B137
C: B136
B21 (BLACK)

WI-04084

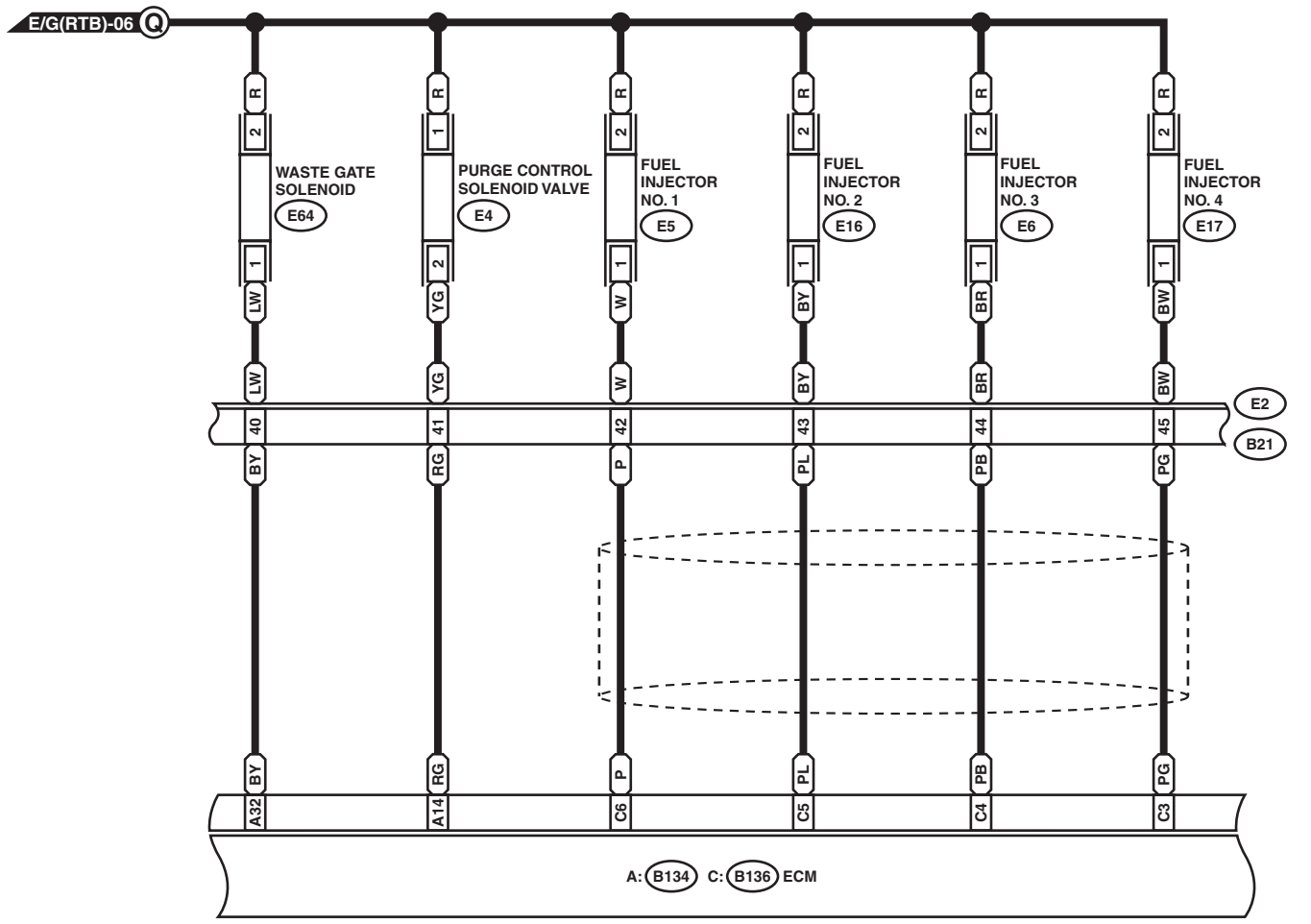

E/G(RTB)-08
E/G(RTB)-08
A: B134 ECM
A19
A29
A18
A28
A21
A31
A20
A30
LB
P
V
Sb
R
RW
L
LOr
27
28
23
24
29
30
25
26
B21
E2
LB
YB
GB
WB
LR
BR
GR
BrR
E37
E38
E66
E63
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH

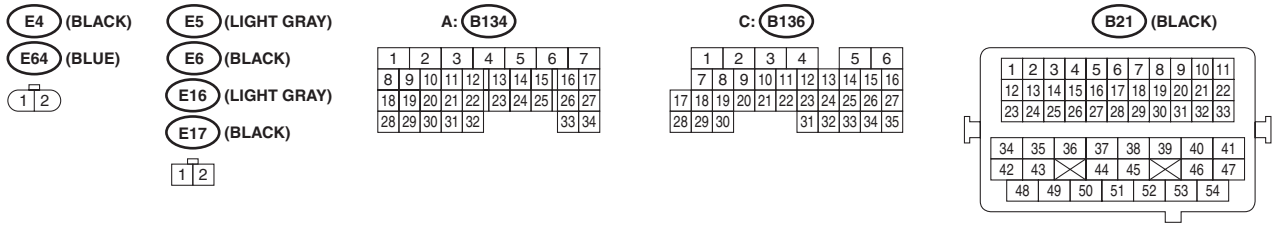

E37 (BLUE)
E38 (BLUE)
E63 (BLUE)
E66 (BLUE)
A: B134
B21 (BLACK)

WI-04085

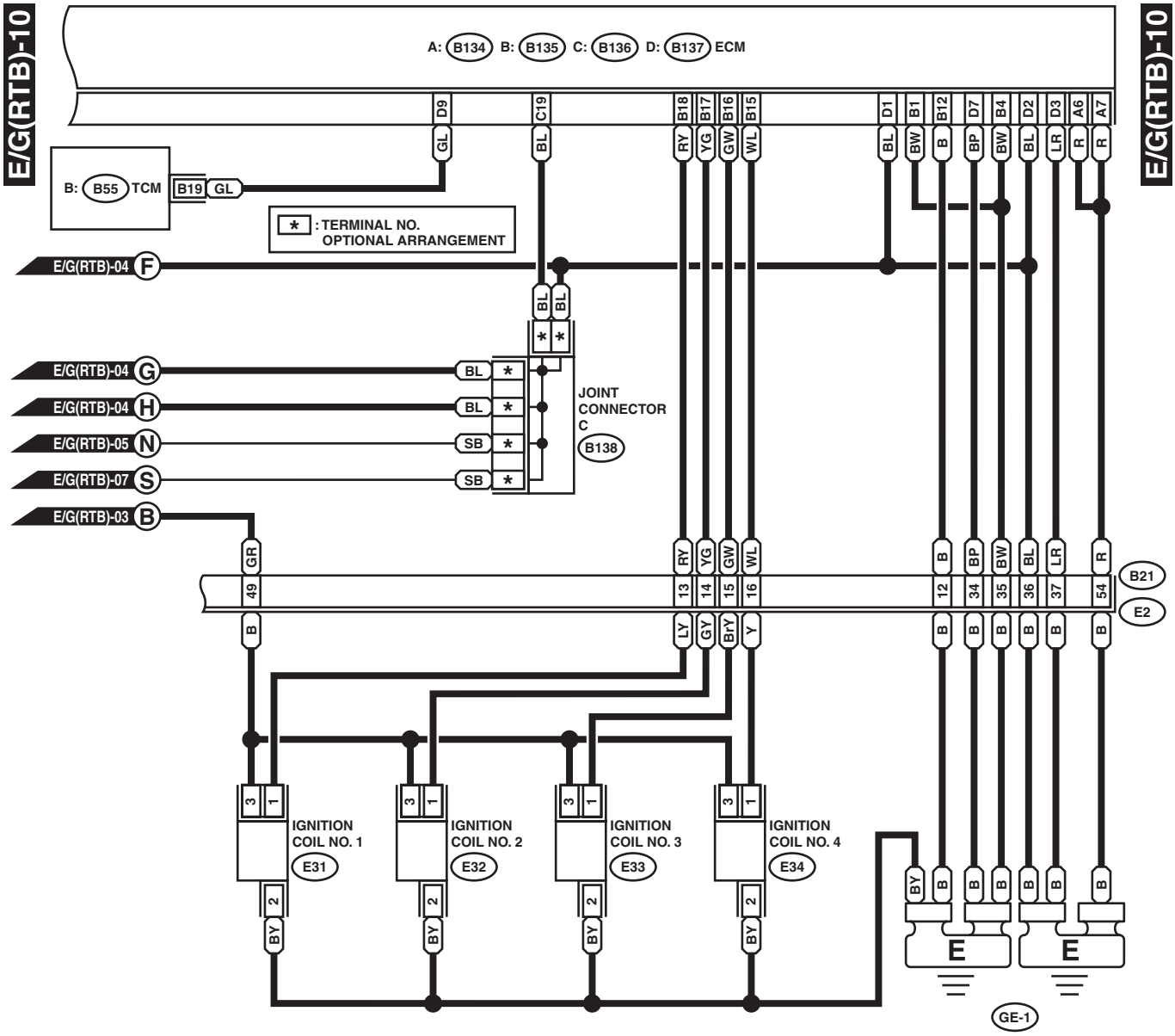
E/G(RTB)-09

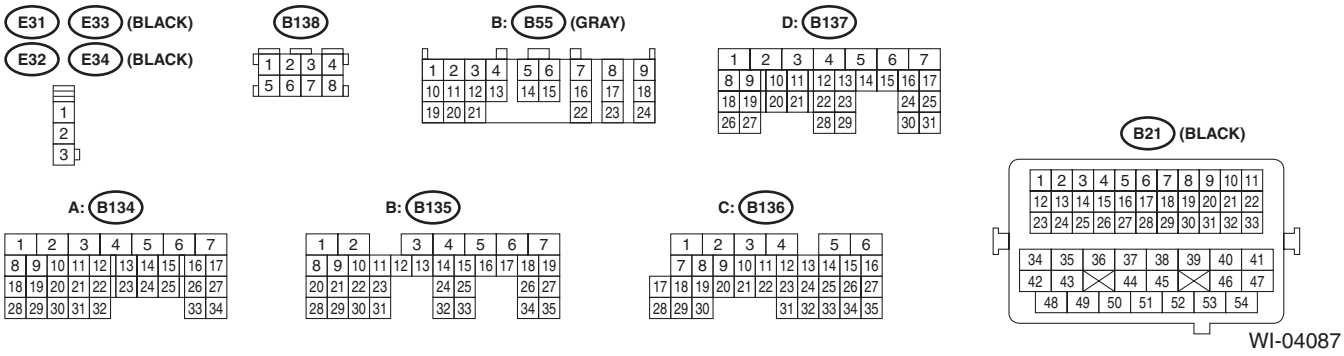
E/G(RTB)-09





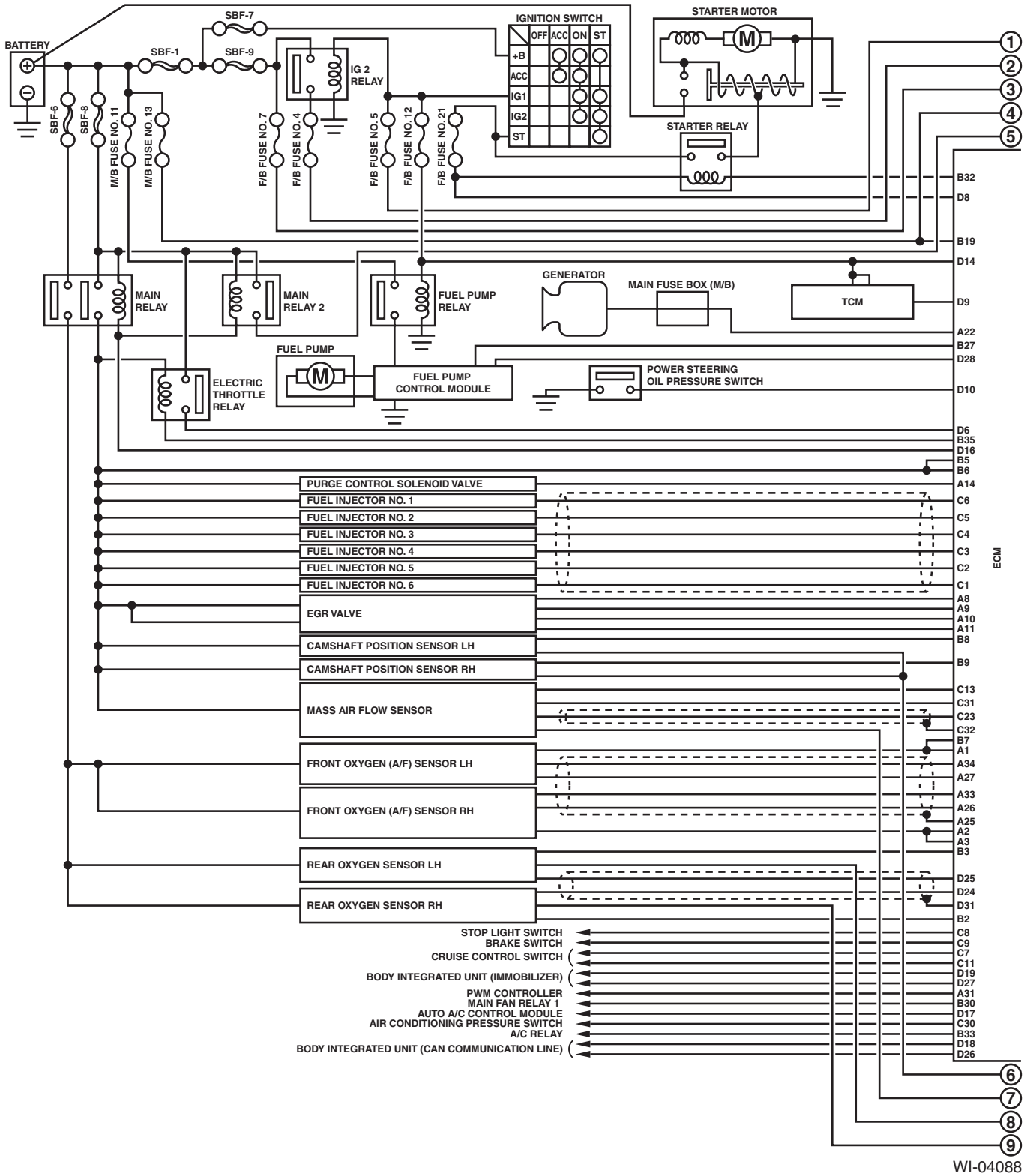
WI-04086


E/G(RTB)-10
A: B134 B: B135 C: B136 D: B137 ECM
D9 C19 B18 B17 B16 B15 D1 B1 B12 D7 B4 D2 D3 A6 A7
GL BL RY YG GW WL BL BW B BP BW BL LR R R
B: B55 TCM B19 GL
* : TERMINAL NO.
OPTIONAL ARRANGEMENT
E/G(RTB)-04 F
E/G(RTB)-04 G
E/G(RTB)-04 H
E/G(RTB)-05 N
E/G(RTB)-07 S
E/G(RTB)-03 B
JOINT CONNECTOR C
B138
GR 49 13 14 15 16 12 34 35 36 37 54
B21
E2
B LY GY BrY Y B B B B B B
IGNITION COIL NO. 1
E31
IGNITION COIL NO. 2
E32
IGNITION COIL NO. 3
E33
IGNITION COIL NO. 4
E34
BY
E
GE-1

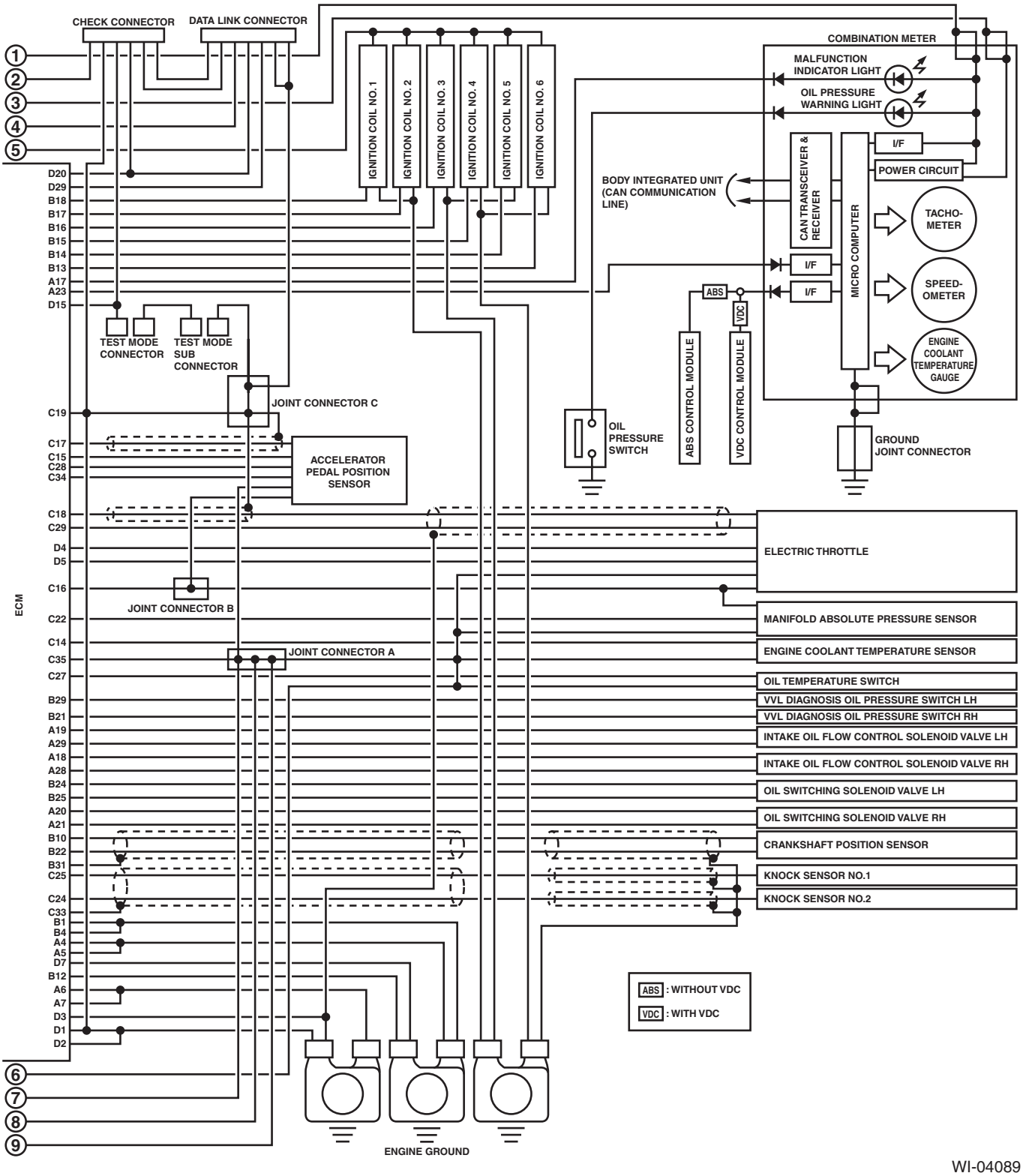

E31 E33 (BLACK)
E32 E34 (BLACK)
B138
B: B55 (GRAY)
D: B137
B21 (BLACK)
A: B134
B: B135
C: B136

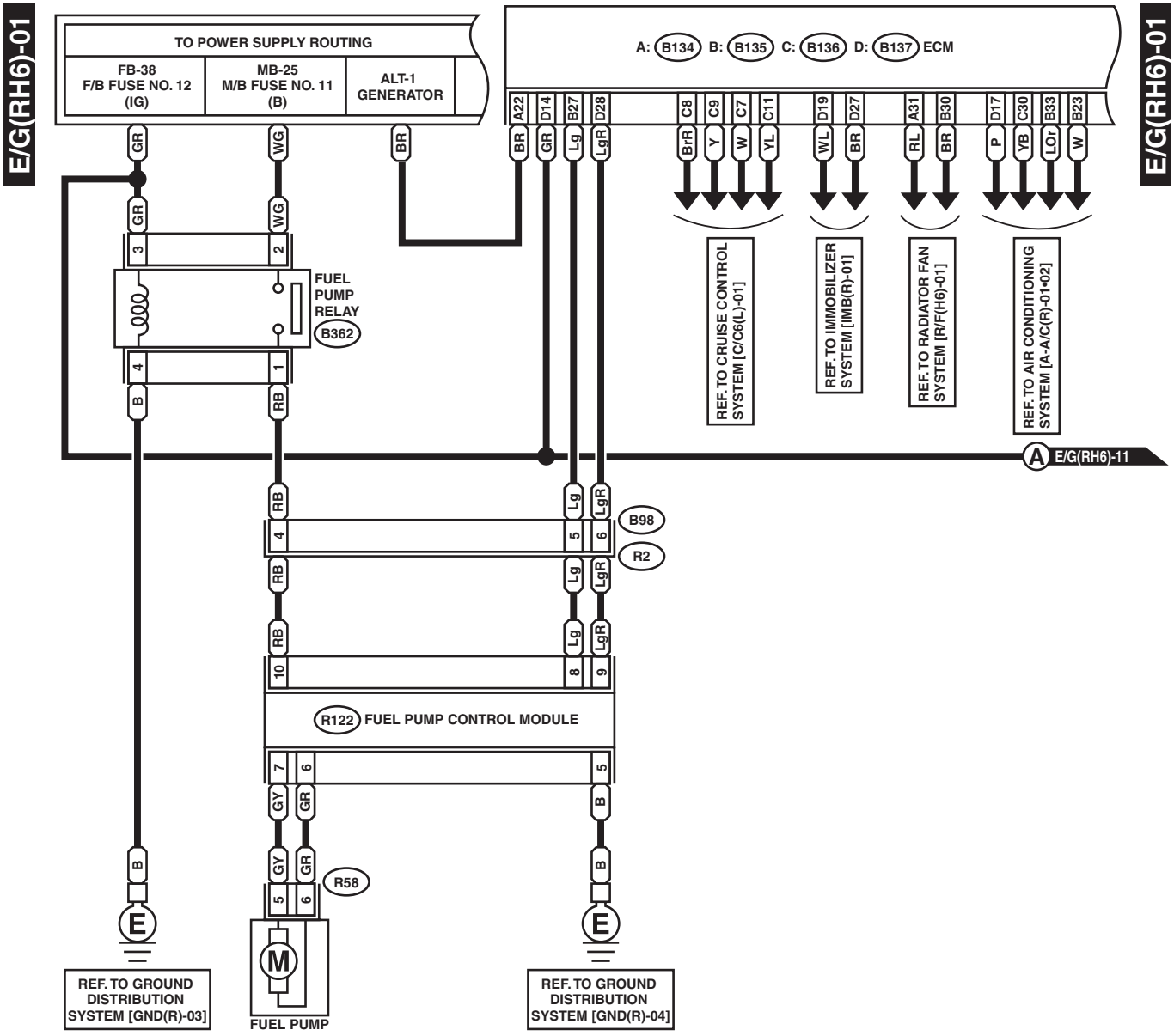
WI-04087

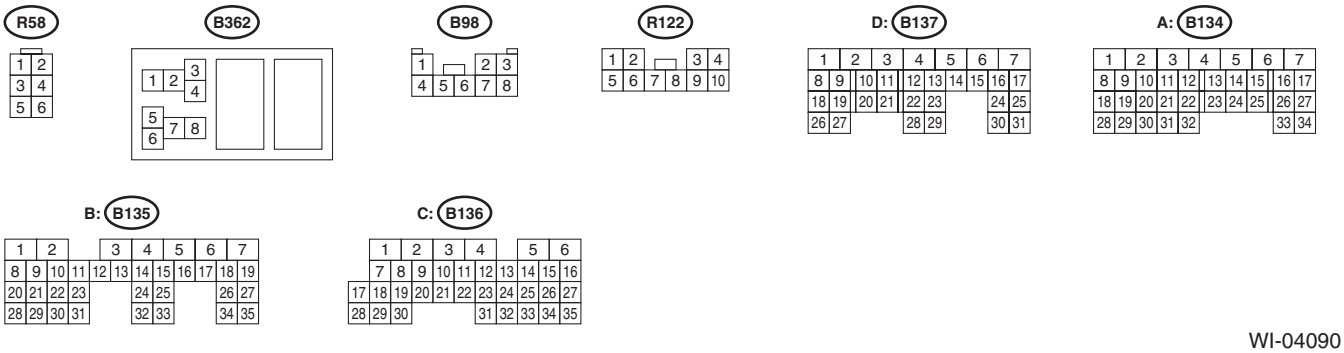
7. RHD 3.0 L MODEL



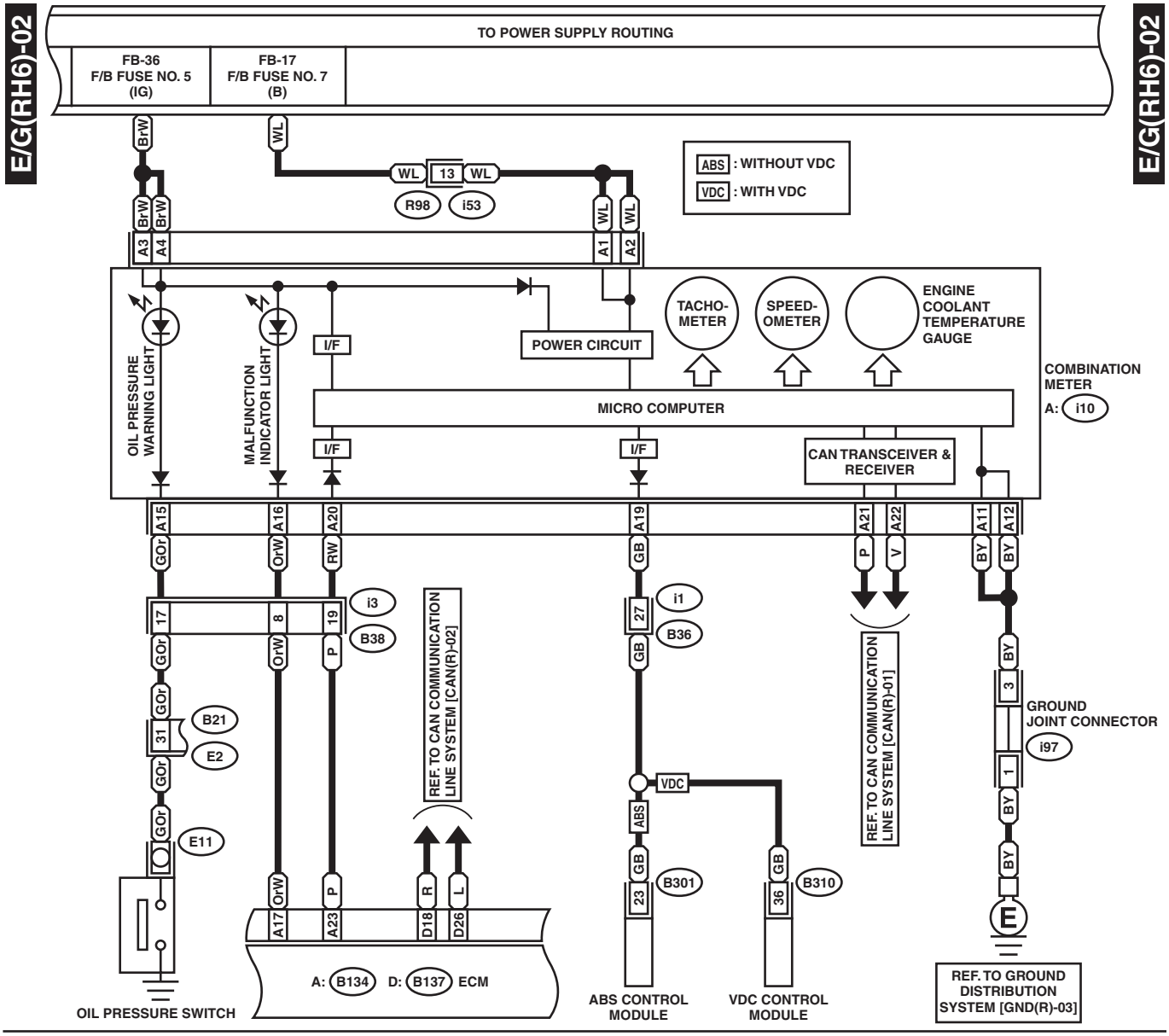
WI-04088

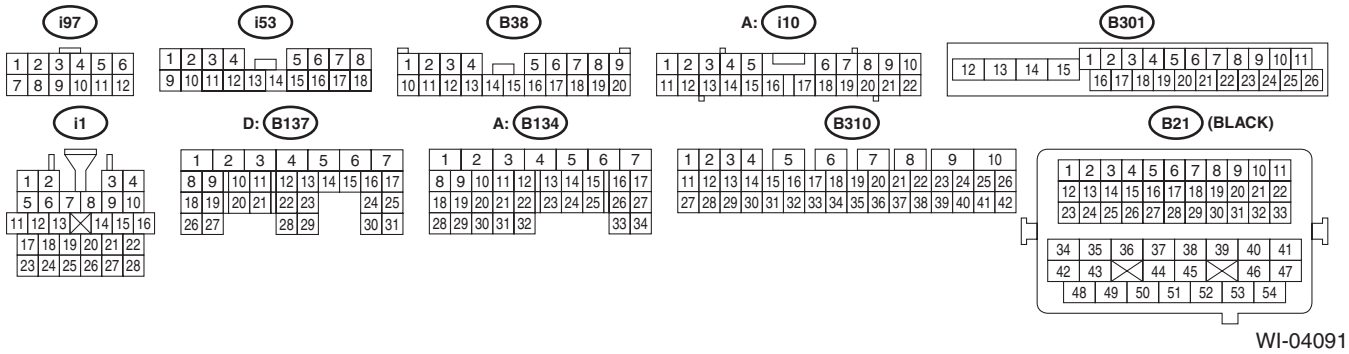

CHECK CONNECTOR
DATA LINK CONNECTOR
IGNITION COIL NO. 1
IGNITION COIL NO. 2
IGNITION COIL NO. 3
IGNITION COIL NO. 4
IGNITION COIL NO. 5
IGNITION COIL NO. 6
COMBINATION METER
MALFUNCTION INDICATOR LIGHT
OIL PRESSURE WARNING LIGHT
I/F
POWER CIRCUIT
BODY INTEGRATED UNIT (CAN COMMUNICATION LINE)
CAN TRANSCEIVER & RECEIVER
MICRO COMPUTER
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
ABS
VDC
ABS CONTROL MODULE
VDC CONTROL MODULE
OIL PRESSURE SWITCH
GROUND JOINT CONNECTOR
TEST MODE CONNECTOR
TEST MODE SUB CONNECTOR
JOINT CONNECTOR C
ACCELERATOR PEDAL POSITION SENSOR
JOINT CONNECTOR B
JOINT CONNECTOR A
ECM
ELECTRIC THROTTLE
MANIFOLD ABSOLUTE PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
OIL TEMPERATURE SWITCH
VVL DIAGNOSIS OIL PRESSURE SWITCH LH
VVL DIAGNOSIS OIL PRESSURE SWITCH RH
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR NO.1
KNOCK SENSOR NO.2
ABS : WITHOUT VDC
VDC : WITH VDC
ENGINE GROUND
WI-04089


E/G(RH6)-01
TO POWER SUPPLY ROUTING
FB-38 F/B FUSE NO. 12 (IG)
MB-25 M/B FUSE NO. 11 (B)
ALT-1 GENERATOR
A: B134 B: B135 C: B136 D: B137 ECM
A22 D14 B27 D28 C8 C9 C7 C11 D19 D27 A31 B30 D17 C30 B33 B23
GR WG BR BR GR Lg LgR BrR Y W YL WL BR RL BR P YB LOr W
REF. TO CRUISE CONTROL SYSTEM [C/C6(L)-01]
REF. TO IMMOBILIZER SYSTEM [IMB(R)-01]
REF. TO RADIATOR FAN SYSTEM [R/F(H6)-01]
REF. TO AIR CONDITIONING SYSTEM [A-A/C(R)-01•02]
FUEL PUMP RELAY
B362
A E/G(RH6)-11
B98
R2
R122 FUEL PUMP CONTROL MODULE
R58
M
FUEL PUMP
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
E/G(RH6)-01

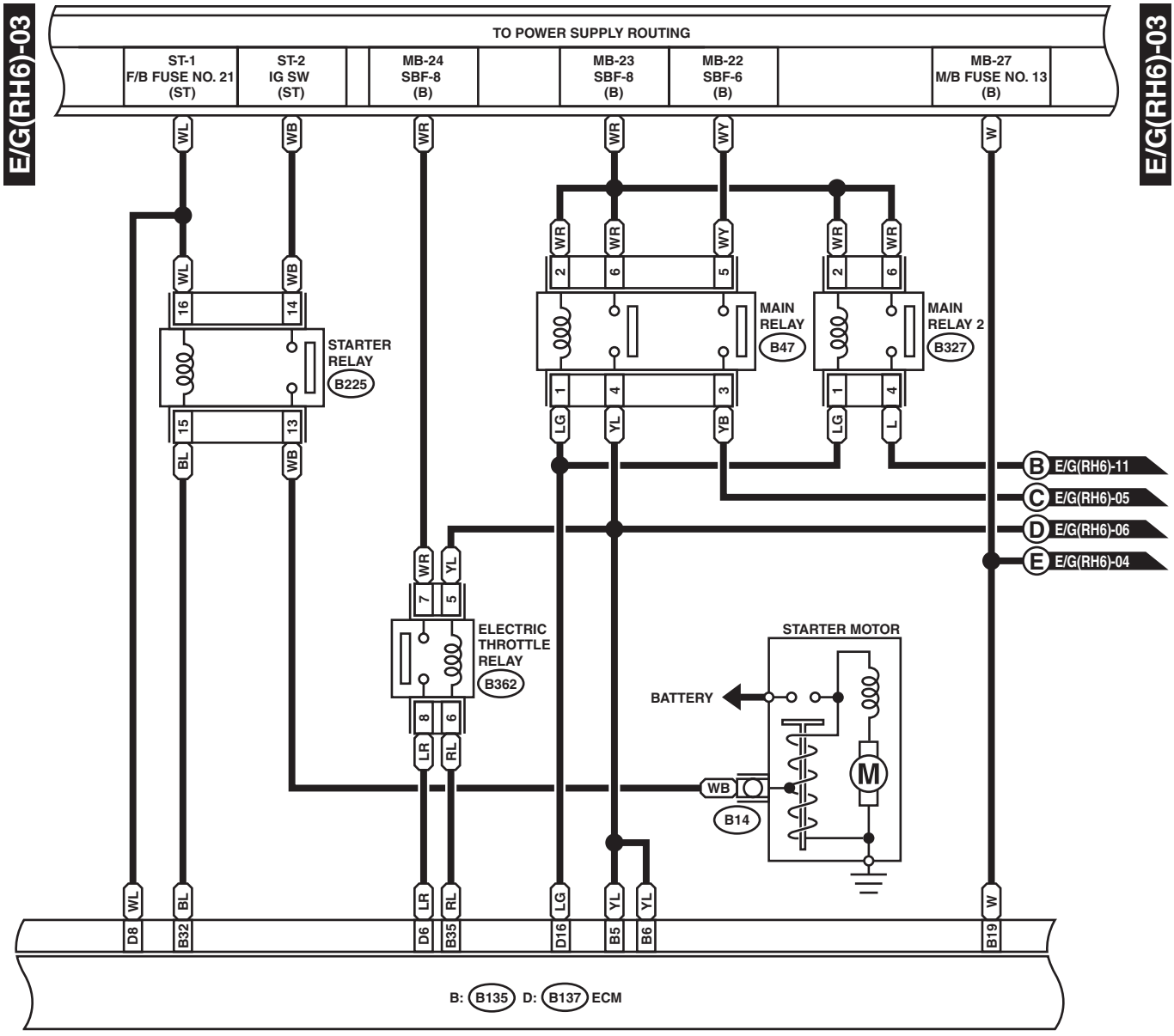

R58
B362
B98
R122
D: B137
A: B134
B: B135
C: B136

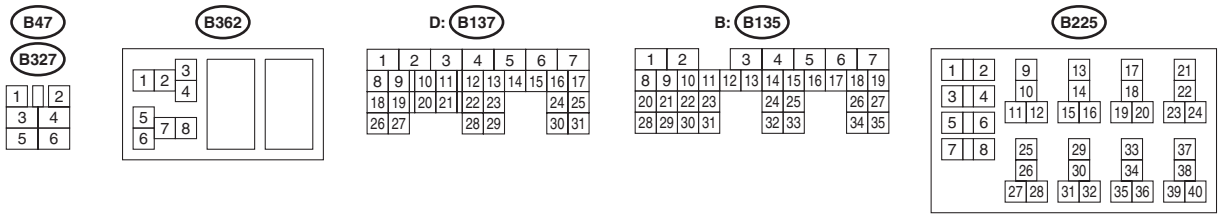
WI-04090


E/G(RH6)-02
E/G(RH6)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
FB-17
F/B FUSE NO. 7
(B)
ABS : WITHOUT VDC
VDC : WITH VDC
R98
i53
13
TACHO-METER
SPEED-OMETER
ENGINE COOLANT TEMPERATURE GAUGE
COMBINATION METER
A: i10
OIL PRESSURE WARNING LIGHT
MALFUNCTION INDICATOR LIGHT
I/F
POWER CIRCUIT
MICRO COMPUTER
CAN TRANSCEIVER & RECEIVER
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-02]
REF. TO CAN COMMUNICATION LINE SYSTEM [CAN(R)-01]
GROUND JOINT CONNECTOR
i97
i3
B38
i1
B36
B21
E2
E11
VDC
ABS
B301
B310
A: B134
D: B137
ECM
OIL PRESSURE SWITCH
ABS CONTROL MODULE
VDC CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]

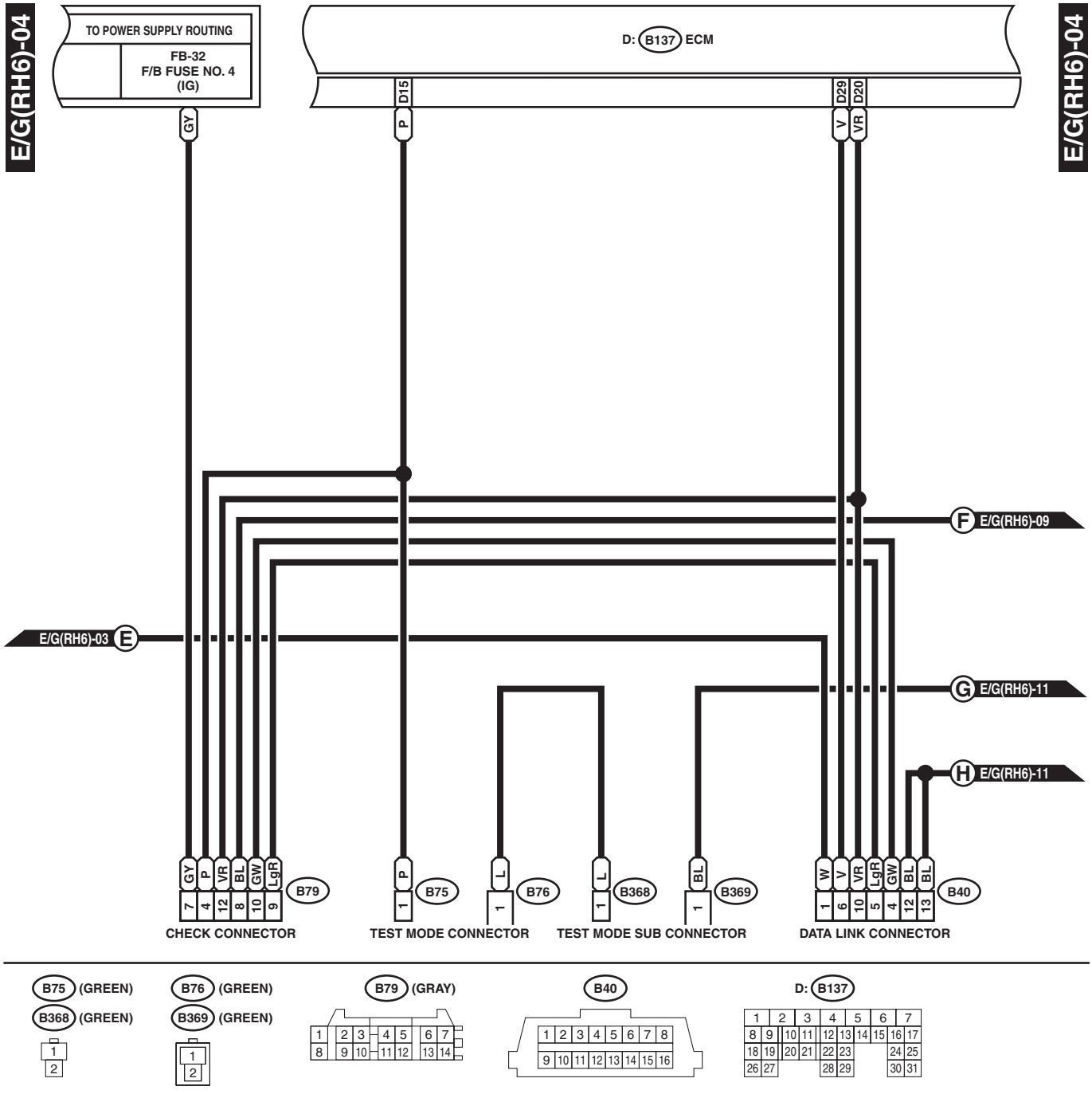

i97
i53
B38
A: i10
B301
i1
D: B137
A: B134
B310
B21 (BLACK)

WI-04091

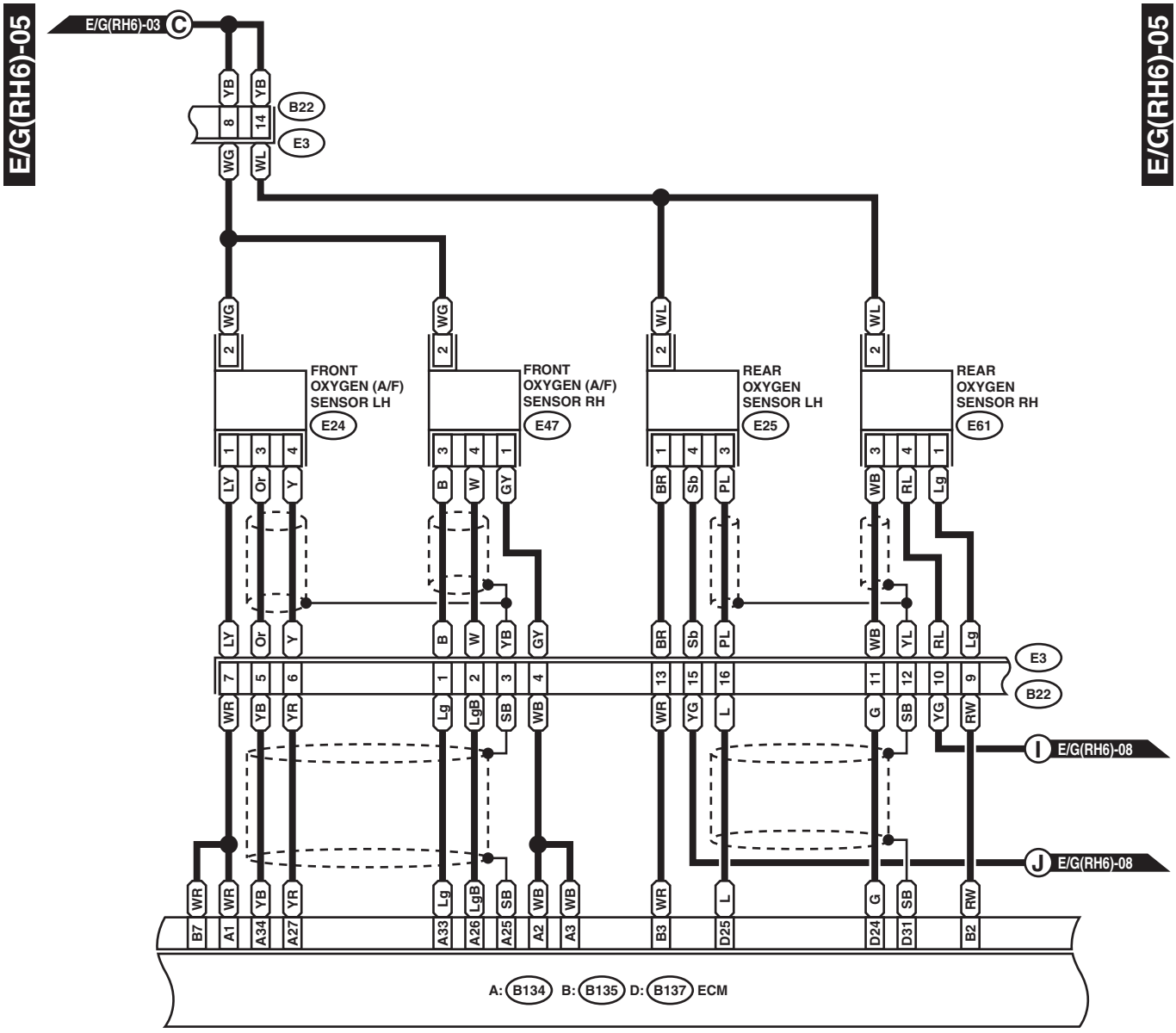

E/G(RH6)-03
E/G(RH6)-03
TO POWER SUPPLY ROUTING
ST-1
F/B FUSE NO. 21
(ST)
ST-2
IG SW
(ST)
MB-24
SBF-8
(B)
MB-23
SBF-8
(B)
MB-22
SBF-6
(B)
MB-27
M/B FUSE NO. 13
(B)
STARTER
RELAY
B225
MAIN
RELAY
B47
MAIN
RELAY 2
B327
ELECTRIC
THROTTLE
RELAY
B362
STARTER MOTOR
BATTERY
B14
B E/G(RH6)-11
C E/G(RH6)-05
D E/G(RH6)-06
E E/G(RH6)-04
B: B135 D: B137 ECM


B47
B327
B362
D: B137
B: B135
B225

WI-04092

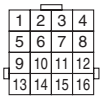

E/G(RH6)-04
TO POWER SUPPLY ROUTING
FB-32
F/B FUSE NO. 4
(IG)
GY
D: B137 ECM
D15
P
D29
V
D20
VR
E/G(RH6)-04
F E/G(RH6)-09
E/G(RH6)-03 E
G E/G(RH6)-11
H E/G(RH6)-11
GY P VR BL GW LgR
7 4 12 8 10 9
B79
CHECK CONNECTOR
P
1
B75
TEST MODE CONNECTOR
L
1
B76
L
1
B368
TEST MODE SUB CONNECTOR
BL
1
B369
W V VR LgR GW BL BL
1 6 10 5 4 12 13
B40
DATA LINK CONNECTOR
B75 (GREEN)
B368 (GREEN)
B76 (GREEN)
B369 (GREEN)
B79 (GRAY)
B40
D: B137

WI-04093

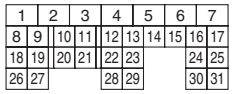


E24 (BLACK)
E25 (DARK GRAY)
E47 (BLACK)
E61 (DARK GRAY)

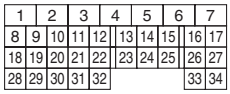
B22



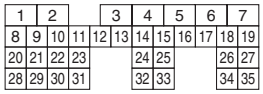
D: B137



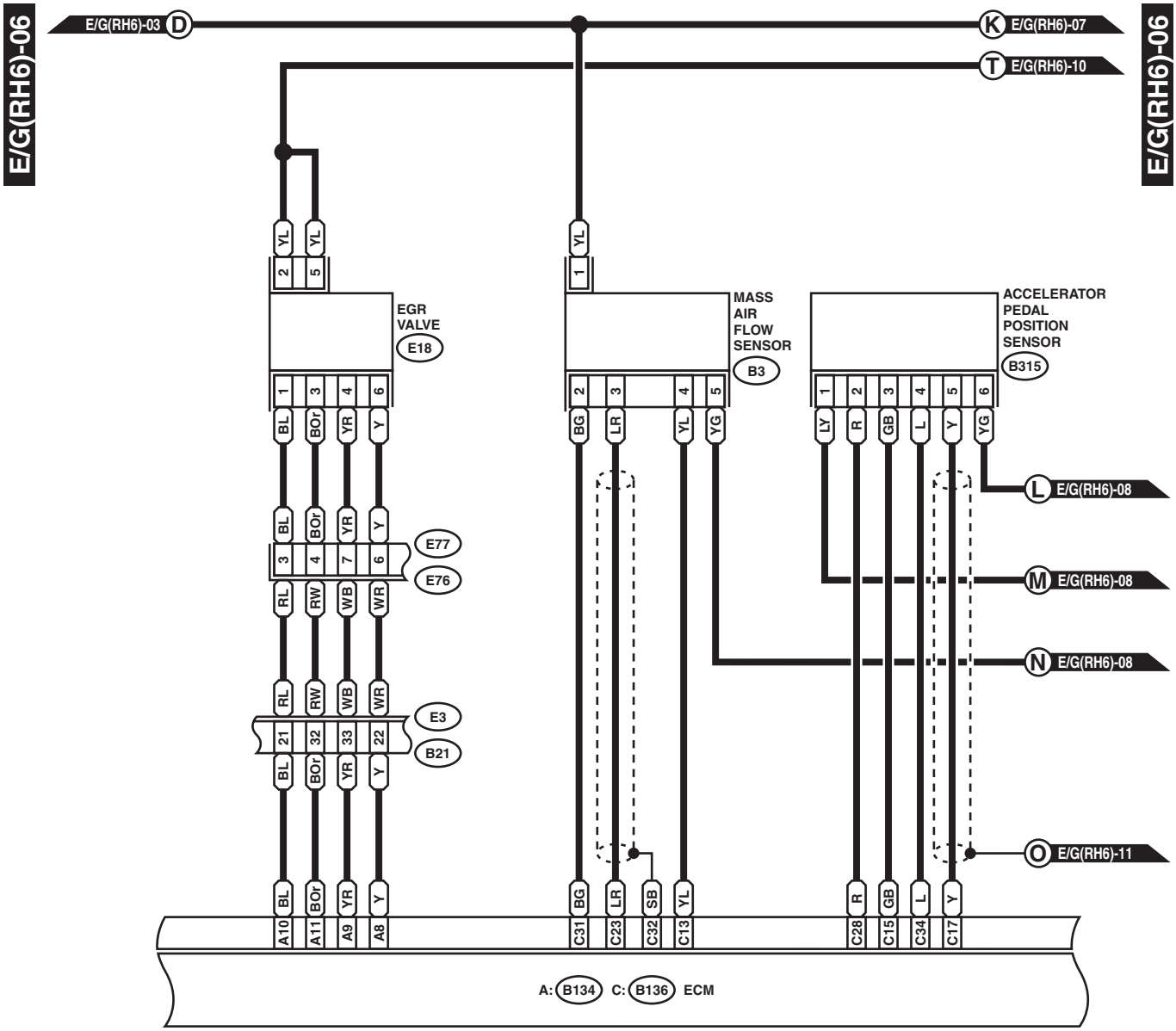
A: B134

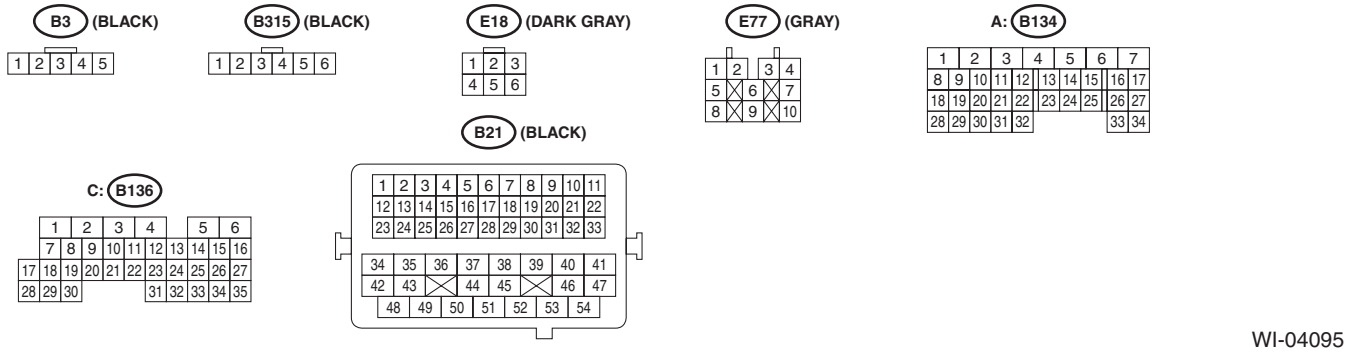


B: B135

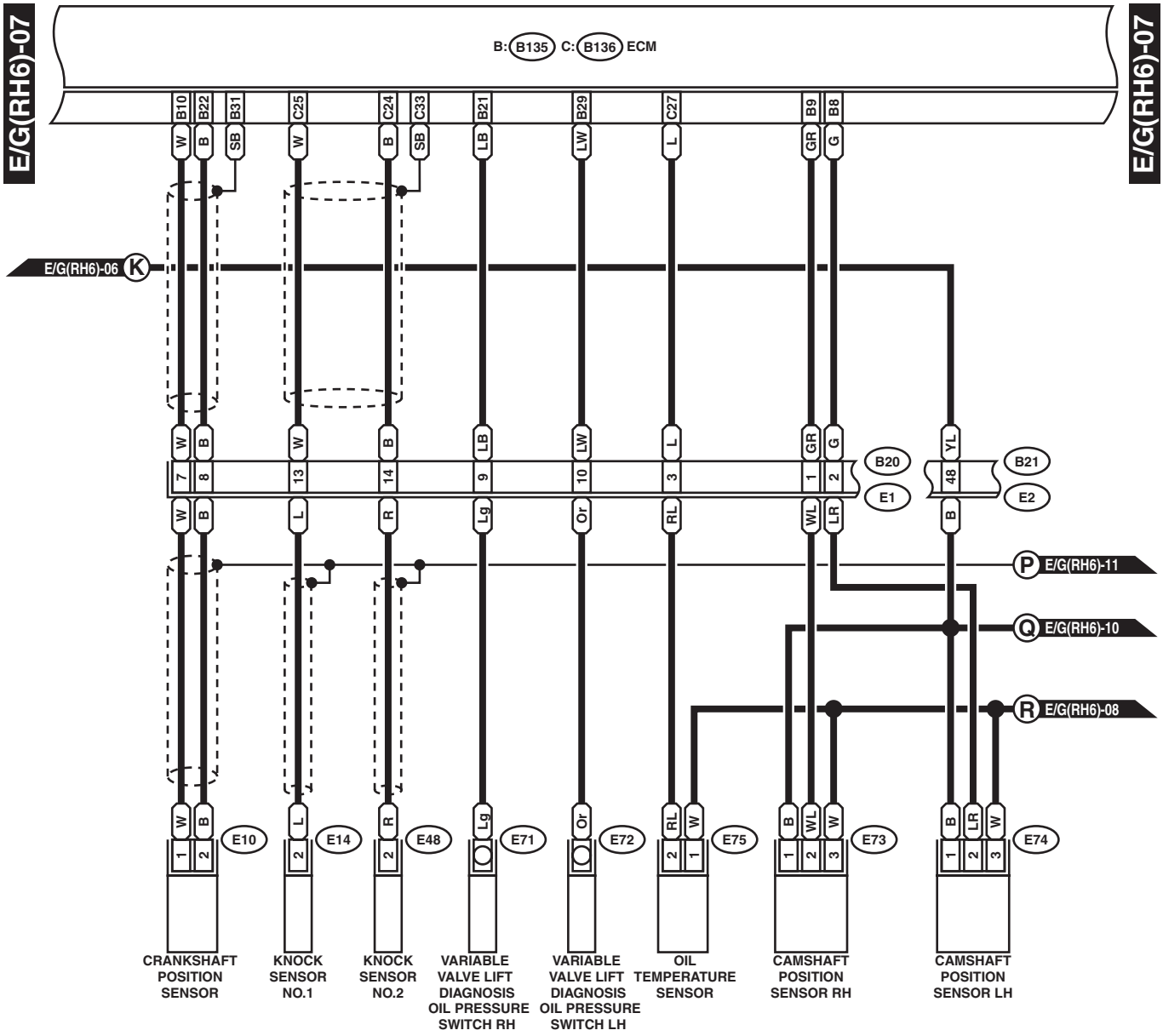


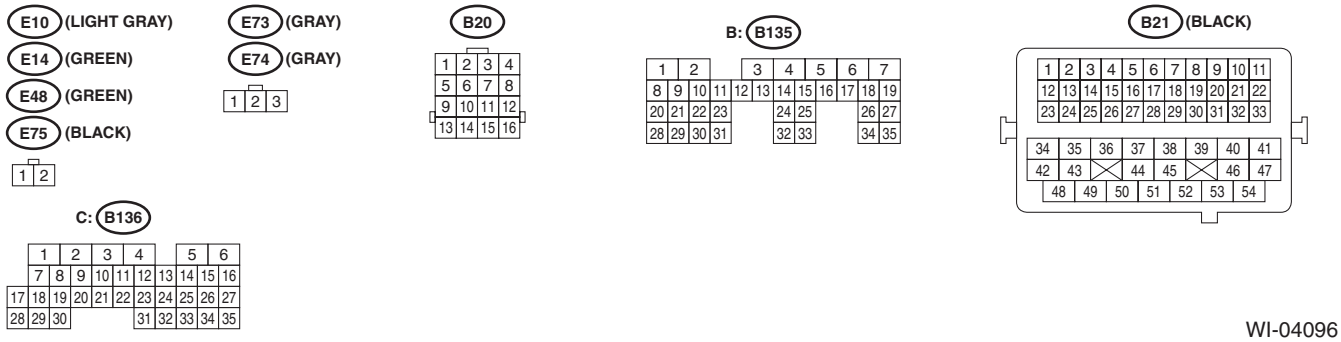
WI-04094


E/G(RH6)-06
E/G(RH6)-03 D
K E/G(RH6)-07
T E/G(RH6)-10
E/G(RH6)-06
EGR VALVE E18
MASS AIR FLOW SENSOR B3
ACCELERATOR PEDAL POSITION SENSOR B315
L E/G(RH6)-08
M E/G(RH6)-08
N E/G(RH6)-08
O E/G(RH6)-11
E77
E76
E3
B21
A: B134 C: B136 ECM

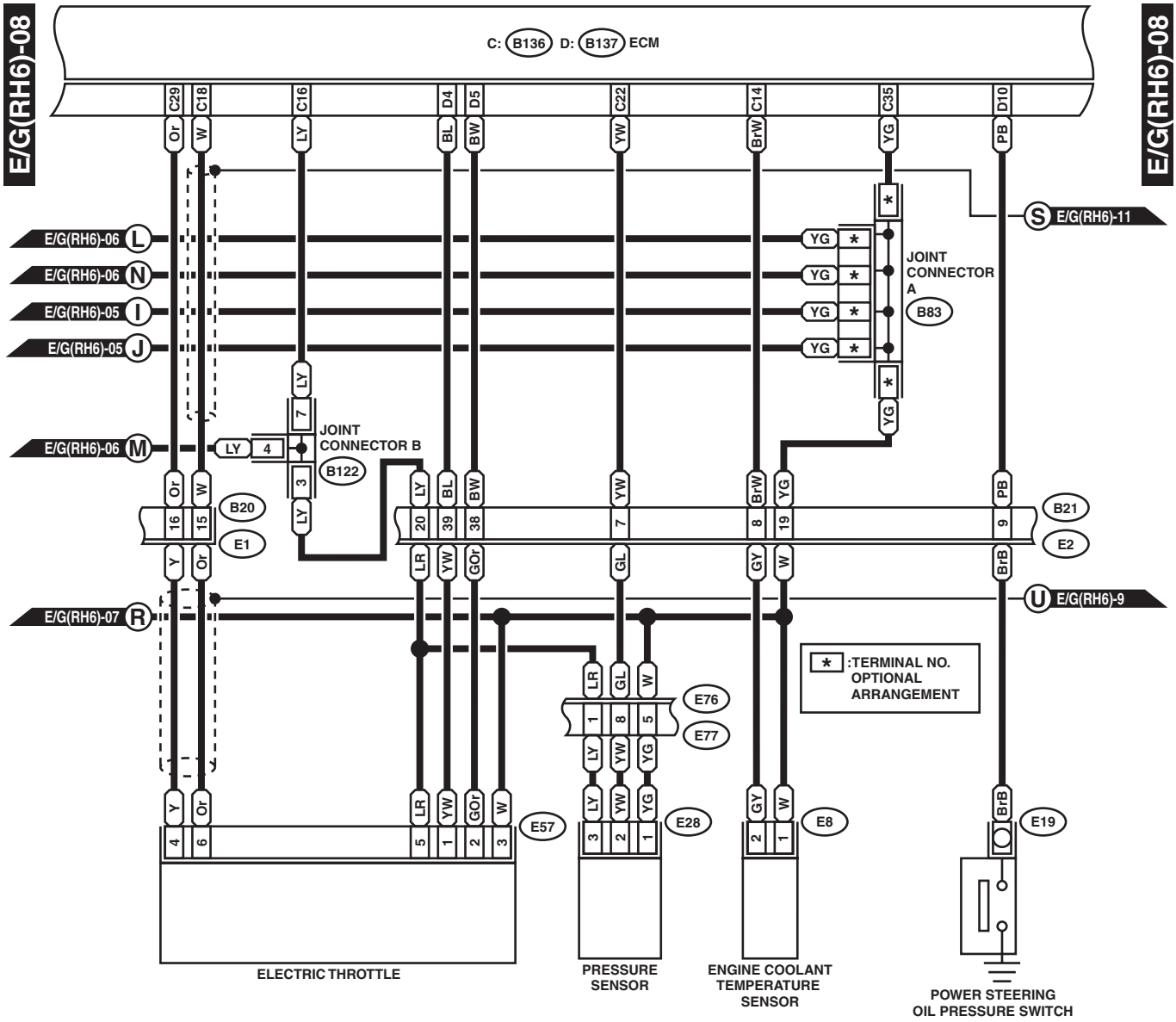

B3 (BLACK)
B315 (BLACK)
E18 (DARK GRAY)
E77 (GRAY)
A: B134
B21 (BLACK)
C: B136

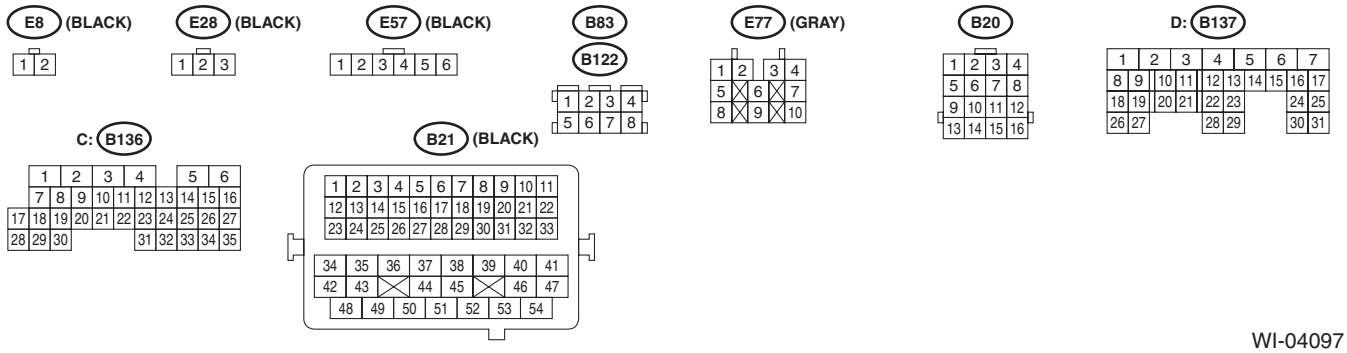
WI-04095


E/G(RH6)-07
E/G(RH6)-07
B: B135 C: B136 ECM
B10 B22 B31 C25 C24 C33 B21 B29 C27 B9 B8
W B SB W B SB LB LW L GR G
E/G(RH6)-06 K
W B W B LB LW L GR G YL
7 8 13 14 9 10 3 1 2 48
B20
E1
B21
E2
W B L R Lg Or RL WL LR B
P E/G(RH6)-11
Q E/G(RH6)-10
R E/G(RH6)-08
W B L R Lg Or RL W B WL W B LR W
1 2 2 2 2 2 1 1 2 3 1 2 3
E10 E14 E48 E71 E72 E75 E73 E74
CRANKSHAFT POSITION SENSOR
KNOCK SENSOR NO.1
KNOCK SENSOR NO.2
VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH RH
VARIABLE VALVE LIFT DIAGNOSIS OIL PRESSURE SWITCH LH
OIL TEMPERATURE SENSOR
CAMSHAFT POSITION SENSOR RH
CAMSHAFT POSITION SENSOR LH

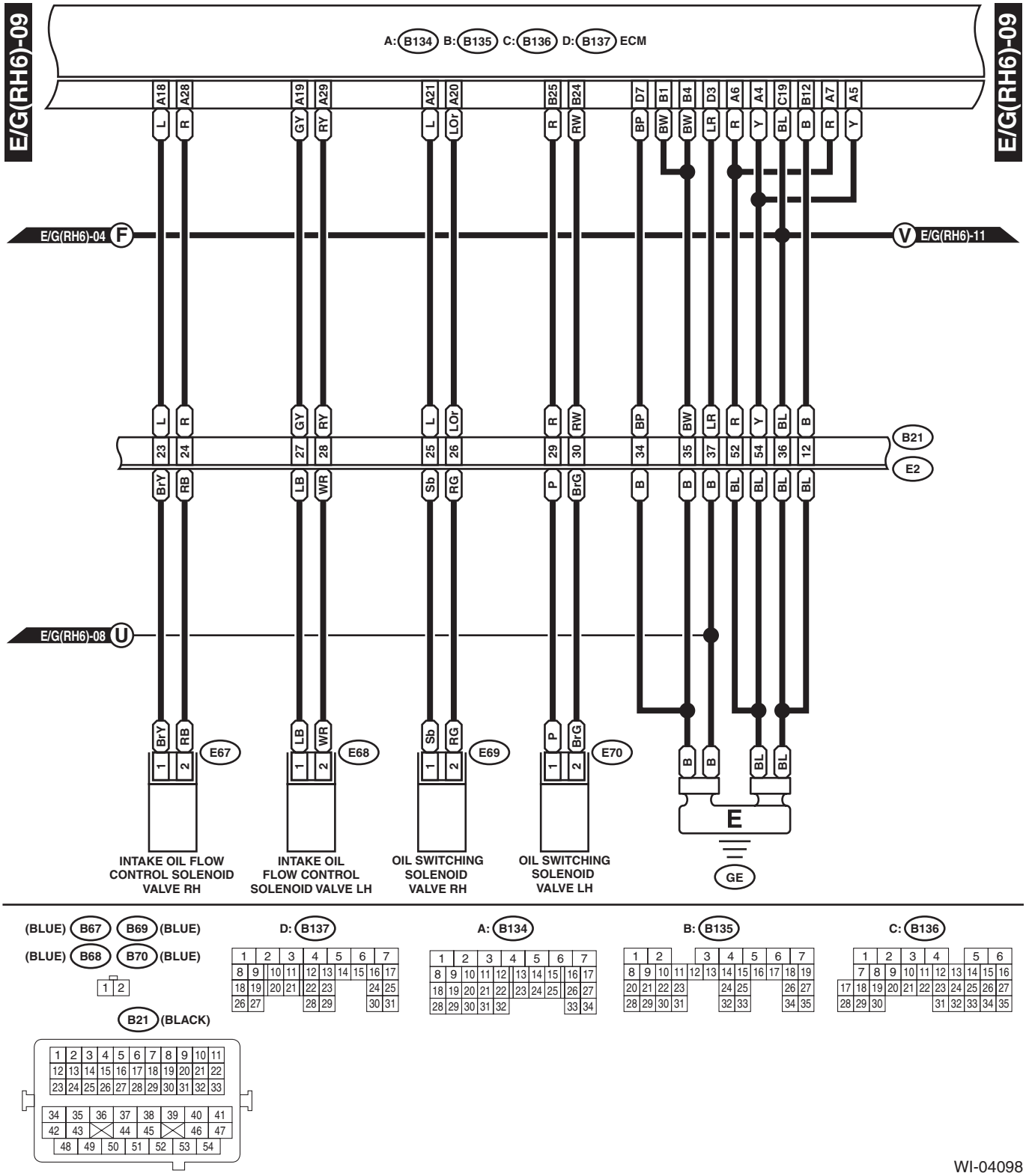

E10 (LIGHT GRAY)
E14 (GREEN)
E48 (GREEN)
E75 (BLACK)
1 2
E73 (GRAY)
E74 (GRAY)
1 2 3
B20
1 2 3 4
5 6 7 8
9 10 11 12
13 14 15 16
B: B135
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17 18 19
20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35
B21 (BLACK)
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
C: B136
1 2 3 4 5 6
7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34 35

WI-04096


E/G(RH6)-08
E/G(RH6)-08
C: B136 D: B137 ECM
C29
C18
C16
D4
D5
C22
C14
C35
D10
Or
W
LY
BL
BW
YW
BrW
YG
PB
S E/G(RH6)-11
E/G(RH6)-06 L
E/G(RH6)-06 N
E/G(RH6)-05 I
E/G(RH6)-05 J
JOINT CONNECTOR A
B83
E/G(RH6)-06 M
JOINT CONNECTOR B
B122
B20
E1
B21
E2
E/G(RH6)-07 R
U E/G(RH6)-9
LR
GL
GY
GOr
BrB
E76
E77
E28
E8
E19
E57
*:TERMINAL NO. OPTIONAL ARRANGEMENT
ELECTRIC THROTTLE
PRESSURE SENSOR
ENGINE COOLANT TEMPERATURE SENSOR
POWER STEERING OIL PRESSURE SWITCH

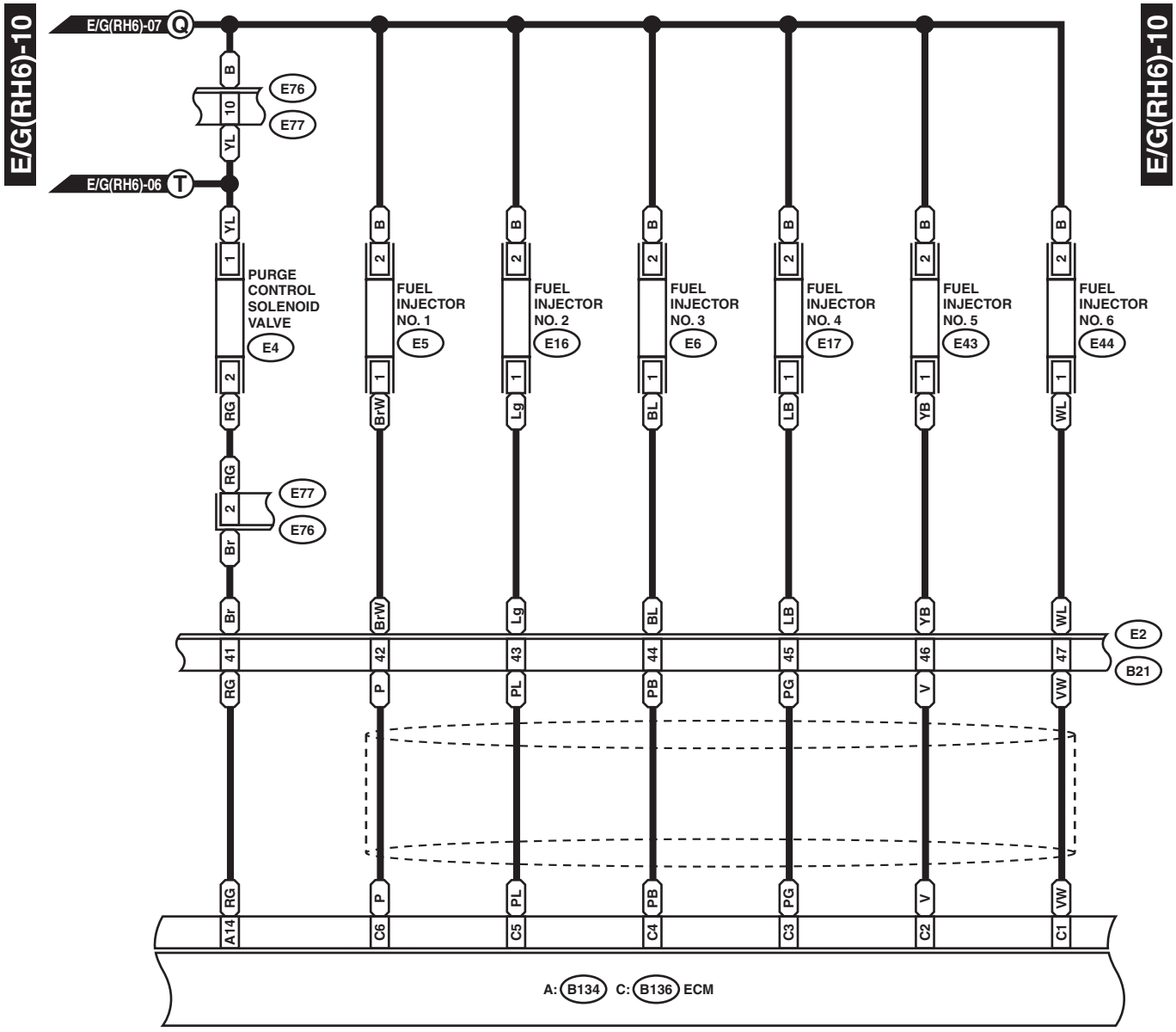

E8 (BLACK)
E28 (BLACK)
E57 (BLACK)
B83
B122
E77 (GRAY)
B20
D: B137
C: B136
B21 (BLACK)

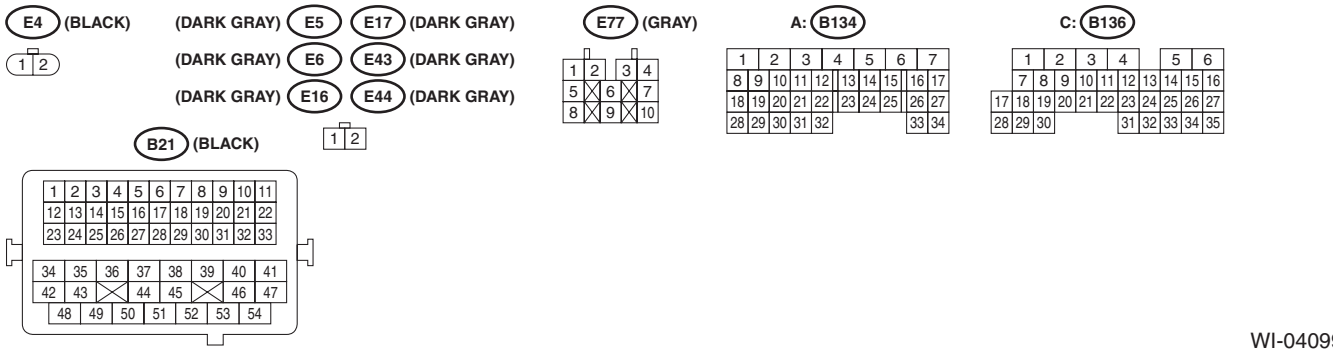
WI-04097


E/G(RH6)-09
E/G(RH6)-09
A: B134 B: B135 C: B136 D: B137 ECM
A18 A28 A19 A29 A21 A20 B25 B24 D7 B1 B4 D3 A6 A4 C19 B12 A7 A5
L R GY RY L LOr R RW BP BW BW LR R Y BL B R Y
E/G(RH6)-04 F
V E/G(RH6)-11
23 24 27 28 25 26 29 30 34 35 37 52 54 36 12
B21
E2
BrY RB LB WR Sb RG P BrG B B B BL BL BL BL
E/G(RH6)-08 U
E67
E68
E69
E70
1 2
B B BL BL
E
GE
INTAKE OIL FLOW CONTROL SOLENOID VALVE RH
INTAKE OIL FLOW CONTROL SOLENOID VALVE LH
OIL SWITCHING SOLENOID VALVE RH
OIL SWITCHING SOLENOID VALVE LH

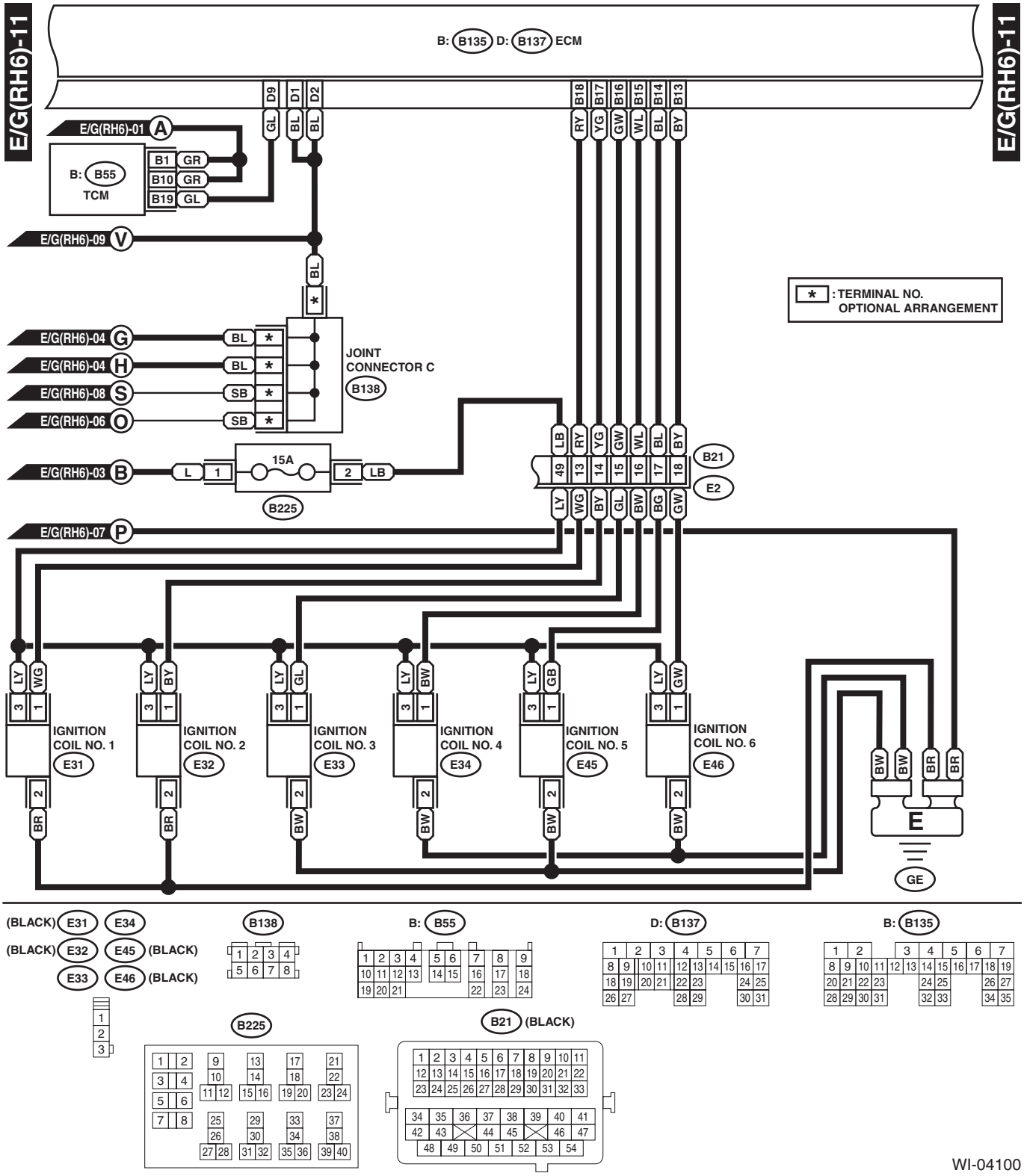
(BLUE) B67 B69 (BLUE)
(BLUE) B68 B70 (BLUE)
1 2
B21 (BLACK)
D: B137
A: B134
B: B135
C: B136

WI-04098


E/G(RH6)-10
E/G(RH6)-07
Q
E/G(RH6)-06
T
E/G(RH6)-10
B
10
YL
E76
E77
PURGE CONTROL SOLENOID VALVE
E4
FUEL INJECTOR NO. 1
E5
FUEL INJECTOR NO. 2
E16
FUEL INJECTOR NO. 3
E6
FUEL INJECTOR NO. 4
E17
FUEL INJECTOR NO. 5
E43
FUEL INJECTOR NO. 6
E44
RG
BrW
Lg
BL
LB
YB
WL
Br
P
PL
PB
PG
V
VW
E2
B21
41
42
43
44
45
46
47
A14
C6
C5
C4
C3
C2
C1
A: B134 C: B136 ECM


E4 (BLACK)
(DARK GRAY) E5
E17 (DARK GRAY)
(DARK GRAY) E6
E43 (DARK GRAY)
(DARK GRAY) E16
E44 (DARK GRAY)
E77 (GRAY)
A: B134
C: B136
B21 (BLACK)

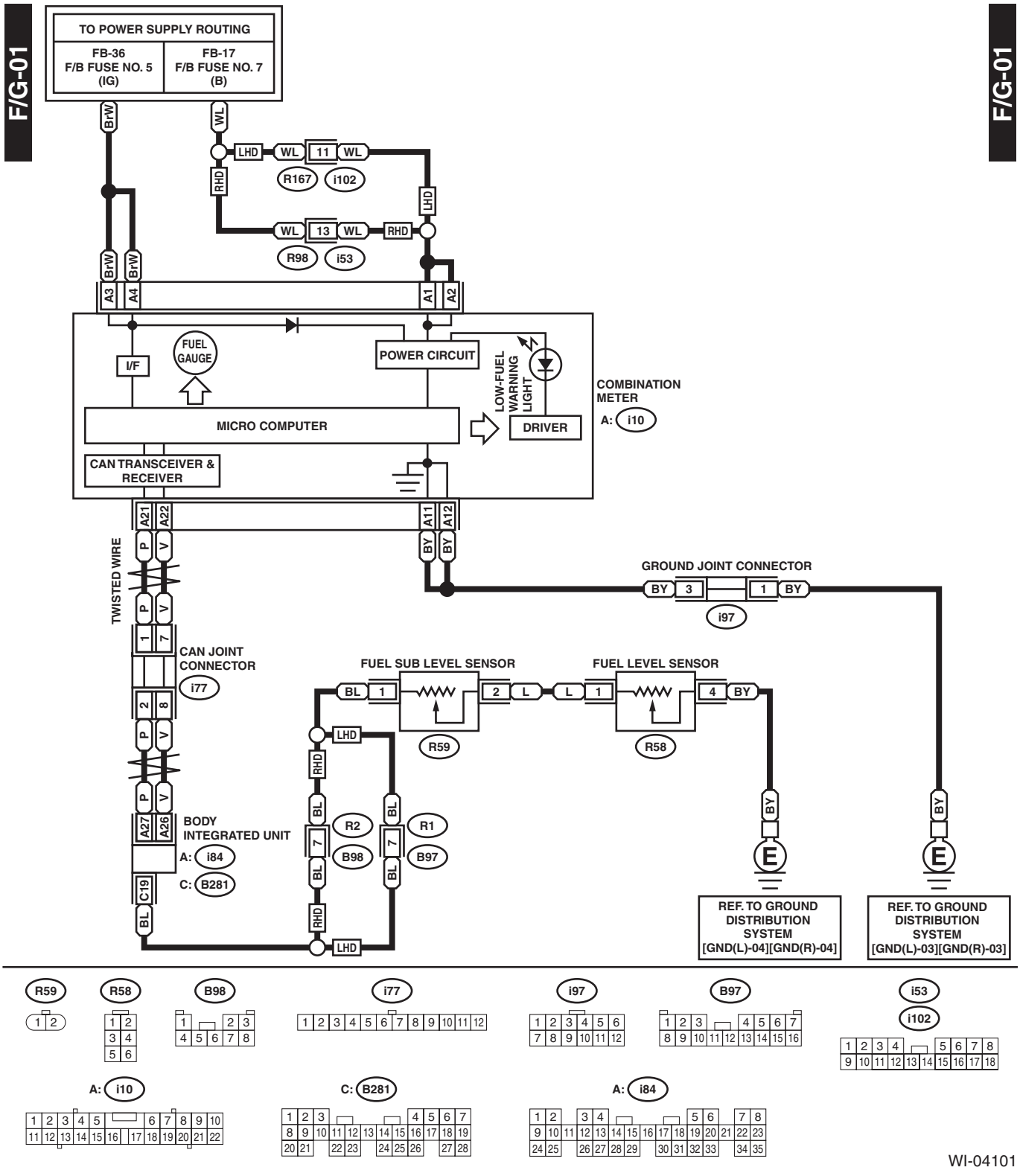
WI-04099


E/G(RH6)-11
B: B135 D: B137 ECM
E/G(RH6)-01 A
B: B55 TCM
B1 GR
B10 GR
B19 GL
E/G(RH6)-09 V
E/G(RH6)-04 G
E/G(RH6)-04 H
E/G(RH6)-08 S
E/G(RH6)-06 O
JOINT CONNECTOR C
B138
E/G(RH6)-03 B
15A
B225
E/G(RH6)-07 P
B21
E2
* : TERMINAL NO. OPTIONAL ARRANGEMENT
IGNITION COIL NO. 1 E31
IGNITION COIL NO. 2 E32
IGNITION COIL NO. 3 E33
IGNITION COIL NO. 4 E34
IGNITION COIL NO. 5 E45
IGNITION COIL NO. 6 E46
E
GE
(BLACK) E31
E34
(BLACK) E32
E45 (BLACK)
E33
E46 (BLACK)
B138
B: B55
D: B137
B: B135
B225
B21 (BLACK)

WI-04100

17.Fuel Gauge System

A: WIRING DIAGRAM

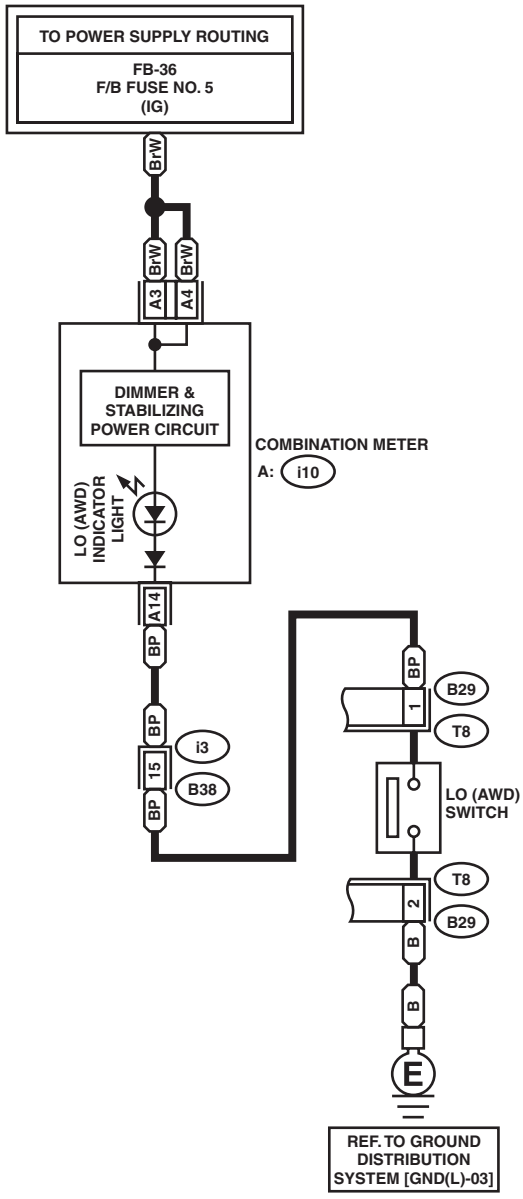


18.Full Time Dual-range System

A: WIRING DIAGRAM

1. LHD MODEL

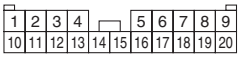
FTDR(L)-01



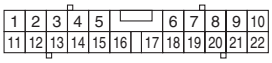
FTDR(L)-01

B29 (BLACK)

B38



A: i10



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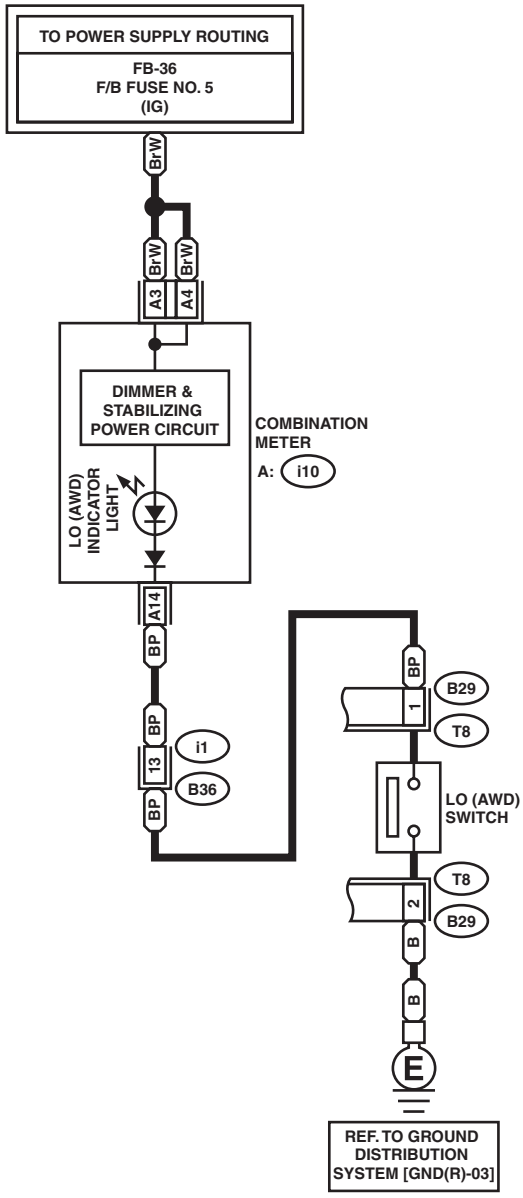
2. RHD MODEL

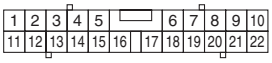
FTDR(R)-01



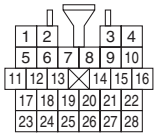
FTDR(R)-01

B29 (BLACK)

A: i10



i1

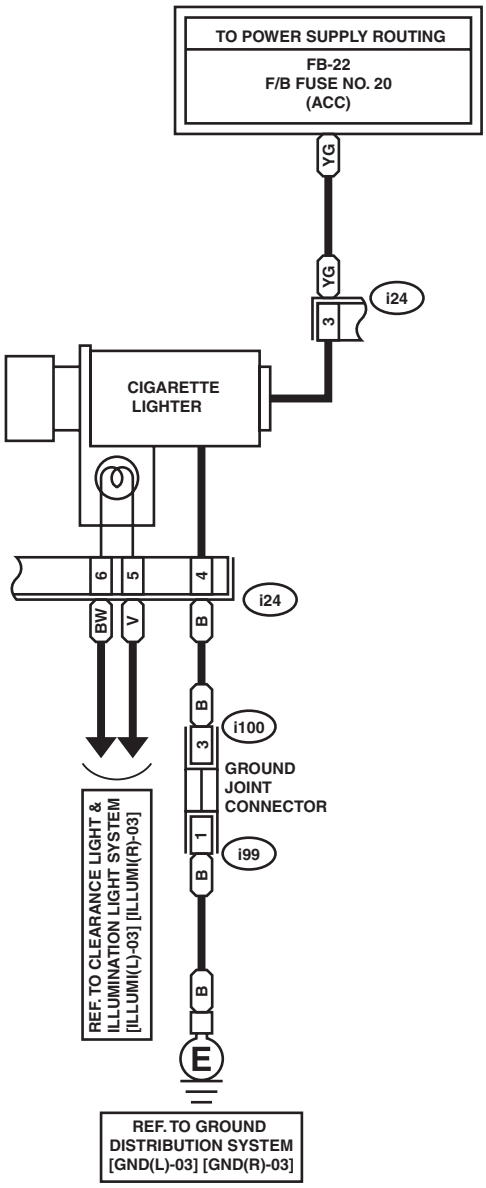


WI-04103

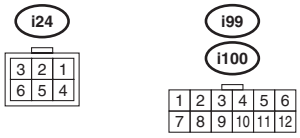
19.Front Accessory Power Supply Socket System

A: WIRING DIAGRAM

FAPS-01



FAPS-01

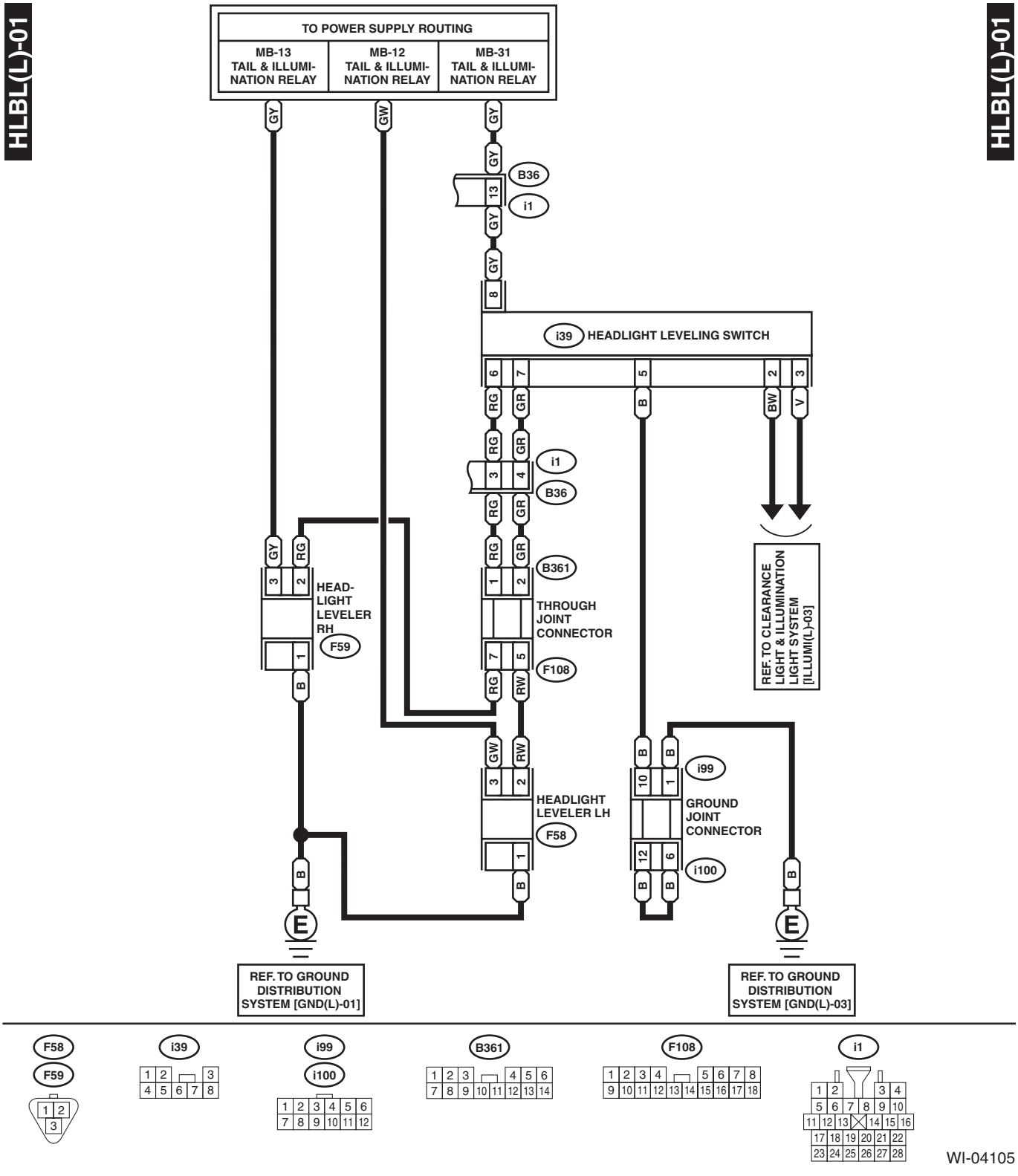


WI-04104

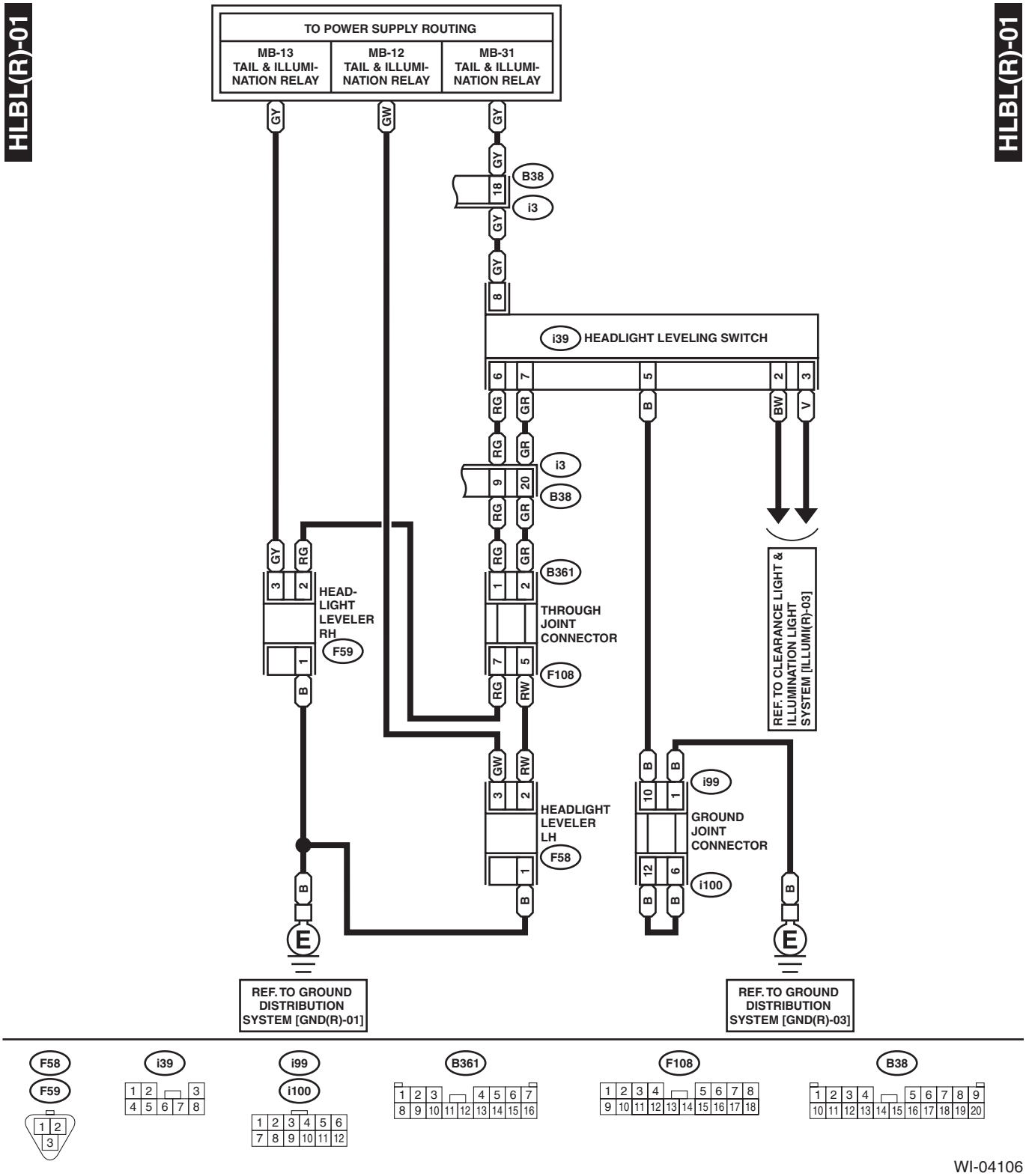
20.Headlight Beam Leveler System

A: WIRING DIAGRAM

1. LHD MODEL



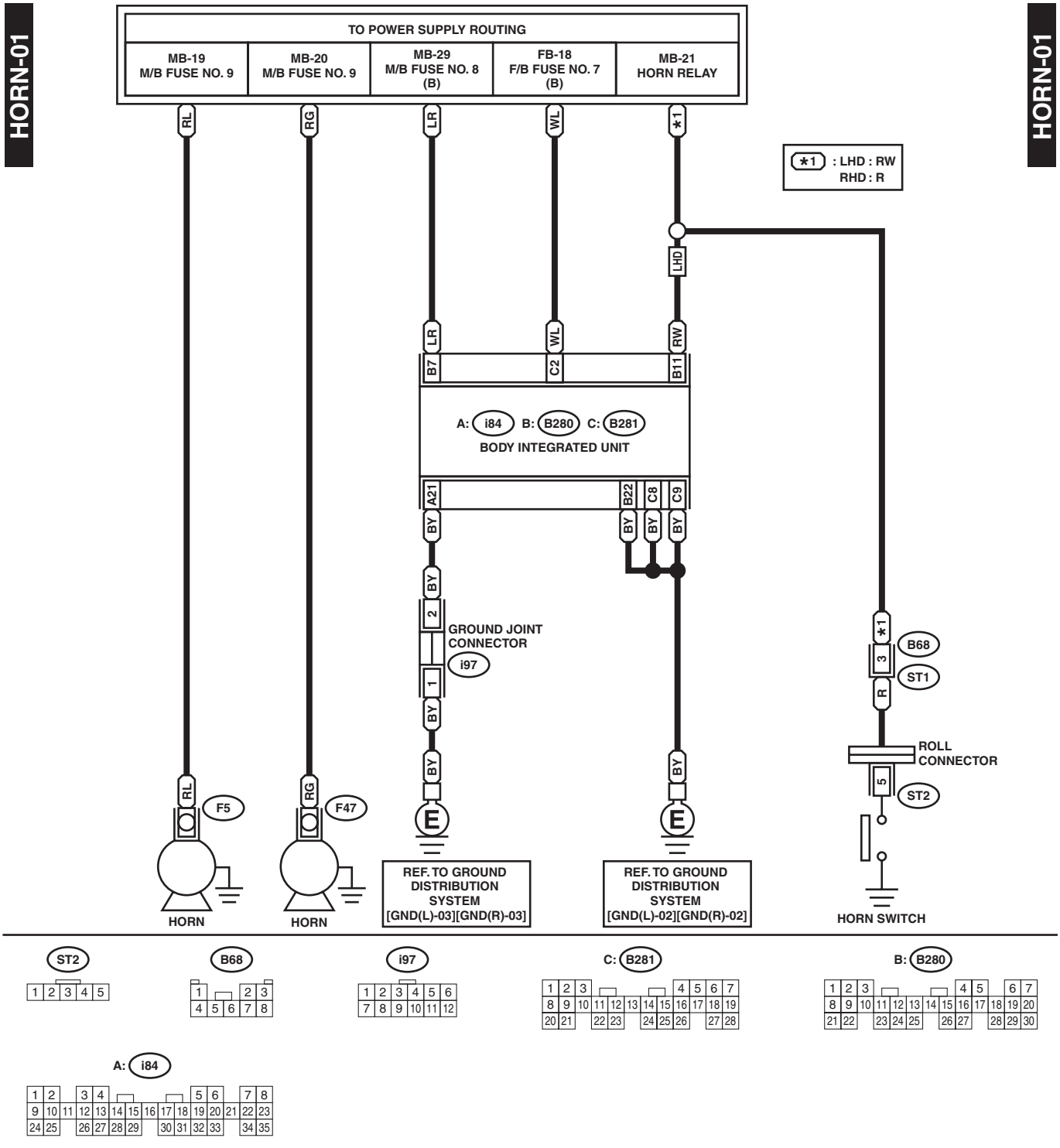
2. RHD MODEL



WI-04106

21.Horn System

A: WIRING DIAGRAM

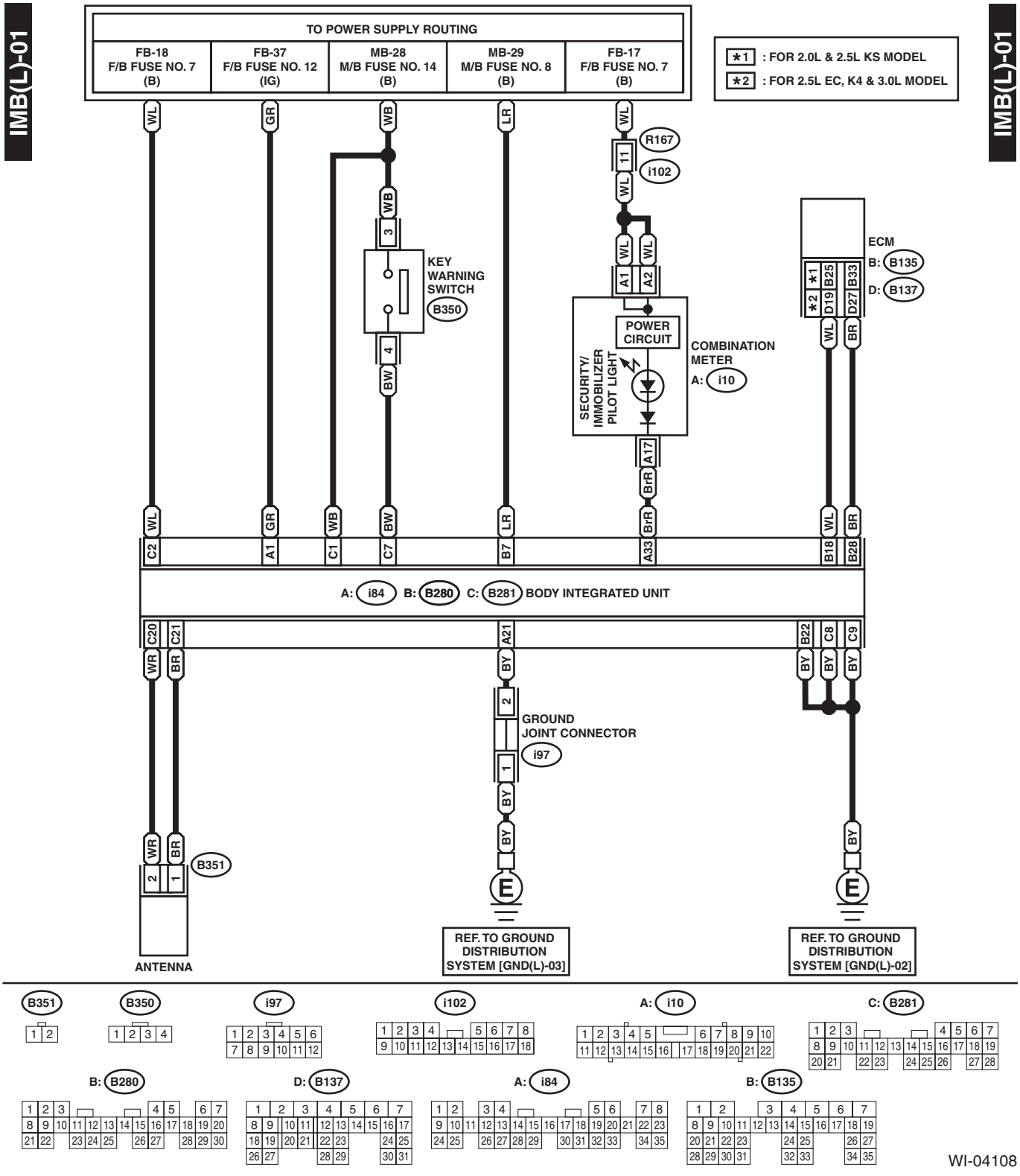


WI-04107

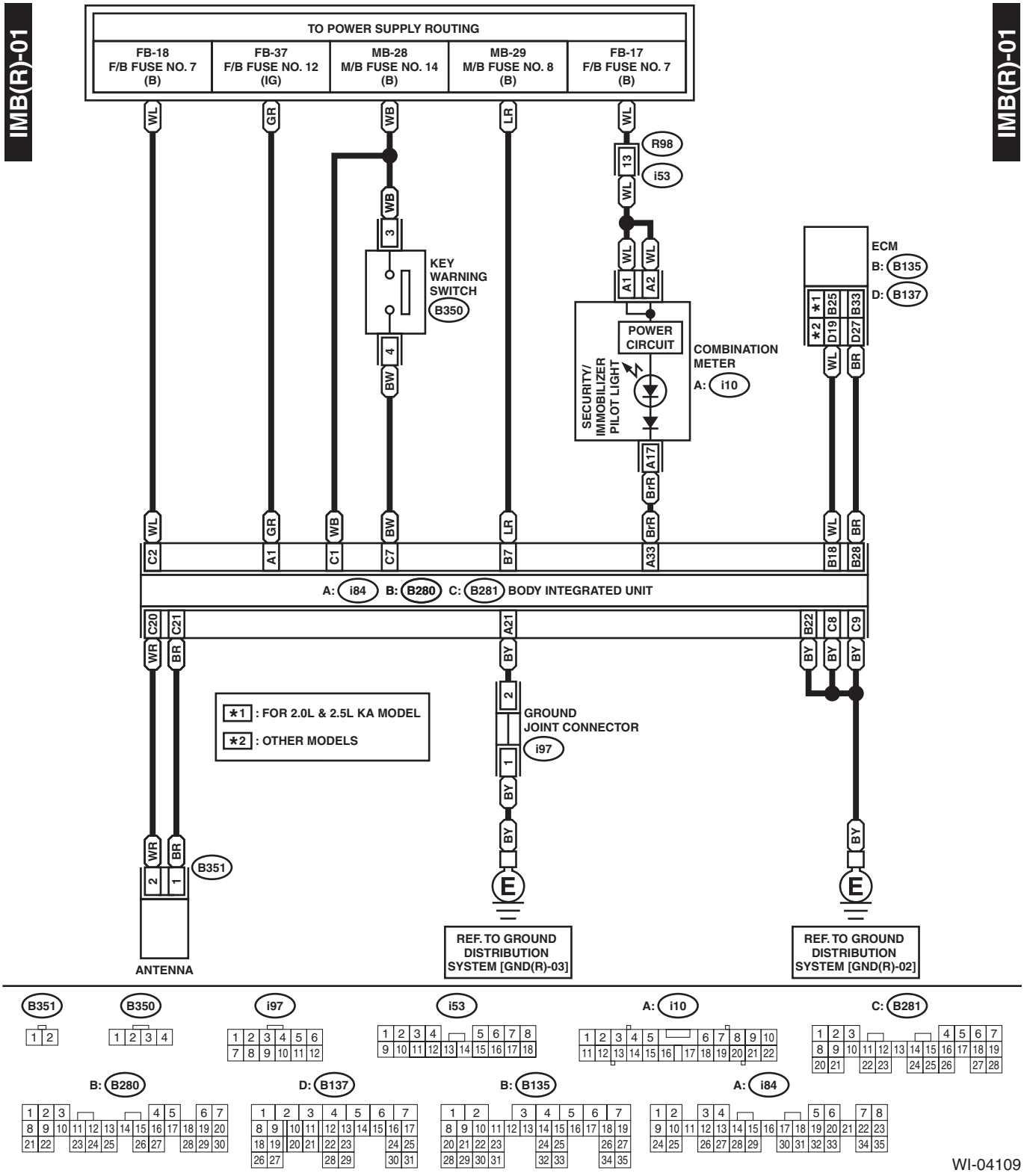
22.Immobilizer System

A: WIRING DIAGRAM

1. LHD MODEL



2. RHD MODEL



WI-04109

WIRING SYSTEM SECTION

WIRING SYSTEM WI

This service manual has been prepared to provide SUBARU service personnel with the necessary information and data for the correct maintenance and repair of SUBARU vehicles.
This manual includes the procedures for maintenance, disassembling, reassembling, inspection and adjustment of components and diagnostics for guidance of experienced mechanics.
Please peruse and utilize this manual fully to ensure complete repair work for satisfying our customers by keeping their vehicle in optimum condition. When replacement of parts during repair work is needed, be sure to use SUBARU genuine parts.

All information, illustration and specifications contained in this manual are based on the latest product information available at the time of publication approval.

FUJI HEAVY INDUSTRIES LTD. G2320GE8

WIRING SYSTEM

WI

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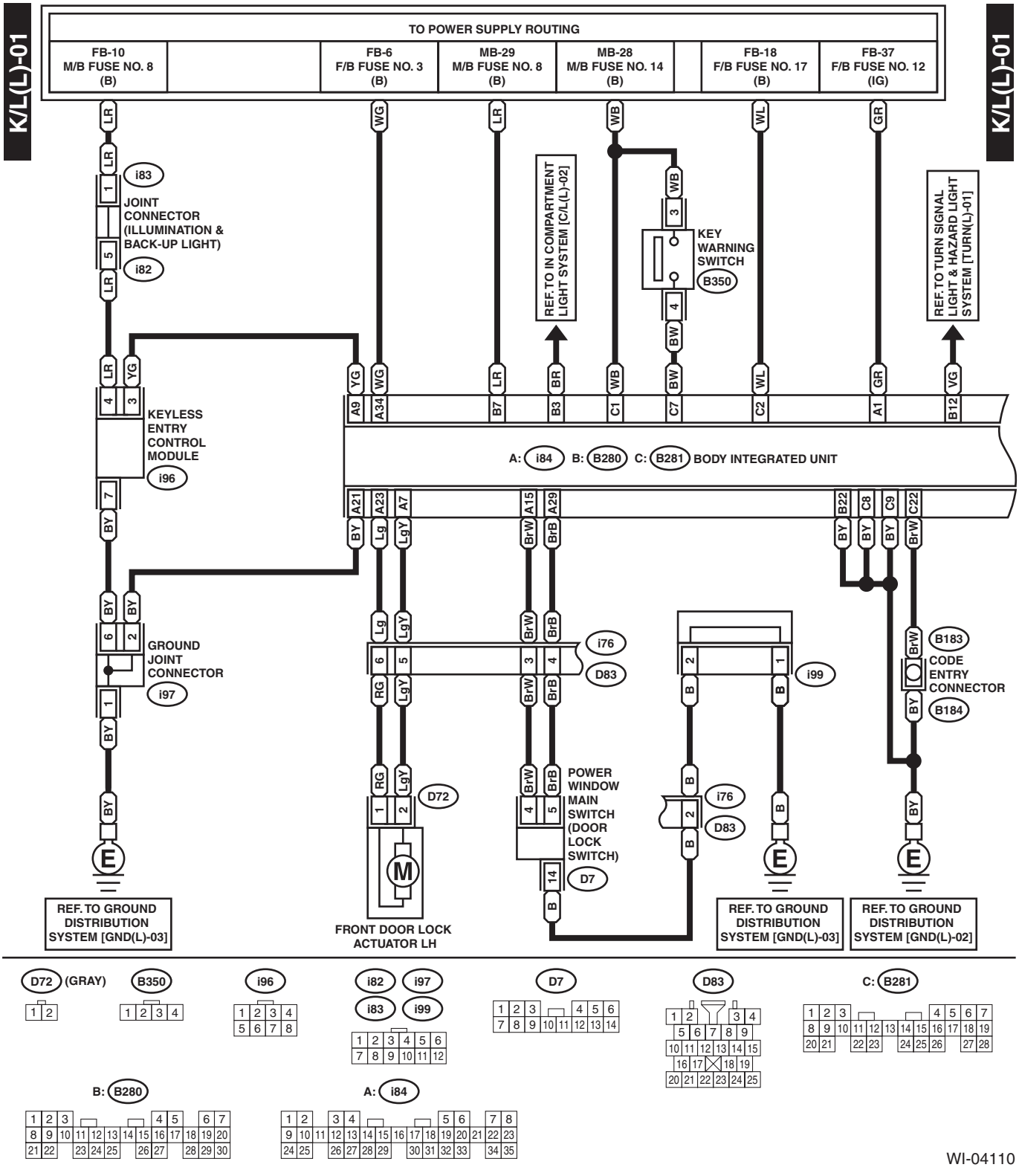
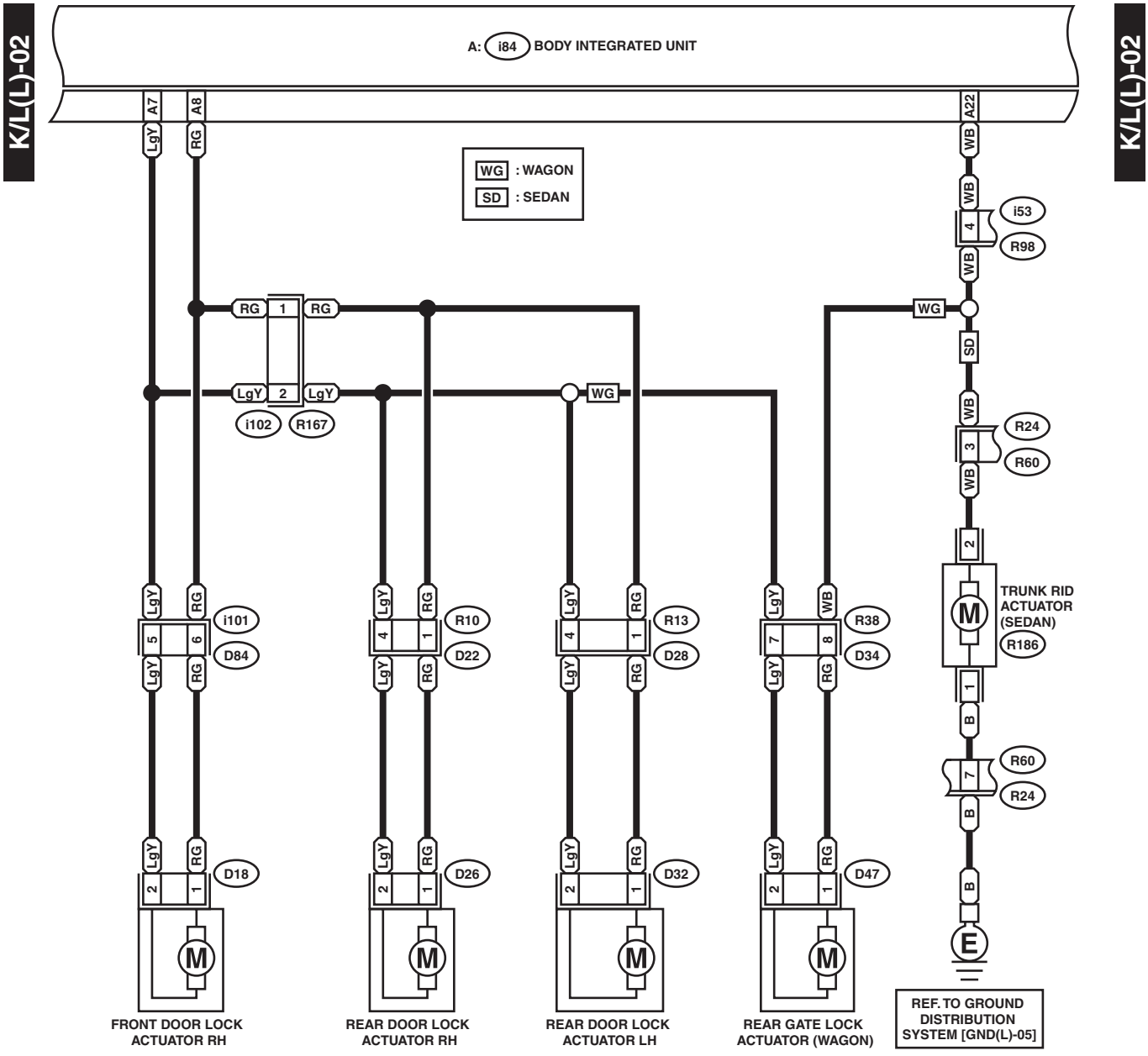
23.Keyless Entry System

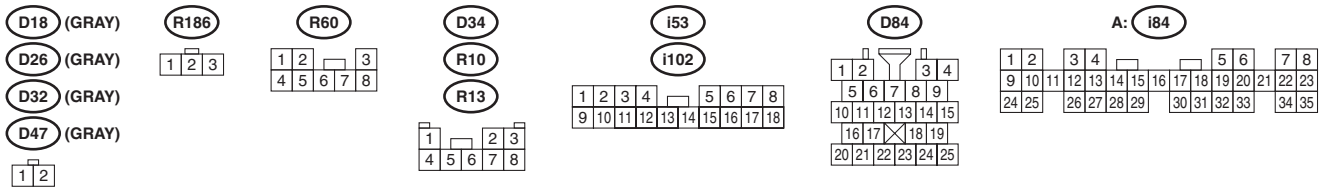
A: WIRING DIAGRAM

1. LHD MODEL

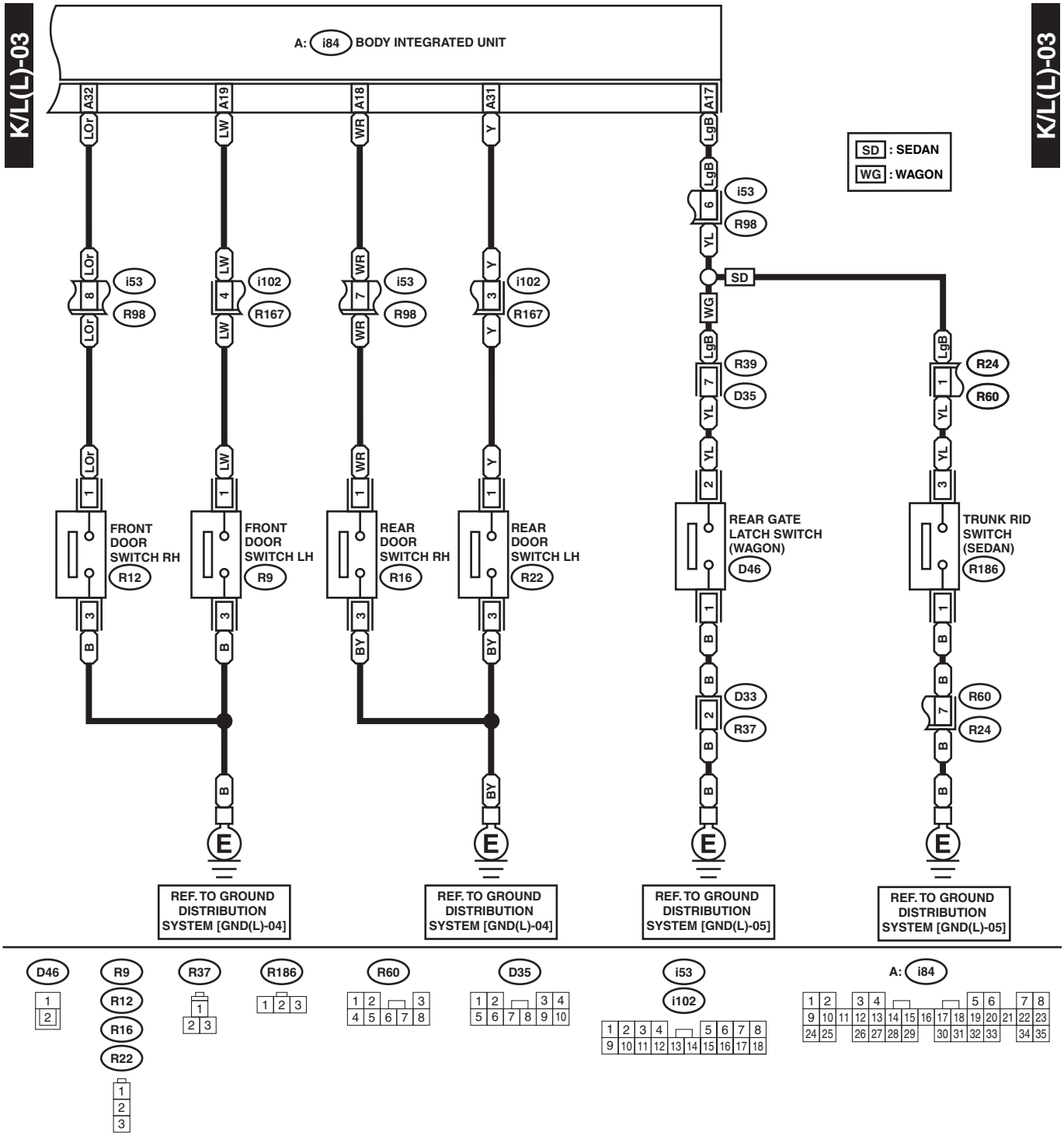


WI-04110


K/L(L)-02
K/L(L)-02
A: i84 BODY INTEGRATED UNIT
A7
A8
A22
LgY
RG
WB
WG : WAGON
SD : SEDAN
i53
R98
i102
R167
R24
R60
i101
D84
R10
D22
R13
D28
R38
D34
D18
D26
D32
D47
TRUNK RID ACTUATOR (SEDAN)
R186
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-05]
FRONT DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)

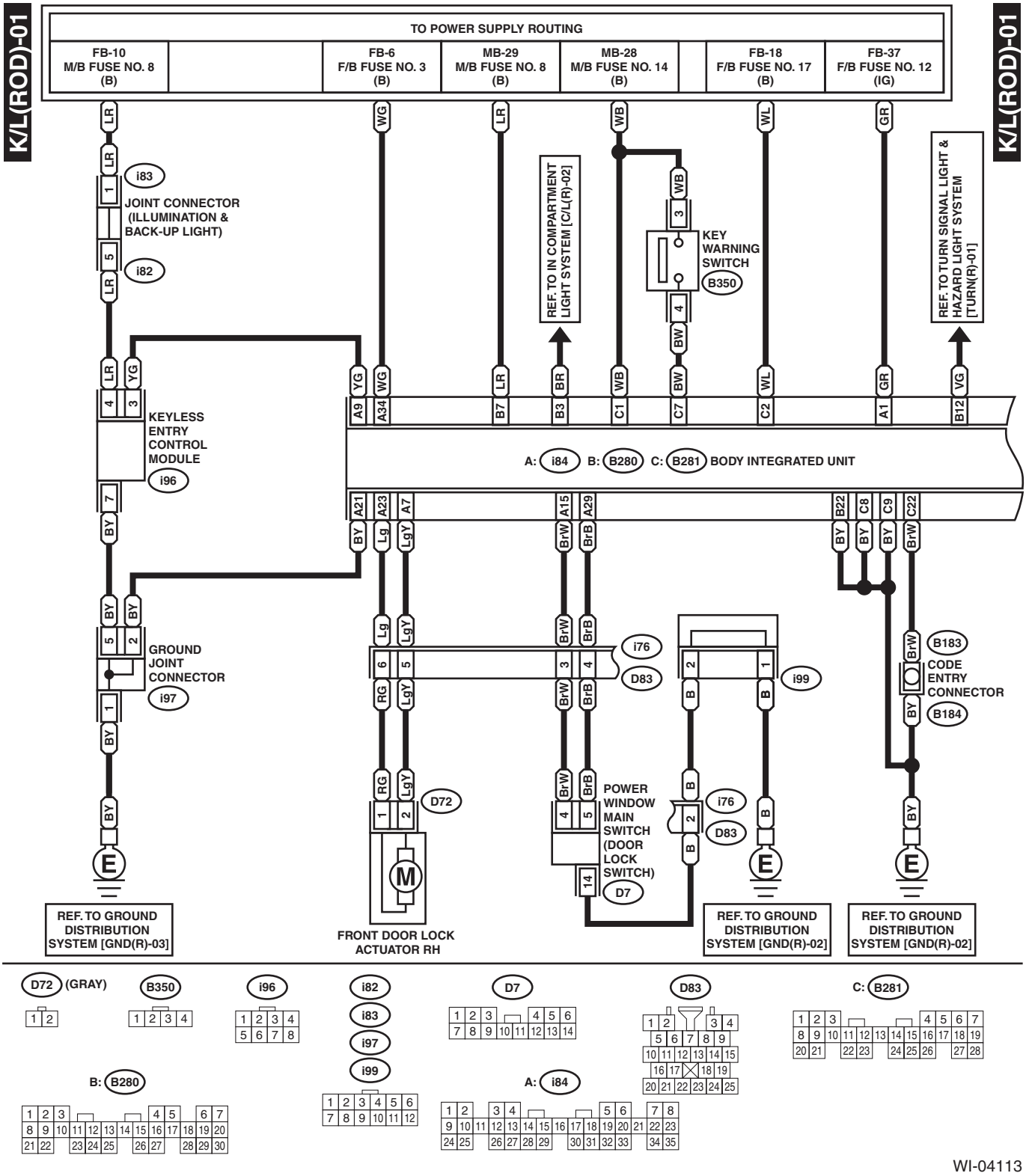

D18 (GRAY)
D26 (GRAY)
D32 (GRAY)
D47 (GRAY)
R186
R60
D34
R10
R13
i53
i102
D84
A: i84

WI-04111

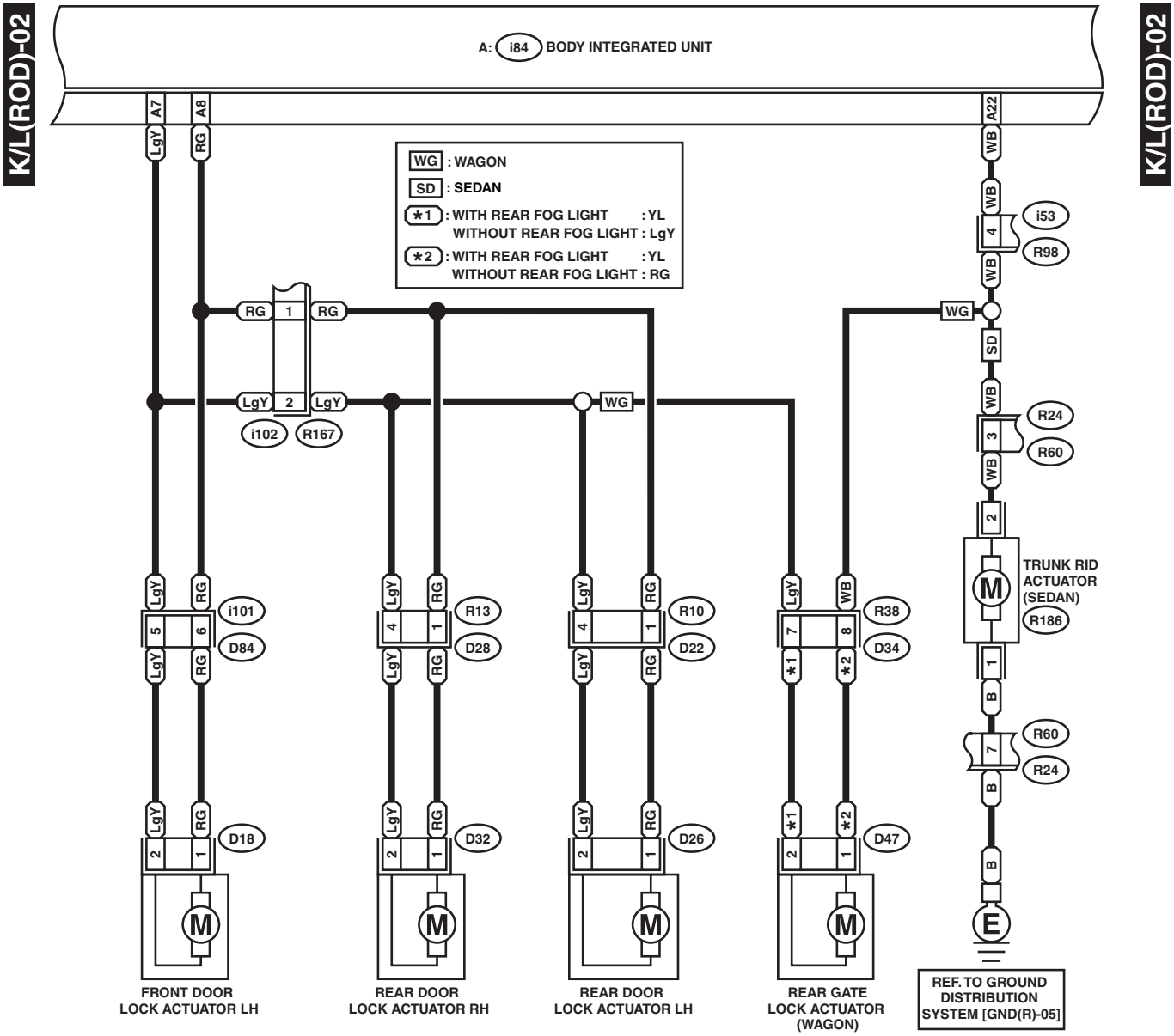

K/L(L)-03
K/L(L)-03
A: i84 BODY INTEGRATED UNIT
SD : SEDAN
WG : WAGON
FRONT DOOR SWITCH RH
R12
FRONT DOOR SWITCH LH
R9
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
REAR GATE LATCH SWITCH (WAGON)
D46
TRUNK RID SWITCH (SEDAN)
R186
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-05]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-05]
D46
R9
R12
R16
R22
R37
R186
R60
D35
i53
i102
A: i84

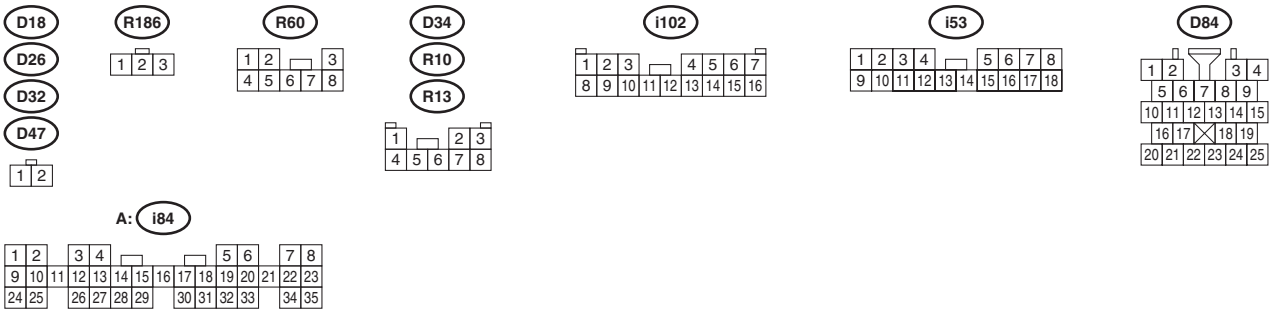
WI-04112

2. RHD MODEL WITHOUT DOUBLE LOCK

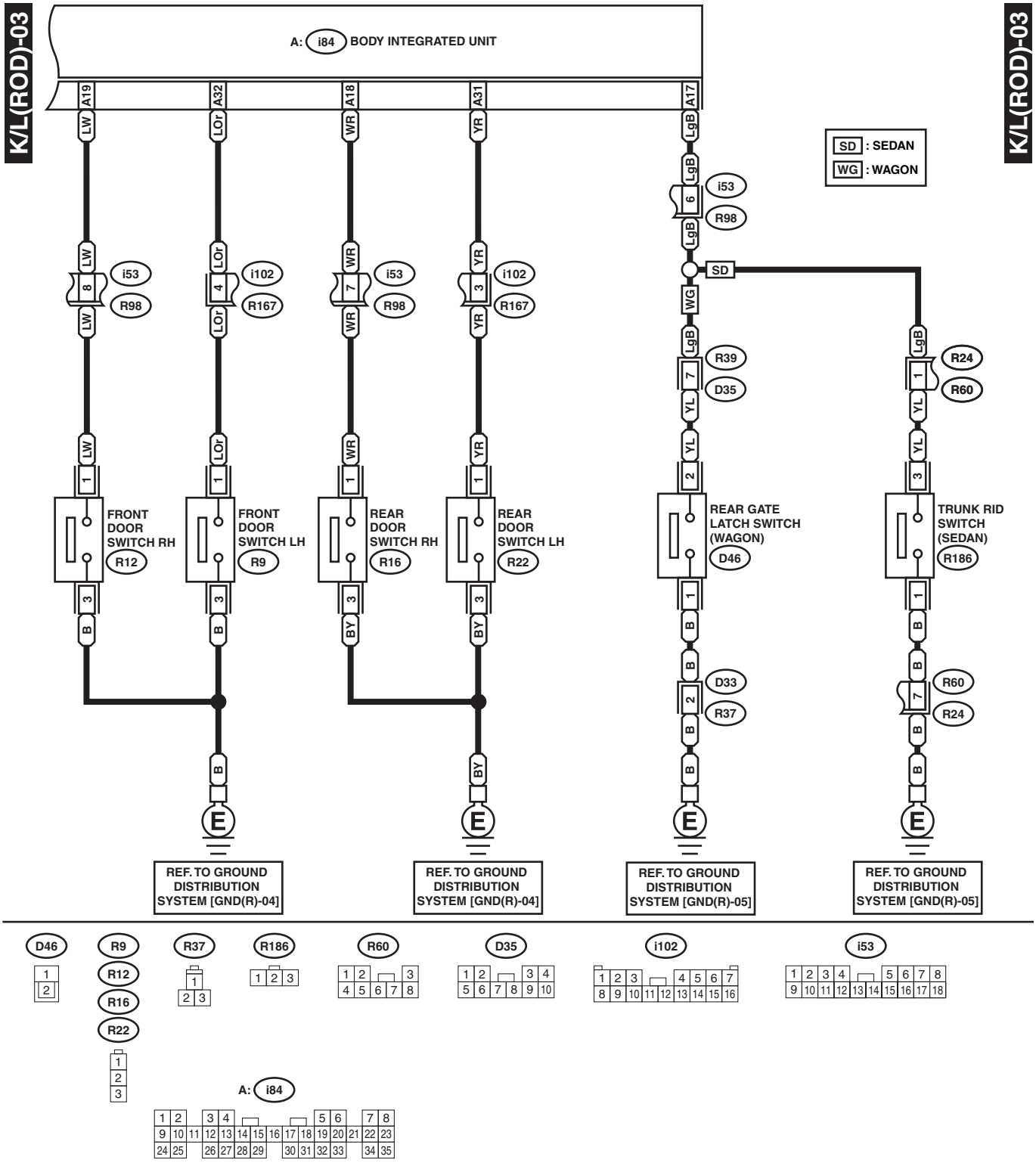


WI-04113


K/L(ROD)-02
K/L(ROD)-02
A: i84 BODY INTEGRATED UNIT
WG : WAGON
SD : SEDAN
*1 : WITH REAR FOG LIGHT : YL
WITHOUT REAR FOG LIGHT : LgY
*2 : WITH REAR FOG LIGHT : YL
WITHOUT REAR FOG LIGHT : RG
A7
A8
A22
LgY
RG
WB
WG
SD
i53
R98
R24
R60
i102
R167
i101
D84
R13
D28
R10
D22
R38
D34
D18
D32
D26
D47
TRUNK RID ACTUATOR (SEDAN)
R186
FRONT DOOR LOCK ACTUATOR LH
REAR DOOR LOCK ACTUATOR RH
REAR DOOR LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]

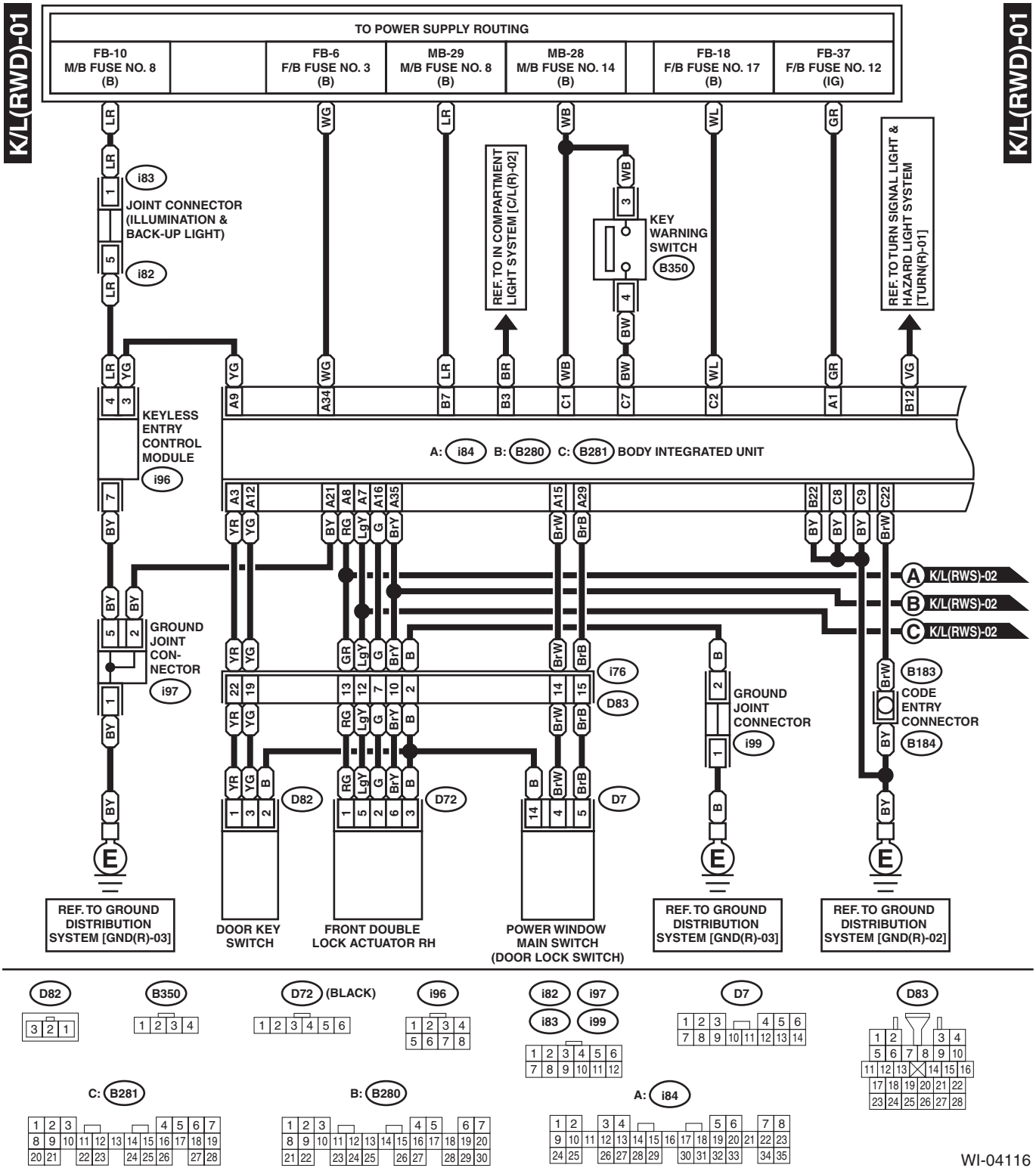

D18
D26
D32
D47
R186
R60
D34
R10
R13
i102
i53
D84
A: i84

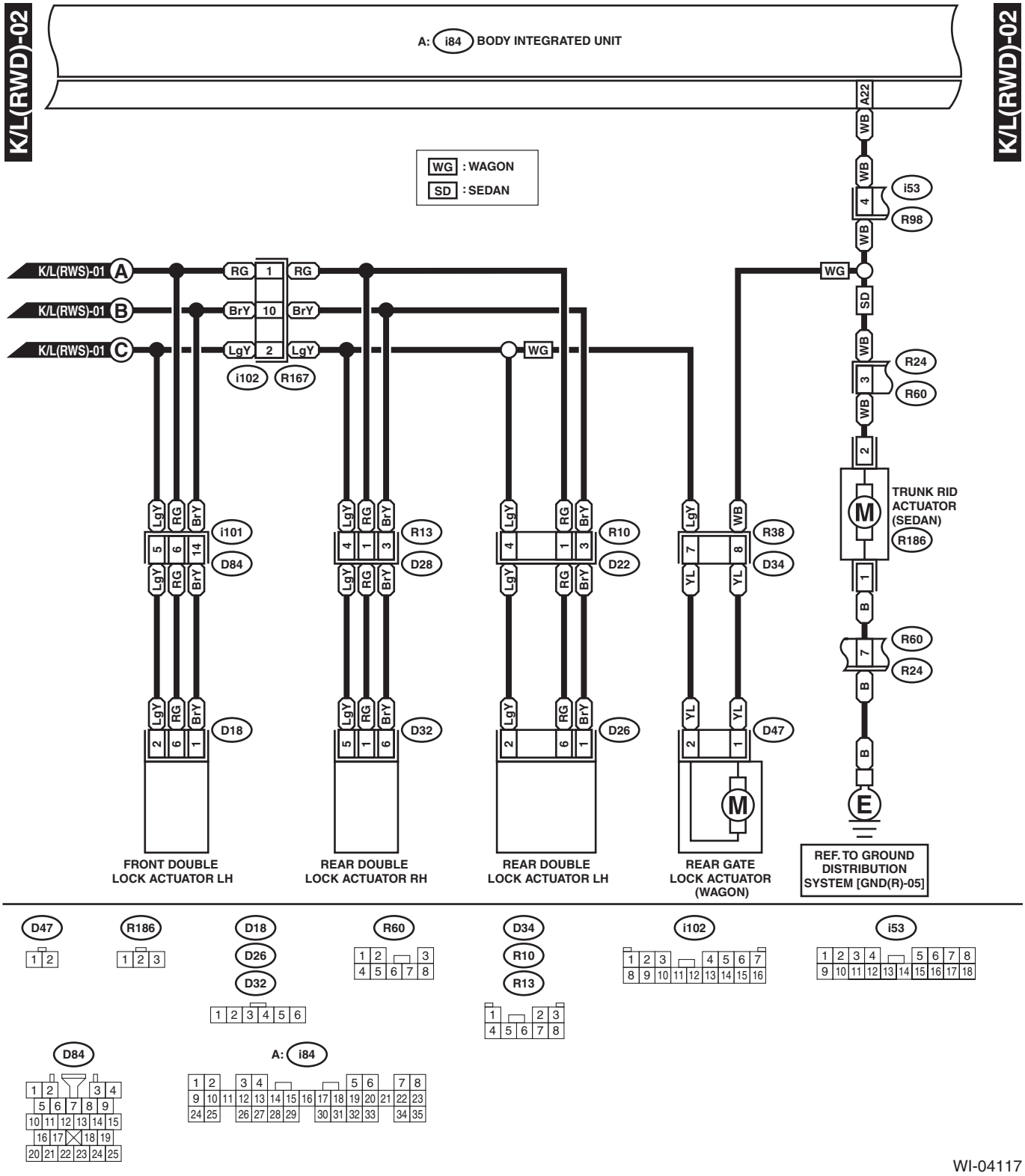
WI-04114


K/L(ROD)-03
K/L(ROD)-03
A: i84 BODY INTEGRATED UNIT
A19
A32
A18
A31
A17
LW
LOr
WR
YR
LgB
SD : SEDAN
WG : WAGON
i53
R98
i102
R167
R39
D35
R24
R60
YL
WG
SD
FRONT DOOR SWITCH RH
R12
FRONT DOOR SWITCH LH
R9
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
REAR GATE LATCH SWITCH (WAGON)
D46
TRUNK RID SWITCH (SEDAN)
R186
D33
R37
B
BY
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]
D46
R9
R12
R16
R22
R37
R186
R60
D35
i102
i53
A: i84

WI-04115

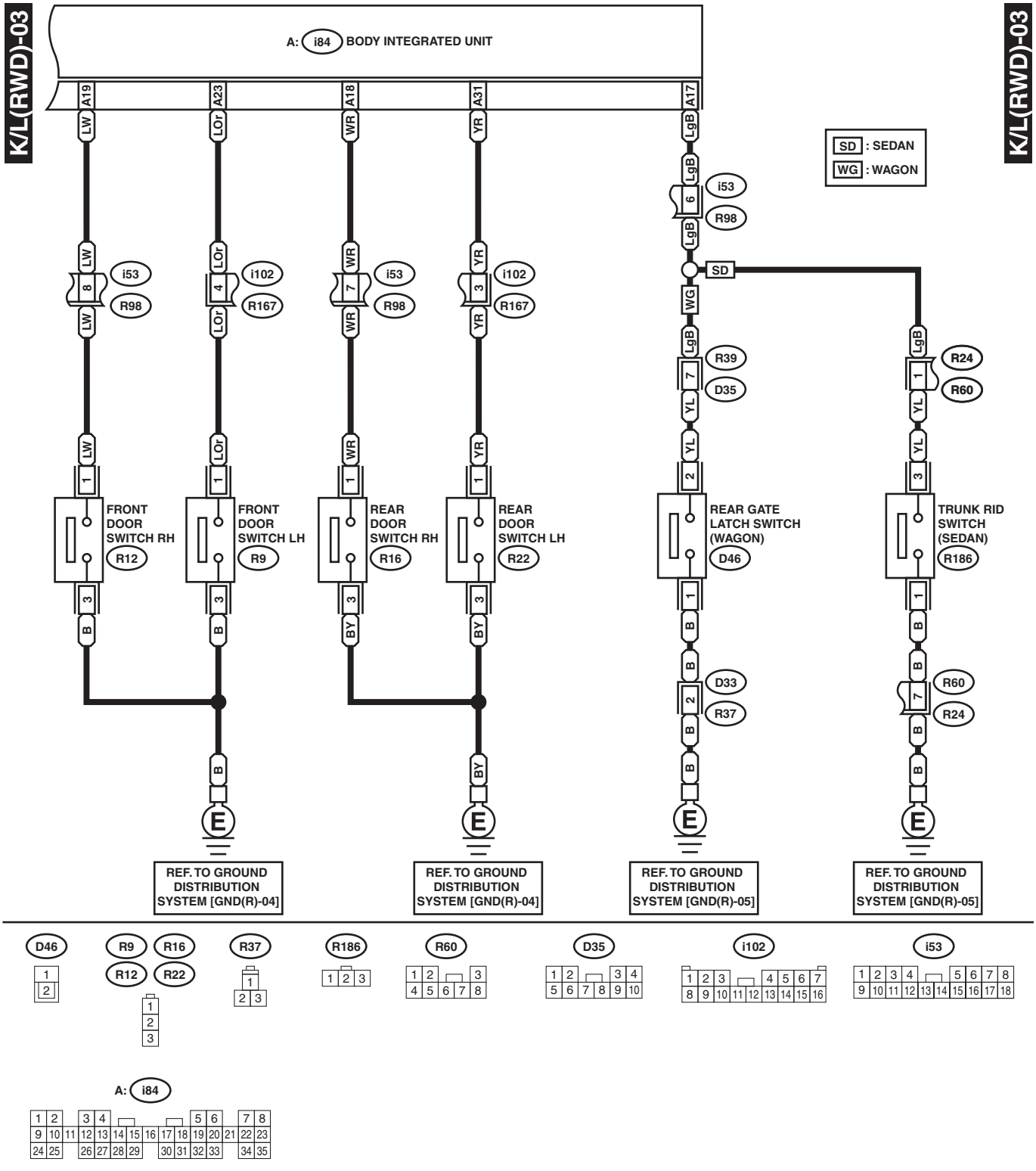
3. RHD MODEL WITH DOUBLE LOCK




K/L(RWD)-02
K/L(RWD)-02
A: i84 BODY INTEGRATED UNIT
WG : WAGON
SD : SEDAN
K/L(RWS)-01 A
K/L(RWS)-01 B
K/L(RWS)-01 C
i102
R167
i101
D84
R13
D28
R10
D22
R38
D34
D18
D32
D26
D47
i53
R98
R24
R60
R186
TRUNK RID ACTUATOR (SEDAN)
FRONT DOUBLE LOCK ACTUATOR LH
REAR DOUBLE LOCK ACTUATOR RH
REAR DOUBLE LOCK ACTUATOR LH
REAR GATE LOCK ACTUATOR (WAGON)
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]

D47
R186
D18
D26
D32
R60
D34
R10
R13
i102
i53
D84
A: i84

WI-04117

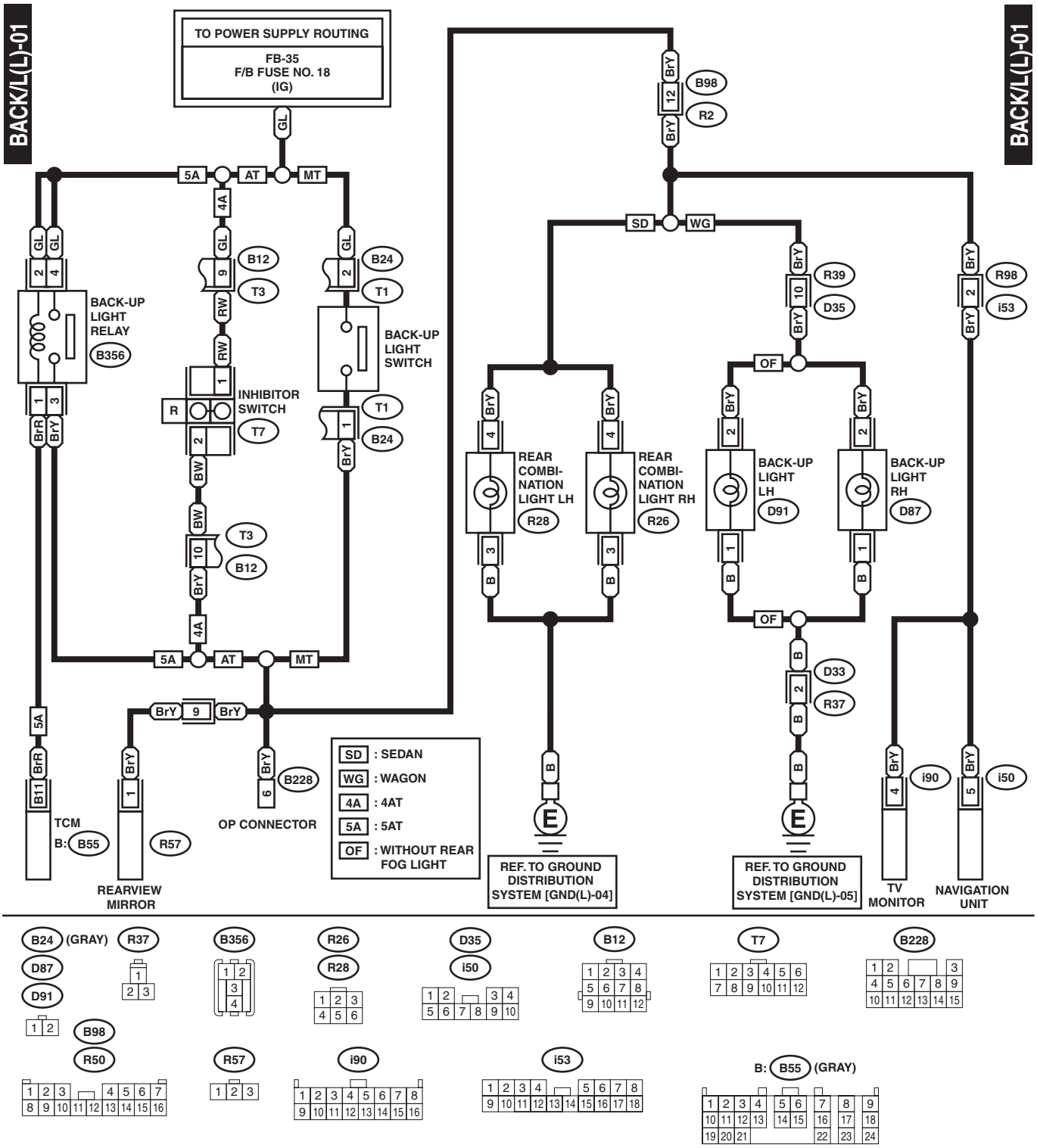

K/L(RWD)-03
K/L(RWD)-03
A: i84 BODY INTEGRATED UNIT
A19
A23
A18
A31
A17
LW
LOr
WR
YR
LgB
SD : SEDAN
WG : WAGON
i53
R98
i102
R167
SD
WG
R39
D35
R24
R60
YL
FRONT DOOR SWITCH RH
R12
FRONT DOOR SWITCH LH
R9
REAR DOOR SWITCH RH
R16
REAR DOOR SWITCH LH
R22
REAR GATE LATCH SWITCH (WAGON)
D46
TRUNK RID SWITCH (SEDAN)
R186
B
BY
D33
R37
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]
D46
R9
R16
R37
R186
R60
D35
i102
i53
R12
R22
A: i84

WI-04118

24.Back-up Light System

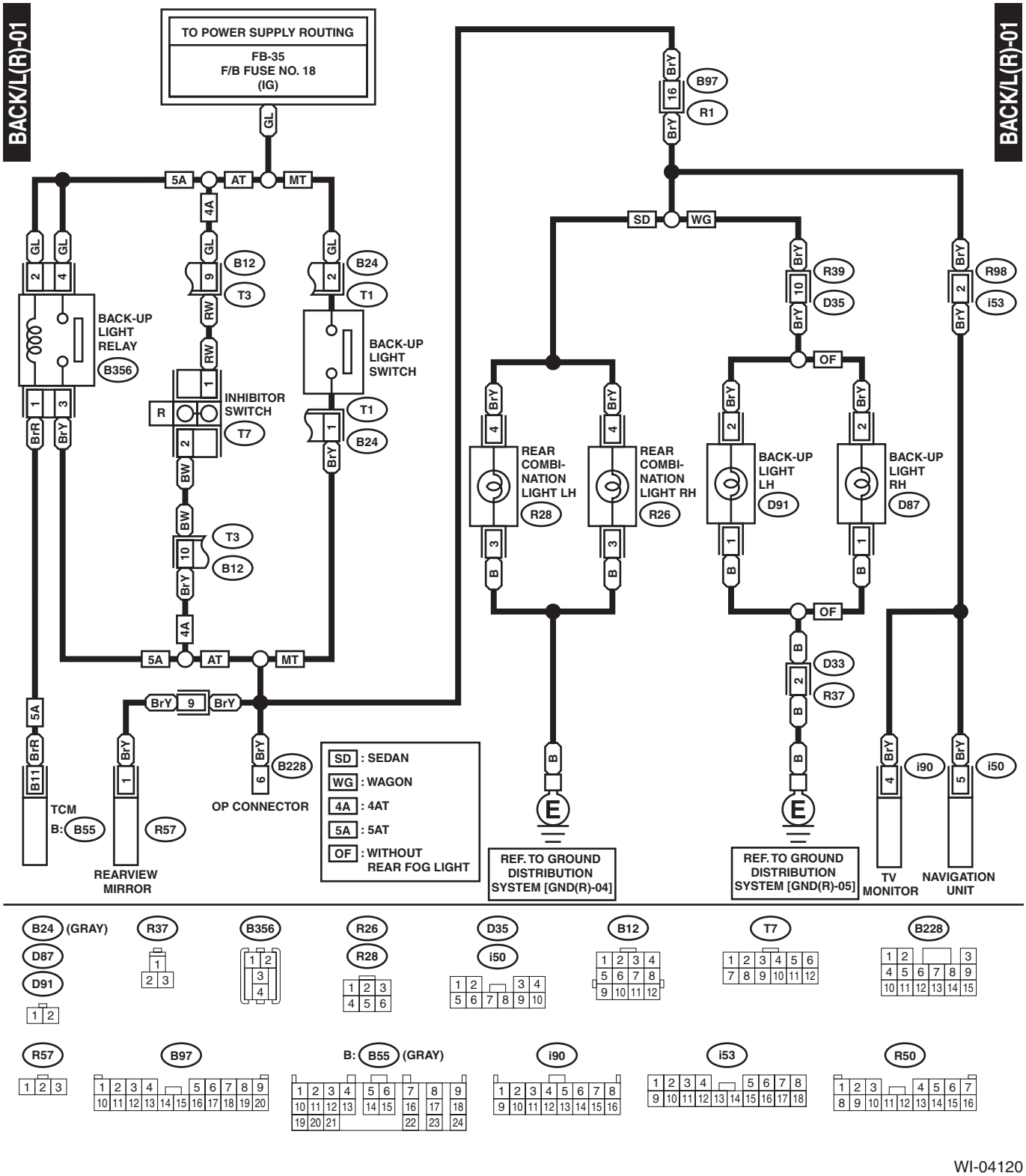
A: WIRING DIAGRAM

1. LHD MODEL



WI-04119

2. RHD MODEL

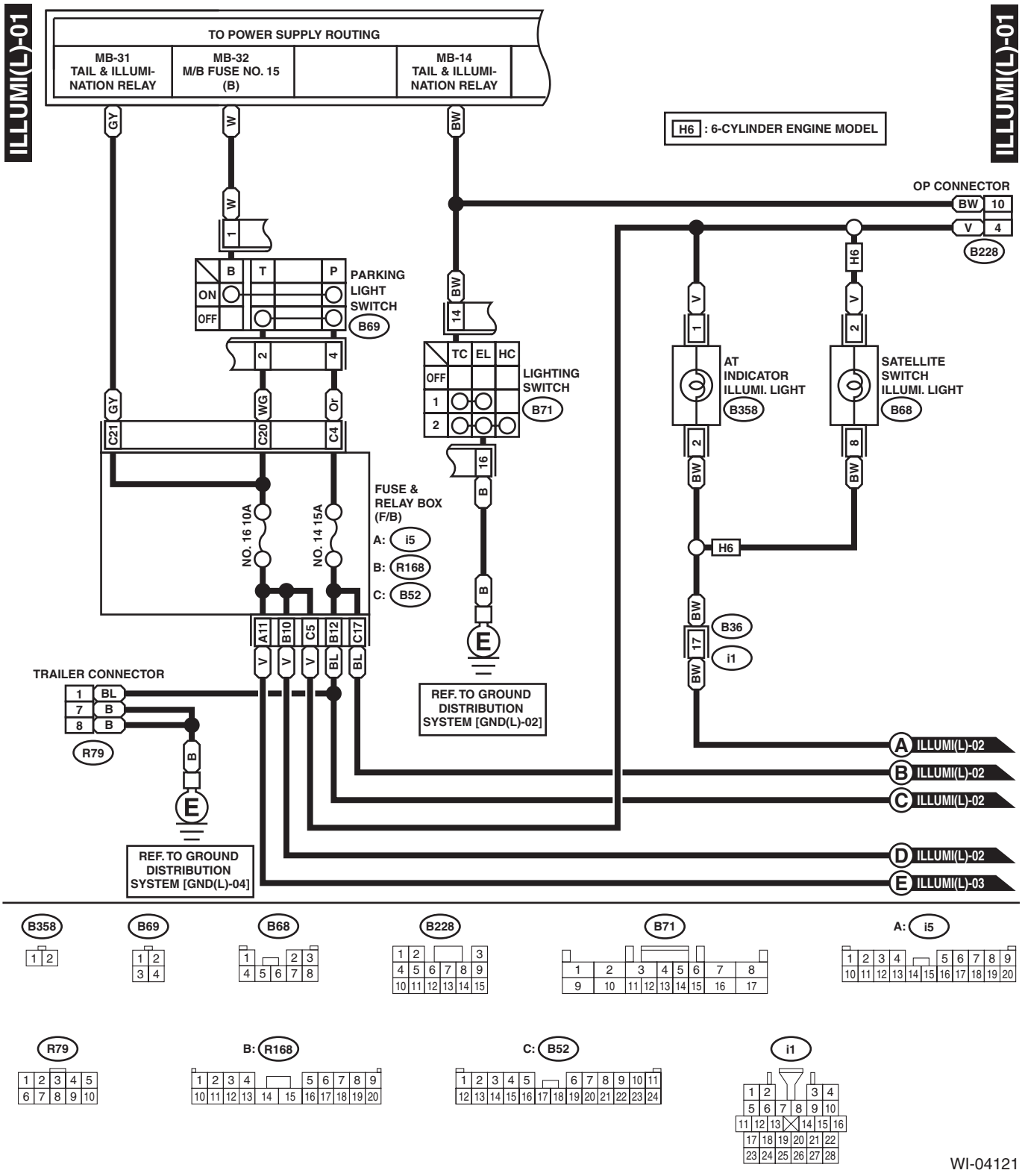


WI-04120

25.Clearance Light and Illumination Light System

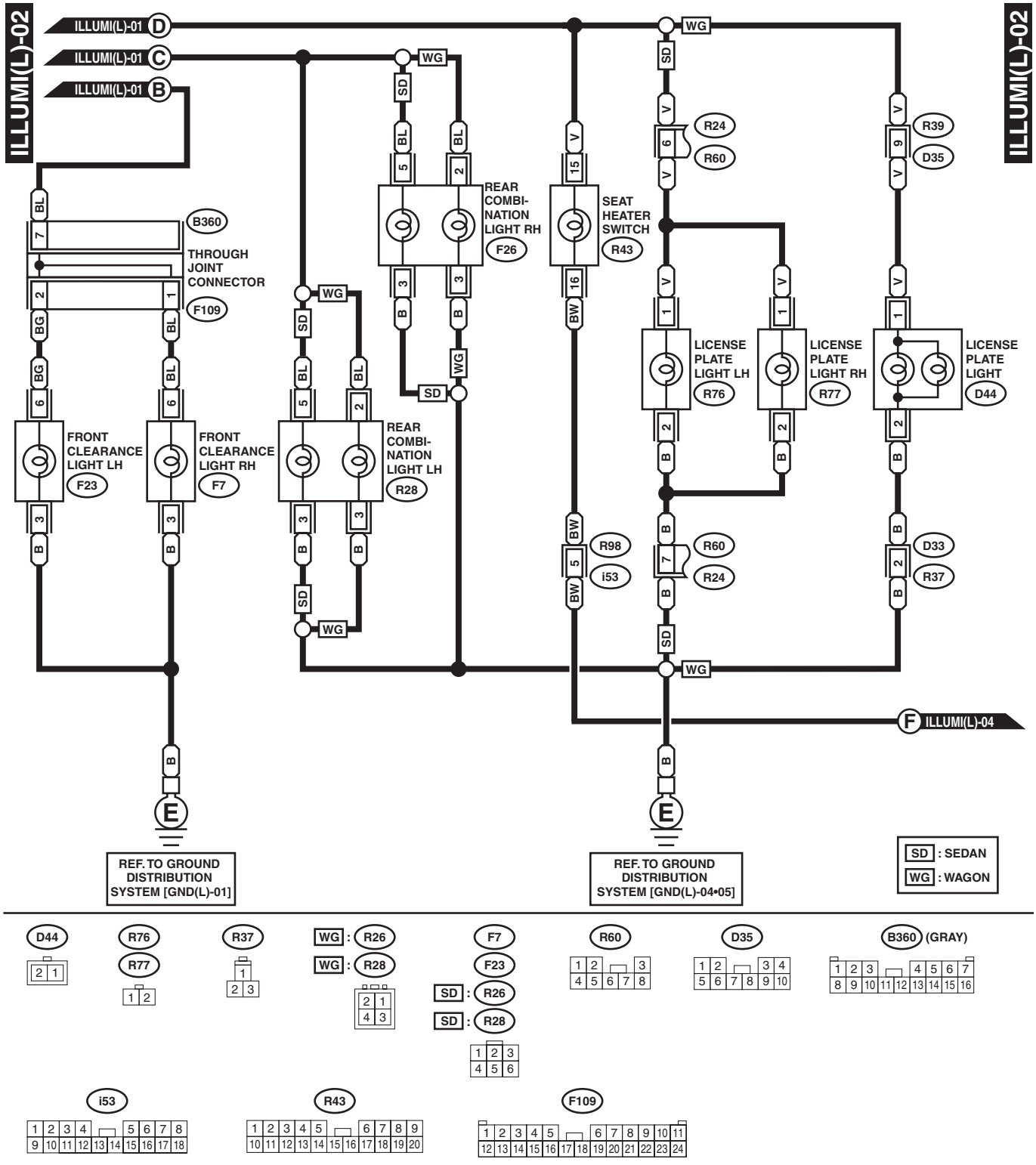
A: WIRING DIAGRAM

1. LHD MODEL

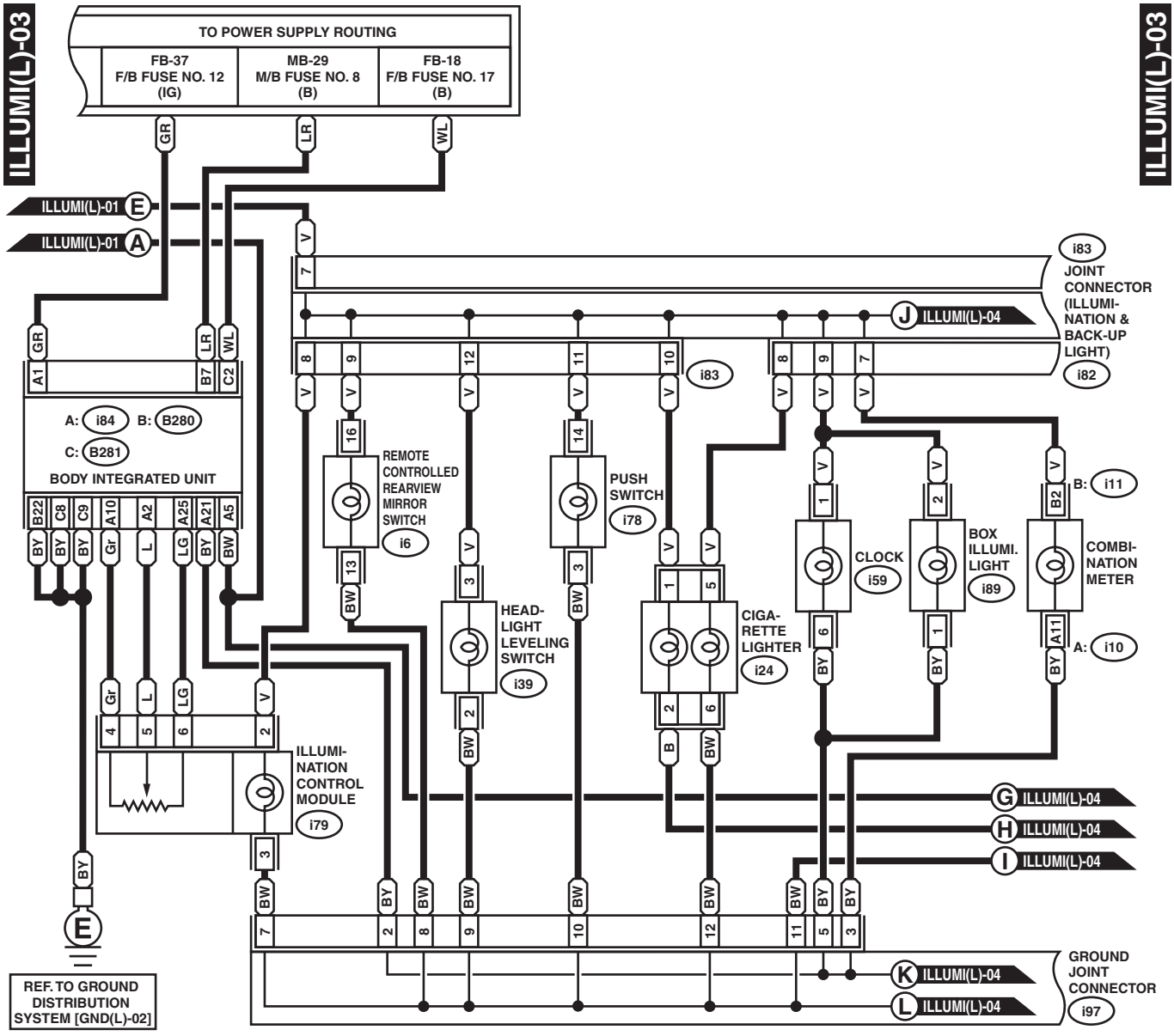


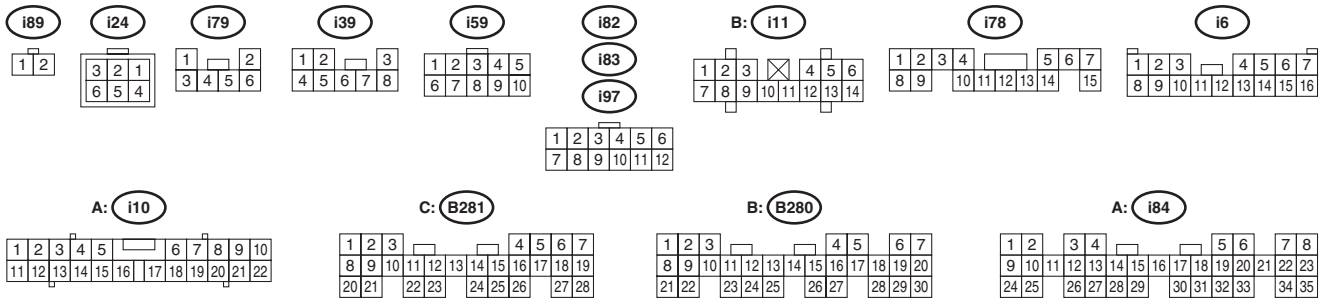
WI-04121

Clearance Light and Illumination Light System

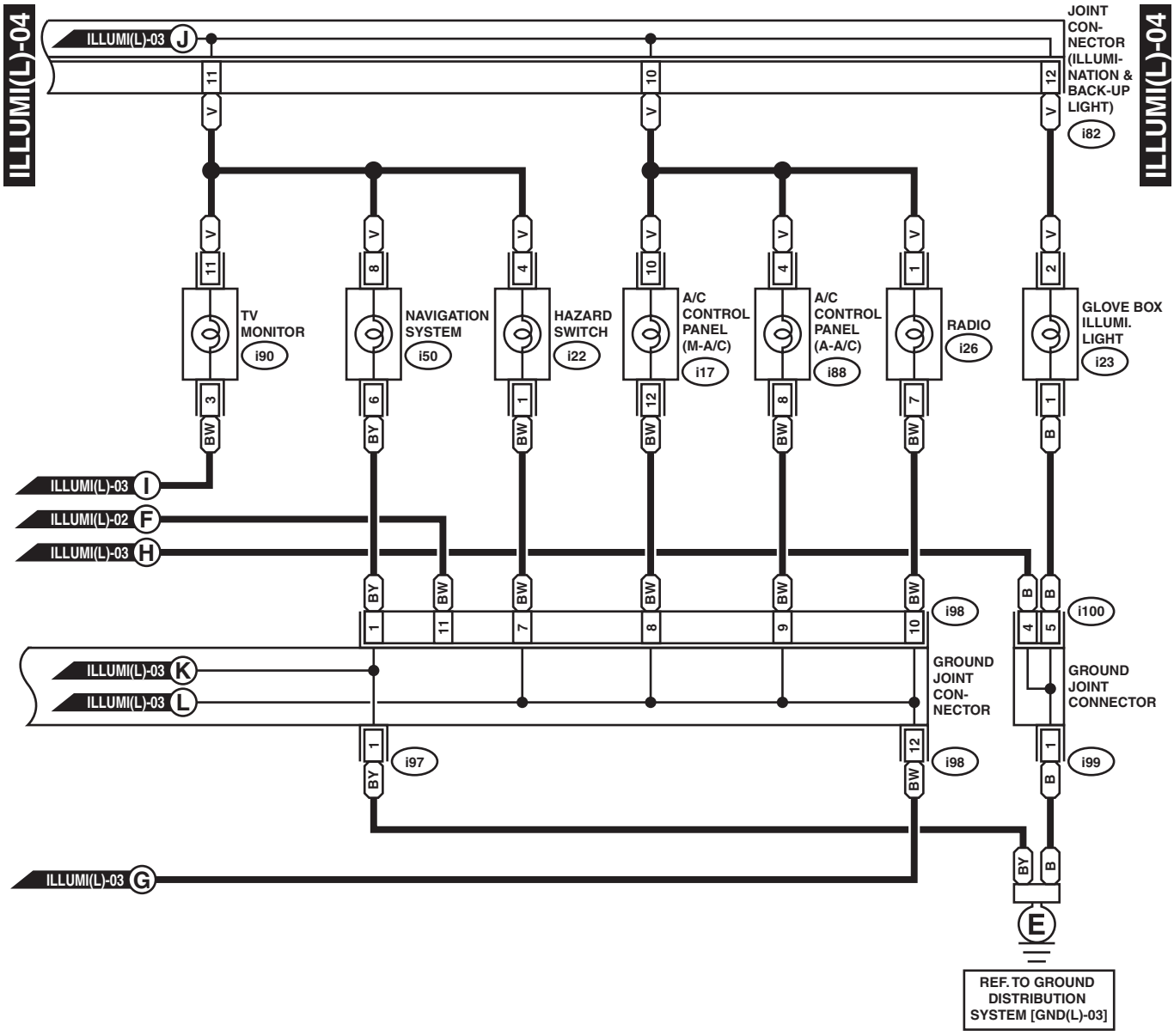


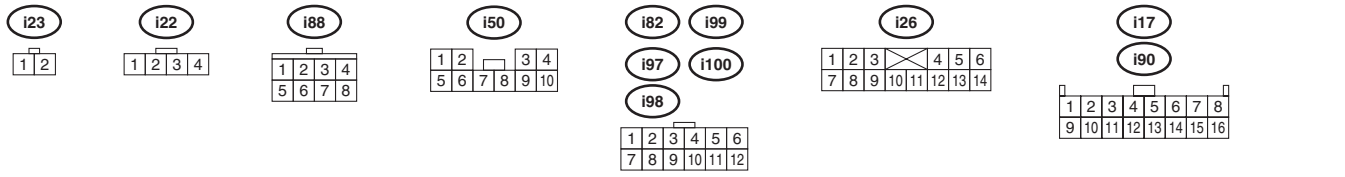
WI-04122


ILLUMI(L)-03
TO POWER SUPPLY ROUTING
FB-37 F/B FUSE NO. 12 (IG)
MB-29 M/B FUSE NO. 8 (B)
FB-18 F/B FUSE NO. 17 (B)
GR
LR
WL
ILLUMI(L)-01 E
ILLUMI(L)-01 A
i83 JOINT CONNECTOR (ILLUMINATION & BACK-UP LIGHT)
J ILLUMI(L)-04
i82
A: i84 B: B280
C: B281
BODY INTEGRATED UNIT
REMOTE CONTROLLED REARVIEW MIRROR SWITCH i6
PUSH SWITCH i78
HEAD-LIGHT LEVELING SWITCH i39
CIGA-RETTE LIGHTER i24
CLOCK i59
BOX ILLUMI. LIGHT i89
B: i11
COMBI-NATION METER
A: i10
ILLUMI-NATION CONTROL MODULE i79
G ILLUMI(L)-04
H ILLUMI(L)-04
I ILLUMI(L)-04
K ILLUMI(L)-04
L ILLUMI(L)-04
GROUND JOINT CONNECTOR i97
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
ILLUMI(L)-03


i89
i24
i79
i39
i59
i82
i83
i97
B: i11
i78
i6
A: i10
C: B281
B: B280
A: i84

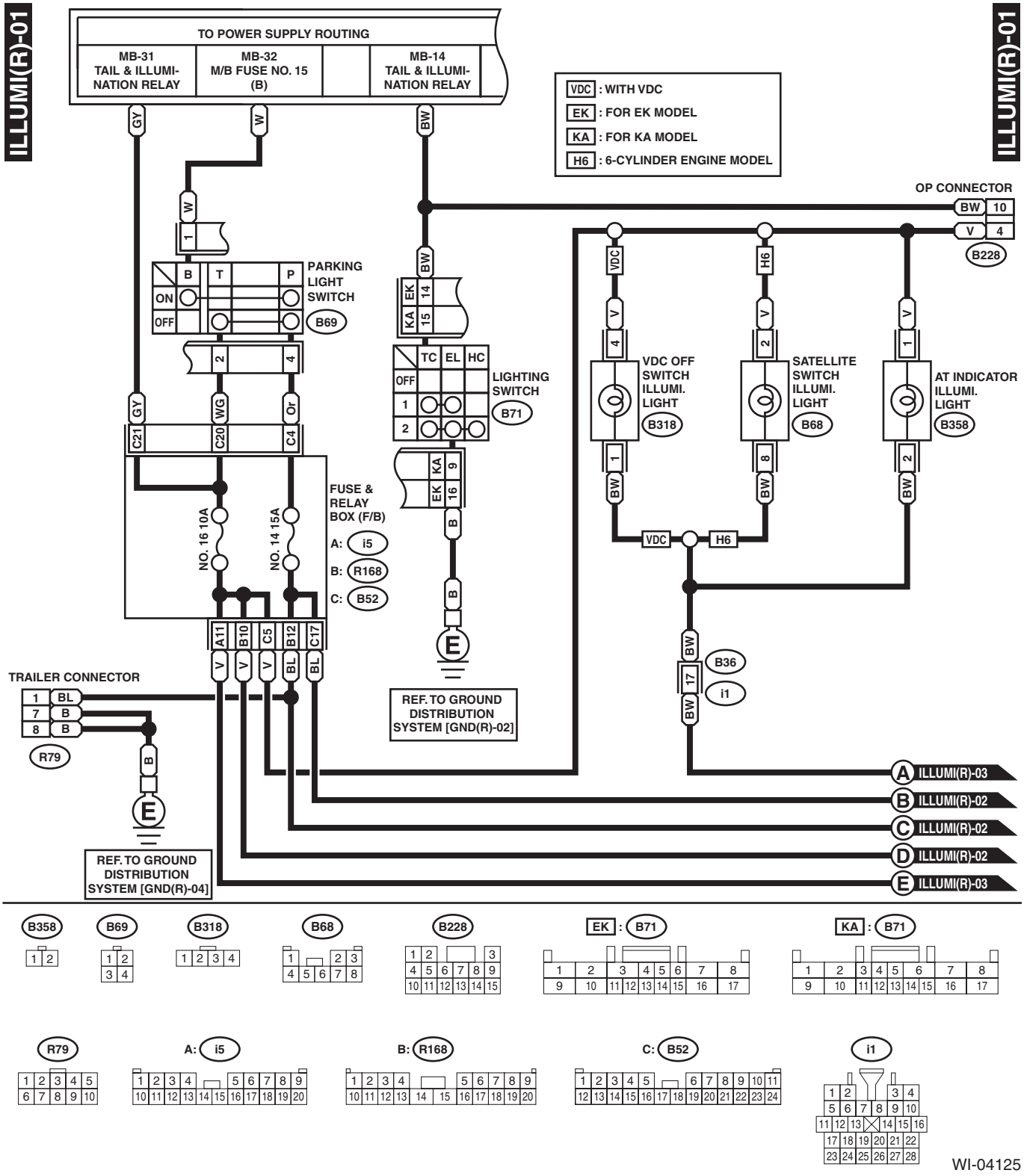
WI-04123


ILLUMI(L)-04
ILLUMI(L)-03 J
JOINT CON-NECTOR (ILLUMI-NATION & BACK-UP LIGHT)
i82
TV MONITOR
i90
NAVIGATION SYSTEM
i50
HAZARD SWITCH
i22
A/C CONTROL PANEL (M-A/C)
i17
A/C CONTROL PANEL (A-A/C)
i88
RADIO
i26
GLOVE BOX ILLUMI. LIGHT
i23
ILLUMI(L)-03 I
ILLUMI(L)-02 F
ILLUMI(L)-03 H
i98
i100
ILLUMI(L)-03 K
ILLUMI(L)-03 L
GROUND JOINT CON-NECTOR
GROUND JOINT CONNECTOR
i97
i98
i99
ILLUMI(L)-03 G
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]

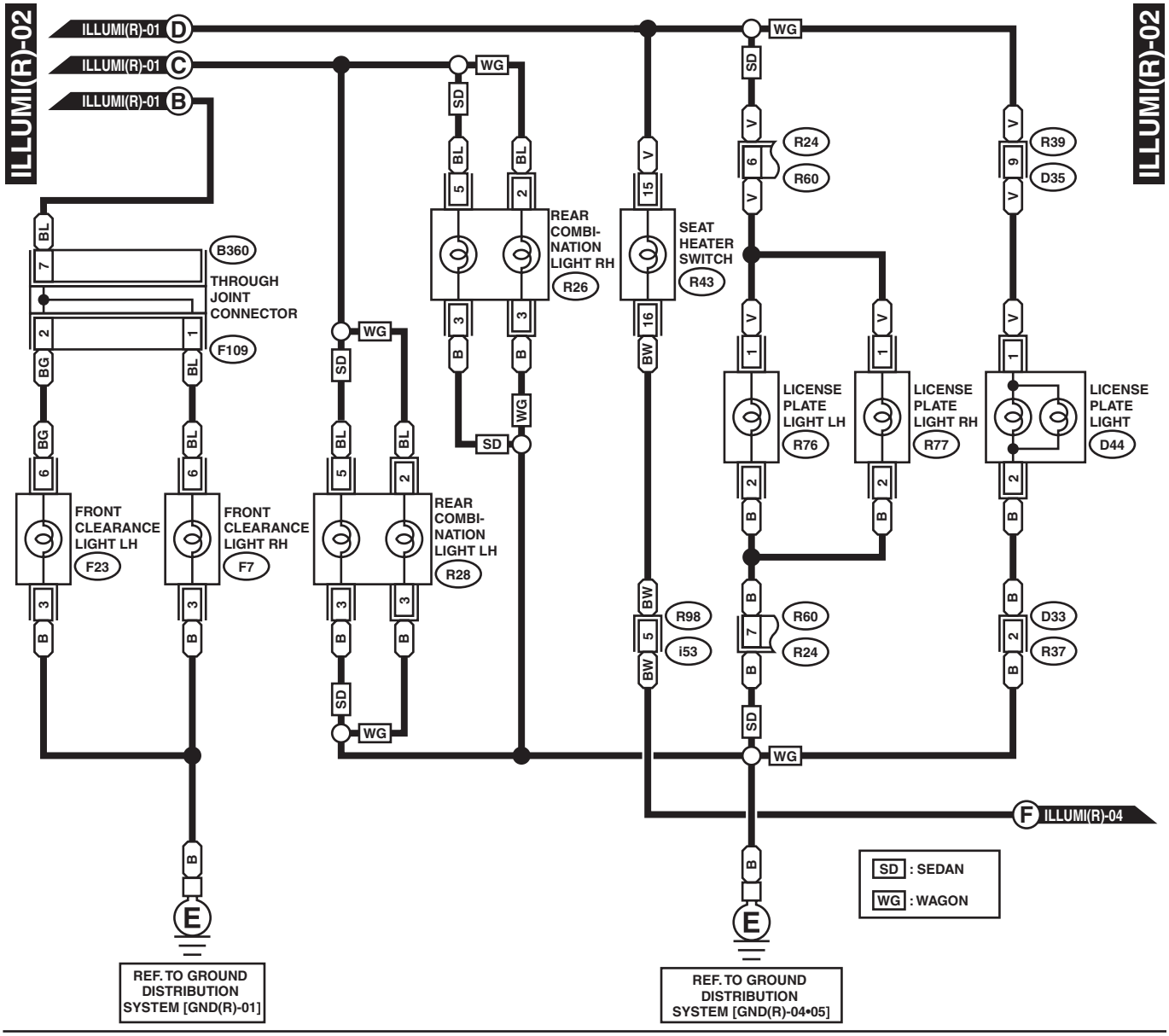

i23
i22
i88
i50
i82
i99
i97
i100
i98
i26
i17
i90

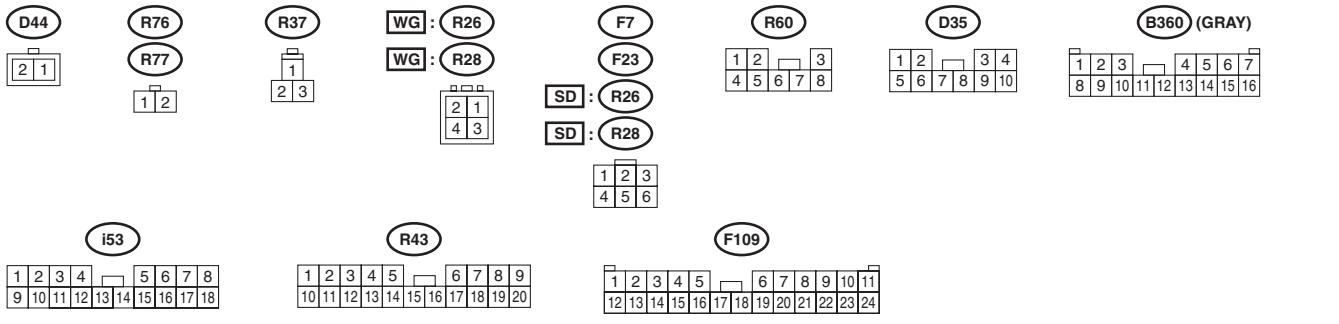
WI-04124

2. RHD MODEL

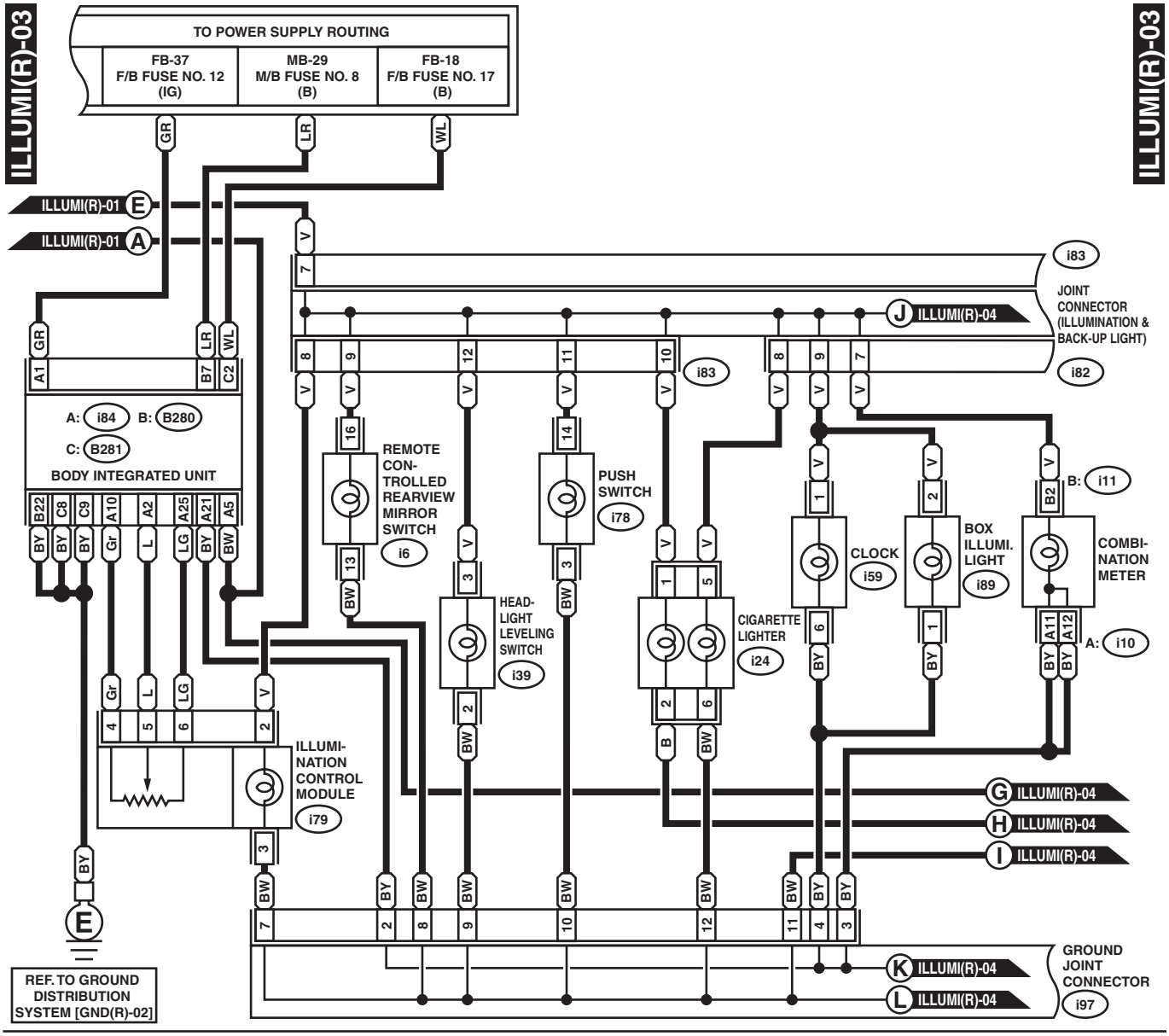

ILLUMI(R)-01
ILLUMI(R)-01
TO POWER SUPPLY ROUTING
MB-31 TAIL & ILLUMI-NATION RELAY
MB-32 M/B FUSE NO. 15 (B)
MB-14 TAIL & ILLUMI-NATION RELAY
VDC : WITH VDC
EK : FOR EK MODEL
KA : FOR KA MODEL
H6 : 6-CYLINDER ENGINE MODEL
OP CONNECTOR
B228
PARKING LIGHT SWITCH
B69
LIGHTING SWITCH
B71
VDC OFF SWITCH ILLUMI. LIGHT
B318
SATELLITE SWITCH ILLUMI. LIGHT
B68
AT INDICATOR ILLUMI. LIGHT
B358
FUSE & RELAY BOX (F/B)
NO. 16 10A
NO. 14 15A
A: i5
B: R168
C: B52
B36
i1
TRAILER CONNECTOR
R79
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
A ILLUMI(R)-03
B ILLUMI(R)-02
C ILLUMI(R)-02
D ILLUMI(R)-02
E ILLUMI(R)-03
WI-04125

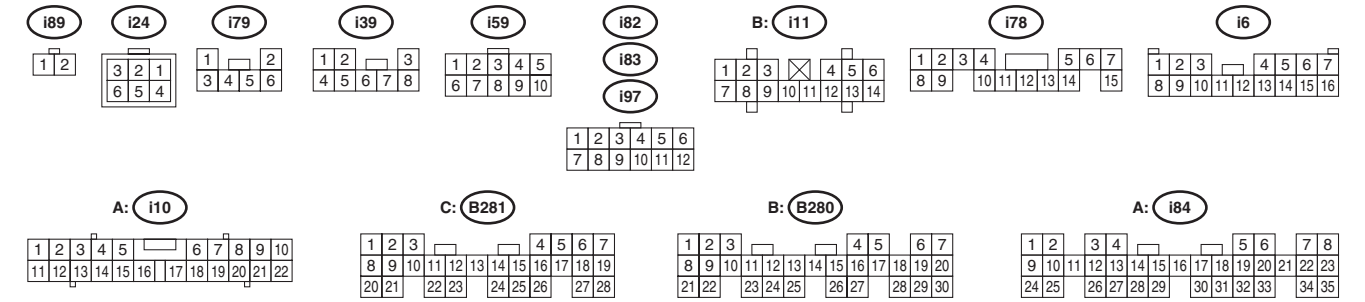
Clearance Light and Illumination Light System



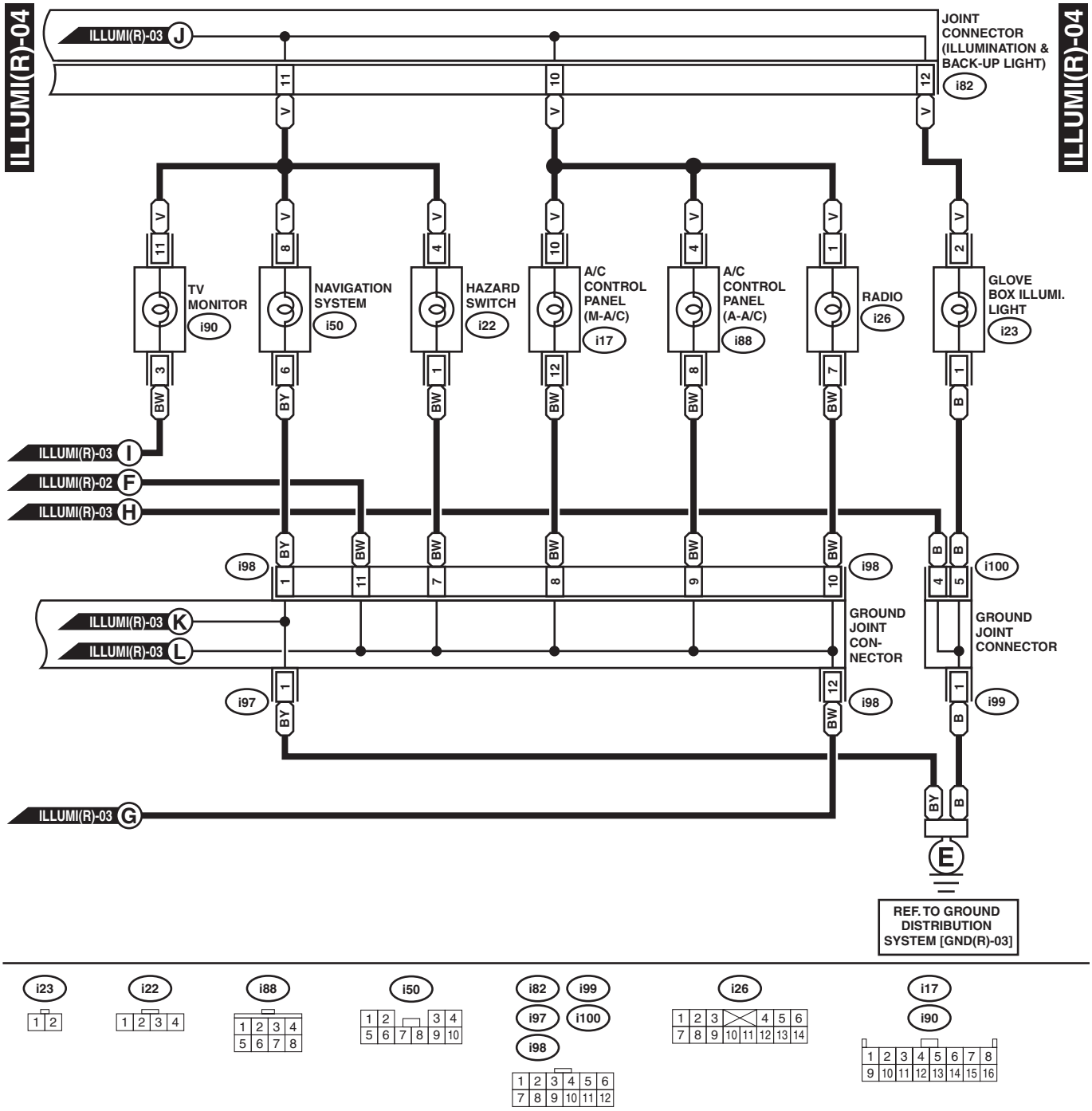


WI-04126


ILLUMI(R)-03
TO POWER SUPPLY ROUTING
FB-37 F/B FUSE NO. 12 (IG)
MB-29 M/B FUSE NO. 8 (B)
FB-18 F/B FUSE NO. 17 (B)
ILLUMI(R)-01 E
ILLUMI(R)-01 A
i83
JOINT CONNECTOR (ILLUMINATION & BACK-UP LIGHT)
J ILLUMI(R)-04
i82
A: i84 B: B280
C: B281
BODY INTEGRATED UNIT
REMOTE CON-TROLLED REARVIEW MIRROR SWITCH i6
PUSH SWITCH i78
HEAD-LIGHT LEVELING SWITCH i39
CIGARETTE LIGHTER i24
CLOCK i59
BOX ILLUMI. LIGHT i89
B: i11
COMBI-NATION METER
A: i10
ILLUMI-NATION CONTROL MODULE i79
G ILLUMI(R)-04
H ILLUMI(R)-04
I ILLUMI(R)-04
K ILLUMI(R)-04
L ILLUMI(R)-04
GROUND JOINT CONNECTOR i97
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]


i89
i24
i79
i39
i59
i82
i83
i97
B: i11
i78
i6
A: i10
C: B281
B: B280
A: i84

WI-04127


ILLUMI(R)-04
ILLUMI(R)-04
ILLUMI(R)-03 J
JOINT CONNECTOR (ILLUMINATION & BACK-UP LIGHT)
i82
TV MONITOR
i90
NAVIGATION SYSTEM
i50
HAZARD SWITCH
i22
A/C CONTROL PANEL (M-A/C)
i17
A/C CONTROL PANEL (A-A/C)
i88
RADIO
i26
GLOVE BOX ILLUMI. LIGHT
i23
ILLUMI(R)-03 I
ILLUMI(R)-02 F
ILLUMI(R)-03 H
i98
i100
ILLUMI(R)-03 K
ILLUMI(R)-03 L
GROUND JOINT CON-NECTOR
GROUND JOINT CONNECTOR
i97
i99
ILLUMI(R)-03 G
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]

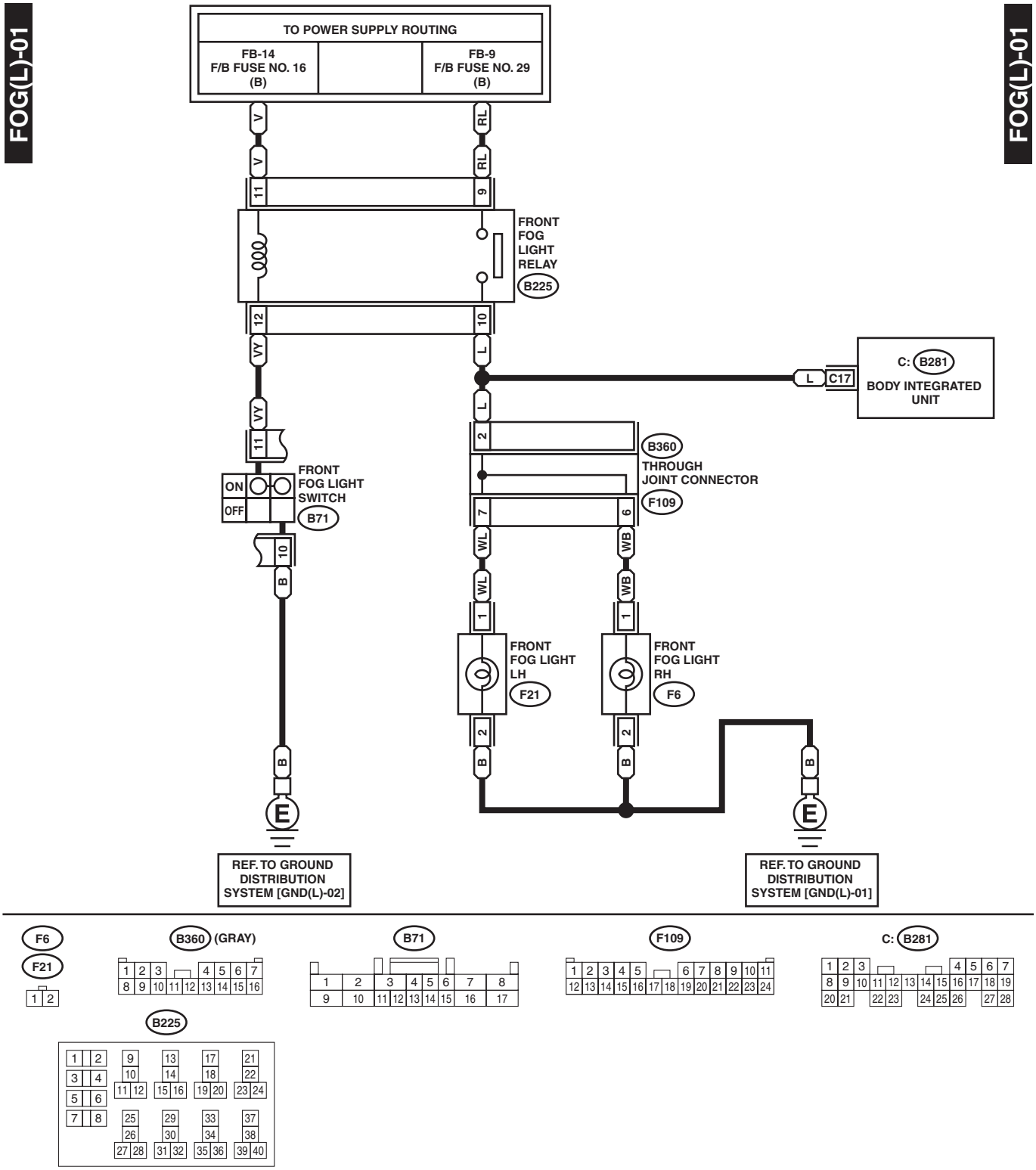
i23
i22
i88
i50
i82
i99
i97
i100
i98
i26
i17
i90

WI-04128

26.Front Fog Light System

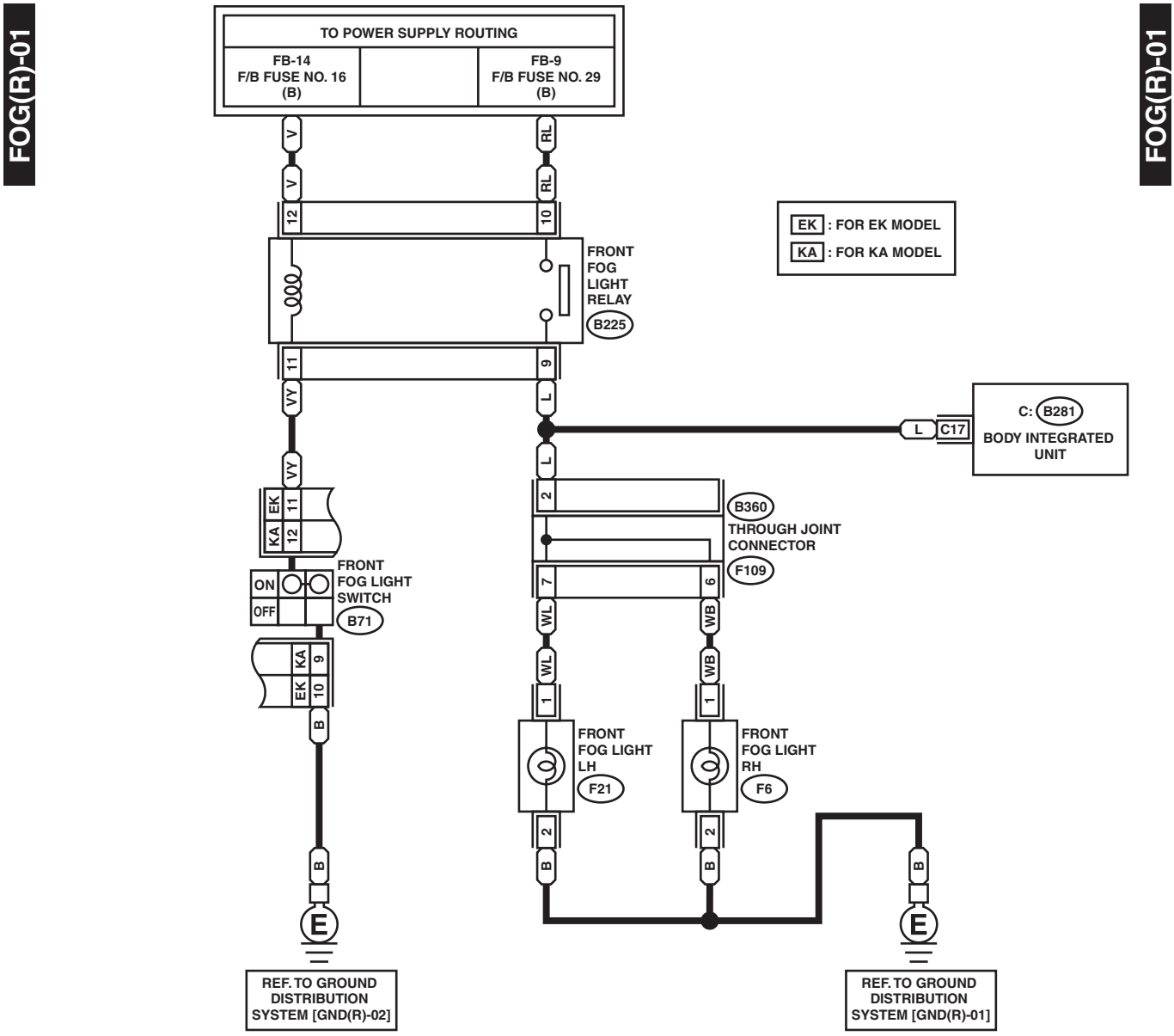
A: WIRING DIAGRAM

1. LHD MODEL



WI-04129

2. RHD MODEL

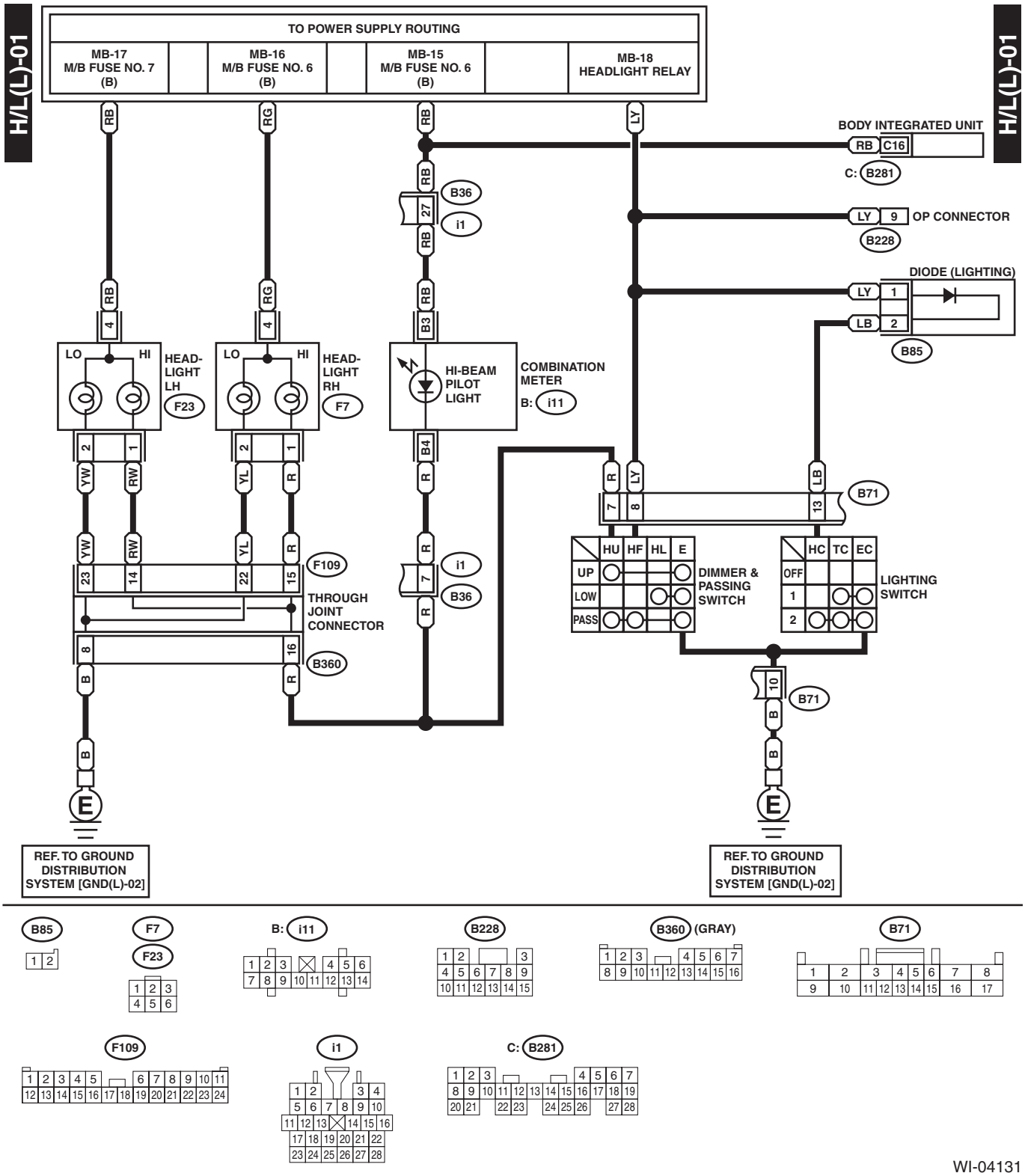


WI-04130

27.Headlight System

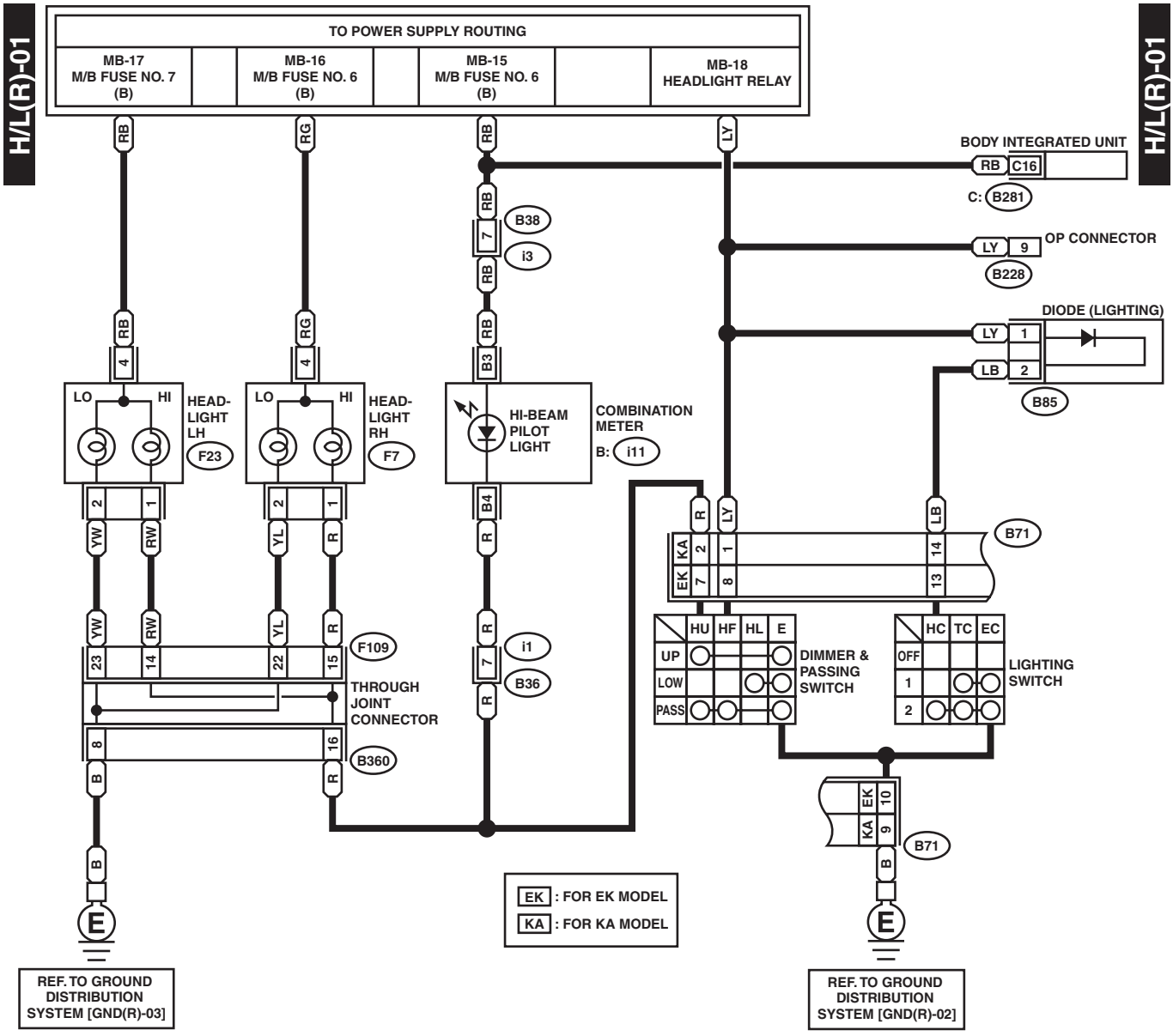
A: WIRING DIAGRAM

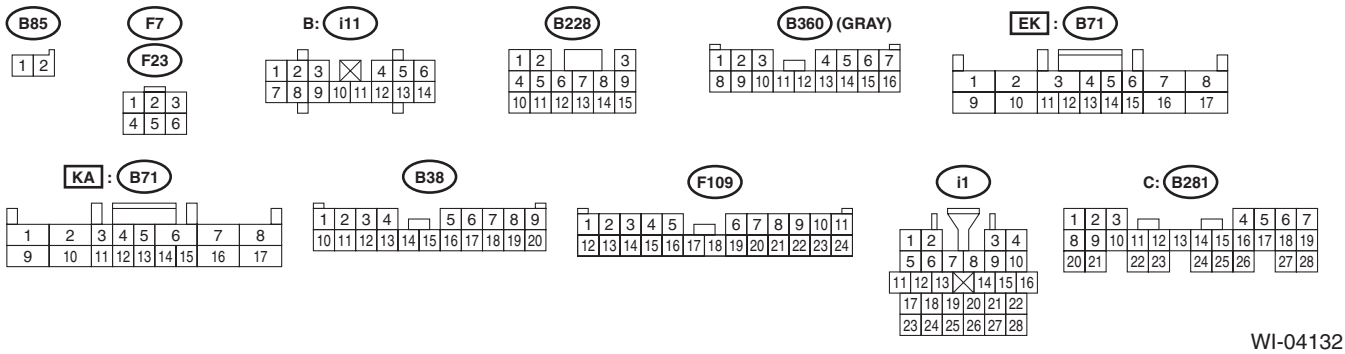
1. LHD MODEL



WI-04131

2. RHD MODEL



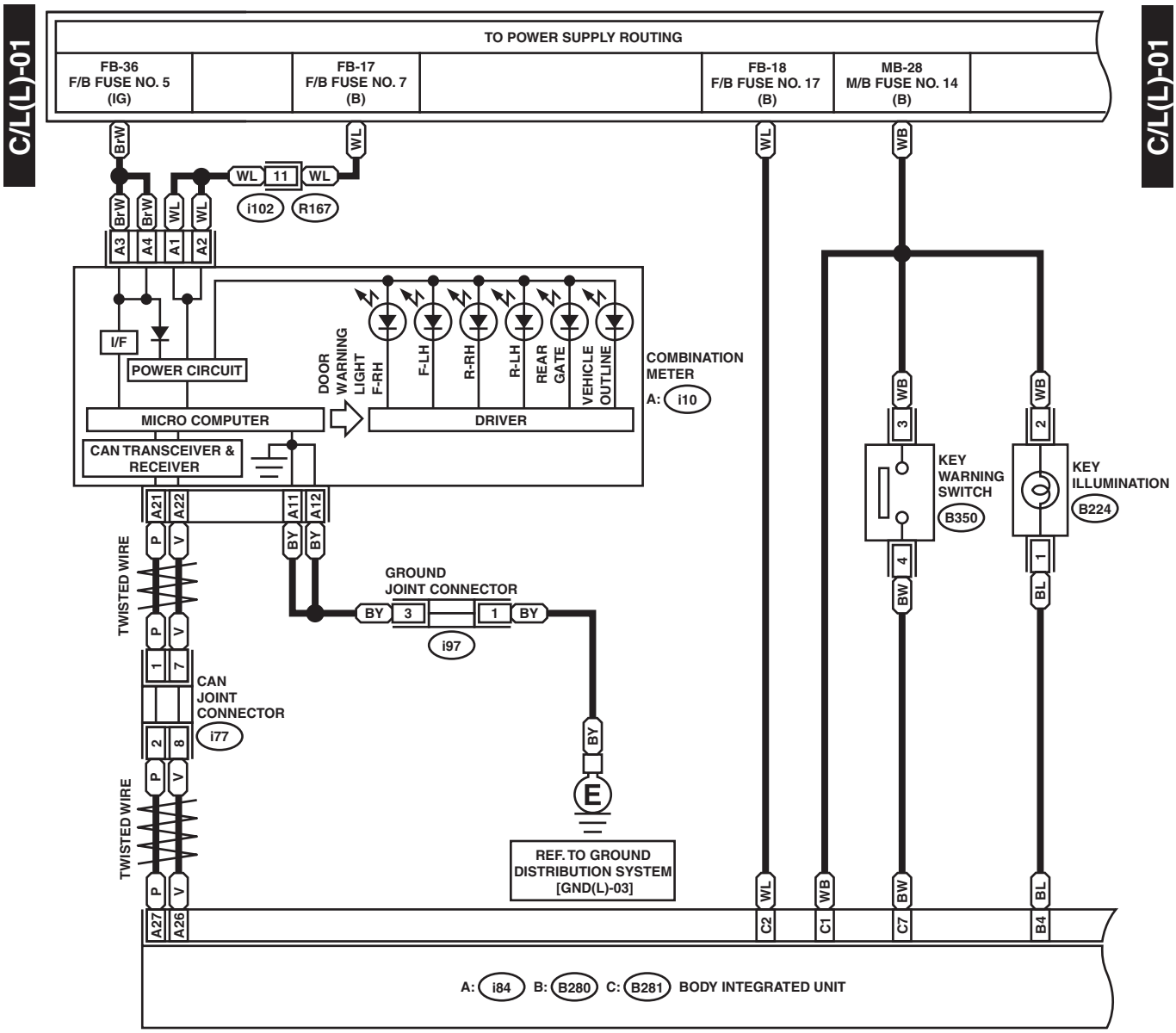


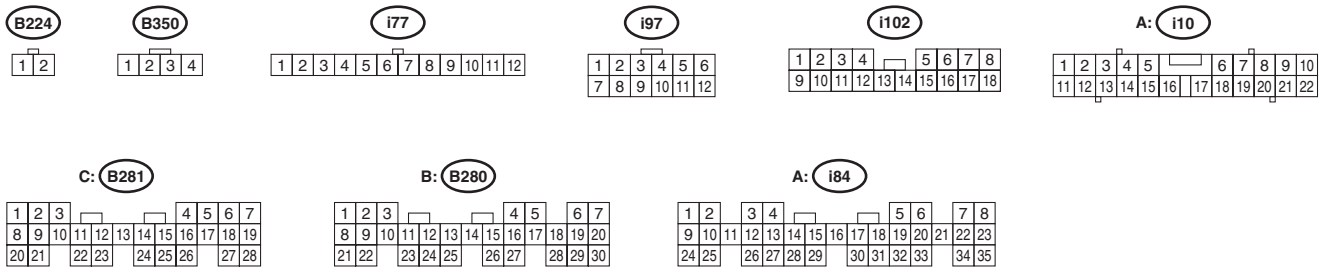
WI-04132

28.Interior Light System

A: WIRING DIAGRAM

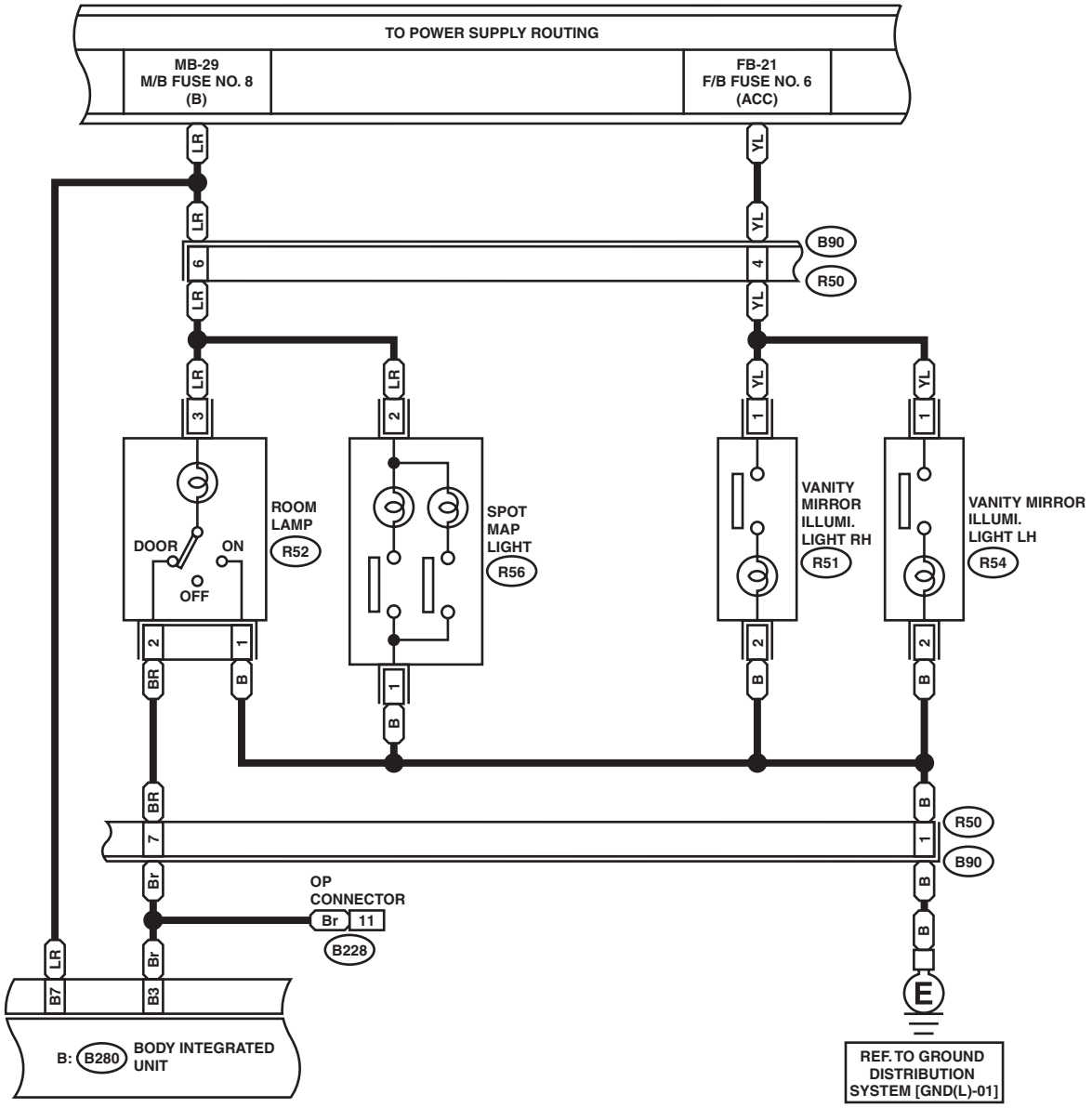
1. LHD MODEL

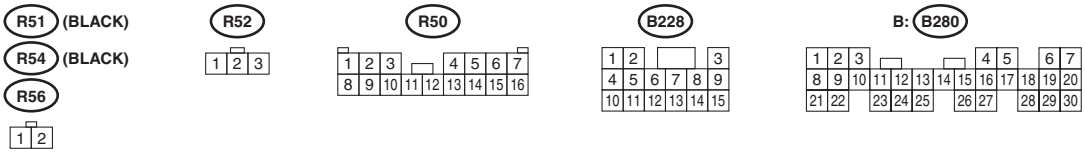




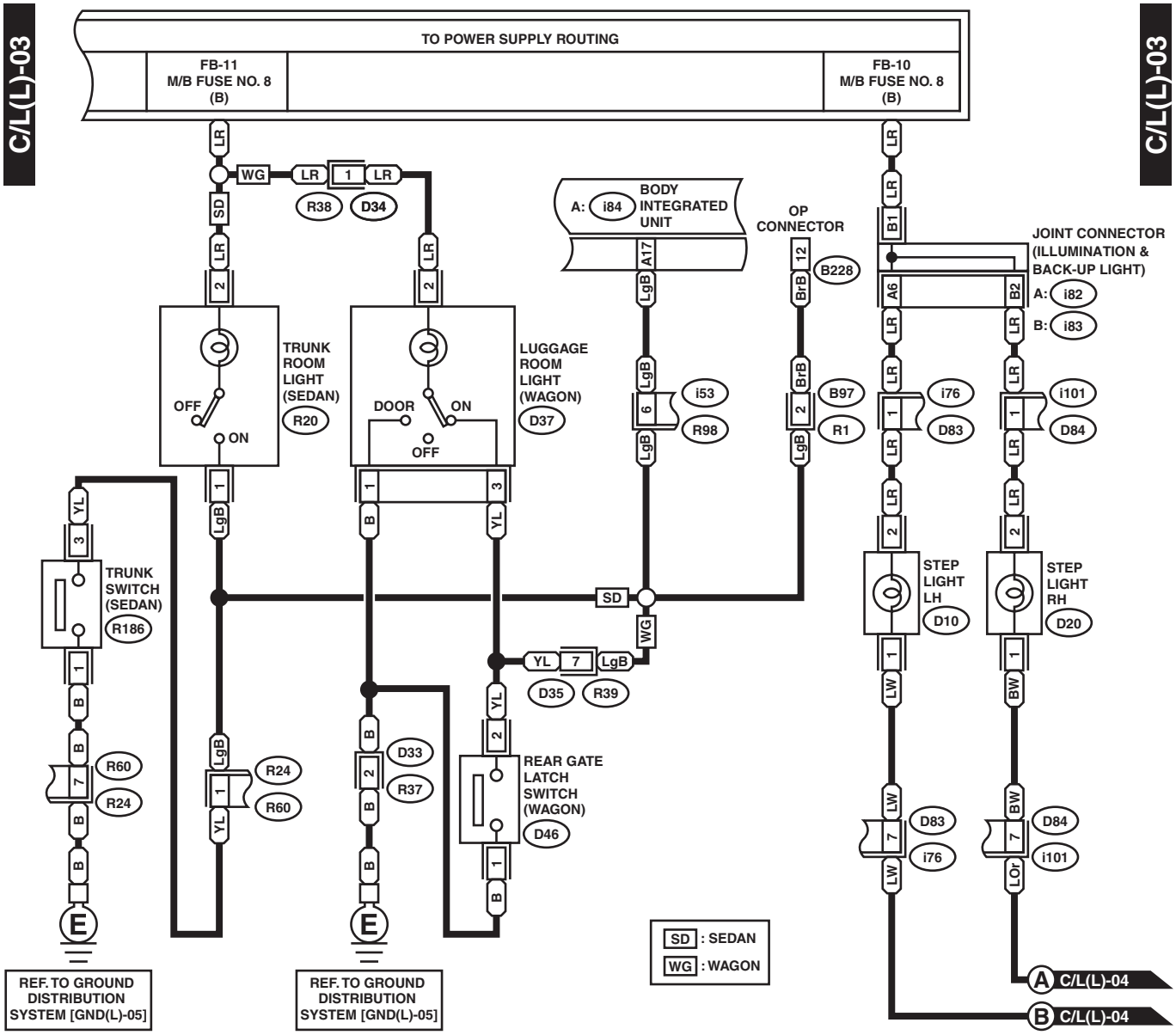
WI-04134

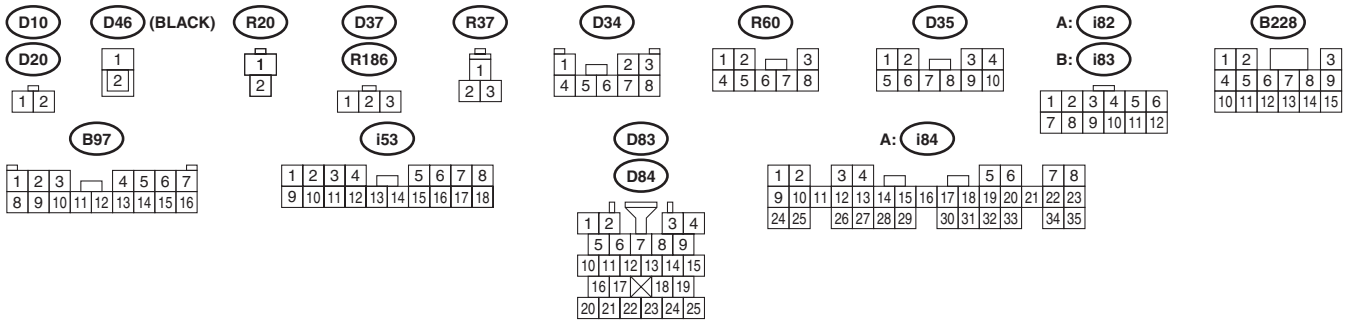
C/L(L)-02





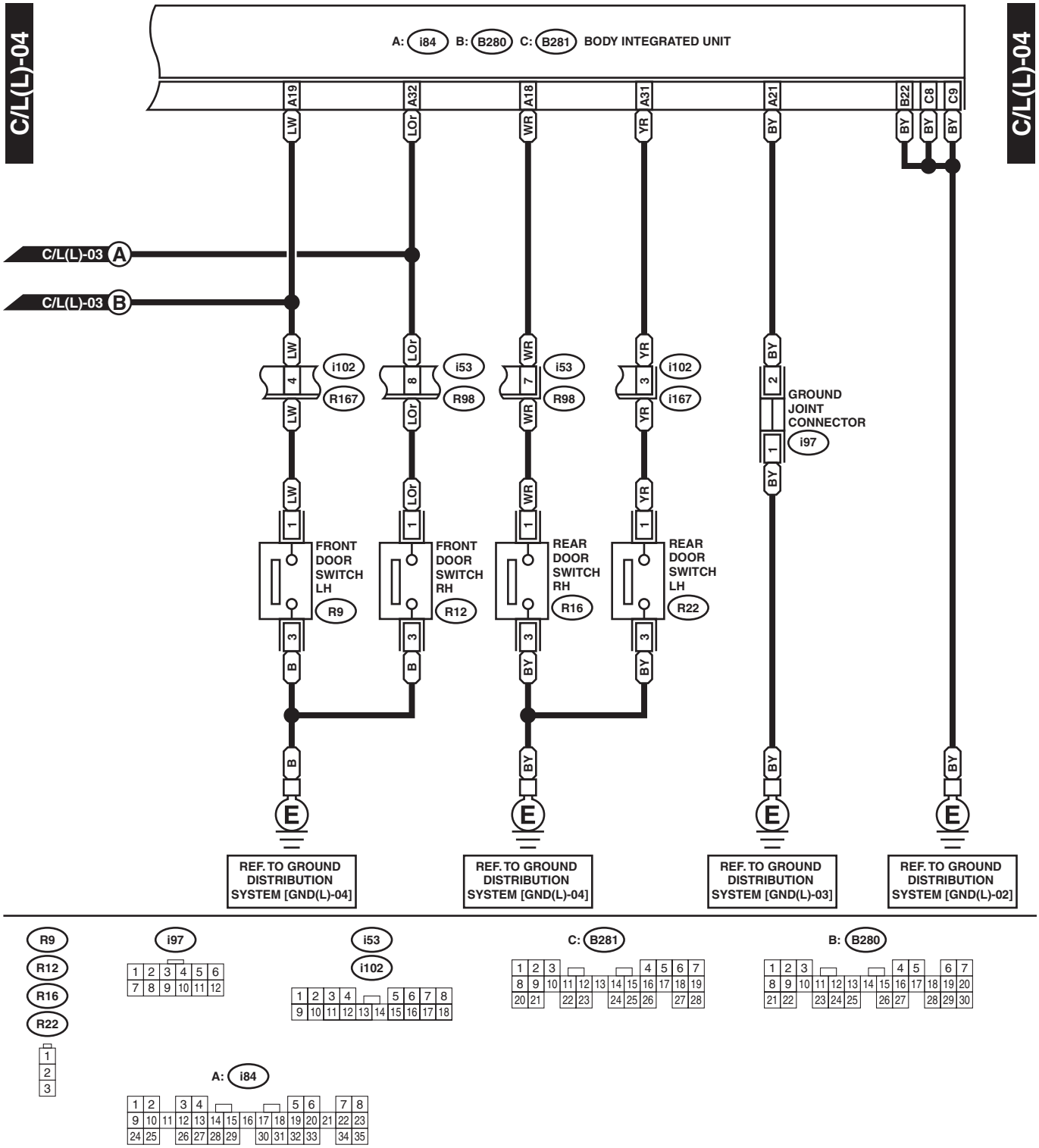
WI-04135


C/L(L)-03
C/L(L)-03
TO POWER SUPPLY ROUTING
FB-11
M/B FUSE NO. 8
(B)
FB-10
M/B FUSE NO. 8
(B)
BODY
INTEGRATED
UNIT
A: i84
OP
CONNECTOR
B228
JOINT CONNECTOR
(ILLUMINATION &
BACK-UP LIGHT)
A: i82
B: i83
TRUNK
ROOM
LIGHT
(SEDAN)
R20
OFF
ON
LUGGAGE
ROOM
LIGHT
(WAGON)
D37
DOOR
ON
OFF
i53
R98
B97
R1
i76
D83
i101
D84
STEP
LIGHT
LH
D10
STEP
LIGHT
RH
D20
TRUNK
SWITCH
(SEDAN)
R186
R60
R24
D33
R37
REAR GATE
LATCH
SWITCH
(WAGON)
D46
D35
R39
SD : SEDAN
WG : WAGON
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-05]
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-05]
A C/L(L)-04
B C/L(L)-04


D10
D20
D46 (BLACK)
R20
D37
R186
R37
D34
R60
D35
A: i82
B: i83
B228
B97
i53
D83
D84
A: i84

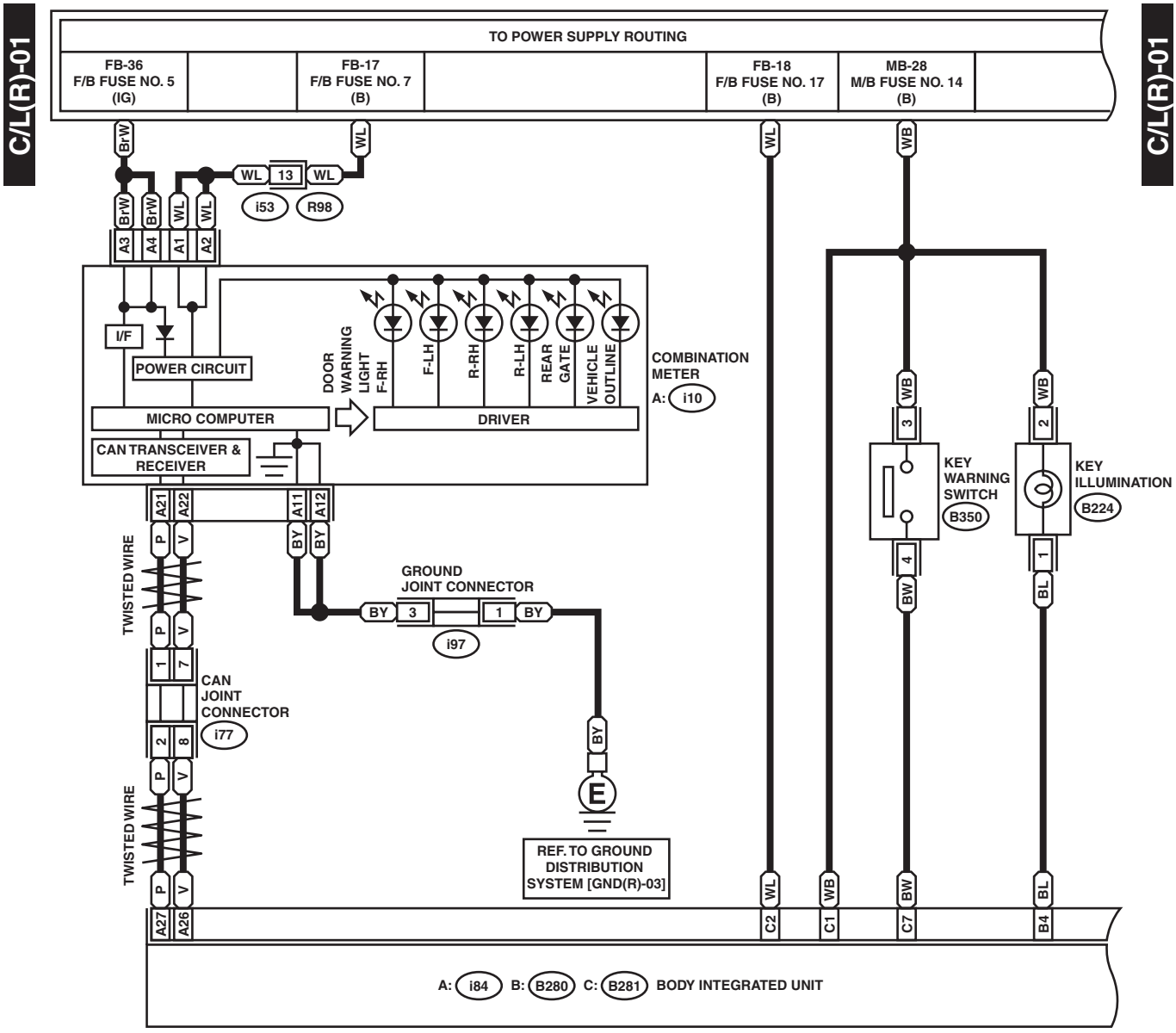
WI-04136

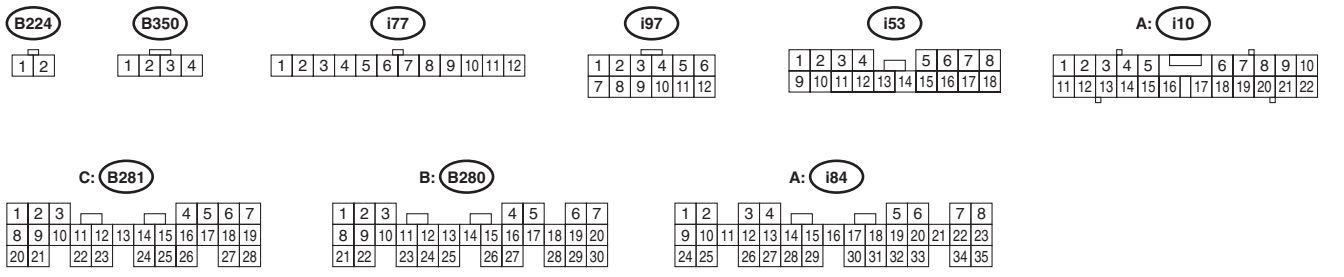
Interior Light System



WI-04137

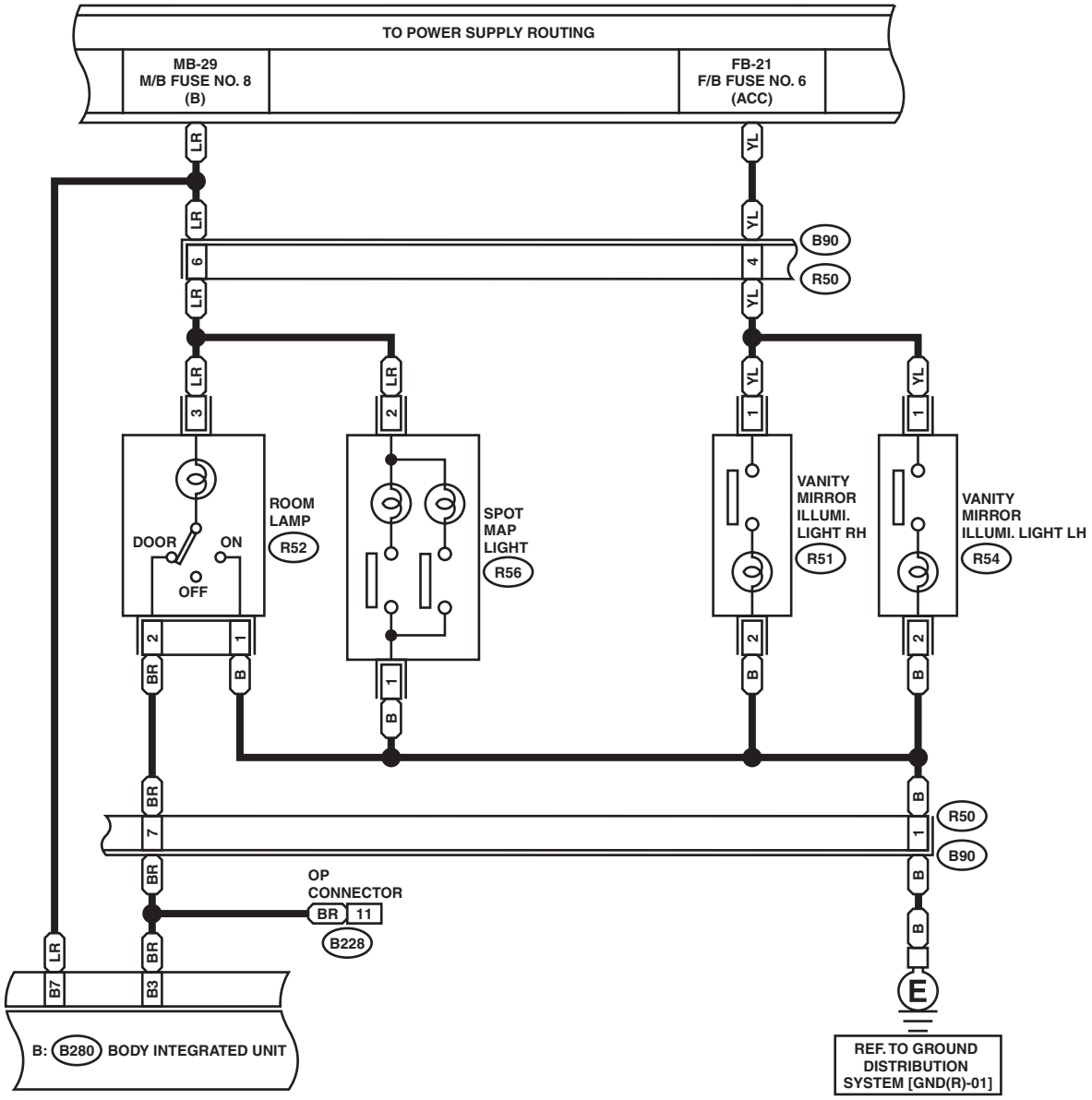
2. RHD MODEL

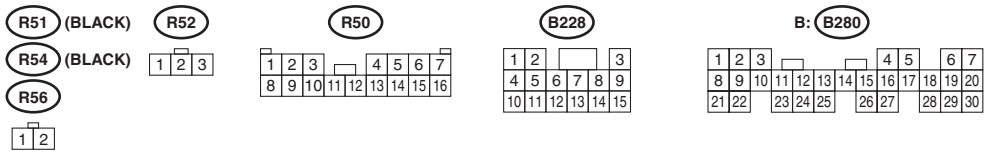




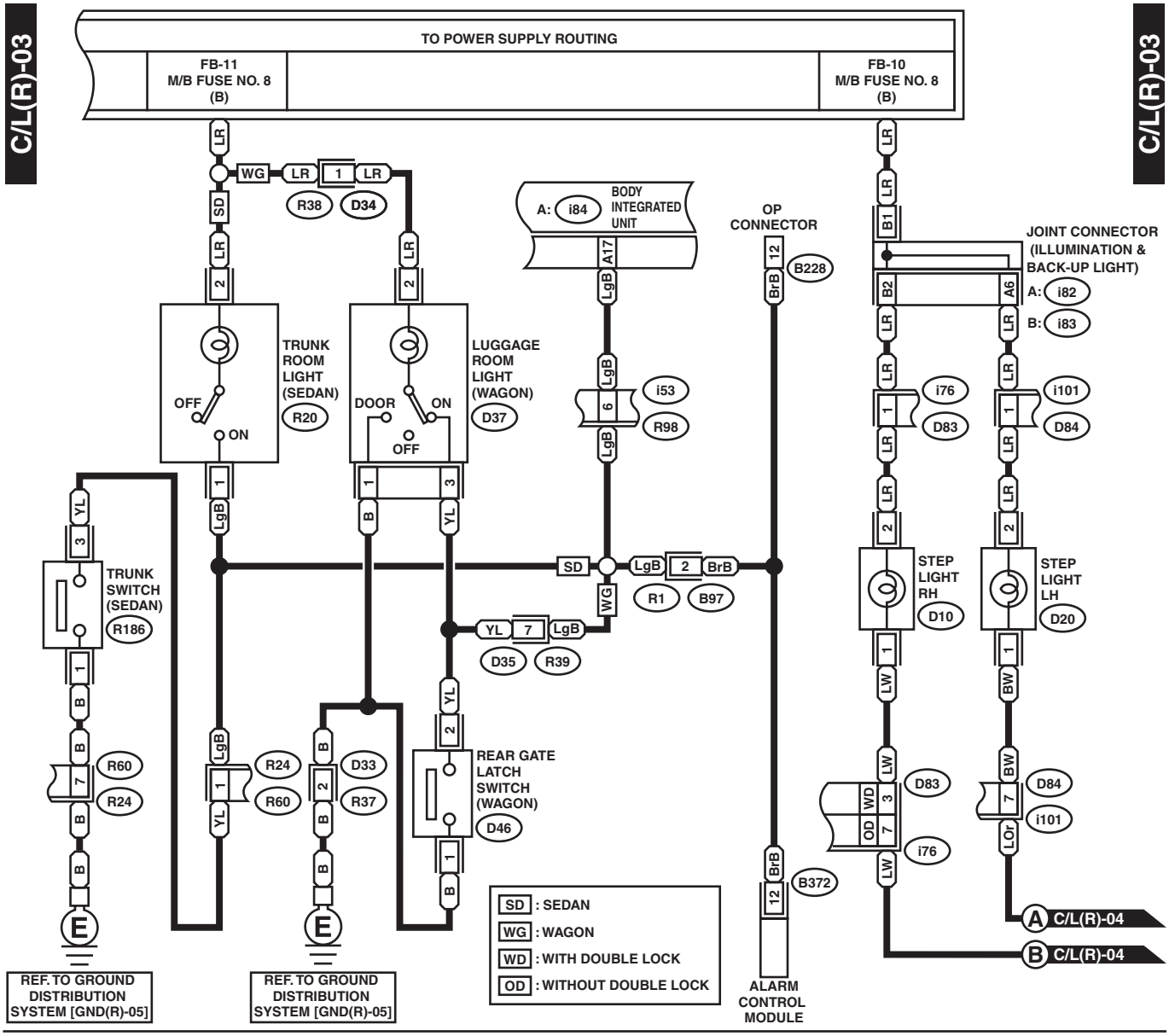
WI-04138

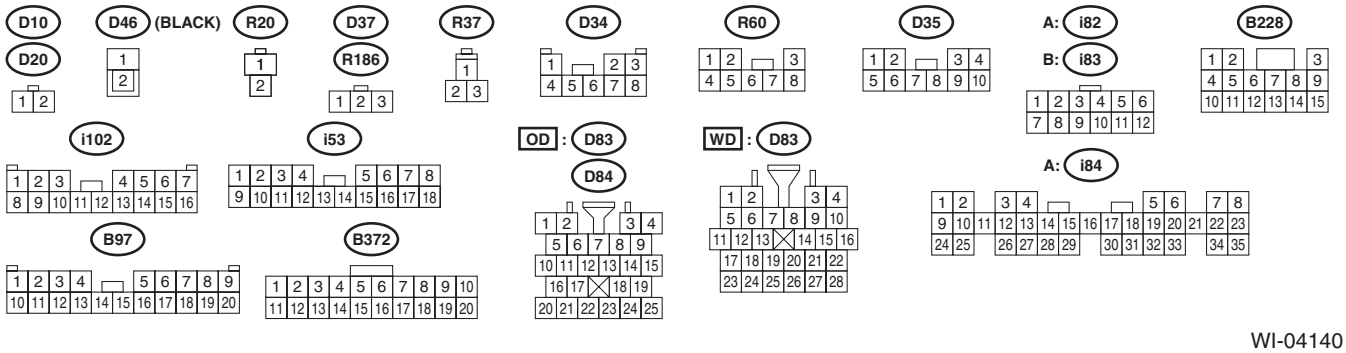
C/L(R)-02





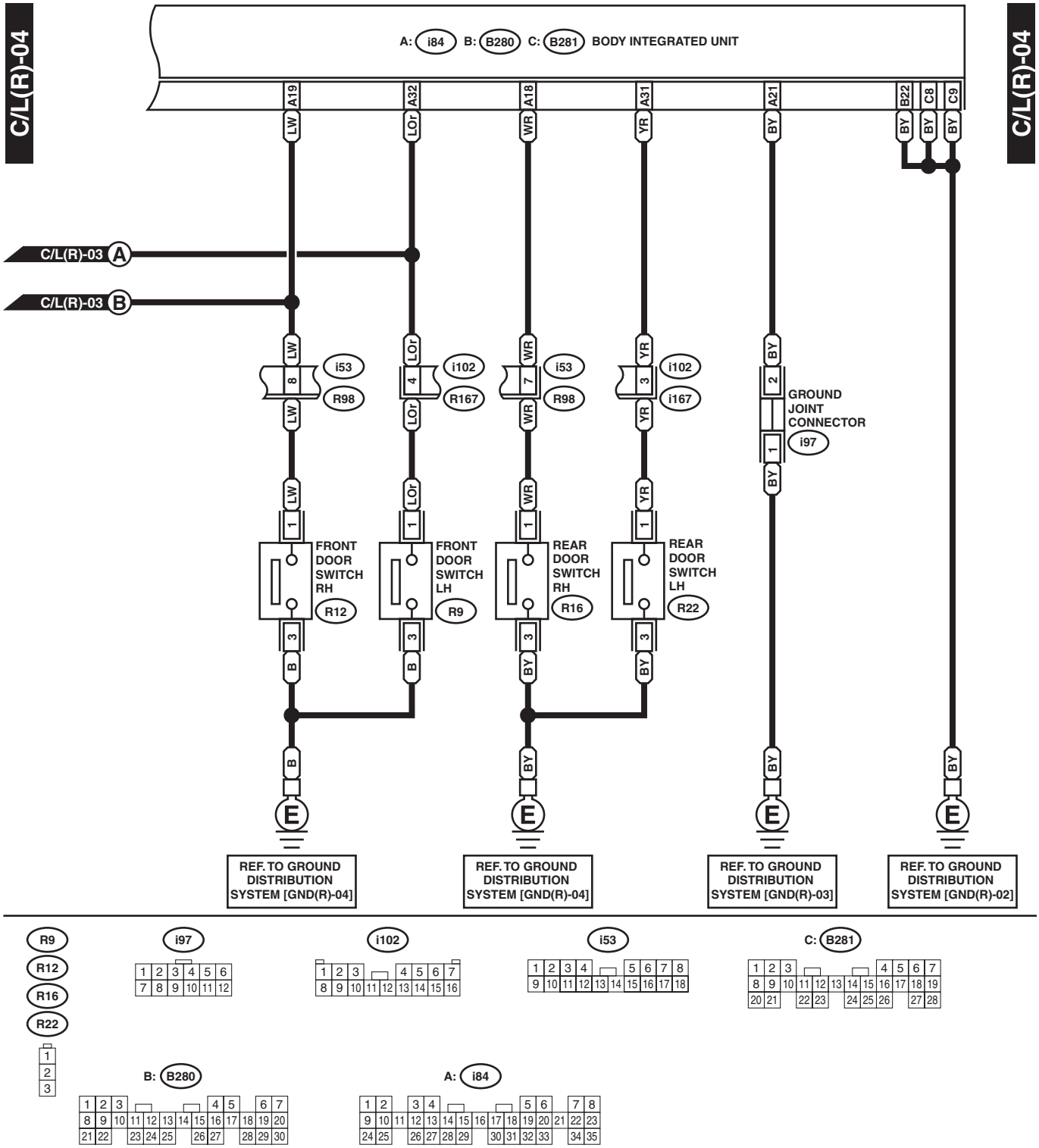
WI-04139


C/L(R)-03
C/L(R)-03
TO POWER SUPPLY ROUTING
FB-11
M/B FUSE NO. 8
(B)
FB-10
M/B FUSE NO. 8
(B)
BODY
INTEGRATED
UNIT
A: i84
OP
CONNECTOR
B228
JOINT CONNECTOR
(ILLUMINATION &
BACK-UP LIGHT)
A: i82
B: i83
TRUNK
ROOM
LIGHT
(SEDAN)
R20
OFF
ON
LUGGAGE
ROOM
LIGHT
(WAGON)
D37
DOOR
ON
OFF
i53
R98
i76
D83
i101
D84
TRUNK
SWITCH
(SEDAN)
R186
STEP
LIGHT
RH
D10
STEP
LIGHT
LH
D20
R60
R24
R24
R60
D33
R37
REAR GATE
LATCH
SWITCH
(WAGON)
D46
R1
B97
YL 7 LgB
D35
R39
D83
i76
D84
i101
B372
A C/L(R)-04
B C/L(R)-04
SD : SEDAN
WG : WAGON
WD : WITH DOUBLE LOCK
OD : WITHOUT DOUBLE LOCK
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-05]
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-05]
ALARM
CONTROL
MODULE


D10
D20
D46 (BLACK)
R20
D37
R186
R37
D34
R60
D35
A: i82
B: i83
A: i84
B228
i102
i53
OD : D83
D84
WD : D83
B97
B372

WI-04140

Interior Light System

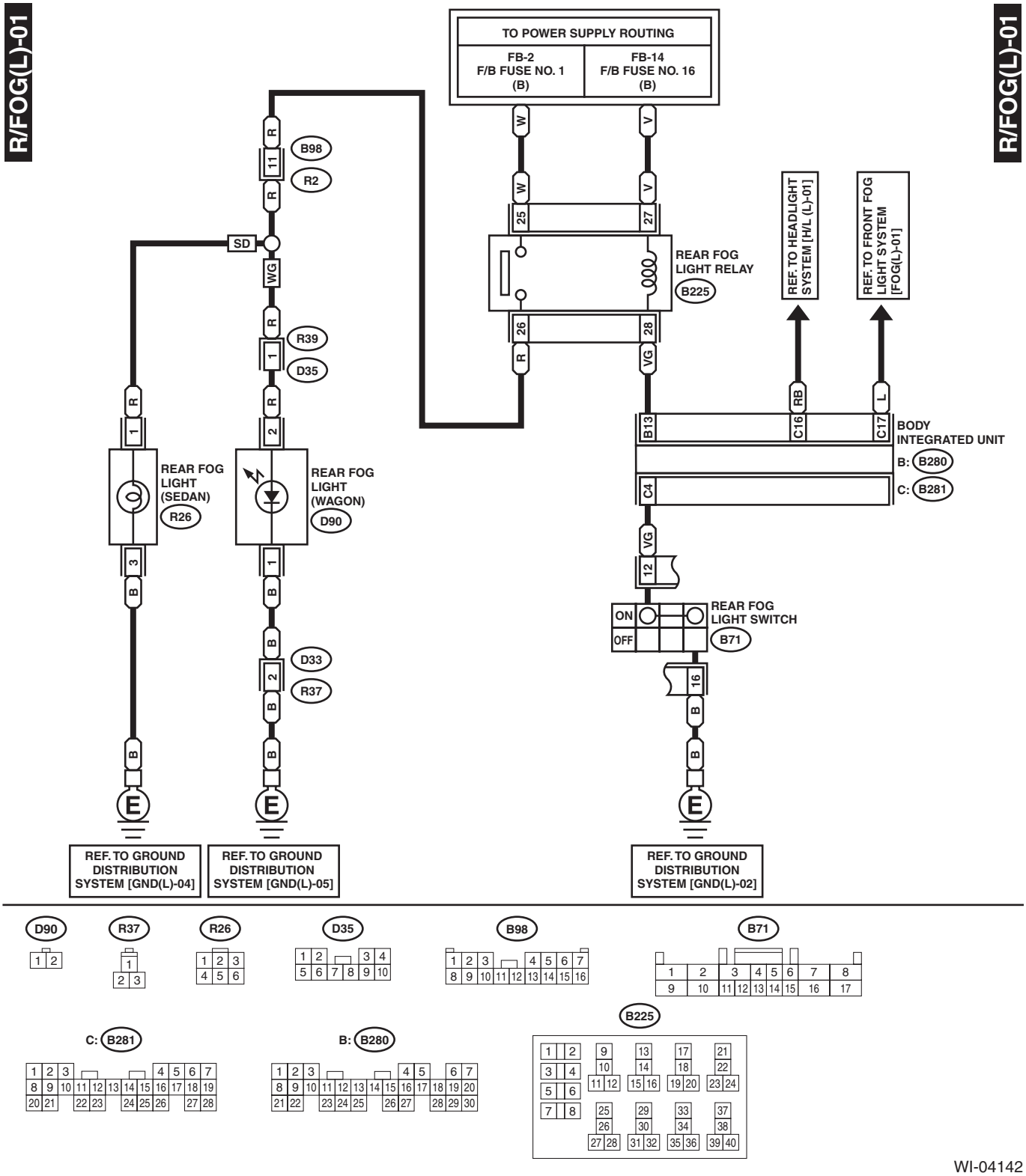


WI-04141

29.Rear Fog Light System

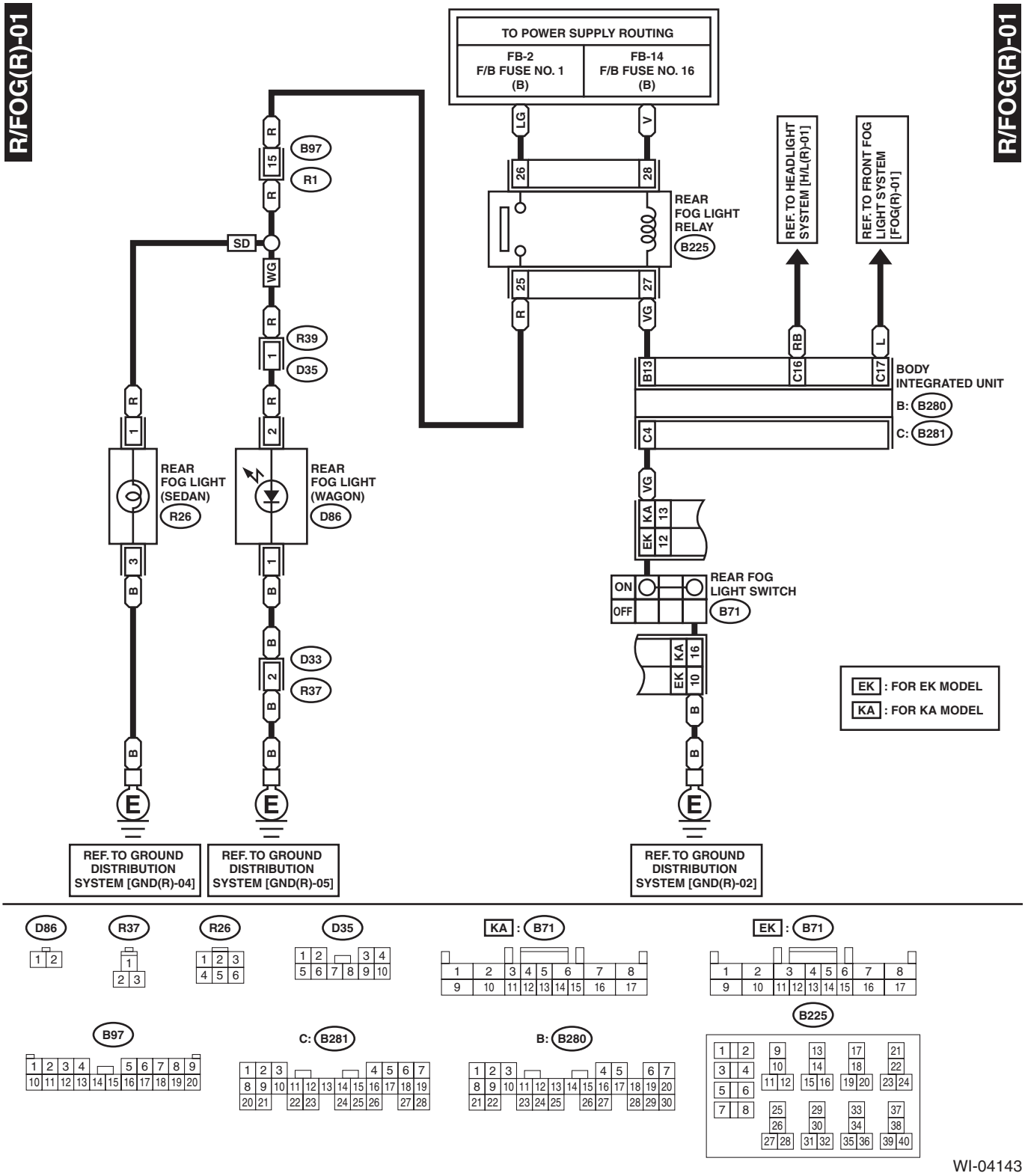
A: WIRING DIAGRAM

1. LHD MODEL



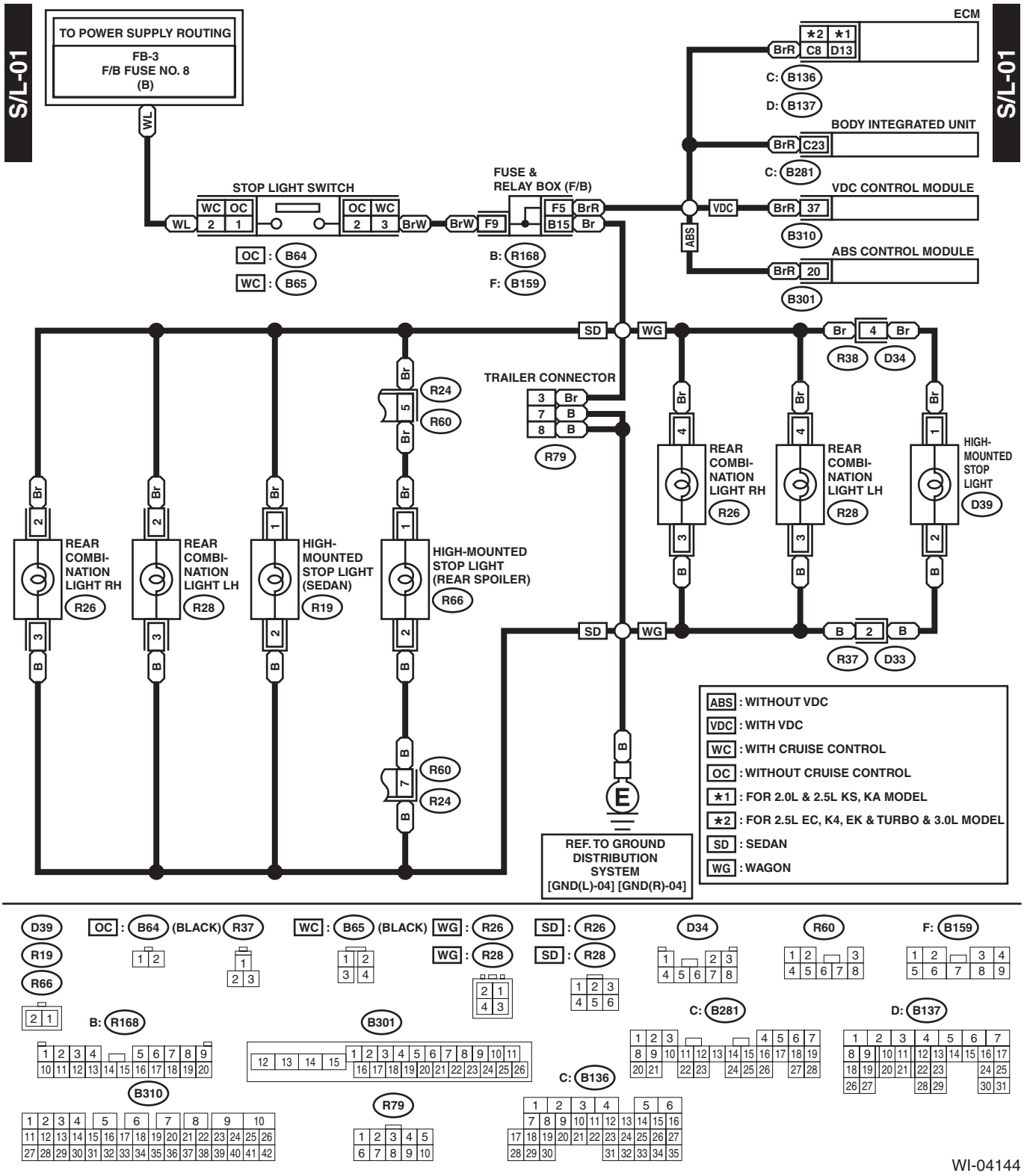
WI-04142

2. RHD MODEL


R/FOG(R)-01
R/FOG(R)-01
TO POWER SUPPLY ROUTING
FB-2 F/B FUSE NO. 1 (B)
FB-14 F/B FUSE NO. 16 (B)
REAR FOG LIGHT RELAY
B225
REF. TO HEADLIGHT SYSTEM [H/L(R)-01]
REF. TO FRONT FOG LIGHT SYSTEM [FOG(R)-01]
BODY INTEGRATED UNIT
B: B280
C: B281
REAR FOG LIGHT (SEDAN)
R26
REAR FOG LIGHT (WAGON)
D86
REAR FOG LIGHT SWITCH
B71
B97
R1
R39
D35
D33
R37
SD
EK : FOR EK MODEL
KA : FOR KA MODEL
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-05]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
WI-04143

30.Stop Light System

A: WIRING DIAGRAM

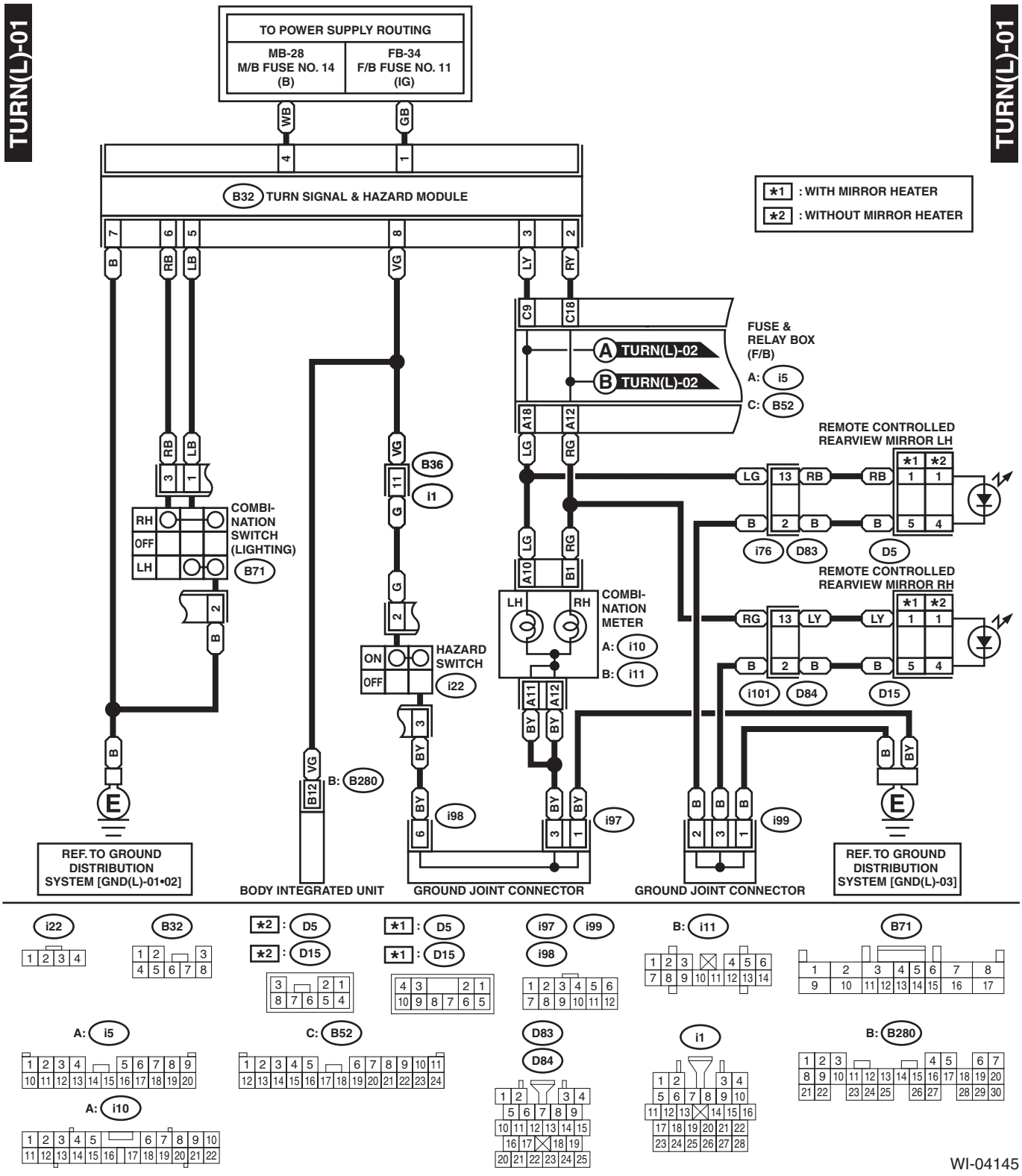


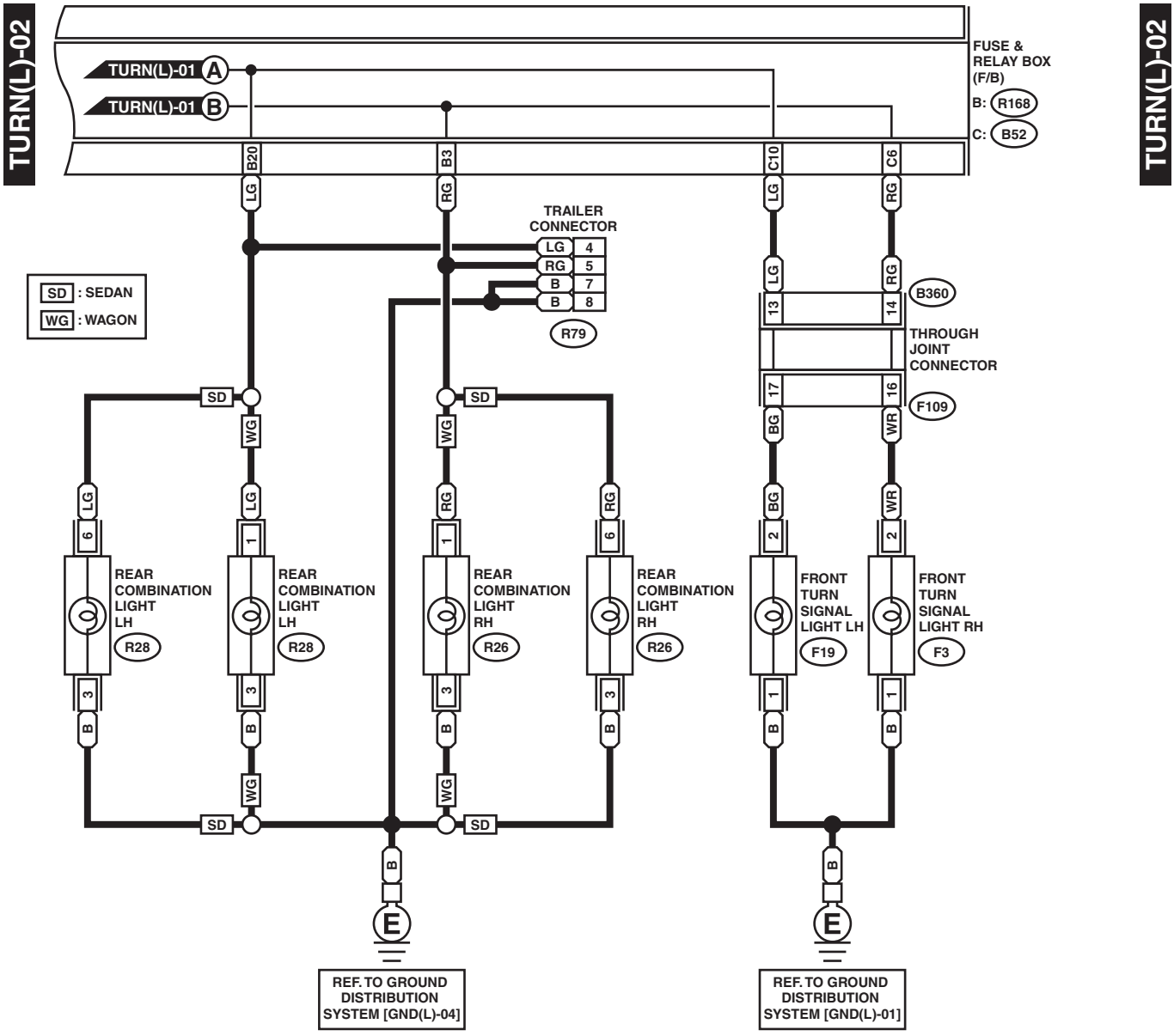
WI-04144

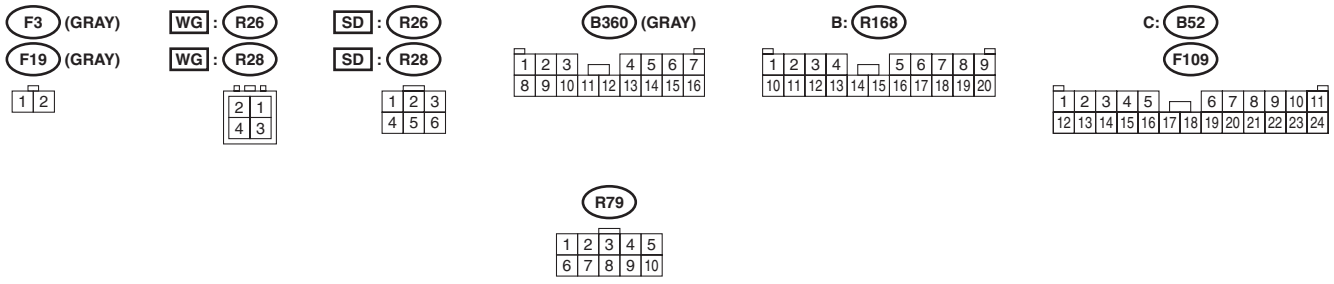
31.Turn Signal Light and Hazard Light System

A: WIRING DIAGRAM

1. LHD MODEL

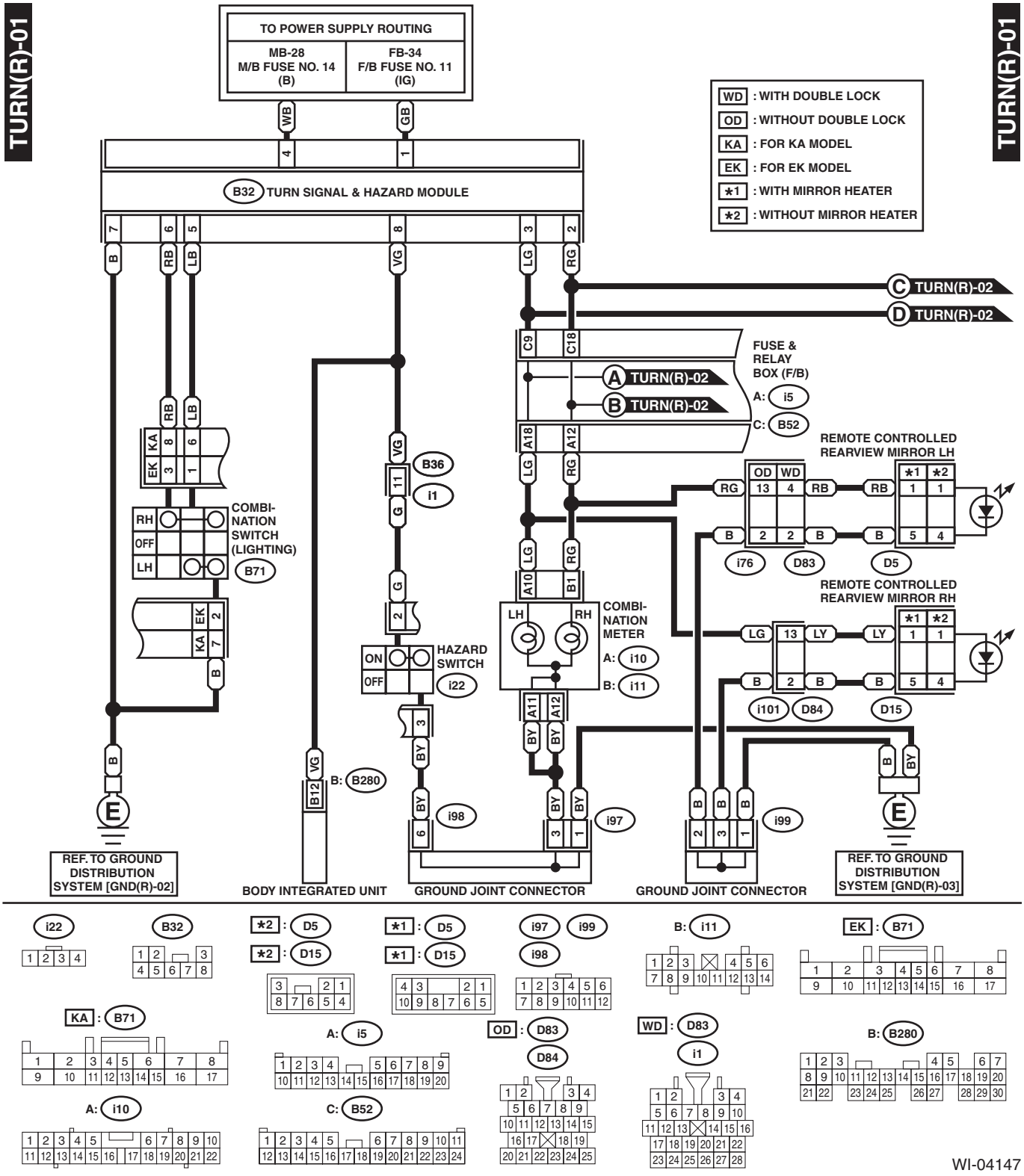


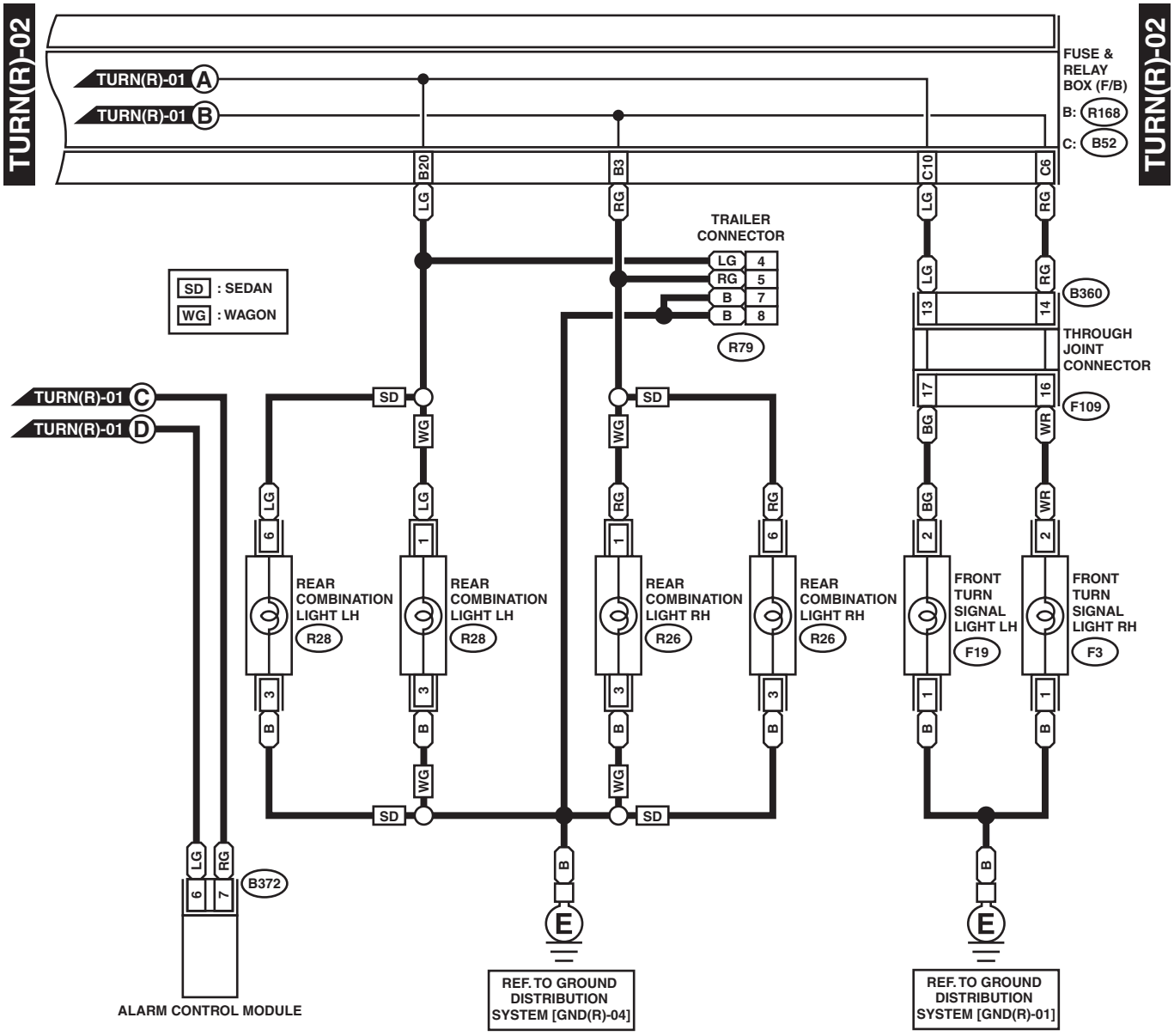

TURN(L)-02
TURN(L)-01 A
TURN(L)-01 B
FUSE & RELAY BOX (F/B)
B: R168
C: B52
B20
B3
C10
C6
LG
RG
TRAILER CONNECTOR
LG 4
RG 5
B 7
B 8
R79
SD : SEDAN
WG : WAGON
B360
13
14
THROUGH JOINT CONNECTOR
17
16
F109
BG
WR
SD
WG
REAR COMBINATION LIGHT LH
R28
REAR COMBINATION LIGHT RH
R26
FRONT TURN SIGNAL LIGHT LH
F19
FRONT TURN SIGNAL LIGHT RH
F3
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-01]


F3 (GRAY)
F19 (GRAY)
WG : R26
WG : R28
SD : R26
SD : R28
B360 (GRAY)
B: R168
C: B52
F109
R79

WI-04146

2. RHD MODEL


TURN(R)-01
TURN(R)-01
TO POWER SUPPLY ROUTING
MB-28 M/B FUSE NO. 14 (B)
FB-34 F/B FUSE NO. 11 (IG)
WD : WITH DOUBLE LOCK
OD : WITHOUT DOUBLE LOCK
KA : FOR KA MODEL
EK : FOR EK MODEL
*1 : WITH MIRROR HEATER
*2 : WITHOUT MIRROR HEATER
B32 TURN SIGNAL & HAZARD MODULE
C TURN(R)-02
D TURN(R)-02
A TURN(R)-02
B TURN(R)-02
FUSE & RELAY BOX (F/B)
A: i5
C: B52
COMBI-NATION SWITCH (LIGHTING)
B71
HAZARD SWITCH
i22
B36
i1
COMBI-NATION METER
A: i10
B: i11
REMOTE CONTROLLED REARVIEW MIRROR LH
REMOTE CONTROLLED REARVIEW MIRROR RH
i76
D83
D5
i101
D84
D15
B: B280
i98
i97
i99
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
BODY INTEGRATED UNIT
GROUND JOINT CONNECTOR
GROUND JOINT CONNECTOR
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
i22
B32
*2 : D5
*2 : D15
*1 : D5
*1 : D15
i97 i99
i98
B: i11
EK : B71
KA : B71
A: i5
OD : D83
D84
WD : D83
i1
A: i10
C: B52
B: B280
WI-04147

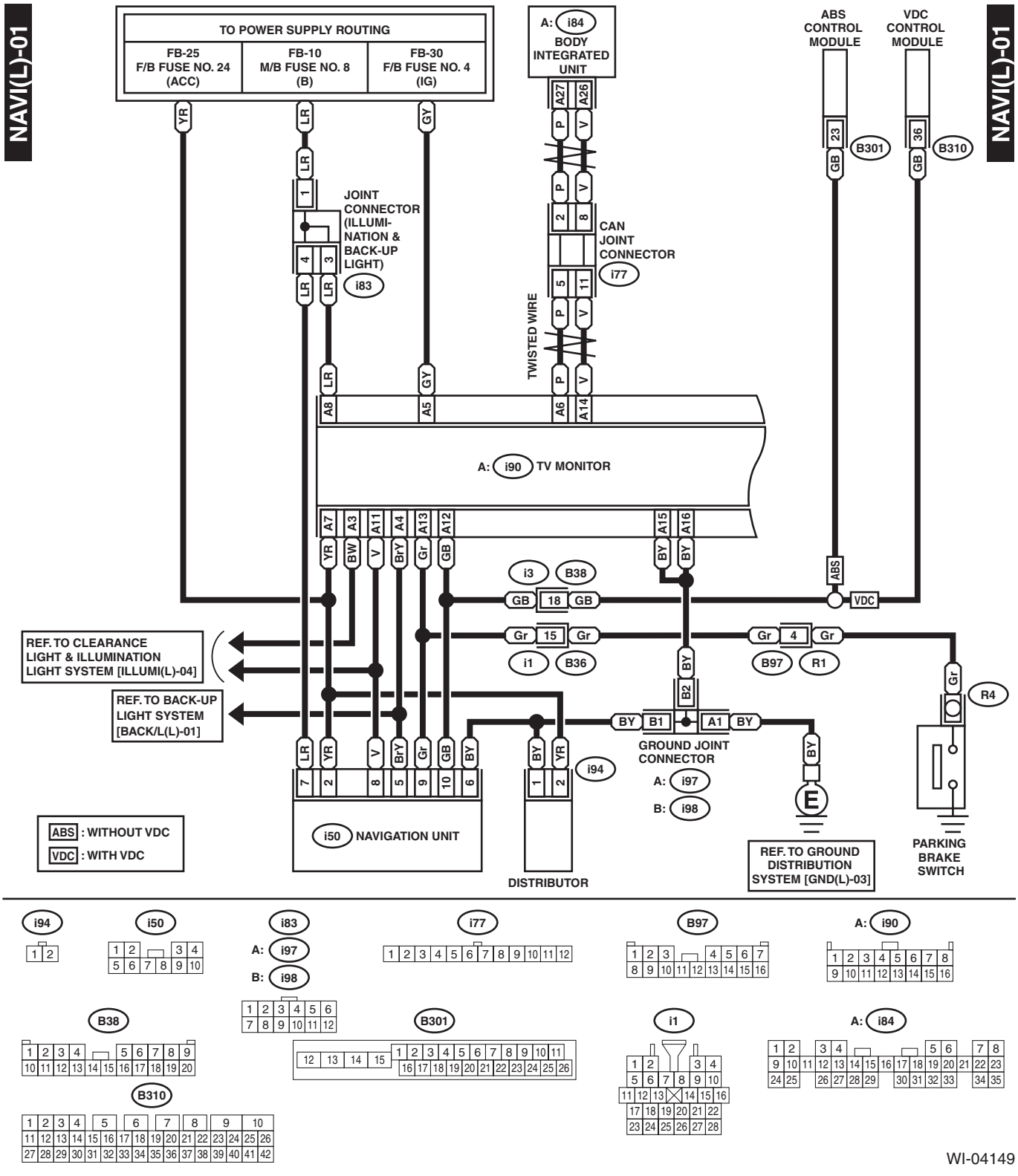

TURN(R)-02
TURN(R)-01 A
TURN(R)-01 B
FUSE & RELAY BOX (F/B)
B: R168
C: B52
TURN(R)-02
B20
B3
C10
C6
LG
RG
TRAILER CONNECTOR
LG 4
RG 5
B 7
B 8
R79
SD : SEDAN
WG : WAGON
B360
13
14
THROUGH JOINT CONNECTOR
17
16
F109
BG
WR
TURN(R)-01 C
TURN(R)-01 D
SD
WG
REAR COMBINATION LIGHT LH
R28
REAR COMBINATION LIGHT RH
R26
FRONT TURN SIGNAL LIGHT LH
F19
FRONT TURN SIGNAL LIGHT RH
F3
B372
ALARM CONTROL MODULE
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-04]
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-01]
F3 (GRAY)
F19 (GRAY)
WG : R26
WG : R28
SD : R26
SD : R28
B360 (GRAY)
B372
B: R168
C: B52
F109
R79

WI-04148

32.Navigation System

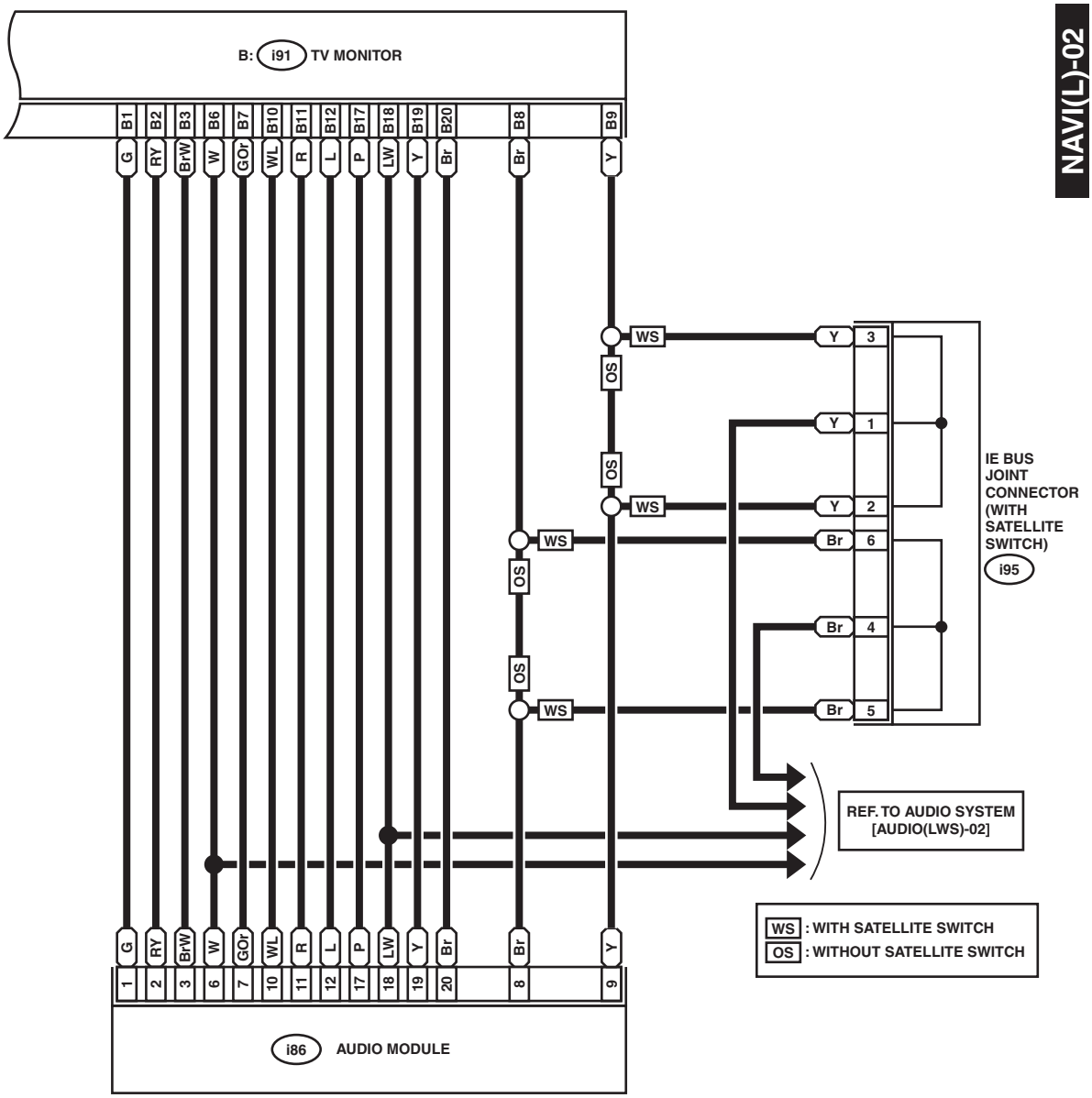
A: WIRING DIAGRAM

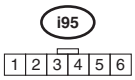
1. LHD MODEL

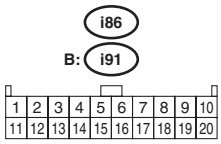


WI-04149

NAVI(L)-02

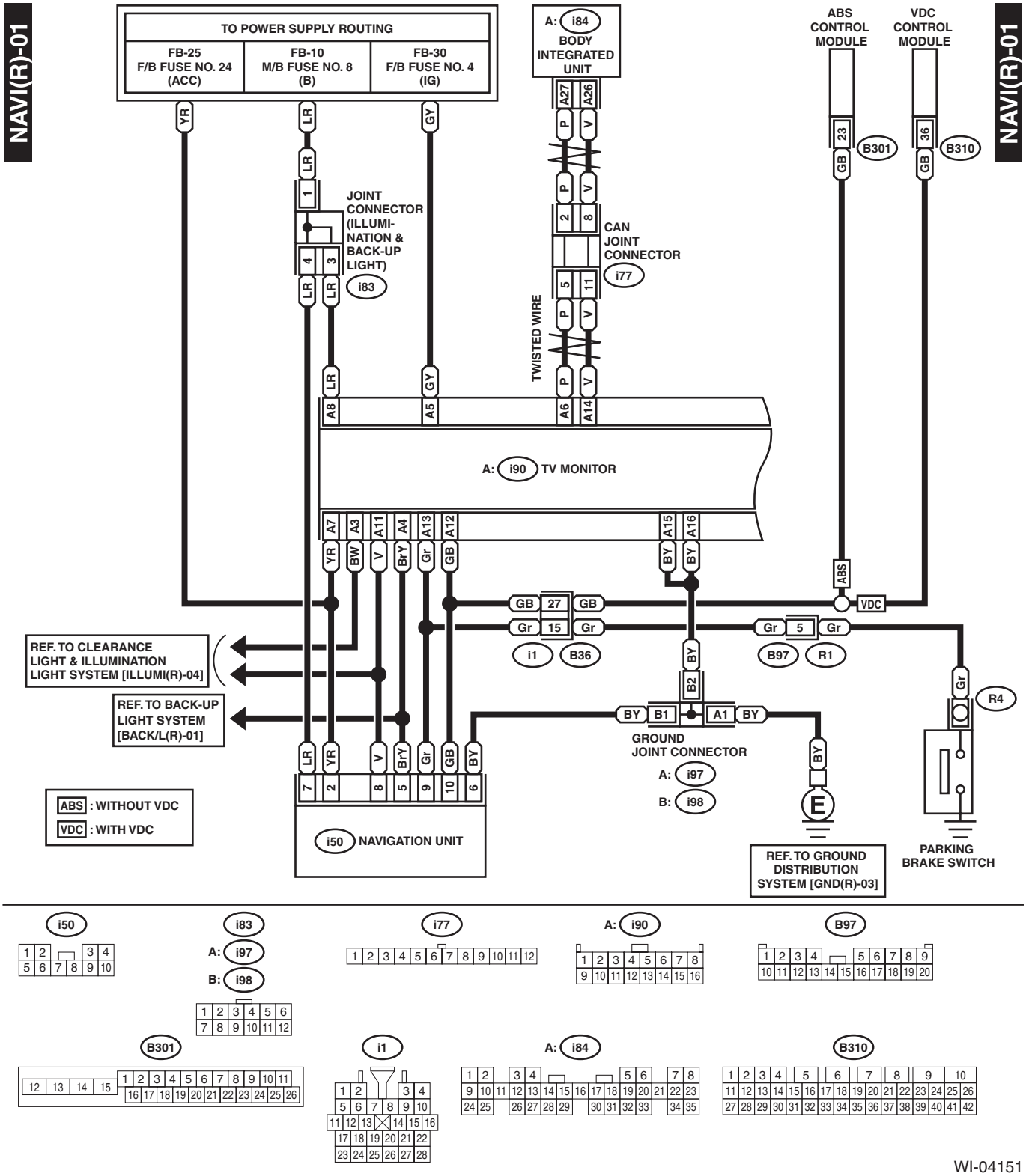






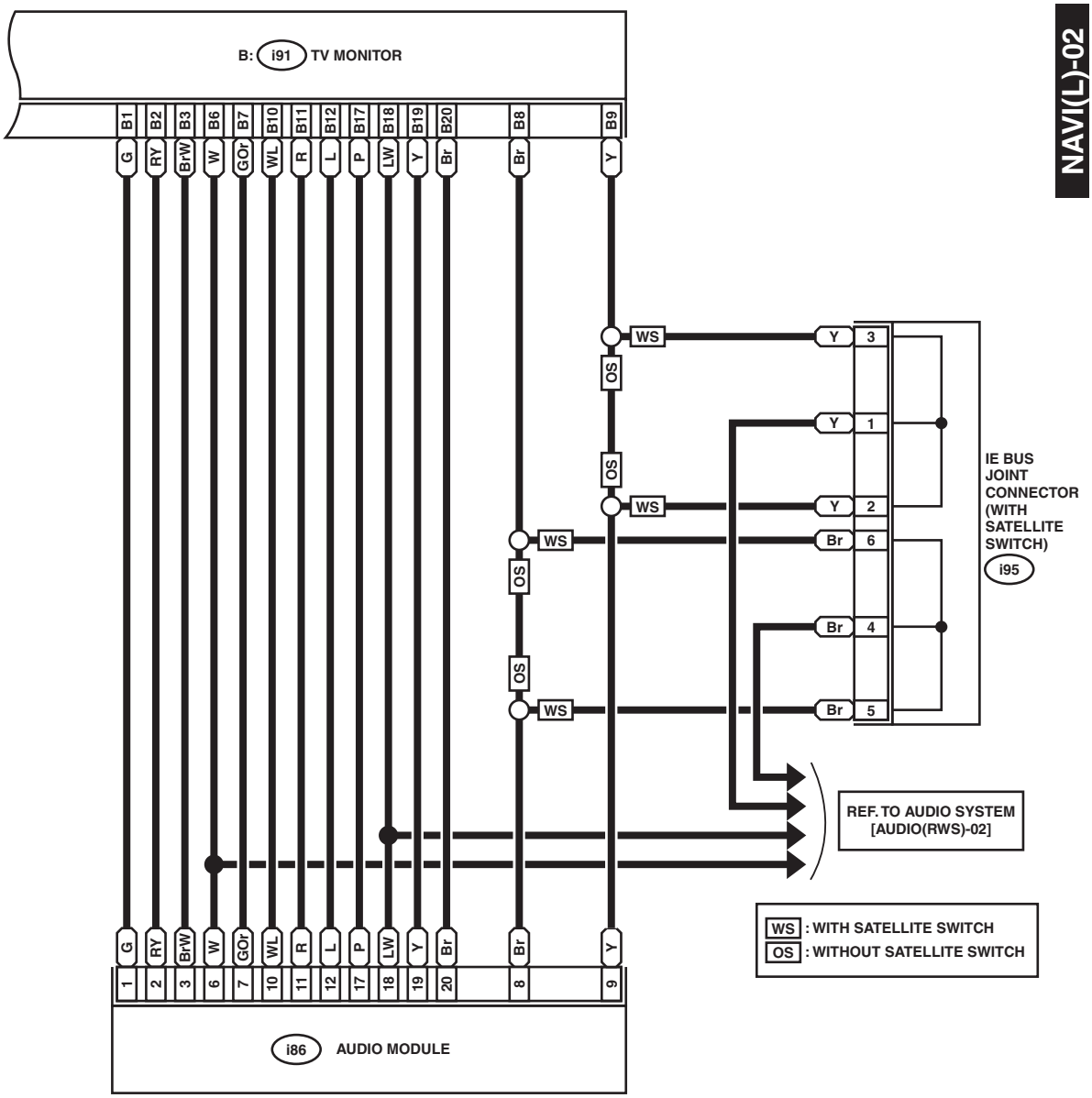
WI-04150

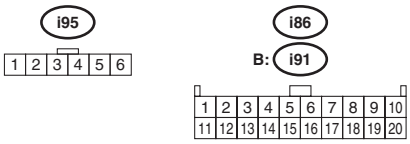
2. RHD MODEL



WI-04151

NAVI(L)-02



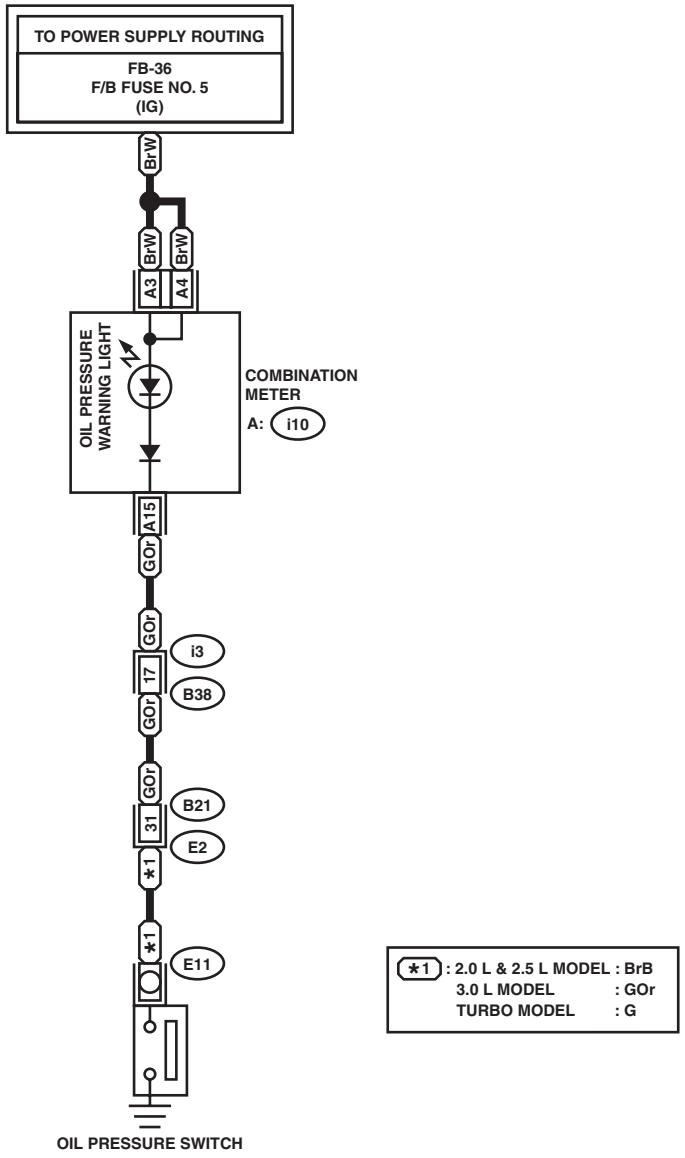


WI-04152

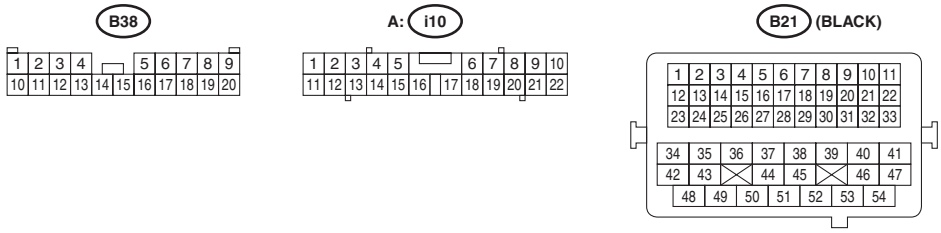
33.Oil Pressure Warning Light System

A: WIRING DIAGRAM

OIL/P-01



OIL/P-01

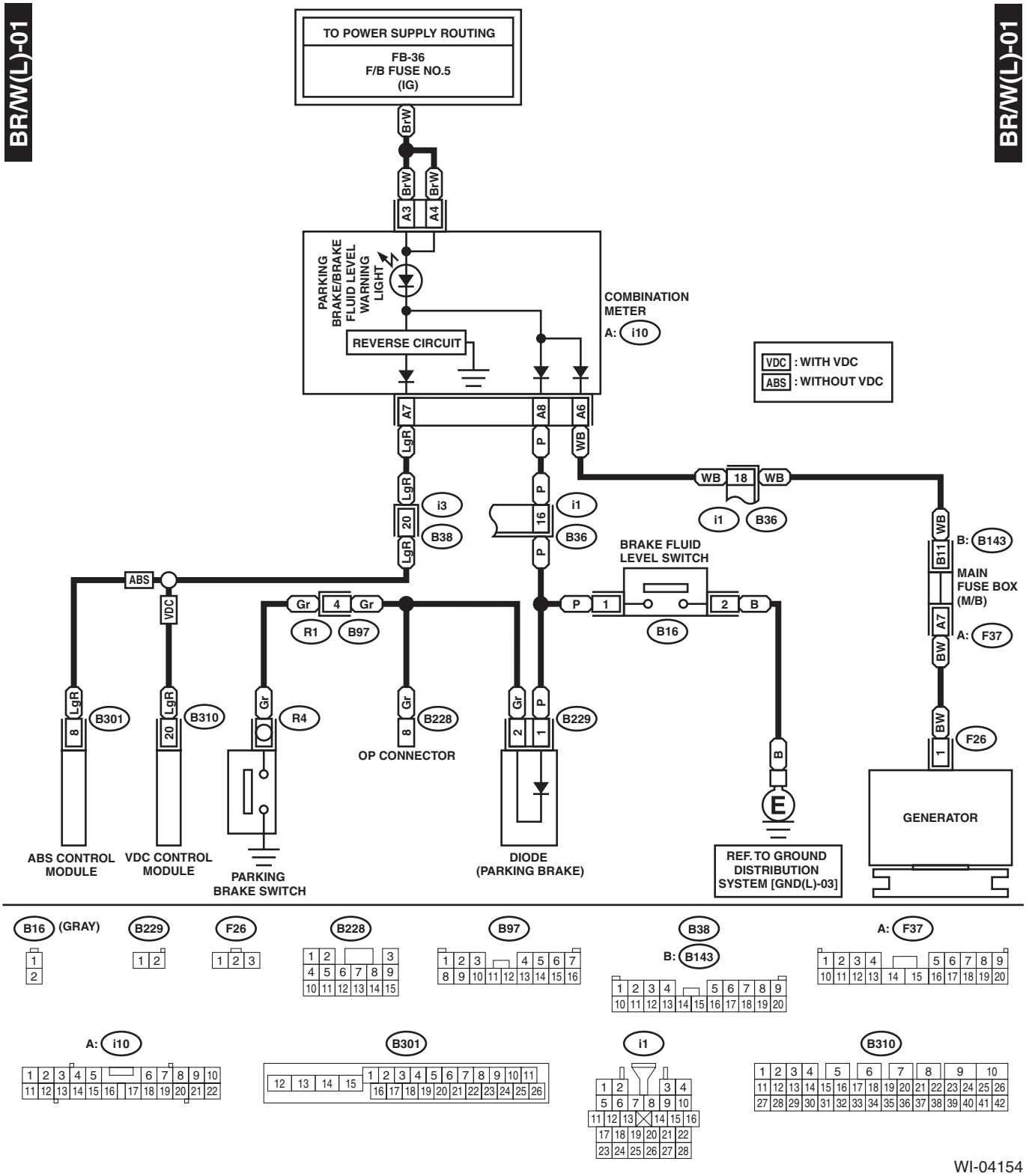


WI-04153

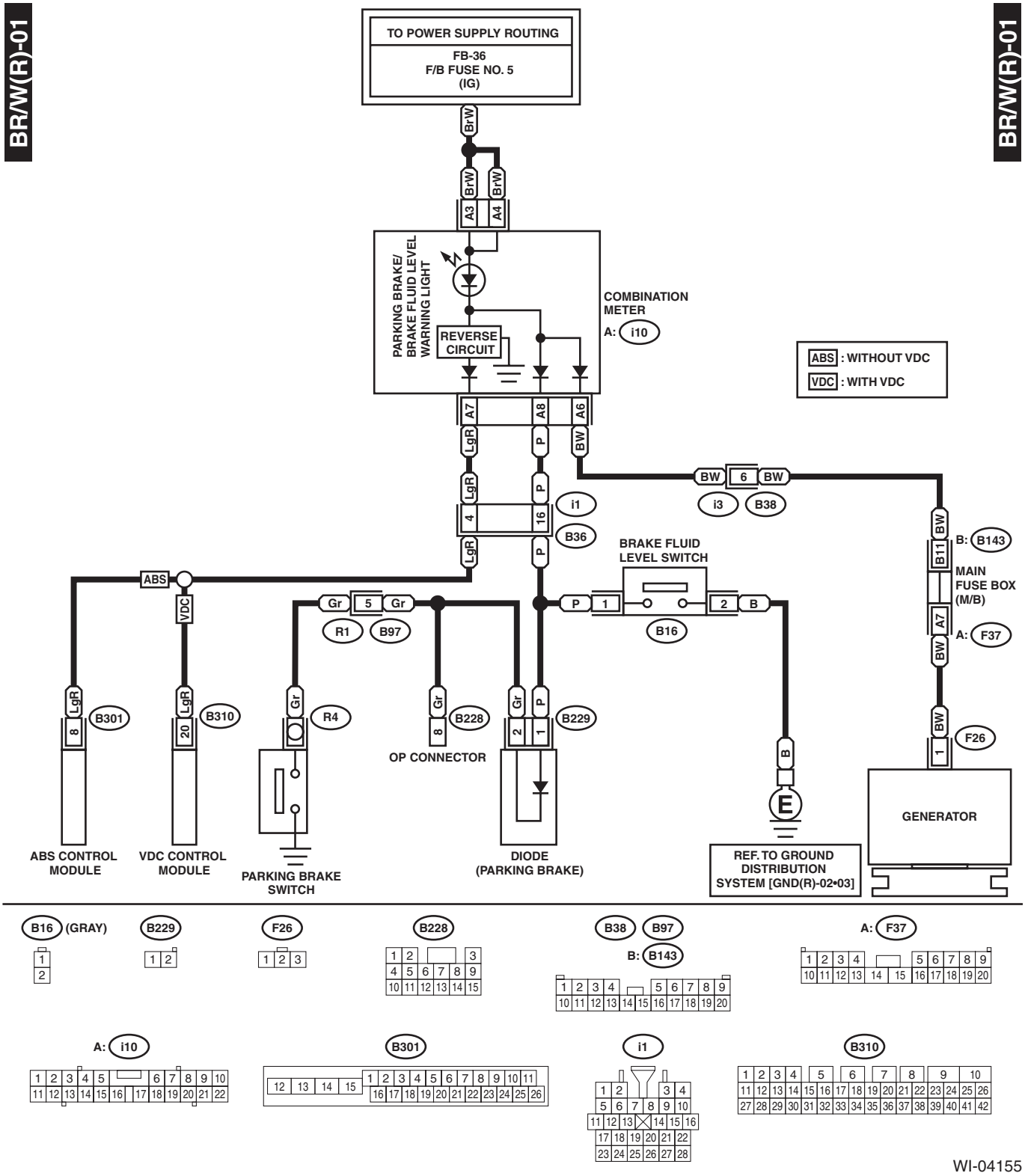
34.Parking Brake / Brake Fluid Level Warning Light System

A: WIRING DIAGRAM

1. LHD MODEL

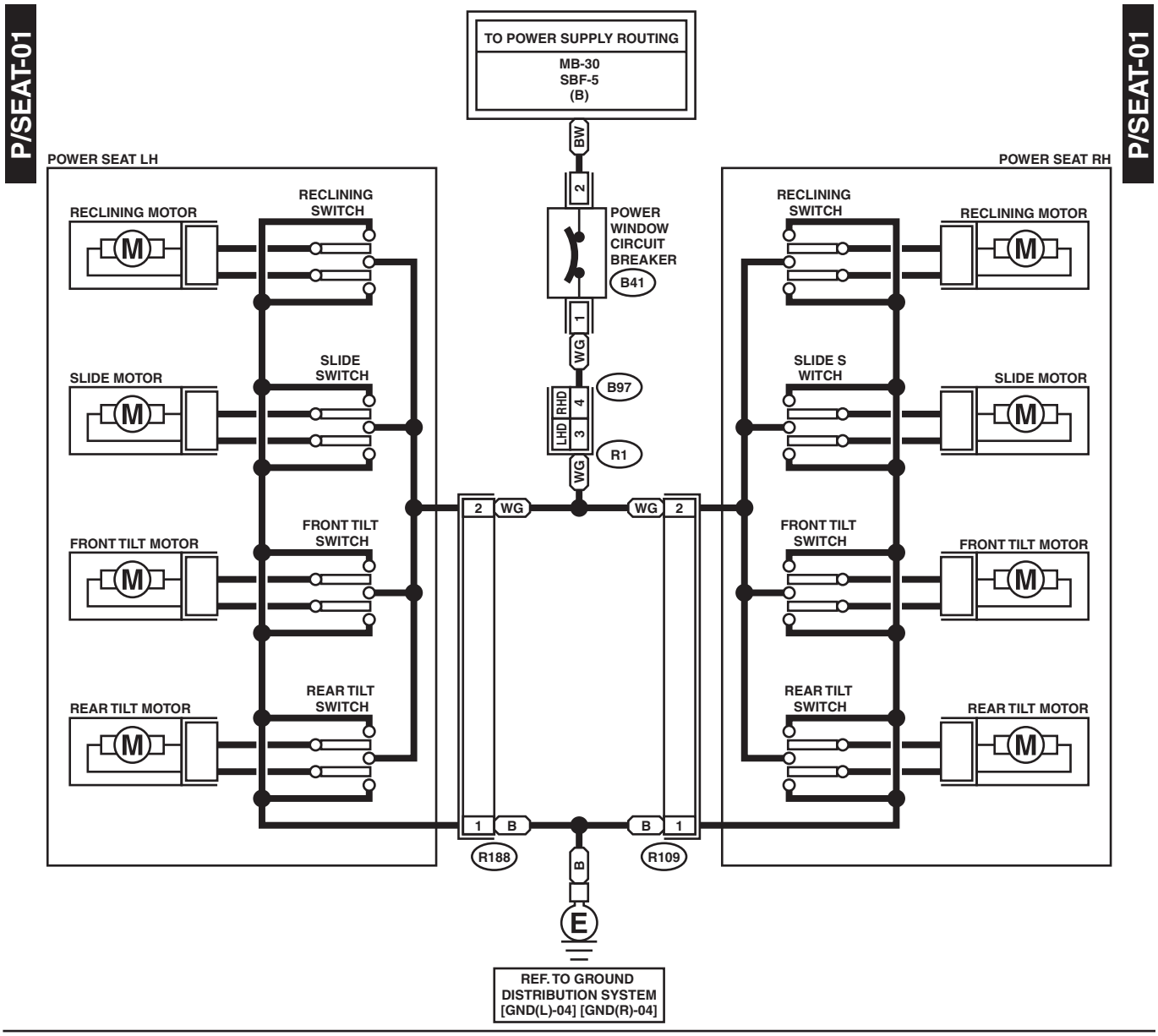


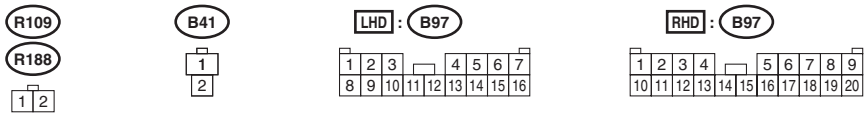
2. RHD MODEL


BR/W(R)-01
BR/W(R)-01
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
PARKING BRAKE/
BRAKE FLUID LEVEL
WARNING LIGHT
REVERSE
CIRCUIT
COMBINATION
METER
A: i10
ABS : WITHOUT VDC
VDC : WITH VDC
A7
A8
A6
LgR
P
BW
i1
4
16
B36
i3
B38
6
BRAKE FLUID
LEVEL SWITCH
B11
B: B143
MAIN
FUSE BOX
(M/B)
A: F37
ABS
VDC
Gr
5
R1
B97
P
1
2
B
B16
B301
B310
R4
B228
OP CONNECTOR
B229
8
20
2
F26
ABS CONTROL
MODULE
VDC CONTROL
MODULE
PARKING BRAKE
SWITCH
DIODE
(PARKING BRAKE)
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-02•03]
GENERATOR
B16 (GRAY)
B229
F26
B228
B38
B97
B: B143
A: F37
A: i10
B301
i1
B310
WI-04155

35.Power Seat System

A: WIRING DIAGRAM



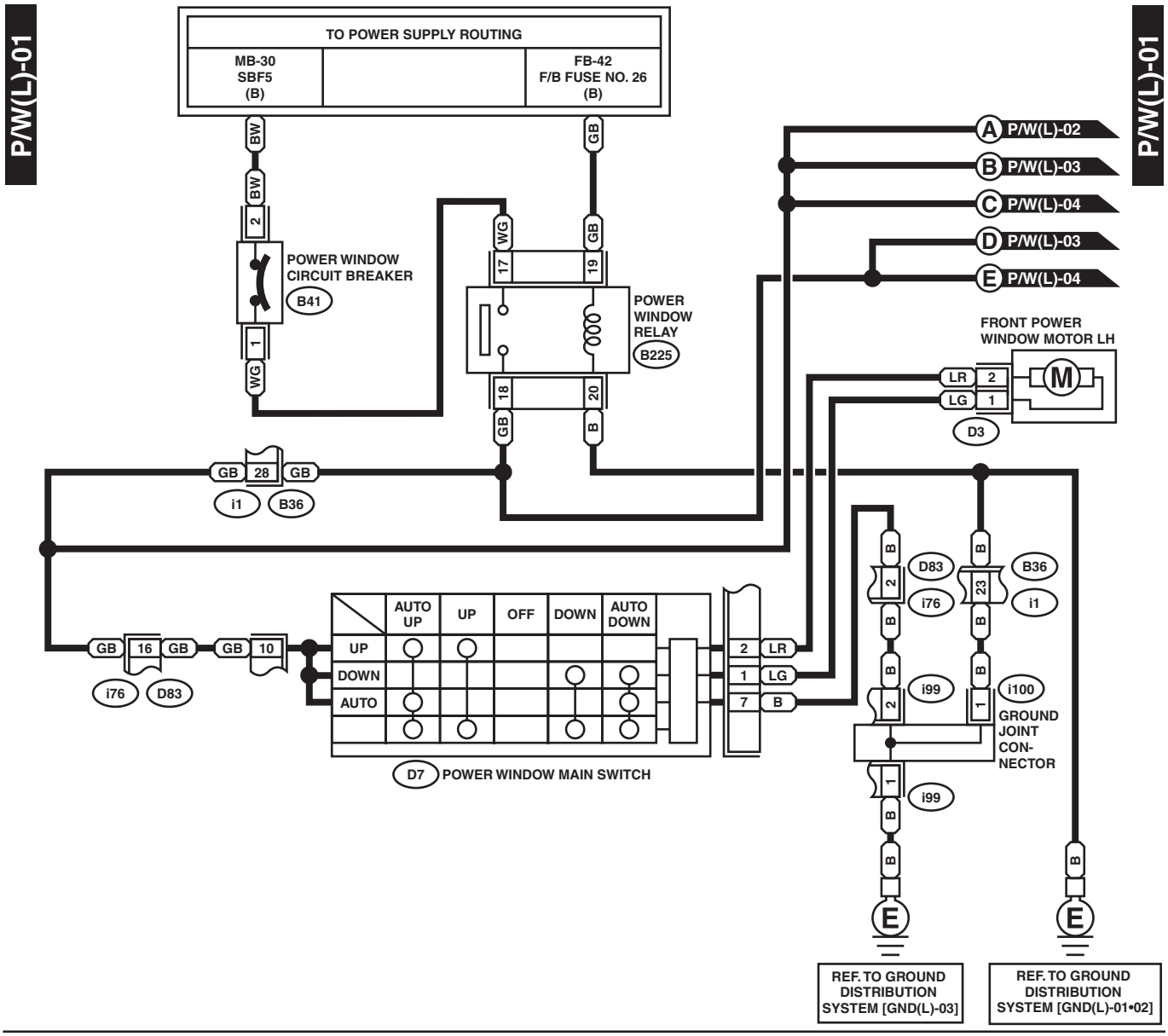


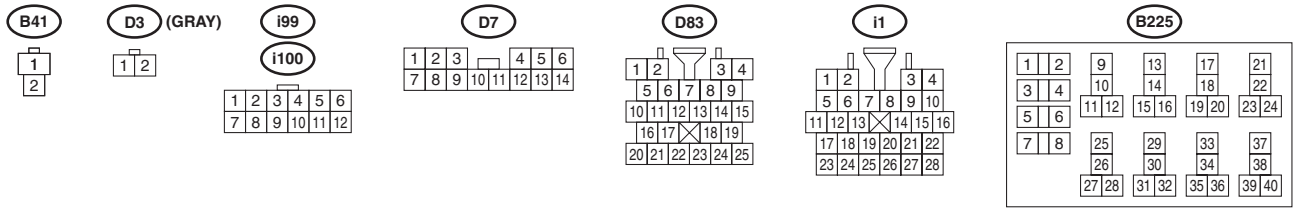
WI-04156

36.Power Window System

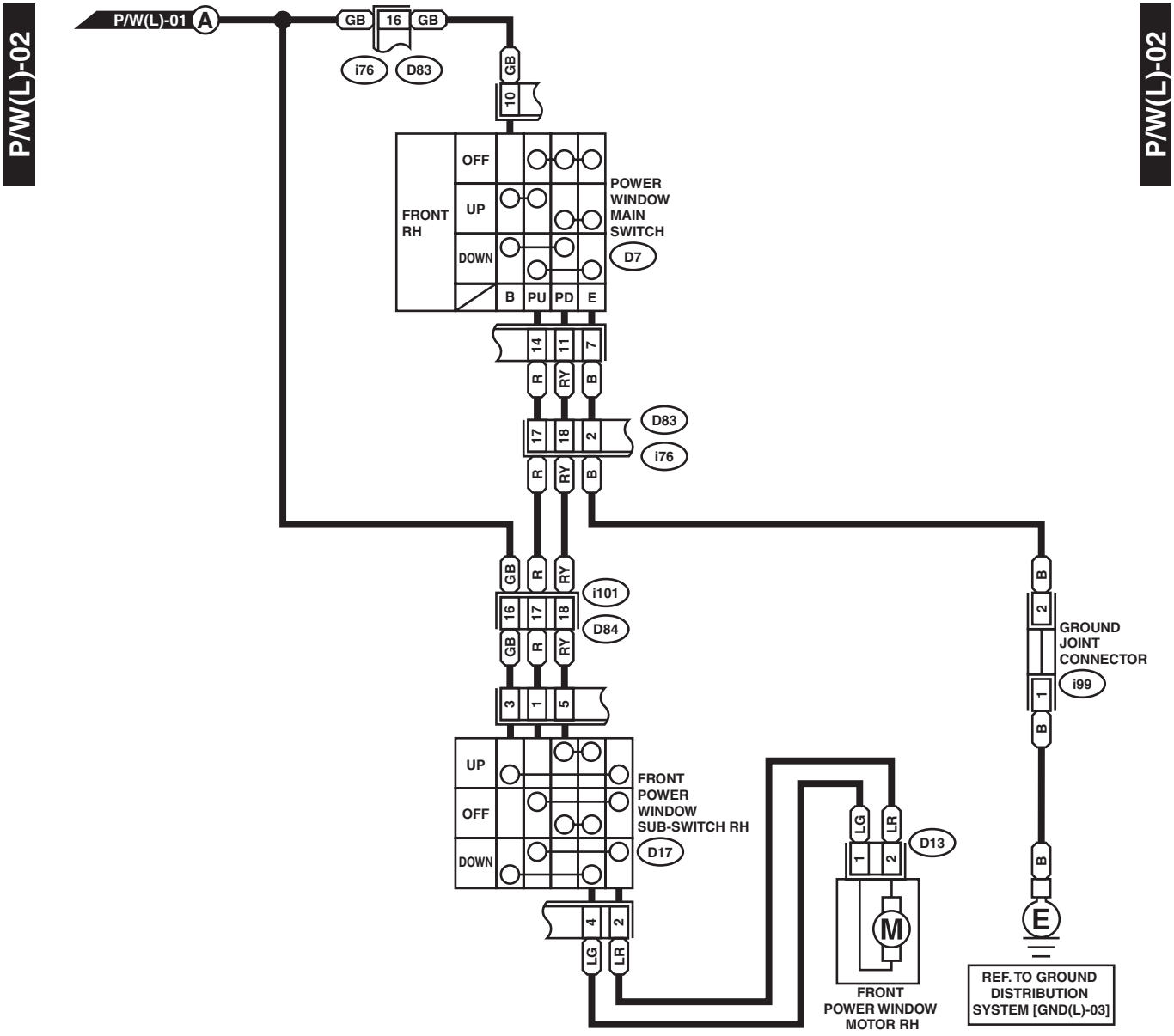
A: WIRING DIAGRAM

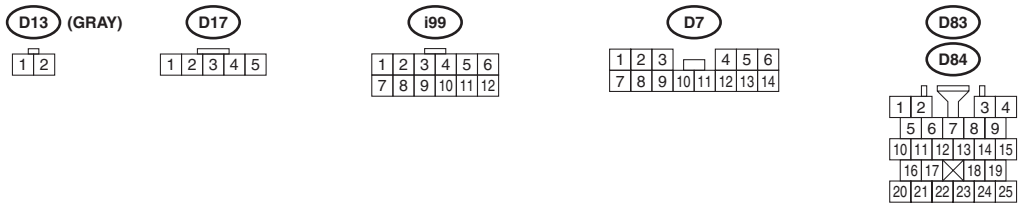
1. LHD MODEL



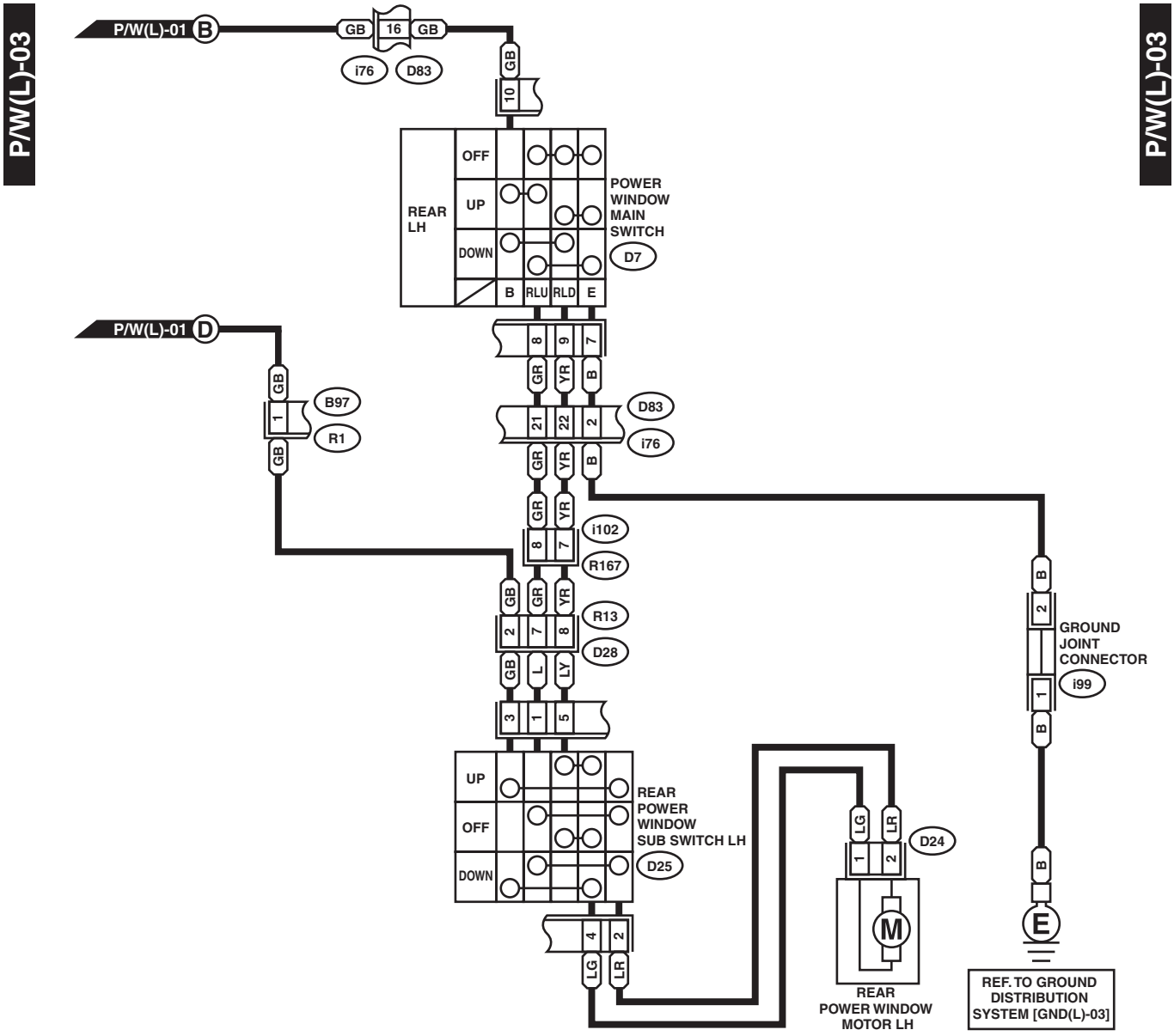


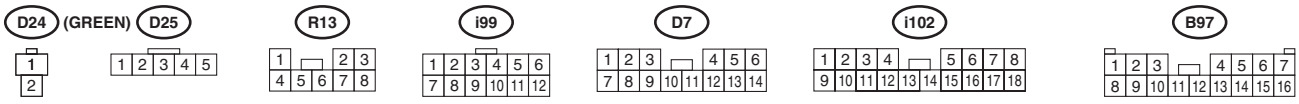
WI-04157

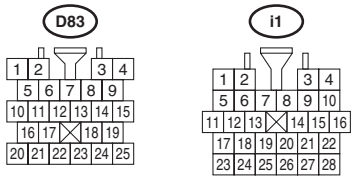

P/W(L)-02
P/W(L)-01
A
GB
16
GB
i76
D83
GB
10
OFF
UP
DOWN
FRONT RH
POWER WINDOW MAIN SWITCH
D7
B
PU
PD
E
14
11
7
R
RY
B
D83
17
18
2
i76
R
RY
B
GB
R
RY
i101
16
17
18
D84
GB
R
RY
3
1
5
UP
OFF
DOWN
FRONT POWER WINDOW SUB-SWITCH RH
D17
4
2
LG
LR
LG
LR
D13
1
2
M
FRONT POWER WINDOW MOTOR RH
B
2
GROUND JOINT CONNECTOR
i99
1
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
P/W(L)-02


D13 (GRAY)
1 2
D17
1 2 3 4 5
i99
1 2 3 4 5 6
7 8 9 10 11 12
D7
1 2 3 4 5 6
7 8 9 10 11 12 13 14
D83
D84
1 2 3 4
5 6 7 8 9
10 11 12 13 14 15
16 17 18 19
20 21 22 23 24 25

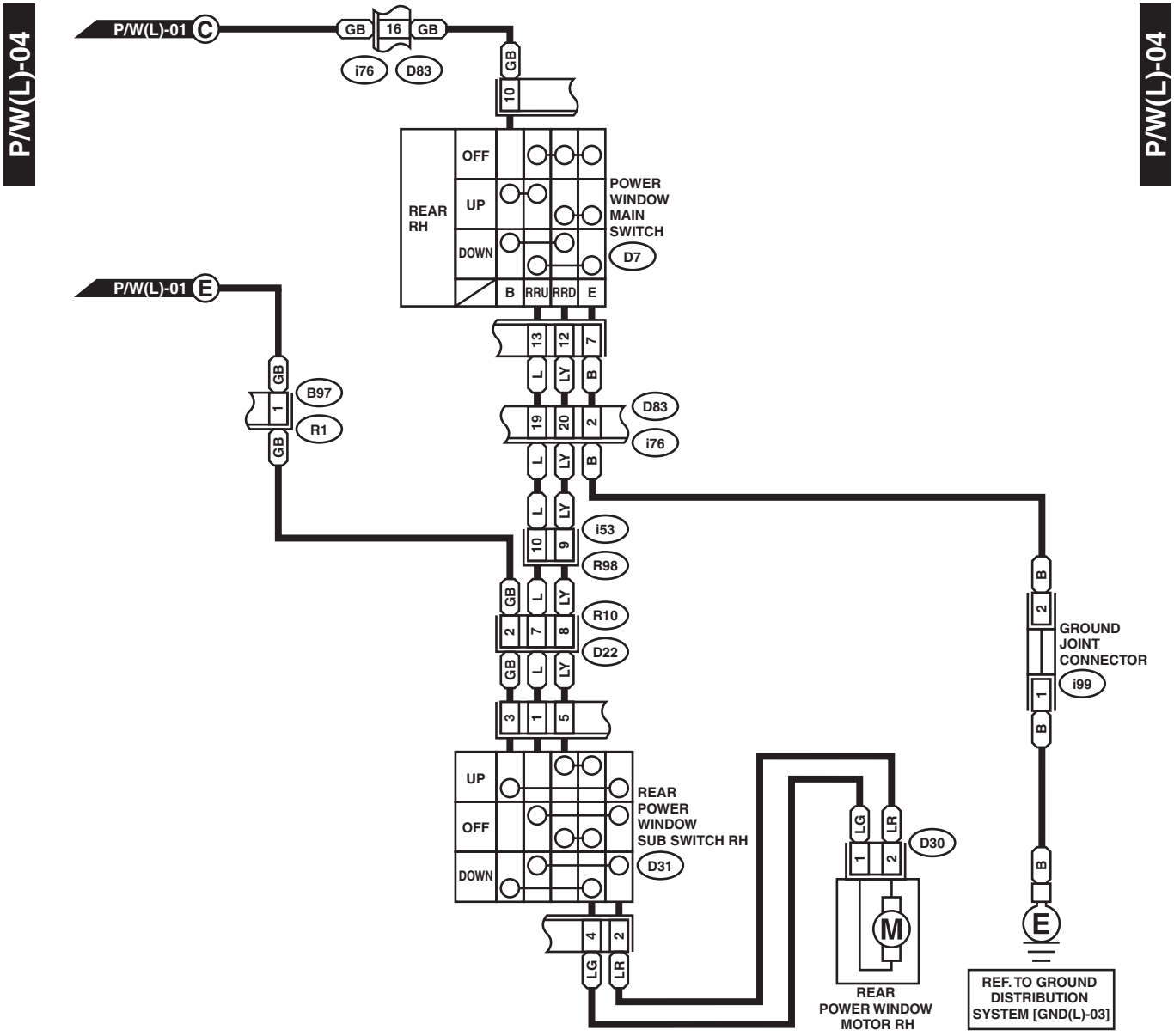
WI-04158

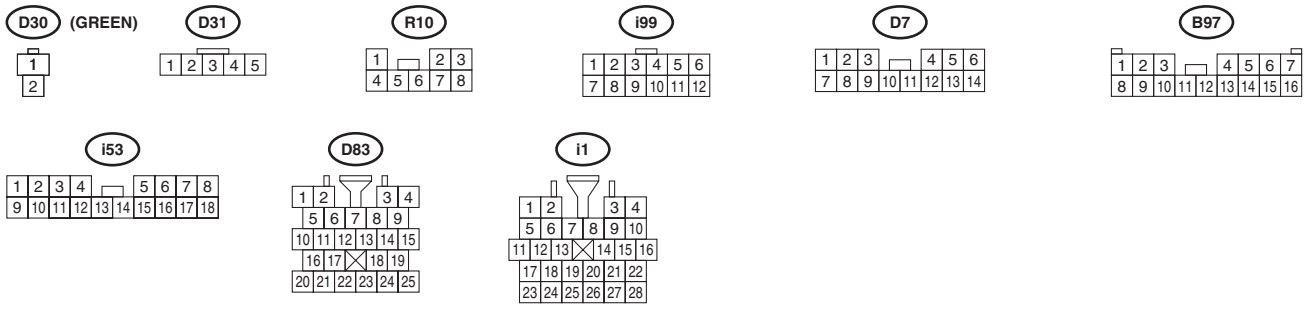

P/W(L)-03
P/W(L)-01 B
GB
16
GB
i76
D83
GB
10
OFF
UP
DOWN
REAR LH
POWER WINDOW MAIN SWITCH
D7
B
RLU
RLD
E
P/W(L)-01 D
GB
1
B97
R1
GB
8
9
7
GR
YR
B
21
22
2
D83
i76
GR
YR
B
GR
YR
8
7
i102
R167
GB
GR
YR
2
7
8
R13
D28
GB
L
LY
3
1
5
UP
OFF
DOWN
REAR POWER WINDOW SUB SWITCH LH
D25
4
2
LG
LR
LG
LR
1
2
D24
M
REAR POWER WINDOW MOTOR LH
B
2
GROUND JOINT CONNECTOR
i99
1
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
P/W(L)-03


D24
(GREEN)
D25
R13
i99
D7
i102
B97


D83
i1

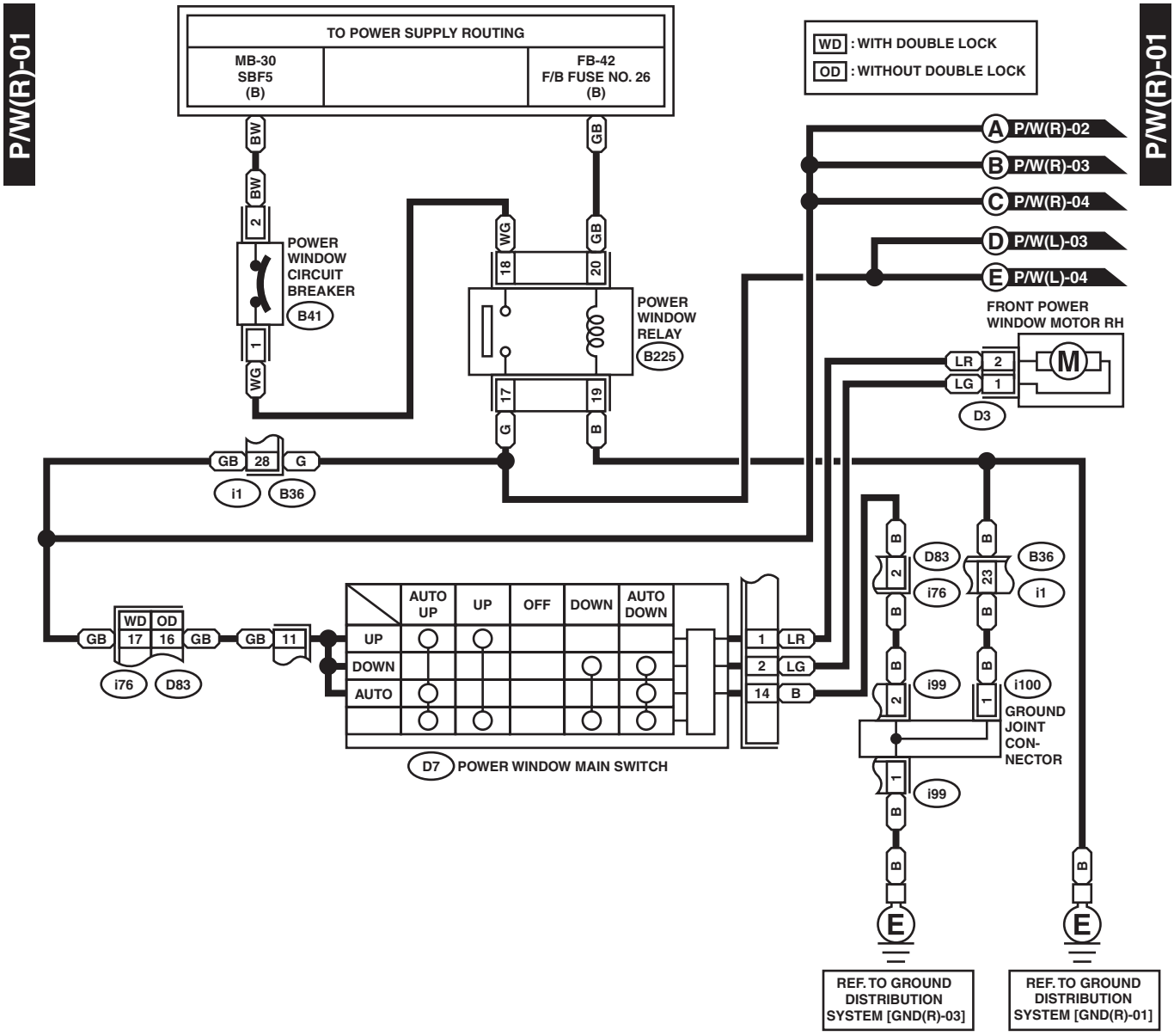
WI-04159

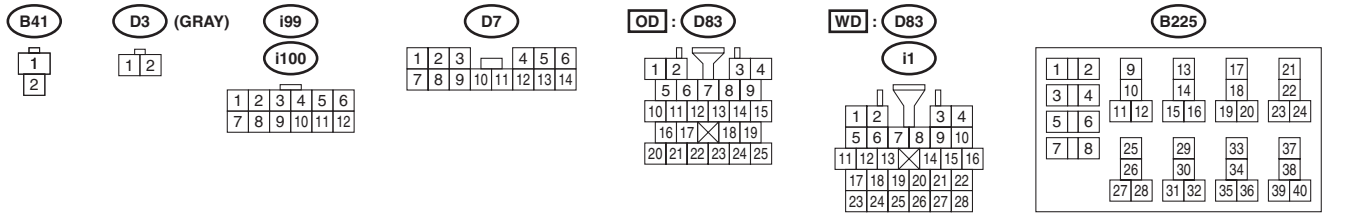

P/W(L)-04
P/W(L)-01 C
GB
16
GB
i76
D83
GB
10
OFF
UP
DOWN
REAR RH
B
RRU
RRD
E
POWER WINDOW MAIN SWITCH
D7
P/W(L)-01 E
GB
1
B97
R1
GB
13
12
7
L
LY
B
19
20
2
D83
i76
L
LY
B
L
LY
10
9
i53
R98
GB
L
LY
2
7
8
R10
D22
GB
L
LY
3
1
5
UP
OFF
DOWN
REAR POWER WINDOW SUB SWITCH RH
D31
4
2
LG
LR
LG
LR
1
2
D30
M
REAR POWER WINDOW MOTOR RH
B
2
GROUND JOINT CONNECTOR
i99
1
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
P/W(L)-04


D30 (GREEN)
D31
R10
i99
D7
B97
i53
D83
i1

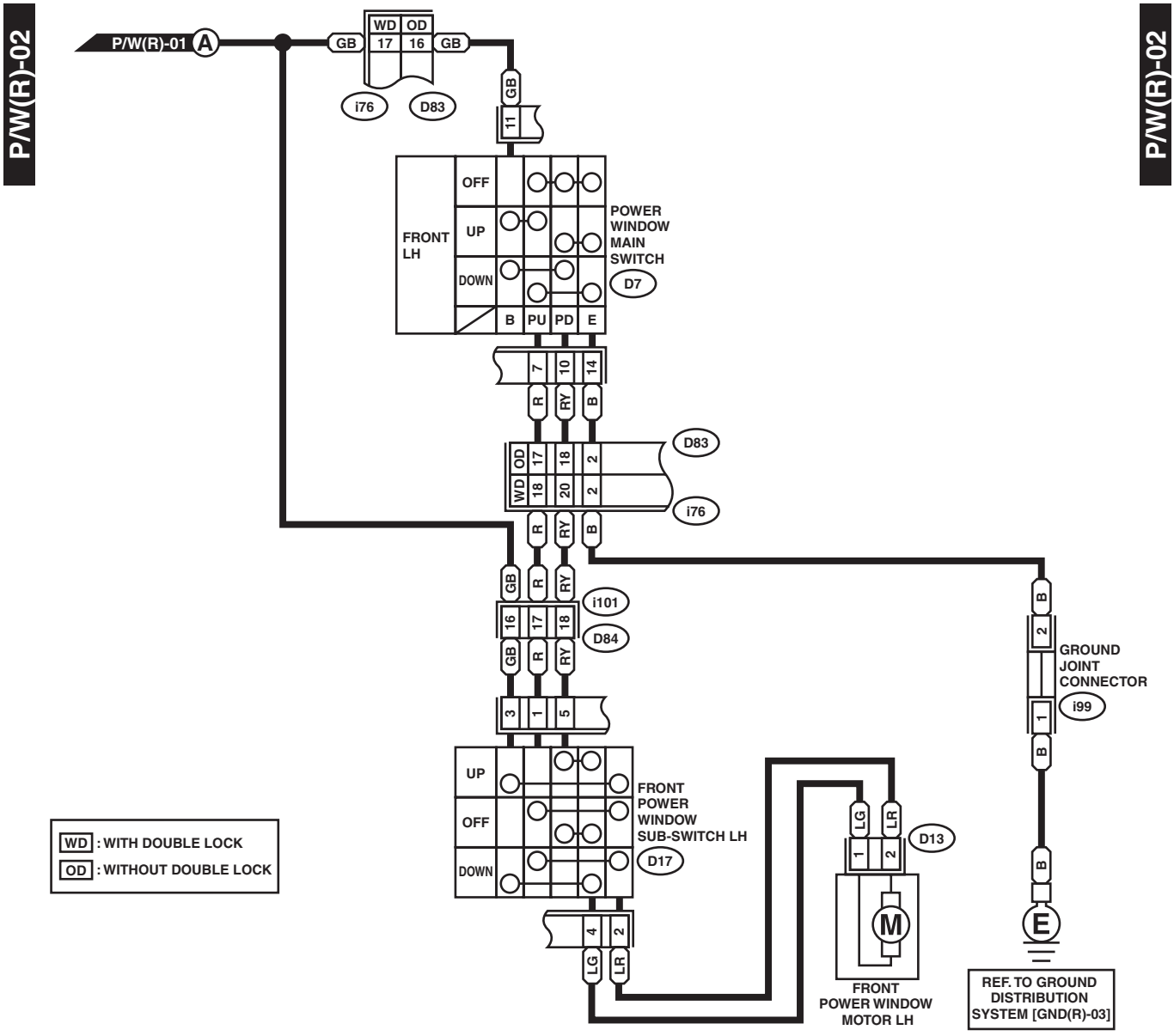
WI-04160

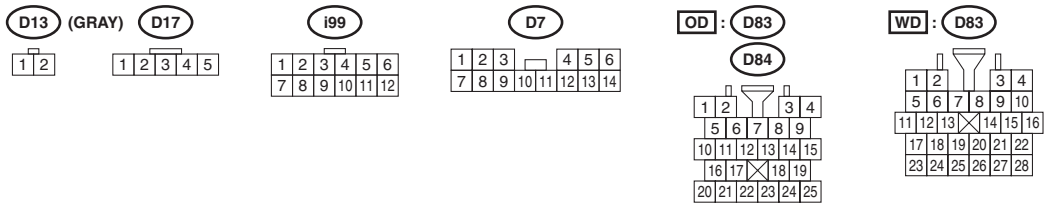
2. RHD MODEL



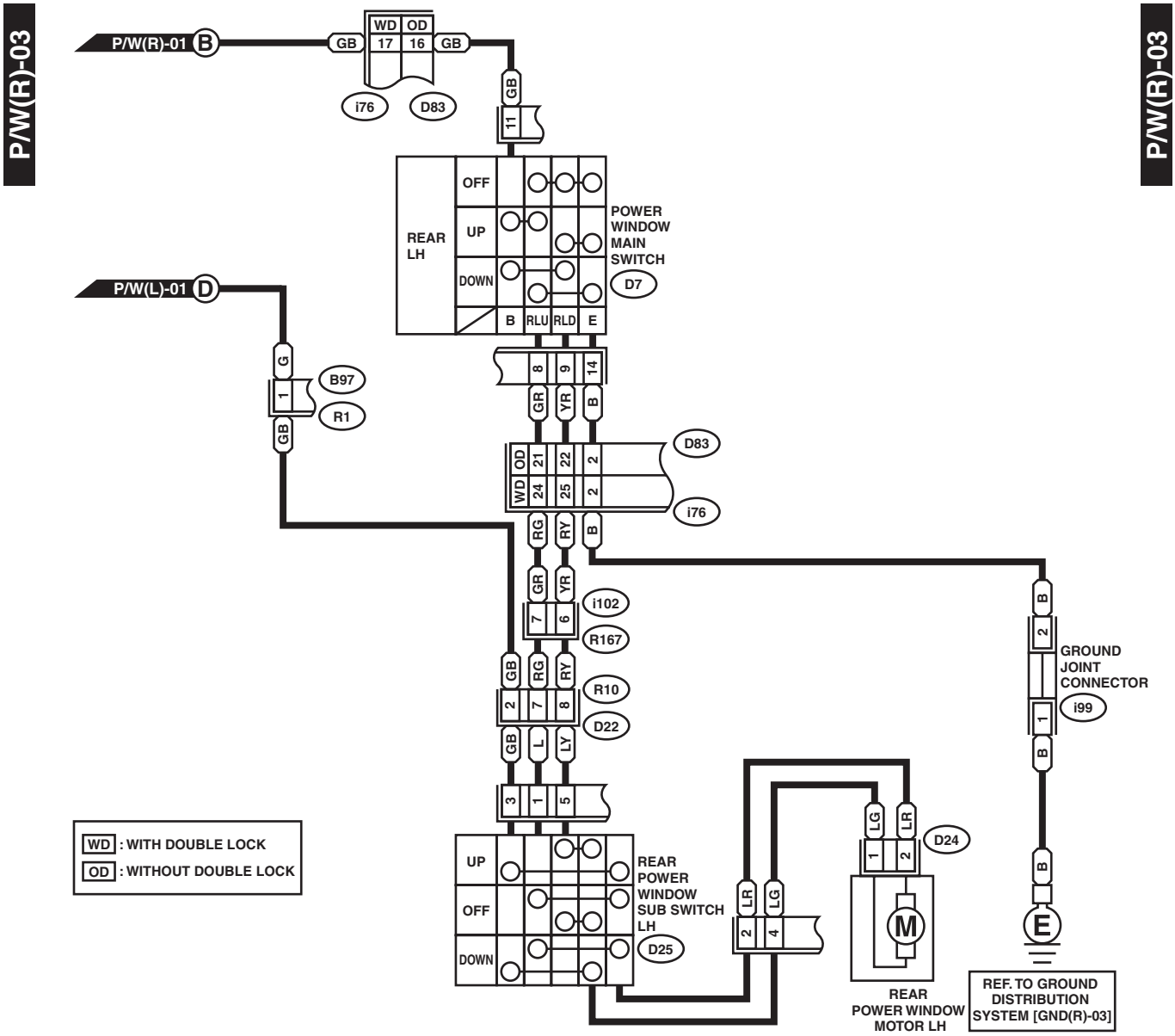


WI-04161

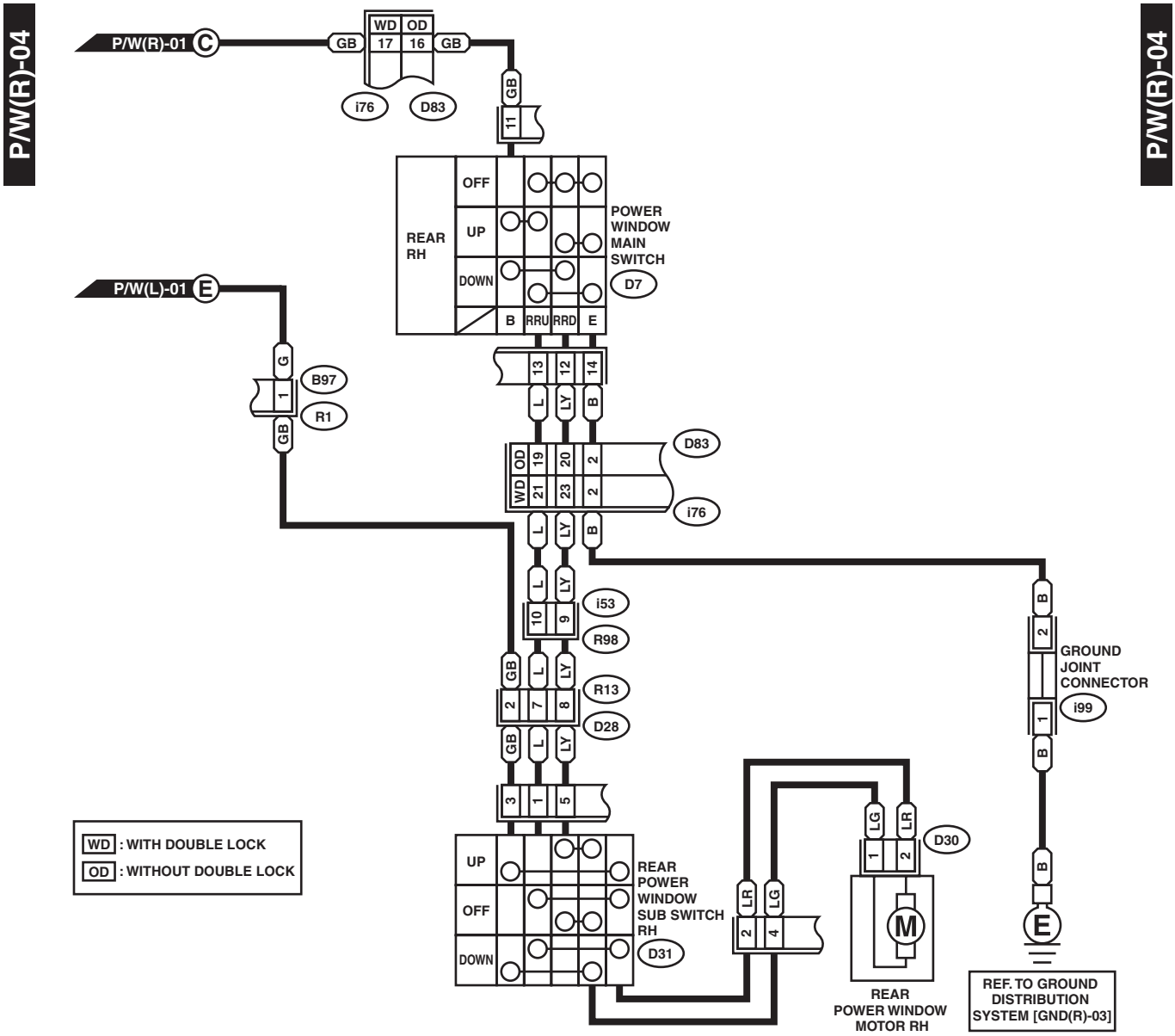

P/W(R)-02
P/W(R)-01
A
WD
OD
17
16
GB
i76
D83
11
OFF
UP
DOWN
FRONT LH
POWER WINDOW MAIN SWITCH
D7
B
PU
PD
E
7
10
14
R
RY
B
18
20
2
i101
D84
3
1
5
UP
OFF
DOWN
FRONT POWER WINDOW SUB-SWITCH LH
D17
4
LG
LR
D13
M
FRONT POWER WINDOW MOTOR LH
GROUND JOINT CONNECTOR
i99
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
WD : WITH DOUBLE LOCK
OD : WITHOUT DOUBLE LOCK


D13 (GRAY)
D17
i99
D7
OD : D83
D84
WD : D83

WI-04162


P/W(R)-03
P/W(R)-03
P/W(R)-01 B
P/W(L)-01 D
WD OD
GB 17 16 GB
i76
D83
GB
11
REAR LH
OFF
UP
DOWN
B RLU RLD E
POWER WINDOW MAIN SWITCH
D7
G
1
B97
R1
GB
8 9 14
GR YR B
WD OD 21 22 2
WD 24 25 2
D83
i76
RG RY B
GR YR
7 6
i102
R167
GB RG RY
2 7 8
R10
D22
GB L LY
3 1 5
UP
OFF
DOWN
REAR POWER WINDOW SUB SWITCH LH
D25
LR LG
2 4
LG LR
1 2
D24
M
REAR POWER WINDOW MOTOR LH
B
2
GROUND JOINT CONNECTOR
i99
1
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
WD : WITH DOUBLE LOCK
OD : WITHOUT DOUBLE LOCK
D24 (GREEN)
D25
R10
i99
D7
i102
B97
OD : D83
i1
WD : D83

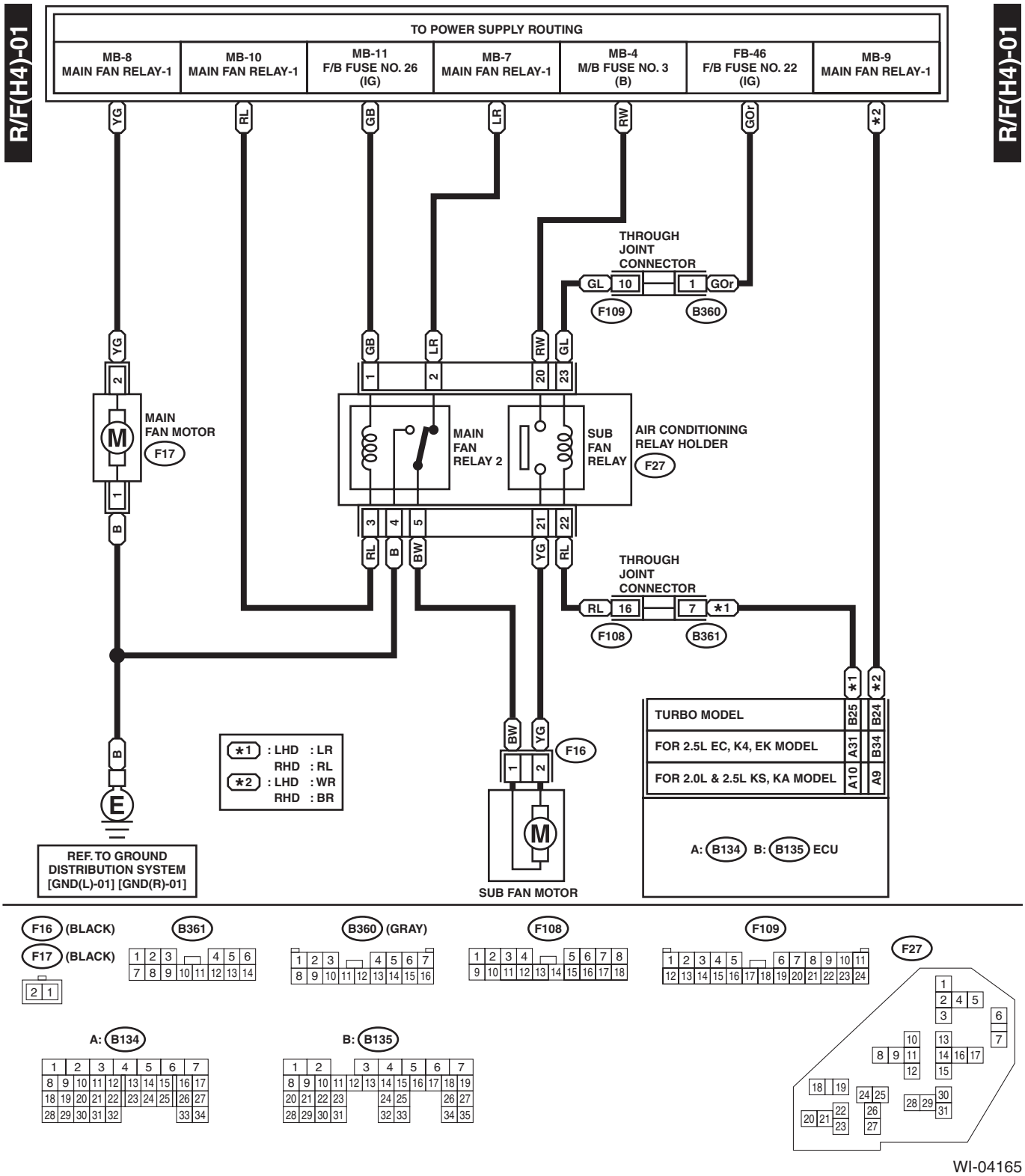
WI-04163


P/W(R)-04
P/W(R)-01 C
GB
WD OD
17 16
GB
i76
D83
GB
11
OFF
UP
DOWN
REAR RH
POWER WINDOW MAIN SWITCH
D7
B RRU RRD E
P/W(L)-01 E
G
1
B97
R1
GB
13 12 14
L LY B
D83
WD OD 19 20 2
WD 21 23 2
i76
L LY B
L LY
10 9
i53
R98
GB L LY
2 7 8
R13
D28
GB L LY
3 1 5
UP
OFF
DOWN
REAR POWER WINDOW SUB SWITCH RH
D31
LR LG
2 4
LG LR
1 2
D30
M
REAR POWER WINDOW MOTOR RH
B
2
GROUND JOINT CONNECTOR
i99
1
B
B
E
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-03]
WD : WITH DOUBLE LOCK
OD : WITHOUT DOUBLE LOCK
D30 (GREEN)
D31
R13
i99
D7
i53
B97
OD : D83
i1
WD : D83

WI-04164

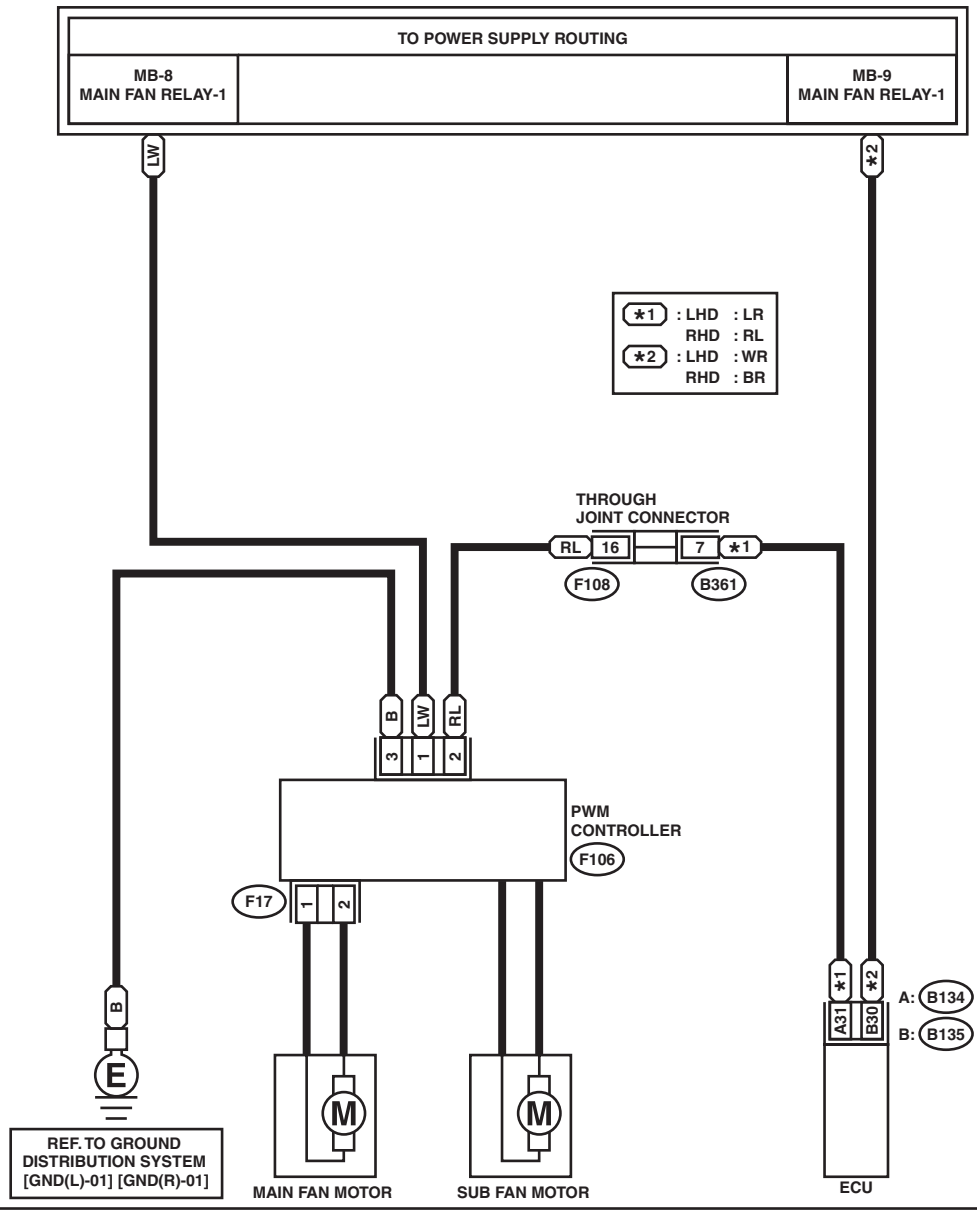
37. Radiator Fan System

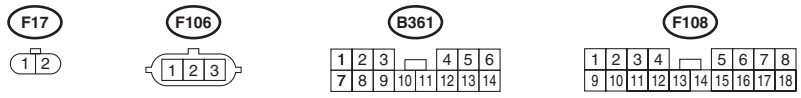
A: WIRING DIAGRAM

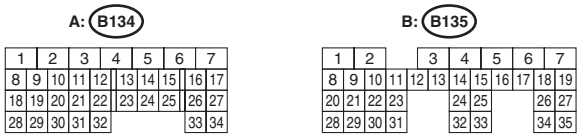


WI-04165

R/F(H6)-01







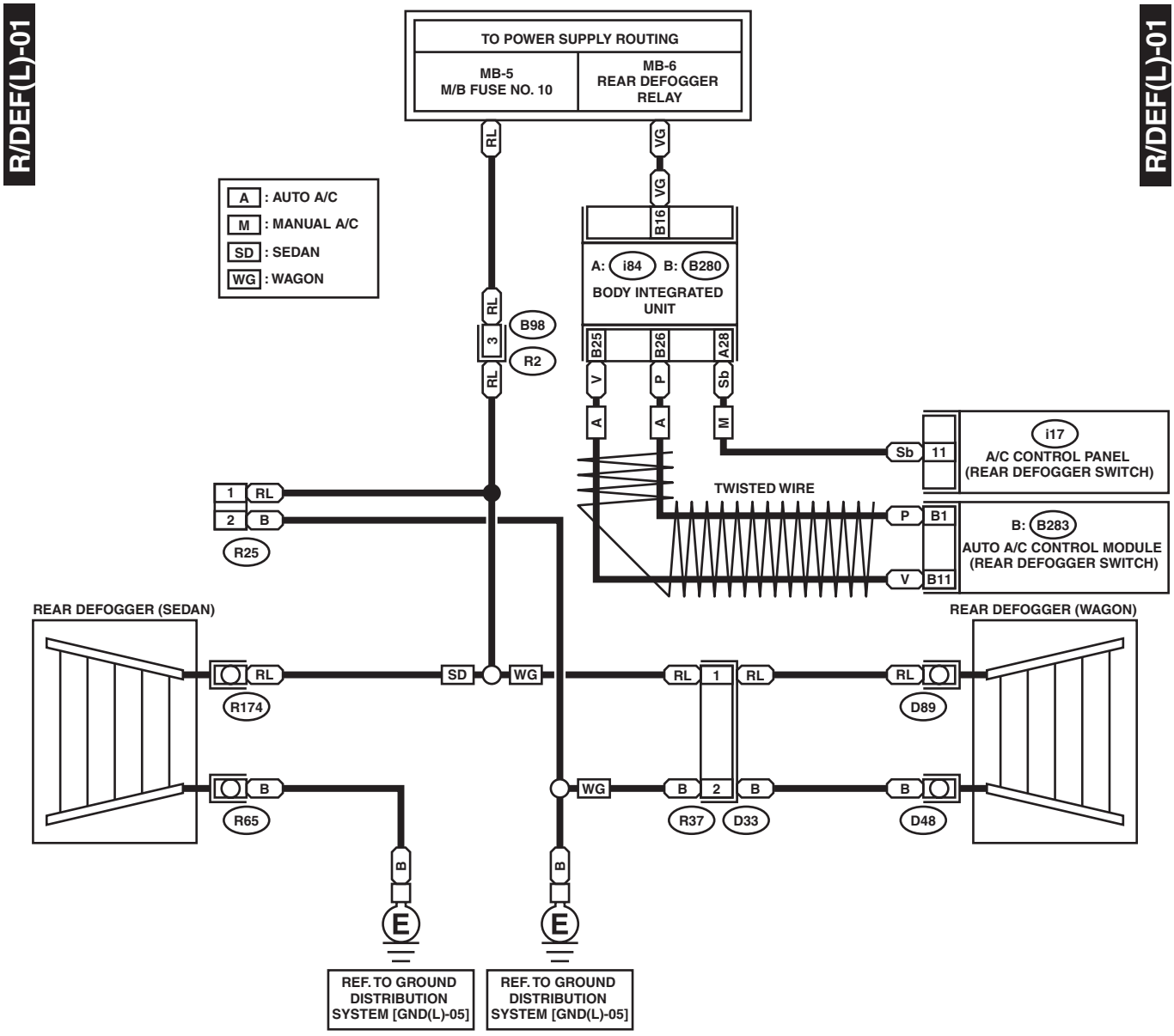
WI-04166

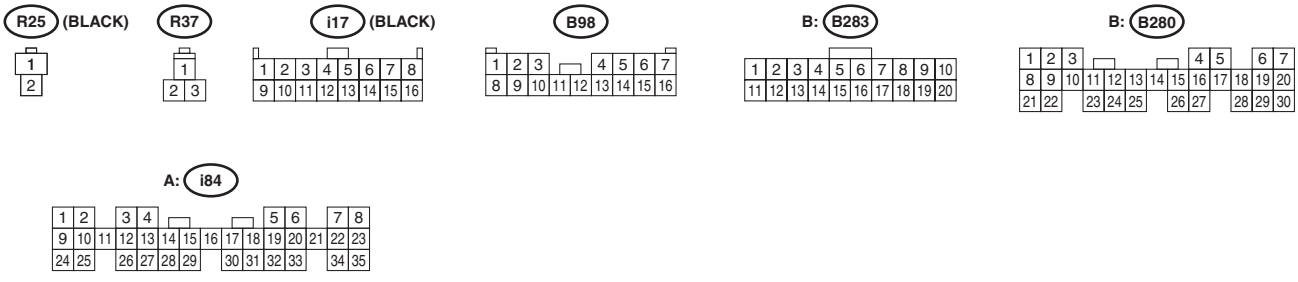
R/F(H6)-01

38.Rear Window Defogger System

A: WIRING DIAGRAM

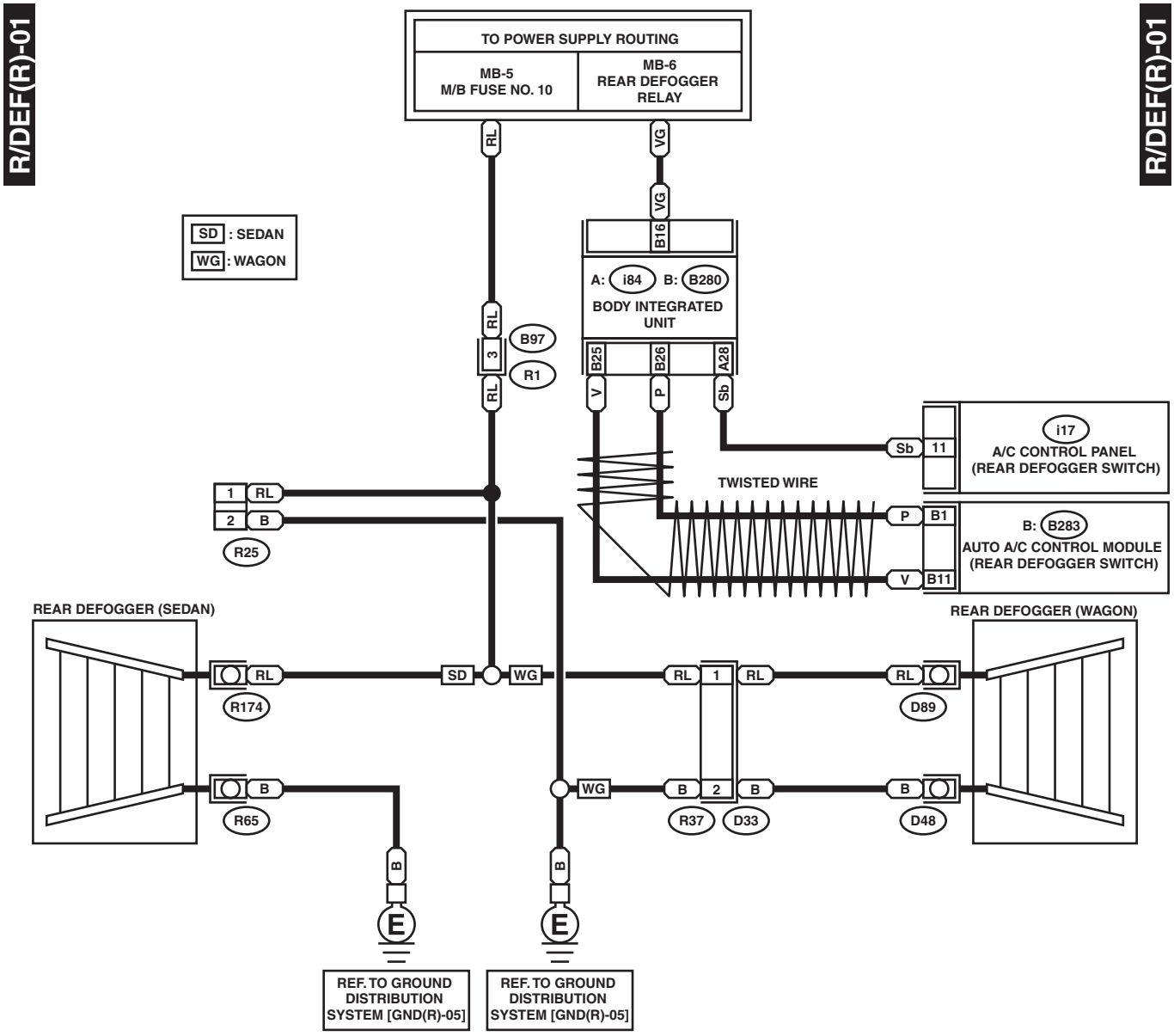
1. LHD MODEL

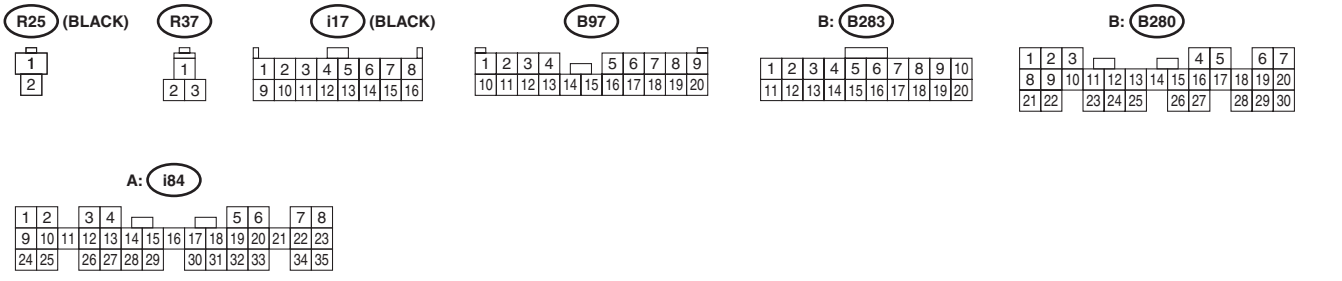




WI-04167

2. RHD MODEL



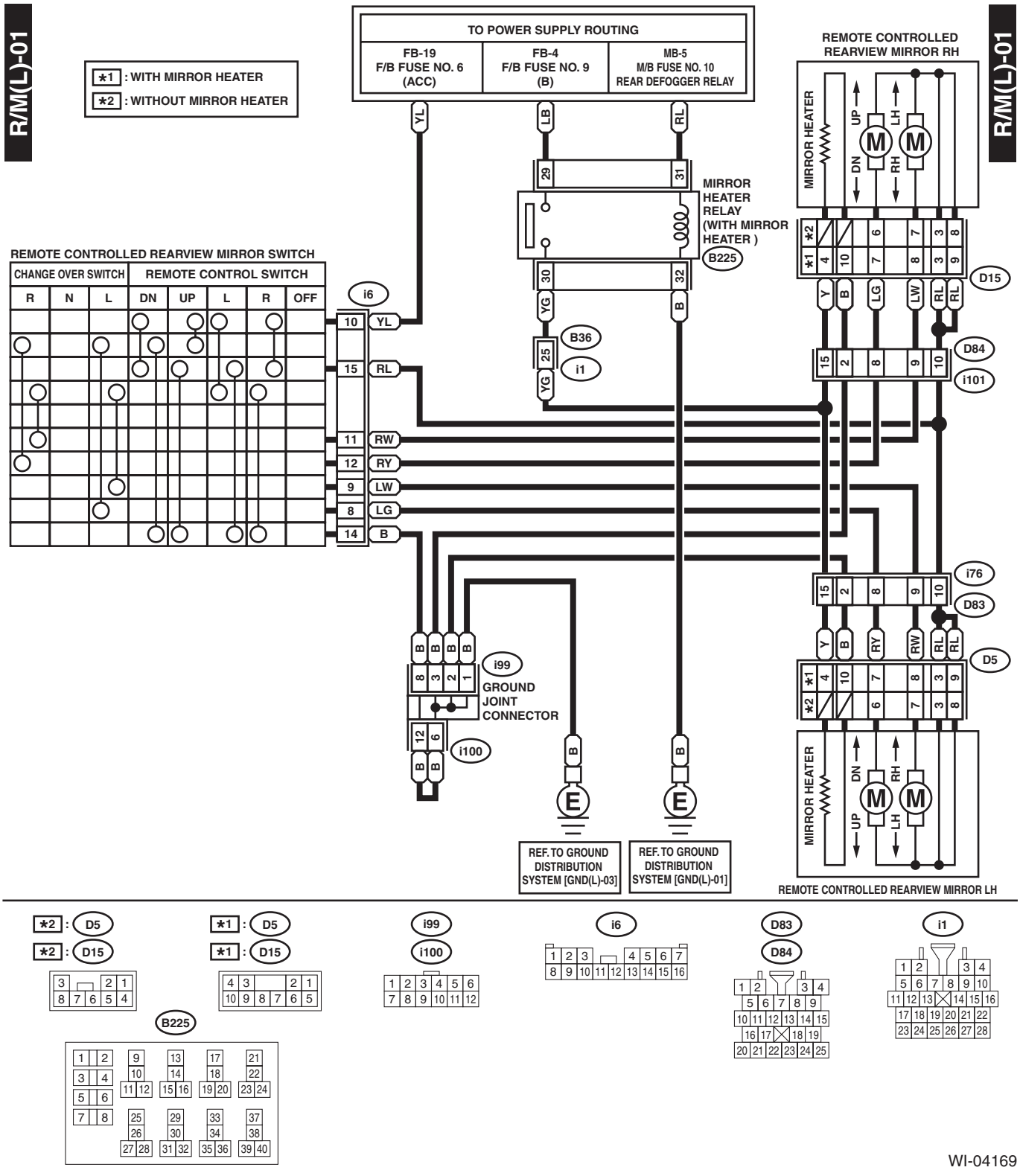


WI-04168

39.Remote Control Mirror System

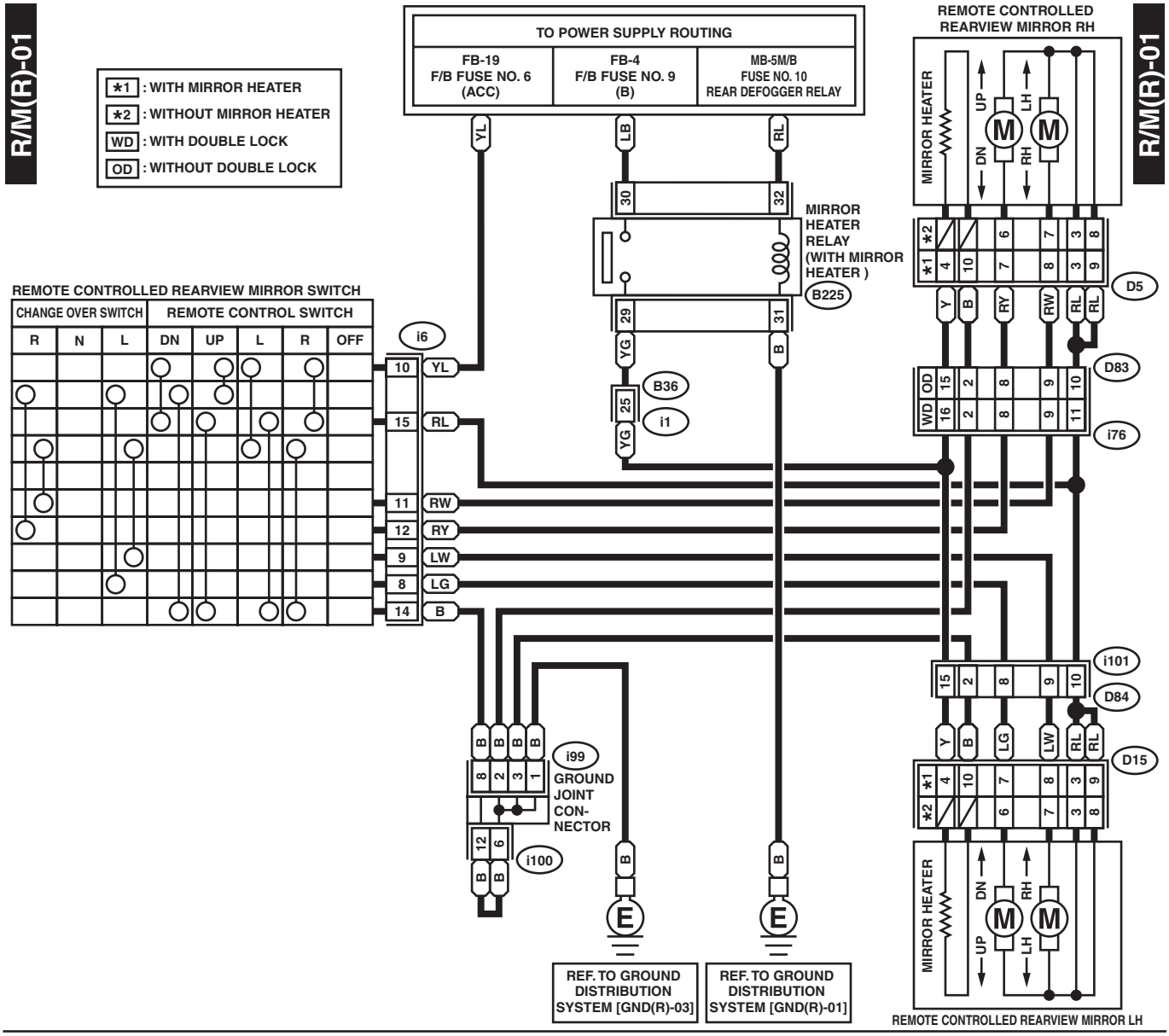
A: WIRING DIAGRAM

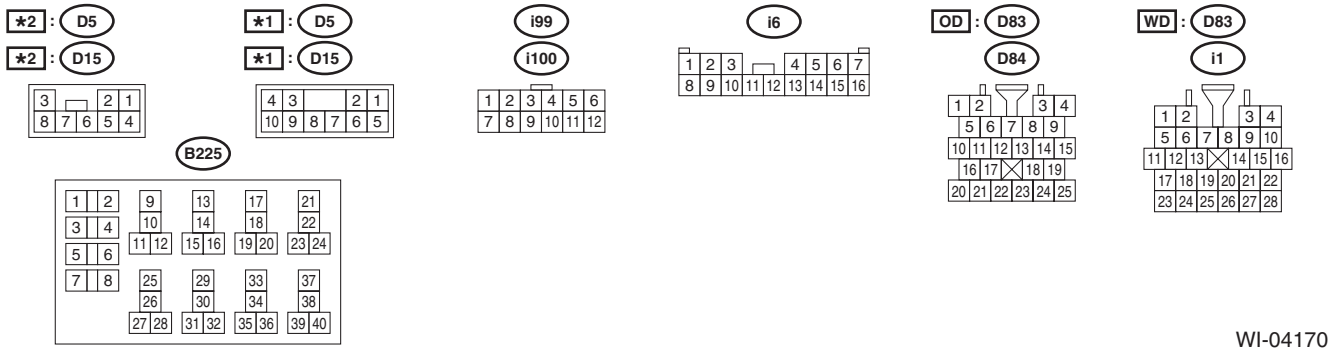
1. LHD MODEL



WI-04169

2. RHD MODEL



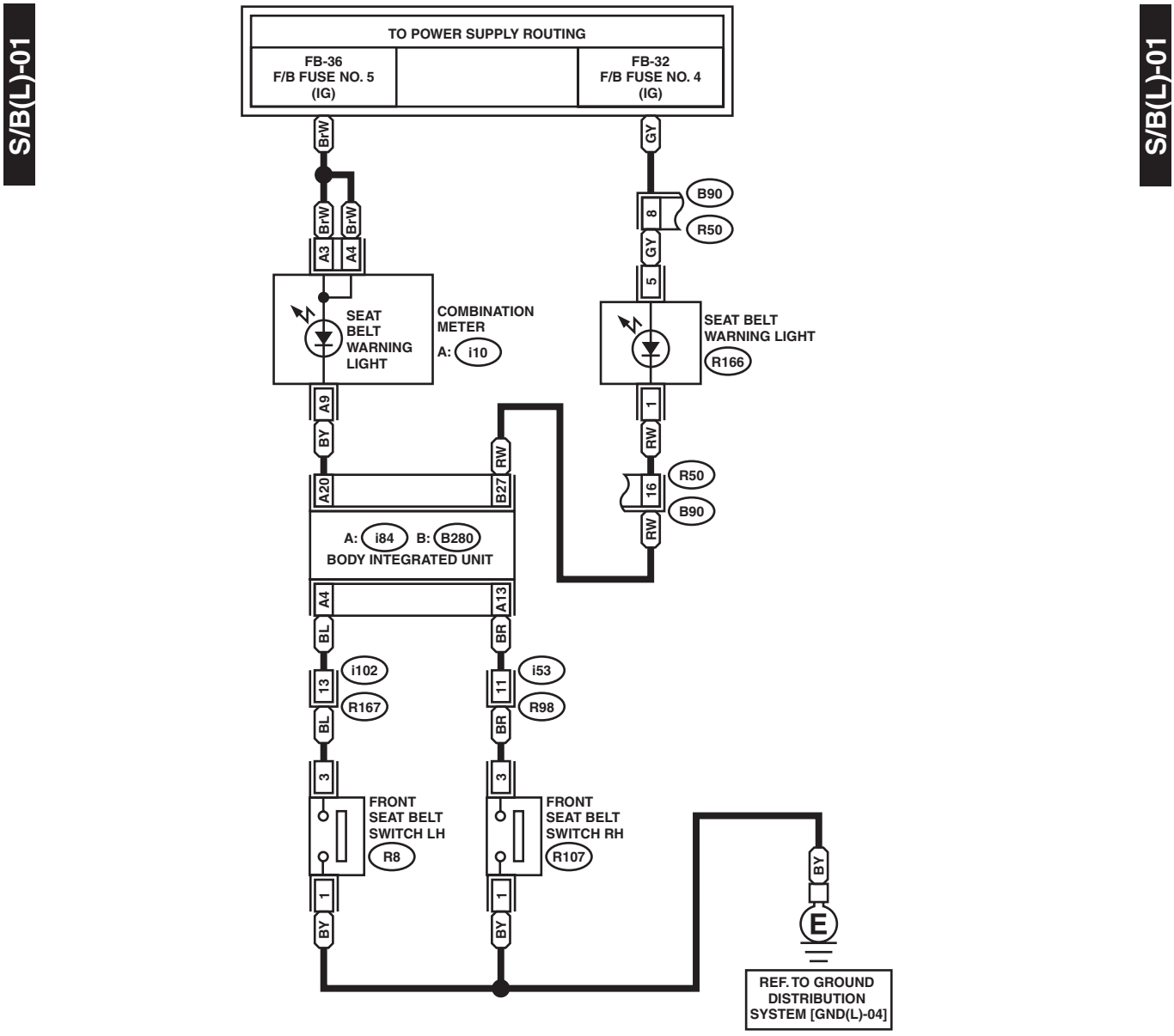


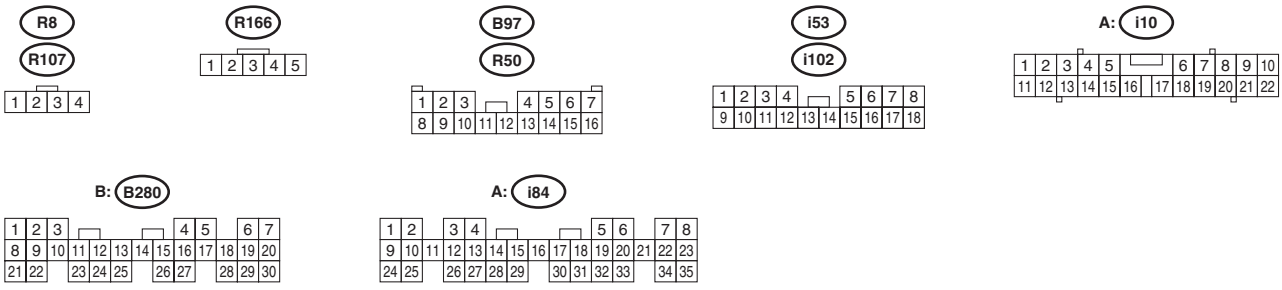
WI-04170

40.Seat Belt Warning System

A: WIRING DIAGRAM

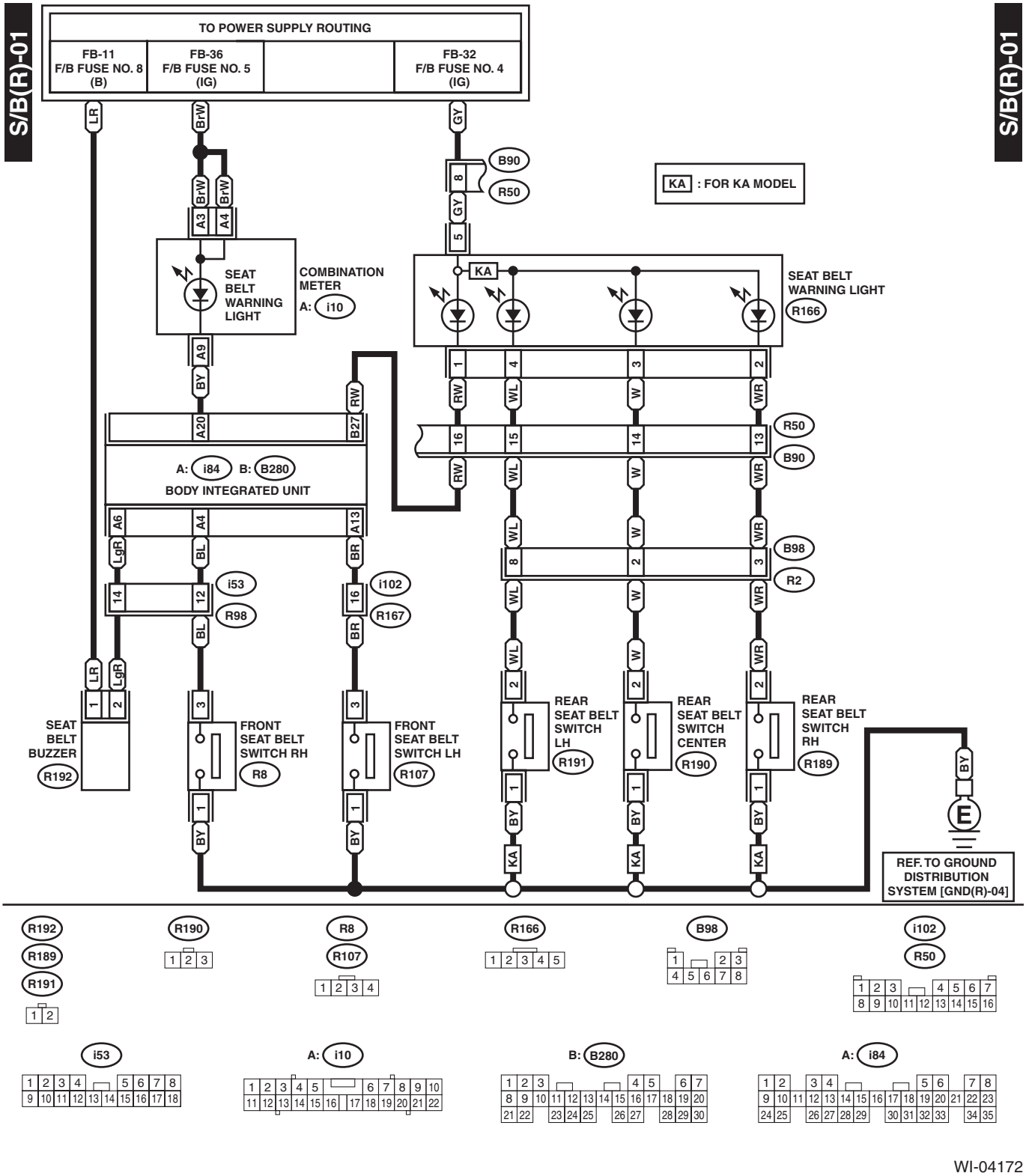
1. LHD MODEL





WI-04171

2. RHD MODEL

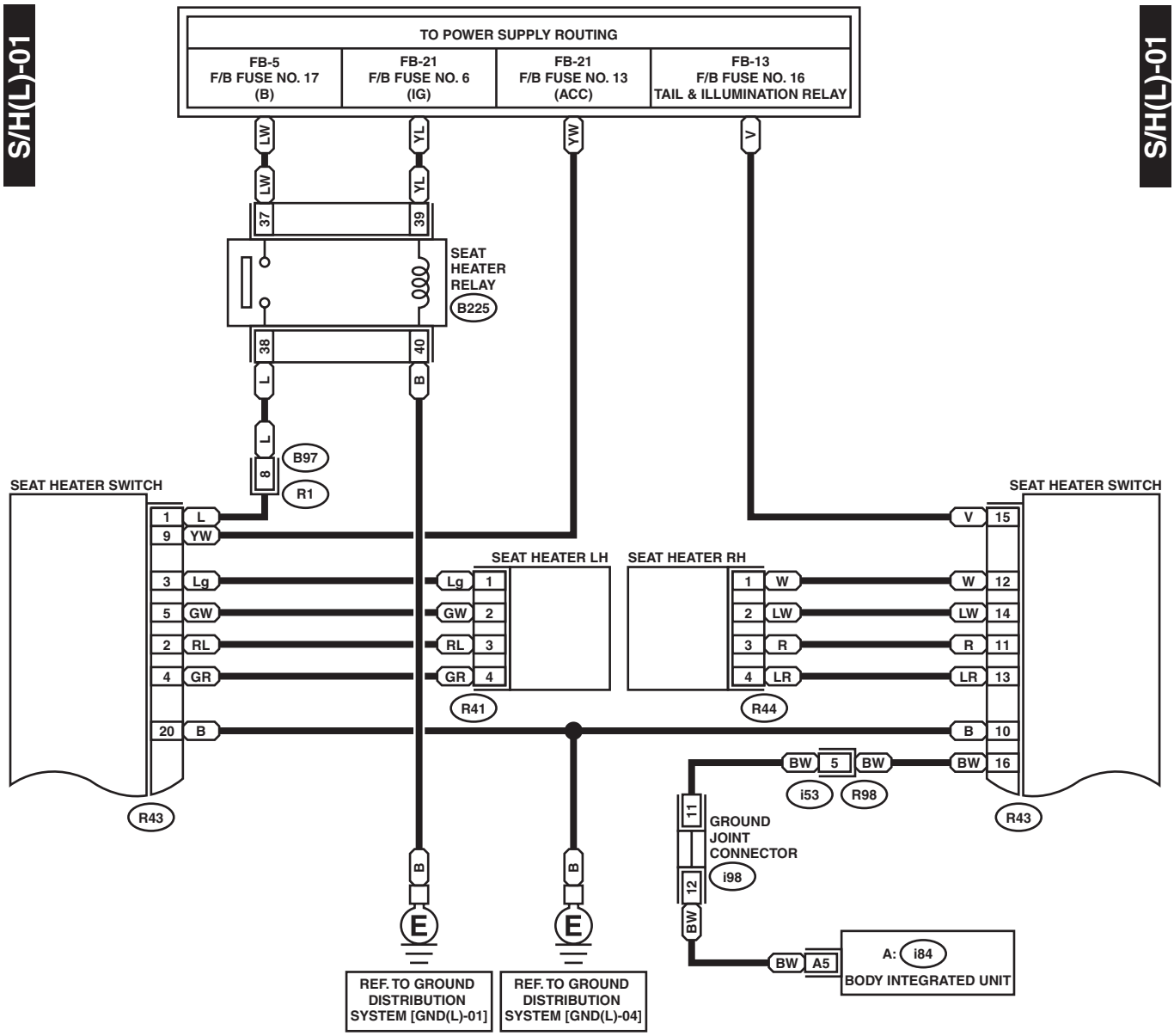


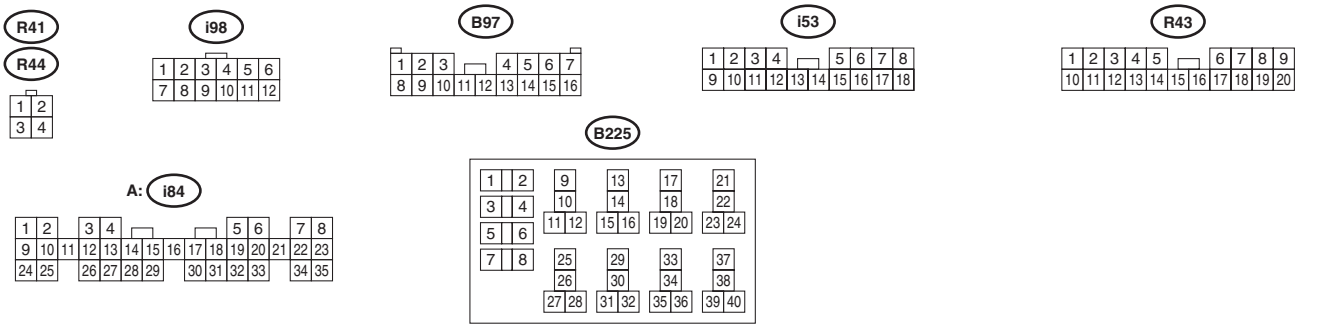
WI-04172

41.Seat Heater System

A: WIRING DIAGRAM

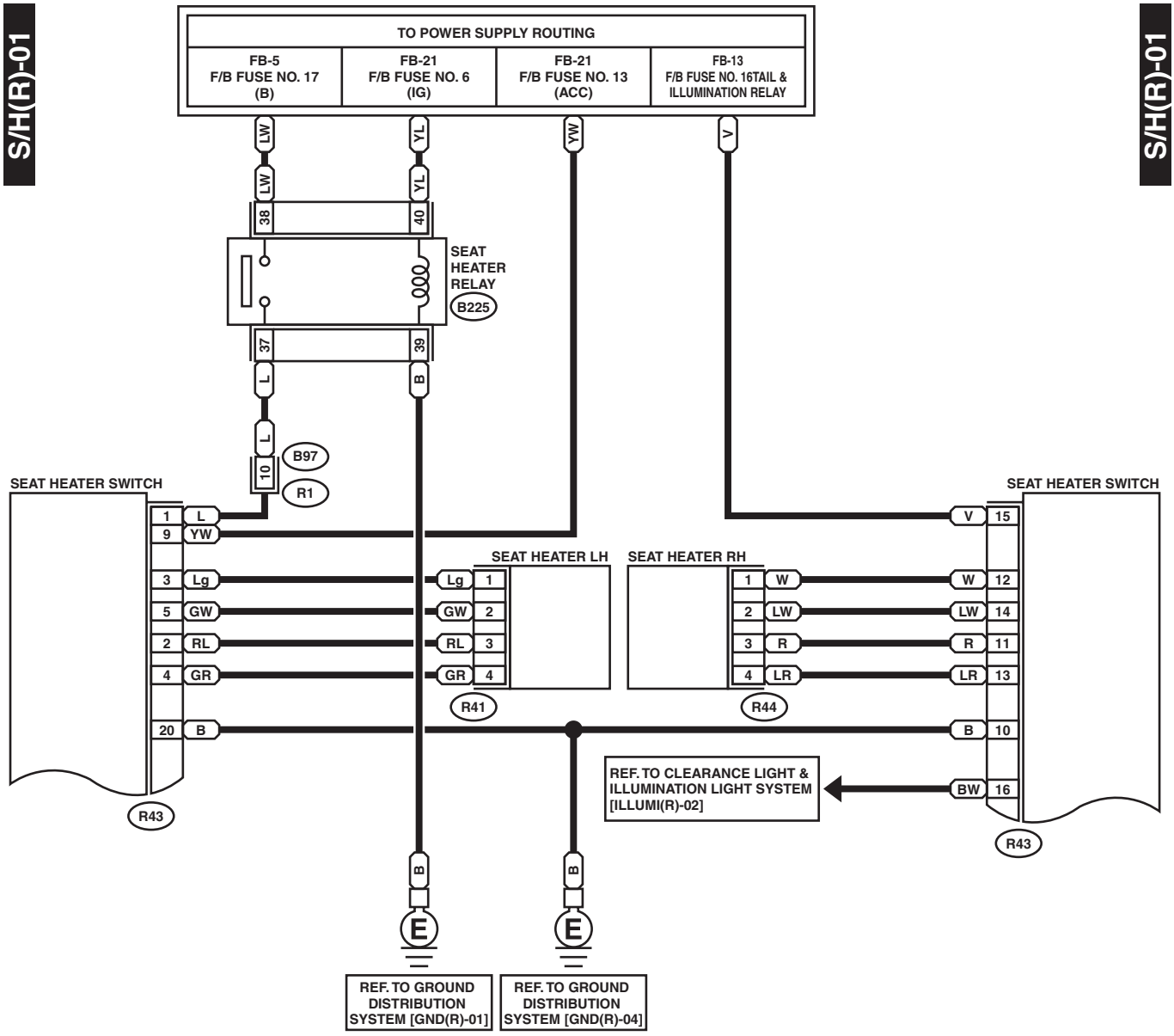
1. LHD MODEL





WI-04173

2. RHD MODEL

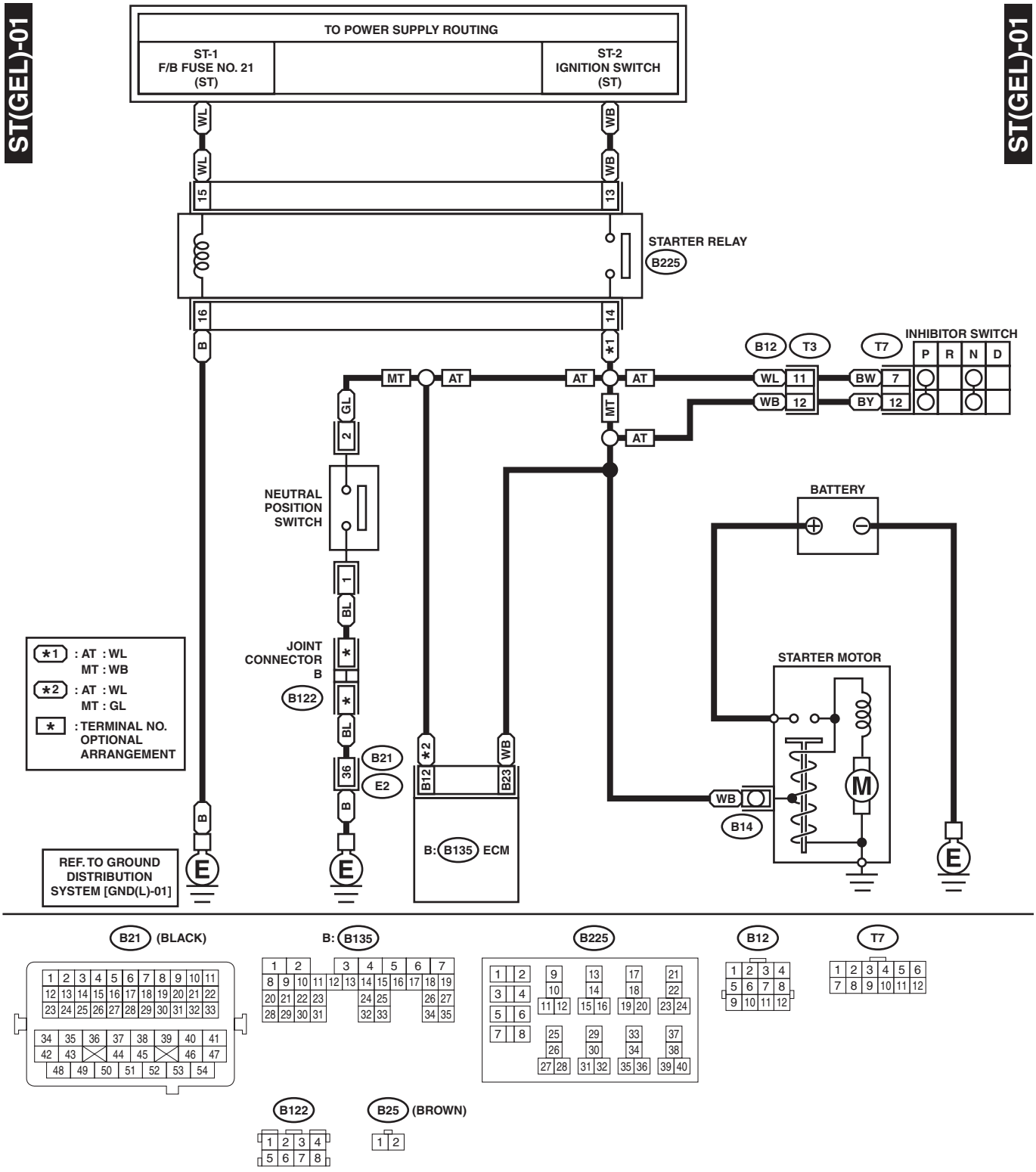


WI-04174

42.Starter System

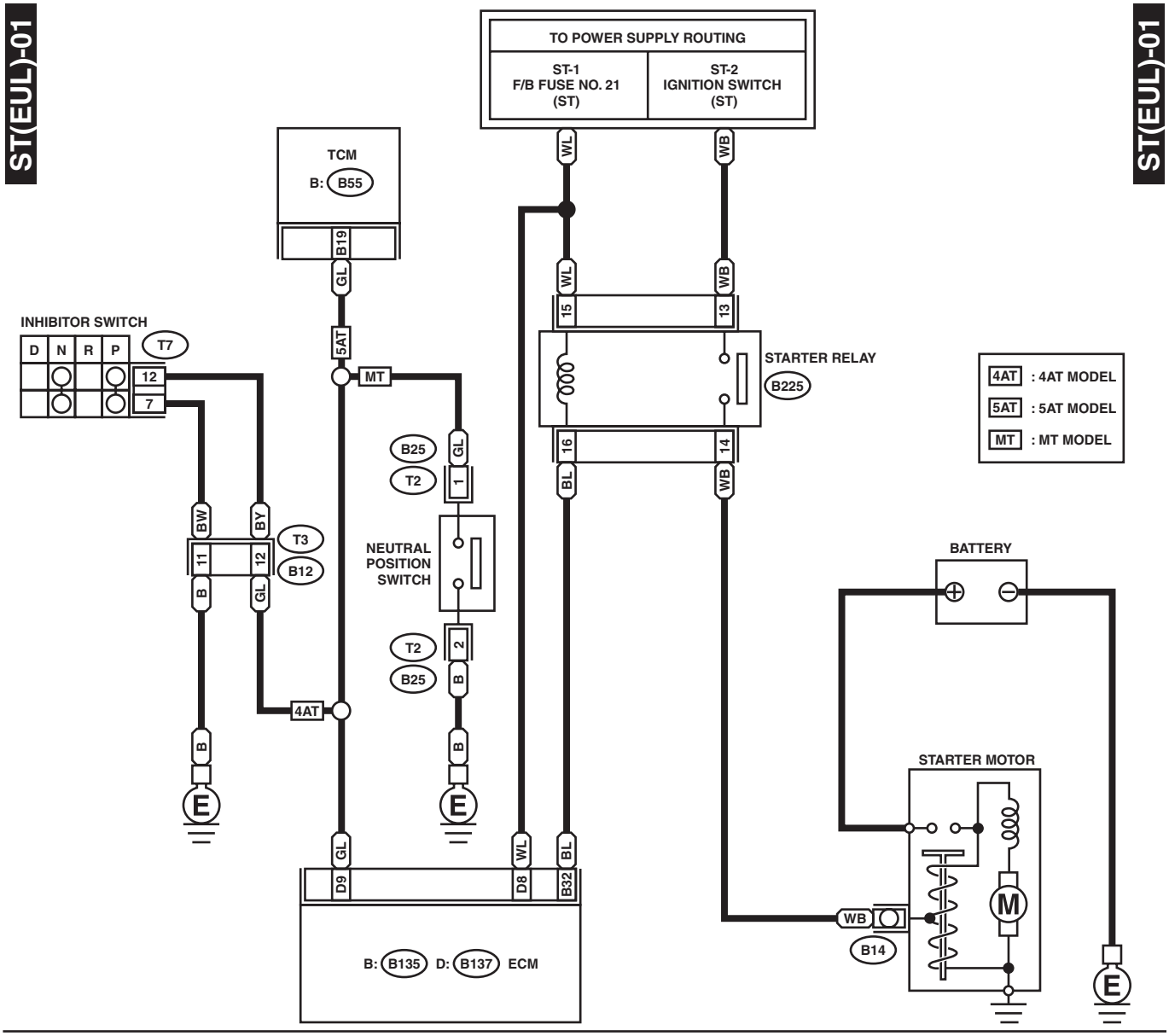
A: WIRING DIAGRAM

1. LHD 2.0 L MODEL AND 2.5 L KS MODEL



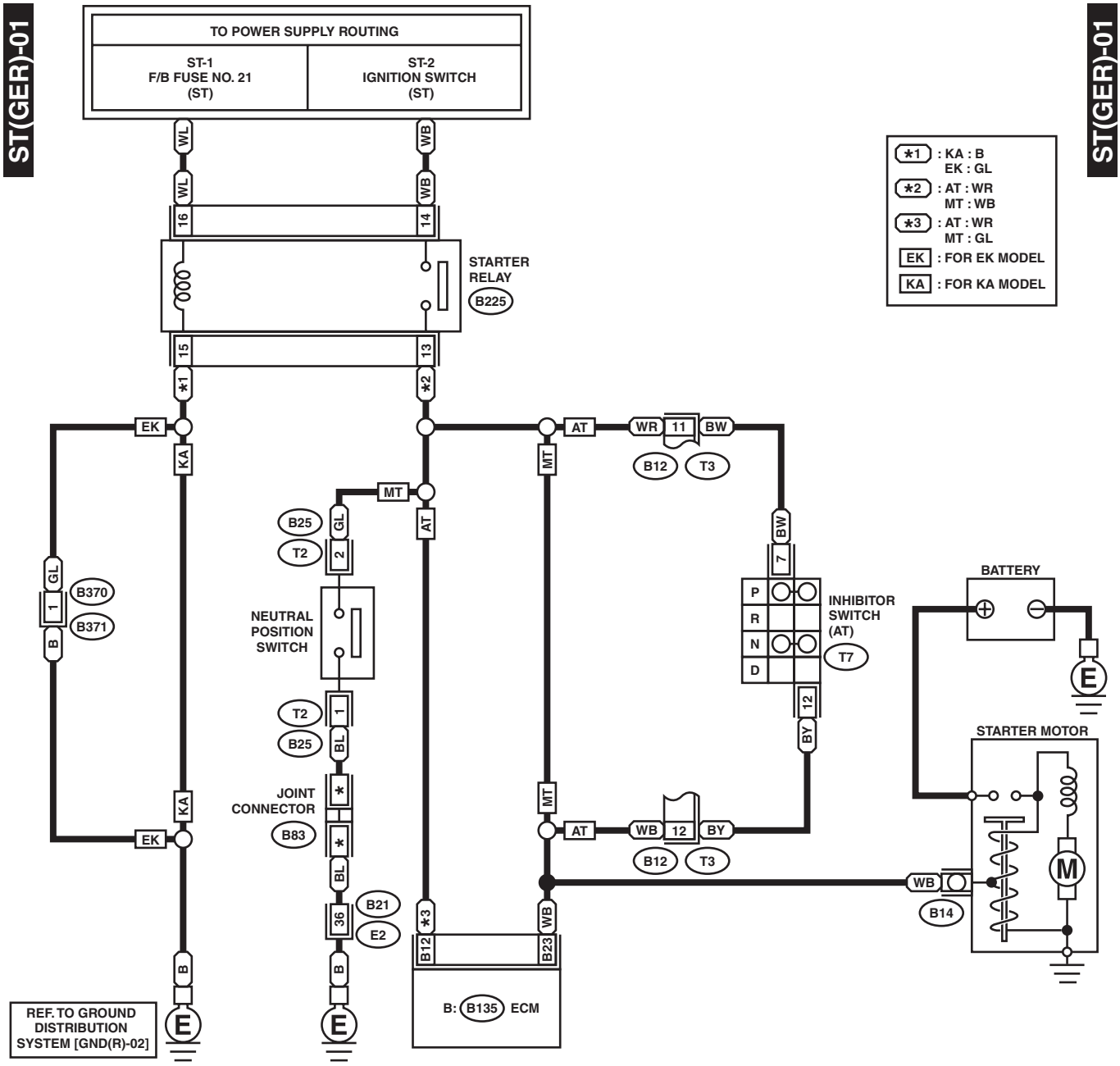
WI-04178

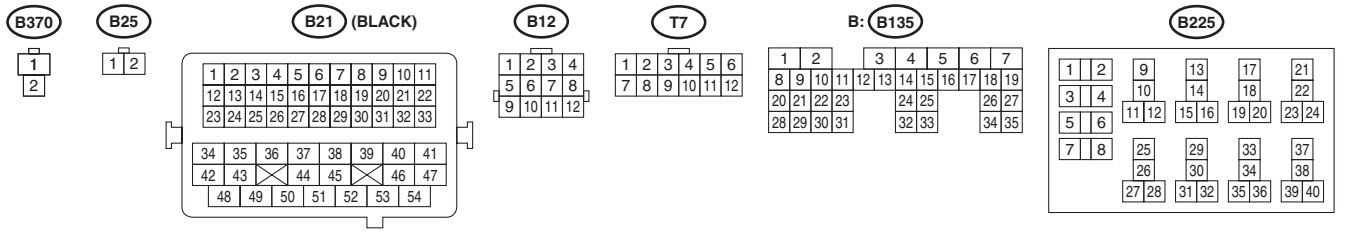
2. LHD 2.5 L EC, K4 AND 3.0 L MODEL



WI-04179

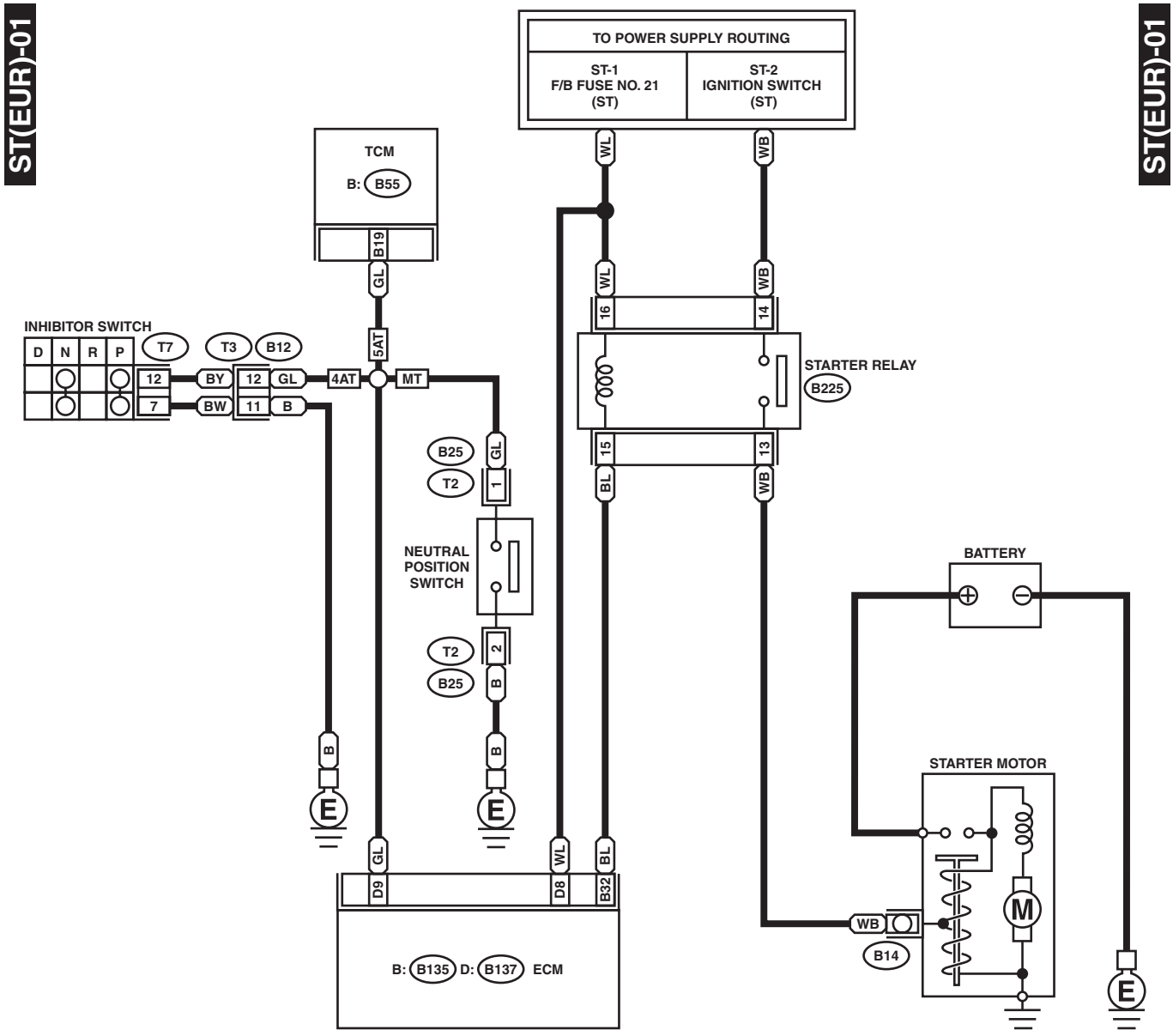
3. RHD 2.0 L NON-TURBO MODEL AND 2.5 L KA MODEL





WI-04180

4. RHD 2.5 L EK MODEL, TURBO MODEL AND 3.0 L MODEL

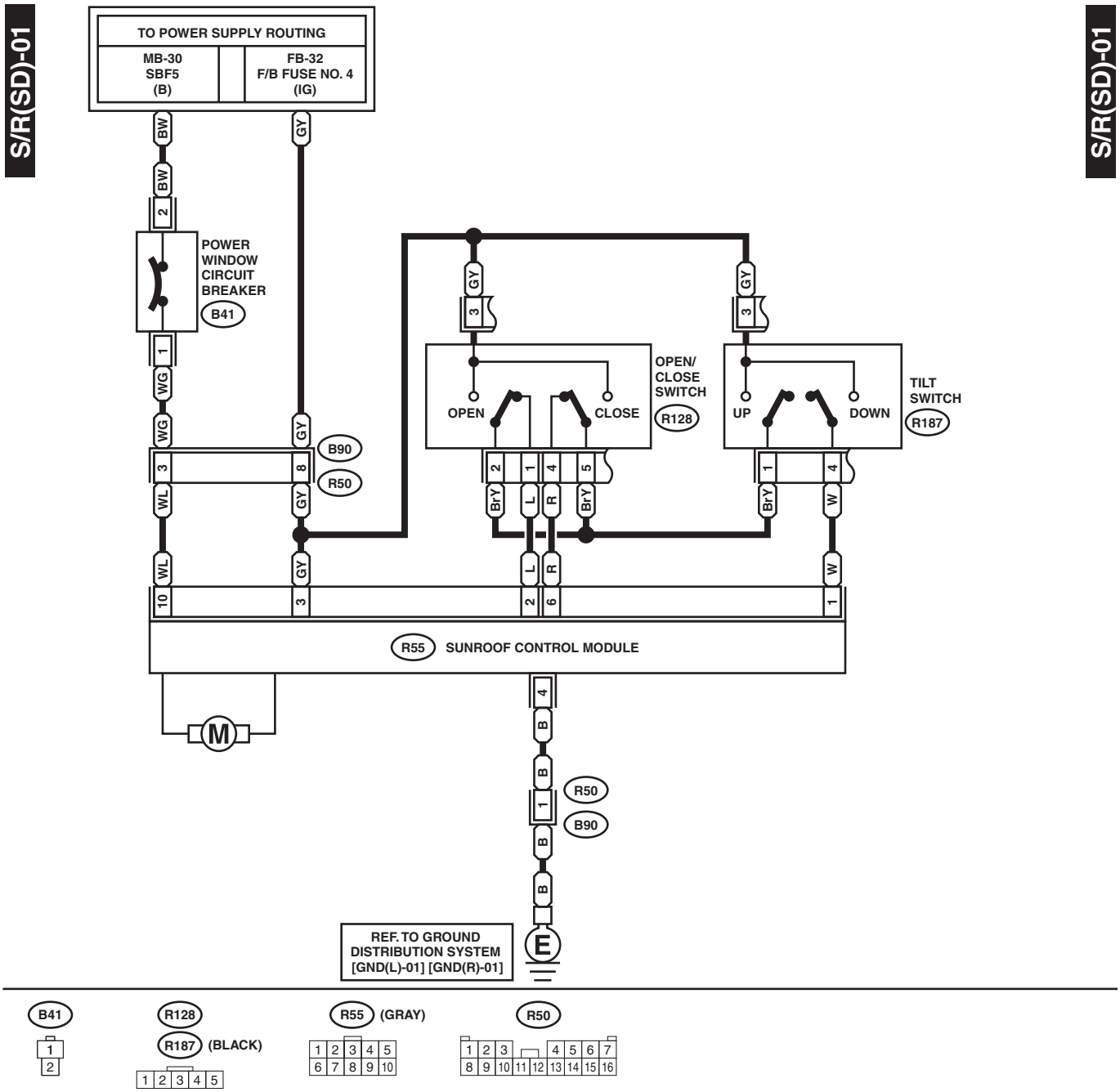


WI-04181

43.Sunroof System

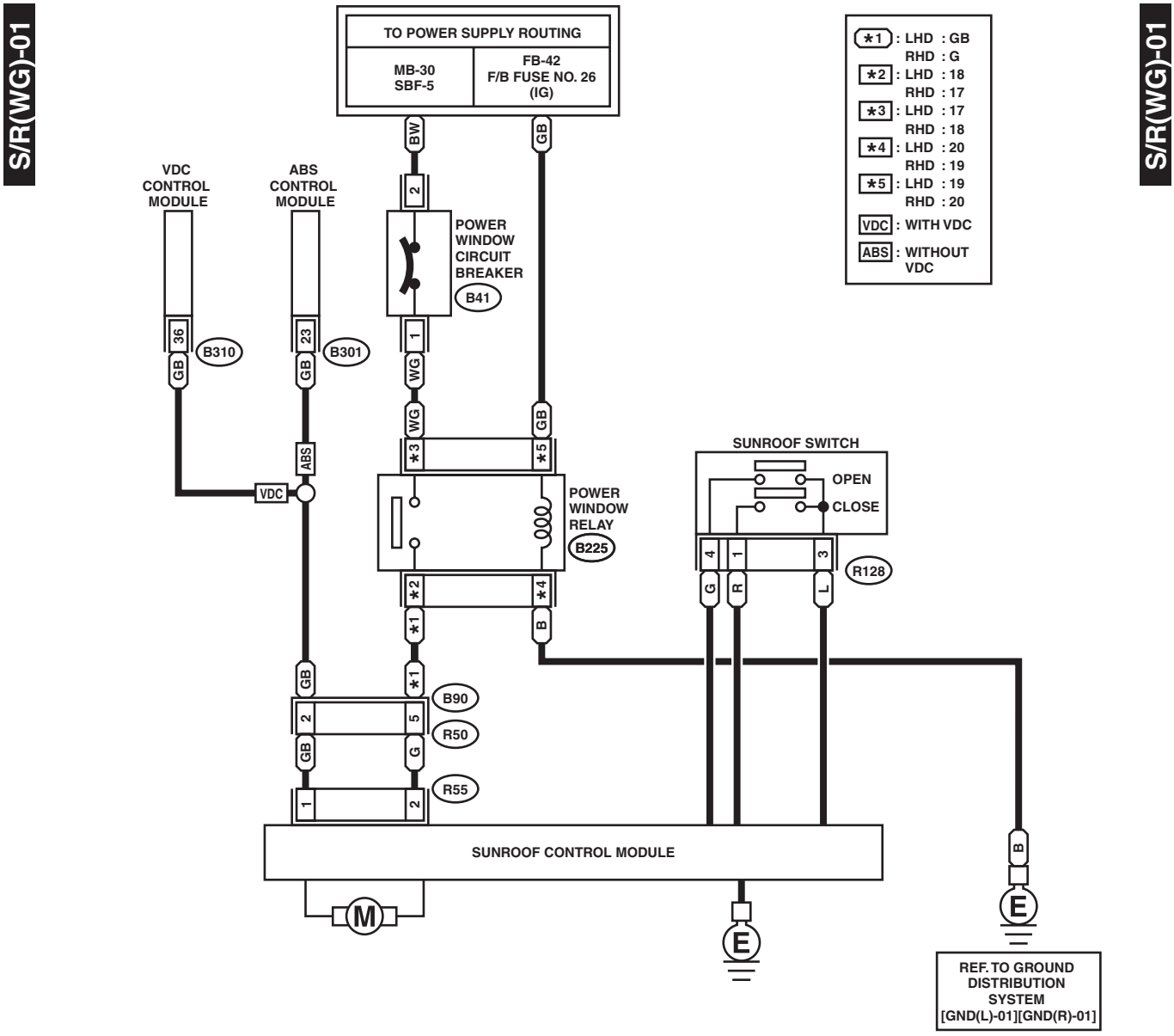
A: WIRING DIAGRAM

1. SEDAN MODEL



WI-04182

2. WAGON MODEL

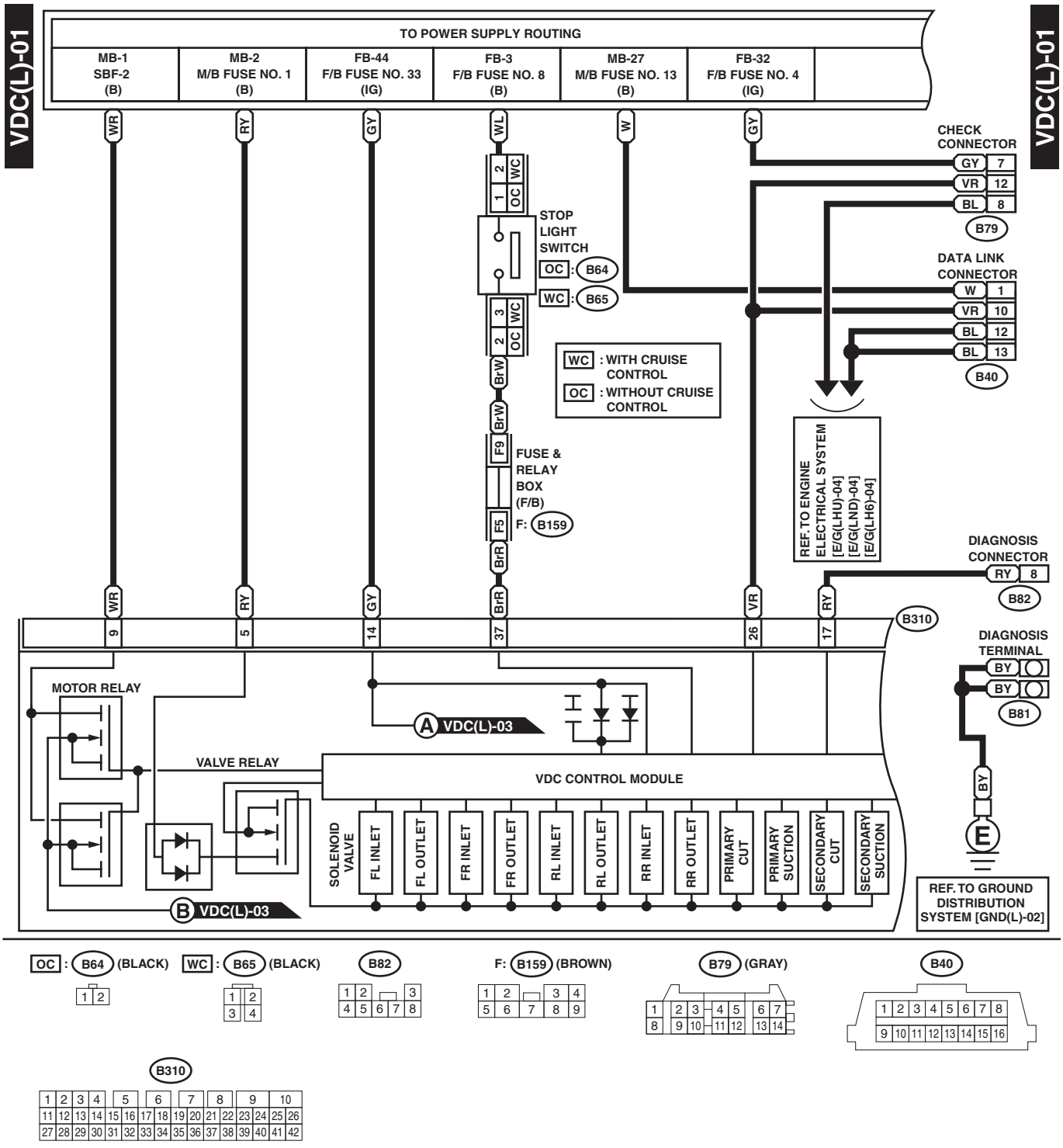


WI-04183

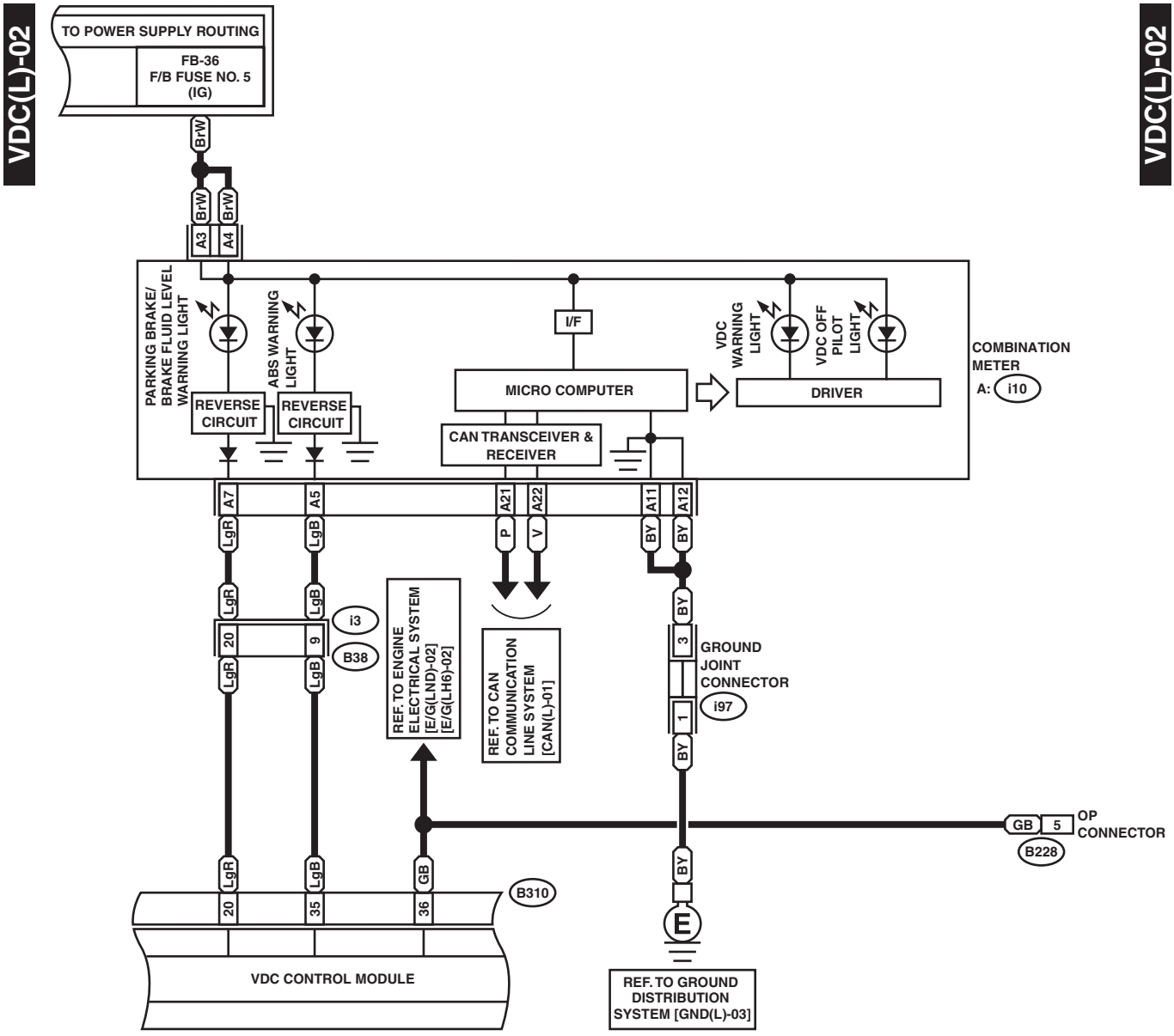
44. Vehicle Dynamics Control System

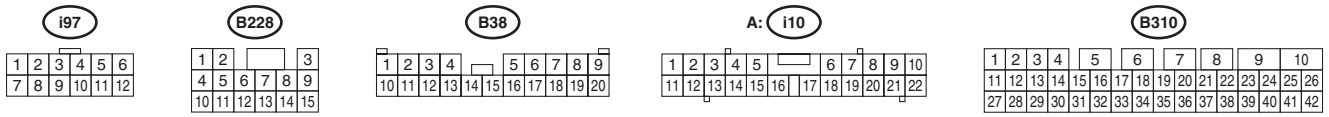
A: WIRING DIAGRAM

1. LHD MODEL

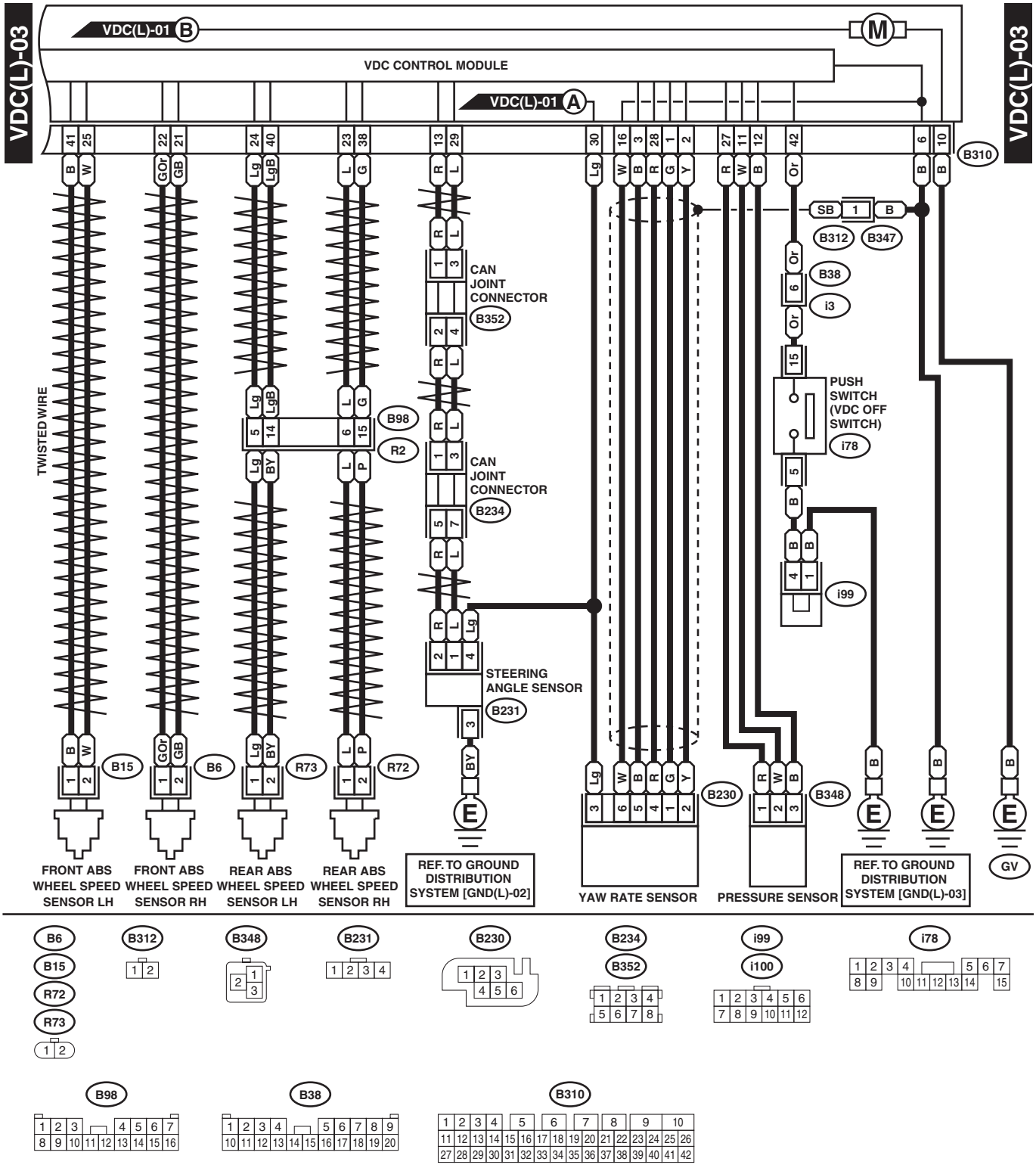


WI-04184


VDC(L)-02
VDC(L)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
PARKING BRAKE/
BRAKE FLUID LEVEL
WARNING LIGHT
ABS WARNING
LIGHT
REVERSE
CIRCUIT
REVERSE
CIRCUIT
I/F
MICRO COMPUTER
CAN TRANSCEIVER &
RECEIVER
VDC
WARNING
LIGHT
VDC OFF
PILOT
LIGHT
DRIVER
COMBINATION
METER
A: i10
A7
A5
A21
A22
A11
A12
LgR
LgB
P
V
BY
i3
B38
20
9
3
1
GROUND
JOINT
CONNECTOR
i97
REF. TO ENGINE
ELECTRICAL SYSTEM
[E/G(LND)-02]
[E/G(LH6)-02]
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(L)-01]
GB
5
OP
CONNECTOR
B228
B310
35
36
VDC CONTROL MODULE
E
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(L)-03]

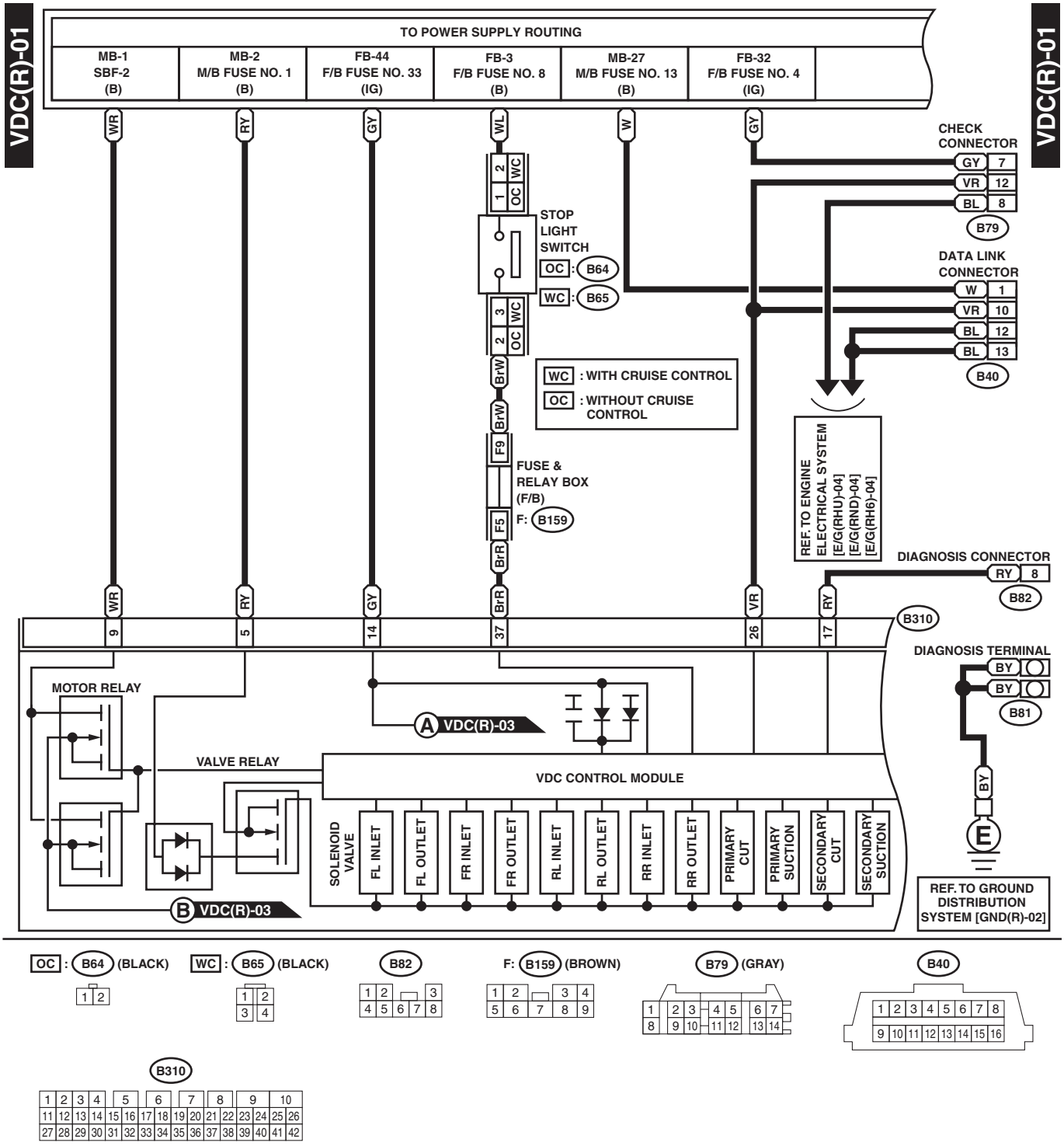

i97
B228
B38
A: i10
B310

WI-04185

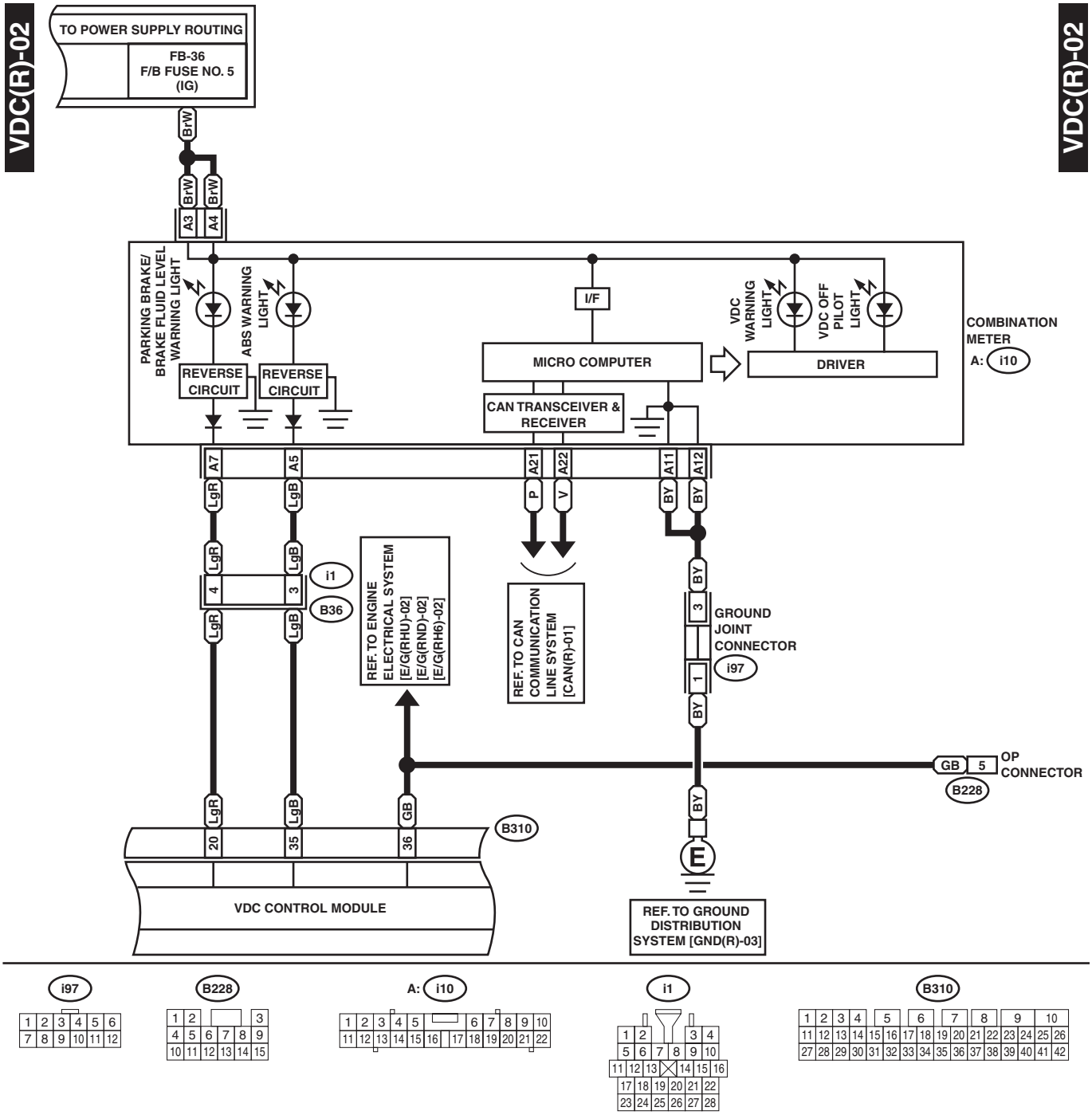

VDC(L)-03
VDC(L)-01 B
VDC CONTROL MODULE
VDC(L)-01 A
M
TWISTED WIRE
CAN JOINT CONNECTOR B352
CAN JOINT CONNECTOR B234
STEERING ANGLE SENSOR B231
B98
R2
B15
B6
R73
R72
B310
B312
B347
B38
i3
PUSH SWITCH (VDC OFF SWITCH) i78
i99
B230
B348
GV
FRONT ABS WHEEL SPEED SENSOR LH
FRONT ABS WHEEL SPEED SENSOR RH
REAR ABS WHEEL SPEED SENSOR LH
REAR ABS WHEEL SPEED SENSOR RH
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-02]
YAW RATE SENSOR
PRESSURE SENSOR
REF. TO GROUND DISTRIBUTION SYSTEM [GND(L)-03]
B6
B15
R72
R73
B312
B348
B231
B230
B234
B352
i99
i100
i78
B98
B38
B310

WI-04186

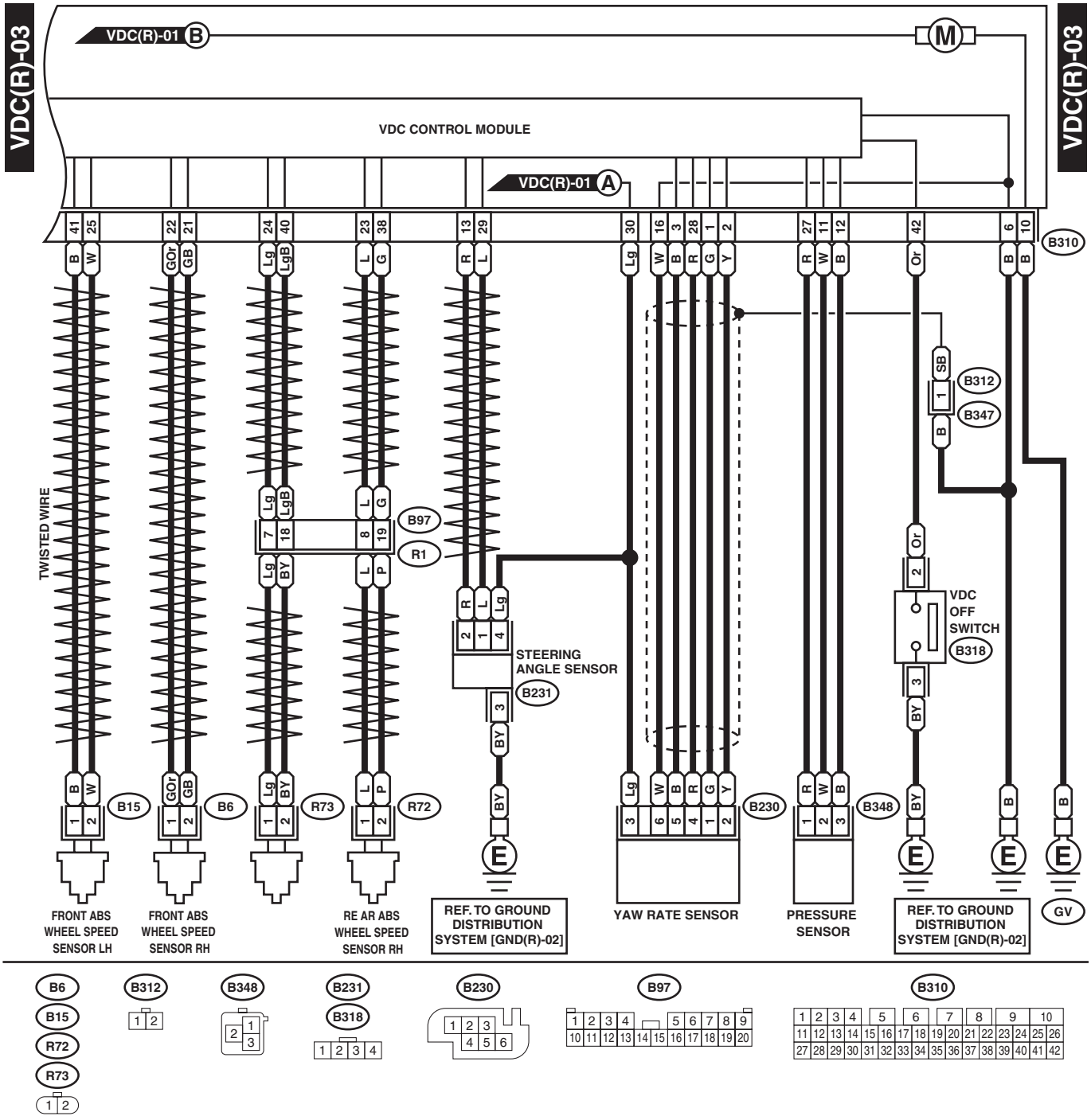
2. RHD MODEL



WI-04187


VDC(R)-02
VDC(R)-02
TO POWER SUPPLY ROUTING
FB-36
F/B FUSE NO. 5
(IG)
BrW
A3
A4
PARKING BRAKE/
BRAKE FLUID LEVEL
WARNING LIGHT
ABS WARNING
LIGHT
REVERSE
CIRCUIT
REVERSE
CIRCUIT
I/F
MICRO COMPUTER
CAN TRANSCEIVER &
RECEIVER
VDC
WARNING
LIGHT
VDC OFF
PILOT
LIGHT
DRIVER
COMBINATION
METER
A: i10
A7
A5
A21
A22
A11
A12
LgR
LgB
P
V
BY
i1
4
3
B36
REF. TO ENGINE
ELECTRICAL SYSTEM
[E/G(RHU)-02]
[E/G(RND)-02]
[E/G(RH6)-02]
REF. TO CAN
COMMUNICATION
LINE SYSTEM
[CAN(R)-01]
GROUND
JOINT
CONNECTOR
i97
1
GB
5
OP
CONNECTOR
B228
20
35
36
B310
VDC CONTROL MODULE
E
REF. TO GROUND
DISTRIBUTION
SYSTEM [GND(R)-03]
i97
B228
A: i10
i1
B310

WI-04188

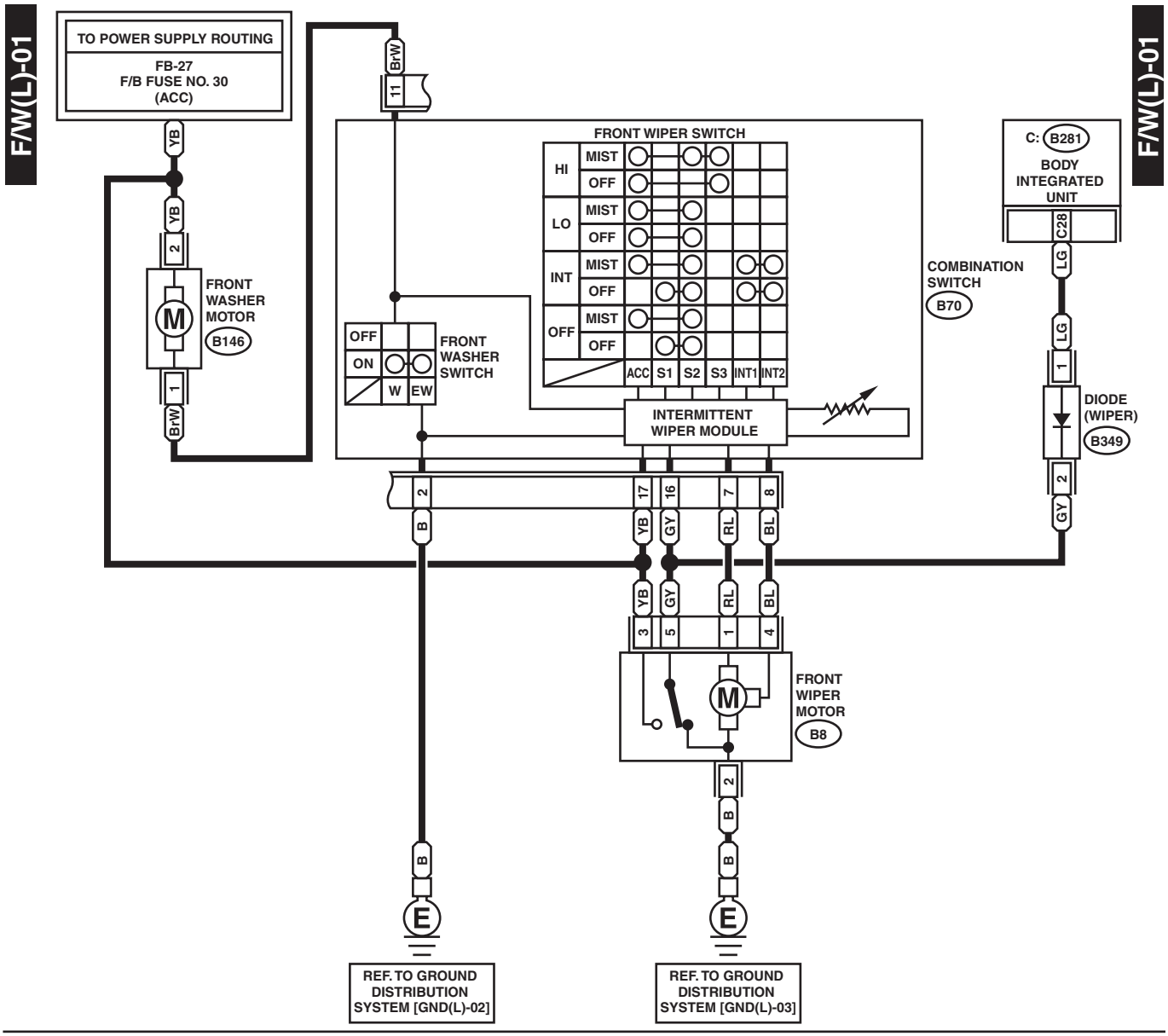

VDC(R)-03
VDC(R)-01 B
M
VDC CONTROL MODULE
VDC(R)-01 A
B310
TWISTED WIRE
B97
R1
B15
B6
R73
R72
B231
STEERING ANGLE SENSOR
B230
B312
B347
B318
VDC OFF SWITCH
B348
GV
FRONT ABS WHEEL SPEED SENSOR LH
FRONT ABS WHEEL SPEED SENSOR RH
RE AR ABS WHEEL SPEED SENSOR RH
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]
YAW RATE SENSOR
PRESSURE SENSOR
REF. TO GROUND DISTRIBUTION SYSTEM [GND(R)-02]

WI-04189

45.Front Wiper and Washer System

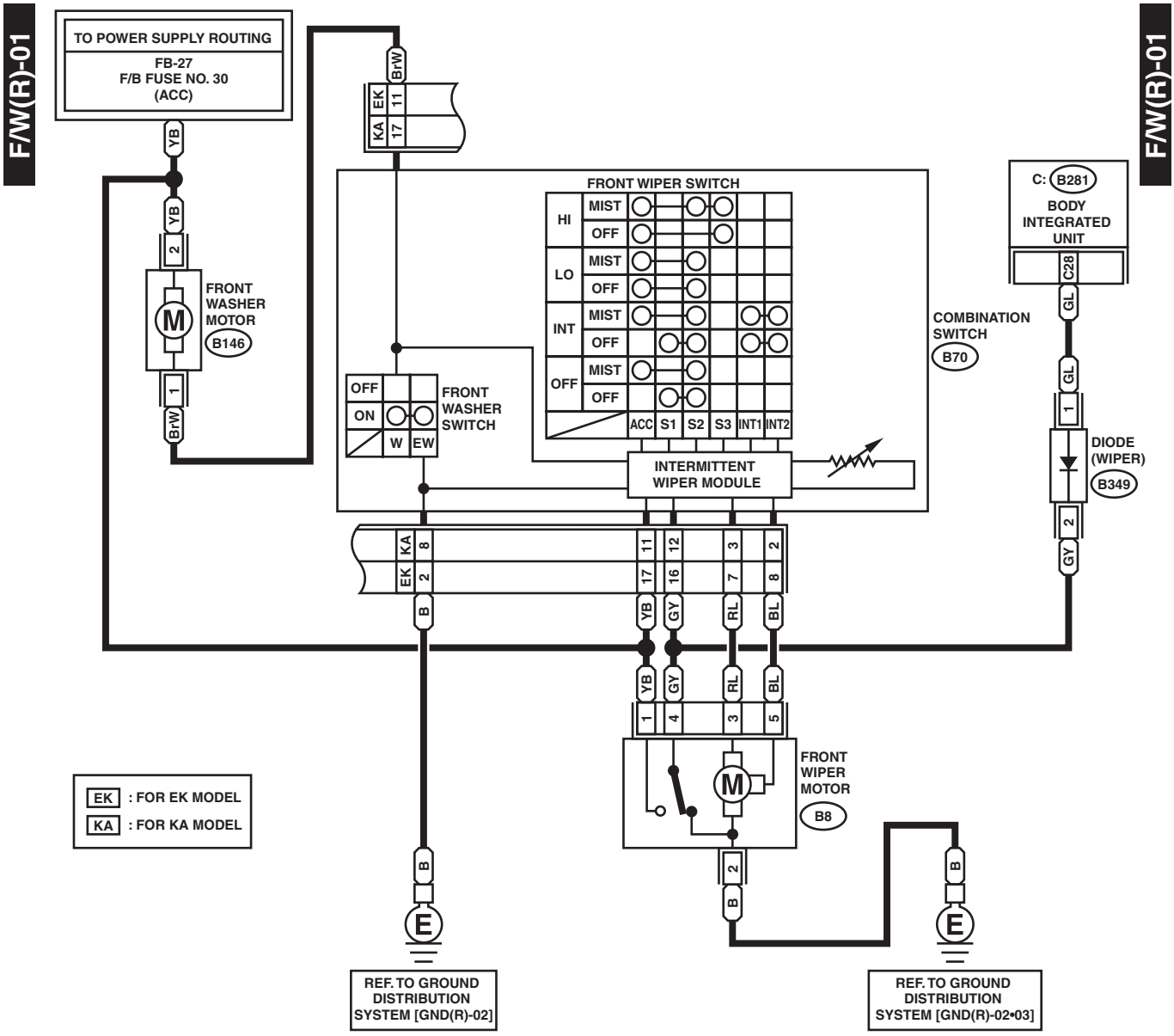
A: WIRING DIAGRAM

1. LHD MODEL



WI-04190

2. RHD MODEL

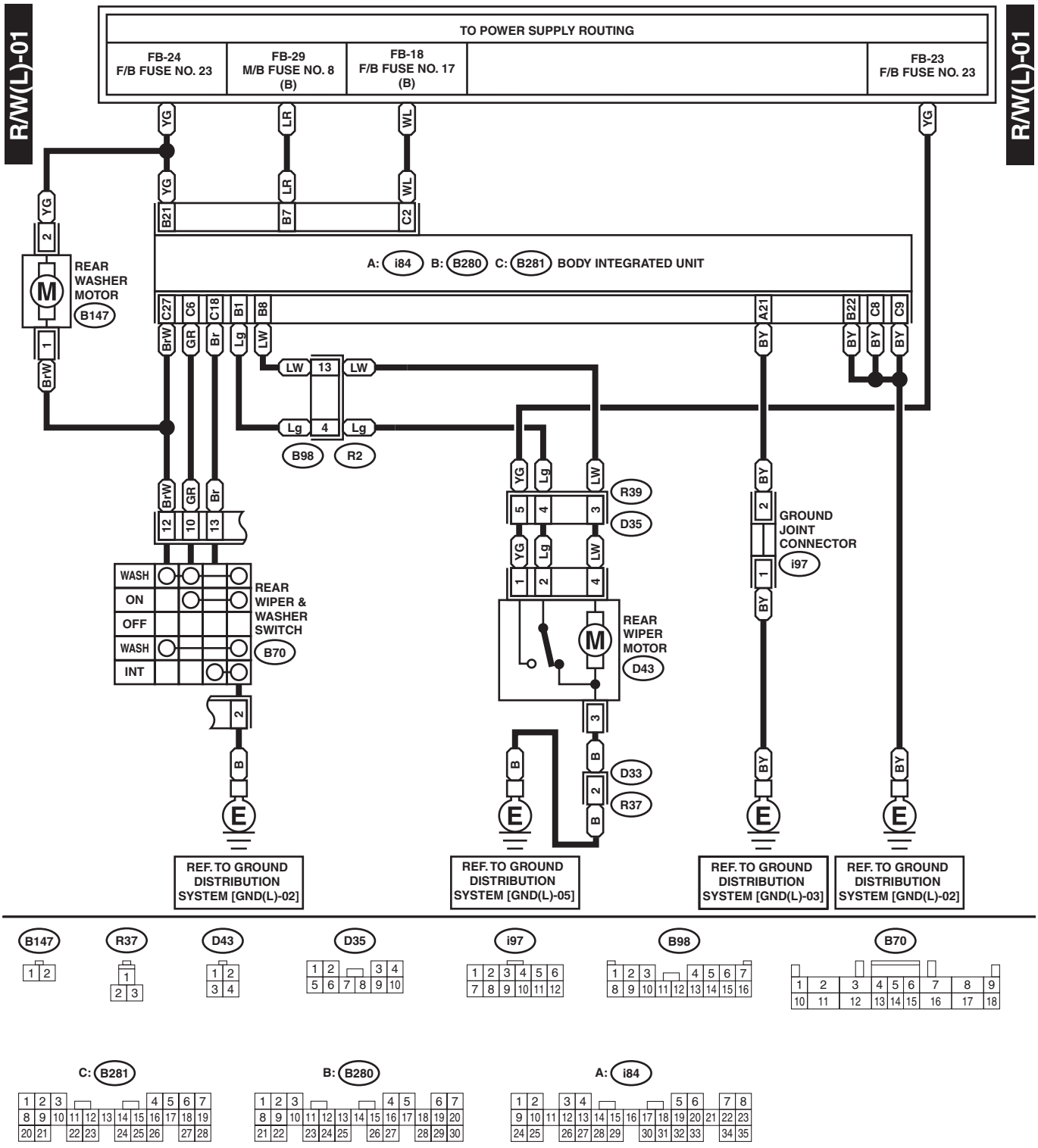


WI-04191

46.Rear Wiper and Washer System

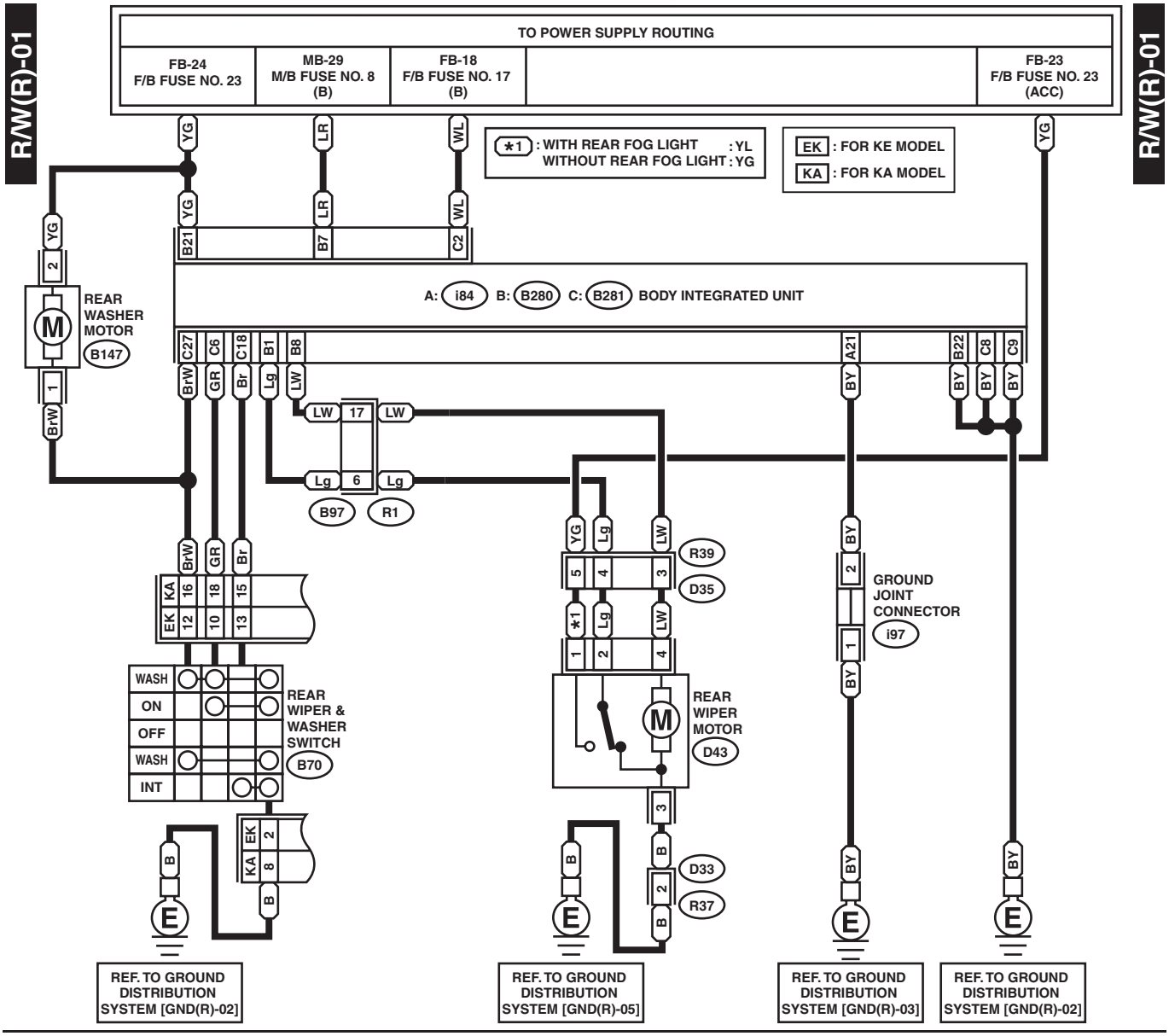
A: WIRING DIAGRAM

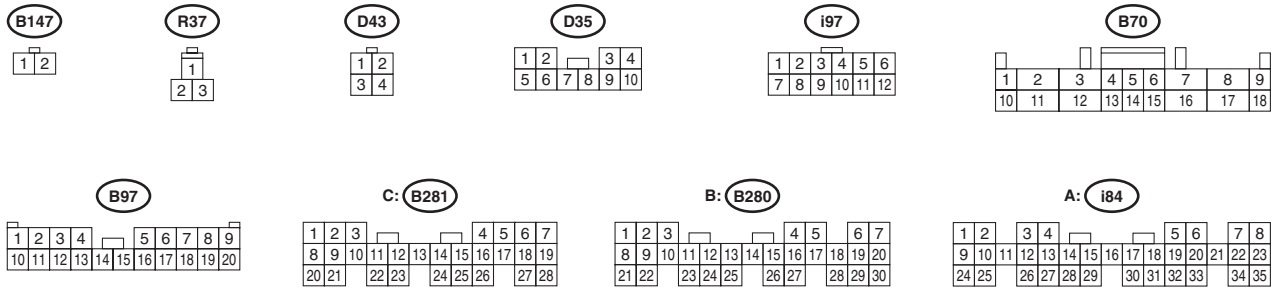
1. LHD MODEL



WI-04192

2. RHD MODEL

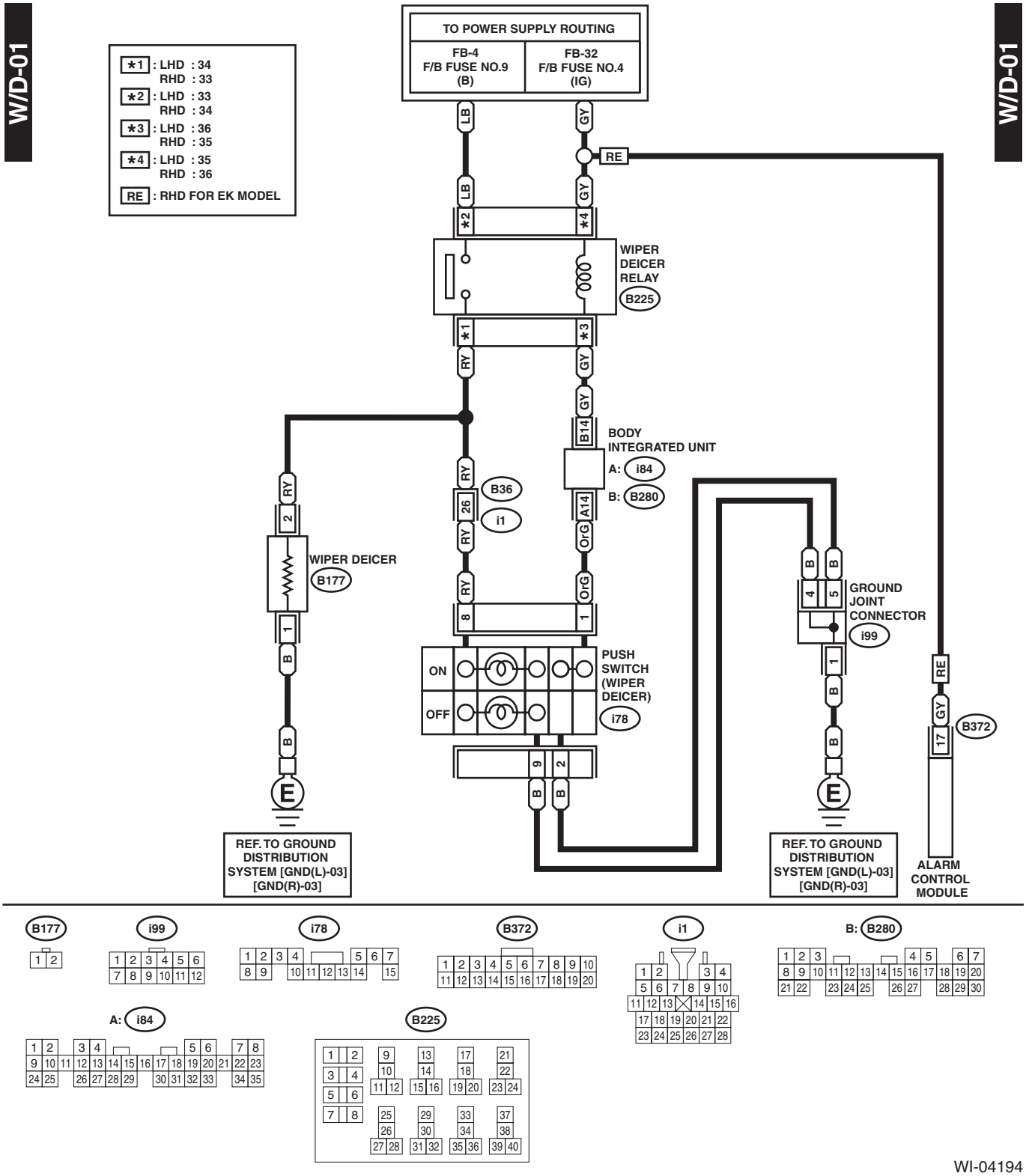




WI-04193

47.Wiper Deicer System

A: WIRING DIAGRAM

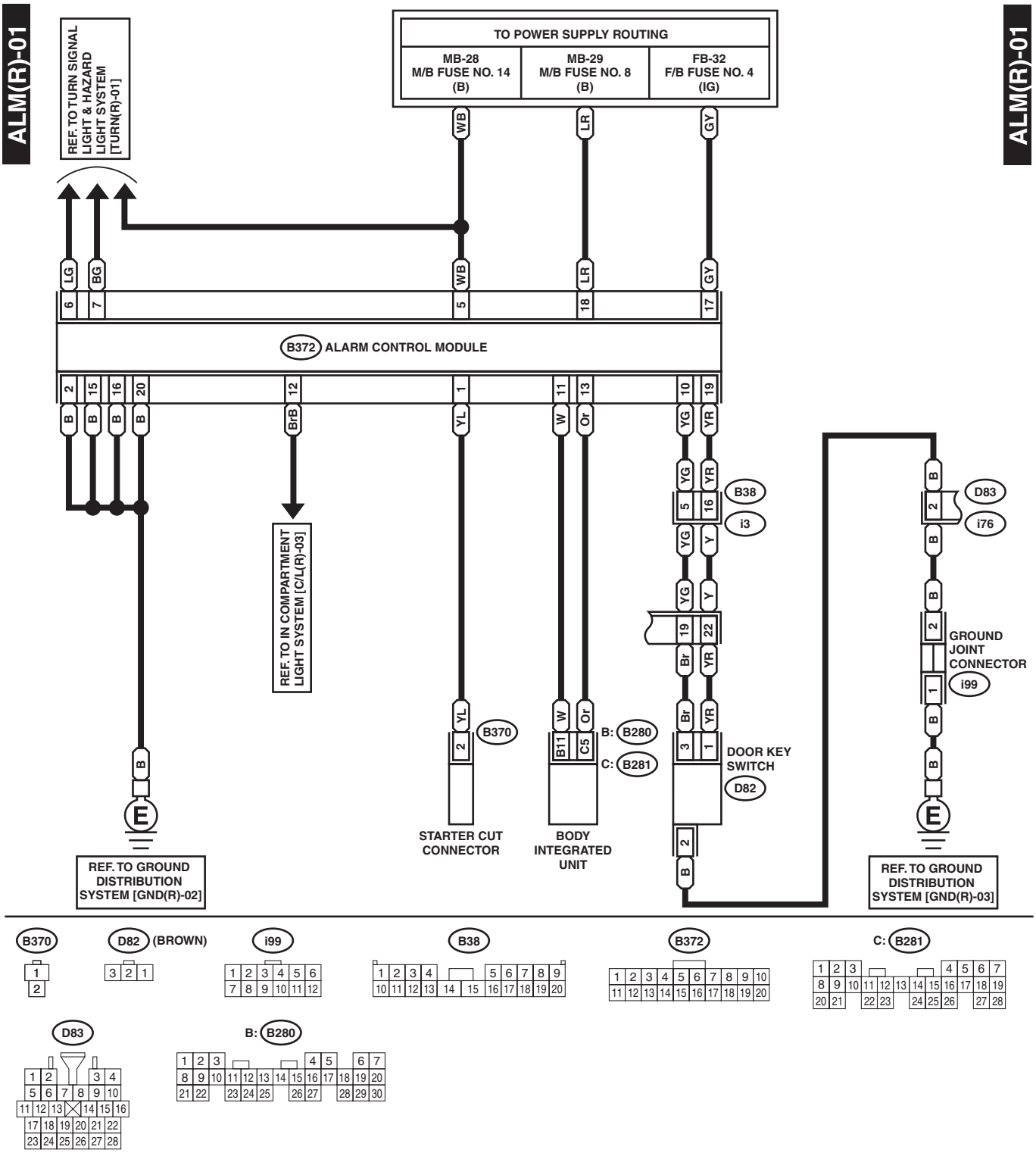


WI-04194

48. Alarm Control System

A: WIRING DIAGRAM

1. RHD MODEL

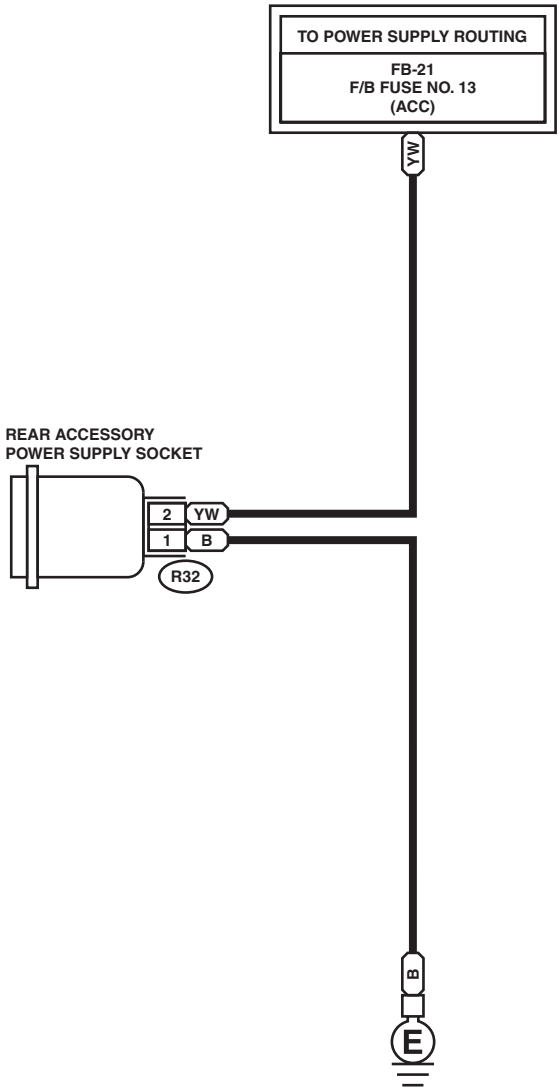


WI-04195

49.Rear Accessory Power Supply System

A: WIRING DIAGRAM

RAPS-01



RAPS-01

R32

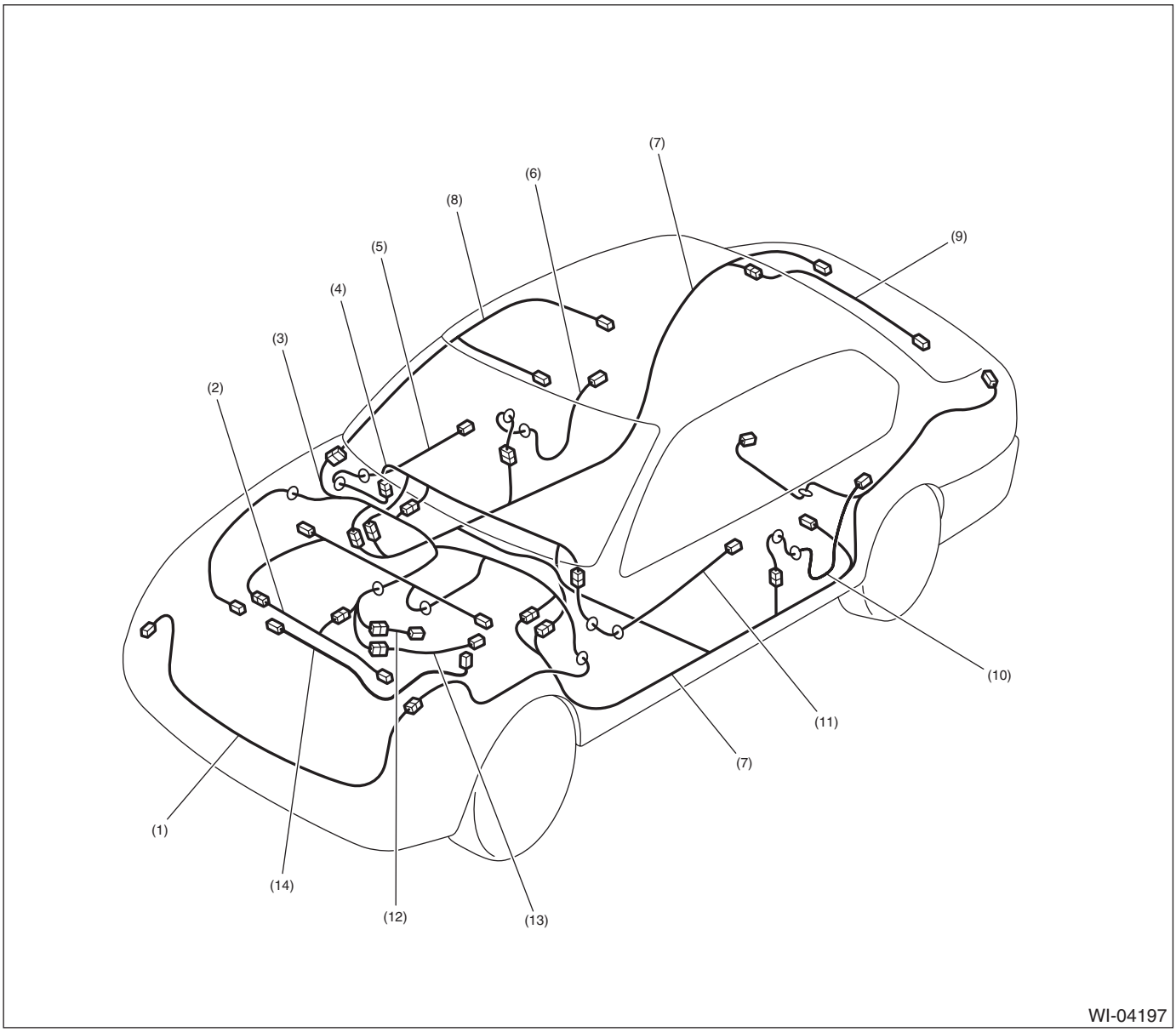
1
2

WI-04673

50.Harness Components Location

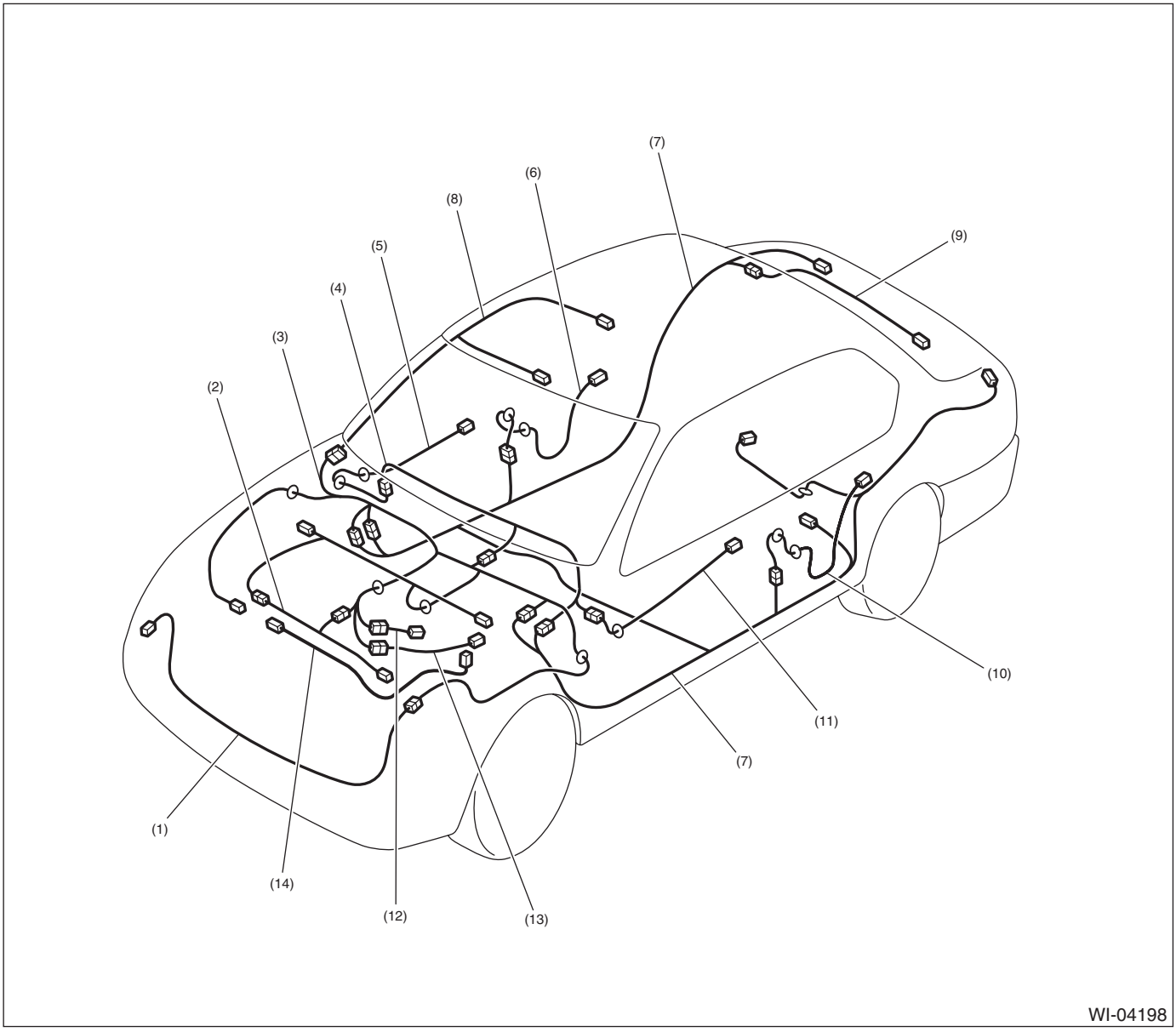
A: LOCATION

1. LHD SEDAN MODEL



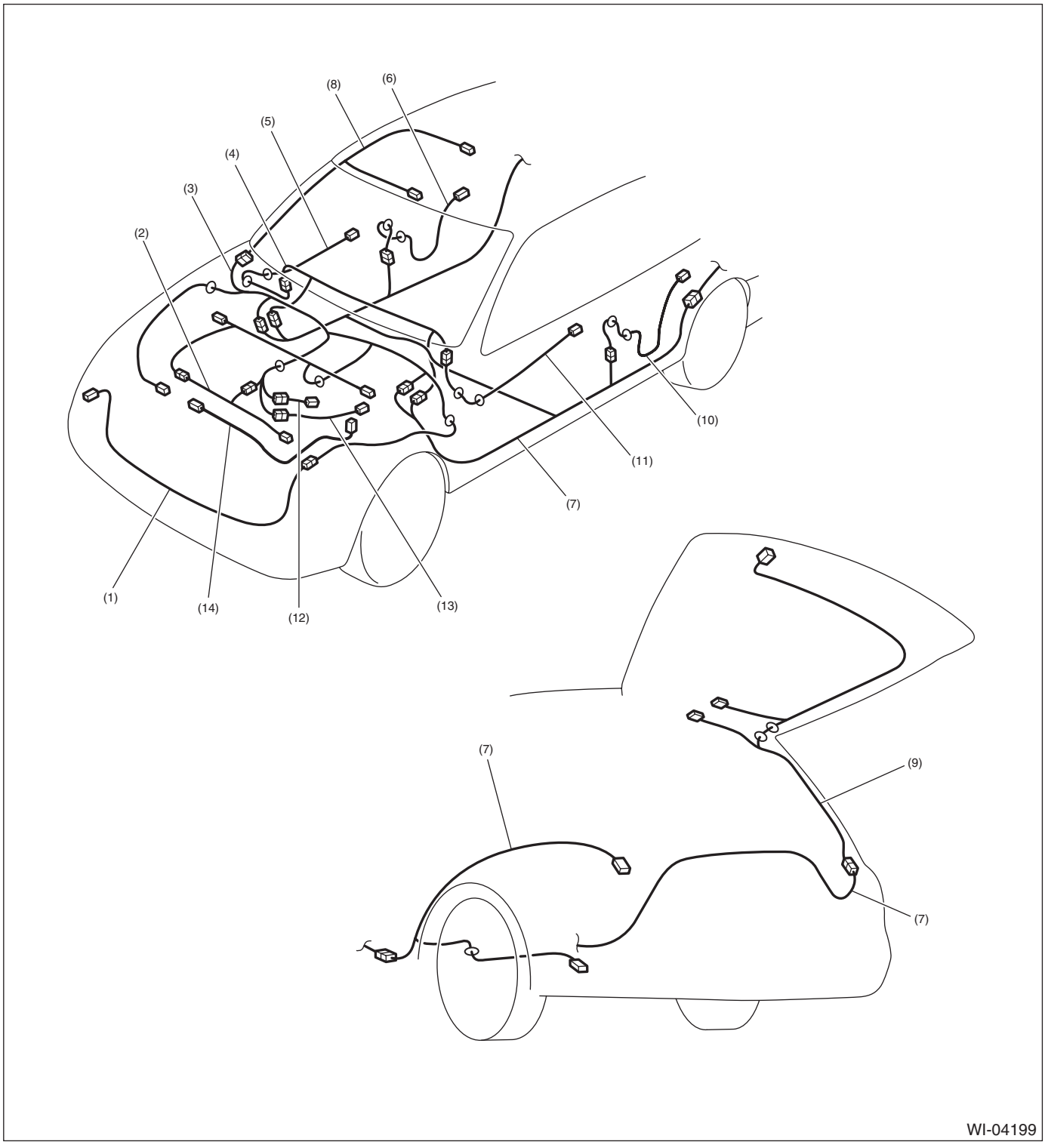
(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Trunk lid cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear oxygen sensor cord
(14) Generator cord

2. RHD SEDAN MODEL



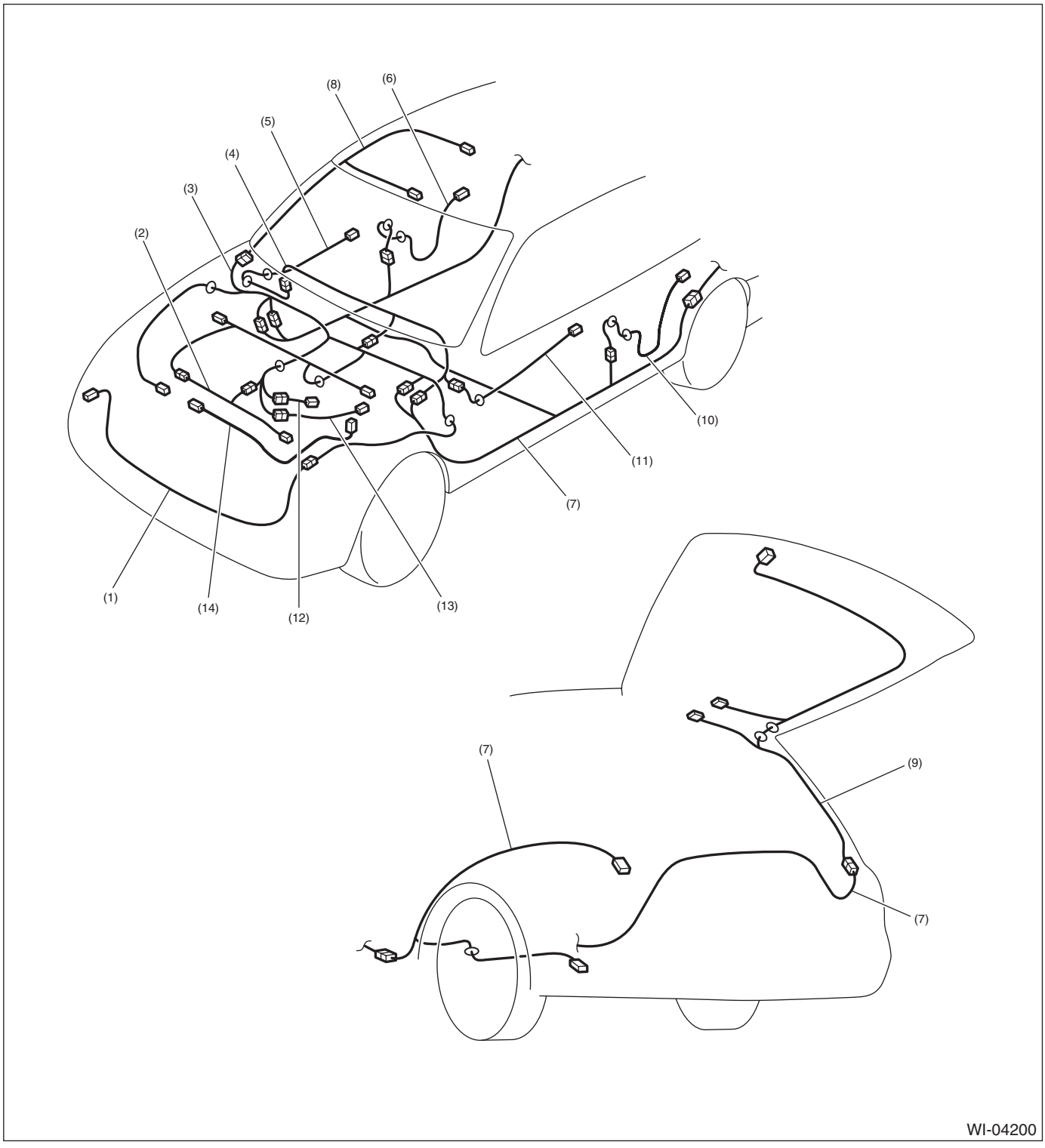
(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Trunk lid cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear oxygen sensor cord
(14) Generator cord

3. LHD WAGON MODEL



(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Rear gate cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear oxygen sensor cord
(14) Generator cord

4. RHD WAGON MODEL



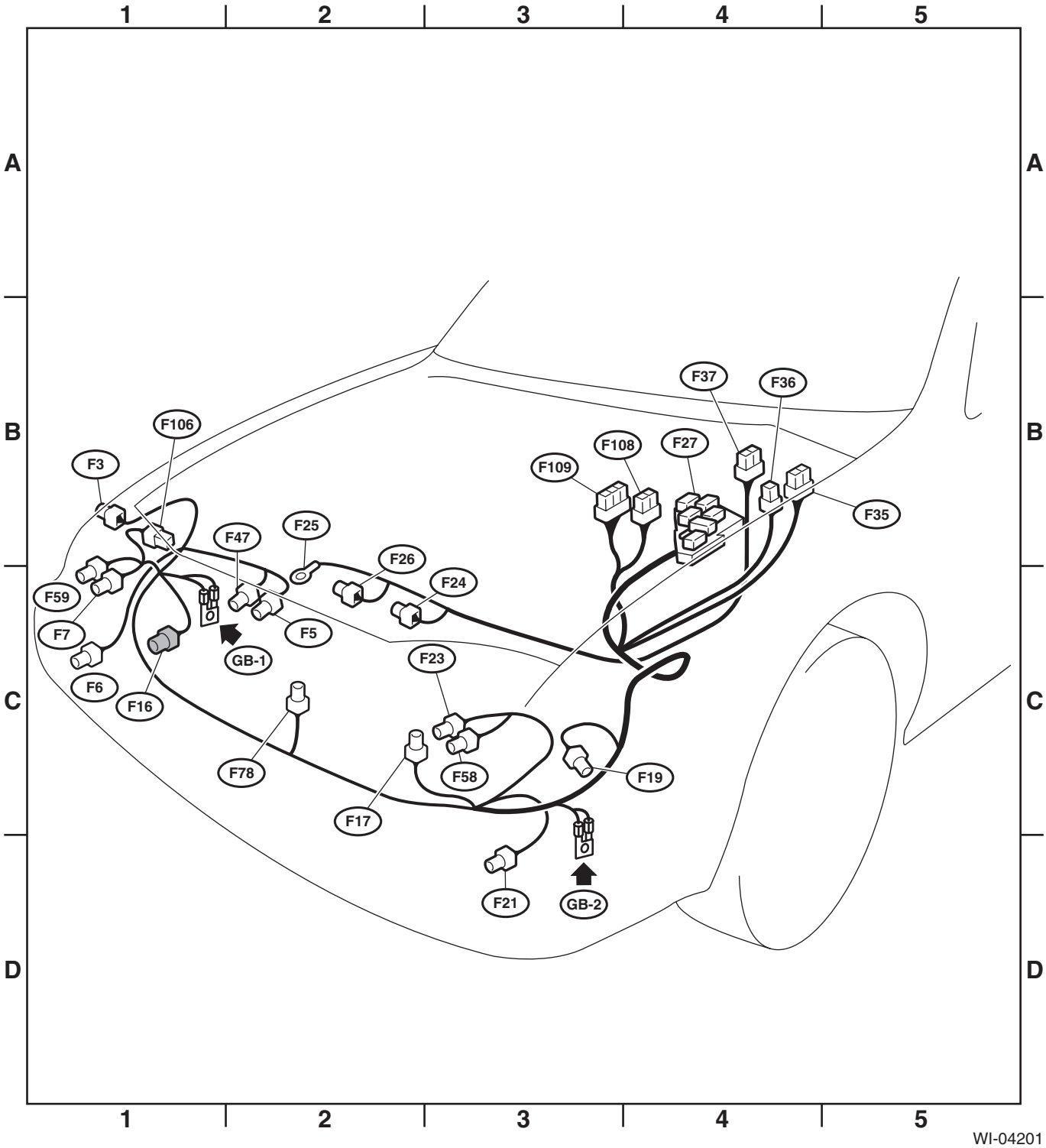
(1) Front wiring harness
(2) Engine wiring harness
(3) Bulkhead wiring harness
(4) Instrument panel wiring harness
(5) Front door cord RH
(6) Rear door cord RH
(7) Rear wiring harness
(8) Roof cord
(9) Rear gate cord
(10) Rear door cord LH
(11) Front door cord LH
(12) Transmission cord
(13) Rear oxygen sensor cord
(14) Generator cord

51.Front Wiring Harness

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
F3	2	Gray	B-1		Front turn signal light RH
F5	1	Black	C-2		Horn
F6	2	★	C-1		Front fog light RH
F7	6	★	C-1		Headlight and front clearance light RH
F16	2	Black	C-1		Sub fun motor (H4 model)
F17	2	Black	C-2		Main fun motor (H4 model)
F19	2	Gray	C-3		Front turn signal light LH
F21	2	★	D-3		Front fog light LH
F23	6	★	C-3		Headlight and front clearance light LH
F24	2	★	C-2		A/C compressor
F25	1	★	C-2		Generator terminal B
F26	3	★	C-2		Generator
F27	31	★	B-4		Relay holder
F35	12	Blue	B-4		Main fuse box (M/B)
F36	7	★	B-4		
F37	20	★	B-4		
F47	1	Black	C-2		Horn
F58	3	★	C-3		Headlight leveler LH
F59	3	★	C-1		Headlight leveler RH
F78	2	Black	C-2		Ambient sensor
F106	3	★	B-1		PWM controller (H6 model)
F108	18	★	B-4	B361	Through joint connector
F109	24	★	B-3	B360	
★: Non-colored					

Front Wiring Harness



52.Bulkhead Wiring Harness (In Engine Compartment)

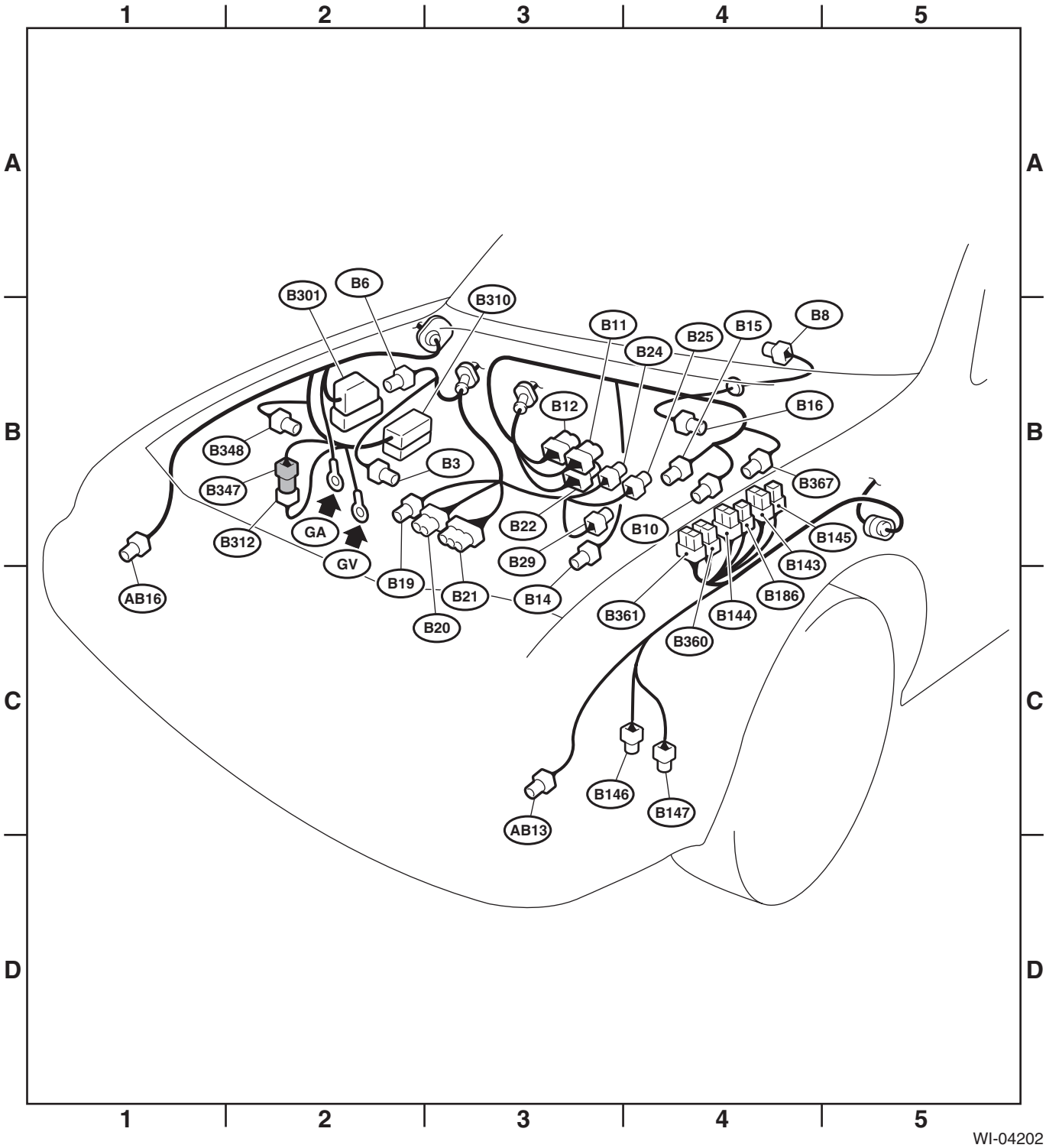
A: LOCATION

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B3	5	★	B-2		Mass air flow sensor
B6	2	Brown	B-2		Front ABS wheel speed sensor RH
B8	5	★	B-4		Front wiper motor
B10	4	★	B-4		A/C pressure switch
B11	20	Gray	B-3	T4	Transmission (AT model)
B12	12	★	B-3	T3	
B14	1	Black	B-3		Starter (Magnet)
B15	2	Brown	B-4		Front ABS wheel speed sensor LH
B16	2	Gray	B-4		Brake fluid level switch
B19	4	★	B-2	T5	Rear oxygen sensor cord (H4 model)
B20	16	★	B-3	E1	Engine wiring harness
B21	54	★	B-3	E2	
B22	16	Brown	B-3	E3	Engine wiring harness (H6 model)
B24	2	Gray	B-3	T1	Back-up light switch (MT model)
B25	2	Brown	B-4	T2	Neutral position switch (MT model)
B29	2	Black	B-3	T8	LO (AWD) switch (MT model)
B143	20	★	B-4		Main fuse box (M/B)
B144	9	Brown	B-4		
B145	7	Brown	B-4		
B146	2	Gray	C-4		Front washer motor
B147	2	Gray	C-4		Rear washer motor
B186	8	Black	B-4		Main fuse box (M/B)
B301	26	★	B-2		ABS control module
B310	42	★	B-2		VDC control module
B312	2	★	B-2	B347	Shield joint connector (VDC)
B347	2	★	B-2	B312	
B348	3	★	B-2		Pressure sensor
B360	16	Gray	B-4	F109	Through joint connector
B361	14	Gray	B-4	F108	
B367	2	★	B-4		Heater cock solenoid (EC, K4 model)
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB13	2	Yellow	C-3		Front sub sensor LH
AB16	2	Yellow	B-1		Front sub sensor RH
★: Non-colored					

Bulkhead Wiring Harness (In Engine Compartment)

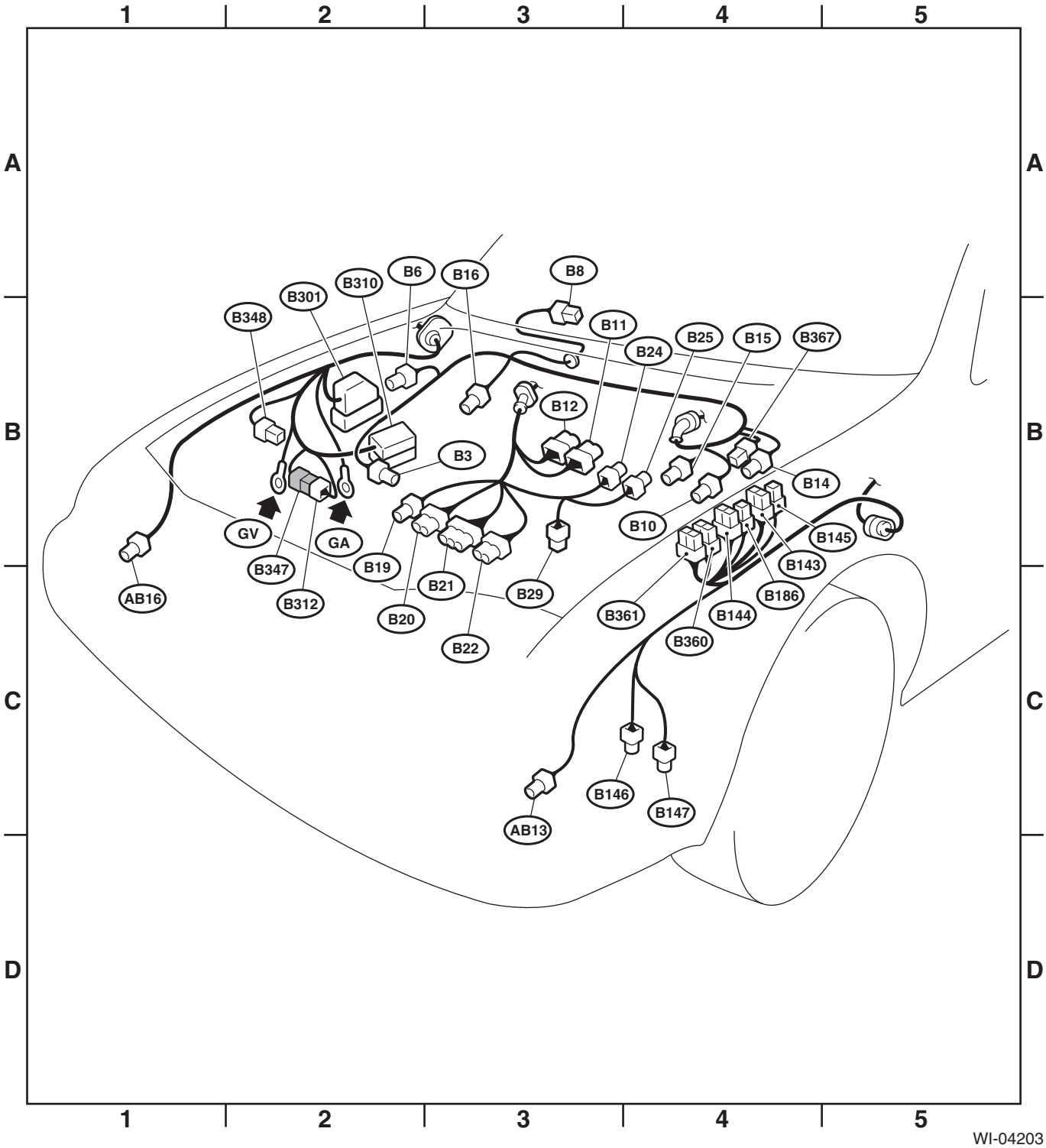


2. RHD NON-TURBO MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B3	5	★	B-2		Mass air flow sensor (2.5 L EK model and 3.0 L model)
B6	2	★	B-2		Front ABS wheel speed sensor RH
B8	5	★	B-3		Front wiper motor
B10	4	★	B-4		A/C pressure switch
B11	20	Gray	B-3	T4	Transmission (AT model)
B12	12	★	B-3	T3	
B14	1	Black	B-4		Starter (Magnet)
B15	2	★	B-4		Front ABS wheel speed sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B19	4	★	B-2	T5	Rear oxygen sensor cord (H4 model)
B20	16	★	B-3	E1	Engine wiring harness
B21	54	★	B-3	E2	
B22	16	★	B-3	E3	Engine wiring harness (H6 model)
B24	2	Gray	B-3	T1	Back-up light switch (MT model)
B25	2	Brown	B-4	T2	Neutral position switch (MT model)
B29	2	Black	B-3	T8	LO (AWD) switch (MT model)
B143	20	★	B-4		Main fuse box (M/B)
B144	9	Brown	B-4		
B145	7	Brown	B-4		
B146	2	★	C-4		Front washer motor
B147	2	★	C-4		Rear washer motor
B186	8	★	B-4		Main fuse box (M/B)
B301	26	★	B-2		ABS control module
B310	42	★	B-2		VDC control module
B312	2	★	B-2	B347	Shield joint connector (VDC)
B347	2	★	B-2	B312	
B348	3	★	B-2		Pressure sensor
B360	16	Gray	B-4	F109	Through joint connector
B361	14	★	B-4	F108	
B367	2	★	B-4		Heater cock solenoid (EK model)
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB13	2	Yellow	C-3		Front sub sensor LH
AB16	2	Yellow	B-1		Front sub sensor RH
★: Non-colored					

Bulkhead Wiring Harness (In Engine Compartment)



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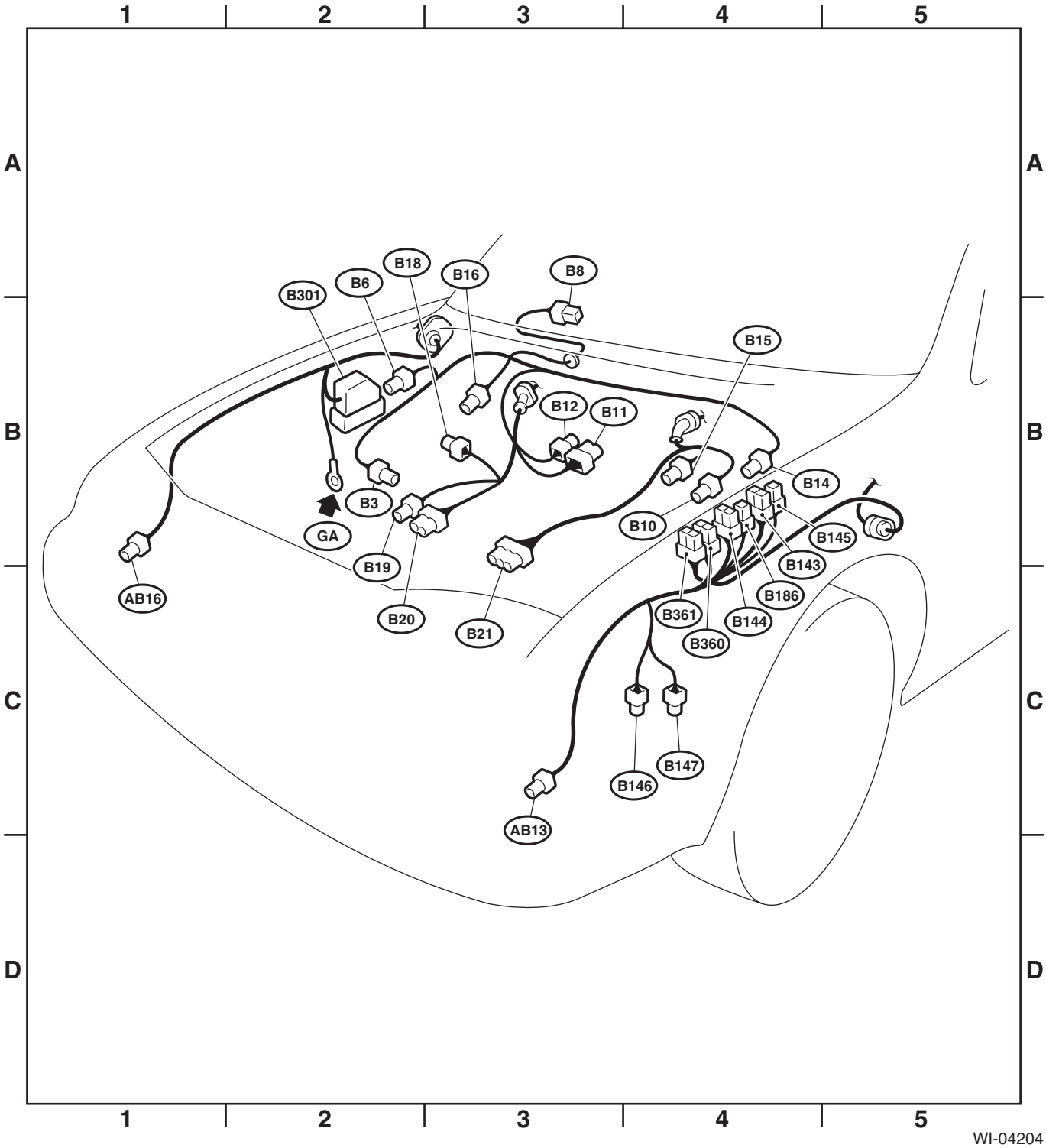
3. RHD TURBO MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B3	5	★	B-2		Mass air flow sensor
B6	2	★	B-2		Front ABS wheel speed sensor RH
B8	5	★	B-3		Front wiper motor
B10	4	★	B-4		A/C pressure switch
B11	20	Gray	B-3	T4	Transmission (AT model)
B12	8	★	B-3	T3	
B14	1	Black	B-4		Starter (Magnet)
B15	2	★	B-4		Front ABS wheel speed sensor LH
B16	2	Gray	B-3		Brake fluid level switch
B18	4	★	B-3		Front oxygen (A/F) sensor
B19	4	★	B-2	T5	Rear oxygen sensor cord
B20	16	★	B-3	E1	Engine wiring harness
B21	54	★	B-3	E2	
B143	20	★	B-4		Main fuse box (M/B)
B144	9	Brown	B-4		
B145	7	Brown	B-4		
B146	2	★	C-4		Front washer motor
B147	2	★	C-4		Rear washer motor
B186	8	★	B-4		Main fuse box (M/B)
B301	26	★	B-2		ABS control module
B360	16	Gray	B-4	F109	Through joint connector
B361	14	★	B-4	F108	
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB13	2	Yellow	C-3		Front sub sensor LH
AB16	2	Yellow	B-1		Front sub sensor RH
★: Non-colored					

Bulkhead Wiring Harness (In Engine Compartment)



53.Bulkhead Wiring Harness (In Compartment)

A: LOCATION

1. LHD MODEL

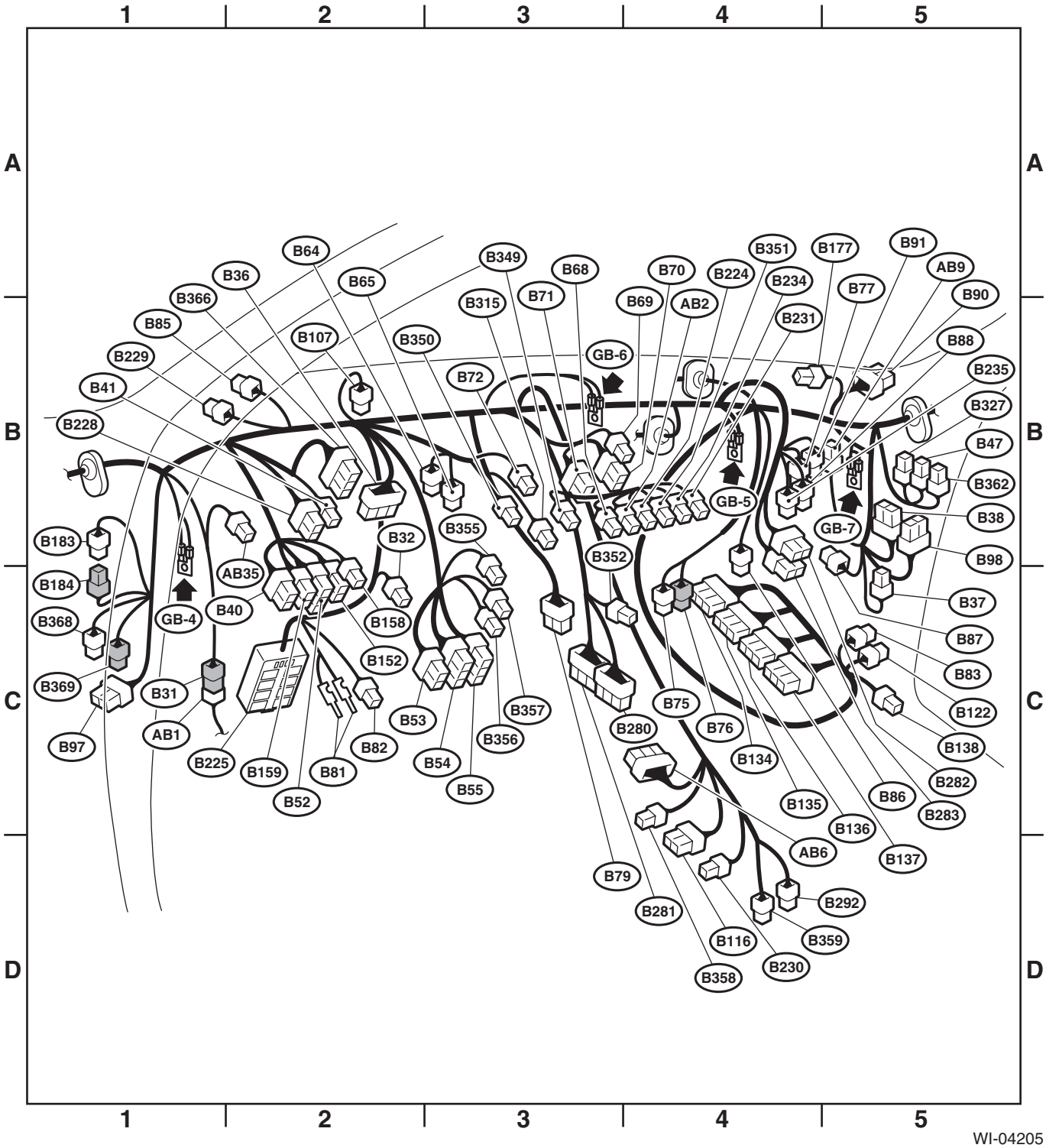
Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B31	6	Yellow	C-1	AB1	Airbag wiring harness
B32	8	★	C-2		Turn signal and hazard unit
B36	28	★	B-2	i1	Instrument panel wiring harness
B37	8	★	C-5	i2	Instrument panel wiring harness (Manual A/C)
B38	20	★	B-5	i3	Instrument panel wiring harness
B40	16	★	C-2		Data link connector
B41	2	★	B-2		Power window circuit breaker
B47	6	Brown	B-5		Main relay
B52	24	★	C-2		Fuse & relay box (F/B)
B53	20	★	C-3		Shield joint connector (4-speed AT model)
B54	24	★	C-3		TCM
B55	24	Gray	C-3		TCM (5-speed AT model)
	31	★			TCM (4-speed AT model)
B64	2	Black	B-3		Stop light switch
B65	4	Black	B-3		Stop and brake switch (Model with cruise control)
B68	8	★	B-3		Roll connector
B69	4	★	B-3		Parking switch
B70	18	★	B-3		Combination switch
B71	17	★	B-3		
B72	6	★	B-3		Ignition switch
B75	2	Green	C-4	B76	Test mode connector
B76	2	Green	C-4	B75	
B77	10	★	B-4		Mode actuator (Manual A/C)
	5	★			Mode actuator (Auto A/C)
B79	14	Gray	C-3		Line end check connector
B81	1×2	★	C-2		Diagnosis terminal
B82	8	★	C-2		Diagnosis connector
B83	2	★	C-5		Joint connector
B85	4	★	B-2		Diode (Light)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B86	2	★	B-4		Blower motor resistor
B87	2	Black	B-5		Blower fan motor
B88	5	★	B-4		Evaporator thermo switch (Manual A/C)
	2	★			Evaporator thermo switch (Auto A/C)
B90	8	★	B-5	R50	Roof cord
B91	7	Green	B-4		FRESH/RECIRC actuator
B97	16	★	C-1	R1	Rear wiring harness
B98	16	★	B-5	R2	
B107	2	Blue	B-2		Clutch switch (Model with cruise control)
B116	10	★	D-4		Select lever (AT model)
B122	8	★	C-5		Joint connector (E/G)
B134	34	★	C-4		ECM
B135	35	★	C-4		ECM
B136	35	★	C-4		ECM
B137	31	★	C-4		ECM
B138	8	★	C-5		Joint connector (H4 model)
B152	10	★	C-2		Fuse & relay box (F/B)
B158	8	★	C-2		Fuse & relay box (F/B)
B159	9	★	C-2		Fuse & relay box (F/B)
B177	2	★	B-4		Wiper deicer
B183	1	★	B-1	B184	Keyless entry connector
B184	1	★	C-1	B183	
B224	2	★	B-4		Key switch illumination
B225	40	★	C-2		Fuse (Relay block)
		★			Mirror heater relay
		★			Starter relay
		★			Front fog light relay
		★			Power window relay
		★			Blower fan relay
		★			Rear fog light relay
		★			Wiper deicer relay
		★			Seat heater relay
B228	15	★	B-2		OP connector
B229	2	★	B-2		Diode (Parking brake)
B230	6	★	D-4		Yaw rate sensor (VDC)
B231	4	★	B-4		Steering angle sensor (VDC)
B234	8	★	B-4		CAN joint connector (VDC)

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B235	7	Green	B-4		Air mix actuator (Auto A/C)
B280	30	★	C-3		Body integrated unit
B281	28	★	C-3		
B282	16	★	B-4		Auto A/C control module
B283	20	★	B-4		
B292	3	★	D-4		ABS G sensor
B315	6	★	B-3		Accelerator pedal position sensor
B327	6	Brown	B-5		Oxygen (A/F) heater relay (2.5 L EC, EK model and 3.0 L model)
B349	2	★	B-3		Diode (Wiper)
B350	4	★	B-3		Key actuator
B351	2	★	B-4		Antenna (Model with immobilizer)
B352	8	★	C-3		CAN joint connector
B355	8	★	B-3		CAN joint connector (TCM)
B356	4	★	C-3		Back-up light relay (5-speed AT model)
B357	4	★	C-3		P-VIGN relay (5-speed AT model)
B358	2	★	C-4		Select lever illumination (AT model)
B359	3	★	D-4		G sensor (AT model)
B362	8	★	B-5		Relay holder
B366	26	★	B-2		Sub-con module (H6 model)
B368	2	★	C-1	B369	Test mode connectors
B369	2	★	C-1	B368	
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB1	6	Yellow	C-1	B31	Bulkhead wiring harness
AB2	4	Yellow	B-4	AB7	Inflator (Driver's side)
AB6	28	Yellow	C-4		Airbag control module
AB9	4	Yellow	B-5	AB10	Inflator (Passenger's side)
AB35	2	Yellow	B-2		Fuse & relay box (F/B)
★: Non-colored					

Bulkhead Wiring Harness (In Compartment)



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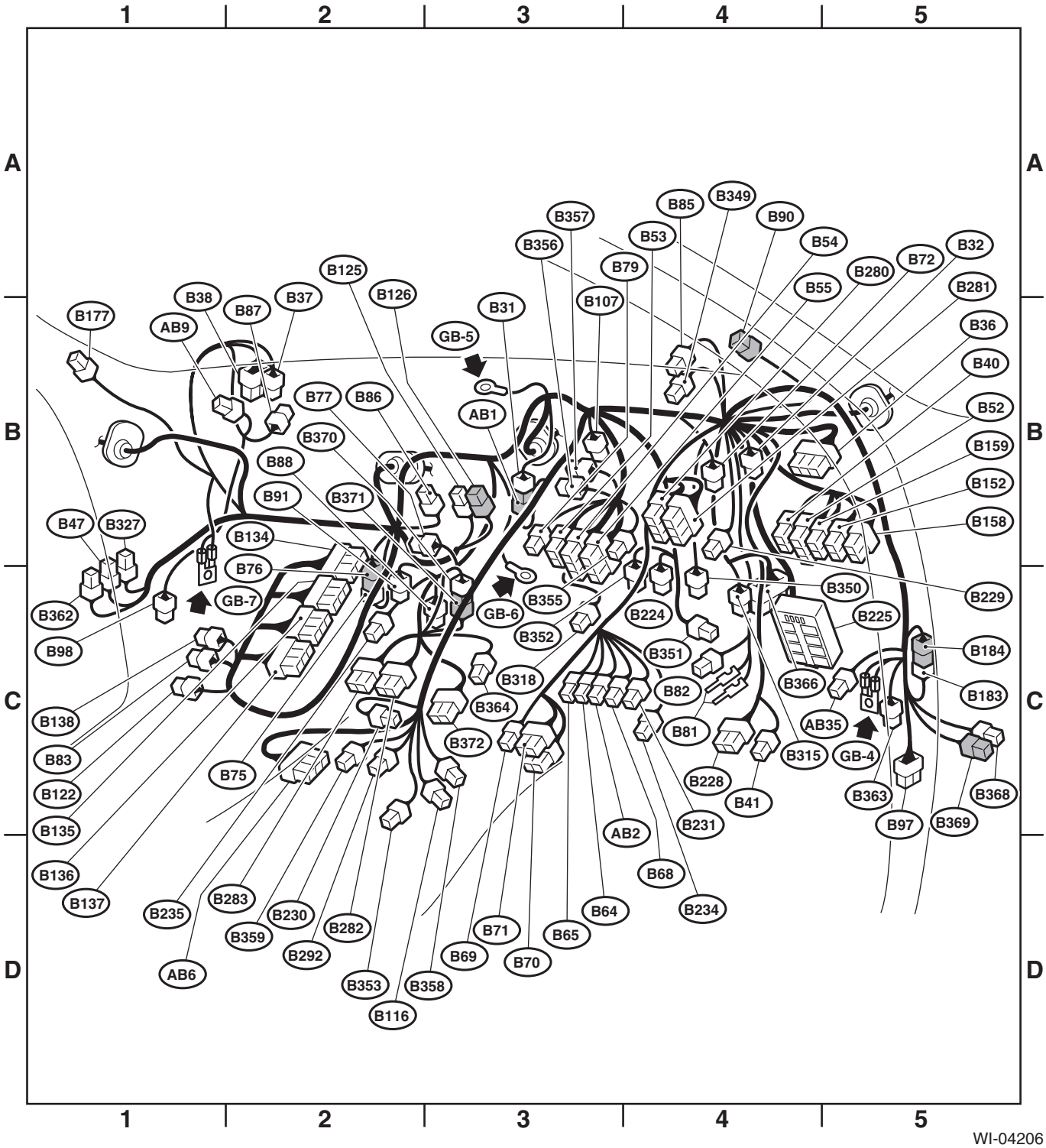
2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B31	6	Yellow	B-3	AB1	Airbag wiring harness
B32	8	★	B-4		Turn signal and hazard unit
B36	28	★	B-4	i1	Instrument panel wiring harness
B37	8	★	B-2	i2	Instrument panel wiring harness (Manual A/C)
B38	20	★	B-2	i3	Instrument panel wiring harness
B40	16	★	B-4		Data link connector
B41	2	★	C-4		Power window circuit breaker
B47	6	★	C-1		Main relay
B52	24	★	B-4		Fuse & relay box (F/B)
B53	20	★	B-3		Shield joint connector (AT model)
B54	24	★	B-3		TCM
B55	24	Gray	B-3		TCM (Turbo model and H6 model)
	31	★			TCM (H4 model and Non-turbo model)
B64	2	Black	C-3		Stop light switch
B65	4	Black	C-3		Stop and brake switch (Model with cruise control)
B68	8	★	C-3		Roll connector
B69	4	★	C-3		Parking switch
B70	18	★	C-3		Combination switch
B71	17	★	C-3		
B72	6	★	B-4		Ignition switch
B75	2	Green	B-3	B76	Test mode connector
B76	2	Green	B-3	B75	
B77	10	★	B-2		Mode actuator (Manual A/C)
	5	★			Mode actuator (Auto A/C)
B79	14	Gray	B-3		Line end check connector
B81	1×2	★	C-4		Diagnosis terminal
B82	8	★	C-4		Diagnosis connector
B83	8	★	C-1		Joint connector
B85	2	★	B-4		Diode (Light)
B86	4	★	B-3		Blower motor resistor
B87	2	Black	B-2		Blower fan motor
B88	5	★	C-3		Evaporator thermo switch (Manual A/C)
	2	★			Evaporator thermo switch (Auto A/C)
B90	8	★	B-4	R50	Roof cord
B91	7	Green	C-2		FRESH/RECIRC actuator
B97	20	★	C-5	R1	Rear wiring harness
B98	8	★	C-1	R2	
B107	2	Blue	B-3		Clutch switch (Model with cruise control)
B116	10	★	C-3		Select lever (AT model)
B122	8	★	C-1		Joint connector (E/G)
B125	1	Black	B-3	B126	Clear memory connector
B126	1	Black	B-3	B125	
B134	34	★	B-2		ECM
B135	35	★	C-2		ECM
B136	35	★	C-2		ECM
B137	31	★	C-2		ECM
B138	8	★	C-1		Joint connector
B152	10	★	B-5		Fuse & relay box (F/B)
B158	8	★	B-5		Fuse & relay box (F/B)
B159	9	Brown	B-4		Fuse & relay box (F/B)
B177	2	★	B-1		Wiper deicer
B183	1	★	C-5	B184	Keyless entry connector
B184	1	★	C-5	B183	
B224	2	★	C-4		Key switch illumination
B225	40	★	C-4		Fuse (Relay block)
		★			Mirror heater relay
		★			Starter relay
		★			Front fog light relay
		★			Power window relay
		★			Blower fan relay
		★			Rear fog light relay
		★			Wiper deicer relay
		★			Seat heater relay
B228	15	★	C-4		OP connector
B229	2	★	B-4		Diode (Parking brake)
B230	6	★	C-2		Yaw rate sensor
B231	4	★	C-4		Steering angle sensor (VDC)
B234	6	★	C-4		CAN joint connector (VDC)
B235	7	★	C-2		Air mix actuator (Auto A/C)
B280	30	★	B-4		Body integrated unit
B281	28	★	B-4		

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
B282	16	★	C-2		Auto A/C control module
B283	20	★	C-2		
B292	3	★	C-2		ABS G sensor
B315	6	★	C-4		Accelerator pedal position sensor
B318	4	★	C-3		VDC OFF switch
B327	6	★	B-1		Oxygen (A/F) heater relay (2.5 L EK model and 3.0 L model)
B349	2	★	B-4		Diode (Wiper)
B350	4	★	C-4		Key actuator
B351	2	★	C-4		Antenna (Model with immobilizer)
B352	8	★	C-4		CAN joint connector
B355	8	★	B-3		CAN joint connector (5-speed AT model)
B356	4	★	B-3		Back-up light relay (5-speed AT model)
B357	4	★	B-3		P-VIGN relay (5-speed AT model)
B358	2	★	C-3		Select lever illumination (AT model)
B359	3	★	C-2		G sensor (AT model)
B362	8	★	C-1		Relay holder
B363	8	★	C-5		CAN analyzer
B364	4	★	C-3		RAM monitor (Auto A/C)
B366	26	★	C-4		LAN unit
B368	2	Green	C-5	B369	Test mode sub connectors
B369	2	Green	C-5	B368	
B370	2	★	C-3	B371	Starter cut connector (EK model)
B371	2	★	C-3	B370	
B372	20	★	C-3		Alarm control module
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB1	6	Yellow	B-3	B31	Bulkhead wiring harness
AB2	4	Yellow	C-3	AB7	Inflator (Driver's side)
AB6	28	Yellow	C-2		Airbag control module
AB9	4	Yellow	B-2	AB10	Inflator (Passenger's side)
AB35	2	Yellow	C-5		Fuse & relay box (F/B)
★: Non-colored					

Bulkhead Wiring Harness (In Compartment)



WI-04206

54.Engine Wiring Harness and Transmission Cord

A: LOCATION

1. 2.0 L SOHC NON-TURBO MODEL AND 2.5 L KS, KA MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E1	16	Brown	A-3	B20	Bulkhead wiring harness
E2	54	Black	A-3	B21	
E4	2	Blue	A-2		CPC Solenoid
E5	2	Dark gray	B-1		Fuel injector No. 1
E6	2	Dark gray	A-2		Fuel injector No. 3
E8	2	Black	B-2		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-3		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Dark gray	A-2		Ignition coil & Ignitor ASSY
E14	2	Brown	A-4		Knock sensor
E15	2	Gray	B-4		Camshaft position sensor
E16	2	Dark gray	B-4		Fuel injector No. 2
E17	2	Dark gray	B-4		Fuel injector No. 4
E19	1	★	B-2		Power steering oil pressure switch
E20	2	Black	A-3		Intake air temperature sensor
E21	3	Gray	A-3		Manifold absolute pressure sensor
E24	4	Gray	B-2		Front oxygen (A/F) sensor
E78	6	Black	A-3		ETB
★: Non-colored					

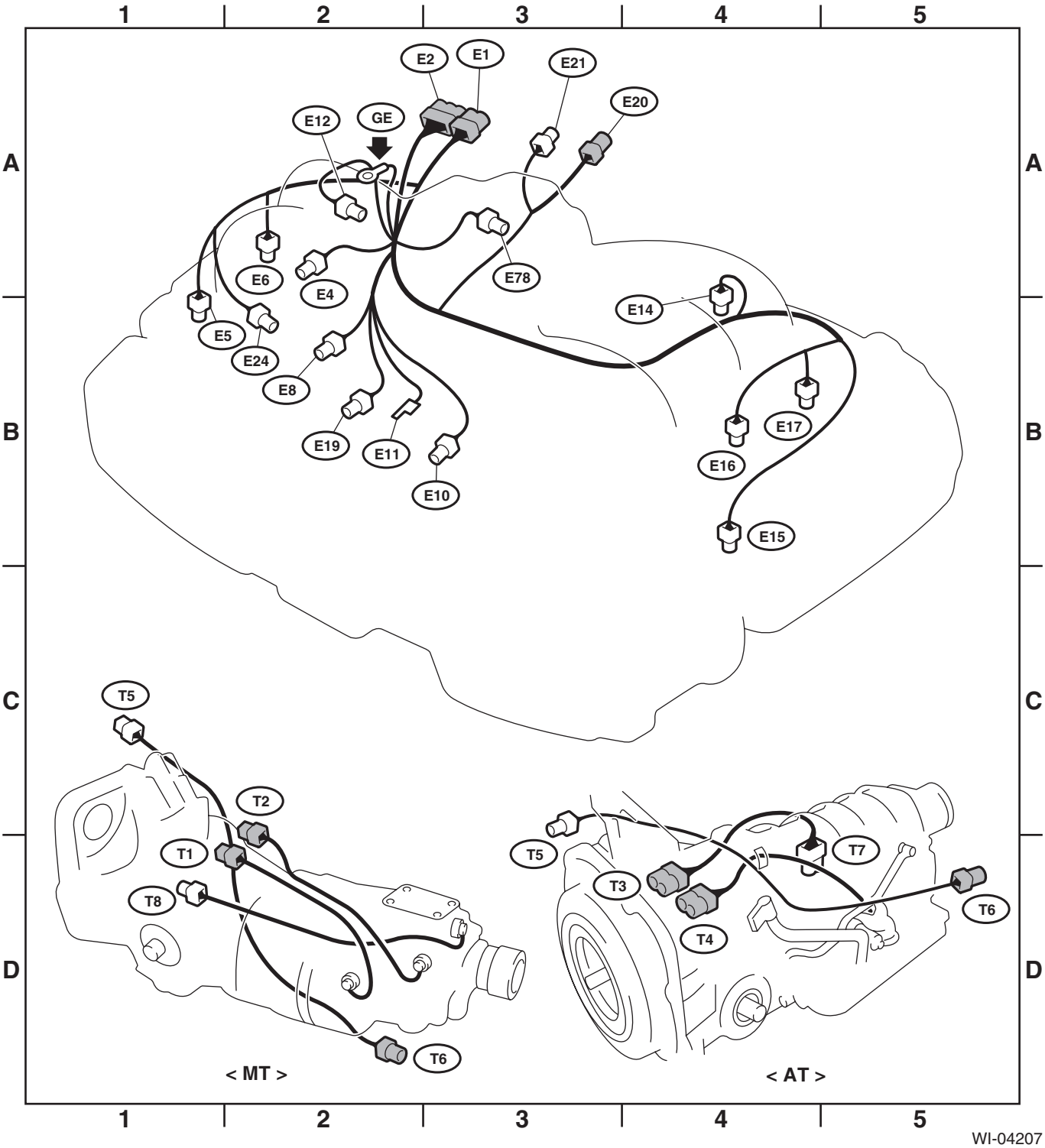
• AT model

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T3	12	★	D-4	B12	Bulkhead wiring harness
T4	20	Black	D-4	B11	
T5	4	Green	C-3	B19	
T6	4	Dark gray	D-5		Rear oxygen sensor
T7	12	★	D-4		Inhibitor switch
★: Non-colored					

• MT model

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T1	2	Gray	D-2	B24	Bulkhead wiring harness
T2	2	Brown	C-2	B25	
T5	4	Gray	C-1	B19	
T6	4	Gray	D-2		Rear oxygen sensor
T8	2	Black	D-1	B29	LO (AWD) switch
★: Non-colored					

Engine Wiring Harness and Transmission Cord



2. 2.5 L EC, K4, EK MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E1	16	Brown	A-3	B20	Bulkhead wiring harness
E2	54	Black	A-3	B21	
E4	2	Blue	A-2		CPC Solenoid
E5	2	Dark gray	B-1		Fuel injector No. 1
E6	2	Dark gray	A-2		Fuel injector No. 3
E8	2	Black	B-2		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-3		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E12	4	Dark gray	A-2		Ignition coil & Ignitor ASSY
E14	2	Brown	A-4		Knock sensor
E15	2	Gray	B-4		Camshaft position sensor
E16	2	Dark gray	B-4		Fuel injector No. 2
E17	2	Dark gray	B-4		Fuel injector No. 4
E18	6	Dark gray	B-4		EGR valve
E19	1	★	B-2		Power steering oil pressure switch
E21	3	Black	A-3		Manifold absolute pressure sensor
E24	6	Gray	B-2		Front oxygen (A/F) sensor
E50	3	Black	A-4		TGV angle sensor LH
E51	2	Black	B-3		TGV LH
E54	3	Black	A-3		TGV angle sensor RH
E55	2	Black	B-1		TGV RH
E57	6	Black	A-3		Electronic throttle control
★: Non-colored					

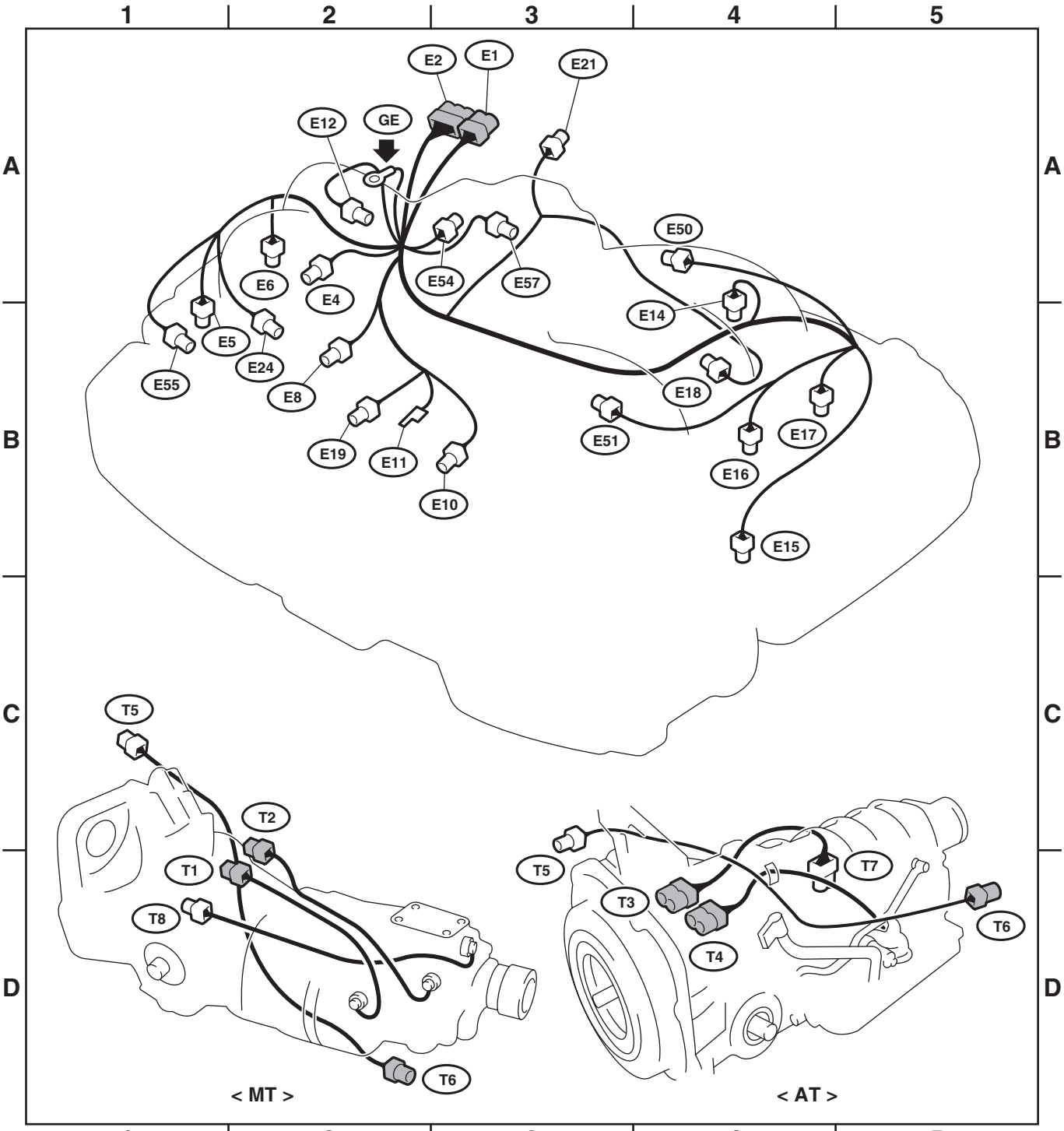
• AT model

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T3	12	★	D-4	B12	Bulkhead wiring harness
T4	20	Black	D-4	B11	
T5	4	Green	C-3	B19	
T6	4	Dark gray	D-5		Rear oxygen sensor
T7	12	★	D-4		Inhibitor switch
★: Non-colored					

• MT model

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T1	2	Gray	D-2	B24	Bulkhead wiring harness
T2	2	Brown	C-2	B25	
T5	4	Gray	C-1	B19	
T6	4	Gray	D-2		Rear oxygen sensor
T8	2	Black	D-1	B29	LO (AWD) switch
★: Non-colored					

Engine Wiring Harness and Transmission Cord

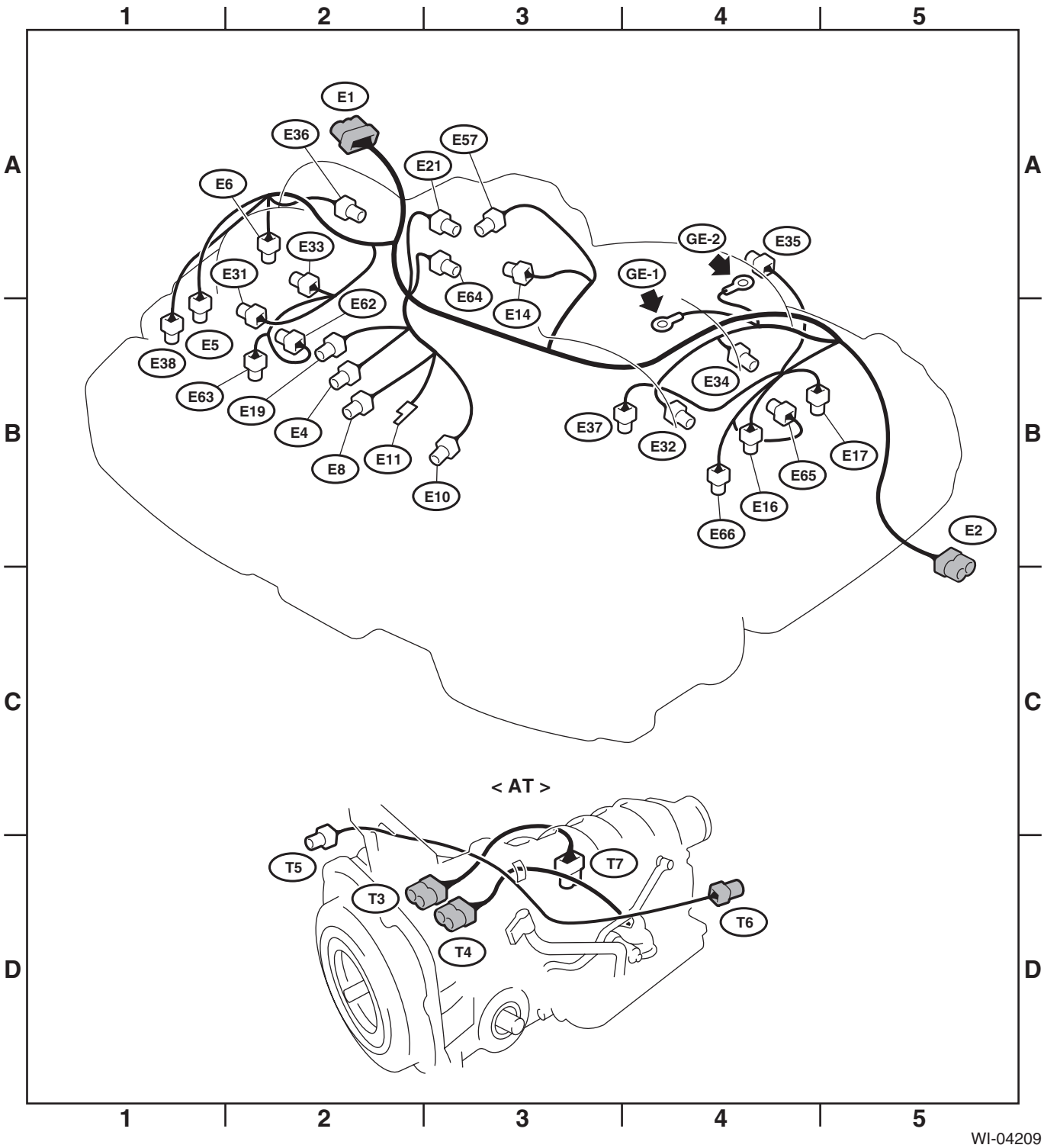


3. TURBO MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E1	16	Brown	A-2	B20	Bulkhead wiring harness
E2	54	Black	B-5	B21	
E4	2	Black	B-2		CPC Solenoid
E5	2	Light gray	B-1		Fuel injector No. 1
E6	2	Black	A-1		Fuel injector No. 3
E8	2	Black	B-2		Engine coolant temperature sensor and thermometer
E10	2	Light gray	B-3		Crankshaft position sensor
E11	1	★	B-2		Oil pressure switch
E14	2	Brown	A-3		Knock sensor
E16	2	Light gray	B-4		Fuel injector No. 2
E17	2	Black	B-4		Fuel injector No. 4
E19	1	★	B-2		Power steering oil pressure switch
E21	3	Black	A-3		Manifold absolute pressure sensor
E31	3	★	B-2		Ignition coil No. 1
E32	3	★	B-4		Ignition coil No. 2
E33	3	Black	A-2		Ignition coil No. 3
E34	3	Black	B-4		Ignition coil No. 4
E35	3	Light gray	A-4		Intake camshaft position sensor LH
E36	3	Light gray	A-2		Intake camshaft position sensor RH
E37	2	Blue	B-4		Intake oil flow control solenoid valve LH
E38	2	Blue	B-1		Intake oil flow control solenoid valve RH
E57	6	Black	A-3		Electronic throttle control
E62	2	Light gray	B-2		Exhaust camshaft position sensor RH
E63	2	Blue	B-2		Exhaust oil flow control solenoid valve RH
E64	2	Blue	A-3		Wastegate control solenoid
E65	2	Light gray	B-4		Exhaust camshaft position sensor LH
E66	2	Blue	B-4		Exhaust oil flow control solenoid valve LH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T3	8	★	D-3	B12	Bulkhead wiring harness
T4	20	Gray	D-3	B11	
T5	4	Gray	D-2	B19	
T6	4	Gray	D-4		Rear oxygen sensor
T7	12	★	D-3		Inhibitor switch
★: Non-colored					

Engine Wiring Harness and Transmission Cord

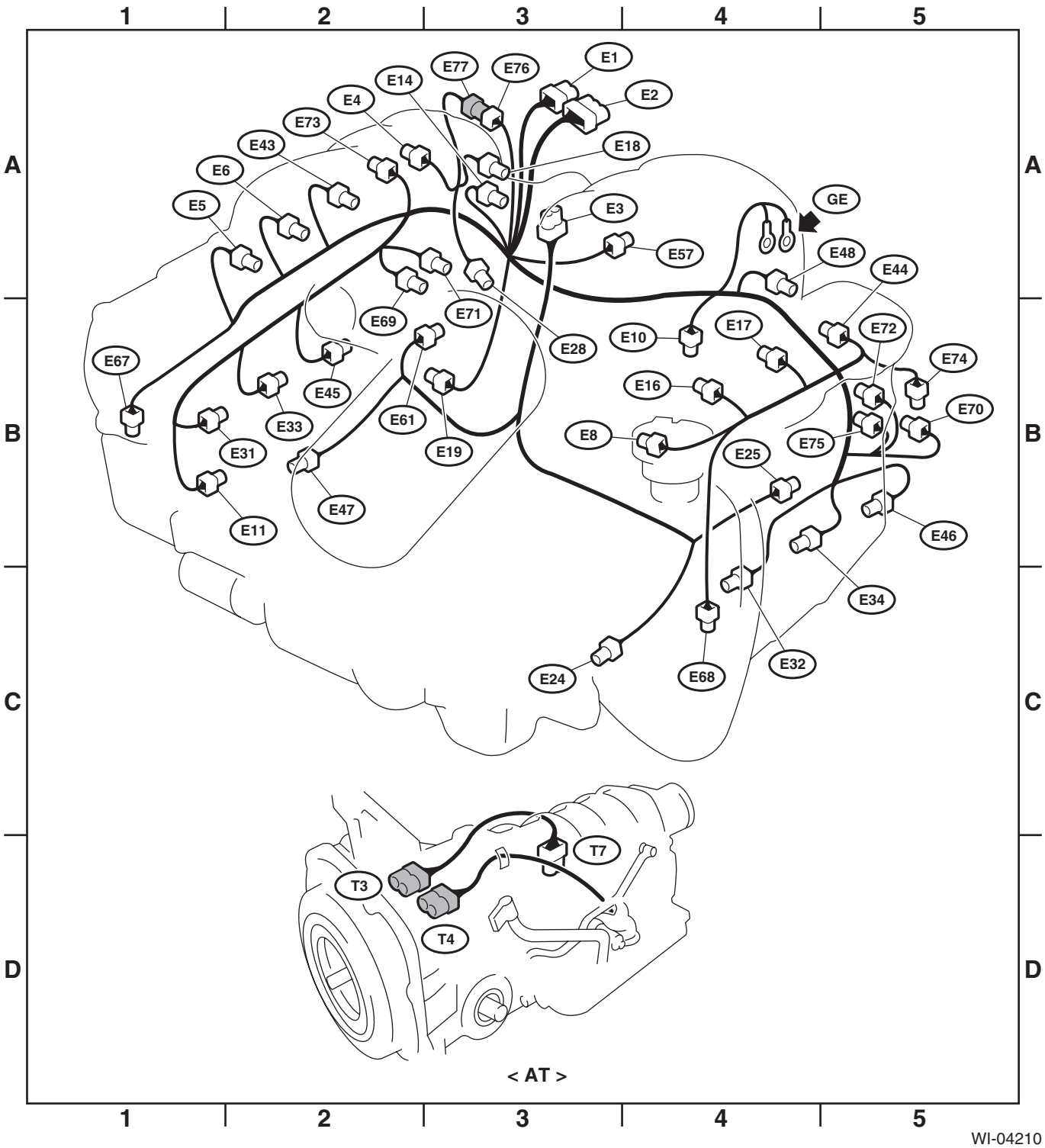


4. 3.0 L MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
E1	16	Brown	A-3	B20	Bulkhead wiring harness
E2	54	Black	A-3	B21	
E3	16	★	A-3	B22	
E4	2	Blue	A-2		CPC Solenoid
E5	2	Dark gray	A-2		Fuel injector No. 1
E6	2	Dark gray	A-2		Fuel injector No. 3
E8	2	Black	B-4		Engine coolant temperature sensor
E10	2	Light gray	B-4		Crankshaft position sensor
E11	1	★	B-1		Oil pressure switch
E14	2	Green	A-3		Knock sensor 1
E16	2	Dark gray	B-4		Fuel injector No. 2
E17	2	Dark gray	B-4		Fuel injector No. 4
E18	6	Dark gray	A-3		EGR valve
E19	1	★	B-3		Power steering oil pressure switch
E24	4	Black	C-3		Front oxygen (A/F) sensor LH
E25	4	Dark gray	B-4		Rear oxygen sensor LH
E28	3	Black	A-3		Intake manifold pressure sensor
E31	3	Black	B-1		Ignition coil No. 1
E32	3	Black	C-4		Ignition coil No. 2
E33	3	★	B-2		Ignition coil No. 3
E34	3	★	B-4		Ignition coil No. 4
E43	2	Dark gray	A-2		Fuel injector No. 5
E44	2	Dark gray	B-5		Fuel injector No. 6
E45	3	Black	B-2		Ignition coil No. 5
E46	3	Black	B-5		Ignition coil No. 6
E47	4	Black	B-2		Front oxygen (A/F) sensor RH
E48	2	Green	A-4		Knock sensor 2
E57	6	Black	A-3		Electronic throttle control
E61	4	Dark gray	B-3		Rear oxygen sensor RH
E67	2	Blue	B-1		Intake oil flow control solenoid valve RH
E68	2	Blue	C-4		Intake oil flow control solenoid valve LH
E69	2	Blue	A-2		Oil switching solenoid valve RH
E70	2	Blue	B-5		Oil switching solenoid valve LH
E71	1	★	A-3		Variable valve lift diagnosis oil pressure switch RH
E72	1	★	B-5		Variable valve lift diagnosis oil pressure switch LH
E73	3	Gray	A-2		Camshaft position sensor RH
E74	3	Gray	B-5		Camshaft position sensor LH
E75	2	Black	B-5		Oil temperature sensor
E76	10	Dark gray	A-3	E77	Engine wiring harness
E77	10	Gray	A-3	E76	
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
T3	12	★	D-2	B12	Bulkhead wiring harness
T4	20	Black	D-3	B11	
T7	12	★	D-3		Inhibitor switch
★: Non-colored					

Engine Wiring Harness and Transmission Cord



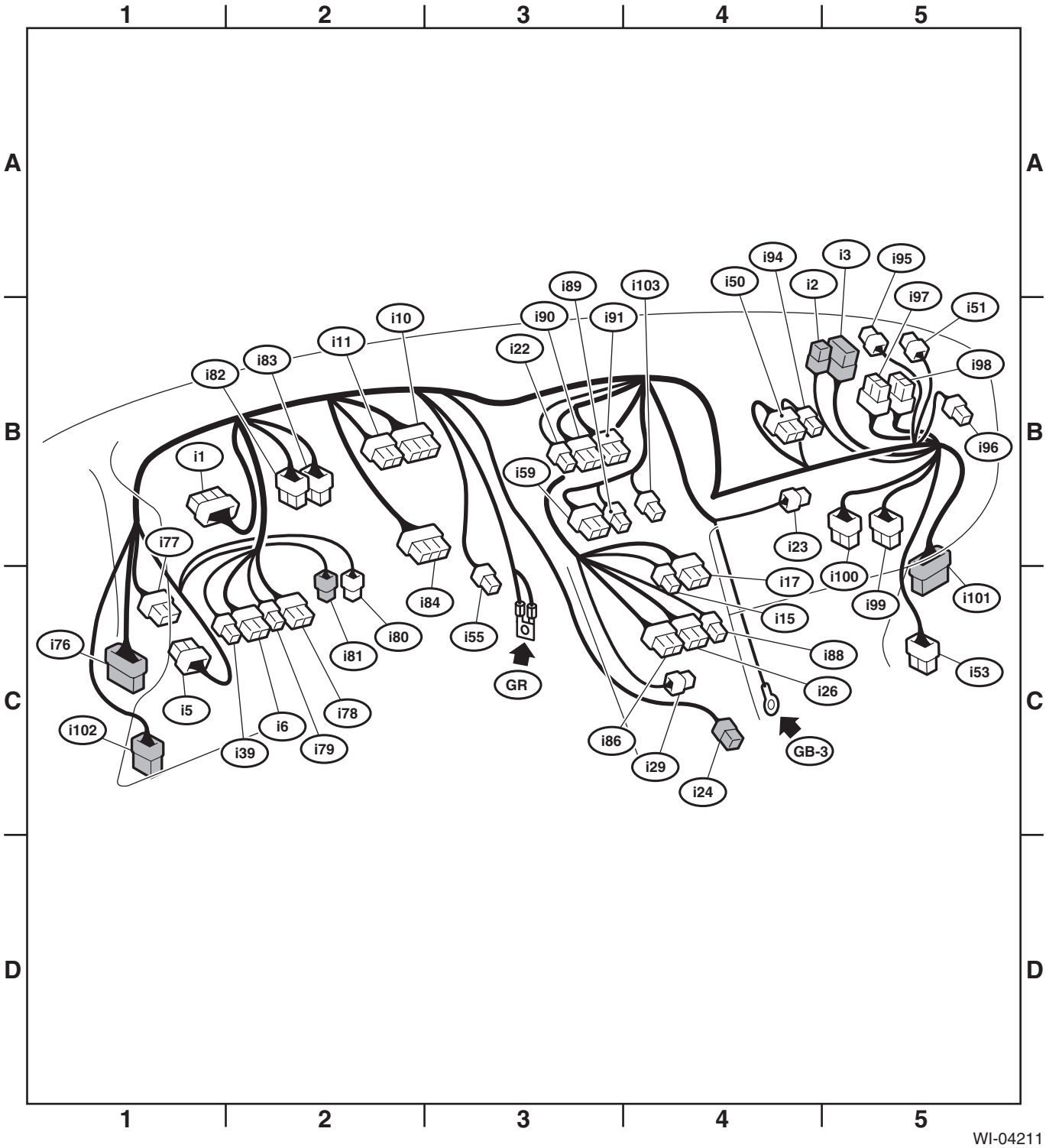
55.Instrument Panel Wiring Harness

A: LOCATION

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i1	28	★	B-1	B36	Bulkhead wiring harness
i2	8	★	B-4	B37	
i3	20	★	B-5	B38	
i5	20	★	C-1		Fuse & relay box (F/B)
i6	16	★	C-2		Mirror control switch
i10	22	Green	B-2		Combination meter
i11	14	Green	B-2		
i15	6	★	C-4		A/C control panel (Manual A/C)
i17	16	Black	C-4		
i22	4	★	B-3		Hazard switch
i23	2	★	B-4		Glove box illumination
i24	6	★	C-4		Front accessory power supply socket
i26	14	★	C-4		Audio
i29	1	Black	C-4		Audio bracket earth
i39	6	★	C-1		Headlight leveler switch
i50	10	★	B-4		Navigation System
i51	2	Black	B-5		Sun load sensor
i53	18	★	C-5	R98	Rear wiring harness
i55	2	★	C-3		In-vehicle sensor
i59	10	★	B-3		Clock
i76	28	★	C-1	D83	Front door cord LH
i77	12	Blue	C-1		CAN joint connector
i78	15	★	C-2		Push switch
i79	6	★	C-2		Illumination control switch
i80	1	★	C-2		Meter diagnosis connector
i81	1	★	C-2		
i82	12	★	B-2		Joint connector (Illumi, and backup)
i83	12	★	B-2		
i84	35	Gray	B-2		Body integrated unit
i86	20	★	C-4		Audio
i88	8	Black	C-4		A/C control panel (Auto A/C)
i89	2	★	B-3		Box light
i90	16	Black	B-3		TV monitor 1
i91	20	Black	B-3		TV monitor 2
i94	2	★	B-4		Distributor
i95	6	★	B-5		IE-BUS joint connector (Model with satellite switch)
i96	8	★	B-5		Keyless entry control module
i97	12	★	B-5		Joint ground connector
i98	12	★	B-5		
i99	12	★	B-5		Joint ground connector
i100	12	★	B-5		
i101	25	★	B-5	D84	Front door cord RH
i102	18	★	C-1	R167	Rear wiring harness
i103	4	★	B-4		TV monitor (For navigation system)
★: Non-colored					

Instrument Panel Wiring Harness



2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
i1	28	★	B-5	B36	Bulkhead wiring harness
i2	8	★	B-1	B37	
i3	20	★	B-1	B38	
i5	20	★	C-5		Fuse & relay box (F/B)
i6	16	★	C-4		Mirror control switch
i10	22	Green	B-4		Combination meter
i11	14	Green	B-4		
i15	6	★	C-2		A/C control panel (Manual A/C)
i17	16	Black	C-2		
i22	4	★	B-2		Hazard switch
i23	2	★	B-2		Glove box illumination
i24	6	★	C-2		Front accessory power supply socket
i26	14	★	C-2		Audio
i29	1	Black	C-2		Audio bracket earth
i39	6	★	C-4		Headlight leveler switch
i50	10	★	B-2		Navigation System
i51	2	Black	B-1		Sunload sensor
i53	18	★	C-5	R98	Rear wiring harness
i55	2	★	C-3		In-vehicle sensor
i59	10	★	B-3		Clock
i76	25	★	C-5	D83	Front door cord RH
	28	★			
i77	12	Blue	B-5		CAN joint connector
i78	15	★	C-4		Push switch
i79	6	★	C-4		Illumination control switch
i80	1	★	C-4		Meter diagnosis connector
i81	1	★	C-4		
i82	12	★	B-4		Joint connector (Illumi. and backup)
i83	12	★	B-4		
i84	35	Gray	B-3		Body integrated unit
i86	20	★	C-2		Audio
i88	8	Black	C-2		A/C control panel (Auto A/C)
i89	2	★	B-3		Box light
i90	16	Black	B-3		TV monitor 1
i91	20	Black	B-3		TV monitor 2
i95	6	★	B-1		IE-BUS joint connector (Model with satellite switch)
i96	8	★	B-1		Keyless entry control module
i97	12	★	B-1		Joint ground connector
i98	12	★	B-1		
i99	12	★	B-1		Joint ground connector
i100	12	★	B-1		
i101	25	★	C-1	D84	Front door cord LH
i102	18	★	C-1	R167	Rear wiring harness
i103	4	★	B-3		TV monitor (For navigation system)
★: Non-colored					

Instrument Panel Wiring Harness

56.Rear Wiring Harness

A: LOCATION

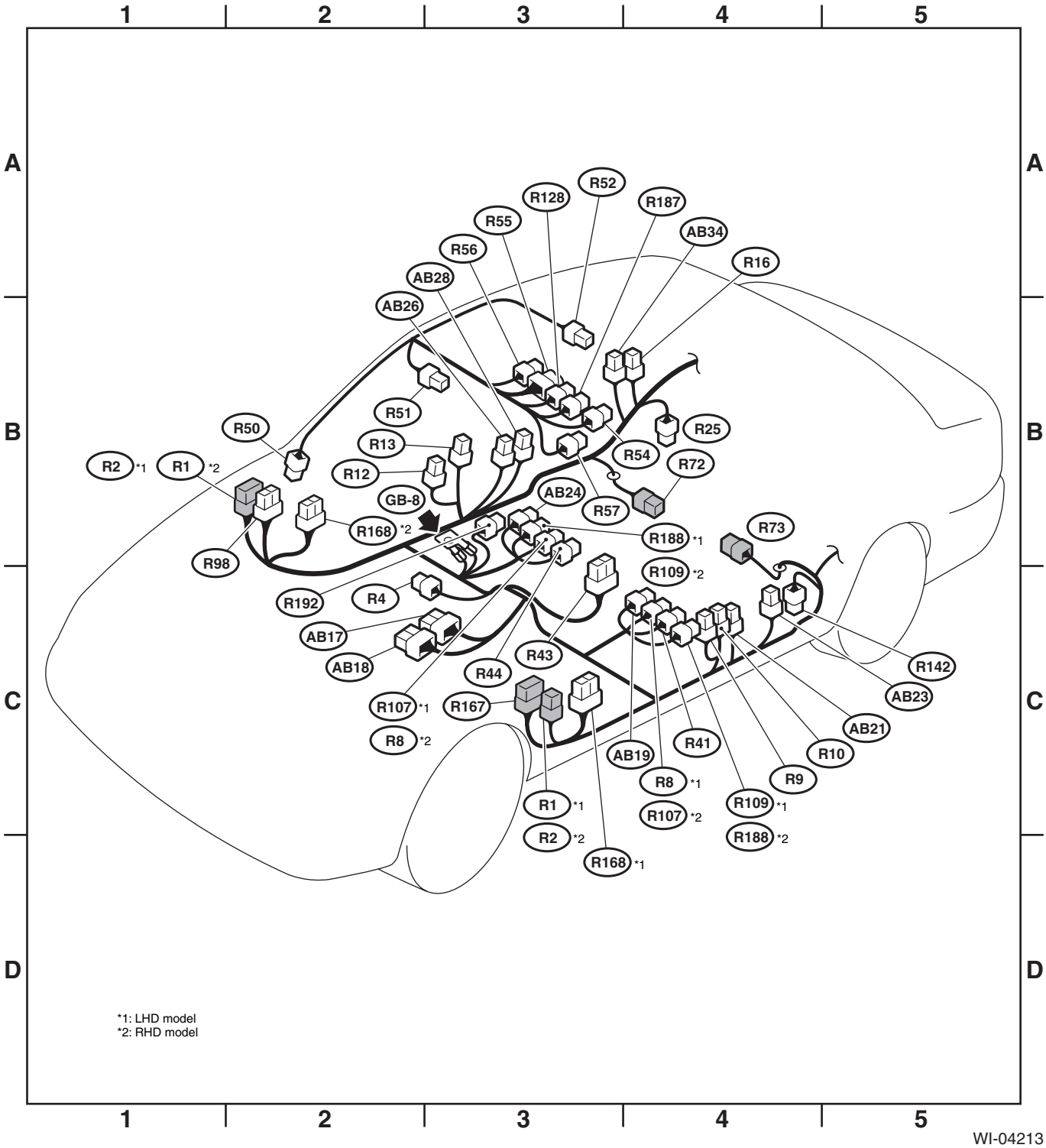
1. SEDAN MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R1	16	★	C-3	B97	Bulkhead wiring harness (LHD)
	20	★	B-2		Bulkhead wiring harness (RHD)
R2	16	★	B-2	B98	Bulkhead wiring harness (LHD)
	8	★	C-3		Bulkhead wiring harness (RHD)
R4	1	Black	C-3		Parking brake switch
R8	4	★	C-4		Front seat belt switch LHD (Driver's side)
			B-3		Front seat belt switch RHD (Driver's side)
R9	3	★	C-4		Front door switch LH
R10	8	★	C-4	D22	Rear door cord (Passenger's side)
R12	3	★	B-3		Front door switch RH
R13	8	★	B-3	D28	Rear door cord (Driver's side)
R16	3	★	B-4		Rear door switch RH
R25	2	Black	B-4		—
R41	4	★	C-4		Seat heater LH
R43	20	★	C-3		Seat heater switch
R44	4	★	B-3		Seat heater RH
R50	12	★	B-2	B90	Bulkhead wiring harness
R51	2	Black	B-3		Vanity mirror illumination RH
R52	3	★	B-3		Interior light
R54	2	Black	B-3		Vanity mirror illumination LH
R55	10	Gray	B-3		Sunroof control unit
R56	2	★	B-3		Spot map light
R57	3	★	B-3		Rear view mirror
R72	2	Black	B-4		Rear ABS wheel speed sensor RH
R73	2	Black	B-4		Rear ABS wheel speed sensor LH
R98	18	★	B-2	i53	Instrument panel wiring harness
R107	4	★	B-3		Front seat belt switch LHD (Passenger's side)
			C-4		Front seat belt switch RHD (Passenger's side)
R109	2	Black	C-4		Power seat LHD (Driver's side)
			B-3		Power seat RHD (Driver's side)
R128	5	★	B-3		Sunroof switch
R142	2	Black	C-4		Fuel pump condenser
R167	18	★	C-3	i102	Instrument panel wiring harness (LHD)
	16	★			Instrument panel wiring harness (RHD)
R168	20	★	C-3		Fuse & relay box (F/B) (LHD)
	20	★	B-2		Fuse & relay box (F/B) (RHD)
R187	5	★	B-3		Tilt switch
R188	2	Black	B-3		Power seat LHD (Passenger's side)
			C-4		Power seat RHD (Passenger's side)
R192	2	★	B-3		Seat buzzer

★: Non-colored

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB17	20	Yellow	C-3		Airbag control module LH (Model with side airbag, curtain airbag)
	12	Yellow			Airbag control module LH
AB18	20	Yellow	C-2		Airbag control module RH (Model with side airbag, curtain airbag)
	12	Yellow			Airbag control module RH
AB19	2	Yellow	C-4	AB20	Inflator (Side) LH
AB21	2	Yellow	C-4		Pretensioner LH
AB23	4	Yellow	C-4		Side airbag sensor LH
AB24	2	Yellow	B-3	AB25	Inflator (Side) RH
AB26	2	Yellow	B-3		Pretensioner RH
AB28	4	Yellow	B-3		Side airbag sensor RH
AB34	4	Yellow	B-3		Curtain airbag sensor RH
★: Non-colored					

Rear Wiring Harness



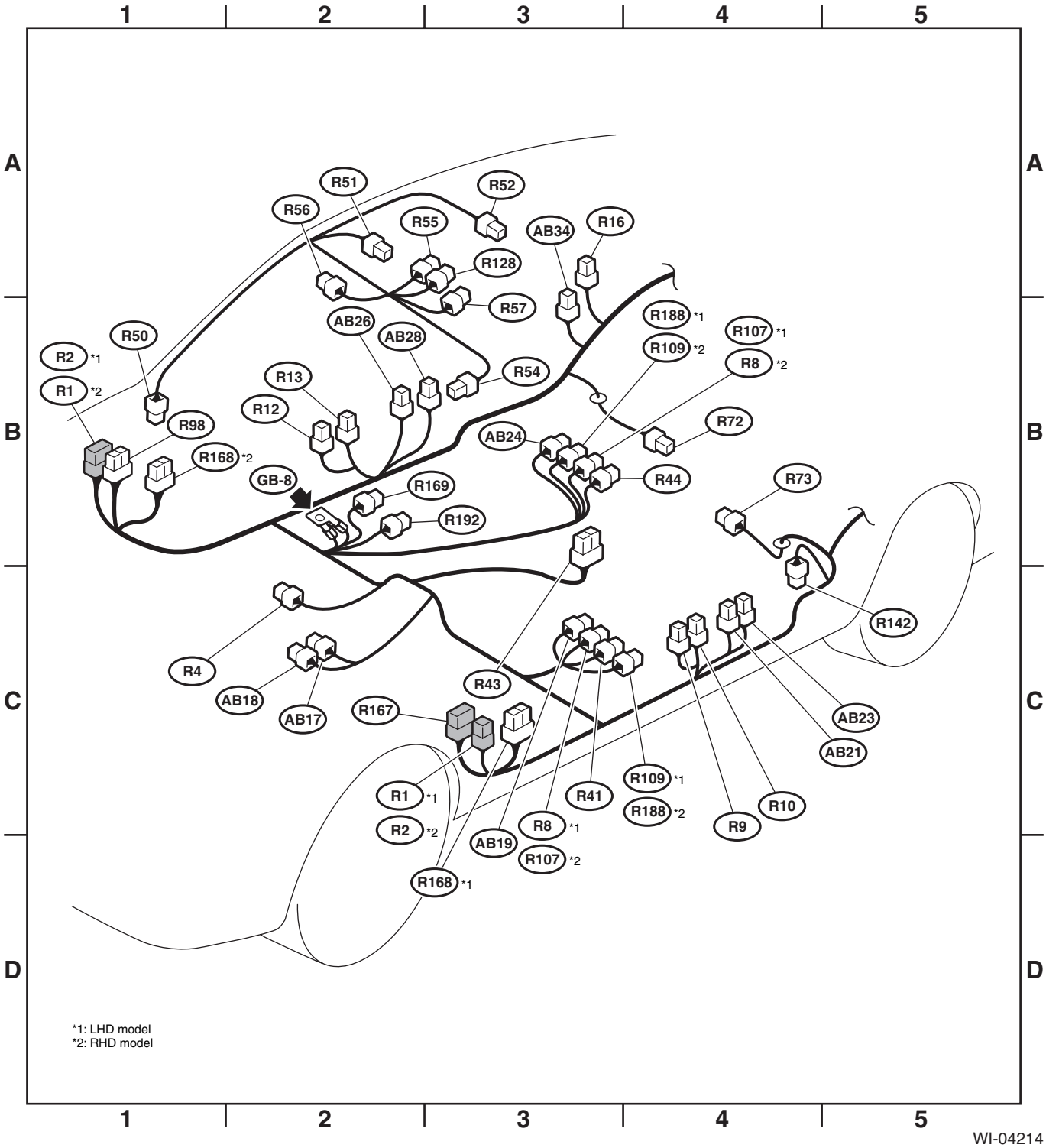
2. WAGON MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R1	16	★	C-3	B97	Bulkhead wiring harness (LHD)
	20	★	B-1		Bulkhead wiring harness (RHD)
R2	16	★	B-1	B98	Bulkhead wiring harness (LHD)
	8	★	C-3		Bulkhead wiring harness (RHD)
R4	1	★	C-2		Parking brake switch
R8	4	★	C-3		Front seat belt switch LHD (Driver's side)
			B-3		Front seat belt switch RHD (Driver's side)
R9	3	★	C-4		Front door switch LH
R10	8	★	C-4	D22	Rear door cord (Passenger's side)
R12	3	★	B-2		Front door switch RH
R13	8	★	B-2	D28	Rear door cord (Driver's side)
R16	3	★	A-3		Rear door switch RH
R41	4	★	C-3		Seat heater LH
R43	20	★	B-3		Seat heater switch
R44	4	★	B-3		Seat heater RH
R50	12	★	B-1	B90	Bulkhead wiring harness
R51	2	Black	A-2		Vanity mirror illumination RH
R52	3	★	A-3		Interior light
R54	2	Black	B-3		Vanity mirror illumination LH
R55	2	★	A-3		Sunroof control module
R56	2	★	A-2		Spot map light
R57	3	★	B-3		Rear view mirror
R72	2	Black	B-4		Rear ABS wheel speed sensor RH
R73	2	Black	B-4		Rear ABS wheel speed sensor LH
R98	18	★	B-1	i53	Instrument panel wiring harness
R107	4	★	B-3		Front seat belt switch LHD (Passenger's side)
			C-3		Front seat belt switch RHD (Passenger's side)
R109	2	Black	C-4		Power seat LHD (Driver's side)
			B-3		Power seat RHD (Driver's side)
R128	5	★	A-3		Sunroof switch
R142	2	Black	C-4		Fuel pump condenser
R167	18	★	C-3	i102	Instrument panel wiring harness (LHD)
	16	★			Instrument panel wiring harness (RHD)
R168	20	★	C-3		Fuse & relay box (F/B) (LHD)
	20	★	B-1		Fuse & relay box (F/B) (RHD)
R169	8	★	B-2		Impact sensor (EK model)
R188	2	Black	B-3		Power seat LHD (Passenger's side)
			C-4		Power seat RHD (Passenger's side)
R192	2	★	B-3		Seat buzzer
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB17	20	Yellow	C-2		Airbag control module LH (Model with side airbag, curtain airbag)
	12	Yellow			Airbag control module LH
AB18	20	Yellow	C-2		Airbag control module RH (Model with side airbag, curtain airbag)
	12	Yellow			Airbag control module RH

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB19	2	Yellow	C-3	AB20	Inflator (Side) LH
AB21	2	Yellow	C-4		Pretensioner LH
AB23	4	Yellow	C-4		Side airbag sensor LH
AB24	2	Yellow	B-3	AB25	Inflator (Side) RH
AB26	2	Yellow	B-2		Pretensioner RH
AB28	4	Yellow	B-3		Side airbag sensor RH
AB34	4	Yellow	B-3		Curtain airbag sensor RH
★: Non-colored					

Rear Wiring Harness



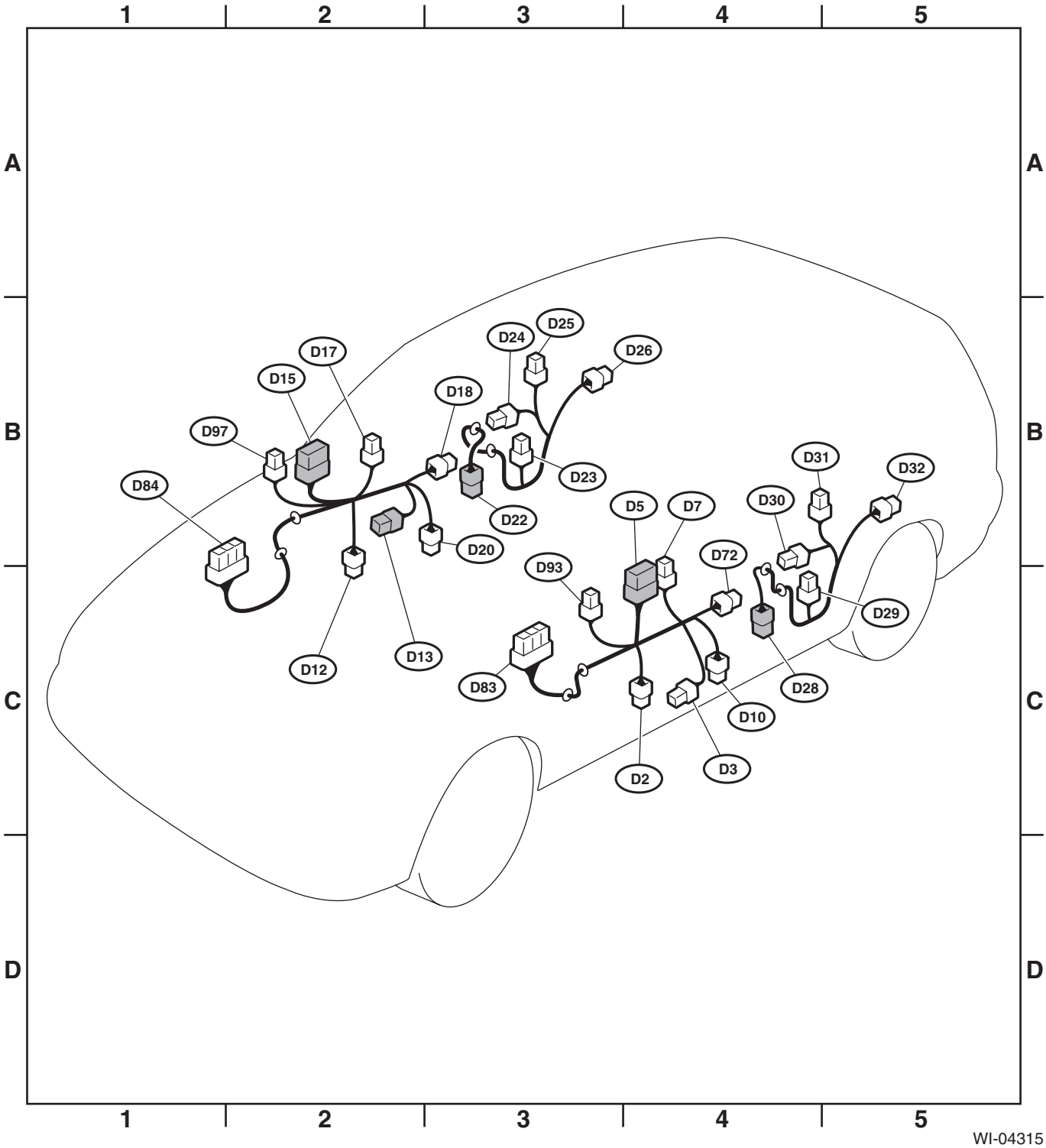
57.Door Cord

A: LOCATION

1. LHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D2	2	★	C-4		Front door speaker LH
D3	2	Gray	C-4		Front power window motor LH
D5	8	★	C-4		Remote controlled rearview mirror LH (Without mirror heater)
	10	★			Remote controlled rearview mirror LH (With mirror heater)
D7	14	★	C-4		Power window main switch
D10	2	★	C-4		Front step light LH
D12	2	★	B-2		Front door speaker RH
D13	2	Gray	B-2		Front power window motor RH
D15	8	★	B-2		Remote controlled rearview mirror RH (Without mirror heater)
	10	★			Remote controlled rearview mirror RH (With mirror heater)
D17	5	★	B-2		Front power window sub switch
D18	2	Gray	B-3		Front door lock actuator RH
D20	2	★	B-3		Front step light RH
D22	8	★	B-3	R10	Rear wiring harness
D23	2	Black	B-3		Rear door speaker RH
D24	2	Green	B-3		Rear power window motor RH
D25	5	★	B-3		Rear power window sub switch RH
D26	2	Gray	B-3		Rear door lock actuator RH
D28	8	★	C-4	R13	Rear wiring harness
D29	2	Black	C-4		Rear door speaker LH
D30	2	Green	B-4		Rear power window motor LH
D31	5	★	B-4		Rear power window sub switch LH
D32	2	Gray	B-5		Rear door lock actuator LH
D72	2	Gray	C-4		Front door lock actuator LH
D83	25	★	C-3	i76	Instrument panel wiring harness
D84	25	★	B-2	i101	
D93	2	★	C-3		Front door tweeter LH
D97	2	★	B-2		Front door tweeter RH
★: Non-colored					

Door Cord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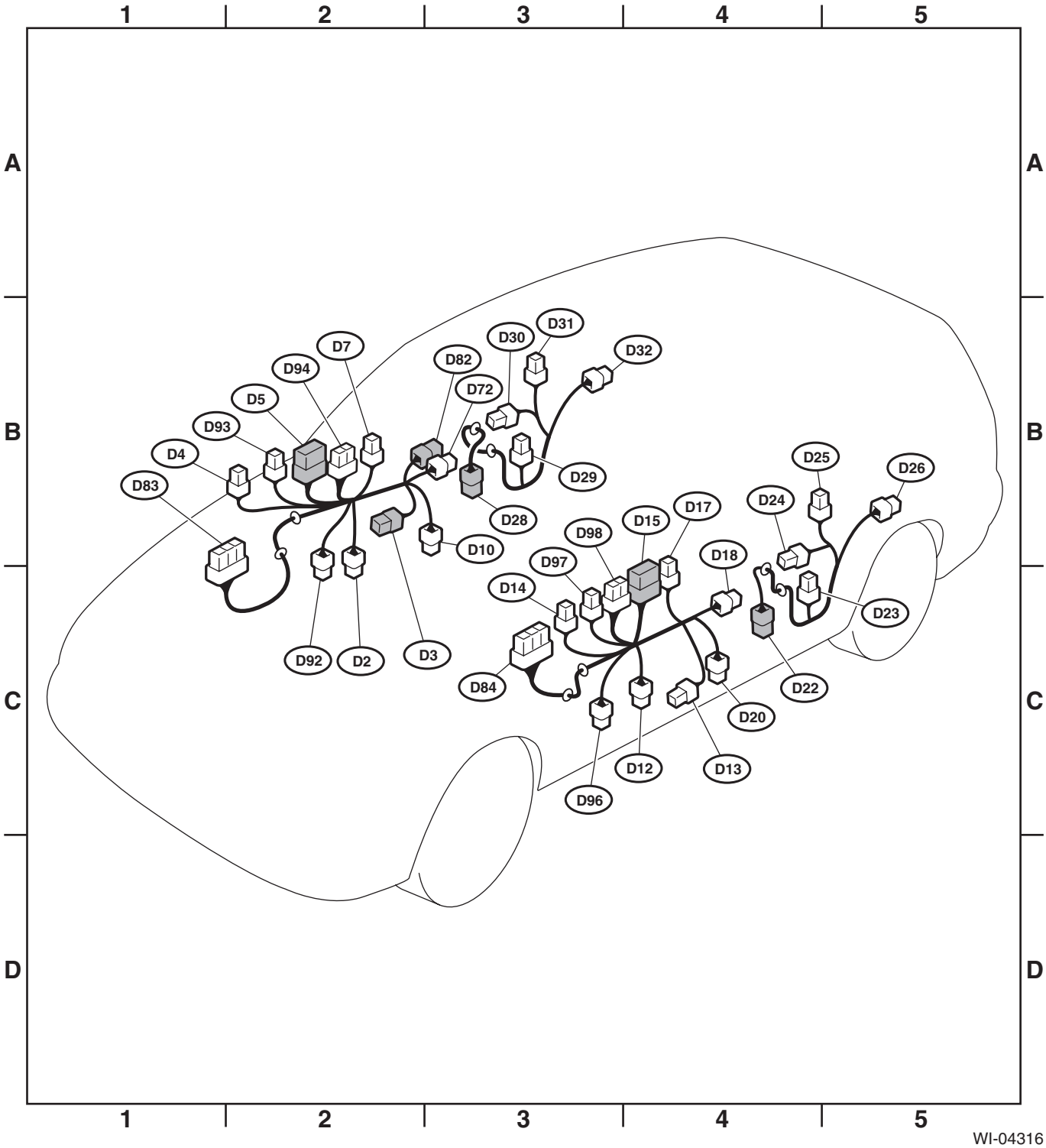
2. RHD MODEL

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D2	2	★	B-2		Front door speaker RH
D3	2	Gray	B-2		Front power window motor RH
D4	2	Gray	B-2		Front door tweeter (Gusset) RH
D5	8	★	B-2		Remote controlled rearview mirror RH (Without mirror heater)
	10	★			Remote controlled rearview mirror RH (With mirror heater)
D7	14	★	B-2		Power window main switch
D10	2	★	B-3		Front step light RH
D12	2	★	C-4		Front door speaker LH
D13	2	Gray	C-4		Front power window motor LH
D14	2	★	C-3		Front door tweeter (Gusset) LH
D15	8	★	C-4		Remote controlled rearview mirror LH (Without mirror heater)
	10	★			Remote controlled rearview mirror LH (With mirror heater)
D17	5	★	C-4		Front power window sub switch
D18	2	★	C-4		Front door lock actuator LH (Without double lock)
	6	★			Front door lock actuator LH (With double lock)
D20	2	★	C-4		Front step light LH
D22	8	★	C-4	R10	Rear wiring harness
D23	2	Black	C-4		Rear door speaker LH
D24	2	Green	B-4		Rear power window motor LH
D25	5	★	B-4		Rear power window sub switch LH
D26	2	★	B-5		Rear door lock actuator LH (Without double lock)
	6	★			Rear door lock actuator LH (With double lock)
D28	8	★	B-3	R13	Rear wiring harness
D29	2	Black	B-3		Rear door speaker RH
D30	2	Green	B-3		Rear power window motor RH
D31	5	★	B-3		Rear power window sub switch RH
D32	2	Gray	B-3		Rear door lock actuator RH (Without double lock)
	6	★			Rear door lock actuator RH (With double lock)
D72	2	Gray	B-3		Front door lock actuator RH (Without double lock)
	6	★			Front door lock actuator RH (With double lock)
D83	25	★	B-1	i76	Instrument panel wiring harness (Without double lock)
	28	★			Instrument panel wiring harness (With double lock)
D84	25	★	C-3	i101	Instrument panel wiring harness
D92	2	★	B-2		Front squawker RH
D93	2	★	B-2		Front door tweeter RH
D94	10	Green	B-2		Joint connector RH (Model with McIntosh)
D96	2	★	C-3		Front squawker LH
D97	2	★	C-3		Front door tweeter LH
D98	10	Green	C-3		Joint connector LH (Model with McIntosh)
★: Non-colored					

Door Cord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D82
D72
D30
D31
D32
D29
D28
D10
D3
D92
D2
D84
D98
D97
D14
D15
D17
D18
D12
D13
D96
D20
D22
D24
D25
D26
D23
WI-04316

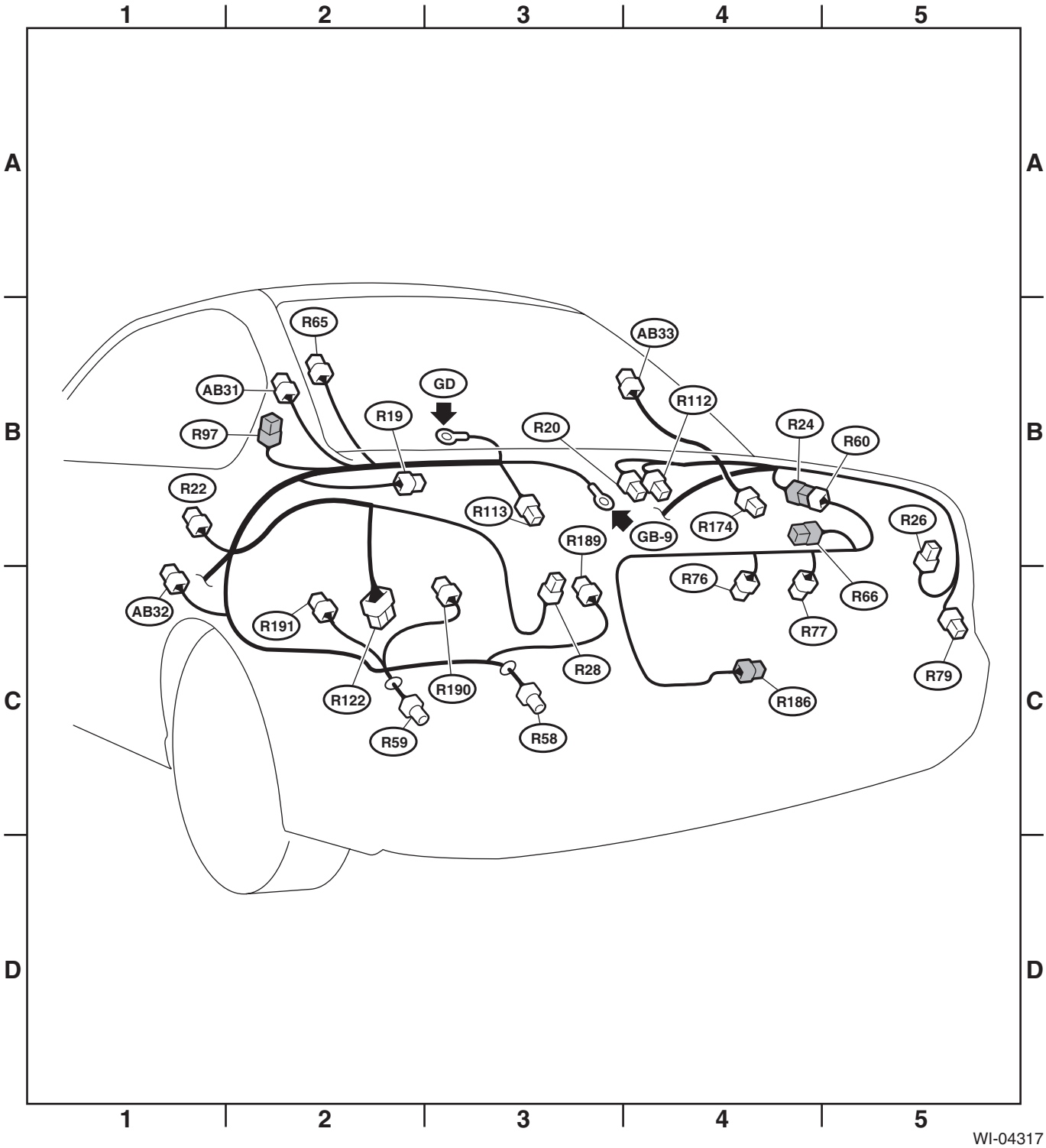
58.Rear Wiring Harness and Trunk Lid Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R19	2	★	B-2		High-mounted stop light (Sedan)
R20	2	★	B-4		Trunk room light
R22	3	★	B-1		Rear door switch LH
R24	8	★	B-4	R60	Trunk lid cord
R26	6	★	B-5		Rear combination light RH
R28	6	★	C-3		Rear combination light LH
R58	6	Gray	C-3		Fuel gauge main unit and fuel pump
R59	2	Gray	C-2		Fuel gauge sub unit
R60	8	★	B-4	R24	Rear wiring harness
R65	1	Black	B-2		Rear defogger
R66	2	★	B-4		High-mounted stop light (Rear spoiler)
R76	2	★	C-4		License plate light LH
R77	2	★	C-4		License plate light RH
R79	10	★	B-2		Trailer connector
R97	1	★	B-2		Antenna amplifier
R112	2	★	B-4		TV antenna amplifier RH
R113	2	★	B-3		TV antenna amplifier LH
R122	10	Black	C-2		Fuel pump control unit
R174	1	★	B-4		Rear defogger
R186	3	★	C-4		Trunk lock actuator
R189	2	★	C-3		Rear seat belt switch RH
R190	3	★	C-3		Rear seat belt switch center
R191	2	★	C-2		Rear seat belt switch LH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB31	2	Yellow	B-2	AB39	Inflator LH (Curtain)
AB32	4	Yellow	C-1		Curtain airbag sensor LH
AB33	2	Yellow	B-4	AB40	Inflator RH (Curtain)
★: Non-colored					

Rear Wiring Harness and Trunk Lid Cord



59.Rear Wiring Harness and Rear Gate Cord

A: LOCATION

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
R22	3	★	C-1		Rear door switch LH
R25	2	Black	C-3		—
R26	4	★	C-5		Rear combination light RH
R28	4	★	C-3		Rear combination light LH
R32	2	★	C-2		Luggage room power supply
R37	3	★	C-4	D33	Rear gate cord
R38	8	★	C-4	D34	
R39	10	★	C-4	D35	
R58	6	Gray	D-2		Fuel gauge main unit and fuel pump
R59	2	Gray	D-2		Fuel gauge sub unit
R79	10	★	C-2		Trailer connector
R97	1	★	C-2		Antenna amplifier
R112	2	★	C-3		TV antenna amplifier RH
R113	2	★	C-2		TV antenna amplifier LH
R122	10	Black	C-2		Fuel pump control unit
R189	2	★	C-2		Rear seat belt switch RH
R190	3	★	C-2		Rear seat belt switch center
R191	2	★	C-2		Rear seat belt switch LH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
D33	3	★	C-4	R37	Rear wiring harness
D34	8	★	C-4	R38	
D35	10	★	C-4	R39	
D37	3	★	B-3		Luggage room light
D39	2	★	B-3		High-mounted stop light
D43	4	★	B-4		Rear wiper motor
D44	2	★	A-5		License plate light
D46	2	Black	B-4		Rear gate latch switch
D47	2	Gray	A-5		Rear gate lock actuator
D48	1	Black	B-3		Rear defogger
D86	2	★	A-5		Rear fog light RH
D87	2	★	A-5		Back-up light RH
D89	1	★	B-4		Rear defogger
D90	2	★	A-4		Rear fog light LH
D91	2	★	A-4		Back-up light LH
★: Non-colored					

Connector				Connecting to	
No.	Pole	Color	Area	No.	Description
AB31	2	Yellow	C-2	AB39	Inflator LH (Curtain)
AB32	4	Yellow	C-1		Curtain airbag sensor LH
AB33	2	Yellow	C-3	AB40	Inflator RH (Curtain)
★: Non-colored					

Rear Wiring Harness and Rear Gate Cord